Franklin Templeton Dec 2023

Capital Market Expectations 2024 and Beyond

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About our capital market expectations

Using a 10 year
outlook, we review the expected returns and risk of investable asset classes

Equities | Fixed income
Currencies | Alternatives

Capital markets expectations are used to set the Strategic Asset Allocation, which forms the basis of our long-term strategic mix for portfolios and funds. Portfolio managers then tactically adjust.

Capital markets expectations summary

Our expectations over the next 10 years…

Expected returns for fixed income have become more attractive; recent volatility expected to subside

Global equity returns expected to revert to longer-term averages and outperform bonds

EAFE area equities look attractive

Emerging market equities expected to outperform developed market equities, but with additional volatility

A diversified & dynamic approach the most likely path to stable returns

Opinions expressed are those of Franklin Templeton Investment Solutions and subject to change without notice.

Our 2024 Capital Market Expectations (CMEs)

Our expectations over the next 10 years…

Asset class	Expected return	Volatility	Past 20 Year Annualized Return
Government of Canada Bonds	3.9%	5.2%	2.8%
Canadian Investment Grade Bonds	6.0%	6.4%	3.7%
Global Bonds Hedged	4.8%	5.0%	3.5%
Canadian Equities	7.2%	14.9%	8.0%
US Equities	7.4%	13.5%	9.8%
EAFE Equities	8.6%	13.4%	6.4%
Emerging Markets	8.6%	16.4%	7.7%
China	8.1%	23.8%	8.5%

Sources: FactSet, Bloomberg, Franklin Templeton Investments. Opinions expressed are those of Franklin Templeton Investment Solutions and subject to change without notice. **Returns in CAD unhedged.**

Long-term economic themes

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Growth

- Trend-growth
- Structural investment drivers: energy, supply chains, artificial intelligence
- Productivity to rise, but still “average”
- Demographics a slight headwind

Inflation

- Slightly higher than central bank targets
- Stickier services inflation
- More volatile goods inflation
- Deflationary forces of globalization and technology still exist

Policy

- Higher policy rates (r*)
- Central banks may tolerate *slightly* higher inflation
- No signs of fiscal austerity

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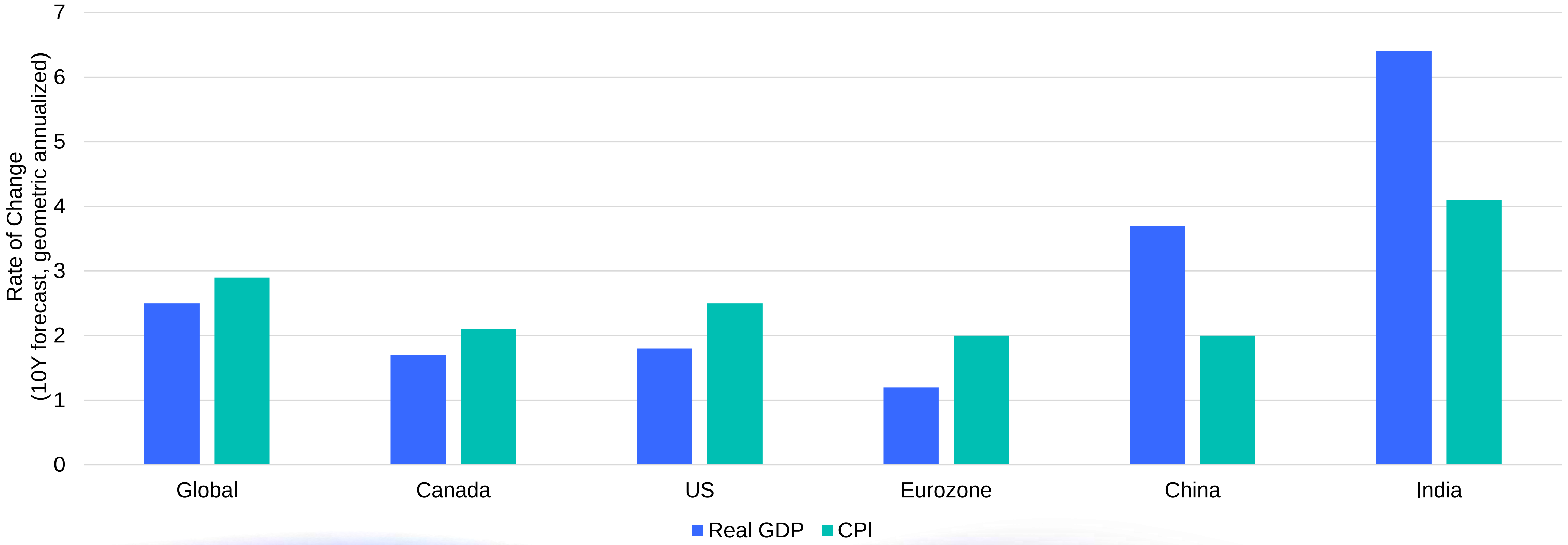
Macro assumptions

Growth steady as inflation assumed higher



Source: FTIS. As of September 30, 2023.

Policy and interest rate assumptions

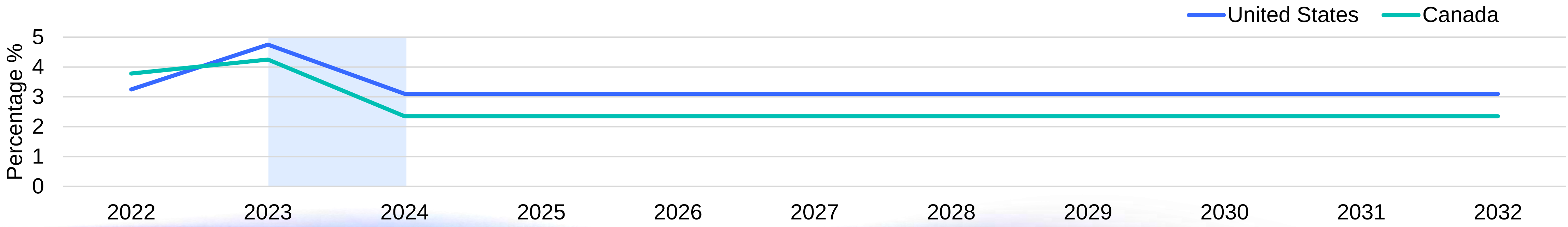
Influences views on fixed income

Canada Yield Assumptions	2023	2024	2025	2026	2027	2028
3M	5.1	4.4	3.0			
10Y	4.0	3.7	3.7			

Periods of stable rates assumed after 2025

US Yield Assumptions	2023	2024	2025	2026	2027	2028
3M	5.4	4.8	3.5			
10Y	4.6	4.3	4.3			

Short Rate Forecasts



Source: Bloomberg, FTIS Forecasts. As of September 30, 2023.

Equities: Returns are driven by earnings growth and yield

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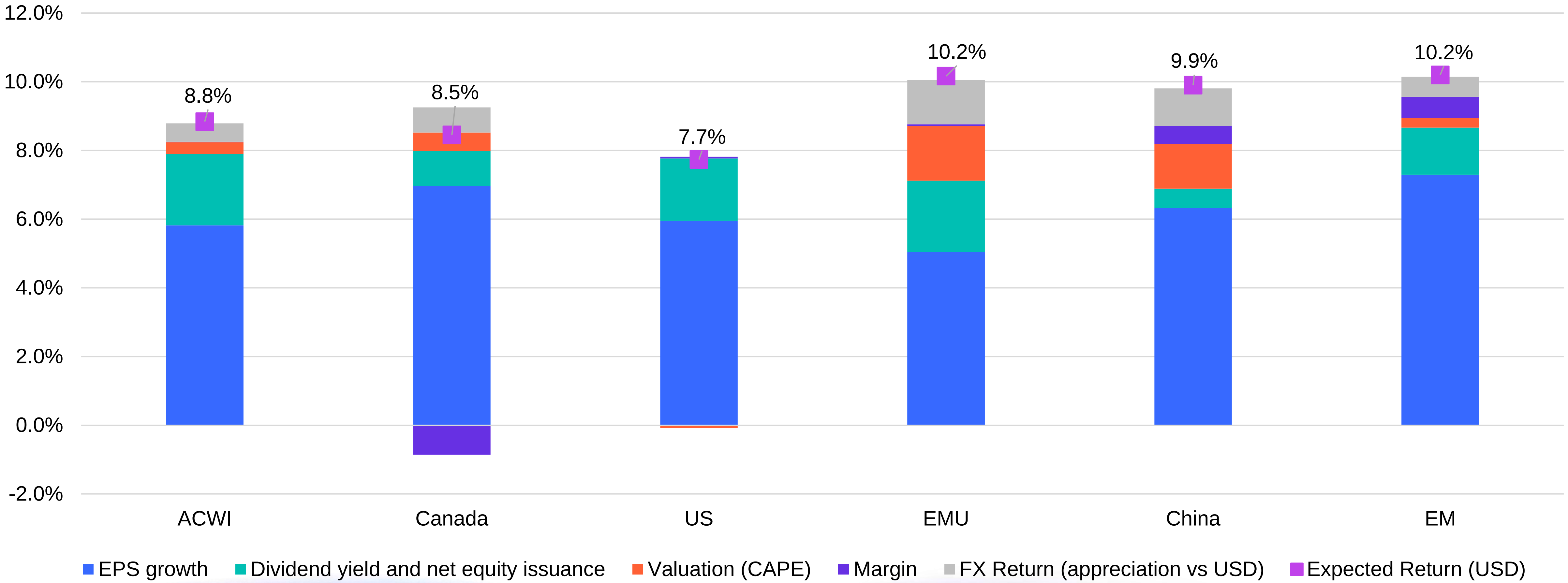
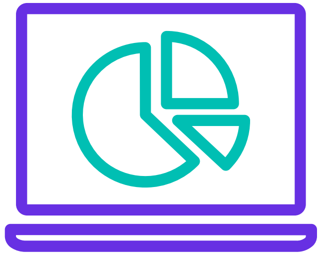
Building blocks model: Equity return decomposition



Source: Macrobond, Bloomberg. As of September 30, 2023.

About our capital market expectations



Using a 10 year outlook,
we review the expected returns
and risk of investable asset classes.
This year CMEs are generally higher than
last year. Primarily due to higher cash and
bond yields as a starting point.

Capital markets expectations are
used to set the Strategic Asset
Allocation, which forms the basis of
our long-term strategic mix for
portfolios and funds. Portfolio
managers then tactically adjust.

Primary investment themes
Current positioning

Broad portfolio themes

What is driving our outlook and portfolio positioning

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Theme #1

Recession risks moderating, but reasons for caution remain

Theme #2

Peak policy, but expect higher rates for longer

Theme #3

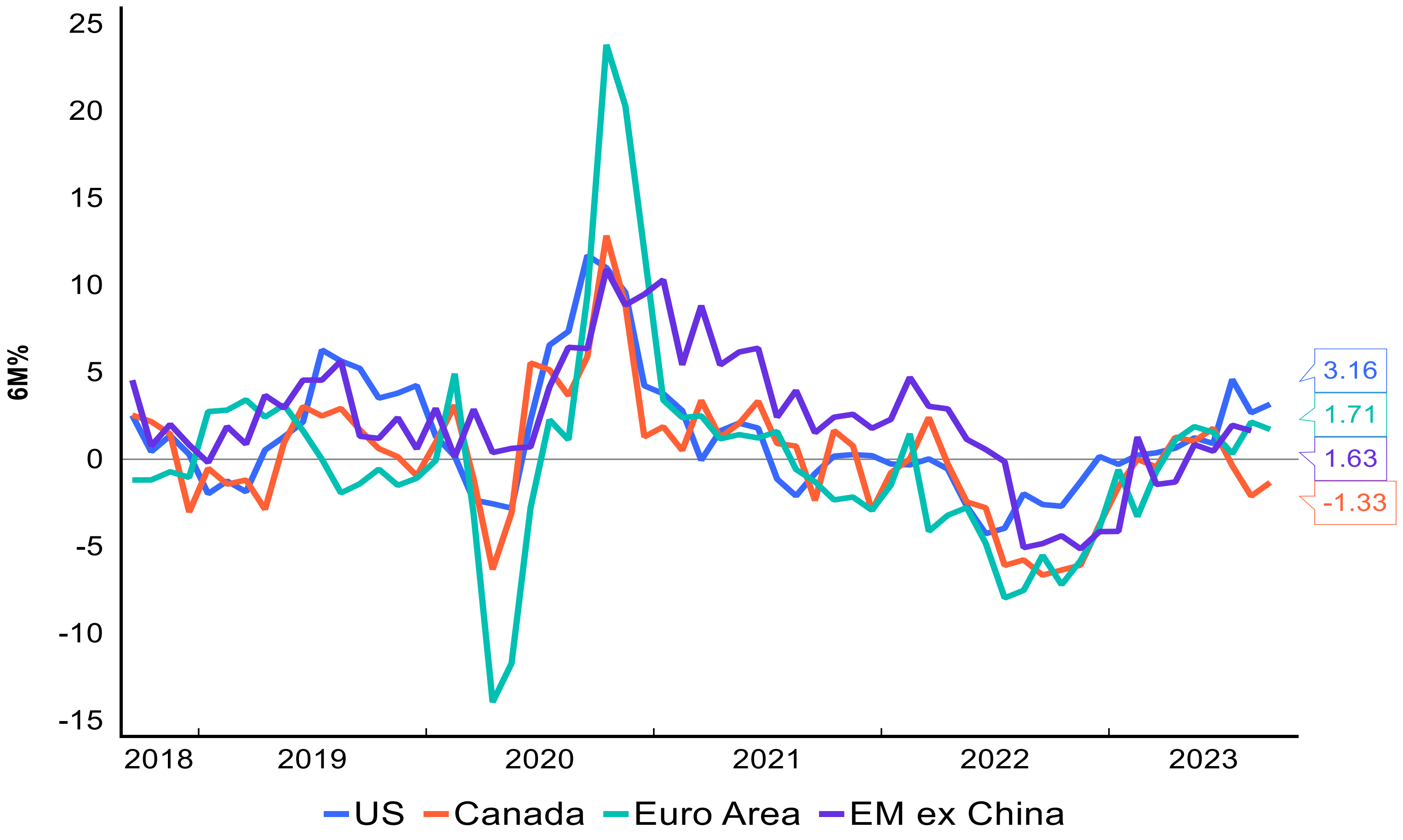
Among the risks, opportunities exist

Theme #1: Reasons to remain cautious

LEIs have recovered but remain mixed

ECRI Long Leading Indices

Data as of September 2023



Source: , Macrobond.
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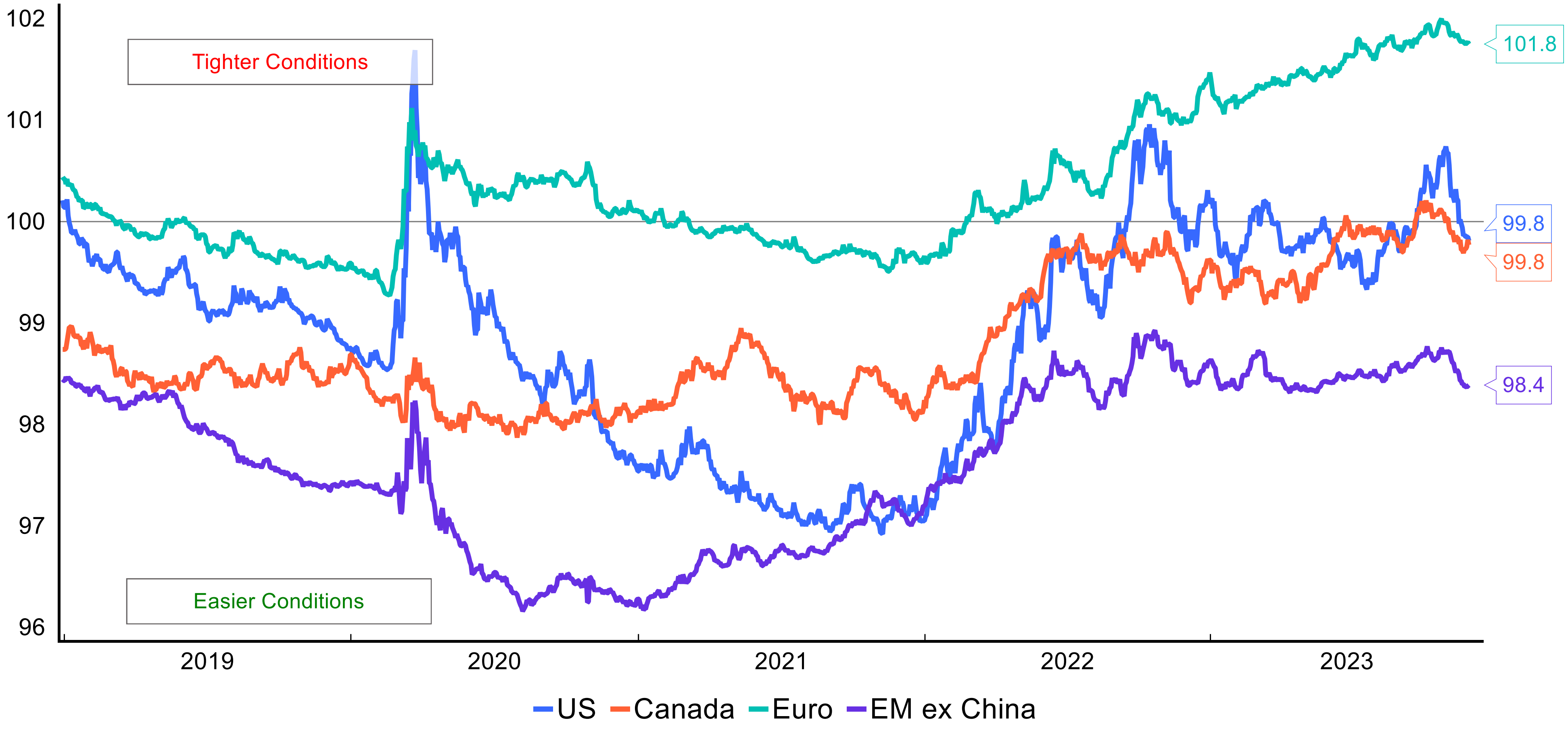
Theme #1: Reasons to remain cautious

Aggressive monetary policy has resulted in tighter financial conditions

Global Financial Conditions

Data as of 11/27/2023



Source: Bloomberg, Goldman Sachs, Macrobond.
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Theme #1: Reasons to remain cautious

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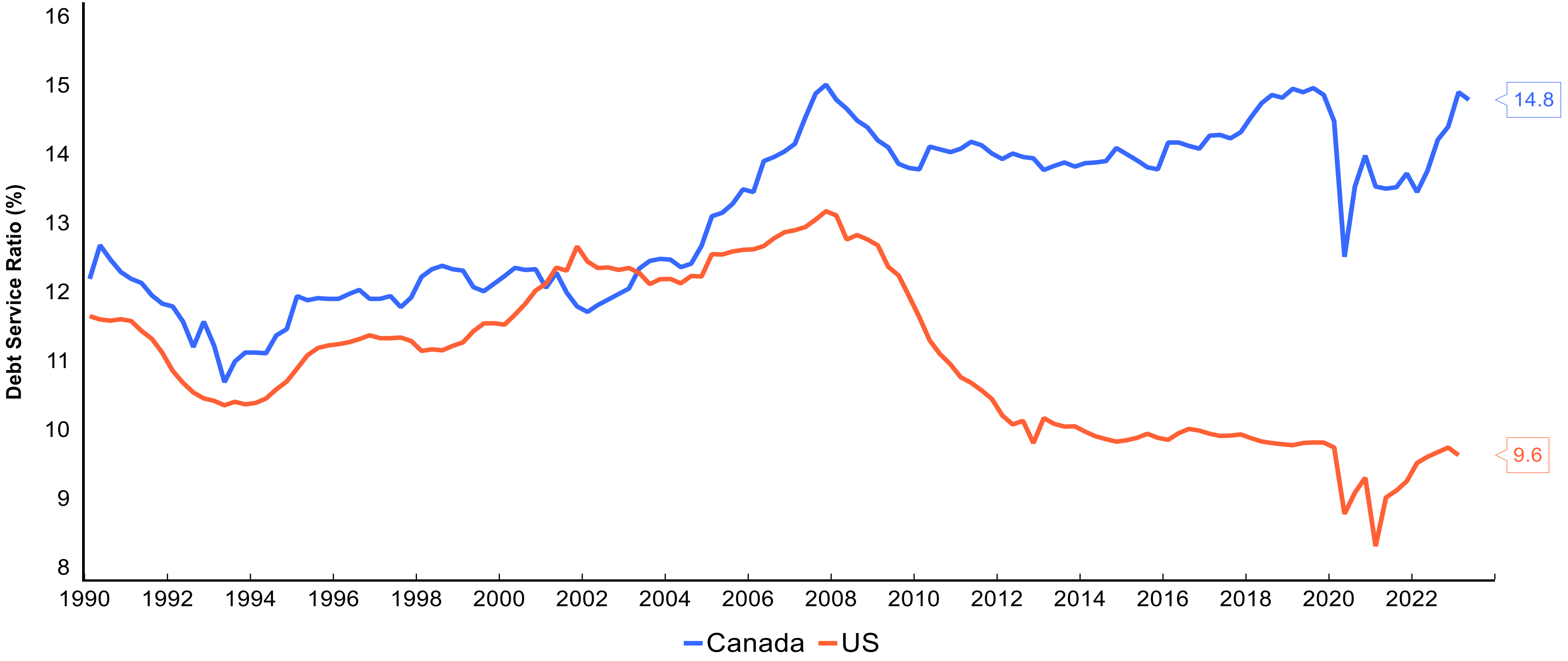
Canadian debt levels suggest more sensitivity to higher rates

Canada vs US: Household Debt Service Ratio Gap has grown significantly larger since 2008

Data as of 2023 Q2



Source: StatCan, Fed, Macrobond.
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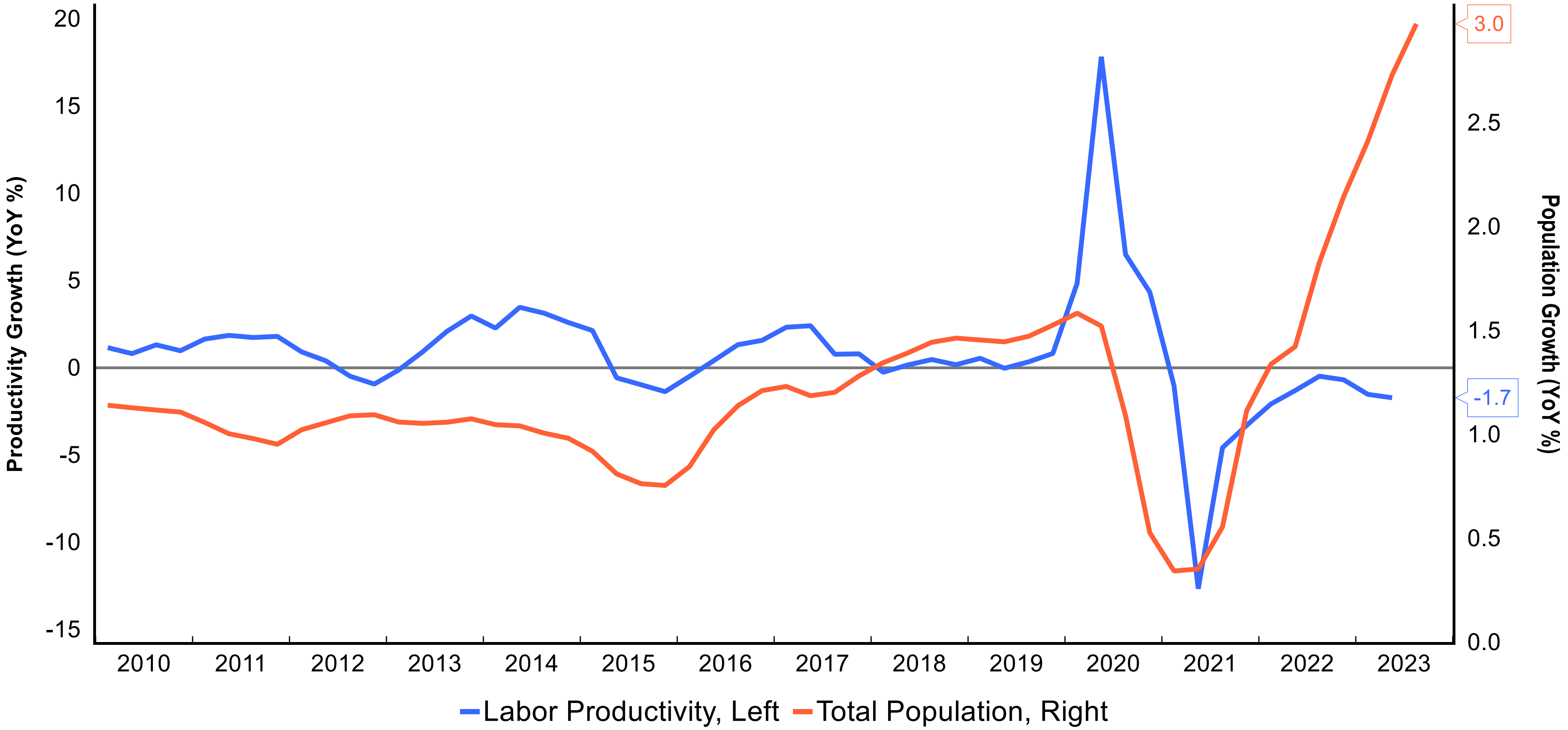
Theme #1: Reasons to remain cautious

Despite strong population growth, weakness in productivity remains a headwind

Canada: Record-level immigration flows are being offset by weak productivity growth

Data as of July 2023



Source: StatCan, Macrobond.
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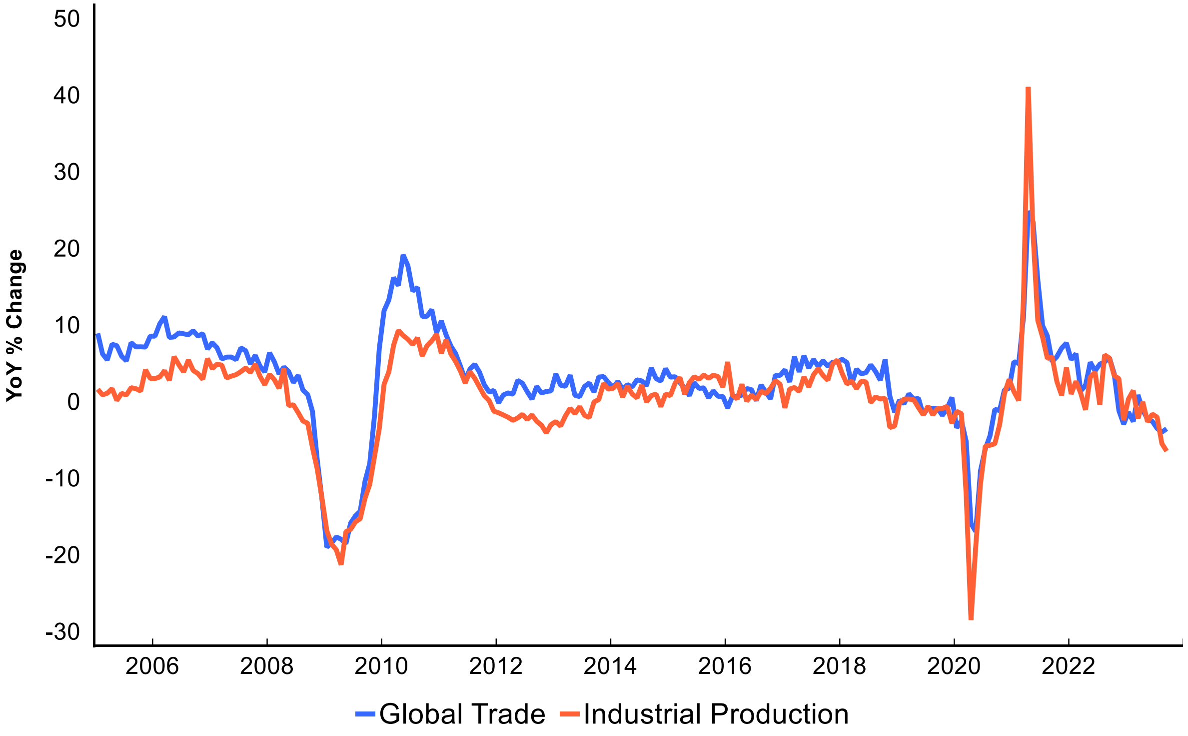
Theme #1: Reasons to remain cautious

European valuations attractive, but reflect weak economic data

Eurozone: Industrial Production vs Global Trade

Data as of September 2023



Source: CPB, Eurostat, Macrobond.
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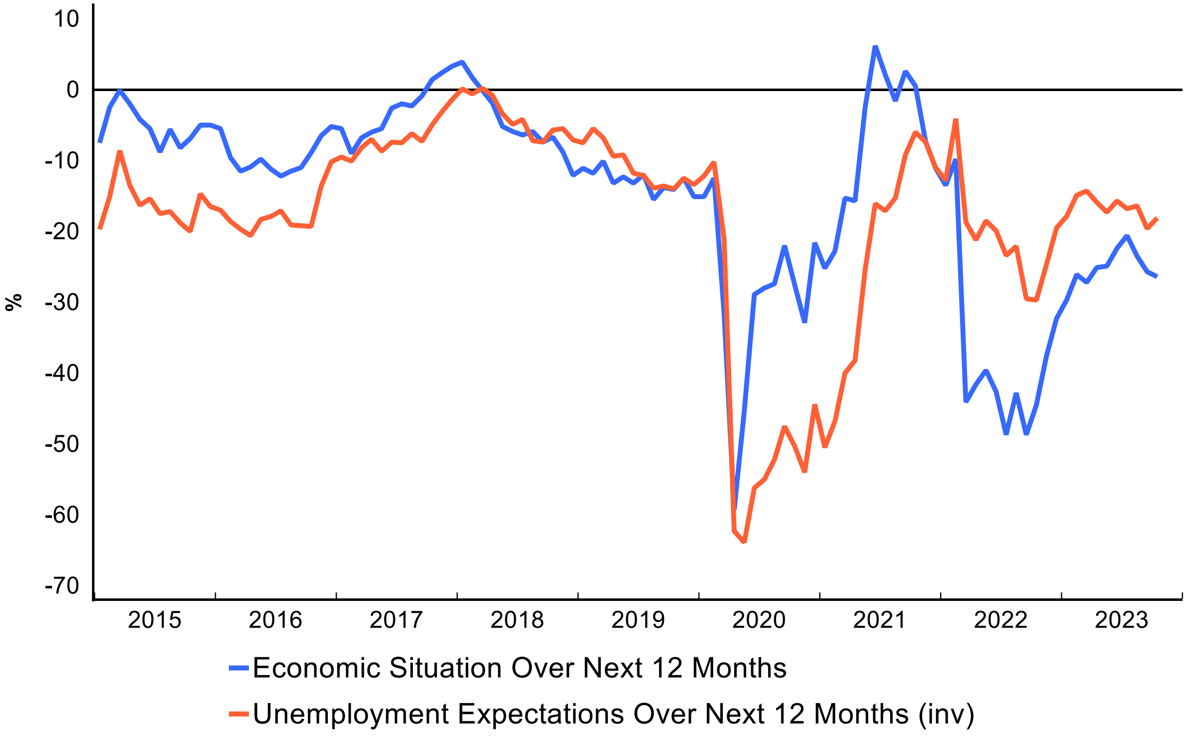
Eurozone: Consumer Sentiment

Data as of October 2023



Source: DG ECFIN, Macrobond.
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Broad portfolio themes

What is driving our outlook and portfolio positioning

Theme #1

Recession risks moderating, but reasons for caution remain

Theme #2

Peak policy, but expect higher rates for longer

Theme #3

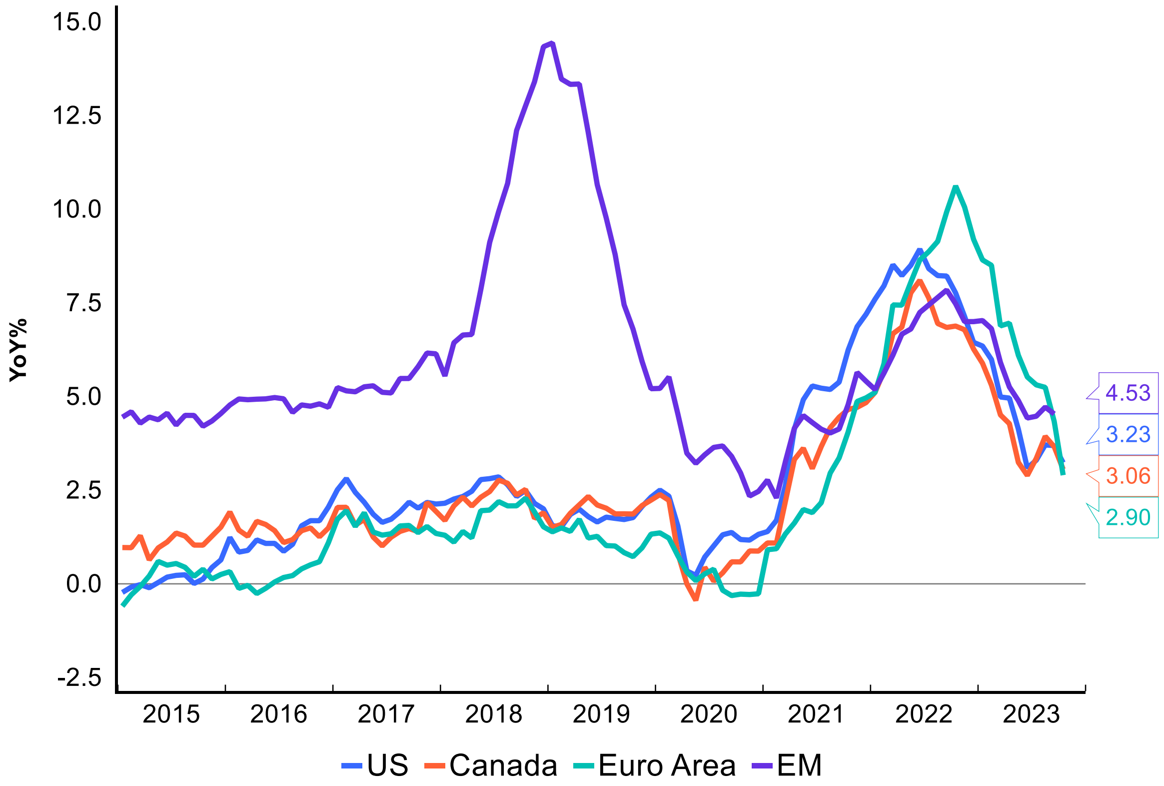
Among the risks, opportunities exist

Theme #2: Higher for longer

Inflation much improved but the last mile is the longest

CPI

Data as of October 2023



Source: BLS, StatCan, Eurostat, ONS, SBJ, ABS, NBS, Federal Reserve Bank of Dallas, Macrobond.
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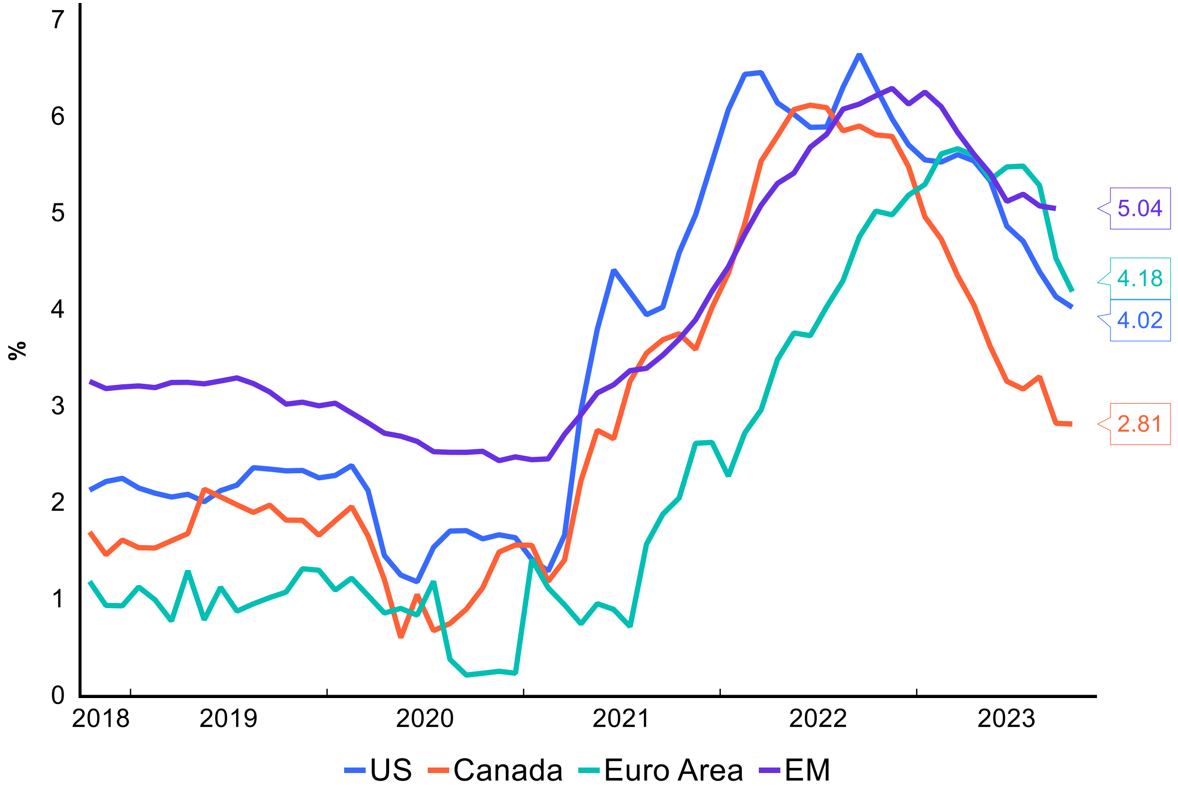
Core CPI

Data as of October 2023



Source: BLS, StatCan, Eurostat, ONS, SBJ, ABS, NBS, Federal Reserve Bank of Dallas, Macrobond.
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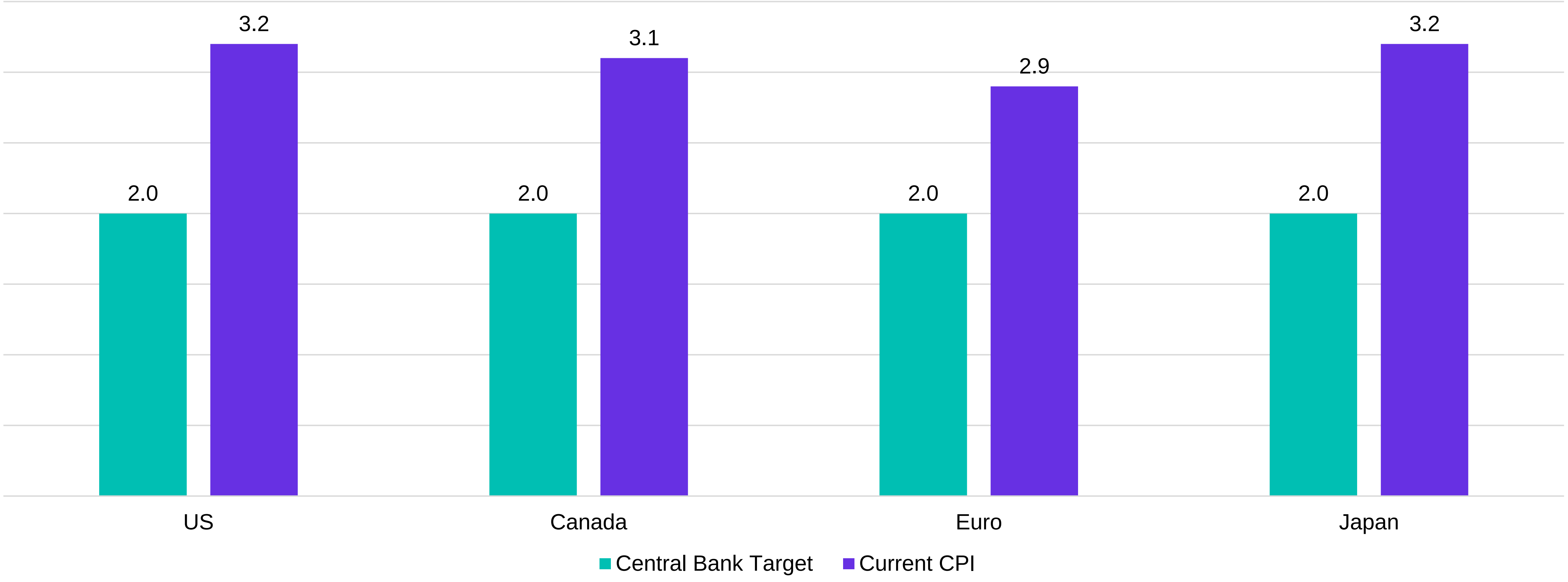
Note: For Canada, the target inflation rate in the chart represents the mid-value of the target inflation range. The current inflation rates pertain to: US – Headline CPI YoY; Canada- Total Consumer Price Index; Europe - Monetary Union Index of Consumer Prices, All Items; Japan - Core Consumer Prices Index;
Source:FTIS, Fed, BoC, ECB, BOJ, StatCan, Japanese Statistics Bureau, Ministry of Internal Affairs & Communications (Japan), BIS, Bloomberg, Macrobond.

Theme #2: Higher for longer

Inflation still above central bank targets

Current Inflation Rate vs Central Bank's Target (%)

As of November 28, 2023



Note: For Canada, the target inflation rate in the chart represents the mid-value of the target inflation range. The current inflation rates pertain to: US – Headline CPI YoY; Canada- Total Consumer Price Index; Europe - Monetary Union Index of Consumer Prices, All Items; Japan - Core Consumer Prices Index;

Source:FTIS, Fed, BoC, ECB, BOJ, StatCan, Japanese Statistics Bureau, Ministry of Internal Affairs & Communications (Japan), BIS, Bloomberg, Macrobond.

Broad portfolio themes

What is driving our outlook and portfolio positioning

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Theme #1

Recession risks moderating, but reasons for caution remain

Theme #2

Peak policy, but expect higher rates for longer

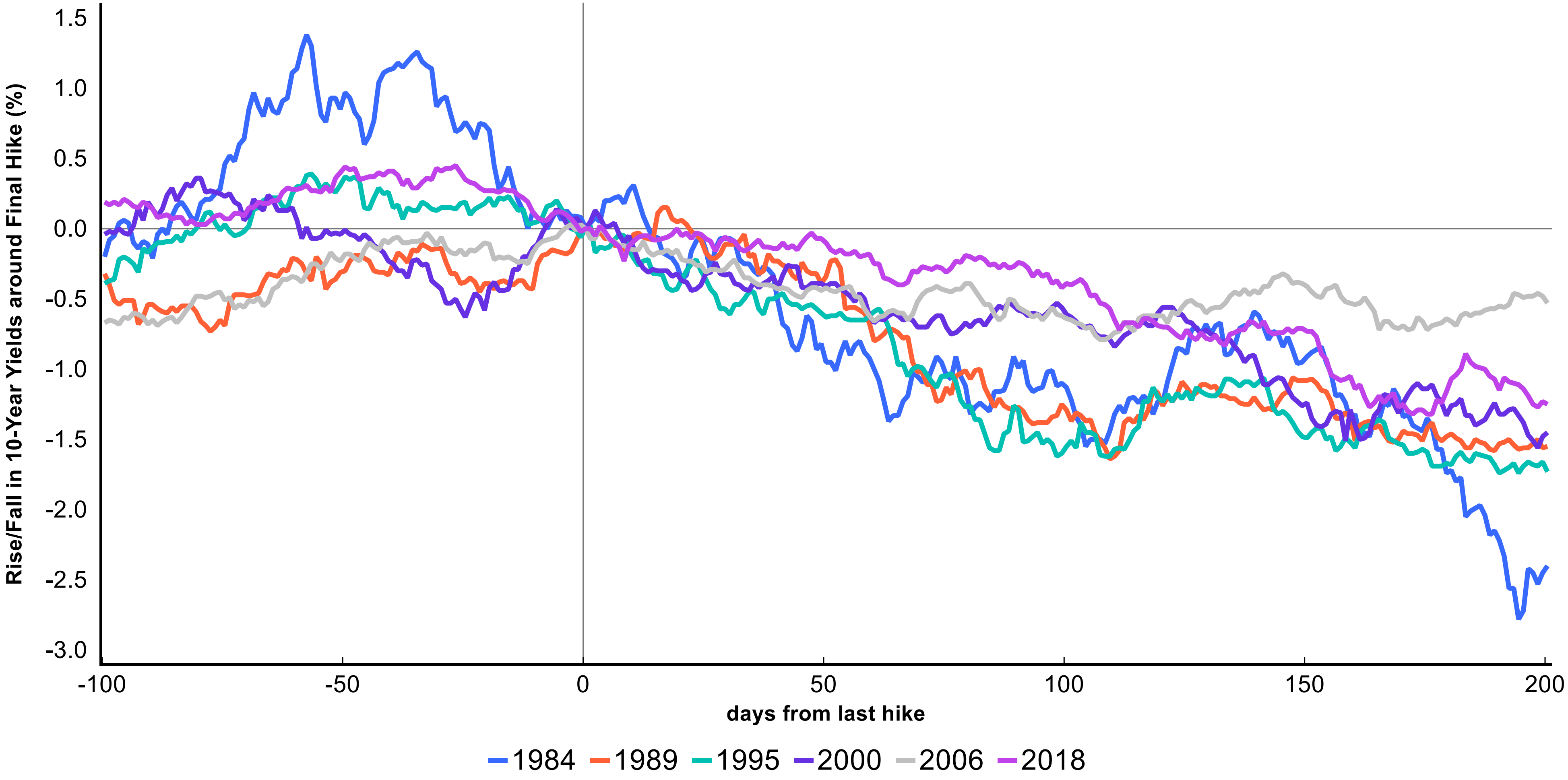
Theme #3

Among the risks, opportunities exist

Theme #3: Among the risks, opportunities exist

Government bonds tend to rally after last rate hike

Change in the US 10YR Yield from Last Rate Hike (%)



Source: U.S. Department of Treasury, Macrobond.
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Theme #3: Among the risks, opportunities exist

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Asymmetry of government bonds is attractive; being dynamic is key

Canadian 10YR Government Bond - Yield to Maturity (%)

Data as of 11/30/2023

Source: Macrobond.
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Scenario over one year

Assuming 3.60% starting yield on 10yr GoC

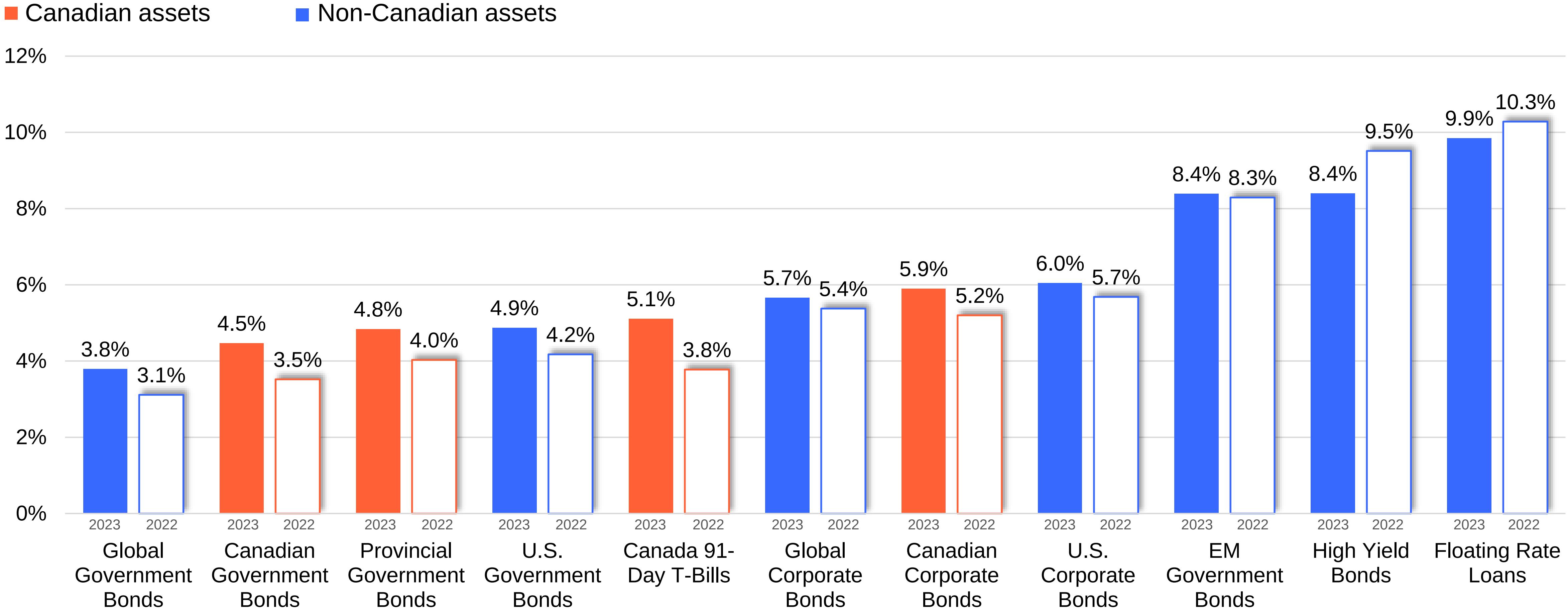
Target Horizon Yield	Total returns %
+50bps	-0.20
+25bps	+1.71
0bps	+3.60
-25bps	+5.62
-50bps	+7.61

Source: Bloomberg.
As of November 30, 2023

Theme #3: Among the risks, opportunities exist

Yields attractive, but risks remain elevated in higher yielding fixed income

Fixed Income Index Yields - Expanded opportunity set



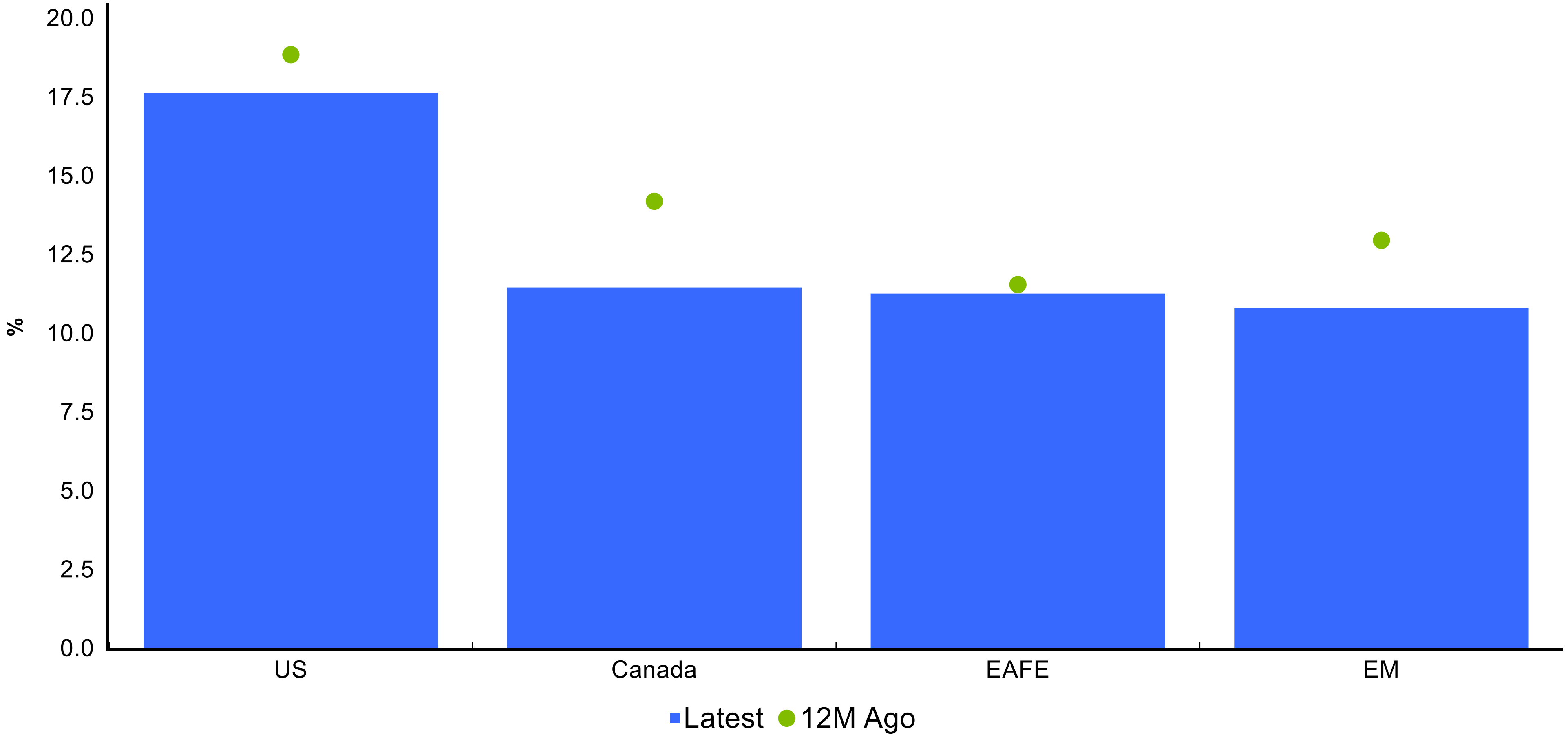
Data as of September 30, 2023.
Source: Franklin Templeton Investments, ICE BofA Indices, J.P. Morgan, S&P/TSX, Macrobond.

Theme #3: Among the risks, opportunities exist

Profitability is key metric and the US still leads

MSCI Indices: Return on Equity

Data as of November 2023



Source: Bloomberg, Macrobond.
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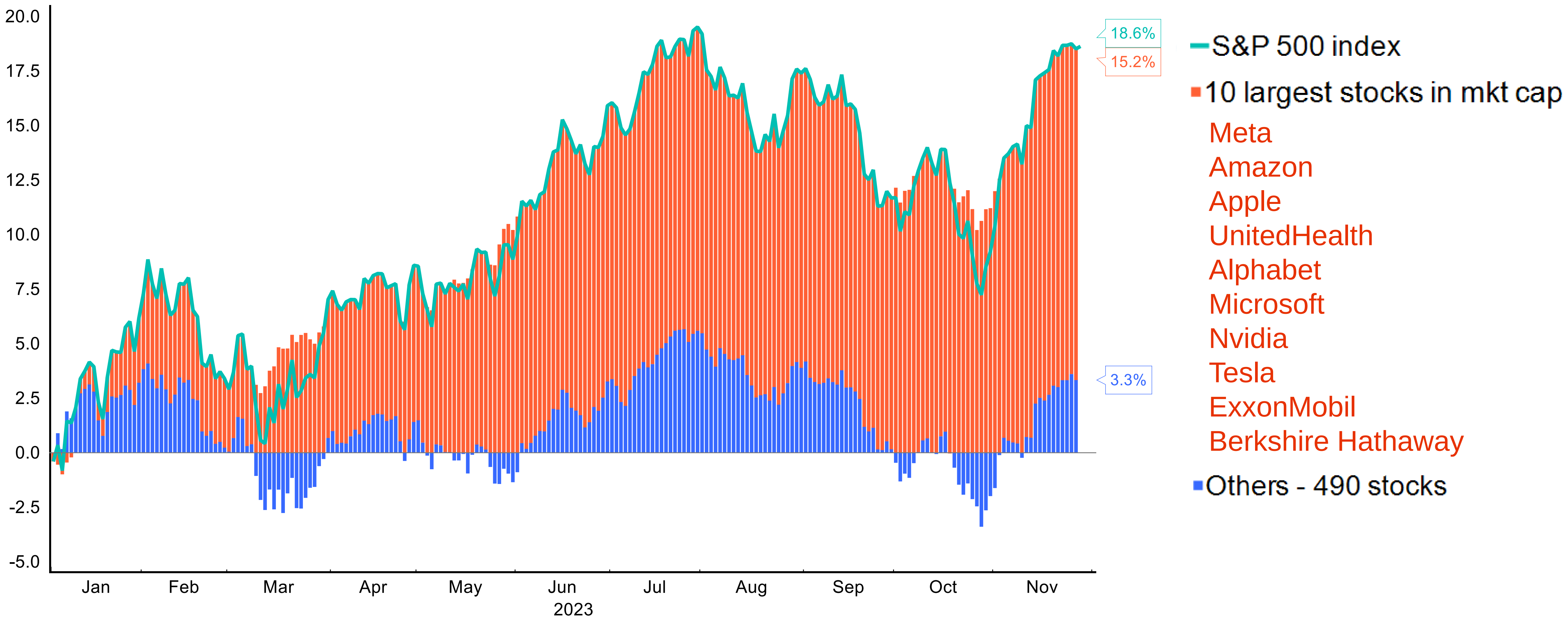
Theme #3: Among the risks, opportunities exist

Market breadth still narrow, but broadening

As of November 27, 2023



Source: S&P Global, Macrobond.
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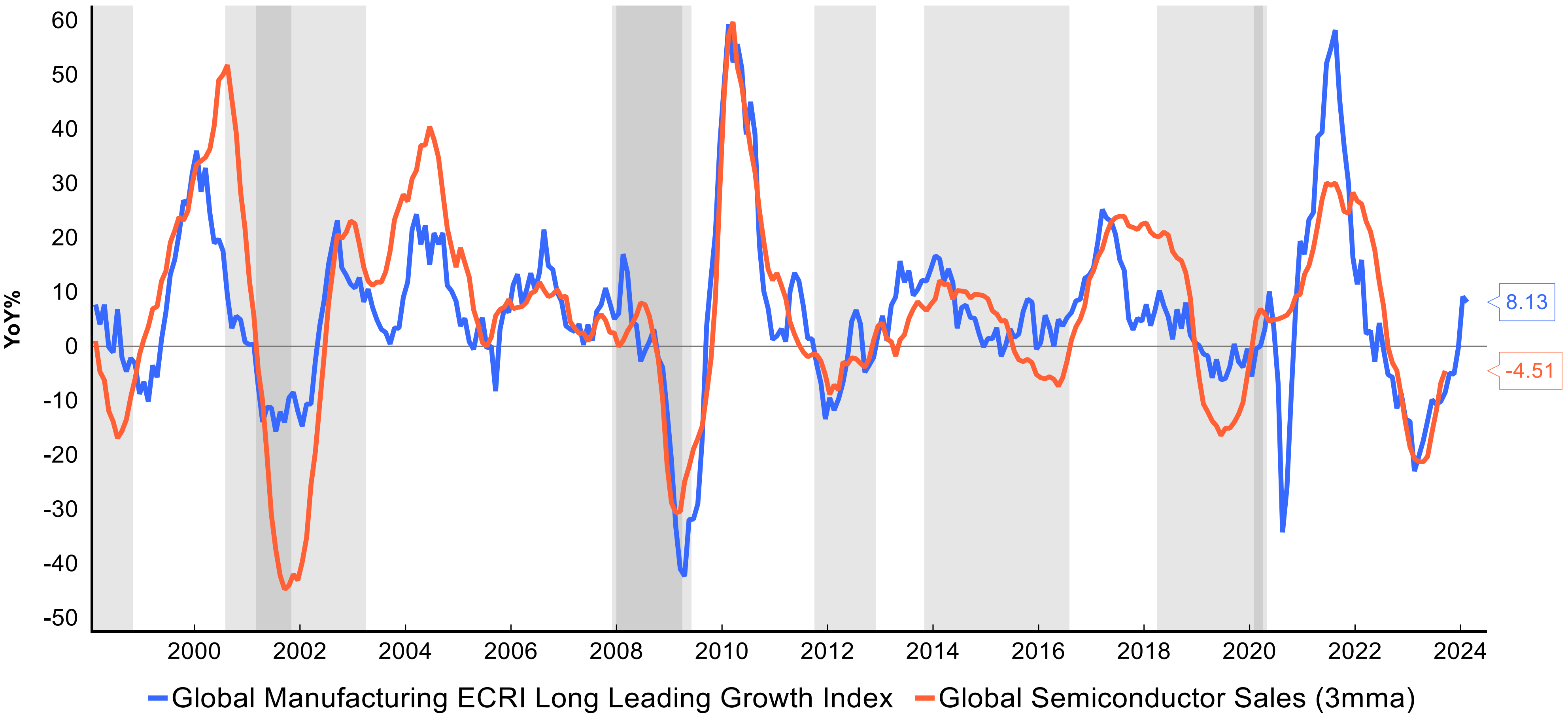
Theme #3: Among the risks, opportunities exist

EM: continued signs of a manufacturing uplift

Global Manufacturing and Semiconductor Cycles

Data as of September 2023



Source: SIA, Macrobond.
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Portfolio Positioning

Selectively adding to Equities; maintaining higher Cash balances

Overweight US equities and EM equities

Underweight Canada and Europe equities

Trimming duration and prefer higher quality corporates

Dynamic, active positioning

Source: FTIS. As of November 30, 2023.

Important Disclosures

What are the risks?

All investments involve risks, including possible loss of principal. Generally, investments offering potential for higher returns are accompanied by a higher degree of risk. The positioning of a specific portfolio may differ from the information presented herein due to various factors, including, but not limited to, allocations from the core portfolio and specific investment objectives, guidelines, strategy and restrictions of a portfolio. There is no assurance any forecast, projection or estimate will be realized. Stock prices fluctuate, sometimes rapidly and dramatically, due to factors affecting individual companies, particular industries or sectors, or general market conditions. Bonds and other debt obligations are affected by changes in interest rates, and the creditworthiness of their issuers. High-yield, lower-rated (junk) bonds generally have greater price swings and higher default risks. Special risks are associated with foreign investing, including currency fluctuations, economic instability and political developments; investments in emerging markets involve heightened risks related to the same factors. To the extent a portfolio is focused on particular countries, regions, industries, sectors or types of investment from time to time, they may be subject to greater risks of adverse developments in such areas of focus than portfolios that invests in a wider variety of countries, regions, industries, sectors or investments. Performance of a portfolio may vary significantly from the performance of an index, as a result of transactions costs, expenses and other factors.

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Blackrock Capital Market Assumptions May 2024

Refer to live excel chart filed separately.

Article, July 3, 3024 - This is the average return you should expect from Canadian blue-chip stocks

This is the average return you should expect from Canadian blue-chip stocks

ROB CARRICK > PERSONAL FINANCE COLUMNIST
PUBLISHED YESTERDAY

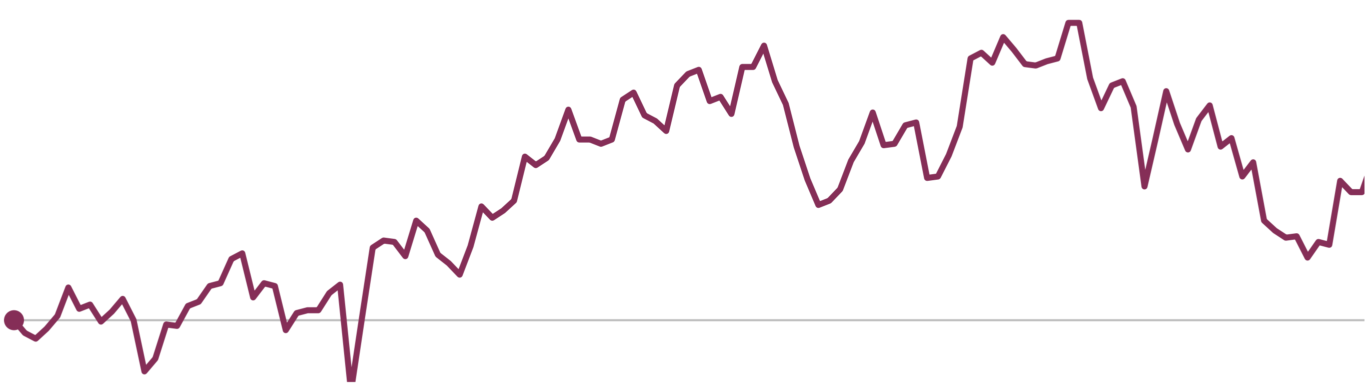
FOR SUBSCRIBERS

If you want to know what to expect from Canadian blue-chip stocks as a long-term investor, let one of the country's biggest, more battle-hardened ETFs be your guide.

The iShares S&P/TSX 60 Index ETF (XIU-T (/investing/markets/stocks/XIU-T/) +0.84% ▲) has been around in its current form since September, 1999, which means it has weathered the stock market tech wreck of 2000-01, the 2008-09 global financial crisis, the pandemic and sundry other setbacks. XIU has likewise seen multiple bull markets, including the one that helped it generate a gain of 17 per cent for the 12 months to May 31.

The average annual total return since inception for XIU is 7.6 per cent. If you invest in big Canadian companies, that's your benchmark for measuring returns over periods of 10 years and longer. We're talking here about share price gains plus dividends, which are an important driver of returns when you invest in blue chips.

ISHARES S&P TSX 60 INDEX ETF 33.14 +1.12 (3.50%)
YEAR TO DATE



DEC. 29, 2023 **JULY 2, 2024**
32.02 33.14

SOURCE: BARCHART

Comparing your portfolio returns to benchmarks is a useful exercise at any time, but more so now. Stocks have had a great run in the past 18 months and there's growing speculation about when and how the next pullback will take shape.

It's noteworthy that the 10-year annualized total return for XIU is 7.95 per cent, not far off the average annual return since inception in 1999. As it happens, the three-year return is 7.4 per cent. Though XIU has had a great 12 months, you can see a pattern of consistency in returns that fall in the mid 7 per cent range.

XIU's past returns offer some guidance on the downside for Canadian blue chips as well as gains. The fund lost 6.4 per cent in 2022, 7.7 per cent in 2018, 7.9 per cent in 2015, 9.3 per cent in 2011 and a disturbing 31 per cent in 2008. Looking ahead, let XIU be your guide to what normal and extreme corrections mean for holders of blue-chip stocks.

There's about $12-billion invested in XIU, most of it from institutional investors that value it for its liquidity. You can jump in and out of this fund at very competitive prices thanks to its exceptionally high trading volume. An average 2.6 million shares of XIU traded hands in the past 30 days, which is massive volume by ETF standards.

The 60 Index is made up of the country's biggest, most widely held stocks. Most pay dividends, but some are growth-oriented companies that do not. Portfolio-wide, the dividend yield on XIU was about 3.1 per cent in late June. If you have a diversified portfolio of blue chips, there's another benchmark to use.

One final note on the XIU is about fees. The management expense ratio of this fund is 0.18 per cent, which is comparatively pricey for retail investors who plan to buy and hold, rather than trade. XIU's stablemate, the more diversified iShares Core S&P/TSX Capped Composite Index ETF (XIC-T (/investing/markets/stocks/XIC-T/) +0.80% ▲) has an MER of 0.06 per cent, similar to some other comparable funds.

XIU isn't the cheapest fund tracking the Canadian market, but it is the oldest. That's why it makes such a useful benchmark.

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Fernandez MRPs for 96 Countries in 2024 – March 2024

Survey: Market Risk Premium and Risk-Free Rate used for 96 countries in 2024

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ABSTRACT

This paper contains the statistics of a survey about the Risk-Free Rate (**R$_F$**) and the Market Risk Premium (**MRP**) used in 2024 for **96 countries**. We got answers for 104 countries, but we only report the results for 96 countries with more than 6 answers.

The paper also contains the links to previous years surveys, from 2008 to 2023.

JEL Classification: G12, G31, M21

Keywords: equity premium; required equity premium; expected equity premium; risk-free rate

March 11, 2024

xPpLmnlsj

1. Market Risk Premium (MRP), Risk Free Rate (RF) and Km [RF + MRP] used in 2024 in 96 countries

We sent a short email (see exhibit 1) in February, 2024 to more than 14,000 email addresses of finance and economics professors, analysts and managers of companies obtained from previous correspondence, papers and webs of companies and universities. We asked about the Risk-Free Rate (**RF**) and the Market Risk Premium (**MRP**) **used *"to calculate the required return to equity in different countries"***.

By March 9, 2024, we had received 1,634 emails. 134 persons answered that they do not use MRP (see table 1), most of them use Km (required return to equity) but do not use MRP nor RF. The remaining emails had specific Risk-Free Rates and MRPs used in 2024 for one or more countries.[1] We would like to sincerely thank everyone who took the time to answer us.

Table 1. MRP and RF used in 2022: 1,624 emails

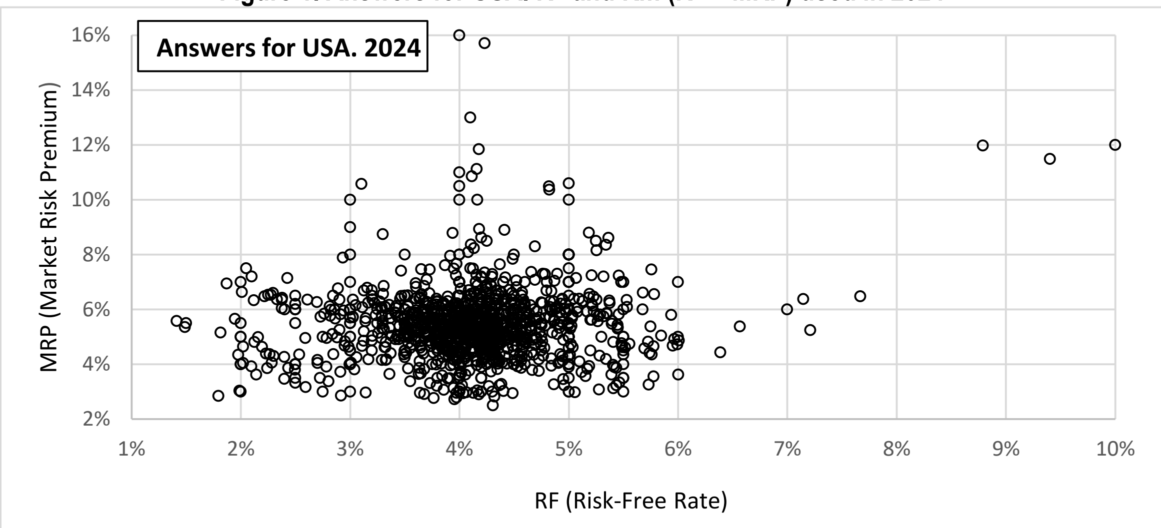
	Total
Answers reported (MRP figures)	**4,064**
Answers for countries with less than 6 answera	**22**
Outliers	**42**
"I can't provide you those figures: now are confidential"	**61**
Only MRP or RF (not both)	**34**
"We do not use MRP"	**134**

Table 2 contains the statistics of the **MRP** used in 2024 **for 96 countries**. We got answers for 102 countries, but we only report the results for 96 countries with more than 6 answers.

Table 3 contains the statistics of the Risk-Free Rate (**RF**) used in 2024 in the 96 countries[2] and **Table 4** contains the average of **Km** (required return to equity: Km = Risk-Free Rate + MRP).

Figure 1 is a graphic representation of the answers (Km and RF) we got for USA.

Figure 1. Answers for USA. RF and Km (RF + MRP) used in 2024



[1] We considered 54 of them as outliers because they provided a very small MRP (below 2%)

[2] Fernandez, P. (2020), "'Normalized' Risk-Free Rate: Fiction or Science Fiction?" Available at: https://ssrn.com/abstract=3708863

Table 2. Market Risk Premium (MRP) used for 96 countries in 2024

MRP	Number of Answers	**Average**	Median	MAX	min
USA	1287	5,5%	5,5%	16,0%	3,0%
Spain 2024	413	6,4%	6,0%	15,0%	3,0%
AbuDhabi	6	6,0%	6,3%	6,5%	5,1%
Andorra	6	8,2%	8,7%	8,9%	7,0%
Argentina	13	21,3%	21,1%	26,7%	13,0%
Australia	34	5,5%	5,4%	10,0%	2,0%
Austria	56	5,9%	5,9%	10,2%	3,0%
Bangladesh	6	11,6%	11,6%	12,9%	10,6%
Barbados	6	16,3%	17,1%	18,2%	13,4%
Belgium	68	5,7%	5,5%	8,0%	3,0%
Bolivia	8	15,1%	14,8%	17,9%	13,0%
Bosnia	21	7,9%	6,0%	16,6%	3,0%
Brazil	56	7,6%	8,3%	11,1%	3,5%
Bulgaria	11	6,8%	7,3%	8,3%	3,0%
Canada	60	5,2%	5,5%	7,5%	0,5%
Chile	21	6,3%	6,3%	7,4%	5,2%
China	36	6,6%	6,0%	13,0%	2,0%
Colombia	19	7,4%	7,4%	9,2%	4,6%
Costa Rica	10	12,2%	12,9%	14,7%	8,8%
Croatia	22	6,2%	6,0%	9,0%	3,0%
Cyprus	7	7,8%	7,4%	9,0%	7,0%
Czech Republic	27	5,6%	5,6%	8,0%	0,3%
Denmark	34	5,8%	5,5%	12,0%	3,0%
Dominican Rep.	9	11,1%	11,5%	13,0%	9,4%
Ecuador	17	15,8%	18,7%	23,2%	4,5%
Egypt	11	16,8%	15,6%	20,0%	14,4%
Estonia	17	6,3%	6,7%	6,9%	5,3%
Ethiopia	7	19,5%	20,5%	20,7%	16,9%
Finland	32	5,7%	5,5%	8,0%	3,0%
France	92	19,8%	5,6%	576,0%	3,0%
Georgia	8	10,0%	10,5%	10,7%	8,6%
Germany	273	5,6%	5,6%	8,5%	2,0%
Ghana	7	22,7%	23,8%	25,7%	18,3%
Greece	41	6,7%	6,0%	12,2%	3,0%
Hong Kong	23	7,3%	6,6%	13,0%	5,2%
Hungary	24	6,3%	6,0%	9,0%	3,0%
Iceland	6	6,6%	6,9%	7,1%	5,5%
India	31	8,4%	8,0%	16,0%	4,0%
Indonesia	9	8,2%	8,3%	9,1%	7,0%
Ireland	38	5,5%	5,7%	7,2%	3,0%
Israel	23	6,0%	5,9%	7,1%	5,0%
Italy	86	6,2%	6,0%	12,0%	3,0%
Jamaica	6	13,2%	13,8%	14,9%	10,6%
Japan	39	5,5%	6,0%	7,5%	3,0%
Kazakhstan	6	7,8%	7,9%	8,9%	6,0%
Kenya	9	14,9%	15,0%	16,2%	13,4%
Korea, (South)	22	5,8%	5,8%	6,5%	5,1%
Kuwait	12	6,3%	6,7%	6,9%	5,3%
Latvia	13	7,0%	7,3%	7,7%	6,0%
Lithuania	28	6,5%	6,7%	7,1%	5,5%
Luxembourg	39	5,5%	5,5%	8,0%	3,0%
Malaysia	8	7,2%	7,4%	8,0%	6,0%
Malta	7	6,2%	5,8%	7,5%	5,5%
Mauritius	8	8,7%	9,1%	9,4%	7,4%

Mexico	47	7,3%	7,4%	13,0%	4,6%
Mongolia	10	16,4%	16,4%	21,0%	13,4%
Montenegro	6	11,4%	12,0%	13,7%	7,3%
Morocco	17	9,1%	9,5%	9,9%	7,8%
Mozambique	13	18,6%	19,1%	20,7%	15,0%
Netherlands	61	5,4%	5,4%	8,0%	3,0%
New Zealand	12	6,0%	5,9%	7,5%	4,4%
Nigeria	11	15,2%	15,6%	17,9%	12,0%
Norway	30	5,4%	5,3%	8,0%	3,0%
Pakistan	11	16,3%	18,9%	22,1%	6,0%
Panama	10	8,9%	8,5%	13,0%	7,0%
Peru	21	8,8%	7,5%	16,4%	5,7%
Phillipines	13	7,4%	7,2%	8,8%	6,0%
Poland	33	5,8%	5,8%	8,0%	3,0%
Portugal	46	6,0%	6,0%	8,2%	2,7%
Qatar	9	6,7%	6,3%	12,0%	4,6%
Romania	32	7,4%	7,4%	9,7%	5,5%
Nrth Macedonia	6	10,7%	10,6%	12,2%	9,4%
Russia	19	10,5%	10,5%	18,9%	4,7%
Saudi Arabia	22	6,8%	6,1%	14,0%	4,6%
Serbia	18	6,9%	6,0%	11,1%	3,0%
Singapore	21	5,1%	5,1%	5,7%	4,4%
Slovakia	21	5,6%	5,8%	8,0%	0,5%
Slovenia	18	5,9%	6,0%	8,0%	3,0%
South Africa	33	8,3%	8,6%	16,0%	5,0%
Sri Lanka	7	23,5%	23,8%	25,7%	21,0%
Sweden	55	5,4%	5,4%	8,0%	3,0%
Switzerland	61	5,3%	5,3%	8,0%	3,0%
Taiwan	28	6,0%	6,0%	8,0%	3,0%
Tanzania	7	13,9%	14,6%	14,9%	12,0%
Thailand	13	7,7%	8,0%	8,7%	6,6%
Trinidad and Tobago	7	10,0%	10,5%	10,7%	8,6%
Tunisia	8	21,7%	22,5%	25,3%	16,9%
Turkey	13	16,5%	17,2%	20,0%	12,0%
Uganda	6	13,9%	14,6%	14,9%	12,0%
Ukraine	10	22,6%	22,4%	25,5%	21,0%
United Arab Emirates (UAE)	13	6,2%	5,7%	12,0%	3,5%
United Kingdom	82	5,7%	5,6%	8,0%	4,0%
Uruguay	9	9,0%	8,5%	13,0%	7,0%
Venezuela	9	26,8%	29,0%	32,3%	13,0%
Vietnam	10	9,7%	10,4%	10,8%	8,0%
Zambia	8	22,7%	23,8%	25,7%	18,3%

Table 3. Risk Free Rate (R_F) used for 96 countries in 2024

R_F	Number of Answers	**Average**	Median	MAX	min
USA	1287	4,1%	4,0%	10,0%	1,5%
Spain 2024	413	3,5%	3,5%	5,1%	2,0%
AbuDhabi	6	2,9%	2,8%	3,5%	2,7%
Andorra	6	3,3%	3,2%	4,0%	2,9%
Argentina	13	17,4%	15,8%	40,0%	9,5%
Australia	34	4,2%	4,2%	5,0%	2,5%
Austria	56	3,0%	3,0%	4,5%	2,0%
Bangladesh	6	9,2%	8,9%	14,1%	5,5%
Barbados	6	4,9%	4,7%	5,8%	4,6%
Belgium	68	3,1%	3,0%	4,5%	2,0%

Bolivia	8	6,8%	6,8%	8,1%	5,7%
Bosnia	21	3,8%	3,1%	8,1%	2,0%
Brazil	56	9,8%	10,0%	13,5%	4,5%
Bulgaria	11	4,1%	4,1%	6,3%	2,6%
Canada	60	3,5%	3,5%	5,0%	1,7%
Chile	21	6,0%	5,4%	13,0%	4,5%
China	36	3,0%	2,5%	5,1%	2,0%
Colombia	19	9,8%	9,6%	13,0%	5,4%
Costa Rica	10	4,7%	5,0%	5,8%	3,5%
Croatia	22	3,1%	3,1%	4,5%	2,0%
Cyprus	7	3,6%	3,4%	4,1%	3,2%
Czech Republic	27	3,4%	3,4%	5,0%	2,0%
Denmark	34	2,9%	2,9%	4,5%	2,0%
Dominican Rep.	9	7,9%	7,8%	9,2%	7,4%
Ecuador	17	13,9%	14,1%	17,3%	9,0%
Egypt	11	18,7%	18,1%	27,0%	14,8%
Estonia	17	2,3%	2,2%	3,5%	1,5%
Ethiopia	7	12,0%	11,7%	13,8%	11,4%
Finland	32	3,0%	3,0%	4,5%	1,8%
France	92	3,0%	3,0%	4,5%	1,0%
Georgia	8	4,9%	4,7%	5,8%	4,7%
Germany	273	2,7%	2,5%	7,5%	1,0%
Ghana	7	18,6%	18,0%	21,9%	17,4%
Greece	41	3,3%	3,3%	4,7%	2,0%
Hong Kong	23	3,9%	3,8%	4,3%	3,6%
Hungary	24	4,3%	3,4%	8,9%	2,0%
Iceland	6	6,4%	6,2%	7,4%	6,1%
India	31	7,2%	7,1%	10,0%	6,0%
Indonesia	9	6,9%	6,9%	7,7%	6,4%
Ireland	38	2,9%	3,0%	3,5%	2,2%
Israel	23	4,4%	4,1%	5,6%	3,9%
Italy	86	3,4%	3,5%	4,5%	2,0%
Jamaica	6	4,8%	4,6%	5,8%	4,5%
Japan	39	1,1%	0,8%	4,0%	0,5%
Kazakhstan	6	5,7%	5,8%	7,0%	4,8%
Kenya	9	16,1%	15,4%	20,1%	14,1%
Korea, (South)	22	3,5%	3,5%	4,0%	2,9%
Kuwait	12	2,0%	2,0%	2,3%	1,9%
Latvia	13	2,3%	2,9%	3,5%	0,9%
Lithuania	28	3,1%	3,6%	4,3%	1,5%
Luxembourg	39	3,1%	3,0%	4,5%	2,0%
Malaysia	8	4,0%	4,1%	4,5%	3,7%
Malta	7	3,7%	3,5%	4,2%	3,3%
Mauritius	8	4,6%	4,4%	5,6%	4,1%
Mexico	47	9,2%	9,2%	12,0%	5,4%
Mongolia	10	10,4%	9,8%	12,0%	9,5%
Montenegro	6	6,6%	7,1%	8,1%	2,5%
Morocco	17	3,7%	3,7%	4,5%	3,3%
Mozambique	13	7,3%	7,3%	9,2%	5,0%
Netherlands	61	2,9%	3,0%	4,5%	2,0%
New Zealand	12	4,9%	4,8%	5,7%	4,7%
Nigeria	11	13,9%	14,8%	18,0%	5,0%
Norway	30	3,3%	3,3%	4,5%	1,5%
Pakistan	11	15,7%	15,7%	17,2%	14,2%
Panama	10	6,6%	6,9%	7,0%	5,7%
Peru	21	6,2%	6,4%	7,7%	4,0%
Phillipines	13	6,0%	6,0%	7,3%	5,0%
Poland	33	4,3%	4,5%	6,8%	2,0%

Portugal	46	3,1%	3,0%	5,8%	2,0%
Qatar	9	4,7%	4,8%	6,0%	2,9%
Romania	32	6,4%	6,6%	7,8%	3,0%
Nrth Macedonia	6	6,4%	6,2%	7,5%	5,9%
Russia	19	11,1%	11,5%	15,0%	4,9%
Saudi Arabia	22	5,4%	5,1%	8,0%	4,3%
Serbia	18	4,2%	3,5%	8,0%	2,0%
Singapore	21	3,2%	3,0%	4,0%	2,6%
Slovakia	21	3,1%	3,1%	4,5%	2,0%
Slovenia	18	3,1%	3,0%	4,5%	2,0%
South Africa	33	10,3%	10,1%	12,0%	9,0%
Sri Lanka	7	12,6%	13,0%	15,4%	9,3%
Sweden	55	2,9%	2,9%	4,5%	1,9%
Switzerland	61	2,2%	2,1%	4,5%	0,7%
Taiwan	28	1,4%	1,2%	2,2%	0,8%
Tanzania	7	9,3%	8,8%	11,5%	8,1%
Thailand	13	2,7%	2,6%	3,0%	2,4%
Trinidad and Tobago	7	4,9%	4,7%	5,8%	4,7%
Tunisia	8	7,9%	7,6%	9,2%	7,6%
Turkey	13	18,6%	15,2%	30,0%	10,0%
Uganda	6	13,6%	13,0%	17,7%	11,3%
Ukraine	10	13,1%	11,7%	20,6%	7,7%
United Arab Emirates (UAE)	13	4,5%	4,2%	6,7%	3,0%
United Kingdom	82	4,0%	4,0%	6,0%	2,0%
Uruguay	9	7,1%	8,0%	10,4%	2,0%
Venezuela	9	24,1%	24,7%	29,9%	20,2%
Vietnam	10	3,1%	3,0%	4,5%	2,2%
Zambia	8	26,6%	26,8%	29,0%	23,9%

Table 4. Km [Required return to equity (market): R_F + MRP)] used for 96 countries in 2024

Km = R_F + MRP	Number of Answers	**Average**	Median	MAX	min
USA	1287	9,6%	9,5%	22,0%	5,0%
Spain 2024	413	9,8%	9,7%	20,0%	6,0%
AbuDhabi	6	8,9%	9,1%	9,3%	8,3%
Andorra	6	11,5%	11,8%	11,8%	10,9%
Argentina	13	38,7%	38,2%	63,0%	30,0%
Australia	34	9,6%	9,3%	15,0%	5,0%
Austria	56	8,9%	8,5%	13,2%	6,1%
Bangladesh	6	20,8%	20,6%	24,7%	17,1%
Barbados	6	21,2%	21,8%	22,8%	19,1%
Belgium	68	8,8%	8,5%	10,5%	6,1%
Bolivia	8	21,9%	21,6%	24,6%	20,1%
Bosnia	21	11,7%	8,8%	22,9%	6,1%
Brazil	56	17,3%	16,5%	23,2%	12,3%
Bulgaria	11	10,9%	11,5%	13,9%	6,1%
Canada	60	8,4%	8,7%	11,0%	2,5%
Chile	21	12,4%	11,9%	19,0%	10,9%
China	36	9,6%	9,8%	17,0%	4,5%
Colombia	19	17,2%	17,6%	21,8%	11,9%
Costa Rica	10	16,9%	17,6%	18,4%	13,8%
Croatia	22	9,3%	8,9%	13,0%	6,1%
Cyprus	7	11,4%	10,9%	13,1%	10,7%
Czech Republic	27	8,9%	9,0%	11,2%	3,7%
Denmark	34	8,7%	8,5%	16,0%	6,1%
Dominican Rep.	9	19,1%	19,0%	21,0%	17,9%
Ecuador	17	29,7%	34,4%	37,2%	15,0%

Egypt	11	35,4%	35,0%	47,0%	29,3%
Estonia	17	8,6%	8,5%	9,3%	8,4%
Ethiopia	7	31,5%	32,0%	32,2%	29,8%
Finland	32	8,6%	8,5%	10,5%	6,1%
France	92	22,8%	8,5%	579,1%	5,0%
Georgia	8	14,9%	15,2%	15,4%	14,0%
Germany	273	8,3%	8,4%	16,0%	4,5%
Ghana	7	41,3%	41,5%	43,7%	38,2%
Greece	41	10,0%	9,5%	16,6%	6,1%
Hong Kong	23	11,2%	10,2%	16,8%	9,3%
Hungary	24	10,6%	9,3%	17,9%	6,1%
Iceland	6	13,0%	13,1%	13,4%	12,3%
India	31	15,7%	15,4%	26,0%	11,5%
Indonesia	9	15,1%	14,9%	16,1%	14,1%
Ireland	38	8,4%	8,4%	10,4%	6,1%
Israel	23	10,4%	10,4%	11,8%	9,0%
Italy	86	9,7%	9,5%	16,5%	6,0%
Jamaica	6	18,0%	18,4%	19,4%	16,2%
Japan	39	6,6%	6,9%	9,3%	4,5%
Kazakhstan	6	13,5%	13,1%	14,7%	12,4%
Kenya	9	31,0%	30,6%	33,5%	28,7%
Korea, (South)	22	9,3%	9,4%	9,9%	8,8%
Kuwait	12	8,4%	8,6%	8,8%	7,6%
Latvia	13	9,3%	9,4%	10,2%	8,6%
Lithuania	28	9,6%	9,8%	10,3%	8,6%
Luxembourg	39	8,6%	8,5%	10,5%	6,1%
Malaysia	8	11,2%	11,3%	12,1%	10,2%
Malta	7	10,0%	9,6%	11,7%	9,4%
Mauritius	8	13,3%	13,4%	13,6%	12,7%
Mexico	47	16,5%	17,0%	24,3%	11,2%
Mongolia	10	26,8%	25,9%	33,0%	24,1%
Montenegro	6	18,0%	19,1%	21,7%	9,8%
Morocco	17	12,9%	13,2%	13,2%	12,1%
Mozambique	13	25,9%	26,9%	28,0%	20,0%
Netherlands	61	8,3%	8,3%	10,5%	6,1%
New Zealand	12	10,9%	10,7%	12,4%	9,5%
Nigeria	11	29,1%	31,2%	32,7%	17,0%
Norway	30	8,7%	8,8%	10,5%	6,1%
Pakistan	11	32,0%	34,6%	36,3%	21,5%
Panama	10	15,4%	14,8%	20,0%	13,4%
Peru	21	14,9%	14,3%	22,6%	11,0%
Phillipines	13	13,4%	13,8%	15,1%	11,5%
Poland	33	10,1%	10,5%	13,8%	6,1%
Portugal	46	9,1%	9,0%	11,6%	5,8%
Qatar	9	11,4%	10,4%	18,0%	9,6%
Romania	32	13,8%	14,4%	17,5%	8,5%
Nrth Macedonia	6	17,0%	17,2%	18,4%	15,5%
Russia	19	21,6%	19,6%	29,4%	16,1%
Saudi Arabia	22	12,3%	11,2%	22,0%	9,1%
Serbia	18	11,1%	9,3%	19,1%	6,1%
Singapore	21	8,3%	8,2%	9,0%	7,7%
Slovakia	21	8,8%	8,8%	11,1%	3,4%
Slovenia	18	9,0%	8,9%	11,8%	6,1%
South Africa	33	18,6%	18,1%	25,0%	15,5%
Sri Lanka	7	36,1%	36,0%	38,2%	34,8%
Sweden	55	8,3%	8,1%	10,5%	6,1%
Switzerland	61	7,5%	7,6%	10,5%	5,0%
Taiwan	28	7,3%	7,5%	10,2%	4,5%

Tanzania	7	23,2%	23,0%	24,0%	22,6%
Thailand	13	10,4%	10,4%	11,3%	9,5%
Trinidad and Tobago	7	14,9%	15,2%	15,4%	14,0%
Tunisia	8	29,7%	30,1%	33,0%	25,8%
Turkey	13	35,1%	34,5%	42,5%	28,0%
Uganda	6	27,5%	27,1%	29,7%	26,1%
Ukraine	10	35,7%	34,1%	43,3%	30,3%
United Arab Emirates (UAE)	13	10,7%	10,0%	18,0%	6,5%
United Kingdom	82	9,7%	9,8%	12,5%	6,0%
Uruguay	9	16,0%	17,0%	21,0%	11,6%
Venezuela	9	50,9%	54,1%	57,0%	34,0%
Vietnam	10	12,8%	12,5%	15,2%	11,0%
Zambia	8	49,3%	49,4%	53,2%	44,4%

2. Changes from 2015 to 2018, 2019, 2020, 2021, 2022 and 2023

Tables 5 and 6 compare the results of the 2023 survey with the results of the surveys published in 2015, 2018, 2019, 2020, 2021 and 2022.

Table 5. Km [Required return to equity (market): R_F + MRP)]
Averages of the surveys of 2023, 2022, 2021, 2020, 2019, 2018 and 2015

	average Km (R_F + MRP)						
	2023	**2022**	**2021**	**2020**	**2019**	**2018**	**2015**
USA	9,5	8,3	7,3	7,5	8,3	8,2	7,9
Spain	10,1	8,8	7,4	7,6	8,1	8,8	8,1
Argentina	57,7	58,3	41,6	29,6	25,0	23,2	35,5
Australia	10,0	9,7	9,0	10,3	9,3	9,7	9,1
Austria	9,5	7,6	6,5	7,1	7,4	8,2	8,5
Belgium	10,2	7,2	6,5	7,1	7,4	7,8	6,8
Brazil	21,5	20,1	14,2	12,7	15,4	15,7	16,5
Canada	9,5	8,5	7,5	7,5	8,3	8,7	8,2
Chile	11,8	13,1	10,2	10,2	10,5	10,2	10,4
China	12,8	12,6	9,0	9,8	11,5	10,1	12,6
Colombia	20,6	16,5	13,8	14,5	13,9	15,4	12,1
Czech Rep.	10,9	10,1	7,8	8,2	8,7	8,5	7,4
Denmark	9,0	7,2	6,5	7,0	7,2	7,6	6,8
Finland	9,4	7,0	6,5	7,5	7,3	7,6	6,9
France	9,0	7,6	6,6	7,0	7,2	7,5	7,1
Germany	8,2	6,9	6,4	6,6	6,8	6,7	6,6
Greece	15,0	8,2	7,8	19,1	19,7	20,6	29,3
Hungary	16,7	11,6	10,4	10,5	11,9	11,5	9,4
India	15,5	12,5	12,9	11,8	14,8	14,7	15,8
Indonesia	14,9	13,2	12,9	13,9	16,2	15,6	16,4
Ireland	9,6	7,3	6,6	7,9	7,4	8,1	6,8
Israel	10,8	8,7	6,8	7,8	8,4	7,7	6,1
Italy	11,1	7,7	7,0	7,5	7,9	8,4	6,9
Japan	7,1	6,4	5,7	7,1	7,2	6,0	6,5
Korea (South)	9,3	9,7	8,3	8,1	9,1	8,8	8,5
Mexico	16,0	14,8	12,2	13,7	15,4	15,3	12,3
Netherlands	8,7	7,5	6,7	7,5	7,3	7,5	7,7
New Zealand	10,9	9,5	8,0	8,6	8,9	8,9	9,5
Norway	9,2	7,5	7,2	7,0	7,4	8,1	6,9
Peru	14,9	13,3	11,1	10,7	13,1	12,6	11,2
Poland	13,4	9,7	8,2	9,0	9,7	9,4	7,9
Portugal	11,6	7,8	8,2	8,7	10,1	10,4	7,3

Russia	27,6	20,0	13,8	13,7	16,8	16,5	17,1
South Africa	18,1	16,4	15,1	14,6	16,4	14,5	15,9
Sweden	7,5	7,4	8,4	7,1	7,4	8,9	6,5
Switzerland	7,4	7,2	5,3	7,0	7,3	8,0	6,5
Thailand	11,1	10,1	9,5	10,2	11,3	12,4	16,0
Turkey	32,7	33,6	27,2	21,2	20,8	18,0	17,1
UK	9,8	8,5	6,9	6,9	8,3	7,5	7,3
Uruguay	17,7	12,7	11,3	15,2	12,8	13,6	10,7
Venezuela	64,3	58,8	60,2	34,5	36,3	28,6	23,1

Table 6. Market Risk Premium (MRP) and Risk Free Rate (RF) (%)
Averages of the surveys of 2023, 2022, 2021, 2020, 2019, 2018 and 2015

	Av. 2023		Av. 2022		Av. 2021		Av. 2020		Av. 2019		Av. 2018		Av. 2015	
	RF	MRP	RF	MRP	RF	MRP	RF	MRP	RF	MRP	RF	MRP	RF	MRP
USA	3,8	5,7	2,7	5,6	1,8	5,5	1,9	5,6	2,7	5,6	2,8	5,4	2,4	5,5
Spain	3,5	6,6	2,1	6,7	1,0	6,4	1,3	6,3	1,7	6,4	2,1	6,7	2,2	5,9
Argentina	29,6	28,1	28,4	29,9	24,2	17,4	12,3	17,3	10,1	14,9	9,3	13,9	12,6	22,9
Australia	3,8	6,2	3,4	6,3	2,6	6,4	2,4	7,9	2,8	6,5	3,1	6,6	3,1	6,0
Austria	2,7	6,8	1,8	5,8	0,6	5,9	0,9	6,2	1,3	6,1	2,0	6,2	2,8	5,7
Belgium	3,8	6,4	1,4	5,8	0,6	5,9	0,9	6,2	1,2	6,2	1,6	6,2	1,3	5,5
Brazil	12,2	9,3	10,3	9,8	6,5	7,7	4,8	7,9	7,2	8,2	7,3	8,4	9,0	7,5
Canada	3,5	6,0	2,8	5,7	1,9	5,6	1,8	5,7	2,5	5,8	2,9	5,8	2,3	5,9
Chile	4,9	6,9	5,7	7,4	3,9	6,3	3,6	6,6	4,2	6,3	4,1	6,1	3,9	6,5
China	4,2	8,6	3,9	8,7	2,8	6,2	3,1	6,7	4,0	7,5	3,8	6,3	4,5	8,1
Colombia	11,6	9,0	9,8	6,7	6,9	6,9	6,3	8,2	6,2	7,7	6,7	8,7	3,8	8,3
Czech Rep.	4,3	6,6	4,1	6,0	2,0	5,8	1,8	6,4	2,4	6,3	2,6	5,9	1,8	5,6
Denmark	2,9	6,2	1,4	5,8	0,7	5,8	0,9	6,1	1,2	6,0	1,6	6,0	1,3	5,5
Finland	3,2	6,2	1,4	5,6	0,6	5,9	1,0	6,5	1,1	6,2	1,7	5,9	1,2	5,7
France	3,0	6,0	1,3	6,3	0,8	5,8	0,8	6,2	1,2	6,0	1,6	5,9	1,5	5,6
Germany	2,5	5,7	1,2	5,7	0,6	5,8	0,8	5,8	1,1	5,7	1,4	5,3	1,3	5,3
Greece	4,1	10,9	1,6	6,6	0,9	6,9	6,4	12,7	4,3	15,4	4,8	15,8	15,0	14,3
Hungary	8,3	8,4	4,9	6,7	3,3	7,1	3,1	7,4	4,0	7,9	3,6	7,9	0,6	8,8
India	7,1	8,5	5,6	6,9	5,6	7,3	4,8	7,0	6,5	8,3	6,8	7,9	7,4	8,4
Indonesia	6,9	8,0	5,5	7,7	5,9	7,0	6,3	7,6	7,2	9,0	6,8	8,8	7,5	8,9
Ireland	2,9	6,7	1,5	5,8	0,7	5,9	1,3	6,6	1,4	6,0	1,6	6,5	1,3	5,5
Israel	3,9	6,9	2,7	6,0	1,1	5,7	1,5	6,3	2,0	6,4	1,9	5,8	0,9	5,2
Italy	4,0	7,1	1,7	6,0	1,0	6,0	1,3	6,2	1,6	6,3	2,3	6,1	1,5	5,4
Japan	1,1	6,1	0,5	5,9	0,5	5,2	0,9	6,2	1,1	6,1	0,3	5,7	0,7	5,8
Korea (South)	2,9	6,4	3,7	6,0	2,4	5,9	2,0	6,1	2,5	6,6	2,4	6,4	2,3	6,2
Mexico	8,3	7,7	7,4	7,4	5,8	6,4	5,4	8,3	7,1	8,3	6,8	8,5	4,3	8,0
Netherlands	3,0	5,6	1,3	6,2	0,9	5,8	1,6	5,9	1,3	6,0	1,7	5,8	1,8	5,9
New Zealand	4,7	6,3	3,8	5,7	2,0	6,0	2,4	6,2	3,0	5,9	3,1	5,8	2,9	6,6
Norway	3,4	5,8	1,7	5,8	1,8	5,4	1,2	5,8	1,4	6,0	2,4	5,7	1,4	5,5
Peru	6,5	8,4	6,4	6,9	4,3	6,8	3,7	7,0	5,6	7,5	5,3	7,3	4,0	7,2
Poland	6,1	7,2	4,0	5,7	2,7	5,5	2,4	6,6	3,1	6,6	3,4	6,0	2,7	5,2
Portugal	3,4	8,2	1,6	6,2	1,4	6,8	1,6	7,1	2,6	7,5	3,2	7,2	1,6	5,7
Russia	9,4	18,2	5,8	14,2	5,7	8,1	5,9	7,8	8,3	8,5	7,8	8,7	7,4	9,7
South Africa	9,4	8,7	9,1	7,3	8,1	7,0	6,7	7,9	8,0	8,4	7,6	6,9	8,2	7,7
Sweden	1,9	5,7	1,4	6,0	0,9	7,5	1,0	6,1	1,3	6,1	1,8	7,1	1,1	5,4
Switzerland	1,7	5,6	1,4	5,8	0,1	5,2	0,9	6,1	1,1	6,2	1,1	6,9	1,1	5,4
Thailand	3,0	8,1	3,1	7,0	2,2	7,3	4,5	5,7	3,1	8,2	3,5	8,9	8,7	7,3
Turkey	14,4	18,3	22,6	11,0	17,7	9,5	10,9	10,3	11,2	9,6	10,3	7,7	7,8	9,3
UK	3,9	6,0	2,4	6,1	1,3	5,6	1,1	5,8	2,1	6,2	2,0	5,5	2,1	5,2
Uruguay	8,3	9,3	5,4	7,3	4,2	7,1	6,1	9,1	4,4	8,4	5,3	8,3	3,6	7,1
Venezuela	34,8	29,5	32,7	26,1	40,4	19,8	11,4	23,1	12,6	23,7	11,7	16,9	3,5	19,6

3. Previous surveys

2008	http://ssrn.com/abstract=1344209
2010	http://ssrn.com/abstract=1606563; http://ssrn.com/abstract=1609563
2011	http://ssrn.com/abstract=1822182; http://ssrn.com/abstract=1805852

2012	http://ssrn.com/abstract=2084213
2013	http://ssrn.com/abstract=914160
2014	http://ssrn.com/abstract=1609563
2015	https://ssrn.com/abstract=2598104
2016	https://ssrn.com/abstract=2776636
2017	https://ssrn.com/abstract=2954142
2018	https://ssrn.com/abstract=3155709
2019	https://ssrn.com/abstract=3358901
2020	https://ssrn.com/abstract=3560869
2021	https://ssrn.com/abstract=3861152
2022	https://ssrn.com/abstract=3803990
2023	https://ssrn.com/abstract=4407839

Welch (2000) performed two surveys with finance professors in 1997 and 1998, asking them what they thought the Expected MRP would be over the next 30 years. He obtained 226 replies, ranging from 1% to 15%, with an average arithmetic EEP of 7% above T-Bonds.[3] Welch (2001) presented the results of a survey of 510 finance and economics professors performed in August 2001 and the consensus for the 30-year arithmetic EEP was 5.5%, much lower than just 3 years earlier. In an update published in 2008 Welch reports that the MRP “used in class” in December 2007 by about 400 finance professors was on average 5.89%, and 90% of the professors used equity premiums between 4% and 8.5%.

Johnson et al (2007) report the results of a survey of 116 finance professors in North America done in March 2007: 90% of the professors believed the Expected MRP during the next 30 years to range from 3% to 7%.

Graham and Harvey (2007) indicate that U.S. CFOs reduced their average EEP from 4.65% in September 2000 to 2.93% by September 2006 (st. dev. of the 465 responses = 2.47%). In the 2008 survey, they report an average EEP of 3.80%, ranging from 3.1% to 11.5% at the tenth percentile at each end of the spectrum. They show that average EEP changes through time. Goldman Sachs (O'Neill, Wilson and Masih 2002) conducted a survey of its global clients in July 2002 and the average long-run EEP was 3.9%, with most responses between 3.5% and 4.5%.

Ilmanen (2003) argues that surveys tend to be optimistic: *“survey-based expected returns may tell us more about hoped-for returns than about required returns”.* Damodaran (2008) points out that *“the risk premiums in academic surveys indicate how far removed most academics are from the real world of valuation and corporate finance and how much of their own thinking is framed by the historical risk premiums... The risk premiums that are presented in classroom settings are not only much higher than the risk premiums in practice but also contradict other academic research”.*

Table 4 of Fernandez et al (2011a) shows the evolution of the Market Risk Premium used for the USA in 2011, 2010, 2009 and 2008 according to previous surveys (Fernandez et al, 2009, 2010a and 2010b).

The magazine *Pensions and Investments* (12/1/1998) carried out a survey among professionals working for institutional investors: the average EEP was 3%. Shiller[4] publishes and updates an index of investor sentiment since the crash of 1987. While neither survey provides a direct measure of the equity risk premium, they yield a broad measure of where investors or professors expect stock prices to go in the near future. The 2004 survey of the Securities Industry Association (SIA) found that the median EEP of 1500 U.S. investors was about 8.3%. Merrill Lynch surveys more than 300 institutional investors globally in July 2008: the average EEP was 3.5%.

A main difference of this survey with previous ones is that this survey asks about the **Required** MRP, while most surveys are interested in the **Expected** MRP.

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[3] At that time, the most recent Ibbotson Associates Yearbook reported an arithmetic HEP versus T-bills of 8.9% (1926–1997).
[4] See http://icf.som.yale.edu/Confidence.Index

4. Expected and Required Equity Premium: different concepts

Fernandez and F. Acín (2015) claim and show that Expected Return and Required Return are two very different concepts. Fernandez (2007, 2009b) claims that the term “equity premium” is used to designate four different concepts:

1. **Historical** equity premium (HEP): historical differential return of the stock market over treasuries.
2. **Expected** equity premium (EEP): expected differential return of the stock market over treasuries.
3. **Required** equity premium (REP): incremental return of a diversified portfolio (the market) over the risk-free rate required by an investor. It is used for calculating the required return to equity.
4. **Implied** equity premium (IEP): the required equity premium that arises from assuming that the market price is correct.

The four concepts (HEP, REP, EEP and IEP) designate different realities. The **HEP** is easy to calculate and is equal for all investors, provided they use the same time frame, the same market index, the same risk-free instrument and the same average (arithmetic or geometric). But the **EEP,** the **REP** and the **IEP** may be different for different investors and are not observable.

The **HEP** is the historical average differential return of the market portfolio over the risk-free debt. The most widely cited sources are Ibbotson Associates and Dimson *et al.* (2007).

Numerous papers and books assert or imply that there is a “market” EEP. However, it is obvious that investors and professors do not share “homogeneous expectations” and have different assessments of the **EEP**. As Brealey et al. (2005, page 154) affirm, *“Do not trust anyone who claims to know what returns investors expect”.*

The **REP** is the answer to the following question: What incremental return do I require for investing in a diversified portfolio of shares over the risk-free rate? It is a crucial parameter because the REP is the key to determining the company’s required return to equity and the WACC. Different companies may use, and in fact do use, different **REPs**.

The **IEP** is the implicit REP used in the valuation of a stock (or market index) that matches the current market price. The most widely used model to calculate the IEP is the dividend discount model: the current price per share (P_0) is the present value of expected dividends discounted at the required rate of return (Ke). If d_1 is the dividend per share expected to be received in year 1, and g the expected long term growth rate in dividends per share,

$$P_0 = d_1 / (Ke - g), \text{ which implies: } IEP = d_1/P_0 + g - R_F \quad (1)$$

The estimates of the IEP depend on the particular assumption made for the expected growth (g). Even if market prices are correct for all investors, there is not an IEP common for all investors: there are many pairs (IEP, g) that accomplish equation (1). Even if equation (1) holds for every investor, there are many *required* returns (as many as expected growths, g) in the market. Many papers in the financial literature report different estimates of the IEP with great dispersion, as for example, Claus and Thomas (2001, IEP = 3%), Harris and Marston (2001, IEP = 7.14%) and Ritter and Warr (2002, IEP = 12% in 1980 and -2% in 1999). There is no a common **IEP** for all investors.

For a particular investor, the **EEP** is not necessary equal to the REP (unless he considers that the market price is equal to the value of the shares). Obviously, an investor will hold a diversified portfolio of shares if his EEP is higher (or equal) than his REP and will not hold it otherwise.

We can find out the REP and the EEP of an investor by asking him, although for many investors the REP is not an explicit parameter but, rather, it is implicit in the price they are prepared to pay for the shares. However, it is not possible to determine the REP for the market as a whole, because it does not exist: even if we knew the REPs of all the investors in the market, it would be meaningless to talk of a REP for the market as a whole. There is a distribution of REPs and we can only say that some percentage of investors have REPs contained in a range. The average of that distribution cannot be interpreted as the REP of the market nor as the REP of a representative investor.

Much confusion arises from not distinguishing among the four concepts that the phrase *equity premium* designates: Historical equity premium, Expected equity premium, Required equity premium and Implied equity premium. 129 of the books reviewed by Fernandez (2009b) identify

Expected and Required equity premium and 82 books identify Expected and Historical equity premium.

Finance textbooks should clarify the MRP by incorporating distinguishing definitions of the four different concepts and conveying a clearer message about their sensible magnitudes.

5. Conclusion

Most previous surveys have been interested in the Expected MRP, but this survey asks about the Required MRP.

This paper contains the statistics of a survey about the Risk-Free Rate (**RF**) and the Market Risk Premium (**MRP**) used in 2024 for **96 countries**. We got answers for 104 countries, but we only report the results for countries with more than 6 answers.

This survey links with the *Equity Premium Puzzle*: Fernandez et al (2009), argue that the equity premium puzzle may be explained by the fact that many market participants (equity investors, investment banks, analysts, companies…) do not use standard theory (such as a standard representative consumer asset pricing model…) for determining their Required Equity Premium, but rather, they use historical data and advice from textbooks and finance professors. Many investors still use historical data and textbook prescriptions to estimate the required and the expected equity premium.

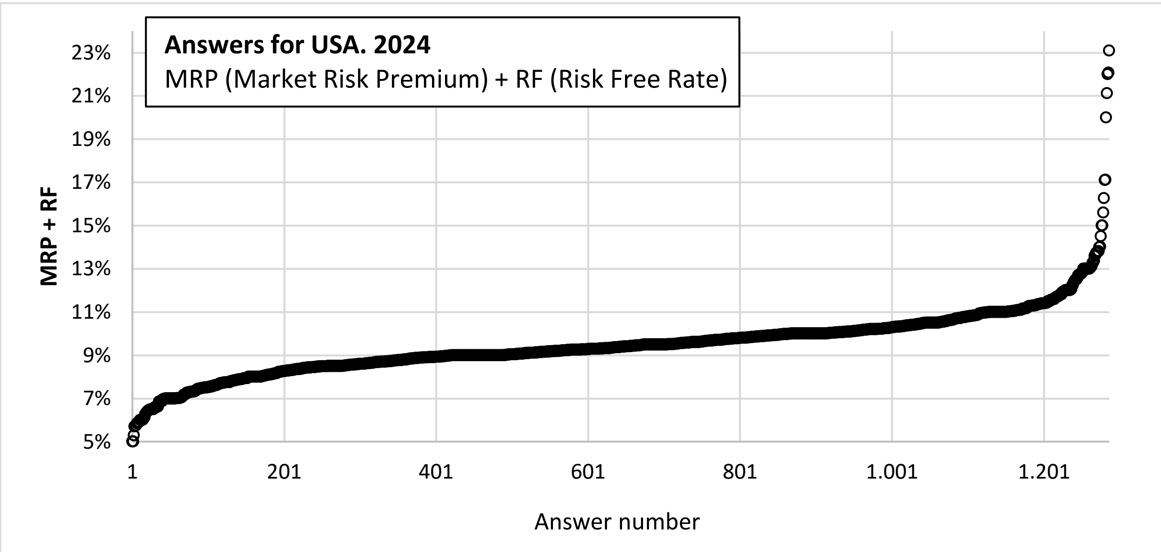

EXHIBIT 1. Mail sent in February 2024

Survey Market Risk Premium and Risk-Free Rate 2024

We are doing a **survey** about the **Market Risk Premium** (MRP or Equity Premium) and **Risk-Free Rate** that companies, analysts, regulators and professors use to calculate the **required return on equity** in different countries.

I would be grateful if you would kindly answer the following 2 questions. No companies, individuals or universities will be identified, and only aggregate data will be made public. I will send you the results in a month.

Best regards and thanks,

Pablo Fernandez. Professor of Finance. IESE Business School. Spain.

2 questions:

1. The Market Risk Premium that I am using in 2024
for USA is: ________%
for____________ is: _______ %
for____________ is: _______ %

2. The Risk-Free rate that I am using in 2024
for USA is: _______ %
for ____________ is: _______ %
for ____________ is: _______ %

EXHIBIT 2. Some comments and webs recommended by respondents.

Equity premium: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html
http://www.market-risk-premia.com/market-risk-premia.html
http://www.marktrisikoprämie.de/marktrisikopraemien.html

US risk free rate: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2015

risk free rate: http://www.basiszinskurve.de/basiszinssatz-gemaess-idw.html
http://www.econ.yale.edu/~shiller/
http://www.cfosurvey.org/pastresults.htm
http://alephblog.com/

I'm not much use for you because I don't add a market risk premium to a risk free rate to get a basic equity rate of return. Many years ago, I took your lessons to heart and stopped using any sort of build-up method, principally because it is backwards looking. Instead, I rely on the Pepperdine survey, along with my understanding of how investors think and my best judgement of the risks of a particular asset. I have not found any better way to do this.

Islamic Development Bank works under development mandate and therefore does not follow market based premium on pricing, and uses its internal costs as benchmark. In short, all of our member countries are given financing at the same pricing.

Our commercial bank can invest overnight funds in our excess balance account with the U.S. Federal Reserve Bank at 2.5%. Our overall cost of funds is 0.2%, yielding a spread of 2.3%. Our leverage ratio (equity/assets) is 9.63%. Hence, our pre-tax risk-free rate is 23.88% of equity. Our target is to earn a net interest margin (interest income less interest expense as a percentage of earning assets) of 4.00%, which yields a targeted asset yield of 4.2%, or 43.61% of equity.

Market risk premium = actual equity return - risk free rate

I want to explain the unusually high risk premium I am using in the US market (7%). In my opinion, the way that costs whether they be raw materials, labor, interest etc. process through the economy differently than a simple "add on" cost. I believe that as any cost increase requires a greater capital base to hold inventory or to produce goods and services, that the pass through is not just the actual cost but the cost plus an increment for a return on the greater capital base. Accordingly, the "cost" of money with interest rates so low is more likely than not to be higher in the future. Labor also with unemployment so low is more likely than not to be higher in the future. Therefore although I do not see traditional commodity inflation and labor costs have been unusually stable for this unemployment level, I believe the probability is higher of an increase than a decrease. Thus I have a higher than would be expected market risk premium to address the direction I think the pressures will move on the discount rate. Conversely, If wrong on the upward pressures on capital returns; it would likely be due to slowing global growth and/or trade disruption of longer duration. In that event I again want a higher discount rate to reflect that greater risk potential. Interesting times we live in.

I do not use a MRP or a RF rate for three reasons:
1) I am retired.
2) I do not accept their validity.
3) The "new normal" makes no economic or financial sense.

I am an academic in a public university – I don't know of any University discount rate.

"The subject who is truly loyal to the Chief Magistrate will neither advise nor submit to arbitrary measures." Junius

Prima de riesgo que utilizo en España: diferencia de rentabilidad que ofrece el bono español respecto al alemán. Tipos de interés sin riesgo: los extraídos día a día del boletín de deuda pública española en operaciones de compra-venta al contado.

I don't value companies on this basis. I prefer to use price to earnings ratio.

In the Netherlands there is a discussion with the fiscal authorities. A lot of valuation experts use the MRP from your Survey. The Fiscal authorities accept that but want consequently also the use of the Rf from your survey. There is a lot of discussion when we use a normalized adjusted Rf.

Por tipo de interés sin riesgo se entiende en el corto plazo, pe 3 meses, al tipo de interés interbancario al plazo correspondiente para el área de referencia. En caso del euro, sería el EURIBOR y en caso de EEUU el Libor USD. Hablando de riesgo soberano USA y Alemania son considerados Benchmarks, por lo que su prima de riesgo es 0 y por tanto se les considera que son libres de riesgo. (Excepto entre ellos cuando se habla de riesgo entre EUR y USD) Por ello, cuando hablamos de prima de riesgo de un país, pe. España, hablamos del diferencial de tipos que hay el bono español con el de Alemania, tomando el mismo plazo. Normalmente se utiliza el plazo estándar del 10 años.

Sigo las recomendaciones de Credit Swiss Global Investment Return Yearbook, en este caso, 2018, con un 3,5% de PRM. No me gustan las recomendaciones de Damodaran, cuando incluye un riesgo país a España mayor que el de, creo, Perú o Ecuador, El tipo de interés sin riesgo que utilizo es, para España, el de el bono alemán a 10 años, según leo es de 0,17%, aunque Credit Swiss, creo recordar utiliza otro....el de EEUU es de 2,73%.

The risk free rate is determined on the historical present value-equivalent base interest rates on the basis of a series of payments increasing with the selected growth rate over a period of 1,000 years. For the calculations, the spot rate from year 30 to year 1,000 is updated constantly based upon the valuation date.

Germany

Risk free rate	0.9%	20 y Bund	Investing.com/rates-bonds/germany-20-year-bond-yield (1-1-2018)
Adjustment	1.8%	Credit Suisse	Credit Suisse Global Investment Source book and Yield book 2016 – Range of estimated long term real rate government bonds 1900-2015 - globally diversified
Risk free rate Adjusted	**2.7%**		

I don't use the market risk premium. I use a hurdle rate of return and won't invest in investments that don't achieve that hurdle. I aspire to a 25% rate of return on my investments but will generally settle for 15%.

I use the relevant rate from each country/currency "risk-free" yield curve to discount the respective expected future cash flow: V0 = CF1/(1 + Rf1 + risk prem)^1 + CF2/(1 + Rf2 + risk prem)^2 + ... + CFt/(1 + Rft + risk prem)^t

The Rf that I am using in 2019 for USA is: 10 year historical average, US Treasuries 20-year notes.

I use the US Equity premium of Damodaran to avoid explanations or justifications to clients.

We only use ROS (Return on Sales).

Rf: 3%, of which 2% is a premium for the risk of manipulation of the interest rate market operated by the ECB with the Quantitative Easing.

Al tener limitación nacional al hacer inversiones, debemos emplear un tipo de interés sin riesgo alto. Al operar en mercados muy consolidados, con pocos operadores y con fuertes barreras de entrada, la prima de riesgo de mercado es muy alta.

En anteriores encuestas intenté ofreceros un tipo orientativo pero estos últimos años, después de la “experimentación” de tipos, de diferentes QE con tipos negativos… sólo tengo una certeza, que ya hemos comentado en muchas ocasiones: es muy difícil, o de dudosa utilidad, establecer un tipo de interés sin riesgo. Porque ¿Es normal que la Deuda Griega pague menos que la Deuda de USA? ¿Emisiones de Deuda del gobierno argentino a periodos larguísimos? ¿Deuda alemana o suiza en tipos negativos?…
Respecto a establecer una tasa que sirva como referencia, mantendría dos premisas: 1) El horizonte de inversión (una Tasa de referencia con el mismo plazo); 2) La seguridad en las estimaciones de los flujos de caja futuros del proyecto o inversión: en caso de menor confianza o duda en las estimaciones, mayor tasa de Descuento
Como norma, siempre tenemos en cuenta que la Renta variable ha sido en periodos muy largos el activo más rentable y, por tanto, a muy largo plazo es el Activo de “Menor riesgo”

Fascinating results. It is always interesting how investors and fund managers interpret the risk free rate of countries who have a negative prevailing long-term bond rate.

I am sure you that you are analysing the data and asking more questions that data can answer. It´s time to improve theory! I hope you will advance on it.

In my DCF valuation I use a global perspective of the marginal investor hence a global MRP.

I match rf with currency/inflation of cash flows being discounted and do not rely too much on current interest rates due to imperfections in the market. The MRP is made consistent with the level of interest rate I use in my model (E(Rm)-Rf) end end up with 6%

For equities we use a 10% as a cost of opportunity independently of the level of interest.

Rf: average last 5-year 10 year Treasury

I would like to help you with these two questions, but the problem is that in no any literature sources or analytical reports I met the calculation of Market Risk Premium and Risk Free rate for Uzbekistan.

The risk free rate that I use depends upon the timing of the future cash flows. I refer to the interest rate swap market and the US treasury market for starters. These days, one has to bear in mind currency volatility as that has a bigger effect on PV than market cost-of-capital.

We use the same Market Risk Premium for any country: 5,75% (source: Damodaran). Only Rf changes.

I am happy that you are asking the second question, because it accounts for what I consider to be a historical anomaly in the reply to the first question. I've concluded that the ERP was recently 3-4 percent. But I think US monetary policy (the various "QE" programs) have in the past couple of years distorted the traditional relationship between expected total market returns and the risk free rate. QE has been driving the US Treasury rate down, while the expected total market return has held steady, leading to a larger than usual market risk premium. This higher market risk premium is not a sign of higher market equity risk, but of the perverse impact of aggressive monetary policy.

For the US in 2015: MRP: 14% (as US equities are even more highly priced than last year).

Interest rates are artificially well below historic levels. Thus, bonds and equities values are artificially inflated.

I do not use "canned" rates applicable for a whole year. The rates I use are time-specific and case-specific, depending on conditions prevailing as of the valuation date.

I must confess I am still surprised with the rates suggested that are at the upper bound of respondent answers.

One hint: It might make sense to ask more precisely about the premium before/after personal income tax. For Germany the premium would differ and I am not sure how people would interpret the question.

The Risk-Free Rate we use is based on rates published by the Federal Reserve. We use the 20 year rate, currently 2.73%. The Equity Risk Premium we use is based on Duff & Phelps Annual Valuation Handbook.

For foreign countries, I generally look at it in dollar terms and assume that purchasing power parity held; hence, I’d use US rates. If I had to do it in a foreign currency, I would use the local 10-year treasury for the risk-free rate. I would use the US equity risk premium, adjust for inflation to real terms, and then adjust for foreign inflation to put it in local nominal terms.

USA. MRP 6.4% - essentially bloomberg/ibbotson number. RF 10 year U.S. treasury yield.

Exijo un mínimo de un 15% de retorno neto de impuestos a cualquier acción, independientemente de su nacionalidad.

No existe un activo libre de riesgo en absoluto. Y menos en estos distorsionados entornos debido a la intervención de los bancos centrales. En mi modesta opinión, creo que nunca sido tan riesgosa la renta fija como lo es ahora.

No creo especialmente en el modelo de CAPM y prefiero usar una cifra basada en el sentido común.

Market Risk Premium for any market is not salubrious for peace or mind.
https://comcom.govt.nz/__data/assets/pdf_file/0029/282674/5B20225D-NZCC-12-Cost-of-capital-determination-EDBs-and-WIAL-3-May-2022.pdf.
https://indialogue.io/clients/reports/public/5d9da61986db2894649a7ef2/5d9da63386db2894649a7ef5

The CAPM is wrongly derived from very beginning (basically, CAPM is the first order condition for optimal portfolio decision (which must have a unique solution of mean-variance efficient portfolio) with its unique solution of market portfolio. CAPM is, of course, a tautology even the market portfolio is mean-variance efficient, not an asset pricing no matter market portfolio is mean-variance efficient or no. In sum, CAPM is theoretical useless.

En Uruguay la práctica más aceptada es descontar flujos convertidos a USD dada la debilidad de la moneda local y dolarizacion de la economía.

Your research over the years has been enlightening. It would be interesting to see the "meta" research on your data, that is, an analysis of the cross-section / time series to determine if there is any information embedded in the disperse responses that you receive, e.g. for forecasting or determining whether the consensus is correct over time.

I am guessing you already know my answers:
1. I do not use CAPM, the build-up-method or similar strategies to figure out required rates of return, and I pay no attention to the so-called "Market Risk Premium". Instead I rely mostly on the Pepperdine Cost of Capital Survey in my work.
2. I acknowledge current and changing U.S. Treasury bond rates because it's probably true they have some effect on investors' Required Rates of Return. But I don't use any specific number at any given time so I don't have an answer to your second question either.

We use a WACC of 8.0% for our pan-European industrial coverage, including UK, CH. We are not explicitly modeling Rf, beta or premium.

I just wanted to thank you for your annual surveys. I work in the intersection between academic theory and economic policy, and your annual surveys provide me with an excellent tool for explaining the market environment for debt-financed government spending. I am especially pleased with the opportunity that your survey provides, to point to the risk-free rates in relation to where par yields are on treasury debt, trends in inflation-adjusted securities and government bond rating.

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Damodaran 2013

Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2013 Edition

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Equity Risk Premiums (ERP): Determinants, Estimation and Implications

Equity risk premiums are a central component of every risk and return model in finance and are a key input in estimating costs of equity and capital in both corporate finance and valuation. Given their importance, it is surprising how haphazard the estimation of equity risk premiums remains in practice. We begin this paper by looking at the economic determinants of equity risk premiums, including investor risk aversion, information uncertainty and perceptions of macroeconomic risk. In the standard approach to estimating equity risk premiums, historical returns are used, with the difference in annual returns on stocks versus bonds over a long time period comprising the expected risk premium. We note the limitations of this approach, even in markets like the United States, which have long periods of historical data available, and its complete failure in emerging markets, where the historical data tends to be limited and volatile. We look at two other approaches to estimating equity risk premiums – the survey approach, where investors and managers are asked to assess the risk premium and the implied approach, where a forward-looking estimate of the premium is estimated using either current equity prices or risk premiums in non-equity markets. In the next section, we look at the relationship between the equity risk premium and risk premiums in the bond market (default spreads) and in real estate (cap rates) and how that relationship can be mined to generated expected equity risk premiums. We close the paper by examining why different approaches yield different values for the equity risk premium, and how to choose the "right" number to use in analysis.

(This is the sixth update of this piece. The first update was in the midst of the financial crisis in 2008 and there were annual updates for 2009, 2010, 2011 and 2012.)

The notion that risk matters, and that riskier investments should have higher expected returns than safer investments, to be considered good investments, is intuitive and is central to risk and return models in finance. Thus, the expected return on any investment can be written as the sum of the riskfree rate and a risk premium to compensate for the risk. The disagreement, in both theoretical and practical terms, remains on how to measure the risk in an investment, and how to convert the risk measure into an expected return that compensates for risk. A central number in this debate is the premium that investors demand for investing in the 'average risk' equity investment (or for investing in equities as a class), i.e., the equity risk premium.

In this paper, we begin by examining competing risk and return models in finance and the role played by equity risk premiums in each of them. We argue that equity risk premiums are central components in every one of these models and consider what the determinants of these premiums might be. We follow up by looking at three approaches for estimating the equity risk premium in practice. The first is to survey investors or managers with the intent of finding out what they require as a premium for investing in equity as a class, relative to the riskfree rate. The second is to look at the premiums earned historically by investing in stocks, as opposed to riskfree investments. The third is to back out an equity risk premium from market prices today. We consider the pluses and minuses of each approach and how to choose between the very different numbers that may emerge from these approaches.

Equity Risk Premiums: Importance and Determinants

Since the equity risk premium is a key component of every valuation, we should begin by looking at not only why it matters in the first place but also the factors that influence its level at any point in time and why that level changes over time. In this section, we look at the role played by equity risk premiums in corporate financial analysis, valuation and portfolio management, and then consider the determinants of equity risk premiums.

Why does the equity risk premium matter?

The equity risk premium reflects fundamental judgments we make about how much risk we see in an economy/market and what price we attach to that risk. In the process, it affects the expected return on every risky investment and the value that we estimate for that investment. Consequently, it makes a difference in both how we allocate wealth across different asset classes and which specific assets or securities we invest in within each asset class.

A Price for Risk

To illustrate why the equity risk premium is the price attached to risk, consider an alternate (though unrealistic) world where investors are risk neutral. In this world, the value of an asset would be the present value of expected cash flows, discounted back at a risk free rate. The expected cash flows would capture the cash flows under all possible scenarios (good and bad) and there would be no risk adjustment needed. In the real world, investors are risk averse and will pay a lower price for risky cash flows than for riskless cash flows, with the same expected value. How much lower? That is where equity risk premiums come into play. In effect, the equity risk premium is the premium that investors demand for the average risk investment, and by extension, the discount that they apply to expected cash flows with average risk. When equity risk premiums rise, investors are charging a higher price for risk and will therefore pay lower prices for the same set of risky expected cash flows.

Expected Returns and Discount Rates

Building on the theme that the equity risk premium is the price for taking risk, it is a key component into the expected return that we demand for a risky investment. This expected return, is a determinant of both the cost of equity and the cost of capital, essential inputs into corporate financial analysis and valuation.

While there are several competing risk and return models in finance, they all share some common assumptions about risk. First, they all define risk in terms of variance in actual returns around an expected return; thus, an investment is riskless when actual returns are always equal to the expected return. Second, they argue that risk has to be measured from the perspective of the marginal investor in an asset, and that this marginal investor is well diversified. Therefore, the argument goes, it is only the risk that an investment adds on to a diversified portfolio that should be measured and compensated. In fact, it is this view of risk that leads us to break the risk in any investment into two components. There is a firm-specific component that measures risk that relates only to that investment or to a few investments like it, and a market component that contains risk that affects a large subset or all investments. It is the latter risk that is not diversifiable and should be rewarded.

All risk and return models agree on this fairly crucial distinction, but they part ways when it comes to how to measure this market risk. In the capital asset pricing model (CAPM), the market risk is measured with a beta, which when multiplied by the equity risk premium yields the total risk premium for a risky asset. In the competing models, such as the arbitrage pricing and multi-factor models, betas are estimated against individual market risk factors, and each factor has it own price (risk premium). Table 1 summarizes four models, and the role that equity risk premiums play in each one:

Table 1: Equity Risk Premiums in Risk and Return Models

	Model	*Equity Risk Premium*
The CAPM	Expected Return = Riskfree Rate + $\text{Beta}_{\text{Asset}}$ (Equity Risk Premium)	Risk Premium for investing in the market portfolio, which includes all risky assets, relative to the riskless rate.
Arbitrage pricing model (APM)	$\text{Expected Return} = \text{Riskfree Rate} + \sum_{j=1}^{j=k} \beta_j (\text{Risk Premium}_j)$	Risk Premiums for individual (unspecified) market risk factors.
Multi-Factor Model	$\text{Expected Return} = \text{Riskfree Rate} + \sum_{j=1}^{j=k} \beta_j (\text{Risk Premium}_j)$	Risk Premiums for individual (specified) market risk factors
Proxy Models	Expected Return = a + b (Proxy 1) + c (Proxy 2) (where the proxies are firm characteristics such as market capitalization, price to book ratios or return momentum)	No explicit risk premium computation, but coefficients on proxies reflect risk preferences.

All of the models other than proxy models require three inputs. The first is the riskfree rate, simple to estimate in currencies where a default free entity exists, but more complicated in markets where there are no default free entities. The second is the beta (in the CAPM) or betas (in the APM or multi-factor models) of the investment being analyzed, and the third is the appropriate risk premium for the portfolio of all risky assets (in the CAPM) and the factor risk premiums for the market risk factors in the APM and multi-factor models. While I examine the issues of riskfree rate and beta estimation in companion pieces, I will concentrate on the measurement of the risk premium in this paper.

Note that the equity risk premium in all of these models is a market-wide number, in the sense that it is not company specific or asset specific but affects expected returns on all risky investments. Using a larger equity risk premium will increase the expected returns for all risky investments, and by extension, reduce their value. Consequently, the choice of an equity risk premium may have much larger consequences for value than firm-specific inputs such as cash flows, growth and even firm-specific risk measures (such as betas).

Investment and Policy Implications

It may be tempting for those not in the midst of valuation or corporate finance analysis to pay little heed to the debate about equity risk premium, but it would be a mistake to do so, since its effects are far reaching.

- The amounts set aside by both corporations and governments to meet future pension fund and health care obligations are determined by their expectations of returns from investing in equity markets, i.e., their views on the equity risk premium. Assuming that the equity risk premium is 6% will lead to far less being set aside each year to cover future obligations than assuming a premium of 4%. If the actual premium delivered by equity markets is only 2%, the fund's assets will be insufficient to meet its liabilities, leading to fund shortfalls which have to be met by raising taxes (for governments) or reducing profits (for corporations) In some cases, the pension benefits can be put at risk, if plan administrators use unrealistically high equity risk premiums, and set aside too little each year.
- Business investments in new assets and capacity is determined by whether the businesses think they can generate higher returns on those investments than the cost that they attach to the capital in that investment. If equity risk premiums increase, the cost of equity and capital will have to increase with them, leading to less overall investment in the economy and lower economic growth.
- Regulated monopolies, such as utility companies, are often restricted in terms of the prices that they charge for their products and services. The regulatory commissions that determine "reasonable" prices base them on the assumption that these companies have to earn a fair rate of return for their equity investors. To come up with this fair rate of return, they need estimates of equity risk premiums; using higher equity risk premiums will translate into higher prices for the customers in these companies.[1]
- Judgments about how much you should save for your retirement or health care and where you should invest your savings are clearly affected by how much return you think you can make on your investments. Being over optimistic about equity risk premiums will lead you to save too little to meet future needs and to over investment in risky asset classes.

Thus, the debate about equity risk premiums has implications for almost every aspect of our lives.

What are the determinants of equity risk premiums?

Before we consider different approaches for estimating equity risk premiums, we should examine the factors that determine equity risk premiums. After all, equity risk

[1] The Society of Utility and Regulatory Financial Analysts (SURFA) has annual meetings of analysts involved primarily in this debate. Not surprisingly, they spend a good chunk of their time discussing equity risk premiums, with analysts working for the utility firms arguing for higher equity risk premiums and analysts working for the state or regulatory authorities wanting to use lower risk premiums.

premiums should reflect not only the risk that investors see in equity investments but also the price they put on that risk.

Risk Aversion and Consumption Preferences

The first and most critical factor, obviously, is the risk aversion of investors in the markets. As investors become more risk averse, equity risk premiums will climb, and as risk aversion declines, equity risk premiums will fall. While risk aversion will vary across investors, it is the collective risk aversion of investors that determines equity risk premium, and changes in that collective risk aversion will manifest themselves as changes in the equity risk premium. While there are numerous variables that influence risk aversion, we will focus on the variables most likely to change over time.

a. Investor Age: There is substantial evidence that individuals become more risk averse as they get older. The logical follow up to this proposition is that markets with older investors, in the aggregate, should have higher risk premiums than markets with younger investors, for any given level of risk. Bakshi and Chen (1994), for instance, examined risk premiums in the United States and noted an increase in risk premiums as investors aged.[2] Liu and Spiegel computed the ratio of the middle-age cohort (40-49 years) to the old-age cohort (60-69) and found that PE ratios are closely and positively related to the MO ratio for the US equity market from 1954 to 2010; since the equity risk premium is inversely related to the PE, this would suggest that investor age does play a role in determining equity risk premiums.[3]
b. Preference for current consumption: We would expect the equity risk premium to increase as investor preferences for current over future consumption increase. Put another way, equity risk premiums should be lower, other things remaining equal, in markets where individuals are net savers than in markets where individuals are net consumers. Consequently, equity risk premiums should increase as savings rates decrease in an economy. Rieger, Wang and Hens (2012) compare equity risk premiums and time discount factors across 27 countries and find that premiums are higher in countries where investors are more short term.[4]

Relating risk aversion to expected equity risk premiums is not straightforward. While the direction of the relationship is simple to establish – higher risk aversion should translate

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[2] Bakshi, G. S., and Z. Chen, 1994, *Baby Boom, Population Aging, and Capital Markets*, The Journal of Business, LXVII, 165-202.

[3] Liu, Z. and M.M. Siegel, 2011, *Boomer Retirement: Headwinds for US Equity Markets?* FRBSF Economic Letter

[4] Rieger, M.O., M. Wang and T. Hens, 2012, International Evidence on the Equity Risk Premium Puzzle and Time Discounting, SSRN Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2120442

into higher equity risk premiums- getting beyond that requires us to be more precise in our judgments about investor utility functions, specifying how investor utility relates to wealth (and variance in that wealth). As we will see later in this paper, there has been a significant angst among financial economics that most conventional utility models do not do a good job of explaining observed equity risk premiums.

Economic Risk

The risk in equities as a class comes from more general concerns about the health and predictability of the overall economy. Put in more intuitive terms, the equity risk premium should be lower in an economy with predictable inflation, interest rates and economic growth than in one where these variables are volatile. Lettau, Ludwigson and Wachter (2008) link the changing equity risk premiums in the United States to shifting volatility in the real economy.[5] In particular, they attribute that that the lower equity risk premiums of the 1990s (and higher equity values) to reduced volatility in real economic variables including employment, consumption and GDP growth. One of the graphs that they use to illustrate the correlation looks at the relationship between the volatility in GDP growth and the dividend/ price ratio (which is the loose estimate that they use for equity risk premiums), and it is reproduced in figure 1.

[5] Lettau, M., S.C. Ludvigson and J.A. Wachter, 2008. *The Declining Equity Risk Premium: What role does macroeconomic risk play?* Review of Financial Studies, v21, 1653-1687.

Figure 1: Volatility in GDP growth and Equity Risk Premiums (US)

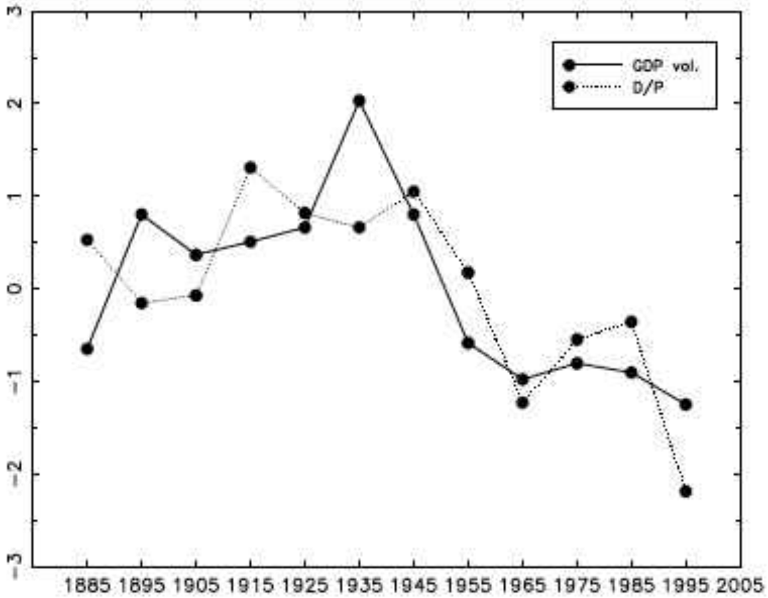

Figure 3
GDP volatility and the D/P ratio—Prewar evidence
This figure plots the standard deviations of GDP growth and the mean D/P ratio by decade starting in 1880 until 2000. Both series are demeaned and divided by their standard deviation. The GDP data are from Ray Fair's website (http://fairmodel.econ.yale.edu/RAYFAIR/PDF/2002DTBL.HTM) based on Balke and Gordon (1989). The dividend yield data is from Robert Shiller's website (http://aida.econ.yale.edu/~shiller/data/ie_data.htm).

Note how closely the dividend yield has tracked the volatility in the real economy over this very long time period.

Gollier (2001) noted that the linear absolute risk tolerance often assumed in standard models breaks down when there is income inequality and the resulting concave absolute risk tolerance should lead to higher equity risk premiums.[6] Hatchondo (2008) attempted to quantify the impact on income inequality on equity risk premiums. In his model, which is narrowly structured, the equity risk premium is higher in an economy with unequal income than in an egalitarian setting, but only by a modest amount (less than 0.50%).[7]

A related strand of research examines the relationship between equity risk premium and inflation, with mixed results. Studies that look at the relationship between the level of inflation and equity risk premiums find little or no correlation. In contrast, Brandt and Wang (2003) argue that news about inflation dominates news about real economic growth and consumption in determining risk aversion and risk premiums.[8]

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[6] Gollier, C., 2001. Wealth Inequality and Asset Pricing, Review of Economic Studies, v68, 181–203.

[7] Hatchondo, J.C., 2008, A Quantitative Study of the Role of Income Inequality on Asset Prices, Economic Quarterly, v94, 73–96.

[8] Brandt, M.W. and K.Q. Wang. 2003. *Time-varying risk aversion and unexpected inflation*,

They present evidence that equity risk premiums tend to increase if inflation is higher than anticipated and decrease when it is lower than expected. Another strand of research on the Fisher equation, which decomposes the riskfree rate into expected inflation and a real interest rate, argues that when inflation is stochastic, there should be a third component in the risk free rate: an inflation risk premium, reflecting uncertainty about future inflation.[9] Reconciling the findings, it seems reasonable to conclude that it is not so much the level of inflation that determines equity risk premiums but uncertainty about that level, and that some of the inflation uncertainty premium may be captured in the risk free rate, rather than in the equity risk premiums.

Information

When you invest in equities, the risk in the underlying economy is manifested in volatility in the earnings and cash flows reported by individual firms in that economy. Information about these changes is transmitted to markets in multiple ways, and it is clear that there have been significant changes in both the quantity and quality of information available to investors over the last two decades. During the market boom in the late 1990s, there were some who argued that the lower equity risk premiums that we observed in that period were reflective of the fact that investors had access to more information about their investments, leading to higher confidence and lower risk premiums in 2000. After the accounting scandals that followed the market collapse, there were others who attributed the increase in the equity risk premium to deterioration in the quality of information as well as information overload. In effect, they were arguing that easy access to large amounts of information of varying reliability was making investors less certain about the future.

As these contrary arguments suggest, the relationship between information and equity risk premiums is complex. More precise information should lead to lower equity risk premiums, other things remaining equal. However, precision here has to be defined in terms of what the information tells us about future earnings and cash flows. Consequently, it is possible that providing more information about last period's earnings may create more uncertainty about future earnings, especially since investors often disagree about how best to interpret these numbers. Yee (2006) defines earnings quality

Journal of Monetary Economics, v50, pp. 1457-1498.

[9] Benninga, S., and A. Protopapadakis. "Real and Nominal Interest Rates under Uncertainty: The Fisher Problem and the Term Structure," Journal of Political Economy, vol. 91, pp. 856–67.

in terms of volatility of future earnings and argues that equity risk premiums should increase (decrease) as earnings quality decreases (increases).[10]

Empirically, is there a relationship between earnings quality and observed equity risk premiums? The evidence is mostly anecdotal, but there are several studies that point to the deteriorating quality of earnings in the United States, with the blame distributed widely. First, the growth of technology and service firms has exposed inconsistencies in accounting definitions of earnings and capital expenditures – the treatment of R&D as an operating expense is a prime example. Second, audit firms have been accused of conflicts of interest leading to the abandonment of their oversight responsibility. Finally, the earnings game, where analysts forecast what firms will earn and firms then try to beat these forecasts has led to the stretching (and breaking) of accounting rules and standards. If earnings have become less informative in the aggregate, it stands to reason that equity investors will demand large equity risk premiums to compensate for the added uncertainty.

Information differences may be one reason why investors demand larger risk premiums in some emerging markets than in others. After all, markets vary widely in terms of transparency and information disclosure requirements. Markets like Russia, where firms provide little (and often flawed) information about operations and corporate governance, should have higher risk premiums than markets like India, where information on firms is not only more reliable but also much more easily accessible to investors. Lau, Ng and Zhang (2011) look at time series variation in risk premiums in 41 countries and conclude that countries with more information disclosure, measured using a variety of proxies, have less volatile risk premiums and that the importance of information is heightened during crises (illustrated using the 1997 Asian financial crisis and the 2008 Global banking crisis).[11]

Liquidity

In addition to the risk from the underlying real economy and imprecise information from firms, equity investors also have to consider the additional risk created by illiquidity. If investors have to accept large discounts on estimated value or pay high transactions costs to liquidate equity positions, they will be pay less for equities today (and thus demand a large risk premium).

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[10] Yee, K. K. (2006), *Earnings Quality and the Equity Risk Premium: A Benchmark Model*, Contemporary Accounting Research, 23: 833–877.

[11] Lau. S.T., L. Ng and B. Zhang, 2011, *Information Environment and Equity Risk Premium Volatility around the World*, Management Science, Forthcoming.

The notion that market for publicly traded stocks is wide and deep has led to the argument that the net effect of illiquidity on aggregate equity risk premiums should be small. However, there are two reasons to be skeptical about this argument. The first is that not all stocks are widely traded and illiquidity can vary widely across stocks; the cost of trading a widely held, large market cap stock is very small but the cost of trading an over-the-counter stock will be much higher. The second is that the cost of illiquidity in the aggregate can vary over time, and even small variations can have significant effects on equity risk premiums. In particular, the cost of illiquidity seems to increase when economies slow down and during periods of crisis, thus exaggerating the effects of both phenomena on the equity risk premium.

While much of the empirical work on liquidity has been done on cross sectional variation across stocks (and the implications for expected returns), there have been attempts to extend the research to look at overall market risk premiums. Gibson and Mougeot (2004) look at U.S. stock returns from 1973 to 1997 and conclude that liquidity accounts for a significant component of the overall equity risk premium, and that its effect varies over time.[12] Baekart, Harvey and Lundblad (2006) present evidence that the differences in equity returns (and risk premiums) across emerging markets can be partially explained by differences in liquidity across the markets.[13]

Catastrophic Risk

When investing in equities, there is always the potential for catastrophic risk, i.e. events that occur infrequently but can cause dramatic drops in wealth. Examples in equity markets would include the great depression from 1929-30 in the United States and the collapse of Japanese equities in the last 1980s. In cases like these, many investors exposed to the market declines saw the values of their investments drop so much that it was unlikely that they would be made whole again in their lifetimes.[14] While the possibility of catastrophic events occurring may be low, they cannot be ruled out and the equity risk premium has to reflect that risk.

Rietz (1988) uses the possibility of catastrophic events to justify higher equity risk premiums and Barro (2006) extends this argument. In the latter's paper, the catastrophic

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[12] Gibson R., Mougeot N., 2004, *The Pricing of Systematic Liquidity Risk: Empirical Evidence from the US Stock Market*. Journal of Banking and Finance, v28: 157–78.

[13] Bekaert G., Harvey C. R., Lundblad C., 2006, *Liquidity and Expected Returns: Lessons from Emerging Markets*, The Review of Financial Studies.

[14] An investor in the US equity markets who invested just prior to the crash of 1929 would not have seen index levels return to pre-crash levels until the 1940s. An investor in the Nikkei in 1987, when the index was at 40000, would still be facing a deficit of 50% (even after counting dividends) in 2008,

risk is modeled as both a drop in economic output (an economic depression) and partial default by the government on its borrowing.[15] Gabaix (2009) extends the Barro-Rietz model to allow for time varying losses in disasters.[16] Barro, Nakamura, Steinsson and Ursua (2009) use panel data on 24 countries over more than 100 years to examine the empirical effects of disasters.[17] They find that the average length of a disaster is six years and that half of the short run impact is reversed in the long term. Investigating the asset pricing implications, they conclude that the consequences for equity risk premiums will depend upon investor utility functions, with some utility functions (power utility, for instance) yielding low premiums and others generating much higher equity risk premiums. Barro and Ursua (2008) look back to 1870 and identify 87 crises through 2007, with an average impact on stock prices of about 22%, and estimate that investors would need to generate an equity risk premium of 7% to compensate for risk taken.[18] Wachter (2012) builds a consumption model, where consumption follows a normal distribution with low volatility most of the time, with a time-varying probability of disasters, that explains high equity risk premiums.[19]

The banking and financial crisis of 2008, where financial and real estate markets plunged in the last quarter of the year, has provided added ammunition to this school. As we will see later in the paper, risk premiums in all markets (equity, bond and real estate) climbed sharply during the weeks of the market crisis. In fact, the series of macro crises in the last four years that have affected markets all over the world has led some to hypothesize that the globalization may have increased the frequency and probability of disasters and by extension, equity risk premiums, in all markets.

Government Policy

The prevailing wisdom, at least until 2008, was that while government policy affected equity risk premiums in emerging markets, it was not a major factor in determining equity risk premiums in developed markets. The banking crisis of 2008 and the government responses to it have changed some minds, as both the US government

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15 Rietz, T. A., 1988, *The equity premium~: A solution*, Journal of Monetary Economics, v22, 117-131; Barro R J., 2006, *Rare Disasters and Asset Markets in the Twentieth Century*, Quarterly Journal of Economics, August, 823-866.

16 Gabaix, Xavier. (2009), "Variable Rare Disasters: An Exactly Solved Framework for Ten Puzzles in Macro-Finance." AFA 2009 San Francisco Meetings Paper. Available at http://ssrn.com/abstract=1106298.

17 Barro, R., E. Nakamura, J. Steinsson and J. Ursua, 2009, Crises and Recoveries in an Empirical Model of Consumption Disasters, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1594554.

18 Barro, R. and J. Ursua, 2008, Macroeconomic Crises since 1870, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1124864.

19 Wachter, J.A., 2012, Can time-varying risk of rare disasters explain aggregate stock market volatility?, Forthcoming in Journal of Finance.

and European governments have made policy changes that at times have calmed markets and at other times roiled them, potentially affecting equity risk premiums.

Pastor and Veronesi (2011) argue that uncertainty about government policy can translate into higher equity risk premiums.[20] The model they develop has several testable implications. First, government policy changes will be more likely just after economic downturns, thus adding policy uncertainty to general economic uncertainty and pushing equity risk premiums upwards. Second, you should expect to see stock prices fall, on average, across all policy changes, with the magnitude of the negative returns increasing for policy changes create more uncertainty. Third, policy changes will increase stock market volatility and the correlation across stocks.

The behavioral/ irrational component

Investors do not always behave rationally, and there are some who argue that equity risk premiums are determined, at least partially, by quirks in human behavior. While there are several strands to this analysis, we will focus on two:

a. <u>The Money Illusion</u>: As equity prices declined significantly and inflation rates increased in the late 1970s, Modigliani and Cohn (1979) argued that low equity values of that period were the consequence of investors being inconsistent about their dealings with inflation. They argued that investors were guilty of using historical growth rates in earnings, which reflected past inflation, to forecast future earnings, but current interest rates, which reflected expectations of future inflation, to estimate discount rates.[21] When inflation increases, this will lead to a mismatch, with high discount rates and low cash flows resulting in asset valuations that are too low (and risk premiums that are too high). In the Modigliani-Cohn model, equity risk premiums will rise in periods when inflation is higher than expected and drop in periods when inflation in lower than expected. Campbell and Voulteenaho (2004) update the Modigliani-Cohn results by relating changes in the dividend to price ratio to changes in the inflation rate over time and find strong support for the hypothesis.[22]
b. <u>Narrow Framing:</u> In conventional portfolio theory, we assume that investors assess the risk of an investment in the context of the risk it adds to their overall

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[20] Pastor, L. and P. Veronesi, 2011, Uncertainty about government policy and stock prices, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1625572.
[21] Modigliani, Franco and Cohn, Richard. 1979, *Inflation, Rational Valuation, and the Market*, Financial Analysts Journal, v37(3), pp. 24-44.
[22] Campbell, J.Y. and T. Vuolteenaho, 2004, *Inflation Illusion and Stock Prices,* American Economic Review, v94, 19-23.

portfolio, and demand a premium for this risk. Behavioral economists argue that investors offered new gambles often evaluate those gambles in isolation, separately from other risks that they face in their portfolio, leading them to over estimate the risk of the gamble. In the context of the equity risk premium, Benartzi and Thaler (1995) use this "narrow framing" argument to argue that investors over estimate the risk in equity, and Barberis, Huang and Santos (2001) build on this theme.[23]

The Equity Risk Premium Puzzle

While many researchers have focused on individual determinants of equity risk premiums, there is a related question that has drawn almost as much attention. Are the equity risk premiums that we have observed in practice compatible with the theory? Mehra and Prescott (1985) fired the opening shot in this debate by arguing that the observed historical risk premiums (which they estimated at about 6% at the time of their analysis) were too high, and that investors would need implausibly high risk-aversion coefficients to demand these premiums.[24] In the years since, there have been many attempts to provide explanations for this puzzle:

1. <u>Statistical artifact</u>: The historical risk premium obtained by looking at U.S. data is biased upwards because of a survivor bias (induced by picking one of the most successful equity markets of the twentieth century). The true premium, it is argued, is much lower. This view is backed up by a study of large equity markets over the twentieth century, which concluded that the historical risk premium is closer to 4% than the 6% cited by Mehra and Prescott.[25] However, even the lower risk premium would still be too high, if we assumed reasonable risk aversion coefficients.
2. <u>Disaster Insurance</u>: A variation on the statistical artifact theme, albeit with a theoretical twist, is that the observed volatility in an equity market does not fully capture the potential volatility, which could include rare but disastrous events that reduce consumption and wealth substantially. Reitz, referenced earlier, argues that investments that have dividends that are proportional to consumption (as stocks do) should earn much higher returns than riskless investments to compensate for

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[23] Benartzi, S. and R. Thaler, 1995, *Myopic Loss Aversion and the Equity Premium Puzzle*, Quarterly Journal of Economics; Barberis, N., M. Huang, and T. Santos, 2001, Prospect Theory and Asset Prices, Quarterly Journal of Economics, v 116(1), 1-53.

[24] Mehra, Rajnish, and Edward C.Prescott, 1985, *The Equity Premium: A Puzzle*, Journal of Monetary Economics, v15, 145–61. Using a constant relative risk aversion utility function and plausible risk aversion coefficients, they demonstrate the equity risk premiums should be much lower (less than 1%).

[25] Dimson, E., P. March and M. Staunton, 2002, *Triumph of the Optimists*, Princeton University Press.

the possibility of a disastrous drop in consumption. Prescott and Mehra (1988) counter than the required drops in consumption would have to be of such a large magnitude to explain observed premiums that this solution is not viable.[26] Berkman, Jacobsen and Lee (2010) use data from 447 international political crises between 1918 and 2006 to create a crisis index and note that increases in the index increase equity risk premiums, with disproportionately large impacts on the industries most exposed to the crisis.[27]

3. Taxes: One possible explanation for the high equity returns in the period after the Second World War is the declining marginal tax rate during that period. McGrattan and Prescott (2001), for instance, provide a hypothetical illustration where a drop in the tax rate on dividends from 50% to 0% over 40 years would cause equity prices to rise about 1.8% more than the growth rate in GDP; adding the dividend yield to this expected price appreciation generates returns similar to the observed equity risk premium.[28] In reality, though, the drop in marginal tax rates was much smaller and cannot explain the surge in equity risk premiums.
4. Alternative Preference Structures: There are some who argue that the equity risk premium puzzle stems from its dependence upon conventional expected utility theory to derive premiums. In particular, the constant relative risk aversion (CRRA) function used by Mehra and Prescott in their paper implies that if an investor is risk averse to variation in consumption across different states of nature at a point in time, he or she will also be equally risk averse to consumption variation across time. Epstein and Zin consider a class of utility functions that separate risk aversion (to consumption variation at a point in time) from risk aversion to consumption variation across time. They argue that individuals are much more risk averse when it comes to the latter and claim that this phenomenon explain the larger equity risk premiums.[29] Put in more intuitive terms, individuals will choose a lower and more stable level of wealth and consumption that they can sustain over the long term over a higher level of wealth and consumption that varies widely from period to period. Constantinides (1990) adds to this argument

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[26] Mehra, R. and E.C. Prescott, 1988, *The Equity Risk Premium: A Solution?* Journal of Monetary Economics, v22, 133-136.

[27] Berkman, H., B. Jacobsen and J. Lee, 2010, Time-varying Disaster Risk and Stock Returns, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1572042.

[28] McGrattan, E.R., and E.C. Prescott. 2001, *Taxes, Regulations, and Asset Prices*, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=292522.

[29] Epstein, L.G., and S.E. Zin. 1991. *Substitution, Risk Aversion, and the Temporal Behavior of Consumption and Asset Returns: An Empirical Analysis*, Journal of Political Economy, v99, no. 2 (April):263–286.

by noting that individuals become used to maintaining past consumption levels and that even small changes in consumption can cause big changes in marginal utility. The returns on stocks are correlated with consumption, decreasing in periods when people have fewer goods to consume (recessions, for instance); the additional risk explains the higher observed equity risk premiums.[30]

5. Myopic Loss Aversion: Myopic loss aversion refers to the finding in behavioral finance that the loss aversion already embedded in individuals becomes more pronounced as the frequency of their monitoring increases. Thus, investors who receive constant updates on equity values actually perceive more risk in equities, leading to higher risk premiums. The paper that we cited earlier by Benartzi and Thaler yields estimates of the risk premium very close to historical levels using a one-year time horizon for investors with plausible loss aversion characteristics (of about 2, which is backed up by the experimental research).

In conclusion, it is not quite clear what to make of the equity risk premium puzzle. It is true that historical risk premiums are higher than could be justified using conventional utility models for wealth. However, that may tell us more about the dangers of using historical data and the failures of classic utility models than they do about equity risk premiums. In fact, the last decade of poor stock returns in the US and declining equity risk premiums may have made the equity risk premium puzzle less of a puzzle, since explaining a historical premium of 4% (the premium in 2011) is far easier than explaining a historical premium of 6% (the premium in 1999).

Estimation Approaches

There are three broad approaches used to estimate equity risk premiums. One is to survey subsets of investors and managers to get a sense of their expectations about equity returns in the future. The second is to assess the returns earned in the past on equities relative to riskless investments and use this historical premium as the expectation. The third is to attempt to estimate a forward-looking premium based on the market rates or prices on traded assets today; we will categorize these as implied premiums.

Survey Premiums

If the equity risk premium is what investors demand for investing in risky assets today, the most logical way to estimate it is to ask these investors what they require as expected returns. Since investors in equity markets number in the millions, the challenge

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[30] Constantinides, G.M. 1990. *Habit Formation: A Resolution of the Equity Premium Puzzle*, Journal of Political Economy, v98, no. 3 (June):519–543.

is often finding a subset of investors that best reflects the aggregate market. In practice, se see surveys of investors, managers and even academics, with the intent of estimating an equity risk premium.

Investors

When surveying investors, we can take one of two tacks. The first is to focus on individual investors and get a sense of what they expect returns on equity markets to be in the future. The second is to direct the question of what equities will deliver as a premium at portfolio managers and investment professionals, with the rationale that their expectations should matter more in the aggregate, since they have the most money to invest.

a. Individual Investors: The oldest continuous index of investor sentiment about equities was developed by Robert Shiller in the aftermath of the crash of 1987 and has been updated since.[31] UBS/Gallup has also polled individual investors since 1996 about their optimism about future stock prices and reported a measure of investor sentiment.[32] While neither survey provides a direct measure of the equity risk premium, they both yield broad measure of where investors expect stock prices to go in the near future. The Securities Industry Association (SIA) surveyed investors from 1999 to 2004 on the expected return on stocks and yields numbers that can be used to extract equity risk premiums. In the 2004 survey, for instance, they found that the median expected return across the 1500 U.S. investors they questioned was 12.8%, yielding a risk premium of roughly 8.3% over the treasury bond rate at that time.[33]
b. Institutional Investors/ Investment Professionals: Investors Intelligence, an investment service, tracks more than a hundred newsletters and categorizes them as bullish, bearish or neutral, resulting in a consolidated advisor sentiment index about the future direction of equities. Like the Shiller and UBS surveys, it is a directional survey that does not yield an equity risk premium. Merrill Lynch, in its monthly survey of institutional investors globally, explicitly poses the question about equity risk premiums to these investors. In its February 2007 report, for instance, Merrill reported an average equity risk premium of 3.5% from the survey, but that number

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[31] The data is available at http://icf.som.yale.edu/Confidence.Index.
[32] The data is available at http://www.ubs.com/1/e/about/research/indexofinvestoroptimism/pressroomeu_5/uspressroom/archive.html
[33] See http://www.sifma.org/research/surveys/Surveys.html. The 2004 survey seems to be the last survey done by SIA. The survey yielded expected stock returns of 10% in 2003, 13% in 2002, 19% in 2001, 33% in 2000 and 30% in 1999.

jumped to 4.1% by March, after a market downturn.[34] As markets settled down in 2009, the survey premium has also settled back to 3.76% in January 2010. Through much of 2010, the survey premium stayed in a tight range (3.85% - 3.90%) but the premium climbed to 4.08% in the January 2012 update. In January 2013, the survey yielded a risk premium of 4.8%, though it may not be directly comparable to the earlier numbers because of changes in the survey.[35]

While survey premiums have become more accessible, very few practitioners seem to be inclined to use the numbers from these surveys in computations and there are several reasons for this reluctance:

1. Survey risk premiums are responsive to recent stock prices movements, with survey numbers generally increasing after bullish periods and decreasing after market decline. Thus, the peaks in the SIA survey premium of individual investors occurred in the bull market of 1999, and the more moderate premiums of 2003 and 2004 occurred after the market collapse in 2000 and 2001.
2. Survey premiums are sensitive not only to whom the question is directed at but how the question is asked. For instance, individual investors seem to have higher (and more volatile) expected returns on equity than institutional investors and the survey numbers vary depending upon the framing of the question.[36]
3. In keeping with other surveys that show differences across sub-groups, the premium seems to vary depending on who gets surveyed. Kaustia, Lehtoranta and Puttonen (2011) surveyed 1,465 Finnish investment advisors and note that not only are male advisors more likely to provide an estimate but that their estimated premiums are roughly 2% lower than those obtained from female advisors, after controlling for experience, education and other factors.[37]
4. Studies that have looked at the efficacy of survey premiums indicate that if they have any predictive power, it is in the wrong direction. Fisher and Statman (2000) document the negative relationship between investor sentiment (individual and institutional) and stock returns.[38] In other words, investors becoming more

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[34] See http://www.ml.com/index.asp?id=7695_8137_47928.

[35] Global Fund Manager Survey, Bank of America Merrill Lynch, February 2012.

[36] Asking the question "What do you think stocks will do next year?" generates different numbers than asking "What should the risk premium be for investing in stocks?"

[37] Kaustia, M., A. Lehtoranta and V. Puttonen, 2011, *Sophistication and Gender Effects in Financial Advisers Expectations*, Working Paper, Aalto University.

[38] Fisher, K.L., and M. Statman, 2000, *Investor Sentiment and Stock Returns*, Financial Analysts Journal, v56, 16-23.

optimistic (and demanding a larger premium) is more likely to be a precursor to poor (rather than good) market returns.

As technology aids the process, the number and sophistication of surveys of both individual and institutional investors will also increase. However, it is also likely that these survey premiums will be more reflections of the recent past rather than good forecasts of the future.

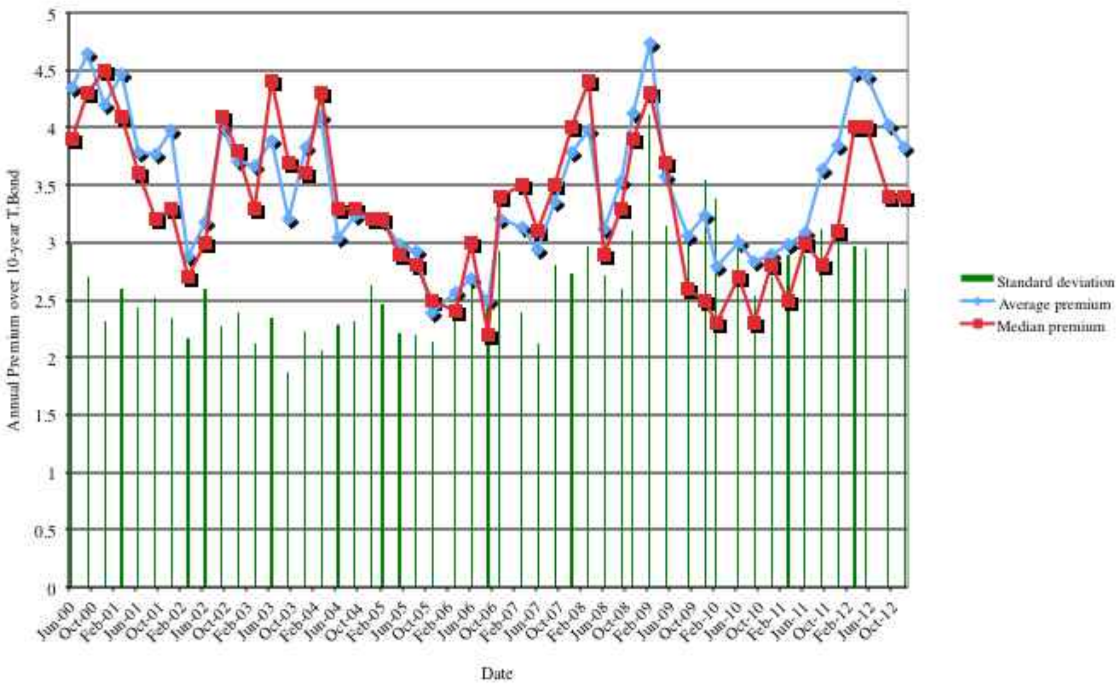
Managers

As noted in the first section, equity risk premiums are a key input not only in investing but also in corporate finance. The hurdle rates used by companies – costs of equity and capital – are affected by the equity risk premiums that they use and have significant consequences for investment, financing and dividend decisions. Graham and Harvey have been conducting annual surveys of Chief Financial Officers (CFOs) or companies for roughly the last decade with the intent of estimating what these CFOs think is a reasonable equity risk premium (for the next 10 years over the ten-year bond rate). In their January 2013 survey, conducted over the last six months of 2012, they report an average equity risk premium of 3.83% across survey respondents, down slightly from the average premium of 3.95% a year earlier. The median premium in the January 2013 survey was 3.4%.[39]

To get a sense of how these assessed equity risk premiums have behaved over time, we have graphed the average and median values of the premium and the cross sectional standard deviation in the estimates in each CFO survey, from 2001 to 2012, in Figure 2.

[39] Graham, J.R. and C.R. Harvey, 2013, *The Equity Risk Premium in 2013*, Working paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2206538. See also Graham, J.R. and C.R. Harvey, 2009, *The Equity Risk Premium amid a Global Financial Crisis*, Working paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1405459.

Figure 2: CFO Survey Premiums



Note the survey premium peak was in February 2009, right after the crisis, at 4.74% and had its lowest recording (2.47%) in September 2006. The average across all 13 years of surveys (about 9000 responses) was 3.53%, but the standard deviation in the survey responses did surge after the 2008 crisis.

Academics

Academics are neither big players in equity markets nor do they make many major corporate finance decisions. Notwithstanding this lack of real world impact, what they think about equity risk premiums may matter for two reasons. The first is that many of the portfolio managers and CFOs that were surveyed in the last two sub-sections received their first exposure to the equity risk premium debate in the classroom and may have been influenced by what was presented as the right risk premium in that setting. The second is that practitioners often offer academic work (textbooks and papers) as backing for the numbers that they use.

Welch (2000) surveyed 226 financial economists on the magnitude of the equity risk premium and reported interesting results. On average, economists forecast an average annual risk premium (arithmetic) of about 7% for a ten-year time horizon and 6-7% for one to five-year time horizons. As with the other survey estimates, there is a wide range on the estimates, with the premiums ranging from 2% at the pessimistic end to 13%

at the optimistic end. Interestingly, the survey also indicates that economists believe that their estimates are higher than the consensus belief and try to adjust the premiums down to reflect that view.[40]

Fernandez (2010) examined widely used textbooks in corporate finance and valuation and noted that equity risk premiums varied widely across the books and that the moving average premium has declined from 8.4% in 1990 to 5.7% in 2010.[41] In a more recent survey, Fernandez, Aguirreamalloa and L. Corres (2011) compared both the level and standard deviation of equity risk premium estimates for analysts, companies and academics in the United States:[42]

Group	*Average Equity Risk Premium*	*Standard deviation in Equity Risk Premium estimates*
Academics	5.6%	1.6%
Analysts	5.0%	1.1%
Companies	5.5%	1.6%

The range on equity risk premiums in use is also substantial, with a low of 1.5% and a high of 15%, often citing the same sources. The same authors also report survey responses from the same groups (academics, analysts and companies) in 82 countries in 2013 and note that those in emerging markets use higher risk premiums (not surprisingly) than those in developed markets.[43]

Historical Premiums

While our task is to estimate equity risk premiums in the future, much of the data we use to make these estimates is in the past. Most investors and managers, when asked to estimate risk premiums, look at historical data. In fact, the most widely used approach to estimating equity risk premiums is the historical premium approach, where the actual returns earned on stocks over a long time period is estimated, and compared to the actual returns earned on a default-free (usually government security). The difference, on an

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[40] Welch, I., 2000, *Views of Financial Economists on the Equity Premium and on Professional Controversies*, Journal of Business, v73, 501-537.

[41] Fernandez, P., 2010, *The Equity Premium in 150 Textbooks*, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1473225. He notes that the risk premium actually varies within the book in as many as a third of the textbooks surveyed.

[42] Fernandez, P., J. Aguirreamalloa and L. Corres, 2011, Equity Premium used in 2011 for the USA by Analysts, Companies and Professors: A Survey, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1805852&rec=1&srcabs=1822182.

[43] Fernandez, P., J. Aguirreamalloa and L. Corres, 2013, Market Risk Premium used in 82 countries in 2012, A Survey with 7192 Answers, SSRN #2084213.

annual basis, between the two returns is computed and represents the historical risk premium. In this section, we will take a closer look at the approach.

Estimation Questions and Consequences

While users of risk and return models may have developed a consensus that historical premium is, in fact, the best estimate of the risk premium looking forward, there are surprisingly large differences in the actual premiums we observe being used in practice, with the numbers ranging from 3% at the lower end to 12% at the upper end. Given that we are almost all looking at the same historical data, these differences may seem surprising. There are, however, three reasons for the divergence in risk premiums: different time periods for estimation, differences in riskfree rates and market indices and differences in the way in which returns are averaged over time.

1. Time Period

Even if we agree that historical risk premiums are the best estimates of future equity risk premiums, we can still disagree about how far back in time we should go to estimate this premium. Ibbotson Associates, which is the most widely used estimation service, has stock return data and risk free rates going back to 1926,[44] and there are other less widely used databases that go further back in time to 1871 or even to 1792.[45]

While there are many analysts who use all the data going back to the inception date, there are almost as many analysts using data over shorter time periods, such as fifty, twenty or even ten years to come up with historical risk premiums. The rationale presented by those who use shorter periods is that the risk aversion of the average investor is likely to change over time, and that using a shorter and more recent time period provides a more updated estimate. This has to be offset against a cost associated with using shorter time periods, which is the greater noise in the risk premium estimate. In fact, given the annual standard deviation in stock returns[46] between 1926 and 2012 of

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[44] Ibbotson Stocks, Bonds, Bills and Inflation Yearbook (SBBI), 2011 Edition, Morningstar.

[45] Siegel, in his book, Stocks for the Long Run, estimates the equity risk premium from 1802-1870 to be 2.2% and from 1871 to 1925 to be 2.9%. (Siegel, Jeremy J., Stocks for the Long Run, Second Edition, McGraw Hill, 1998). Goetzmann and Ibbotson estimate the premium from 1792 to 1925 to be 3.76% on an arithmetic average basis and 2.83% on a geometric average basis. Goetzmann. W.N. and R. G. Ibbotson, 2005, History and the Equity Risk Premium, Working Paper, Yale University. Available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=702341.

[46] For the historical data on stock returns, bond returns and bill returns check under "updated data" in http://www.damodaran.com.

19.88%, the standard error associated with the risk premium estimate can be estimated in table 2 follows for different estimation periods:[47]

Table 2: Standard Errors in Historical Risk Premiums

Estimation Period	*Standard Error of Risk Premium Estimate*
5 years	20%/ √5 = 8.94%
10 years	20%/ √10 = 6.32%
25 years	20% / √25 = 4.00%
50 years	20% / √50 = 2.83%
80 years	20% / √80 = 2.23%

Even using all of the entire Ibbotson data (about 85 years) yields a substantial standard error of 2.2%. Note that that the standard errors from ten-year and twenty-year estimates are likely to be almost as large or larger than the actual risk premium estimated. This cost of using shorter time periods seems, in our view, to overwhelm any advantages associated with getting a more updated premium.

What are the costs of going back even further in time (to 1871 or before)? First, the data is much less reliable from earlier time periods, when trading was lighter and record keeping more haphazard. Second, and more important, the market itself has changed over time, resulting in risk premiums that may not be appropriate for today. The U.S. equity market in 1871 more closely resembled an emerging market, in terms of volatility and risk, than a mature market. Consequently, using the earlier data may yield premiums that have little relevance for today's markets.

There are two other solutions offered by some researchers. The first is to break the annual data down into shorter return intervals – quarters or even months – with the intent of increasing the data points over any given time period. While this will increase the sample size, the effect on the standard error will be minimal.[48] The second is to use the entire data but to give a higher weight to more recent data, thus getting more updated premiums while preserving the data. While this option seems attractive, weighting more recent data will increase the standard error of the estimate. After all, using only the last ten years of data is an extreme form of time weighting, with the data during that period being weighted at one and the data prior to the period being weighted at zero.

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[47] The standard deviation in annual stock returns between 1928 and 2011 is 20.11%; the standard deviation in the risk premium (stock return – bond return) is a little higher at 21.62%. These estimates of the standard error are probably understated, because they are based upon the assumption that annual returns are uncorrelated over time. There is substantial empirical evidence that returns are correlated over time, which would make this standard error estimate much larger. The raw data on returns is provided in Appendix 1.

[48] If returns are uncorrelated over time, the variance in quarterly (monthly) risk premiums will be approximately one-quarter (one twelfth) the variance in annual risk premiums.

2. Riskfree Security and Market Index

The second estimation question we face relates to the riskfree rate. We can compare the expected return on stocks to either short-term government securities (treasury bills) or long term government securities (treasury bonds) and the risk premium for stocks can be estimated relative to either. Given that the yield curve in the United States has been upward sloping for most of the last eight decades, the risk premium is larger when estimated relative to short term government securities (such as treasury bills) than when estimated against treasury bonds.

Some practitioners and a surprising number of academics (and textbooks) use the treasury bill rate as the riskfree rate, with the alluring logic that there is no price risk in a treasury bill, whereas the price of a treasury bond can be affected by changes in interest rates over time. That argument does make sense, but only if we are interested in a single period equity risk premium (say, for next year). If your time horizon is longer (say 5 or 10 years), it is the treasury bond that provides the more predictable returns.[49] Investing in a 6-month treasury bill may yield a guaranteed return for the next six months, but rolling over this investment for the next five years will create reinvestment risk. In contrast, investing in a ten-year treasury bond, or better still, a ten-year zero coupon bond will generate a guaranteed return for the next ten years.[50]

The riskfree rate chosen in computing the premium has to be consistent with the riskfree rate used to compute expected returns. Thus, if the treasury bill rate is used as the riskfree rate, the premium has to be the premium earned by stocks over that rate. If the treasury bond rate is used as the riskfree rate, the premium has to be estimated relative to that rate. For the most part, in corporate finance and valuation, the riskfree rate will be a long-term default-free (government) bond rate and not a short-term rate. Thus, the risk premium used should be the premium earned by stocks over treasury bonds.

The historical risk premium will also be affected by how stock returns are estimated. Using an index with a long history, such as the Dow 30, seems like an obvious solution, but returns on the Dow may not be a good reflection of overall returns on stocks. In theory, at least, we would like to use the broadest index of stocks to compute returns, with two caveats. The first is that the index has to be market-weighted, since the overall returns on equities will be tilted towards larger market cap stocks. The second is

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[49] For more on risk free rates, see Damodaran, A., 2008, *What is the riskfree rate,* Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1317436.

[50] There is a third choice that is sometimes employed, where the short term government security (treasury bills) is used as the riskfree rate and a "term structure spread" is added to this to get a normalized long term rate.

that the returns should be free of survivor bias; estimating returns only on stocks that have survived that last 80 years will yield returns that are too high. Stock returns should incorporate those equity investments from earlier years that did not make it through the estimation period, either because the companies in question went bankrupt or were acquired.

Finally, there is some debate about whether the equity risk premiums should be computed using nominal returns or real returns. While the choice clearly makes a difference, if we estimate the return on stocks or the government security return standing alone, it is less of an issue, when computing equity risk premiums, where we look at the difference between the two values.

3. Averaging Approach

The final sticking point when it comes to estimating historical premiums relates to how the average returns on stocks, treasury bonds and bills are computed. The arithmetic average return measures the simple mean of the series of annual returns, whereas the geometric average looks at the compounded return[51]. Many estimation services and academics argue for the arithmetic average as the best estimate of the equity risk premium. In fact, if annual returns are uncorrelated over time, and our objective was to estimate the risk premium for the next year, the arithmetic average is the best and most unbiased estimate of the premium. There are, however, strong arguments that can be made for the use of geometric averages. First, empirical studies seem to indicate that returns on stocks are negatively correlated[52] over time. Consequently, the arithmetic average return is likely to over state the premium. Second, while asset pricing models may be single period models, the use of these models to get expected returns over long periods (such as five or ten years) suggests that the estimation period may be much longer than a year. In this context, the argument for geometric average premiums becomes stronger. Indro and Lee (1997) compare arithmetic and geometric premiums,

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[51] The compounded return is computed by taking the value of the investment at the start of the period (Value_0) and the value at the end (Value_N), and then computing the following:

$$\text{Geometric Average} = \left(\frac{\text{Value}_N}{\text{Value}_0}\right)^{1/N} - 1$$

[52] In other words, good years are more likely to be followed by poor years, and vice versa. The evidence on negative serial correlation in stock returns over time is extensive, and can be found in Fama and French (1988). While they find that the one-year correlations are low, the five-year serial correlations are strongly negative for all size classes. Fama, E.F. and K.R. French, 1992, *The Cross-Section of Expected Returns*, Journal of Finance, Vol 47, 427-466.

find them both wanting, and argue for a weighted average, with the weight on the geometric premium increasing with the time horizon.[53]

In closing, the averaging approach used clearly matters. Arithmetic averages will be yield higher risk premiums than geometric averages, but using these arithmetic average premiums to obtain discount rates, which are then compounded over time, seems internally inconsistent. In corporate finance and valuation, at least, the argument for using geometric average premiums as estimates is strong.

Estimates for the United States

The questions of how far back in time to go, what riskfree rate to use and how to average returns (arithmetic or geometric) may seem trivial until you see the effect that the choices you make have on your equity risk premium. Rather than rely on the summary values that are provided by data services, we will use raw return data on stocks, treasury bills and treasury bonds from 1928 to 2012 to make this assessment.[54] In figure 3, we begin with a chart of the annual returns on stock, treasury bills and bonds for each year:

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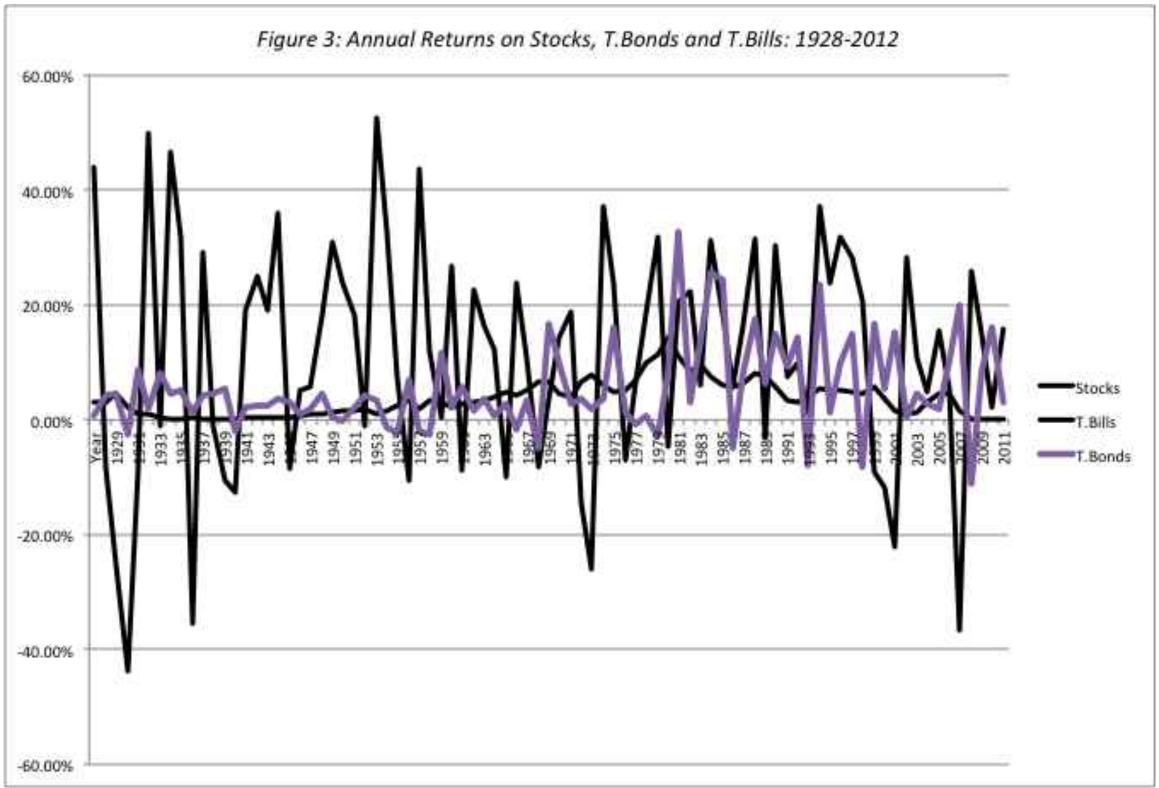
[53] Indro, D.C. and W. Y. Lee, 1997, *Biases in Arithmetic and Geometric Averages as Estimates of Long-run Expected Returns and Risk Premium*, Financial Management, v26, 81-90.

[54] The raw data for treasury rates is obtained from the Federal Reserve data archive (http://research.stlouisfed.org/fred2/) at the Fed site in St. Louis, with the 3-month treasury bill rate used for treasury bill returns and the 10-year treasury bond rate used to compute the returns on a constant maturity 10-year treasury bond. The stock returns represent the returns on the S&P 500. Appendix 1 provides the returns by year on stocks, bonds and bills, by year, from 1928 through the current year.



It is difficult to make much of this data other than to state the obvious, which is that stock returns are volatile, which is at the core of the demand for an equity risk premium in the first place. In table 3, we present summary statistics for stock, 3-month Treasury bill and ten-year Treasury bond returns from 1928 to 2012:

Table 3: Summary Statistics- U.S. Stocks, T.Bills and T. Bonds- 1928-2012

	Stocks	*T. Bills*	*T. Bonds*
Mean	11.26%	3.61%	5.38%
Standard Error	2.17%	0.33%	0.84%
Median	14.22%	3.16%	3.61%
Standard Deviation	20.00%	3.05%	7.74%
Kurtosis	2.9487	3.8197	4.5021
Skewness	-0.3879	0.9531	1.0304
Minimum	-43.84%	0.03%	-11.12%
Maximum	52.56%	14.28%	32.81%
25th percentile	-1.20%	1.04%	1.31%
75th percentile	25.72%	5.45%	8.71%

While U.S. equities have delivered much higher returns than treasuries over this period, they have also been more volatile, as evidenced both by the higher standard deviation in returns and by the extremes in the distribution. Using this table, we can take a first shot at estimating a risk premium by taking the difference between the average returns on stocks and the average return on treasuries, yielding a risk premium of 7.65% for stocks over

T.Bills (11.26%-3.61%) and 5.88% for stocks over T.Bonds (11.26%-5.38%). Note, though, that these represent arithmetic average, long-term premiums for stocks over treasuries.

How much will the premium change if we make different choices on historical time periods, riskfree rates and averaging approaches? To answer this question, we estimated the arithmetic and geometric risk premiums for stocks over both treasury bills and bonds over different time periods in table 4, with standard errors reported in brackets below each number:

Table 4: Historical Equity Risk Premiums (ERP) –Estimation Period, Riskfree Rate and Averaging Approach

	ERP: Stocks minus T.Bills		*ERP: Stocks minus T.Bonds*	
	Arithmetic	*Geometric*	*Arithmetic*	*Geometric*
1928-2012	7.65% (2.20%)	5.74%	5.88% (2.33%)	4.20%
1963-2012	5.93% (2.38%)	4.60%	3.91% (2.66%)	2.93%
2003-2012	7.06% (5.82%)	5.39%	3.90% (8.11%)	1.72%

Note that even with only three slices of history considered, the premiums range from 1.72% to 7.65%, depending upon the choices made. If we take the earlier discussion about the "right choices" to heart, and use a long-term geometric average premium over the long-term rate as the risk premium to use in valuation and corporate finance, the equity risk premium that we would use would be 4.20%. The caveats that we would offer, though, are that this estimate comes with significant standard error and is reflective of time periods (such as 1920s and 1930s) when the U.S. equity market (and investors in it) had very different characteristics.

There have been attempts to extend the historical time period to include years prior to 1926 (the start of the Ibbotson database). Goetzmann and Jorion (1999) estimate the returns on stocks and bonds between 1792 and 1925 and report an arithmetic average premium, for stocks over bonds, of 2.76% and a geometric average premium of 2.83%.[55] The caveats about data reliability and changing market characteristics that we raised in an earlier section apply to these estimates.

There is one more troublesome (or at least counter intuitive) characteristic of historical risk premiums. The geometric average equity risk premium through the end of 2007 was 4.79%, higher than the 3.88% estimated though the end of 2008; in fact, every

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[55] Jorion, Philippe and William N. Goetzmann, 1999, *Global Stock Markets in the Twentieth Century*, Journal of Finance, 54(3), 953-980.

single equity risk premium number in this table would have been much higher, if we had stopped with 2007 as the last year. Adding the data for 2008, an abysmal year for stocks and a good year for bonds, lowers the historical premium dramatically, even when computed using a long period of history. In effect, the historical risk premium approach would lead investors to conclude, after one of worst stock market crisis in several decades, that stocks were less risky than they were before the crisis and that investors should therefore demand lower premiums. In contrast, adding the data for 2009, a good year for stocks (+25.94%) and a bad year for bonds (-11.12%) would have increased the equity risk premium from 3.88% to 4.29%. As a general rule, historical risk premiums will tend to rise when markets are buoyant and investors are less risk averse and will fall as markets collapse and investor fears rise.

Global Estimates

If it is difficult to estimate a reliable historical premium for the US market, it becomes doubly so when looking at markets with short, volatile and transitional histories. This is clearly true for emerging markets, where equity markets have often been in existence for only short time periods (Eastern Europe, China) or have seen substantial changes over the last few years (Latin America, India). It also true for many West European equity markets. While the economies of Germany, Italy and France can be categorized as mature, their equity markets did not share the same characteristics until recently. They tended to be dominated by a few large companies, many businesses remained private, and trading was thin except on a few stocks.

Notwithstanding these issues, services have tried to estimate historical risk premiums for non-US markets with the data that they have available. To capture some of the danger in this practice, Table 5 summarizes historical arithmetic average equity risk premiums for major non-US markets below for 1976 to 2001, and reports the standard error in each estimate:[56]

Table 5: Risk Premiums for non-US Markets: 1976- 2001

Country	*Weekly average*	*Weekly standard deviation*	*Equity Risk Premium*	*Standard error*
Canada	0.14%	5.73%	1.69%	3.89%
France	0.40%	6.59%	4.91%	4.48%
Germany	0.28%	6.01%	3.41%	4.08%
Italy	0.32%	7.64%	3.91%	5.19%
Japan	0.32%	6.69%	3.91%	4.54%

[56] Salomons, R. and H. Grootveld, 2003, *The equity risk premium: Emerging vs Developed Markets,* Emerging Markets Review, v4, 121-144.

UK	0.36%	5.78%	4.41%	3.93%
India	0.34%	8.11%	4.16%	5.51%
Korea	0.51%	11.24%	6.29%	7.64%
Chile	1.19%	10.23%	15.25%	6.95%
Mexico	0.99%	12.19%	12.55%	8.28%
Brazil	0.73%	15.73%	9.12%	10.69%

Before we attempt to come up with rationale for why the equity risk premiums vary across countries, it is worth noting the magnitude of the standard errors on the estimates, largely because the estimation period includes only 25 years. Based on these standard errors, we cannot even reject the hypothesis that the equity risk premium in each of these countries is zero, let alone attach a value to that premium.

If the standard errors on these estimates make them close to useless, consider how much more noise there is in estimates of historical risk premiums for some emerging market equity markets, which often have a reliable history of ten years or less, and very large standard deviations in annual stock returns. Historical risk premiums for emerging markets may provide for interesting anecdotes, but they clearly should not be used in risk and return models.

The survivor bias

Given how widely the historical risk premium approach is used, it is surprising that the flaws in the approach have not drawn more attention. Consider first the underlying assumption that investors' risk premiums have not changed over time and that the average risk investment (in the market portfolio) has remained stable over the period examined. We would be hard pressed to find anyone who would be willing to sustain this argument with fervor. The obvious fix for this problem, which is to use a more recent time period, runs directly into a second problem, which is the large noise associated with historical risk premium estimates. While these standard errors may be tolerable for very long time periods, they clearly are unacceptably high when shorter periods are used.

Even if there is a sufficiently long time period of history available, and investors' risk aversion has not changed in a systematic way over that period, there is a final problem. Markets such as the United States, which have long periods of equity market history, represent "survivor markets". In other words, assume that one had invested in the largest equity markets in the world in 1926, of which the United States was one.[57] In

[57] Jorion, Philippe and William N. Goetzmann, 1999, *Global Stock Markets in the Twentieth Century*, Journal of Finance, 54(3), 953-980. They looked at 39 different equity markets and concluded that the US was the best performing market from 1921 to the end of the century. They estimated a geometric average premium of 3.84% across all of the equity markets that they looked at, rather than just the US and estimated

the period extending from 1926 to 2000, investments in many of the other equity markets would have earned much smaller premiums than the US equity market, and some of them would have resulted in investors earning little or even negative returns over the period. Thus, the survivor bias will result in historical premiums that are larger than expected premiums for markets like the United States, even assuming that investors are rational and factor risk into prices.

How can we mitigate the survivor bias? One solution is to look at historical risk premiums across multiple equity markets across very long time periods. In the most comprehensive attempt of this analysis, Dimson, Marsh and Staunton (2002, 2008) estimated equity returns for 17 markets and obtained both local and a global equity risk premium.[58] In their most recent update in 2013, they provide the risk premiums from 1900 to 2012 for 20 markets, with standard errors on each estimate:[59]

Table 6: Historical Risk Premiums across Equity Markets – 1900 – 2012 (in %)

	Stocks minus Short term Governments				*Stocks minus Long term Governments*			
Country	*Geometric Mean*	*Arithmetic Mean*	*Standard Error*	*Standard Deviation*	*Geometric Mean*	*Arithmetic Mean*	*Standard Error*	*Standard Deviation*
Australia	6.6%	8.1%	1.7%	17.6%	5.6%	7.5%	1.9%	19.9%
Austria	5.6%	10.5%	3.6%	37.7%	2.8%	22.1%	14.7%	154.8%
Belgium	2.7%	5.2%	2.3%	24.0%	2.3%	4.3%	2.0%	21.0%
Canada	4.1%	5.5%	1.6%	17.1%	3.4%	5.0%	1.7%	18.3%
Denmark	2.8%	4.6%	1.9%	20.5%	1.8%	3.3%	1.6%	17.5%
Finland	5.8%	9.3%	2.8%	30.0%	5.3%	8.9%	2.8%	30.1%
France	5.9%	8.6%	2.3%	24.4%	3.0%	5.3%	2.1%	22.8%
Germany	5.9%	9.8%	3.0%	31.7%	5.2%	8.6%	2.7%	28.4%
Ireland	3.2%	5.4%	2.0%	21.3%	2.6%	4.6%	1.9%	19.8%
Italy	5.6%	9.5%	3.0%	31.8%	3.4%	6.8%	2.8%	29.5%
Japan	5.7%	8.9%	2.6%	27.6%	4.8%	8.9%	3.1%	32.7%
Netherlands	4.2%	6.4%	2.1%	22.7%	3.3%	5.6%	2.1%	22.2%
New Zealand	4.2%	5.8%	1.7%	18.3%	3.7%	5.3%	1.7%	18.1%
Norway	2.9%	5.8%	2.5%	26.3%	2.2%	5.2%	2.6%	27.8%

that the survivor bias added 1.5% to the US equity risk premium (with arithmetic averages) and 0.9% with geometric averages.

[58] Dimson, E.,, P Marsh and M Staunton, 2002, *Triumph of the Optimists: 101 Years of Global Investment Returns,* Princeton University Press, NJ; Dimson, E.,, P Marsh and M Staunton, 2008, The Worldwide Equity Risk Premium: a smaller puzzle, Chapter 11 in the Handbook of the Equity Risk Premium, edited by R. Mehra, Elsevier.

[59] *Credit Suisse Global Investment Returns Sourcebook,* 2013, Credit Suisse/ London Business School. Summary data is accessible at the Credit Suisse website.

South Africa	6.3%	8.3%	2.1%	21.9%	5.4%	7.1%	1.8%	19.5%
Spain	3.1%	5.3%	2.0%	21.7%	2.1%	4.1%	1.9%	20.7%
Sweden	3.6%	5.7%	1.9%	20.6%	2.9%	5.1%	2.0%	20.8%
Switzerland	3.4%	5.1%	1.8%	18.8%	2.0%	3.5%	1.7%	17.6%
U.K.	4.3%	6.0%	1.9%	19.8%	3.7%	5.0%	1.6%	17.1%
U.S.	5.3%	7.2%	1.8%	19.6%	4.2%	6.2%	1.9%	20.5%
Europe	3.3%	5.1%	1.8%	19.3%	3.4%	4.8%	1.5%	16.3%
World-ex U.S.	3.5%	5.1%	1.8%	18.6%	3.0%	4.1%	1.4%	14.7%
World	4.1%	5.5%	1.6%	17.0%	3.2%	4.4%	1.4%	15.3%

In making comparisons of the numbers in this table to prior years, note that this database was modified in two ways: the world estimates are now weighted by market capitalization and the issue of survivorship bias has been dealt with frontally by incorporating the return histories of three markets (Austria, China and Russia) where equity investors would have lost their entire investment during the century. Note that the risk premiums, averaged across the markets, are lower than risk premiums in the United States. For instance, the geometric average risk premium for stocks over long-term government bonds, across the non-US markets, is only 3.0%, lower than the 4.2% for the US markets. The results are similar for the arithmetic average premium, with the average premium of 3.5% across markets being lower than the 5.3% for the United States. In effect, the difference in returns captures the survivorship bias, implying that using historical risk premiums based only on US data will results in numbers that are too high for the future.

Note that the "noise" problem persists, even with averaging across 20 markets and over 112 years. The standard error in the global equity risk premium estimate is 1.4-1.6%, suggesting that the range for the historical premium remains a large one. In an addendum, Dimson, Marsh and Staunton decompose the realized equity risk premium in each market into three components: the level of dividends, the growth in those dividends and the effects on stock price of a changing multiple for dividend (price to dividend ratio). For the United States, they attribute 1.49% of the overall premium of 5.31% (for stocks over treasury bills) to growth in real dividends and 0.47% to expansion in the price to dividend ratio. Of the global premium of 4.07%, 0.47% can be attributed to growth in dividends and 0.40% to increases in the price to dividend ratio.

Historical Premium Plus

If we accept the proposition that historical risk premiums are the best way to estimate future risk premiums and also come to terms with the statistical reality that we need long time periods of history to get reliable estimates, we are trapped when it comes to estimating risk premiums in most emerging markets, where historical data is either non-existent or unreliable. Furthermore, the equity risk premium that we estimate becomes the risk premium that we use for all stocks within a market, no matter what their differences are on market capitalization and growth potential; in effect, we assume that the betas we use will capture differences in risk across companies.

In this section, we consider one way out of this box, where we begin with the US historical risk premium (4.20%) or the global premium from the DMS data (3.2%) as the base premium for a mature equity market and then build additional premiums for riskier markets or classes of stock. For the first part of this section, we stay within the US equity market and consider the practice of adjusting risk premiums for company-specific characteristics, with market capitalization being the most common example. In the second part, we extend the analysis to look at emerging markets in Asia, Latin American and Eastern Europe, and take a look at the practice of estimating country risk premiums that augment the US equity risk premium. Since many of these markets have significant exposures to political and economic risk, we consider two fundamental questions in this section. The first relates to whether there should be an additional risk premium when valuing equities in these markets, because of the country risk. As we will see, the answer will depend upon whether we think country risk is diversifiable or non-diversifiable, view markets to be open or segmented and whether we believe in a one-factor or a multi-factor model. The second question relates to estimating equity risk premiums for emerging markets. Depending upon our answer to the first question, we will consider several solutions.

Small cap and other risk premiums

In computing an equity risk premium to apply to all investments in the capital asset pricing model, we are essentially assuming that betas carry the weight of measuring the risk in individual firms or assets, with riskier investments having higher betas than safer investments. Studies of the efficacy of the capital asset pricing model over the last three decades have cast some doubt on whether this is a reasonable assumption, finding that the model understates the expected returns of stocks with specific characteristics; small market cap companies and companies low price to book ratios, in particular, seem to earn much higher returns than predicted by the CAPM. It is to counter this finding that many practitioners add an additional premium to the required returns (and costs of equity) of smaller market cap companies.

The CAPM and Market Capitalization

In one of very first studies to highlight the failure of the traditional capital asset pricing model to explain returns at small market cap companies, Banz (1981) looked returns on stocks from 1936-1977 and concluded that investing in the smallest companies (the bottom 20% of NYSE firms in terms of capitalization) would have generated about 6% more, after adjusting for beta risk, than larger cap companies.[60] In the years since, there has been substantial research on both the origins and durability of the small cap premium, with mixed conclusions. First, there is evidence of a small firm premium in markets outside the United States as well. Studies find small cap premiums of about 7% from 1955 to 1984 in the United Kingdom,[61] 8.8% in France and 3% in Germany,[62] and a premium of 5.1% for Japanese stocks between 1971 and 1988.[63] Dimson, March and Staunton (2013), in their updated assessment of equity risk premiums in 19 markets, also compute small cap premiums in those markets. Of the 19 markets, small cap stocks have not outperformed the rest of the market in only Norway and Denmark; the small cap premium, over the long term, has been higher in the United States than in any of the other equity markets. Second, while the small cap premium has been persistent in US equity markets, it has also been volatile, with large cap stocks outperforming small cap stocks for extended periods. In figure 4, we look at the difference in returns between small cap (defined as bottom 10% of firms in terms of market capitalization) and all US stocks between 1927 and 2012; note that the premium was pronounced in the 1970s and disappeared for much of the 1980s.[64]

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[60] Banz, R., 1981, *The Relationship between Return and Market Value of Common Stocks*, Journal of Financial Economics, v9.

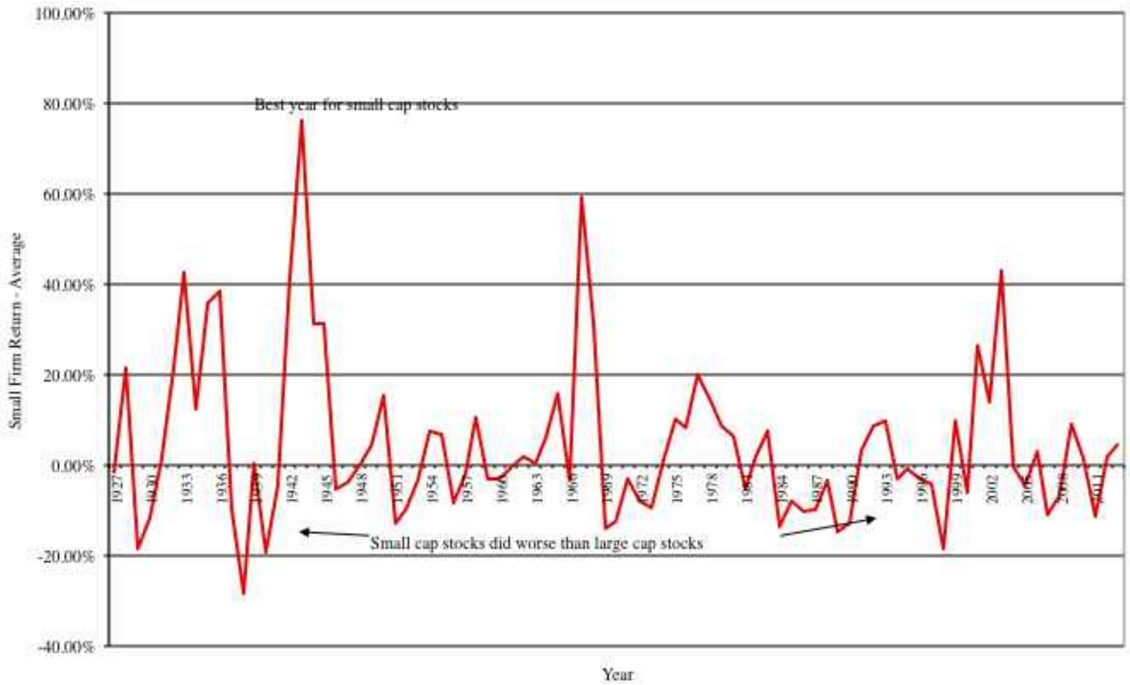
[61] Dimson, E. and P.R. Marsh, 1986, *Event Studies and the Size Effect: The Case of UK Press Recommendations*, Journal of Financial Economics, v17, 113-142.

[62] Bergstrom,G.L., R.D. Frashure and J.R. Chisholm, 1991, *The Gains from international small-company diversification* in Global Portfolios: Quantiative Strategies for Maximum Performance, Edited By R.Z. Aliber and B.R. Bruce, Business One Irwin, Homewood.

[63] Chan, L.K., Y. Hamao, and J. Lakonishok, 1991, *Fundamentals and Stock Returns in Japan*, Journal of Finance. v46. 1739-1789.

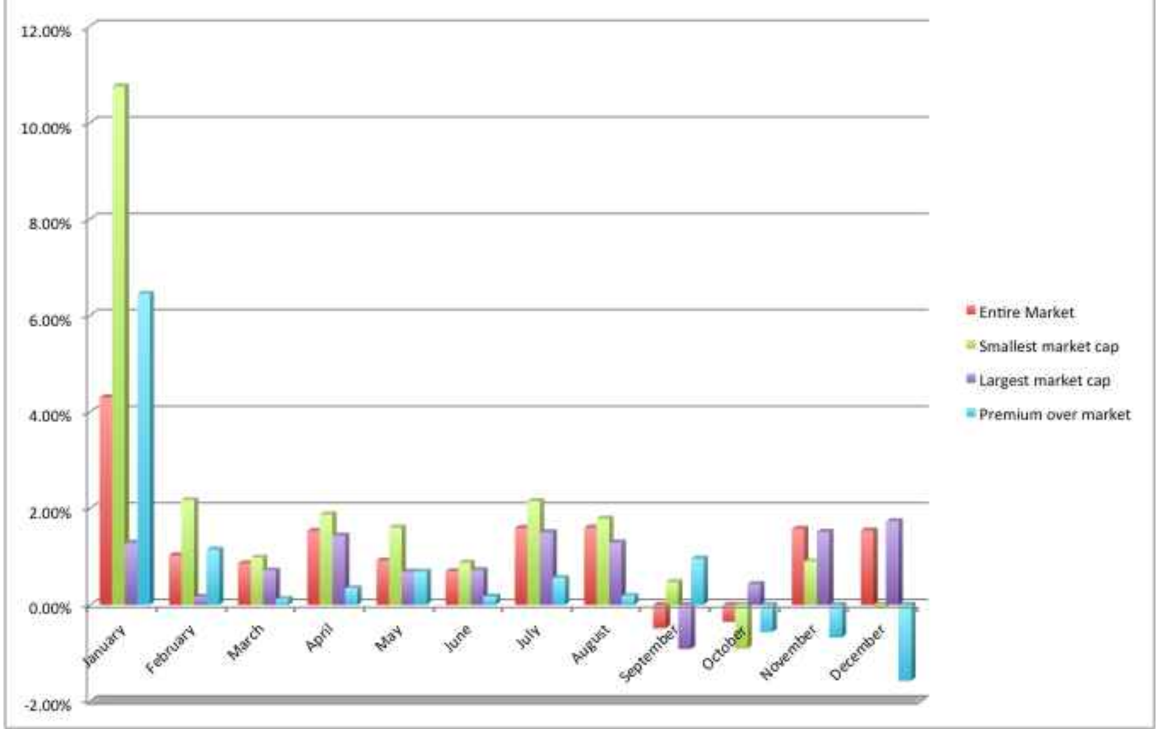
[64] The raw data for this table is obtained from Professor Ken French's website at Dartmouth. These premiums are based on value weighted portfolios. If equally weighted portfolios are used, the small cap premium is larger.

Figure 4: Small Firm Premium over time- 1927 -2012



The average premium for stocks in the smallest companies, in terms of market capitalization, between 1927 and 2012 was 4.41%, but the standard error in that estimate is 1.97%. Third, much of the premium is generated in one month of the year: January. As Figure 5 shows, eliminating that month from our calculations would essentially dissipate the entire small stock premium. That would suggest that size itself is not the source of risk, since small firms in January remain small firms in the rest of the year, but that the small firm premium, if it exists, comes from some other risk that is more prevalent in January than in the rest of the year.

Figure 5: Small Cap Premium by month of year- US stocks from 1927-2011



Source: Raw data from Ken French

Finally, a series of studies have argued that market capitalization, by itself, is not the reason for excess returns but that it is a proxy for other ignored risks such as illiquidity and poor information.

In summary, while the empirical evidence supports the notion that small cap stocks have earned higher returns after adjusting for beta risk than large cap stocks, it is not as conclusive, nor as clean as it was initially thought to be. The argument that there is, in fact, no small cap premium and that we have observed over time is just an artifact of history cannot be rejected out of hand.

The Small Cap Premium

If we accept the notion that there is a small cap premium, there are two ways in which we can respond to the empirical evidence that small market cap stocks seem to earn higher returns than predicted by the traditional capital asset pricing model. One is to view this as a market inefficiency that can be exploited for profit: this, in effect, would require us to load up our portfolios with small market cap stocks that would then proceed to deliver higher than expected returns over long periods. The other is to take the excess returns as evidence that betas are inadequate measures of risk and view the additional returns are compensation for the missed risk. The fact that the small cap premium has endured for as long as it has suggests that the latter is the more reasonable path to take.

If CAPM betas understate the true risk of small cap stocks, what are the solutions? The first is to try and augment the model to reflect the missing risk, but this would require being explicit about this risk. For instance, there are models that include additional factors for illiquidity and imperfect information that claim to do better than the CAPM in predicting future returns. The second and simpler solution that is adopted by many practitioners is to add a premium to the expected return (from the CAPM) of small cap stocks. To arrive at this premium, analysts look at historical data on the returns on small cap stocks and the market, adjust for beta risk, and attribute the excess return to the small cap effect. As we noted earlier, using the data from 1926-2012, we would estimate a small cap premium of 4.41%. Duff and Phelps present a richer set of estimates, where the premiums are computed for stocks in 25 different size classes (with size measured on eight different dimensions including market capitalization, book value and net income). Using the Fama/French data, we present excess returns for firms broken down by ten market value classes in Table 7, with the standard error for each estimate.

Table 7: Excess Returns by Market Value Class: US Stocks from 1927 – 2012

Excess Return = Return on Portfolio – Return on Market

Decile	Average	Standard Error	Maximum	Minimum
Smallest	4.41%	1.97%	76.28%	-28.42%
2	1.69%	1.15%	41.25%	-17.96%
3	1.45%	0.78%	41.98%	-13.54%
4	0.70%	0.55%	15.56%	-7.33%
5	0.11%	0.53%	11.63%	-16.05%
6	-0.04%	0.51%	15.21%	-14.01%
7	-0.53%	0.55%	7.48%	-19.50%
8	-1.56%	0.81%	11.20%	-29.42%
9	-2.21%	1.02%	21.96%	-36.09%
Largest	-4.03%	1.56%	31.29%	-65.57%

Note that the market capitalization effect shows up at both extremes – the smallest firms earn higher returns than expected whereas the largest firms earn lower returns than expected. The small firm premium is statistically significant only for the lowest and three highest size deciles.

Perils of the approach

While the small cap premium may seem like a reasonable way of dealing with the failure of the CAPM to capture the risk in smaller companies, there are significant costs to using the approach.

a. Standard Error on estimates: One of the dangers we noted with using historical risk premiums is the high standard error in our estimates. This danger is magnified when we look at sub-sets of stocks, based on market capitalization or any other characteristic, and extrapolate past returns. The standard errors on the small cap premiums that are estimated are likely to be significant, as is evidenced in table 7.
b. Small versus Large Cap: At least in its simplest form, the small cap premium adjustment requires us to divide companies into small market companies and the rest of the market, with stocks falling on one side of the line having much higher required returns (and costs of equity) than stocks falling on the other side.
c. Understanding Risk: Even in its more refined format, where the required returns are calibrated to market cap, using small cap premiums allows analysts to evade basic questions about what it is that makes smaller cap companies riskier, and whether these factors may vary across companies.
d. Small cap companies become large cap companies over time: When valuing companies, we attach high growth rates to revenues, earnings and value over time. Consequently, companies that are small market cap companies now grow to become large market cap companies over time. Consistency demands that we adjust the small cap premium as we go further into a forecast period.
e. Other risk premiums: Using a small cap premium opens the door to other premiums being used to augment expected returns. Thus, we could adjust expected returns upwards for stocks with price momentum and low price to book ratios, reflecting the excess returns that these characteristics seem to deliver, at least on paper. Doing so will deliver values that are closer to market prices, across assets, but undercuts the rationale for intrinsic valuation, i.e., finding market mistakes.

There is one final reason why we are wary about adjusting costs of equity for a small cap effect. If, as is the practice now, we add a small cap premium of 4-5% to the cost of equity of small companies, without attributing this premium to any specific risk factor, we are exposed to the risk of double counting risk. For instance, assume that the small cap premium that we have observed over the last few decades is attributable to the lower liquidity (and higher transactions costs) of trading small cap stocks. Adding that premium on to the discount rate will reduce the estimated values of small cap and private businesses. If we attach an illiquidity discount to this value, we are double counting the effect of illiquidity.

Country Risk Premiums

As both companies and investors get used to the reality of a global economy, they have also been forced to confront the consequences of globalization for equity risk premiums and hurdle rates. Should an investor putting his money in Indian stocks demand a higher risk premium for investing in equities that one investing in German stocks? Should a US consumer product company investing in Brazil demand the same hurdle rates for its Brazilian investments as it does for its US investments? In effect, should we demand one global equity risk premium that we use for investments all over the world or should we use higher equity risk premiums in some markets than in others?

The arguments for no country risk premium

Is there more risk in investing in a Malaysian or Brazilian stock than there is in investing in the United States? The answer, to most, seems to be obviously affirmative, with the solution being that we should use higher equity risk premiums when investing in riskier emerging markets. There are, however, three distinct and different arguments offered against this practice.

1. Country risk is diversifiable

In the risk and return models that have developed from conventional portfolio theory, and in particular, the capital asset pricing model, the only risk that is relevant for purposes of estimating a cost of equity is the market risk or risk that cannot be diversified away. The key question in relation to country risk then becomes whether the additional risk in an emerging market is diversifiable or non-diversifiable risk. If, in fact, the additional risk of investing in Malaysia or Brazil can be diversified away, then there should be no additional risk premium charged. If it cannot, then it makes sense to think about estimating a country risk premium.

But diversified away by whom? Equity in a publicly traded Brazilian, or Malaysian, firm can be held by hundreds or even thousands of investors, some of whom may hold only domestic stocks in their portfolio, whereas others may have more global exposure. For purposes of analyzing country risk, we look at the marginal investor – the investor most likely to be trading on the equity. If that marginal investor is globally diversified, there is at least the potential for global diversification. If the marginal investor does not have a global portfolio, the likelihood of diversifying away country risk declines substantially. Stulz (1999) made a similar point using different terminology.[65] He differentiated between segmented markets, where risk premiums can be different in each market, because investors cannot or will not invest outside their domestic markets, and open markets, where investors can invest across markets. In a segmented market, the marginal investor will be diversified only across investments in that market, whereas in an open market, the marginal investor has the opportunity (even if he or she does not take it) to invest across markets. It is unquestionable that investors today in most markets have more opportunities to diversify globally than they did three decades ago, with international mutual funds and exchange traded funds, and that many more of them take advantage of these opportunities. It is also true still that a significant home bias exists in most investors' portfolios, with most investors over investing in their home markets.

Even if the marginal investor is globally diversified, there is a second test that has to be met for country risk to be diversifiable. All or much of country risk should be country specific. In other words, there should be low correlation across markets. Only then will the risk be diversifiable in a globally diversified portfolio. If, on the other hand, the returns across countries have significant positive correlation, country risk has a market risk component, is not diversifiable and can command a premium. Whether returns across countries are positively correlated is an empirical question. Studies from the 1970s and 1980s suggested that the correlation was low, and this was an impetus for global diversification.[66] Partly because of the success of that sales pitch and partly because economies around the world have become increasingly intertwined over the last decade, more recent studies indicate that the correlation across markets has risen. The correlation across equity markets has been studied extensively over the last two decades and while there are differences, the overall conclusions are as follows:

1. The correlation across markets has increased over time, as both investors and firms have globalized. Yang, Tapon and Sun (2006) report correlations across eight, mostly developed markets between 1988 and 2002 and note that the correlation in the 1998-2002 time period was higher than the correlation between 1988 and 1992 in every single market; to illustrate, the correlation between the

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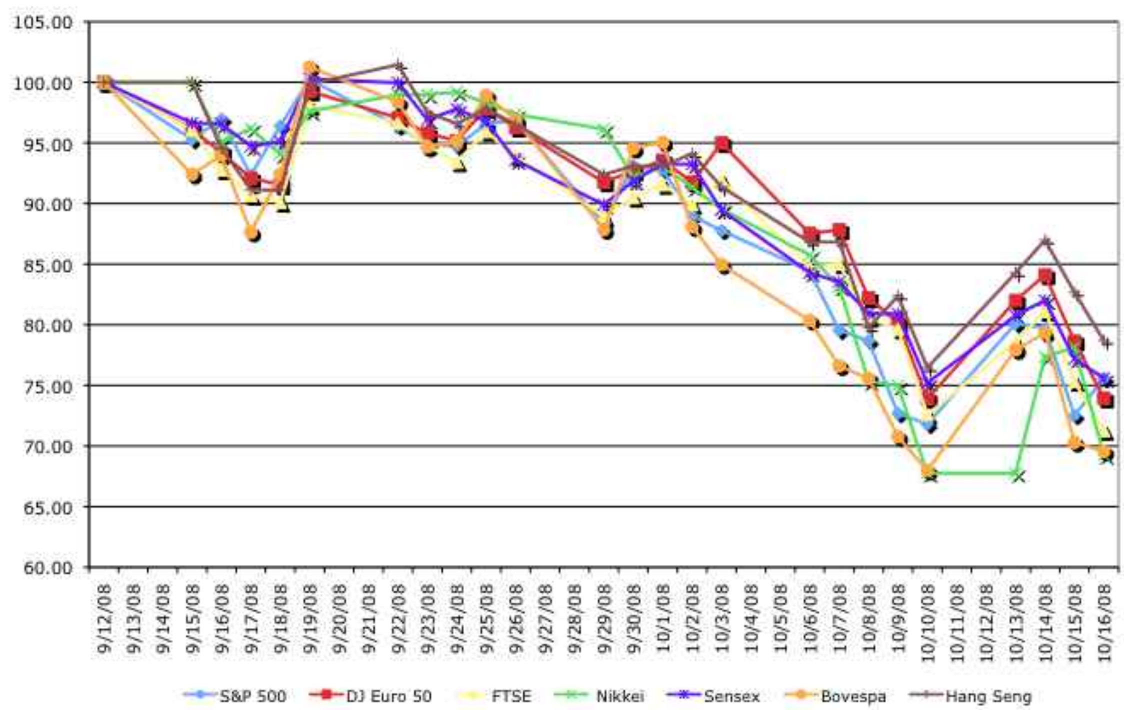
[65] Stulz, R.M., *Globalization, Corporate finance, and the Cost of Capital,* Journal of Applied Corporate Finance, v12.

[66] Levy, H. and M. Sarnat, 1970, *International Diversification of Investment Portfolios*, American Economic Review 60(4), 668-75.

Hong Kong and US markets increased from 0.48 to 0.65 and the correlation between the UK and the US markets increased from 0.63 to 0.82.[67]

2. The correlation across equity markets increases during periods of extreme stress or high volatility.[68] This is borne out by the speed with which troubles in one market, say Russia, can spread to a market with little or no obvious relationship to it, say Brazil. The contagion effect, where troubles in one market spread into others is one reason to be skeptical with arguments that companies that are in multiple emerging markets are protected because of their diversification benefits. In fact, the market crisis in the last quarter of 2008 illustrated how closely bound markets have become, as can be seen in figure 6:

Figure 6: The globalization of risk



Between September 12, 2008 and October 16, 2008, markets across the globe moved up and down together, with emerging markets showing slightly more volatility.

3. In a twist on the last point, Longin and Solnik (2001) report that it is not high volatility per se that increases correlation, but downside volatility. Put differently,

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67 Yang, Li , Tapon, Francis and Sun, Yiguo, 2006, *International correlations across stock markets and industries: trends and patterns 1988-2002*, Applied Financial Economics, 16: 16, 1171-1183

68 Ball, C. and W. Torous, 2000, *Stochastic correlation across international stock markets*, Journal of Empirical Finance. V7, 373-388.

the correlation between equity markets is higher in bear markets than in bull markets.[69]

2. A Global Capital Asset Pricing Model

The other argument against adjusting for country risk comes from theorists and practitioners who believe that the traditional capital asset pricing model can be adapted fairly easily to a global market. In their view, all assets, no matter where they are traded, should face the same global equity risk premium, with differences in risk captured by differences in betas. In effect, they are arguing that if Malaysian stocks are riskier than US stocks, they should have higher betas and expected returns.

While the argument is reasonable, it flounders in practice, partly because betas do not seem capable of carry the weight of measuring country risk.

1. If betas are estimated against local indices, as is usually the case, the average beta within each market (Brazil, Malaysia, US or Germany) has to be one. Thus, it would be mathematically impossible for betas to capture country risk.
2. If betas are estimated against a global equity index, such as the Morgan Stanley Capital Index (MSCI), there is a possibility that betas could capture country risk but there is little evidence that they do in practice. Since the global equity indices are market weighted, it is the companies that are in developed markets that have higher betas, whereas the companies in small, very risky emerging markets report low betas. Table 8 reports the average beta estimated for the ten largest market cap companies in Brazil, India, the United States and Japan against the MSCI.

Table 8: Betas against MSCI – Large Market Cap Companies

Country	*Average Beta (against local index)*	*Average Beta (against MSCI)*
India	0.97	0.83
Brazil	0.98	0.81
United States	0.96	1.05
Japan	0.94	1.03

[a] The betas were estimated using two years of weekly returns from January 2006 to December 2007 against the most widely used local index (Sensex in India, Bovespa in Brazil, S&P 500 in the US and the Nikkei in Japan) and the MSCI using two years of weekly returns.

The emerging market companies consistently have lower betas, when estimated against global equity indices, than developed market companies. Using these betas with a global equity risk premium will lead to lower costs of equity for emerging market companies than developed market companies. While there are creative fixes

[69] Longin, F. and B. Solnik, 2001, *Extreme Correlation of International Equity Markets*, Journal of Finance, v56 , pg 649-675.

that practitioners have used to get around this problem, they seem to be based on little more than the desire to end up with higher expected returns for emerging market companies.[70]

3. *Country risk is better reflected in the cash flows*

The essence of this argument is that country risk and its consequences are better reflected in the cash flows than in the discount rate. Proponents of this point of view argue that bringing in the likelihood of negative events (political chaos, nationalization and economic meltdowns) into the expected cash flows effectively risk adjusts the cashflows, thus eliminating the need for adjusting the discount rate.

This argument is alluring but it is wrong. The expected cash flows, computed by taking into account the possibility of poor outcomes, is not risk adjusted. In fact, this is exactly how we should be calculating expected cash flows in any discounted cash flow analysis. Risk adjustment requires us to adjust the expected cash flow further for its risk, i.e. compute certainty equivalent cash flows in capital budgeting terms. To illustrate why, consider a simple example where a company is considering making the same type of investment in two countries. For simplicity, let us assume that the investment is expected to deliver \$ 90, with certainty, in country 1 (a mature market); it is expected to generate \$ 100 with 90% probability in country 2 (an emerging market) but there is a 10% chance that disaster will strike (and the cash flow will be \$0). The expected cash flow is \$90 on both investments, but only a risk neutral investor would be indifferent between the two. A risk averse investor would prefer the investment in the mature market over the emerging market investment, and would demand a premium for investing in the emerging market.

In effect, a full risk adjustment to the cash flows will require us to go through the same process that we have to use to adjust discount rates for risk. We will have to estimate a country risk premium, and use that risk premium to compute certainty equivalent cash flows.[71]

The arguments for a country risk premium

There are elements in each of the arguments in the previous section that are persuasive but none of them is persuasive enough.

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[70] There are some practitioners who multiply the local market betas for individual companies by a beta for that market against the US. Thus, if the beta for an Indian chemical company is 0.9 and the beta for the Indian market against the US is 1.5, the global beta for the Indian company will be 1.35 (0.9*1.5). The beta for the Indian market is obtained by regressing returns, in US dollars, for the Indian market against returns on a US index (say, the S&P 500).

[71] In the simple example above, this is how it would work. Assume that we compute a country risk premium of 3% for the emerging market to reflect the risk of disaster. The certainty equivalent cash flow on the investment in that country would be \$90/1.03 = \$87.38.

- Investors have become more globally diversified over the last three decades and portions of country risk can therefore be diversified away in their portfolios. However, the significant home bias that remains in investor portfolios exposes investors disproportionately to home country risk, and the increase in correlation across markets has made a portion of country risk into non-diversifiable or market risk.
- As stocks are traded in multiple markets and in many currencies, it is becoming more feasible to estimate meaningful global betas, but it also is still true that these betas cannot carry the burden of capturing country risk in addition to all other macro risk exposures.
- Finally, there are certain types of country risk that are better embedded in the cash flows than in the risk premium or discount rates. In particular, risks that are discrete and isolated to individual countries should be incorporated into probabilities and expected cash flows; good examples would be risks associated with nationalization or related to acts of God (hurricanes, earthquakes etc.).

After you have diversified away the portion of country risk that you can, estimated a meaningful global beta and incorporated discrete risks into the expected cash flows, you will still be faced with residual country risk that has only one place to go: the equity risk premium.

There is evidence to support the proposition that you should incorporate additional country risk into equity risk premium estimates in riskier markets:

1. Historical equity risk premiums: Donadelli and Prosperi (2011) look at historical risk premiums in 32 different countries (13 developed and 19 emerging markets) and conclude that emerging market companies had both higher average returns and more volatility in these returns between 1988 and 2010 (see table 9)

Table 9: Historical Equity Risk Premiums (Monthly) by Region

Region	Monthly ERP	Standard deviation
Developed Markets	0.62%	4.91%
Asia	0.97%	7.56%
Latin America	2.07%	8.18%
Eastern Europe	2.40%	15.66%
Africa	1.41%	6.03%

While we remain cautious about using historical risk premiums over short time periods (and 22 years is short in terms of stock market history), the evidence is consistent with the argument that country risk should be incorporated into a larger equity risk premium.[72]

2. Survey premiums: Earlier in the paper, we referenced a paper by Fernandez et al (2013) that surveyed academics, analysts and companies in 82 countries on equity risk premiums. The reported average premiums vary widely across markets and are higher for riskier emerging markets, as can be seen in table 10.

Table 10: Survey Estimates of Equity Risk Premium: By Region

Row Labels	Number	Average ERP	Median ERP
Africa	9	8.62%	8.59%
Developed Markets	20	6.06%	6.01%
Eastern Europe	12	7.63%	7.96%
Emerging Asia	13	7.60%	7.42%
EU Troubled	5	7.16%	6.81%
Latin America	15	9.67%	9.49%
Middle East	8	8.43%	8.88%
Grand Total	**82**	**7.77%**	**7.76%**

Again, while this does not conclusively prove that country risk commands a premium, it does indicate that those who do valuations in these countries seem to act like it does.

Ultimately, the question of whether country risk matters and should affect the equity risk premium is an empirical one, not a theoretical one, and for the moment, at least, the evidence seems to suggest that you should incorporate country risk into your discount rates. This could change as we continue to move towards a global economy, with globally diversified investors and a global equity market, but we are not there yet.

Estimating a Country Risk Premium

If country risk is not diversifiable, either because the marginal investor is not globally diversified or because the risk is correlated across markets, we are then left with the task of measuring country risk and considering the consequences for equity risk premiums. In this section, we will consider three approaches that can be used to estimate country risk premiums, all of which build off the historical risk premiums estimated in the last section. To approach this estimation question, let us start with the basic proposition that the risk premium in any equity market can be written as:

Equity Risk Premium = Base Premium for Mature Equity Market + Country Risk Premium

[72] Donadelli, M. and L. Prosperi, 2011, The Equity Risk Premium: Empirical Evidence from Emerging Markets, Working Paper, http://ssrn.com/abstract=1893378.

The country premium could reflect the extra risk in a specific market. This boils down our estimation to estimating two numbers – an equity risk premium for a mature equity market and the additional risk premium, if any, for country risk. To estimate a mature market equity risk premium, we can look at one of two numbers. The first is the historical risk premium that we estimated for the United States, which yielded 4.20% as the geometric average premium for stocks over treasury bonds from 1928 to 2012. If we do this, we are arguing that the US equity market is a mature market, and that there is sufficient historical data in the United States to make a reasonable estimate of the risk premium. The other is the average historical risk premium across 20 equity markets, approximately 3.2%, that was estimated by Dimson et al (see earlier reference), as a counter to the survivor bias that they saw in using the US risk premium. Consistency would then require us to use this as the equity risk premium, in every other equity market that we deem mature; the equity risk premium in January 2013 would be 4.20% in Germany, France and the UK, for instance. For markets that are not mature, however, we need to measure country risk and convert the measure into a country risk premium, which will augment the mature market premium.

Measuring Country Risk

There are at least three measures of country risk that we can use. The first is the sovereign rating attached to a country by ratings agencies. The second is to subscribe to services that come up with broader measures of country risk that explicitly factor in the economic, political and legal risks in individual countries. The third is go with a market-based measure such as the volatility in the country's currency or markets.

i. Sovereign Ratings

One of the simplest and most accessible measures of country risk is the rating assigned to a country's debt by a ratings agency (S&P, Moody's and Fitch, among others, all provide country ratings). These ratings measure default risk (rather than equity risk) but they are affected by many of the factors that drive equity risk – the stability of a country's currency, its budget and trade balances and political uncertainty, among other variables[73].

To get a measure of country ratings, consider six countries – Germany, Brazil, China, India, Russia and Greece. In January 2013, the Moody's ratings for the countries are summarized in table 11:

Table 11: Sovereign Ratings in January 2013 – Moody's

[73] The process by which country ratings are obtained in explained on the S&P web site at http://www.ratings.standardpoor.com/criteria/index.htm.

Country	*Foreign Currency Rating*	*Local Currency Rating*
Germany	Aaa	Aaa
Brazil	Baa2	Baa2
China	Aa3	Aa3
India	Baa3	Baa3
Russia	Baa1	Baa1
Greece	Caa3	Caa3

What do these ratings tell us? First, the local currency and foreign currency ratings are identical for all of the countries on the list. There are a few countries (not on this list) where the two ratings diverge, and when they do, the local currency ratings tend to be higher (or at worst equal to) the foreign currency ratings for most countries, because a country should be in a better position to pay off debt in the local currency than in a foreign currency. Second, at least based on Moody's assessments in 2013, Germany is the safest company in this group, followed by China, Russia, Brazil, India and Greece, in that order. Third, ratings do change over time. In fact, Brazil's rating has risen from B1 in 2001 to its current rating of Baa2, reflecting both strong economic growth and a more robust political system. Appendix 2 contains the current ratings – local currency and foreign currency – for the countries that are tracked by Moody's in January 2013.[74]

While ratings provide a convenient measure of country risk, there are costs associated with using them as the only measure. First, ratings agencies often lag markets when it comes to responding to changes in the underlying default risk. The ratings for India, according to Moody's, were unchanged from 2004 to 2007, though the Indian economy grew at double-digit rates over that period. Similarly, Greece's ratings did not plummet until the middle of 2011, though their financial problems were visible well before that time. Second, the ratings agency focus on default risk may obscure other risks that could still affect equity markets. For instance, rising commodity (and especially oil) prices pushed up the ratings for commodity supplying countries (like Russia), even though there was little improvement in the rest of the economy. Finally, not all countries have ratings; much of sub-Saharan Africa, for instance, is unrated.

[74] In a disquieting reaction to the turmoil of the market crisis in the last quarter of 2008, Moody's promoted the notion that Aaa countries were not all created equal and slotted these countries into three groups – resistant Aaa (the stongest), resilient Aaa (weaker but will probably survive intact) and vulnerable Aaa (likely to face additional default risk.

ii. Country Risk Scores

Rather than focus on just default risk, as rating agencies do, some services have developed numerical country risk scores that take a more comprehensive view of risk. These risk scores are often estimated from the bottom-up by looking at economic fundamentals in each country. This, of course, requires significantly more information and, as a consequence, most of these scores are available only to commercial subscribers.

The Political Risk Services (PRS) group, for instance, considers political, financial and economic risk indicators to come up with a composite measure of risk (ICRG) for each country that ranks from 0 to 100, with 0 being highest risk and 100 being the lowest risk.[75] Appendix 3 classifies countries based on composite country risk measures from the PRS Group in January 2012.[76] Harvey (2005) examined the efficacy of these scores and found that they were correlated with costs of capital, but only for emerging market companies.

The Economist, the business newsmagazine, also operates a country risk assessment unit that measures risk from 0 to 100, with 0 being the least risk and 100 being the most risk. In September 2008, Table 12 the following countries were ranked as least and most risky by their measure:

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[75] The PRS group considers three types of risk – political risk, which accounts for 50% of the index, financial risk, which accounts for 25%, and economic risk, which accounts for the balance. While this table is dated, updated numbers are available for a hefty price. We have used the latest information in the public domain. Some university libraries have access to the updated data. While we have not updated the numbers, out of concerns about publishing proprietary data, you can get the latest PRS numbers by paying $99 on their website (http://www.prsgroup.com).

[76] Harvey, C.R., *Country Risk Components, the Cost of Capital, and Returns in Emerging Markets*, Working paper, Duke University. Available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=620710.

Table 12: Country Risk Scores – The Economist

Economist.com rankings

Country risk

Selected countries and territories, September 2008 (except where noted)

Least risky Rank		Score*	Most risky Rank		Score
1	Switzerland †	12	120	Zimbabwe	86
2	Finland **	14	119	Iraq	80
	Norway **	14	118	Sudan	76
	Sweden ††	14	117	Myanmar	75
5	Canada **	17	116	Nicaragua	69
	Denmark †	17	115	Jamaica	68
	Netherlands §	17	114	Kenya	66
8	Germany ††	18	113	Cuba	64
9	Austria **	19	112	Cambodia	62
	France ††	19	111	Côte d'Ivoire	61
11	Belgium ††	20		Ecuador	61
12	Singapore	21		Pakistan	61
13	Japan **	23		Venezuela	61
14	Ireland #	24		Vietnam	61
	Britain	24	106	Syria	60
	United States †	24			

*Out of 100, with higher numbers indicating more risk. Scores are based on indicators from three categories: currency risk, sovereign debt risk and banking risk.

† May 2008; ** July 2008; †† June 2008; § August 2008; # February 2008

In fact, comparing the PRS and Economist measures of country risk provides some insight into the problems with using their risk measures. The first is that the measures may be internally consistent but are not easily comparable across different services. The Economist, for instance, assigns its lowest scores to the safest countries whereas PRS assigns the highest scores to these countries. The second is that, by their very nature, a significant component of these measures have to be black boxes to prevent others from replicating them at no cost. Third, the measures are not linear and the services do not claim that they are; a country with a risk score of 60 in the Economist measure is not twice as risky as a country with a risk score of 30.

iii. Market-based Measures

To those analysts who feel that ratings agencies are either slow to respond to changes in country risk or take too narrow a view of risk, there is always the alternative of using market based measures.

- Bond default spread: We can compute a default spread for a country if it has bonds that are denominated in currencies such as the US dollar, Euro or Yen, where there is a riskfree rate to compare it to. In January 2013, for instance, a 10-year US dollar denominated bond issued by the Brazilian government had a yield to maturity of 2.50%, giving it a default spread of 0.74% over the 10-year US treasury bond rate (1.76%), as of the same time.
- Credit Default Swap Spreads: In the last few years, credit default swaps (CDS) markets have developed, allowing us to obtain updated market measures of default risk in different entities. In particular, there are CDS spreads for countries (governments) that yield measures of default risk that are more updated and precise, at least in some cases, than bond default spreads.[77] Table 13 summarizes the CDS spreads for all countries where a CDS spread was available, in January 2013:

Table 13: Credit Default Swap Spreads (in basis points)– January 2013

Country	CDS Spread	Net of US CDS	Country	CDS Spread	Net of US CDS
Argentina	13.07%	12.40%	Lithuania	1.58%	0.91%
Australia	0.86%	0.19%	Malaysia	1.14%	0.47%
Austria	0.79%	0.12%	Mexico	1.36%	0.69%
Bahrain	2.52%	1.85%	Morocco	2.79%	2.12%
Belgium	1.24%	0.57%	Netherlands	0.83%	0.16%
Brazil	1.44%	0.77%	New Zealand	0.72%	0.05%
Bulgaria	1.41%	0.74%	Norway	0.41%	-0.26%
Chile	0.99%	0.32%	Pakistan	7.90%	7.23%
China	1.02%	0.35%	Panama	1.36%	0.69%
Colombia	1.35%	0.68%	Peru	1.38%	0.71%
Costa Rica	3.91%	3.24%	Philippines	1.59%	0.92%
Croatia	2.99%	2.32%	Poland	1.30%	0.63%
Cyprus	6.55%	5.88%	Portugal	4.93%	4.26%
Czech Republic	0.89%	0.22%	Qatar	1.28%	0.61%
Denmark	0.69%	0.02%	Romania	2.81%	2.14%
Egypt	5.76%	5.09%	Russia	1.82%	1.15%
Estonia	0.95%	0.28%	Saudi Arabia	0.78%	0.11%
Finland	0.60%	-0.07%	Slovakia	1.42%	0.75%
France	1.44%	0.77%	Slovenia	2.59%	1.92%
Germany	0.82%	0.15%	South Africa	2.03%	1.36%
Hong Kong	1.03%	0.36%	Spain	3.14%	2.47%
Hungary	3.16%	2.49%	Sweden	0.41%	-0.26%
Iceland	2.16%	1.49%	Switzerland	0.76%	0.09%
Indonesia	1.81%	1.14%	Thailand	1.43%	0.76%
Ireland	2.54%	1.87%	Tunisia	4.21%	3.54%
Israel	1.61%	0.94%	Turkey	1.79%	1.12%

[77] The spreads are usually stated in US dollar or Euro terms.

Italy	3.03%	2.36%	Ukraine	6.51%	5.84%
Japan	1.32%	0.65%	United Kingdom	0.74%	0.07%
Kazakhstan	1.97%	1.30%	United States of America	0.67%	0.00%
Korea	1.13%	0.46%	Venezuela	6.55%	5.88%
Latvia	1.70%	1.03%	Vietnam	2.74%	2.07%
Lebanon	4.72%	4.05%			

Source: Bloomberg
Spreads are for 10-year US $ CDS.

In January 2013, for instance, the CDS market yielded a spread of 1.44% for the Brazilian Government, higher than the 0.74% that we obtained from the 10-year dollar denominated Brazilian bond. However, the CDS market does have some counterparty risk exposure and other risk exposures that are incorporated into the spreads. In fact, there is no country with a zero CDS spread, indicating either that there is no entity with default risk or that the CDS spread is not a pure default spread. To counter that problem, we netted the US CDS spread of 0.67% from each country's CDS to get a modified measure of country default risk.[78] Using this approach for Brazil, for instance, yields a netted CDS spread of 0.77% for the country.

- Market volatility: In portfolio theory, the standard deviation in returns is generally used as the proxy for risk. Extending that measure to emerging markets, there are some analysts who argue that the best measure of country risk is the volatility in local stock prices. Stock prices in emerging markets will be more volatile that stock prices in developed markets, and the volatility measure should be a good indicator of country risk. While the argument makes intuitive sense, the practical problem with using market volatility as a measure of risk is that it is as much a function of the underlying risk as it is a function of liquidity. Markets that are risky and illiquid often have low volatility, since you need trading to move stock prices. Consequently, using volatility measures will understate the risk of emerging markets that are illiquid and overstate the risk of liquid markets.

Market-based numbers have the benefit of constant updating and reflect the points of view of investors at any point in time. However, they also are also afflicted with all of the problems that people associate with markets – volatility, mood shifts and at times, irrationality. They tend to move far more than the other two measures – sovereign ratings and country risk scores – sometimes for good reasons and sometimes for no reason at all.

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[78] If we assume that there is default risk in the US, we would subtract the default spread associated with this risk from the 0.67% first, before netting the value against other CDS spreads. Thus, if the default spread for the US is 0.15%, we would subtract out only 0.52% (0.67% - 0.15%) from each country's CDS spread to get to a corrected default spread for that country.

b. Estimating Country Risk Premium

How do we link a country risk measure to a country risk premium? In this section, we will look at three approaches. The first uses default spreads, based upon country bonds or ratings, whereas the latter two use equity market volatility as an input in estimating country risk premiums.

1. Default Spreads

The simplest and most widely used proxy for the country risk premium is the default spread that investors charge for buying bonds issued by the country. This default spread can be estimated in one of three ways.

a. Current Default Spread on Sovereign Bond or CDS market: As we noted in the last section, the default spread comes from either looking at the yields on bonds issued by the country in a currency where there is a default free bond yield to which it can be compared or spreads in the CDS market.[79] With the 10-year US dollar denominated Brazilian bond that we cited as an example in the last section, the default spread would have amounted to 0.74% in January 2013: the difference between the interest rate on the Brazilian bond and a treasury bond of the same maturity. The netted CDS market spread on the same day for the default spread was 0.77%.

b. Average (Normalized) spread on bond: While we can make the argument that the default spread in the dollar denominated is a reasonable measure of the default risk in Brazil, it is also a volatile measure. In figure 7, we have graphed the yields on the dollar denominated ten-year Brazilian Bond and the U.S. ten-year treasury bond and highlighted the default spread (as the difference between the two yields) from 2000 to 2012. In the same figure, we also show the 10-year CDS spreads from 2004 to 2012,[80] the spreads have also changed over time but move with the bond default spreads.

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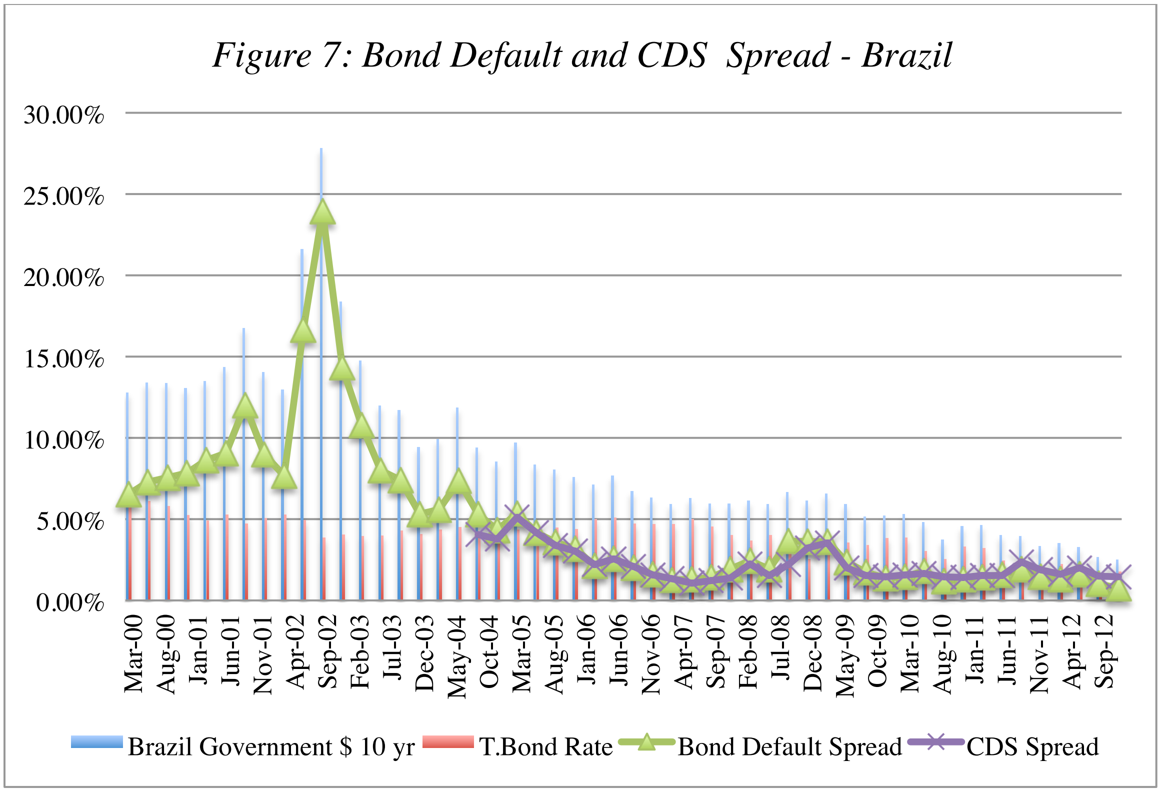
[79] You cannot compare interest rates across bonds in different currencies. The interest rate on a peso bond cannot be compared to the interest rate on a dollar denominated bond.

[80] Data for the sovereign CDS market is available only from the last part of 2004.



Note that the bond default spread widened dramatically during 2002, mostly as a result of uncertainty in neighboring Argentina and concerns about the Brazilian presidential elections.[81] After the elections, the spreads decreased just as quickly and continued on a downward trend through the middle of last year. Since 2004, they have stabilized, with a downward trend; they spiked during the market crisis in the last quarter of 2008 but have settled back into pre-crisis levels. Given this volatility, a reasonable argument can be made that we should consider the average spread over a period of time rather than the default spread at the moment. If we accept this argument, the normalized default spread, using the average spreads over the last 5 years of data would be 1.93% (bond default spread) or 1.81% (CDS spread). Using this approach makes sense only if the economic fundamentals of the country have not changed significantly (for the better or worse) during the period but will yield misleading values, if there have been structural shifts in the economy. In 2008, for instance, it would have made sense to use averages over time for a country like Nigeria, where oil price movements created volatility in spreads over time, but not for countries like China and India, which saw their economies expand and mature dramatically over the period or Venezuela, where government capriciousness

[81] The polls throughout 2002 suggested that Lula who was perceived by the market to be a leftist would beat the establishment candidate. Concerns about how he would govern roiled markets and any poll that showed him gaining would be followed by an increase in the default spread.

made operating private businesses a hazardous activity (with a concurrent tripling in default spreads).

c. Imputed or Synthetic Spread: The two approaches outlined above for estimating the default spread can be used only if the country being analyzed has bonds denominated in US dollars, Euros or another currency that has a default free rate that is easily accessible. Most emerging market countries, though, do not have government bonds denominated in another currency and some do not have a sovereign rating. For the first group (that have sovereign rating but no foreign currency government bonds), there are two solutions. If we assume that countries with the similar default risk should have the same sovereign rating, we can use the typical default spread for other countries that have the same rating as the country we are analyzing and dollar denominated or Euro denominated bonds outstanding. Thus, Bulgaria, with a Baa2 rating, would be assigned the same default spread as Brazil, which also has Baa2 rating, and dollar denominated bonds and CDS prices from which we can extract a default spread. For the second group, we are on even more tenuous grounds. Assuming that there is a country risk score from the Economist or PRS for the country, we could look for other countries that are rated and have similar scores and assign the default spreads that these countries face. For instance, we could assume that Cuba and Tanzania, which have the same country risk score from PRS, have similar country risk; this would lead us to attach Cuba's rating of Caa1 to Tanzania (which is not rated) and to use the same default spread of 7% (based on this rating) for both countries.

In table 12, we have estimated the typical default spreads for bonds in different sovereign ratings classes in January 2013. One problem that we had in obtaining the numbers for this table is that relatively few emerging markets have dollar or Euro denominated bonds outstanding. Consequently, there were some ratings classes where there was only one country with data and several ratings classes where there were none. To mitigate this problem, we used spreads from the CDS market, referenced in the earlier section. We were able to get default spreads for 63 countries, categorized by rating class, and we averaged the spreads across multiple countries in the same ratings class.[82] An alternative approach to estimating default spread is to assume that sovereign ratings are comparable to corporate ratings, i.e., a Ba1 rated country bond and a Ba1 rated corporate bond have equal default risk. In this case, we can use the default spreads on corporate bonds for different ratings classes. Table 14 summarizes the typical default spreads by

[82] There were seven Baa2 rated countries, with ten-year CDS spreads, in January 2013. The average spread across the these countries is 1.83%.

sovereign rating class in January 2013, and compares it to the default spreads for similar corporate ratings.

Table 14: Default Spreads by Ratings Class – Sovereign vs. Corporate in January 2013

Moody's rating	*Sovereign Bonds/CDS*	Corporate Bonds
Aaa/AAA	0.00%	0.40%
Aa1/AA+	0.25%	0.57%
Aa2/AA	0.50%	0.73%
Aa3/AA-	0.70%	0.78%
A1/A+	0.85%	0.82%
A2/A	1.00%	0.95%
A3/A-	1.15%	1.31%
Baa1/BBB+	1.50%	1.55%
Baa2/BBB	1.75%	1.84%
Baa3/BBB-	2.00%	2.28%
Ba1/BB+	2.40%	3.12%
Ba2/BB	2.75%	3.97%
Ba3/BB-	3.25%	4.81%
B1/B+	4.00%	5.65%
B2/B	5.00%	6.49%
B3/B-	6.00%	7.34%
Caa1/ CCC+	7.00%	7.75%
Caa2/CCC	8.50%	8.75%
Caa3/ CCC-	10.00%	10.00%

Note that the corporate bond spreads, at least in January 2013, were slightly larger than the sovereign spreads for the higher ratings classes, converge for the intermediate ratings and widen again at the lowest ratings. Using this approach to estimate default spreads for Brazil, with its rating of Baa2 would result in a spread of 1.75% (1.84%), if we use sovereign spreads (corporate spreads). These spreads are down from post-crisis levels at the end of 2008 but are still much larger than the actual spreads on Brazilian sovereign bonds in early 2013.

Figure 8 depicts the alternative approaches to estimating default spreads for four countries, Brazil, China, India and Poland, in early 2013:

Figure 8: Approaches for estimating Sovereign Default Spreads

Estimating a default spread for a country or sovereign entity

Market Based estimates

Soverign Bond spread
1. Find a bond issued by the country, denominated in US$ or Euros.
2. Compute the default spread by comparing to US treasury bond (if US $) or German Euro bond (if Euros).

CDS Market
1. Find a 10-year CDS for the country (if one exists)
2. Net out US CDS
2. This is your default spread.

Country	Sovereign Bond Yield	Currency	Riskfree Rate	Default Spread	CDS spread (net of US)
Brazil	2.50%	US$	1.76%	0.74%	0.77%
China	NA	NA	NA	NA	0.35%
India	NA	NA	NA	NA	NA
Poland	2.10%	Euro	1.50%	0.60%	0.63%

Rating/Risk score based estimates
Step 1: Find a sovereign rating (local currency) for the country (on Moody's or S&P)
Step 2: Look up the default spread for that rating in the lookup table below:

Moody's rating	*Sovereign Bonds/CDS*
Aaa	0.00%
Aa1	0.25%
Aa2	0.50%
Aa3	0.70%
A1	0.85%
A2	1.00%
A3	1.15%
Baa1	1.50%
Baa2	1.75%
Baa3	2.00%
Ba1	2.40%
Ba2	2.75%
Ba3	3.25%
B1	4.00%
B2	5.00%
B3	6.00%
Caa1	7.00%
Caa2	8.50%
Caa3	10.00%

Country	Rating	Default Spread
Brazil	Baa2	1.75%
China	Aa3	0.70%
India	Baa3	2.00%
Poland	A2	1.00%

With some countries, such as India, you don't have a choice since the only estimate of the default spread comes from the rating and yields 2.00%. With other countries, such as Brazil, you have multiple estimates of the default spreads: 0.74% from the dollar denominated bond, 1.44% from the CDS spread, 0.77% from the netted CDS spread and 1.75% from the sovereign rating look up table. You could choose one of these approaches and stay consistent over time or average across them.

Analysts who use default spreads as measures of country risk typically add them on to both the cost of equity and debt of every company traded in that country. Thus, the cost of equity for an Indian company, estimated in U.S. dollars, will be 2% higher than the cost of equity of an otherwise similar U.S. company, using the January 2013 measure of the default spread, based upon the rating. In some cases, analysts add the default spread to the U.S. risk premium and multiply it by the beta. This increases the cost of equity for high beta companies and lowers them for low beta firms.[83]

[83] In a companion paper, I argue for a separate measure of company exposure to country risk called lambda that is scaled around one (just like beta) that is multiplied by the country risk premium to estimate the cost of equity. See Damodaran, A., 2007, Measuring Company Risk Exposure to Country Risk, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=889388.

While many analysts use default spreads as proxies for country risk, the evidence for its use is still thin. Abuaf (2011) examines ADRs from ten emerging markets and relates the returns on these ADRs to returns on the S&P 500 (which yields a conventional beta) and to the CDS spreads for the countries of incorporation. He finds that ADR returns as well as multiples (such as PE ratios) are correlated with movement in the CDS spreads over time and argues for the addition of the CDS spread (or some multiple of it) to the costs of equity and capital to incorporate country risk.[84]

2. Relative Equity Market Standard Deviations

There are some analysts who believe that the equity risk premiums of markets should reflect the differences in equity risk, as measured by the volatilities of these markets. A conventional measure of equity risk is the standard deviation in stock prices; higher standard deviations are generally associated with more risk. If you scale the standard deviation of one market against another, you obtain a measure of relative risk. For instance, the relative standard deviation for country X (against the US) would be computed as follows:

$$\text{Relative Standard Deviation}_{\text{Country X}} = \frac{\text{Standard Deviation}_{\text{Country X}}}{\text{Standard Deviation}_{\text{US}}}$$

If we assume a linear relationship between equity risk premiums and equity market standard deviations, and we assume that the risk premium for the US can be computed (using historical data, for instance) the equity risk premium for country X follows:

$$\text{Equity risk premium}_{\text{Country X}} = \text{Risk Premum}_{\text{US}} * \text{Relative Standard Deviation}_{\text{Country X}}$$

Assume, for the moment, that you are using an equity risk premium for the United States of 5.80%. The annualized standard deviation in the S&P 500 in two years preceding March 2013, using weekly returns, was 17.67%, whereas the standard deviation in the Bovespa (the Brazilian equity index) over the same period was 21.62%.[85] Using these values, the estimate of a total risk premium for Brazil would be as follows.

$$\text{Equity Risk Premium}_{Brazil} = 5.80\% * \frac{21.62\%}{17.67\%} = 7.10\%$$

The country risk premium for Brazil can be isolated as follows:

$$\text{Country Risk Premium}_{Brazil} = 7.10\% - 5.80\% = 1.30\%$$

Table 15 lists country volatility numbers for the Latin American markets and the resulting total and country risk premiums for these markets, based on the assumption that

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[84] Abuaf, N., 2011, Valuing Emerging Market Equities – The Empirical Evidence, Journal of Applied Finance, v2.

[85] If the dependence on historical volatility is troubling, the options market can be used to get implied volatilities for both the US market (18.03%) and for the Bovespa (23.56%).

the equity risk premium for the United States is 5.8%. Appendix 4 contains a more complete list of emerging markets, with equity risk premiums and country risk premiums estimated for each.

Table 15: Equity Market Volatilities and Risk Premiums (Weekly returns: Feb 11-Feb 13): Latin American Countries

Country	*Standard deviation in Equities (weekly)*	*Relative Volatility (to US)*	*Total Equity Risk Premium*	*Country risk premium*
Argentina	31.02%	1.76	10.18%	4.38%
Brazil	21.62%	1.22	7.10%	1.30%
Chile	14.14%	0.80	4.64%	-1.16%
Colombia	14.31%	0.81	4.70%	-1.10%
Costa Rica	9.52%	0.54	3.12%	-2.68%
Mexico	16.58%	0.94	5.44%	-0.36%
Panama	4.01%	0.23	1.32%	-4.48%
Peru	23.33%	1.32	7.66%	1.86%
Venezuela	32.34%	1.83	10.62%	4.82%
US	**17.67%**	**1.00**	**5.80%**	**0.00%**

While this approach has intuitive appeal, there are problems with using standard deviations computed in markets with widely different market structures and liquidity. Since equity market volatility is affected by liquidity, with more liquid markets often showing higher volatility, this approach will understate premiums for illiquid markets and overstate the premiums for liquid markets. For instance, the standard deviations for Panama and Costa Rica are lower than the standard deviation in the S&P 500, leading to equity risk premiums for those countries that are lower than the US. The second problem is related to currencies since the standard deviations are usually measured in local currency terms; the standard deviation in the U.S. market is a dollar standard deviation, whereas the standard deviation in the Brazilian market is based on nominal Brazilian Real returns. This is a relatively simple problem to fix, though, since the standard deviations can be measured in the same currency – you could estimate the standard deviation in dollar returns for the Brazilian market.

3. Default Spreads + Relative Standard Deviations

In the first approach to computing equity risk premiums, we assumed that the default spreads (actual or implied) for the country were good measures of the additional risk we face when investing in equity in that country. In the second approach, we argued that the information in equity market volatility can be used to compute the country risk premium. In the third approach, we will meld the first two, and try to use the information in both the country default spread and the equity market volatility.

The country default spreads provide an important first step in measuring country equity risk, but still only measure the premium for default risk. Intuitively, we would expect the country equity risk premium to be larger than the country default risk spread. To address the issue of how much higher, we look at the volatility of the equity market in a country relative to the volatility of the bond market used to estimate the spread. This yields the following estimate for the country equity risk premium.

$$\text{Country Risk Premium}=\text{Country Default Spread}*\left(\frac{\sigma_{\text{Equity}}}{\sigma_{\text{Country Bond}}}\right)$$

To illustrate, consider again the case of Brazil. As noted earlier, the default spread for Brazil in January 2013, based upon its sovereign rating, was 1.75%. We computed annualized standard deviations, using two years of weekly returns, in both the equity market and the government bond, in early March 2013. The annualized standard deviation in the Brazilian dollar denominated ten-year bond was 10.61%, well below the standard deviation in the Brazilian equity index of 21.62%. The resulting country equity risk premium for Brazil is as follows:

$$\text{Brazil Country Risk Premium} = 1.75\% * \frac{21.62\%}{10.61\%} = 3.57\%$$

Unlike the equity standard deviation approach, this premium is in addition to a mature market equity risk premium. Thus, assuming a 5.8% mature market premium, we would compute a total equity risk premium for Brazil of 9.37%:

Brazil's Total Equity Risk Premium = 5.8% + 3.57% = 9.37%

Note that this country risk premium will increase if the country rating drops or if the relative volatility of the equity market increases.

Why should equity risk premiums have any relationship to country bond spreads? A simple explanation is that an investor who can make 1.75% risk premium on a dollar-denominated Brazilian government bond would not settle for a risk premium of 1.75% (in dollar terms) on Brazilian equity. Playing devil's advocate, however, a critic could argue that the interest rate on a country bond, from which default spreads are extracted, is not really an expected return since it is based upon the promised cash flows (coupon and principal) on the bond rather than the expected cash flows. In fact, if we wanted to estimate a risk premium for bonds, we would need to estimate the expected return based upon expected cash flows, allowing for the default risk. This would result in a lower default spread and equity risk premium. Both this approach and the last one use the standard deviation in equity of a market to make a judgment about country risk premium, but they measure it relative to different bases. This approach uses the country bond as a base, whereas the previous one uses the standard deviation in the U.S. market. This approach assumes that investors are more likely to choose between Brazilian bonds and Brazilian equity, whereas the previous approach assumes that the choice is across equity markets.

There are two potential measurement problems with using this approach. The first is that the relative standard deviation of equity is a volatile number, both across countries (ranging from 2.70 for Thailand to 0.50 for Greece) and across time (Brazil's relative volatility numbers have ranged from close to one to well above 2). The second is that computing the relative volatility requires us to estimate volatility in the government bond, which, in turn, presupposes that long-term government bonds not only exist but are also traded.[86] In countries where this data item is not available, we have three choices. One is to fall back on one of the other two approaches. The second is to use a different market measure of default risk, say the CDS spread, and compute the standard deviation in the spread; this number can be standardized by dividing the level of the spread. The third is to compute a cross sectional average of the ratio of stock market to bond market volatility across countries, where both items are available, and use that average. In 2013, for instance, there were 27 emerging markets, where both the equity market volatility and the government bond volatility numbers were available, at least for 100 trading weeks; the numbers are summarized in Appendix 5. The median ratio, across these markets, of equity market volatility to bond price volatility was approximately 1.86.[87] We also computed two other measures of relative volatility: equity volatility divided by the coefficient of variation in the bond yield and equity volatility divided by the coefficient of variation in the CDS spread.

	$\sigma_{Equity} / \sigma_{Bond}$	$\sigma_{Equity} / \sigma_{Yield}$	$\sigma_{Equity} / \sigma_{CDS}$
Number of countries with data	27	26	47
Average	1.94	1.27	1.45
Median	1.86	1.04	0.99
Maximum	4.91	3.69	7.93
Minimum	0.50	0.46	0.48

[86] One indication that the government bond is not heavily traded is an abnormally low standard deviation on the bond yield.

[87] The ratio seems to be lowest in the markets with the highest default spreads and higher in markets with lower default spreads. The median ratio this year is higher than it has been historically. On my website, I continue to use a multiple of 1.50, reflecting the historical value for this ratio.

Looking at the descriptive statistics, the need to adjust default spreads seems to be smaller, at least in the cross section, if you use the CDS spread as your measure of the default spread for a country; the median ratio is close to one.

Choosing between the approaches

The three approaches to estimating country risk premiums will usually give you different estimates, with the bond default spread and relative equity standard deviation approaches generally yielding lower country risk premiums than the melded approach that uses both the country bond default spread and the equity and bond standard deviations. Table 16 summarizes the estimates of country equity and total risk premium using the three approaches for Brazil in January 2013:

Table 16: Country and Total Equity Risk Premium: Brazil in January 2013

Approach	*Mature Market Equity Premium*	*Brazil Country Risk Premium*	*Total Equity Risk Premium*
Country Bond Default Spread	5.80%	1.75%	7.55%
Relative Equity Market Standard Deviations	5.80%	1.30%	7.10%
Melded Approach (Bond default spread X Relative Standard $\text{Deviation}_{\text{Bond}}$)	5.80%	1.75%*1.88 = 3.57%	9.57%
Melded Approach (CDS X Relative Standard $\text{Deviation}_{\text{CDS}}$)	5.80%	1.44% *1.08 =1.55%	7.35%

The bond default spread yields a much larger estimate of the equity risk premium than the other three approaches. In particular, the melded CDS approach offers more promise going forward, as more countries have CDS traded on them. With all three approaches, just as companies mature and become less risky over time, countries can mature and become less risky as well.

One way to adjust country risk premiums over time is to begin with the premium that emerges from the melded approach and to adjust this premium down towards either the country bond default spread or the country premium estimated from equity standard deviations. Thus, the equity risk premium will converge to the country bond default spread as we look at longer term expected returns. As an illustration, the country risk premium for Brazil would be 3.57% for the next year but decline over time to either the

1.75% (country default spread) or 1.30% (relative standard deviation) or perhaps even lower, depending upon your assessment of how Brazil's economy will evolve over time.

Implied Equity Premiums

The problem with any historical premium approach, even with substantial modifications, is that it is backward looking. Given that our objective is to estimate an updated, forward-looking premium, it seems foolhardy to put your faith in mean reversion and past data. In this section, we will consider three approaches for estimating equity risk premiums that are more forward looking.

1. DCF Model Based Premiums

When investors price assets, they are implicitly telling you what they require as an expected return on that asset. Thus, if an asset has expected cash flows of $15 a year in perpetuity, and an investor pays $75 for that asset, he is announcing to the world that his required rate of return on that asset is 20% (15/75). In this section, we expand on this intuition and argue that the current market prices for equity, in conjunction with expected cash flows, should yield an estimate on the equity risk premium.

A Stable Growth DDM Premium

It is easiest to illustrated implied equity premiums with a dividend discount model (DDM). In the DDM, the value of equity is the present value of expected dividends from the investment. In the special case where dividends are assumed to grow at a constant rate forever, we get the classic stable growth (Gordon) model:

$$\text{Value of equity} = \frac{\text{Expected Dividends Next Period}}{\text{(Required Return on Equity - Expected Growth Rate)}}$$

This is essentially the present value of dividends growing at a constant rate. Three of the four inputs in this model can be obtained or estimated - the current level of the market (value), the expected dividends next period and the expected growth rate in earnings and dividends in the long term. The only "unknown" is then the required return on equity; when we solve for it, we get an implied expected return on stocks. Subtracting out the riskfree rate will yield an implied equity risk premium.

To illustrate, assume that the current level of the S&P 500 Index is 900, the expected dividend yield on the index is 2% and the expected growth rate in earnings and dividends in the long term is 7%. Solving for the required return on equity yields the following:

$$900 = (.02*900) /(r - .07)$$

Solving for r,

$$r = (18+63)/900 = 9\%$$

If the current riskfree rate is 6%, this will yield a premium of 3%.

In fact, if we accept the stable growth dividend discount model as the base model for valuing equities and assume that the expected growth rate in dividends should equate to the riskfree rate in the long term, the dividend yield on equities becomes a measure of the equity risk premium:

$$\text{Value of equity} = \frac{\text{Expected Dividends Next Period}}{(\text{Required Return on Equity - Expected Growth Rate})}$$

Dividends/ Value of Equity = Required Return on Equity – Expected Growth rate

Dividend Yield = Required Return on Equity – Riskfree rate

= Equity Risk Premium

Rozeff (1984) made this argument[88] and empirical support has been claimed for dividend yields as predictors of future returns in many studies since.[89] Note that this simple equation will break down if (a) companies do not pay out what they can afford to in dividends, i.e., they hold back cash or (b) if earnings are expected to grow at extraordinary rates for the short term.

There is another variant of this model that can be used, where we focus on earnings instead of dividends. To make this transition, though, we have to state the expected growth rate as a function of the payout ratio and return on equity (ROE) :[90]

Growth rate = (1 – Dividends/ Earnings) (Return on equity)

= (1 – Payout ratio) (ROE)

Substituting back into the stable growth model,

$$\text{Value of equity} = \frac{\text{Expected Earnings Next Period (Payout ratio)}}{(\text{Required Return on Equity - (1-Payout ratio) (ROE)})}$$

If we assume that the return on equity (ROE) is equal to the required return on equity (cost of equity), i.e., that the firm does not earn excess returns, this equation simplifies as follows:

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[88] Rozeff, M. S. 1984. *Dividend yields are equity risk premiums*, Journal of Portfolio Management, v11, 68-75.

[89] Fama, E. F., and K. R. French. 1988. *Dividend yields and expected stock returns*. Journal of Financial Economics, v22, 3-25.

[90] This equation for sustainable growth is discussed more fully in Damodaran, A., 2002, Investment Valuation, John Wiley and Sons.

$$\text{Value of equity} = \frac{\text{Expected Earnings Next Period}}{\text{Required Return on Equity}}$$

In this case, the required return on equity can be written as:

$$\text{Required return on equity} = \frac{\text{Expected Earnings Next Period}}{\text{Value of Equity}}$$

In effect, the inverse of the PE ratio (also referenced as the earnings yield) becomes the required return on equity, if firms are in stable growth and earning no excess returns. Subtracting out the riskfree rate should yield an implied premium:

Implied premium (EP approach) = Earnings Yield on index – Riskfree rate

In January 2013, the first of these approaches would have delivered a very low equity risk premium for the US market.

Dividend Yield = 2.13%

The second approach of netting the earnings yield against the risk free rate would have generated a more plausible number:

Earnings Yield = 7.18%:[91]

Implied premium = Earnings yield – 10-year T.Bond rate

= 7.18% - 1.76% = 5.42%

Both approaches, though, draw on the dividend discount model and make strong assumptions about firms being in stable growth and/or long-term excess returns.

A Generalized Model: Implied Equity Risk Premium

To expand the model to fit more general specifications, we would make the following changes: Instead of looking at the actual dividends paid as the only cash flow to equity, we would consider potential dividends instead of actual dividends. In my earlier work (2002, 2006), the free cash flow to equity (FCFE), i.e, the cash flow left over after taxes, reinvestment needs and debt repayments, was offered as a measure of potential dividends.[92] Over the last decade, for instance, firms have paid out only about half their FCFE as dividends. If this poses too much of an estimation challenge, there is a simpler alternative. Firms that hold back cash build up large cash balances that they use over time to fund stock buybacks. Adding stock buybacks to aggregate dividends paid should give us a better measure of total cash flows to equity. The model can also be expanded to allow for a high growth phase, where earnings and dividends can grow at

[91] The earnings yield in January 2013 is estimated by dividing the aggregated earnings for the index by the index level.

[92] Damodaran, A., 2002, *Investment Valuation*, John Wiley and Sons; Damodaran, A., 2006, *Damodaran on Valuation*, John Wiley and Sons.

rates that are very different (usually higher, but not always) than stable growth values. With these changes, the value of equity can be written as follows:

$$\text{Value of Equity} = \sum_{t=1}^{t=N} \frac{E(FCFE_t)}{(1+k_e)^t} + \frac{E(FCFE_{N+1})}{(k_e\text{-}g_N)\,(1+k_e)^N}$$

In this equation, there are N years of high growth, $E(FCFE_t)$ is the expected free cash flow to equity (potential dividend) in year t, k_e is the rate of return expected by equity investors and g_N is the stable growth rate (after year N). We can solve for the rate of return equity investors need, given the expected potential dividends and prices today. Subtracting out the riskfree rate should generate a more realistic equity risk premium.

In a variant of this approach, the implied equity risk premium can be computed from excess return or residual earnings models. In these models, the value of equity today can be written as the sum of capital invested in assets in place and the present value of future excess returns:[93]

$$\text{Value of Equity} = \text{Book Equity today} + \sum_{t=1}^{t=\infty} \frac{\text{Net Income}_t - k_e(\text{Book Equity}_{t-1})}{(1+k_e)^t}$$

If we can make estimates of the book equity and net income in future periods, we can then solve for the cost of equity and use that number to back into an implied equity risk premium. Claus and Thomas (2001) use this approach, in conjunction with analyst forecasts of earnings growth, to estimate implied equity risk premiums of about 3% for the market in 2000.[94] Easton (2007) provides a summary of possible limitations of models that attempt to extract costs of equity from accounting data including the unreliability of book value numbers and the use of optimistic estimates of growth from analysts.[95]

Implied Equity Risk Premium: S&P 500

Given its long history and wide following, the S&P 500 is a logical index to use to try out the implied equity risk premium measure. In this section, we will begin by estimating implied equity risk premiums at the start of the years 2008-2012, and follow up by looking at the volatility in that estimate over time.

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[93] For more on excess return models, see Damodaran, A, 2006, *Valuation Approaches and Metrics: A Survey of the Theory and Evidence,* Working Paper, www.damodaran.com.

[94] Claus, J. and J. Thomas, 2001,'*Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets*, Journal of Finance 56(5), 1629–1666.

[95] Easton, P., 2007, Estimating the cost of equity using market prices and accounting data, Foundations and Trends in Accounting, v2, 241-364.

Implied Equity Risk Premiums: Annual Estimates from 2008 to 2013

On December 31, 2007, the S&P 500 Index closed at 1468.36, and the dividend yield on the index was roughly 1.89%. In addition, the consensus estimate of growth in earnings for companies in the index was approximately 5% for the next 5 years.[96] Since this is not a growth rate that can be sustained forever, we employ a two-stage valuation model, where we allow growth to continue at 5% for 5 years, and then lower the growth rate to 4.02% (the riskfree rate) after that.[97] Table 17 summarizes the expected dividends for the next 5 years of high growth, and for the first year of stable growth thereafter:

Table 17: Estimated Dividends on the S&P 500 Index – January 1, 2008

Year	*Dividends on Index*
1	29.12
2	30.57
3	32.10
4	33.71
5	35.39
6	36.81

[a]Dividends in the first year = 1.89% of 1468.36 (1.05)

If we assume that these are reasonable estimates of the expected dividends and that the index is correctly priced, the value can be written as follows:

$$1468.36 = \frac{29.12}{(1+r)} + \frac{30.57}{(1+r)^2} + \frac{32.10}{(1+r)^3} + \frac{33.71}{(1+r)^4} + \frac{35.39}{(1+r)^5} + \frac{36.81}{(r-.0402)(1+r)^5}$$

Note that the last term in the equation is the terminal value of the index, based upon the stable growth rate of 4.02%, discounted back to the present. Solving for required return in this equation yields us a value of 6.04%. Subtracting out the ten-year treasury bond rate (the riskfree rate) yields an implied equity premium of 2.02%.

The focus on dividends may be understating the premium, since the companies in the index have bought back substantial amounts of their own stock over the last few years. Table 18 summarizes dividends and stock buybacks on the index, going back to 2001.

Table 18: Dividends and Stock Buybacks: 2001- 2007

Year	*Dividend Yield*	*Stock Buyback Yield*	*Total Yield*
2001	1.37%	1.25%	2.62%
2002	1.81%	1.58%	3.39%

[96] We used the average of the analyst estimates for individual firms (bottom-up). Alternatively, we could have used the top-down estimate for the S&P 500 earnings.

[97] The treasury bond rate is the sum of expected inflation and the expected real rate. If we assume that real growth is equal to the real interest rate, the long term stable growth rate should be equal to the treasury bond rate.

2003	1.61%	1.23%	2.84%
2004	1.57%	1.78%	3.35%
2005	1.79%	3.11%	4.90%
2006	1.77%	3.39%	5.16%
2007[a]	1.89%	4.00%	5.89%
Average total yield between 2001-2007 =			4.02%

[a]Trailing 12-month data, from September 2006 through September 2007. In January 2008, this was the information that would have been available. The actual cash yield for all of 2007 was 6.49%.

In 2007, for instance, firms collectively returned more than twice as much in the form of buybacks than they paid out in dividends. Since buybacks are volatile over time, and 2007 may represent a high-water mark for the phenomenon, we recomputed the expected cash flows, in table 19, for the next 6 years using the average total yield (dividends + buybacks) of 4.11%, instead of the actual dividends, and the growth rates estimated earlier (5% for the next 5 years, 4.02% thereafter):

Table 19: Cashflows on S&P 500 Index

Year	*Dividends+ Buybacks on Index*
1	63.37
2	66.54
3	69.86
4	73.36
5	77.02

Using these cash flows to compute the expected return on stocks, we derive the following:

$$1468.36 = \frac{63.37}{(1+r)} + \frac{66.54}{(1+r)^2} + \frac{69.86}{(1+r)^3} + \frac{73.36}{(1+r)^4} + \frac{77.02}{(1+r)^5} + \frac{77.02(1.0402)}{(r-.0402)(1+r)^5}$$

Solving for the required return and the implied premium with the higher cash flows:

Required Return on Equity = 8.39%

Implied Equity Risk Premium = Required Return on Equity - Riskfree Rate

= 8.48% - 4.02% = 4.46%

This value (4.46%) would have been our estimate of the equity risk premium on January 1, 2008.

During 2008, the S&P 500 lost just over a third of its value and ended the year at 903.25 and the treasury bond rate plummeted to close at 2.21% on December 31, 2008. Firms also pulled back on stock buybacks and financial service firms in particular cut dividends during the year. The inputs to the equity risk premium computation reflect these changes:

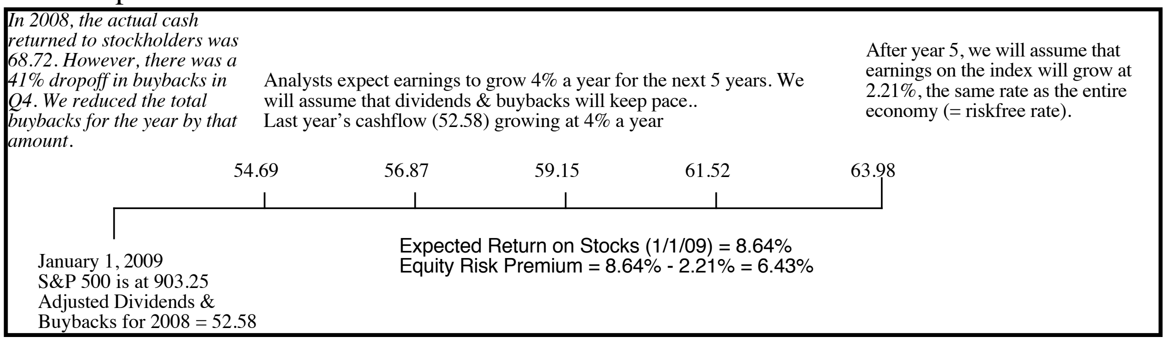
Level of the index = 903.25 (Down from 1468.36)

Treasury bond rate = 2.21% (Down from 4.02%)

Updated dividends and buybacks on the index = 52.58 (Down about 15%)

Expected growth rate = 4% for next 5 years (analyst estimates) and 2.21% thereafter (set equal to riskfree rate).

The computation is summarized below:



The resulting equation is below:

$$903.25 = \frac{54.69}{(1+r)} + \frac{56.87}{(1+r)^2} + \frac{59.15}{(1+r)^3} + \frac{61.52}{(1+r)^4} + \frac{63.98}{(1+r)^5} + \frac{63.98(1.0221)}{(r-.0221)(1+r)^5}$$

Solving for the required return and the implied premium with the higher cash flows:

Required Return on Equity = 8.64%

Implied Equity Risk Premium = Required Return on Equity - Riskfree Rate

= 8.64% - 2.21% = 6.43%

The implied premium rose more than 2%, from 4.37% to 6.43%, over the course of the year, indicating that investors perceived more risk in equities at the end of the year, than they did at the start and were demanding a higher premium to compensate.

By January 2010, the fears of a banking crisis had subsided and the S&P 500 had recovered to 1115.10. However, a combination of dividend cuts and a decline in stock buybacks had combined to put the cash flows on the index down to 40.38 in 2009. That was partially offset by increasing optimism about an economic recovery and expected earnings growth for the next 5 years had bounced back to 7.2%.[98] The resulting equity risk premium is 4.36%:

[98] The expected earnings growth for just 2010 was 21%, primarily driven by earnings bouncing back to pre-crisis levels, followed by a more normal 4% earnings growth in the following years. The compounded average growth rate is $((1.21)(1.04)^4)^{1/5}$-1= .072 or 7.2%.

In 2009, the actual cash returned to stockholders was 40.38. That was down about 40% from 2008 levels.

Analysts expect earnings to grow 21% in 2010, resulting in a compounded annual growth rate of 7.2% over the next 5 years. We will assume that dividends & buybacks will keep pace.

After year 5, we will assume that earnings on the index will grow at 3.84%, the same rate as the entire economy (= riskfree rate).

43.29 46.40 49.74 53.32 57.16

January 1, 2010
S&P 500 is at 1115.10
Adjusted Dividends & Buybacks for 2009 = 40.38

$$115.10 = \frac{43.29}{(1+r)} + \frac{46.40}{(1+r)^2} + \frac{49.74}{(1+r)^3} + \frac{53.32}{(1+r)^4} + \frac{57.16}{(1+r)^5} + \frac{57.16(1.0384)}{(r-.0384)(1+r)^5}$$

Expected Return on Stocks (1/1/10) = 8.20%
T.Bond rate on 1/1/10 = 3.84 %
Equity Risk Premium = 8.20% - 3.84% = 4.36%

In effect, equity risk premiums have reverted back to what they were before the 2008 crisis.

Updating the numbers to January 2011, the S&P 500 had climbed to 1257.64, but cash flows on the index, in the form of dividends and buybacks, made an even more impressive comeback, increasing to 53.96 from the depressed 2009 levels. The implied equity risk premium computation is summarized below:

In 2010, the actual cash returned to stockholders was 53.96. That was up about 30% from 2009 levels.

Analysts expect earnings to grow 13% in 2011, 8% in 2012, 6% in 2013 and 4% therafter, resulting in a compounded annual growth rate of 6.95% over the next 5 years. We will assume that dividends & buybacks will tgrow 6.95% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 3.29%, the same rate as the entire economy (= riskfree rate).

57.72 61.73 66.02 70.60 75.51

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: News stories, Yahoo! Finance, Zacks

January 1, 2011
S&P 500 is at 1257.64
Adjusted Dividends & Buybacks for 2010 = 53.96

$$1257.64 = \frac{57.72}{(1+r)} + \frac{61.73}{(1+r)^2} + \frac{66.02}{(1+r)^3} + \frac{70.60}{(1+r)^4} + \frac{75.51}{(1+r)^5} + \frac{75.51(1.0329)}{(r-.0329)(1+r)^5}$$

Expected Return on Stocks (1/1/11) = 8.49%
T.Bond rate on 1/1/11 = 3.29%
Equity Risk Premium = 8.03% - 3.29% = 5.20%

The implied equity risk premium climbed to 5.20%, with the higher cash flows more than offsetting the rise in equity prices.

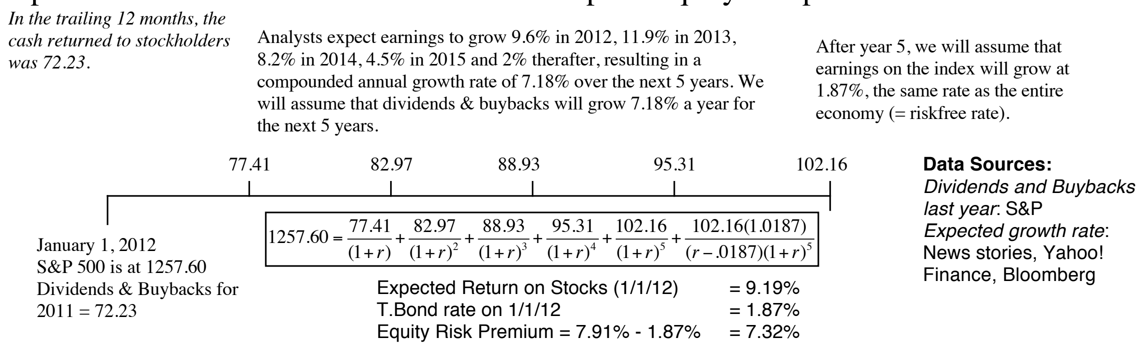
The S&P 500 ended 2011 at 1257.60, almost unchanged from the level at the start of the year. The other inputs into the implied equity risk premium equation changed significantly over the year:

a. The ten-year treasury bond rate dropped during the course of the year from 3.29% to 1.87%, as the European debt crisis caused a "flight to safety". The US did lose its AAA rating with Standard and Poor's during the course of the year, but we will continue to assume that the T.Bond rate is riskfree.
b. Companies that had cut back dividends and scaled back stock buybacks in 2009, after the crisis, and only tentatively returned to the fray in 2010, returned to buying back stocks at almost pre-crisis levels. The total dividends and buybacks

for the trailing 12 months leading into January 2012 climbed to 72.23, a significant increase over the previous year.[99]

c. Analysts continued to be optimistic about earnings growth, in the face of signs of a pickup in the US economy, forecasting growth rate of 9.6% for 2012 (year 1), 11.9% in 2013, 8.2% in 2014, 4% in 2015 and 2.5% in 2016, leading to a compounded annual growth rate of 7.18% a year:.

Incorporating these inputs into the implied equity risk premium computation, we get an expected return on stocks of 9.29% and an implied equity risk premium of 7.32%:



Since the index level did not change over the course of the year, the jump in the equity risk premium from 5.20% on January 1, 2011 to 7.32% on January 1, 2012, was precipitated by two factors. The first was the drop in the ten-year treasury bond rate to a historic low of 1.87% and the second was the surge in the cash returned to stockholders, primarily in buybacks. With the experiences of the last decade fresh in our minds, we considered the possibility that the cash returned during the trailing 12 months may reflect cash that had built up during the prior two years, when firms were in their defensive posture. If that were the case, it is likely that buybacks will decline to a more normalized value in future years. To estimate this value, we looked at the total cash yield on the S&P 500 from 2002 to 2011 and computed an average value of 4.69% over the decade in table 20.

Table 20: Dividends and Buybacks on S&P 500 Index: 2002-2011

Year	Dividend Yield	Buybacks/Index	Yield
2002	1.81%	1.58%	3.39%
2003	1.61%	1.23%	2.84%
2004	1.57%	1.78%	3.35%
2005	1.79%	3.11%	4.90%
2006	1.77%	3.39%	5.16%

[99] These represented dividends and stock buybacks from October 1, 2010 to September 30, 2011, based upon the update from S&P on December 22, 2011. The data for the last quarter is not made available until late March of the following year.

2007	1.92%	4.58%	6.49%
2008	3.15%	4.33%	7.47%
2009	1.97%	1.39%	3.36%
2010	1.80%	2.61%	4.42%
2011	2.00%	3.53%	5.54%
Average: Last 10 years =			4.69%

Assuming that the cash returned would revert to this yield provides us with a lower estimate of the cash flow (4.69% of 1257.60= 59.01) and an equity risk premium of 6.01%:

In the trailing 12 months, the cash returned to stockholders was 72.23. Using the average cash yield of 4.69% for 2002-2011 the cash returned would have been 59.01.

Analysts expect earnings to grow 9.6% in 2012, 11.9% in 2013, 8.2% in 2014, 4.5% in 2015 and 2.5% therafter, resulting in a compounded annual growth rate of 7.18% over the next 5 years. We will assume that dividends & buybacks will grow 7.18% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.87%, the same rate as the entire economy (= riskfree rate).

63.24 67.78 72.65 77.87 83.46

January 1, 2012
S&P 500 is at 1257.60
Normalized Dividends & Buybacks for 2011 = 59.01

$$1257.60=\frac{63.24}{(1+r)}+\frac{67.78}{(1+r)^2}+\frac{72.65}{(1+r)^3}+\frac{77.87}{(1+r)^4}+\frac{83.46}{(1+r)^5}+\frac{83.46(1.0287)}{(r-.0187)(1+r)^5}$$

Expected Return on Stocks (1/1/12) = 7.88%
T.Bond rate on 1/1/12 = 1.87%
Equity Risk Premium = 7.91% - 1.87% = 7.32%

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: News stories, Yahoo! Finance, Bloomberg

So, did the equity risk premium for the S&P 500 jump from 5.20% to 7.32%, as suggested by the raw cash yield, or from 5.20% to 6.01%, based upon the normalized yield? We would be more inclined to go with the latter, especially since the index remained unchanged over the year. Note, though, that if the cash returned by firms does not drop back in the next few quarters, we will revisit the assumption of normalization and the resulting lower equity risk premium.

By December 31, 2012, the S&P 500 climbed to 1426.19 and the treasury bond rate had dropped to 1.76%. The dividends and buybacks were almost identical to the prior year and the smoothed out cash returned (using the average yield over the prior 10 years) climbed to 69.46. Incorporating the lower growth expectations leading into 2013, the implied equity risk premium dropped to 5.78% on January 1, 2013:

In 2012, the actual cash returned to stockholders was 72.25. Using the average total yield for the last decade yields 69.46

Analysts expect earnings to grow 7.67% in 2013, 7.28% in 2014, scaling down to 1.76% in 2017, resulting in a compounded annual growth rate of 5.27% over the next 5 years. We will assume that dividends & buybacks will tgrow 5.27% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.76%, the same rate as the entire economy (= riskfree rate).

73.12 76.97 81.03 85.30 89.80

January 1, 2013
S&P 500 is at 1426.19
Adjusted Dividends & Buybacks for base year = 69.46

$$1426.19=\frac{73.12}{(1+r)}+\frac{76.97}{(1+r)^2}+\frac{81.03}{(1+r)^3}+\frac{85.30}{(1+r)^4}+\frac{89.80}{(1+r)^5}+\frac{89.80(1.0176)}{(r-.0176)(1+r)^5}$$

Expected Return on Stocks (1/1/13) = 7.54%
T.Bond rate on 1/1/13 = 1.76%
Equity Risk Premium = 7.54% - 1.76% = 5.78%

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: S&P, Media reports, Factset, Thomson-Reuters

Note that the chasm between the trailing 12-month cash flow premium and the smoother cash yield premium that had opened up at the start of 2012 had narrowed. The trailing 12-month cash flow premium was 6%, just 0.22% higher than the 5.78% premium obtained with the smoothed out cash flow.

A Term Structure for Equity Risk Premiums

When we estimate an implied equity risk premium, from the current level of the index and expected future cash flows, we are estimating a compounded average equity risk premium over the long term. Thus, the 6.01% estimate of the equity risk premium at the start of 2012 is the geometric average of the annualized equity risk premiums in future years and is analogous to the yield to maturity on a long term bond.

But is it possible that equity risk premiums have a term structure, just as interest rates do? Absolutely. In a creative attempt to measure the slope of the term structure of equity risk premiums, Binsberger, Brandt and Koijen (2011) use dividend strips, i.e., short term assets that pay dividends for finite time periods (and have no face value), to extract equity risk premiums for the short term as opposed to the long term. Using dividend strips on the S&P 500 to extract expected returns from 1996 to 2009, they find that equity risk premiums are higher for shorter term claims than for longer term claims, by approximately 2.75%.[100] Their findings are contested by Boguth, Carlson, Fisher and Simutin (2011), who note that small market pricing frictions are amplified when valuing synthetic dividend strips and that using more robust return measures results in no significant differences between short term and longer term equity risk premiums.[101]

While this debate will undoubtedly continue, the relevance to valuation and corporate finance practice is questionable. Even if you could compute period-specific equity risk premiums, the effect on value of using these premiums (instead of the compounded average premium) would be small in most valuations. To illustrate, your valuation of an asset, using an equity risk premium of 7% for the first 3 years and 5.88% thereafter[102], at the start of 2012, would be very similar to the value you would have obtained using 6.01% as your equity risk premium for all time periods. The only scenario where using year-specific premiums would make a material difference would be in the

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[100] Binsbergen, J. H. van, Michael W. Brandt, and Ralph S. J. Koijen, 2011, *On the timing and pricing of dividends*, American Economic Review, Forthcoming.

[101] Boguth, O., M. Carlson, A. Fisher and M. Simutin, 2011, Dividend Strips and the Term Structure of Equity Risk Premia: A Case Study of Limits to Arbitrage, Working Paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1931105. In a response, Binsberger, Brandt and Koijen argue that their results hold even if traded dividend strips (rather than synthetic strips) are used.

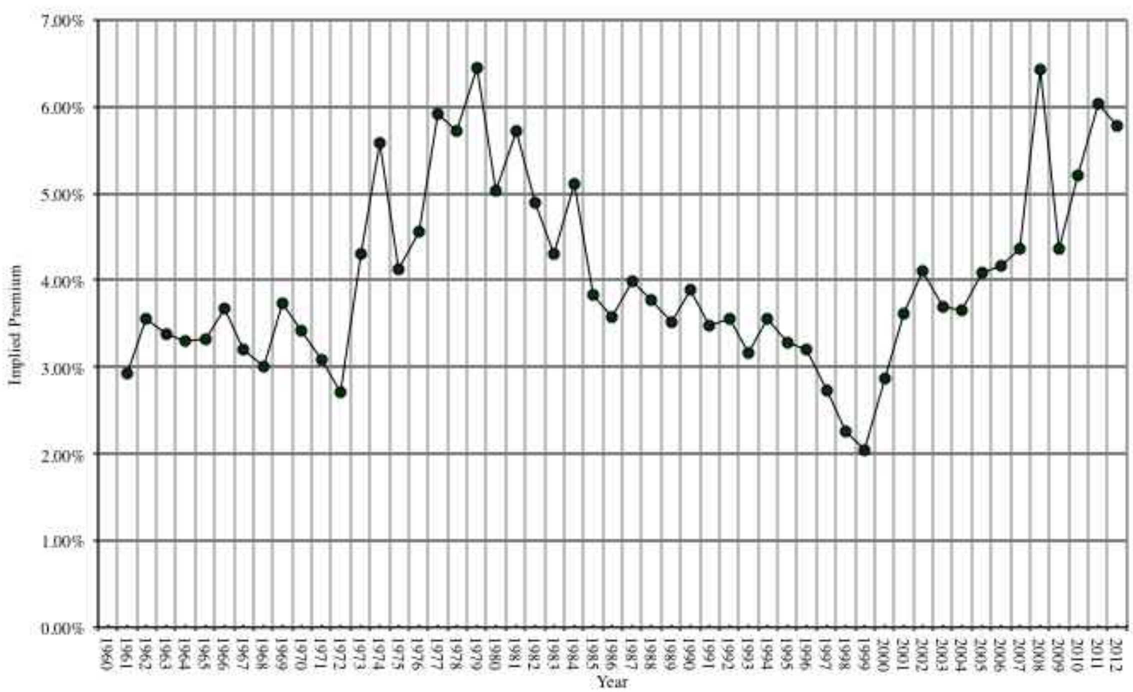
[102] The compounded average premium over time, using a 7% equity risk premium for the first 3 years and 5.88% thereafter, is roughly 6.01%.

valuation of an asset or investment with primarily short-term cash flows, where using a higher short term premium will yield a lower (and perhaps more realistic) value for the asset.

Time Series Behavior for S&P 500 Implied Premium

As the inputs to the implied equity risk premium, it is quite clear that the value for the premium will change not just from day to day but from one minute to the next. In particular, movements in the index will affect the equity risk premium, with higher (lower) index values, other things remaining equal, translating into lower (higher) implied equity risk premiums. In Figure 9, we chart the implied premiums in the S&P 500 from 1960 to 2012:

Figure 9: Implied Premium for US Equity Market



In terms of mechanics, we used potential dividends (including buybacks) as cash flows, and a two-stage discounted cash flow model; the estimates for each year are in appendix 6.[103] Looking at these numbers, we would draw the following conclusions:

- The implied equity premium has generally been lower than the historical risk premium for the US equity market for most of the last few decades. To provide a

[103] We used analyst estimates of growth in earnings for the 5-year growth rate after 1980. Between 1960 and 1980, we used the historical growth rate (from the previous 5 years) as the projected growth, since analyst estimates were difficult to obtain. Prior to the late 1980s, the dividends and potential dividends were very similar, because stock buybacks were uncommon. In the last 20 years, the numbers have diverged.

contrast, we compare the implied equity risk premiums each year to the historical risk premiums for stocks over treasury bonds, using both geometric and arithmetic averages, each year from 1961 to 2012 in figure 10:

Figure 10: Historical versus Implied Premium - 1961- 2012

The arithmetic average premium, which is used by many practitioners, has been significantly higher than the implied premium over almost the entire fifty-year period (with 2009 and 2011 being the only exceptions). The geometric premium does provide a more interesting mix of results, with implied premiums exceeding historical premiums in the mid-1970s and again since 2008.

- The implied equity premium did increase during the seventies, as inflation increased. This does have interesting implications for risk premium estimation. Instead of assuming that the risk premium is a constant, and unaffected by the level of inflation and interest rates, which is what we do with historical risk premiums, would it be more realistic to increase the risk premium if expected inflation and interest rates go up? We will come back and address this question in the next section.
- While historical risk premiums have generally drifted down for the last few decades, there is a strong tendency towards mean reversion in implied equity premiums. Thus, the premium, which peaked at 6.5% in 1978, moved down towards the average in the 1980s. By the same token, the premium of 2% that we observed at the end of the dot-com boom in the 1990s quickly reverted back to the average, during the market

correction from 2000-2003.[104] Given this tendency, it is possible that we can end up with a far better estimate of the implied equity premium by looking at not just the current premium, but also at historical trend lines. We can use the average implied equity premium over a longer period, say ten to fifteen years. Note that we do not need as many years of data to make this estimate as we do with historical premiums, because the standard errors tend to be smaller.

Finally, the crisis of 2008 was unprecedented in terms of its impact on equity risk premiums. Implied equity risk premiums rose more during 2008 than in any one of the prior 50 years, with much of the change happening in a fifteen week time period towards the end of the year. While much of that increase dissipated in 2009, as equity risk premiums returned to pre-crisis levels, equity risk premiums have remained more volatile since 2008. In the next section, we will take a closer look at this time period.

Implied Equity Risk Premiums during a Market Crisis and Beyond

When we use historical risk premiums, we are, in effect, assuming that equity risk premiums do not change much over short periods and revert back over time to historical averages. This assumption was viewed as reasonable for mature equity markets like the United States, but was put under a severe test during the market crisis that unfolded with the fall of Lehman Brothers on September 15, and the subsequent collapse of equity markets, first in the US, and then globally.

Since implied equity risk premiums reflect the current level of the index, the 75 trading days between September 15, 2008, and December 31, 2008, offer us an unprecedented opportunity to observe how much the price charged for risk can change over short periods. In figure 11, we depict the S&P 500 on one axis and the implied equity risk premium on the other. To estimate the latter, we used the level of the index and the treasury bond rate at the end of each day and used the total dollar dividends and buybacks over the trailing 12 months to compute the cash flows for the most recent year.[105] We also updated the expected growth in earnings for the next 5 years, but that number changed only slowly over the period. For example, the total dollar dividends and buybacks on the index for the trailing 12 months of 52.58 resulted in a dividend yield of

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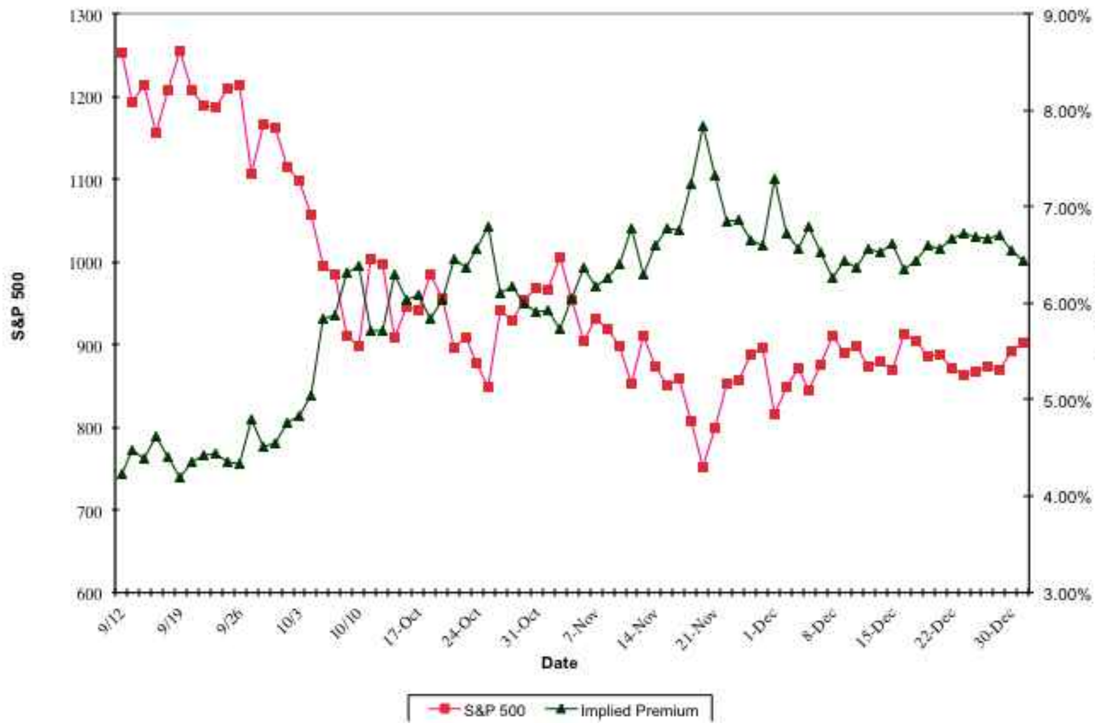
[104] Arnott, Robert D., and Ronald Ryan, 2001, *The Death of the Risk Premium: Consequences of the 1990s*, Journal of Portfolio Management, Spring 2001. They make the same point about reduction in implied equity risk premiums that we do. According to their calculations, though, the implied equity risk premium in the late 1990s was negative.

[105] This number, unlike the index and treasury bond rate, is not updated on a daily basis. We did try to modify the number as companies in the index announced dividend suspensions or buyback modifications.

4.20% on September 12 (when the index closed at 1252) but jumped to 4.97% on October 6, when the index closed at 1057.[106]

Figure 11: Implied Equity Risk Premium - 9/12- 12/31/08



In a period of a month, the implied equity risk premium rose from 4.20% on September 12 to 6.39% at the close of trading of October 10 as the S&P moved from 1250 down to 903. Even more disconcertingly, there were wide swings in the equity risk premium within a day; in the last trading hour just on October 10, the implied equity risk premium ranged from a high of 6.6% to a low of 6.1%. Over the rest of the year, the equity risk premium gyrated, hitting a high of 8% in late November, before settling into the year-end level of 6.43%.

The volatility captured in figure 12 was not restricted to just the US equity markets. Global equity markets gyrated with and sometimes more than the US, default spreads widened considerably in corporate bond markets, commercial paper and LIBOR rates soared while the 3-month treasury bill rate dropped close to zero and the implied volatility in option markets rose to levels never seen before. Gold surged but other

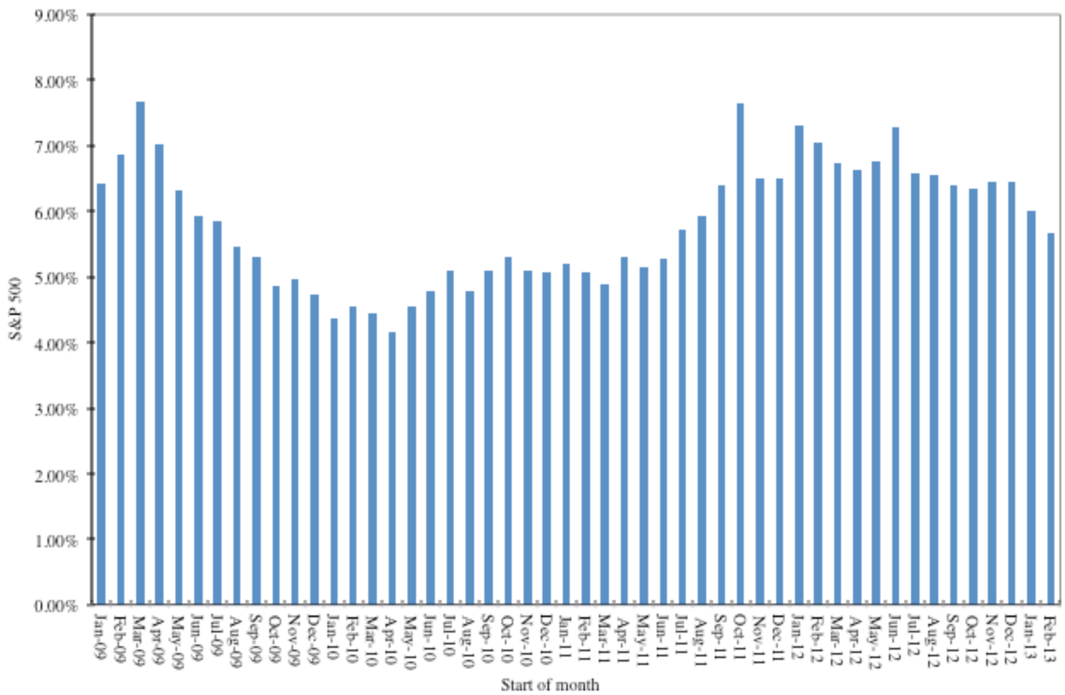
[106] It is possible, and maybe even likely, that the banking crisis and resulting economic slowdown was leading some companies to reassess policies on buybacks. Alcoa, for instance, announced that it was terminating stock buybacks. However, other companies stepped up buybacks in response to lower stock prices. If the total cash return was dropping, as the market was, the implied equity risk premiums should be lower than the numbers that we have computed.

commodities, such as oil and grains, dropped. Not only did we discover how intertwined equity markets are around the globe but also how markets for all risky assets are tied together. We will explicitly consider these linkages as we go through the rest of the paper.

There are two ways in which we can view this volatility. One the one side, proponents of using historical averages (either of actual or implied premiums) will use the day-to-day volatility in market risk premiums to argue for the stability of historical averages. They are implicitly assuming that when the crisis passes, markets will return to the status quo. On the other hand, there will be many who point to the unprecedented jump in implied premiums over a few weeks and note the danger of sticking with a "fixed" premium. They will argue that there are sometimes structural shifts in markets, i.e. big events that change market risk premiums for long periods, and that we should be therefore be modifying the risk premiums that we use in valuation as the market changes around us. In January 2009, in the context of equity risk premiums, the first group would have argued we should ignore history (both in terms of historical returns and implied equity risk premiums) and move to equity risk premiums of 6%+ for mature markets (and higher for emerging markets whereas the second would have made a case for sticking with a historical average, which would have been much lower than 6.43%.

The months since the crisis ended in 2008 have seen ups and downs in the implied premium, with clear evidence that the volatility in the equity risk premium has increased over the last few years. In figure 12, we report on the monthly equity risk premiums for the S&P 500 from January 2009 through February 2013:

Figure 12: Implied ERP by month: S&P 500
January 2009- Current



Note that the equity risk premium dropped from its post-crisis highs in 2010 but climbed back in 2011 to 6% or higher.

On a personal note, I believe that the very act of valuing companies requires taking a stand on the appropriate equity risk premium to use. For many years prior to September 2008, I used 4% as my mature market equity risk premium when valuing companies, and assumed that mean reversion to this number (the average implied premium over time) would occur quickly and deviations from the number would be small. Though mean reversion is a powerful force, I think that the banking and financial crisis of 2008 has created a new reality, i.e., that equity risk premiums can change quickly and by large amounts even in mature equity markets. Consequently, I have forsaken my practice of staying with a fixed equity risk premium for mature markets, and I now vary it year-to-year, and even on an intra-year basis, if conditions warrant. After the crisis, in the first half of 2009, I used equity risk premiums of 6% for mature markets in my valuations. As risk premiums came down in 2009, I moved back to using a 4.5% equity risk premium for mature markets in 2010. With the increase in implied premiums at the start of 2011, my valuations for the year were based upon an equity risk premium of 5% for mature markets and I increased that number to 6% for 2012. In 2013, I will be using a slightly lower equity risk premium (5.80%), reflecting the drop from 2012. While some may view this shifting equity risk premium as a sign of weakness, I would frame it differently. When valuing individual companies, I want my valuations to reflect my assessments of the company and not my assessments of the overall equity market. Using equity risk premiums that are very different from the implied premium will introduce a market view into individual company valuations.

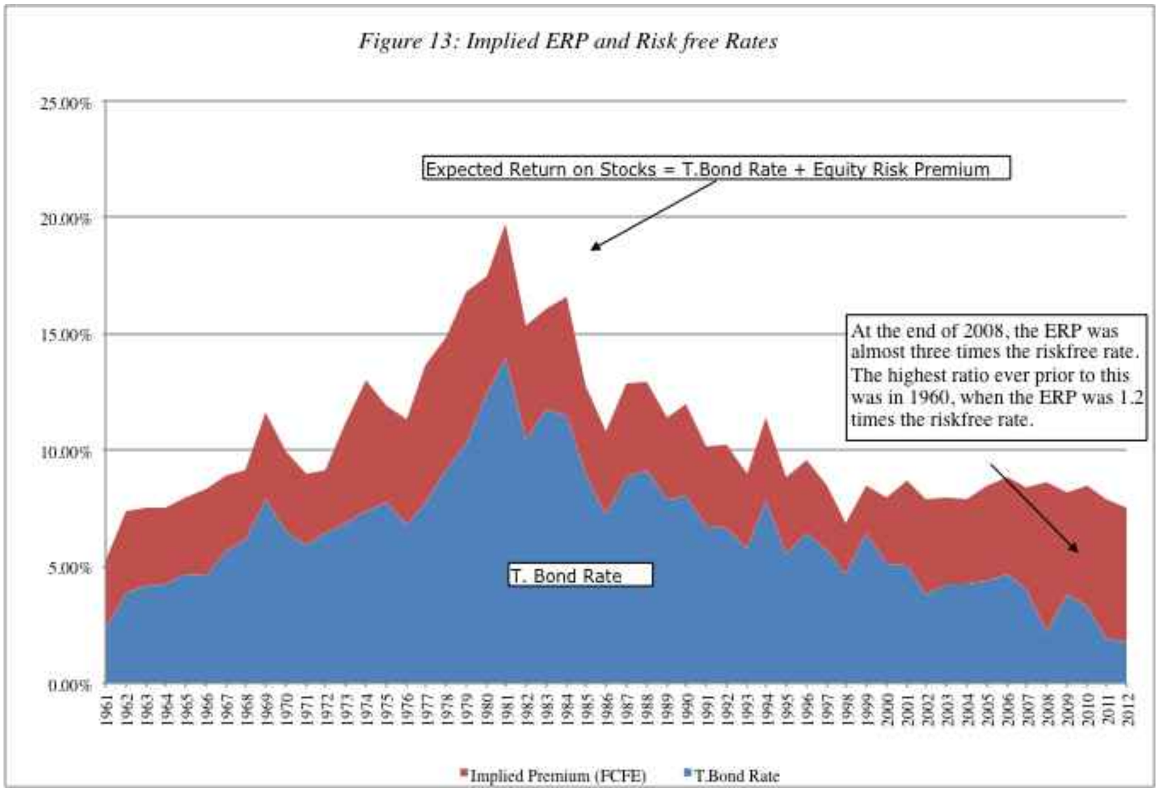
Determinants of Implied Premiums

One of the advantages of estimating implied equity risk premiums, by period, is that we can track year to year changes in that number and relate those changes to shifts in interest rates, the macro environment or even to company characteristics. By doing so, not only can we get a better understanding of what causes equity risk premiums to change over time but we also be able to come up with better estimates of future premiums.

Implied ERP and Interest rates

In much of valuation and corporate finance practice, we assume that the equity risk premium that we compute and use is unrelated to the level of interest rates. In particular, the use of historical risk premiums, where the premium is based upon an average premium earned over shifting risk free rates, implicitly assumes that the level of the premium is unchanged as the risk free rate changes. Thus, we use the same equity risk premium of 4.2% (the historical average for 1928-2012) on a risk free rate of 1.76% in 2012, as we would have, if the risk free rate had been 10%.

But is this a reasonable assumption? How much of the variation in the premium over time can be explained by changes in interest rates? Put differently, do equity risk premiums increase as the risk free rate increases or are they unaffected? To answer this question, we considered looked at the relationship between the implied equity risk premium and the treasury bond rate (risk free rate). As can be seen in figure 13, the implied equity risk premiums were highest in the 1970s, when interest rates and inflation were also high. However, there is contradictory evidence between 2008 and 2012, when high equity risk premiums accompanied low risk free rates.



To examine the relationship between equity risk premiums and risk free rates, we ran a regression of the implied equity risk premium against both the level of long-term rates (the treasury bond rate) and the slope of the yield curve (captured as the difference between the 10-year treasury bond rate and the 3-month T.Bill rate), with the t statistics reported in brackets below each coefficient:

Implied ERP = 3.44% + 0.0853 (T.Bond Rate) + 0.0335 (T.Bond – T.Bill) R^2= 4.82%
(8.20) (1.57) (0.27)

There is a mildly positive relationship between the T.Bond rate and implied equity risk premiums: every 1% increase in the treasury bond rate increases the equity risk premium by 0.09%. The slope of the yield curve seems to have little impact on the implied equity risk premium. Removing the latter variable and running the regression again:

Implied ERP = 3.48% + 0.0842 (T.Bond Rate) R^2=4.68%
(9.33) (1.57)

This regression does provide support for the view that equity risk premiums should not be constant but should be linked to the level of interest rates. In fact, the regression can be used to estimate an equity risk premium, conditional on current interest rates. On February 23, 2013, for instance, when the 10-year treasury bond rate was 2.0%, the implied equity risk premium would have been computed as follows:

Implied ERP = = 3.48% + 0.0842 (2.0%) = 3.65%

This would have been below the observed implied equity risk premium of about 5.78% and the average implied equity risk premium of 4.00% between 1960 and 2012. Put differently, given the low level of risk free rates in 2013 and the historical relationship between equity risk premiums and risk free rates, we would have expected the equity risk premium to be a much lower number (3.65%) than the actual number (5.78%).

Implied ERP and Macroeconomic variables

While we considered the interaction between equity risk premiums and interest rates in the last section, the analysis can be expanded to include other macroeconomic variables including economic growth, inflation rates and exchange rates. Doing so may give us a way of estimating an "intrinsic' equity risk premium, based upon macro economic variables, that is less susceptible to market moods and perceptions.

To explore the relationship, we estimated the correlation, between the implied equity risk premiums that we estimated for the S&P 500 and three macroeconomic variables – real GDP growth for the US, inflation rates (CPI) and exchange rates (trade weighted dollar), using data from 1973 to 2012, in table 21 (t statistics in brackets):

Table 21: Correlation Matrix: ERP and Macroeconomic variables: 1973-2012

	ERP	*Weighted Dollar*	*Real GDP*	*CPI*
ERP	1.0000			
Weighted dollar	-0.0139 (-0.08)	1.0000		
Real GDP	0.2901 (1.84)*	0.0972 (0.59)	1.0000	
CPI	0.5141 (3.65)**	0.1474 (0.91)	0.6698 (5.47)	1.0000

** Statistically significant

The implied equity risk premium is positively correlated with GDP growth, increasing as GDP growth increase. The ERP is also affected by inflation, with higher inflation going hand-in-hand with higher equity risk premiums.[107]

Following up on this analysis, we regressed equity risk premiums against the inflation rate and GDP growth, using data from 1961 to 2012:

Implied ERP = 3.49% - 0.061 Real GDP growth + 0.234 (Inflation rate) R^2= 25.66%
(10.84)   (1.14)   (4.21)

[107] The correlation was also computed for lagged and leading versions of these variables, with two material differences: the equity risk premium is negatively correlated with leading inflation rates and positively correlated with a leading weighted dollar.

GDP growth is only marginally significant and changes signs but inflation remains a potent explanatory variable. Based on this regression, every 1% increase in the inflation rate increases the equity risk premium by approximately 0.23%.

The absence of a relationship between real GDP growth and equity risk premiums should not be surprising for two reasons. First, from a risk perspective, it is not the level of GDP growth that matters, but uncertainty about that level; you can have low and stable economic growth and high and unstable economic growth. Second, the US was a mature economy for all of the time period of our analysis, and had low variance in real growth, as a consequence, for much of the period. Put differently, even in the midst of recessions and booms, the expected real growth rate and the standard deviation in that number probably did not change very much over most of this time period. Thus, it is not surprising that a regression of implied equity risk premiums on the standard deviation in real GDP growth over the prior ten years reveals little or no link between the two:

$$\text{Implied ERP} = \underset{(6.60)}{3.51\%} + \underset{(0.94)}{0.2258}\ (\text{Std dev in real GDP growth}) \qquad R^2 = 1.79\%$$

The banking crisis of 2008 has upended many long held beliefs about developed economies and it is possible that investors perceive much more volatility in expected real growth in these economies today. It will be interesting to see if equity risk premiums become more sensitive to real economic growth in this environment.

Implied ERP, Earnings Yields and Dividend Yields

Earlier in the paper, we noted that the dividend yield and the earnings yield (net of the risk free rate) can be used as proxies for the equity risk premium, if we make assumptions about future growth (stable growth, with the dividend yield) or expected excess returns (zero, with the earnings yield). In figure 14, we compare the implied equity risk premiums that we computed to the earnings and dividend yields for the S&P 500 from 1961 to 2012:

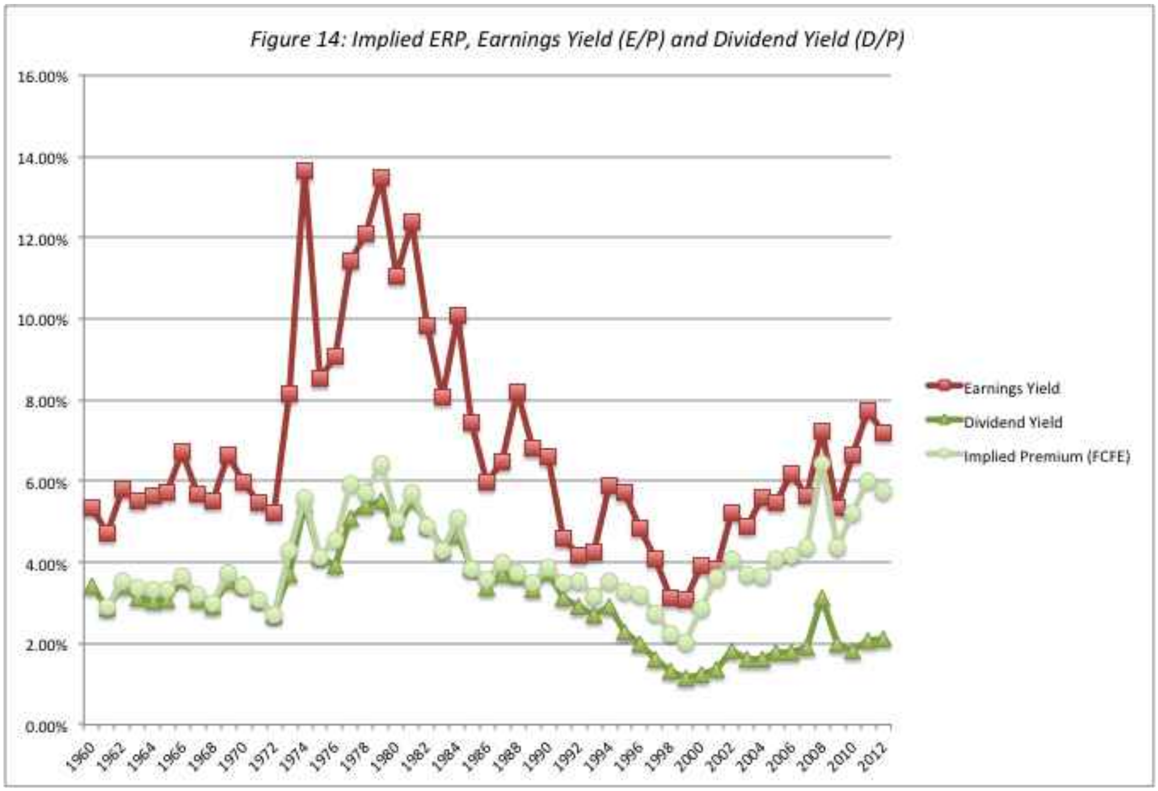


Figure 14: Implied ERP, Earnings Yield (E/P) and Dividend Yield (D/P)

Note that the dividend yield is a very close proxy for the implied equity risk premium until the late 1980s, when the two measures decoupled, a phenomenon that is best explained by the rise of stock buybacks as an alternative way of returning cash to stockholders.

The earnings yield, with the riskfree rate netted out, has generally not been a good proxy for the implied equity risk premium and would have yielded negative values for the equity risk premium (since you have to subtract out the risk free rate from it) through much of the 1990s. The difference between the earnings to price measure and the implied ERP can be attributed to a combination of higher earnings growth and excess returns that investors expect companies to deliver in the future. Analysts and academic researchers who use the earnings to price ratio as a proxy for forward-looking equity risk premiums may therefore end up with significant measurement error in their analyses.

Implied ERP and Technical Indicators

Earlier in the paper, we noted that any market timing forecast can be recast as a view on the future direction of the equity risk premium. Thus, a view that the market is under (over) priced and likely to go higher (lower is consistent with a belief that equity risk premiums will decline (increase) in the future. Many market timers do rely on technical indicators, such as moving averages and momentum measures, to make their judgment about market direction. To evaluate whether these approaches have a basis, you would need to look at how these measures are correlated with changes in equity risk premiums.

In a test of the efficacy of technical indicators, Neely, Rapach, Tu and Zhou (2011) compare the predictive power of macroeconomic/fundamental indications (including the interest rate, inflation, GDP growth and earnings/dividend yield numbers) with those of technical indicators (moving average, momentum and trading volume) and conclude that the latter better explain movements in stock returns.[108] They conclude that a composite prediction, that incorporates both macroeconomic and technical indicators, is superior to using just one set or the other of these variables. Note, however, that their study focused primarily on the predictability of stock returns over the next year and not on longer term equity risk premiums.

Extensions of Implied Equity Risk Premium

The process of backing out risk premiums from current prices and expected cashflows is a flexible one. It can be expanded into emerging markets to provide estimates of risk premiums that can replace the country risk premiums we developed in the last section. Within an equity market, it can be used to compute implied equity risk premiums for individual sectors or even classes of companies.

Other Equity Markets

The advantage of the implied premium approach is that it is market-driven and current, and does not require any historical data. Thus, it can be used to estimate implied equity premiums in any market, no matter how short its history, It is, however, bounded by whether the model used for the valuation is the right one and the availability and reliability of the inputs to that model. Earlier in this paper, we estimated country risk premiums for Brazil, using default spreads and equity market volatile. To provide a contrast, we estimated the implied equity risk premium for the Brazilian equity market in September 2009, from the following inputs.

- The index (Bovespa) was trading at 61,172 on September 30, 2009, and the dividend yield on the index over the previous 12 months was approximately 2.2%. While stock buybacks represented negligible cash flows, we did compute the FCFE for companies in the index, and the aggregate FCFE yield across the companies was 4.95%.
- Earnings in companies in the index are expected to grow 6% (in US dollar terms) over the next 5 years, and 3.45% (set equal to the treasury bond rate) thereafter.

[108] Neely, C.J., D.E. Rapach, J. Tu and G. Zhou, 2011, Forecasting the Equity Risk Premium: The Role of Technical Indicators, Working Paper, http://ssrn.com/abstract=1787554.

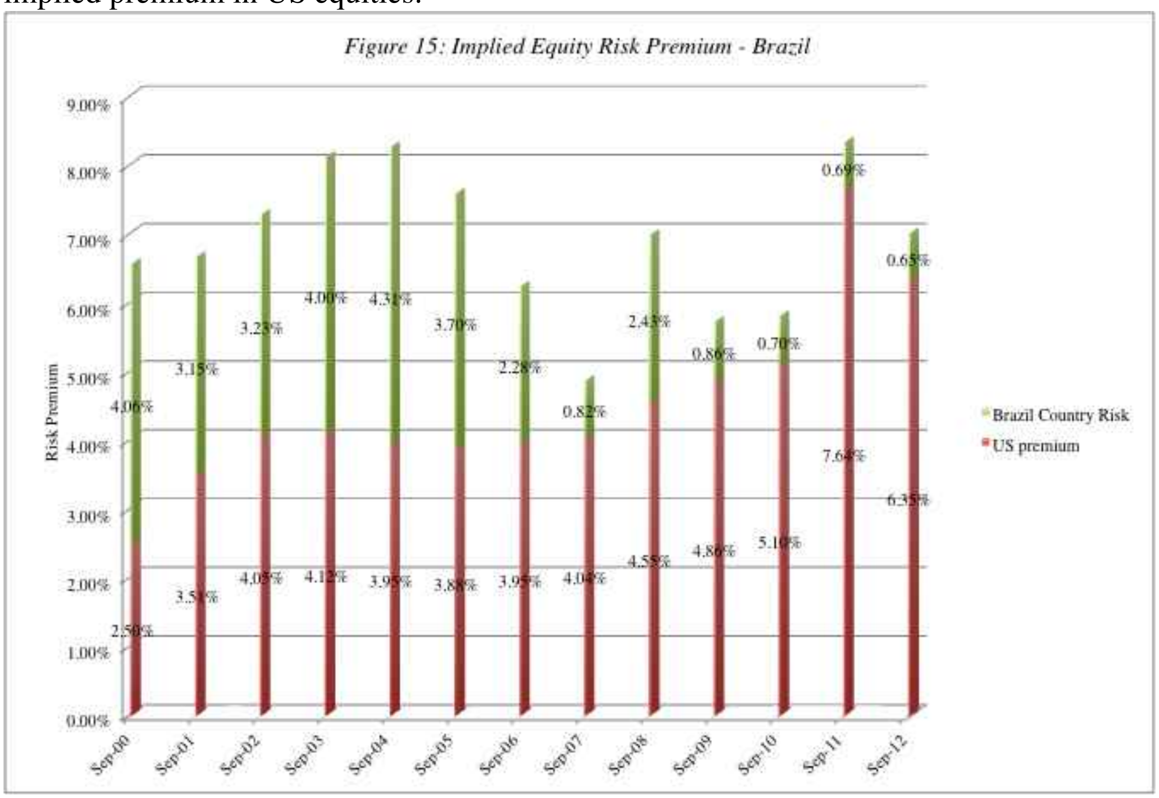
- The riskfree rate is the US 10-year treasury bond rate of 3.45%.

The time line of cash flows is shown below:

$$61,272 = \frac{3210}{(1+r)} + \frac{3,402}{(1+r)^2} + \frac{3,606}{(1+r)^3} + \frac{3,821}{(1+r)^4} + \frac{4,052}{(1+r)^5} + \frac{4,052(1.0345)}{(r-.0345)(1+r)^5}$$

These inputs yield a required return on equity of 9.17%, which when compared to the treasury bond rate of 3.45% on that day results in an implied equity premium of 5.72%. For simplicity, we have used nominal dollar expected growth rates[109] and treasury bond rates, but this analysis could have been done entirely in the local currency.

One of the advantages of using implied equity risk premiums is that that they are more sensitive to changing market conditions. The implied equity risk premium for Brazil in September 2007, when the Bovespa was trading at 73512, was 4.63%, lower than the premium in September 2009, which in turn was much lower than the premium prevailing in September 2012. In figure 15, we trace the changes in the implied equity risk premium in Brazil from September 2000 to September 2012 and compare them to the implied premium in US equities:



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109 The input that is most difficult to estimate for emerging markets is a long-term expected growth rate. For Brazilian stocks, I used the average consensus estimate of growth in earnings for the largest Brazilian companies which have ADRs listed on them. This estimate may be biased, as a consequence.

Implied equity risk premiums in Brazil declined steadily from 2003 to 2007, with the September 2007 numbers representing a historic low. They surged in September 2008, as the crisis unfolded, fell back in 2009 and 2010 but increased again in 2011. In fact, the Brazil portion of the implied equity risk premium had fallen to its lowest level in ten years in September 2010, a phenomenon that remained largely unchanged in 2011 and 2012.

Computing and comparing implied equity risk premiums across multiple equity markets allows us to pinpoint markets that stand out, either as over priced (because their implied premiums are too low, relative to other markets) or under priced (because their premiums at too high, relative to other markets). In September 2007, for instance, the implied equity risk premiums in India and China were roughly equal to or even lower than the implied premium for the United States, computed at the same time. Even an optimist on future growth these countries would be hard pressed to argue that equity markets in these markets and the United States were of equivalent risk, which would lead us to conclude that these stocks were overvalued relative to US companies.

One final note is worth making. Over the last decade, the implied equity risk premiums in the largest emerging markets – India, China and Brazil- have all declined substantially, relative to developed markets. Though it is possible that these markets are over priced, a stronger argument that can be made that this convergence reflects the increasing maturity and stability of the underlying economies in these countries. In fact, the volatility in developed markets, especially in the last two years, suggests that globalization has put "emerging market risk" into developed markets, while creating "developed markets stability factors" (more predictable government policies, stronger legal and corporate governance systems, lower inflation and stronger currencies) in emerging markets.

Sector premiums

Using current prices and expected future cash flows to back out implied risk premiums is not restricted to market indices. We can employ the approach to estimate the implied equity risk premium for a specific sector at a point in time. In September 2008, for instance, there was a widely held perception that investors were attaching much higher equity risk premiums to commercial bank stocks, in the aftermath of the failures of Fannie Mae, Freddie Mac, Bear Stearns and Lehman. To test this proposition, we took a look at the S&P Commercial Bank index, which was trading at 318.26 on September 12, 2008, with an expected dividend yield of 5.83% for the next 12 months. Assuming that these dividends will grow at 4% a year for the next 5 years and 3.60% (the treasury bond rate) thereafter, well below the nominal growth rate in the overall economy, we arrived at the following equation:

$$318.26 = \frac{19.30}{(1+r)} + \frac{20.07}{(1+r)^2} + \frac{20.87}{(1+r)^3} + \frac{21.71}{(1+r)^4} + \frac{22.57}{(1+r)^5} + \frac{22.57(1.036)}{(r-.036)(1+r)^5}$$

Solving for the expected return yields a value of 9.74%, which when netted out against the riskfree rate at the time (3.60%) yields an implied premium for the sector:

Implied ERP for Banking in September 2008 = 9.74% - 3.60% = 6.14%

How would we use this number? One approach would be to compare it to the average implied premium in this sector over time, with the underlying assumption that the value will revert back to the historical average for the sector. The implied equity risk premium for commercial banking stocks was close to 4% between 2005 and 2007, which would lead to the conclusion that banking stocks were undervalued in September 2008. The other is to assume that the implied equity premium for a sector is reflective of perceptions of future risk in that sector; in September 2008, there can be no denying that financial service companies faced unique risks and the market was reflecting these risks in prices. As a postscript, the implied equity risk premium for financial service firms was 5.80% in January 2012, just below the market implied premium at the time (6.01%), suggesting that some of the post-crisis fear about banking stocks is receding (at least for the moment).

A note of caution has to be added to about sector-implied premiums. Since these risk premiums consolidate both sector risk and market risk, it would be inappropriate to multiply these premiums by conventional betas, which are measures of sector risk. Thus, multiplying the implied equity risk premium for the technology sector (which will yield a high value) by a market beta for a technology company (which will also be high for the same reason) will result in double counting risk.[110]

Firm Characteristics

Earlier in this paper, we talked about the small firm premium and how it has been estimated using historical data, resulting in backward looking estimates with substantial standard error. We could use implied premiums to arrive at more forward looking estimates, using the following steps:

Step 1: Compute the implied equity risk premium for the overall market, using a broad index such as the S&P 500. Earlier in this paper, we estimated this, as of January 2013, to be 5.78%.

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[110] You could estimate betas for technology companies against a technology index (rather than the market index) and use these betas with the implied equity risk premium for technology companies.

Step 2: Compute the implied equity risk premium for an index containing primarily or only small cap firms, such as the S&P 600 Small Cap Index. On January 1, 2013, the index was trading at 476.57, with an aggregated FCFE yield of about 3.85% (yielding a FCFE for the most recent year of 18.35), and an expected growth rate in earnings of 13.53% for the next 5 years. Using these values, in conjunction with the prevailing riskfree rate of 1.76%, yields the following equation:

$$476.57 = \frac{20.83}{(1+r)} + \frac{23.65}{(1+r)^2} + \frac{26.85}{(1+r)^3} + \frac{30.48}{(1+r)^4} + \frac{34.60}{(1+r)^5} + \frac{34.60(1.0176)}{(r-.0176)(1+r)^5}$$

Solving for the expected return, we get:

Expected return on small cap stocks = 8.28%

Implied equity risk premium for small cap stocks = 8.28% -1.76% = 6.42%

Step 3: The forward-looking estimate of the small cap premium should be the difference between the implied premium for small cap stocks (in step 2) and the implied premium for the market (in step 1).

Small cap premium = 6.42% - 5.78% = 0.54%

With the numbers in January 2013, the small cap premium is 0.54%, well below the historical average premium of 4.41% that we estimated in the earlier section. In fact, if small cap stocks are riskier than the rest of the market (have a beta greater than 1.11), there may be no excess returns at all from buying these stocks.[111]

This approach to estimating premiums can be extended to other variables. For instance, one of the issues that has challenged analysts in valuation is how to incorporate the illiquidity of an asset into its estimated value. While the conventional approach is to attach an illiquidity discount, an alternative is to adjust the discount rate upwards for illiquid assets. If we compute the implied equity risk premiums for stocks categorized by illiquidity, we may be able to come up with an appropriate adjustment. For instance, you could estimate the implied equity risk premium for the stocks that rank in the lowest decile in terms of illiquidity, defined as turnover ratio.[112] Comparing this value to the implied premium for the S&P 500 of 5.78% should yield an implied illiquidity risk premium. Adding this premium to the cost of equity for relatively illiquid investments will then discount the value of these investments for illiquidity.

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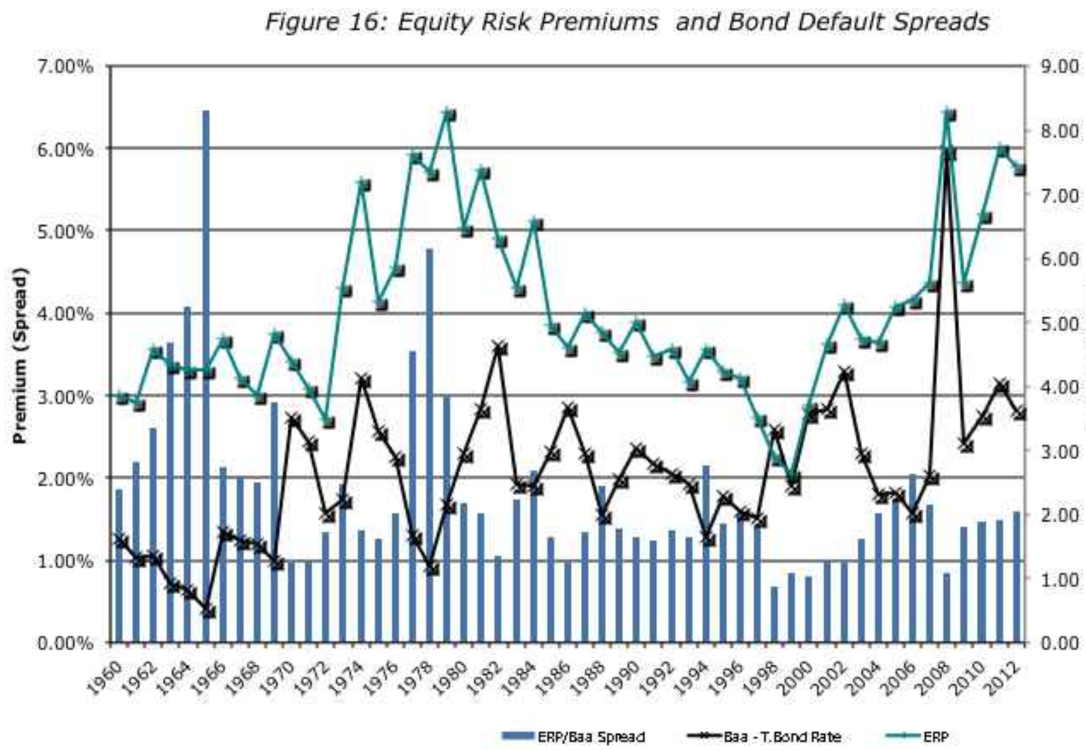
[111] To work out the imputed beta, divide the implied premium for small cap stocks (6.42%) by the implied premium for the S&P 500 (5.78%). If we assume that the latter has a beta close to 1, the beta for small cap stocks would have to be less than 1.11 (6.42/5.78) for the excess return to be positive.

[112] The turnover ratio is obtained by dividing $ trading volume in a stock by its market capitalization at that time.

2. Default Spread Based Equity Risk Premiums

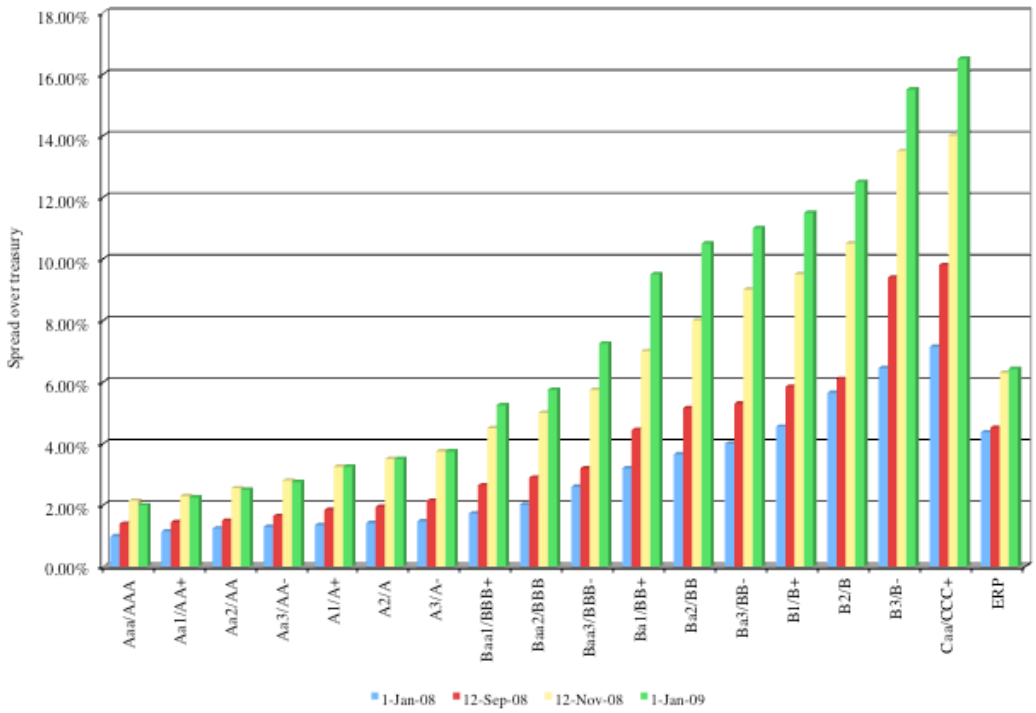
While we think of corporate bonds, stocks and real estate as different asset classes, it can be argued that they are all risky assets and that they should therefore be priced consistently. Put another way, there should be a relationship across the risk premiums in these asset classes that reflect their fundamental risk differences. In the corporate bond market, the default spread, i.e, the spread between the interest rate on corporate bonds and the treasury bond rate, is used as the risk premium. In the equity market, as we have seen through this paper, historical and implied equity premiums have tussled for supremacy as the measure of the equity risk premium. In the real estate market, no mention is made of an explicit risk premium, but real estate valuations draw heavily on the "capitalization rate", which is the discount rate applied to a real estate property's earnings to arrive at an estimate of value. The use of higher (lower) capitalization rates is the equivalent of demanding a higher (lower) risk premium.

Of these three premiums, the default spread is the less complex and the most widely accessible data item. If equity risk premiums could be stated in terms of the default spread on corporate bonds, the estimation of equity risk premiums would become immeasurably simpler. For instance, assume that the default spread on Baa rated corporate bonds, relative to the ten-year treasury bond, is 2.2% and that equity risk premiums are routinely twice as high as Baa bonds, the equity risk premium would be 4.4%. Is such a rule of thumb even feasible? To answer this question, we looked at implied equity risk premiums and Baa-rated corporate bond default spreads from 1960 to 2012 in Figure 16.



Note that both default spreads and equity risk premiums jumped in 2008, with the former increasing more on a proportionate basis. The ratio of 1.08 (ERP/ Baa Default Spread) at the end of 2008 was close to the lowest value in the entire series, suggesting that either equity risk premiums were too low or default spreads were too high. At the end of 2012, both the equity risk premium and the default spread increased, and the ratio moved back to 2.05, a little higher than the median value of 1.96 for the entire time period. The connection between equity risk premiums and default spreads was most obvious during 2008, where changes in one often were accompanied by changes in the other. Figure 17 graphs out changes in default spreads and ERP over the tumultuous year:

Figure 17: Default Spreads on Ratings Classes



How could we use the historical relationship between equity risk premiums and default spreads to estimate a forward-looking equity risk premium? On January 1, 2012, the default spread on a Baa rated bond was 3.14%. Applying the median ratio of 1.96, estimated from 1960-2011 numbers, to the Baa default spread of 2.82% results in the following estimate of the ERP:

Default Spread on Baa bonds (over treasury) on 1/1/2013 = 2.82%

Imputed Equity Risk Premium = Default Spread * Median ratio or ERP/Spread

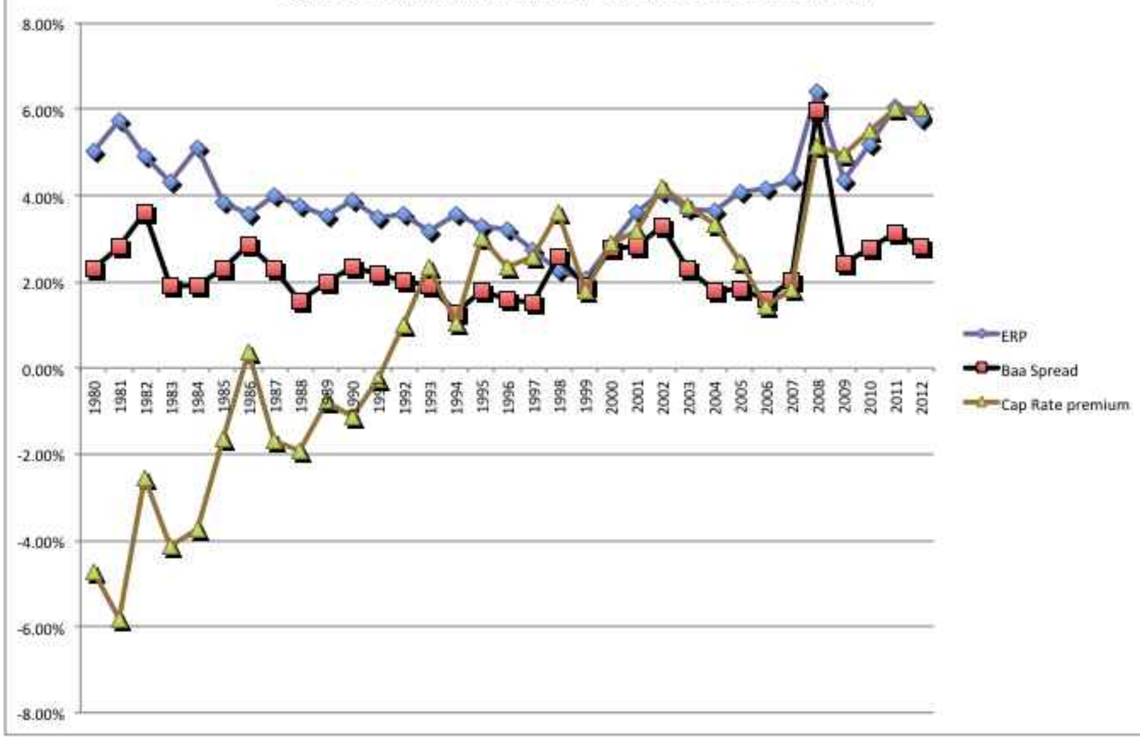
= 2.82%* 1.96 = 5.53%

This is very close to the implied equity risk premium of 5.78% that we computed in January 2013. Note that there is significant variation in the ratio (of ERP to default spreads) over time, with the ratio dropping below one at the peak of the dot.com boom (when equity risk premiums dropped to 2%) and rising to as high as 2.63 at the end of 2006; the standard error in the estimate is 0.20. Whenever the ratio has deviated significantly from the average, though, there is reversion back to that median over time.

The capitalization rate in real estate, as noted earlier, is a widely used number in the valuation of real estate properties. For instance, a capitalization rate of 10%, in conjunction with an office building that generates income of $ 10 million, would result in a property value of $ 100 million ($10/.10). The difference between the capitalization ratio and the treasury bond rate can be considered a real estate market risk premium, In

Figure 17, we used the capitalization rate in real estate ventures and compared the risk premiums imputed for real estate with both bond default spreads and implied equity risk premiums between 1980 and 2012.

Figure 18: Equity Risk Premiums, Cap Rates and Bond Spreads



The story in this graph is the convergence of the real estate and financial asset risk premiums. In the early 1980s, the real estate market seems to be operating in a different risk/return universe than financial assets, with the cap rates being less than the treasury bond rate. For instance, the cap rate in 1980 was 8.1%, well below the treasury bond rate of 12.8%, resulting in a negative risk premium for real estate. The risk premiums across the three markets - real estate, equity and bonds - starting moving closer to each other in the late 1980s and the trend accelerated in the 1990s. We would attribute at least some of this increased co-movement to the securitization of real estate in this period. In 2008, the three markets moved almost in lock step, as risk premiums in the markets rose and prices fell. The housing bubble of 2004-2008 is manifested in the drop in the real estate equity risk premium during those years, bottoming out at less than 2% at the 2006. The correction in housing prices since has pushed the premium back up. Both equity and bond premiums have adjusted quickly to pre-crisis levels in 2009 and 2010, and real estate premiums are following, albeit at a slower pace.

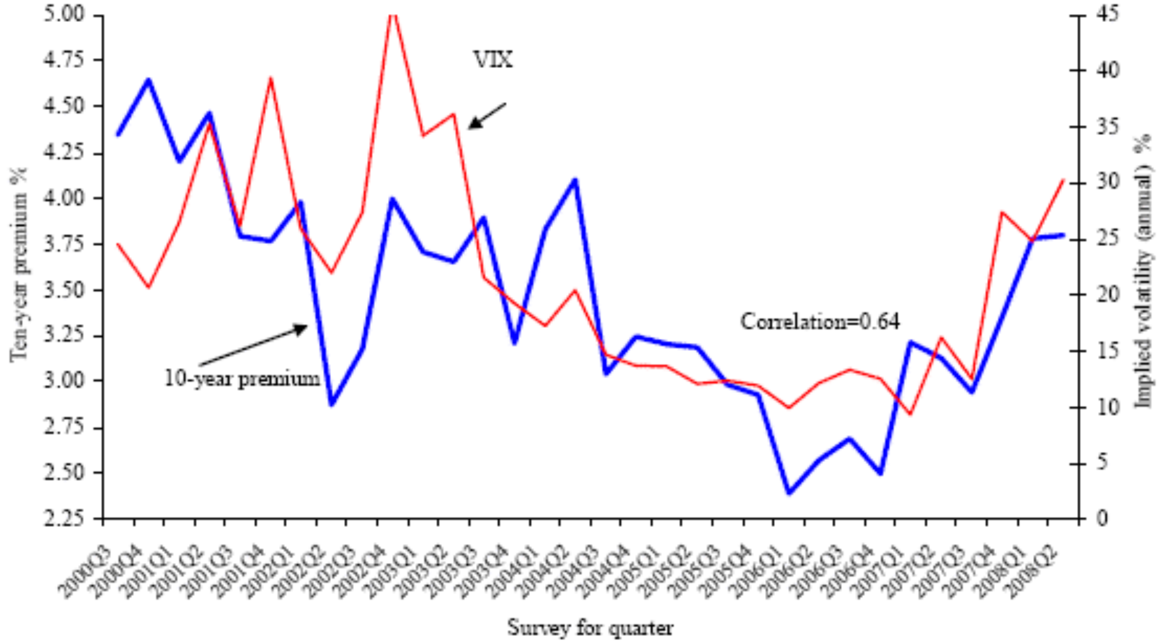
While the noise in the ratios (of ERP to default spreads and cap rates) is too high for us to develop a reliable rule of thumb, there is enough of a relationship here that we would suggest using this approach as a secondary one to test to see whether the equity risk premiums that we are using in practice make sense, given how risky assets are being priced in other markets. Thus, using an equity risk premium of 2%, when the Baa default spread is approximately at the same level strikes us as imprudent, given history. For macro strategists, there is a more activist way of using these premiums. When risk premiums in markets diverge, there is information in the relative pricing. Thus, the drop in equity risk premiums in the late 1990s, as default spreads stayed stable, would have signaled that the equity markets were overvalued (relative to bonds), just as the drop in default spreads between 2004 and 2007, while equity risk premiums were stagnant, would have suggested the opposite.

3. Option Pricing Model based Equity Risk Premium

There is one final approach to estimating equity risk premiums that draws on information in the option market. In particular, option prices can be used to back out implied volatility in the equity market. To the extent that the equity risk premium is our way of pricing in the risk of future stock price volatility, there should be a relationship between the two.

The simplest measure of volatility from the options market is the volatility index (VIX), which is a measure of 30—day volatility constructed using the implied volatilities in traded S&P 500 index options. The CFO survey premium from Graham and Harvey that we referenced earlier in the paper found a high degree of correlation between the premiums demanded by CFOs and the VIX value (see figure 19 below):

Figure 19: Volatility Index (VIX) and Survey Risk Premiums

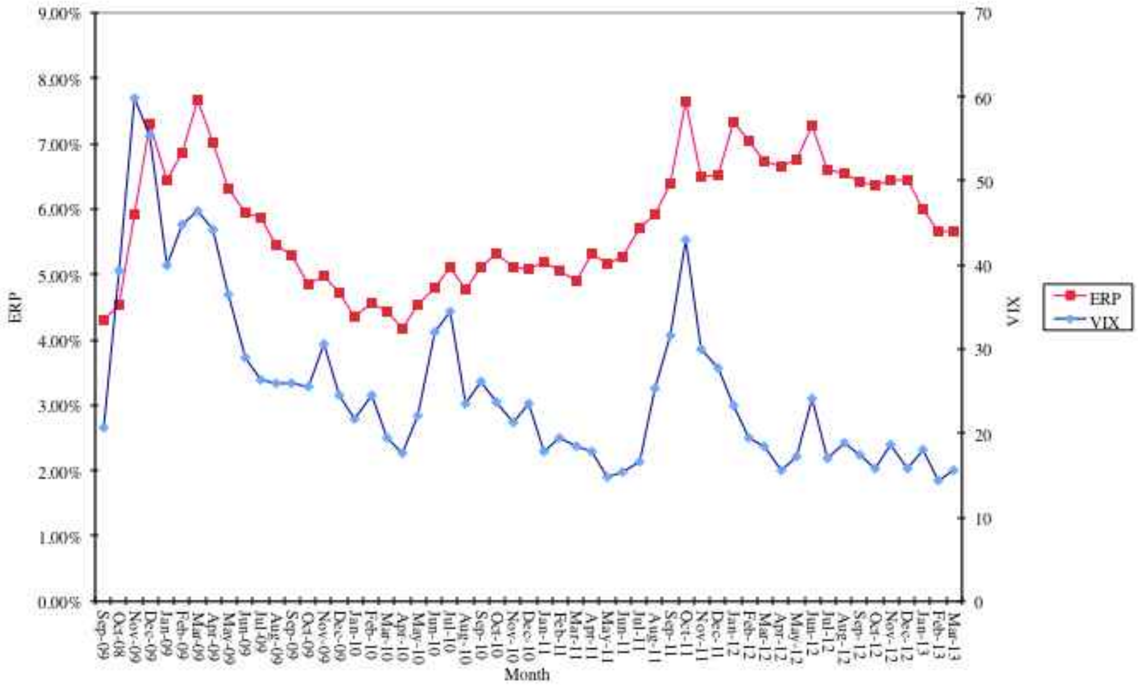


Santa-Clara and Yan (2006) use options on the S&P 500 to estimate the ex-ante risk assessed by investors from 1996 and 2002 and back out an implied equity risk premium on that basis.[113] To estimate the ex-ante risk, they allow for both continuous and discontinuous (or jump) risk in stocks, and use the option prices to estimate the probabilities of both types of risk. They then assume that investors share a specific utility function (power utility) and back out a risk premium that would compensate for this risk. Based on their estimates, investors should have demanded an equity risk premium of 11.8% for their perceived risk and that the perceived risk was about 70% higher than the realized risk over this period.

The link between equity market volatility and the equity risk premium also became clearer during the market meltdown in the last quarter of 2008. Earlier in the paper, we noted the dramatic shifts in the equity risk premiums, especially in the last year, as the financial crisis has unfolded. In Figure 20, we look at the implied equity risk premium each month from September 2008 to March 2013 and the volatility index (VIX) for the S&P 500:

[113] Santa-Clara, P. and S. Yan, 2006, *Crashes, Volatility, and the Equity Premium: Lessons from S&P 500 Options*, Review of Economics and Statistics, v92, pg 435-451.

Figure 20: ERP versus VIX



Note that the surge in equity risk premiums between September 2008 and December 2008 coincided with a jump in the volatility index and that both numbers have declined in the years since the crisis. The drop in the VIX between September 2011 and March 2012 was not accompanied by a decrease in the implied equity risk premium, but equity risk premiums have drifted down since.

Bollerslev, Tauchen and Zhou (2009) take a different tack and argue that it is not the implied volatility per se, but the variance risk, i.e., the difference between the implied variance (in option prices) and the actual variance, that drives expected equity returns.[114] Thus, if the realized variance in a period is far higher (lower) than the implied variance, you should expect to see higher (lower) equity risk premiums demanded for subsequent periods. While they find evidence to back this proposition, they also note the relationship is strongest for short term returns (next quarter) and are weaker for longer-term returns.

Choosing an Equity Risk Premium

We have looked at three different approaches to estimating risk premiums, the survey approach, where the answer seems to depend on who you ask and what you ask them, the historical premium approach, with wildly different results depending on how

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[114] Bollerslev, T. G. Tauchen and H. Zhou, 2009, Expected Stock Returns and Variance Risk Premia, Review of Financial Studies, v22, 4463-4492.

you slice and dice historical data and the implied premium approach, where the final number is a function of the model you use and the assumptions you make about the future. Ultimately, thought, we have to choose a number to use in analysis and that number has consequences. In this section, we consider why the approaches give you different numbers and a pathway to use to devise which number is best for you.

Why do the approaches yield different values?

The different ways of estimating equity risk premium provide cover for analysts by providing justification for almost any number they choose to use in practice. No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate. While this may suffice as a legal defense, it does not pass muster on common sense grounds since not all risk premiums are equally justifiable. To provide a measure of how the numbers vary, the values that we have attached to the US equity risk premium, using different approaches, in January 2013 are summarized in table 22.

Table 22: Equity Risk Premium (ERP) for the United States – January 2013

Approach Used	*ERP*	*Additional information*
Survey: CFOs	3.83%	Campbell and Harvey survey of CFOs (2013); Average estimate. Median was 3.4%.
Survey: Global Fund Managers	4.80%	Merrill Lynch (January 2012) survey of global managers
Historical - US	4.20%	Geometric average - Stocks over T.Bonds: 1928-2012
Historical – Multiple Equity Markets	3.20%	Average premium across 20 markets: Dimson, Marsh and Staunton (2013)
Current Implied premium	5.78%	From S&P 500 – January 1, 2013
Average Implied premium	4.00%	Average of implied equity risk premium: 1960-2012
Implied premium adjusted for T.Bond rate and term structure	3.65%	Using regression of implied premium on T.Bond rate
Default spread based premium	5.53%	Baa Default Spread * Median value of (ERP/ Default Spread)

The equity risk premiums, using the different approaches, yield a range, with the lowest value being 3.20% and the highest being 5.78%. Note that the range would have been larger if we used other measures of historical risk premiums: different time periods, arithmetic instead of geometric averages.

There are several reasons why the approaches yield different answers much of time and why they converge sometimes.

1. When stock prices enter an extended phase of upward (downward) movement, the historical risk premium will climb (drop) to reflect past returns. Implied premiums will tend to move in the opposite direction, since higher (lower) stock prices generally translate into lower (higher) premiums. In 1999, for instance, after the technology induced stock price boom of the 1990s, the implied premium was 2% but the historical risk premium was almost 6%.
2. Survey premiums reflect historical data more than expectations. When stocks are going up, investors tend to become more optimistic about future returns and survey premiums reflect this optimism. In fact, the evidence that human beings overweight recent history (when making judgments) and overreact to information can lead to survey premiums overshooting historical premiums in both good and bad times. In good times, survey premiums are even higher than historical premiums, which, in turn, are higher than implied premiums; in bad times, the reverse occurs.
3. When the fundamentals of a market change, either because the economy becomes more volatile or investors get more risk averse, historical risk premiums will not change but implied premiums will. Shocks to the market are likely to cause the two numbers to deviate. After the terrorist attack on the World Trade Center in September 2001, for instance, implied equity risk premiums jumped almost 0.50% but historical premiums were unchanged (at least until the next update).

In summary, we should not be surprised to see large differences in equity risk premiums as we move from one approach to another, and even within an approach, as we change estimation parameters.

Which approach is the "best" approach?

If the approaches yield different numbers for the equity risk premium, and we have to choose one of these numbers, how do we decide which one is the "best" estimate? The answer to this question will depend upon several factors:

a. Predictive Power: In corporate finance and valuation, what we ultimately care about is the equity risk premium for the future. Consequently, the approach that has the best predictive power, i.e. yields forecasts of the risk premium that are closer to realized premiums, should be given more weight. So, which of the approaches does best on this count?

   Campbell and Shiller (1988) suggested that the dividend yield, a simplistic measure of the implied equity risk premium, had significant predictive power for future returns.[115] However, Goyal and Welch (2007) examined many of the measures suggested as predictors of the equity risk premium in the literature, including the dividend yield and the earnings to price ratio, and find them all wanting.[116] Using data from 1926 to 2005, they conclude that while the measures do reasonably well in sample, they perform poorly out of sample, suggesting that the relationships in the literature are either spurious or unstable. Campbell and Thompson (2008) disagree, noting that putting simple restrictions on the predictive regressions improve out of sample performance for many predictive variables.[117]

To answer this question, we looked at the implied equity risk premiums from 1960 to 2012 and considered four predictors of this premium – the historical risk premium through the end of the prior year, the implied equity risk premium at the end of the prior year, the average implied equity risk premium over the previous five years and the premium implied by the Baa default spread. Since the survey data does not go back very far, we could not test the efficacy of the survey premium. Our results are summarized in table 23:

Table 23: Predictive Power of different estimates- 1960 - 2012

Predictor	*Correlation with implied premium next year*	*Correlation with actual risk premium – next 10 years*
Current implied premium	0.758	0.425
Average implied premium: Last 5 years	0.657	0.359
Historical Premium	-0.286	-0.480
Default Spread based premium	0.115	0.178

Over this period, the implied equity risk premium at the end of the prior period was the best predictor of the implied equity risk premium in the next period, whereas historical risk premiums did worst. If we extend our analysis to make forecasts of the actual return premium earned by stocks over bonds for the next 10 years, the current implied equity risk premium still yields the best forecast for the future, though default spread based premiums improve slightly as predictors. Historical risk premiums

[115] Campbell, J. Y. and R. J. Shiller. 1988, *The Dividend-Price Ratio And Expectations Of Future Dividends And Discount Factors*, Review of Financial Studies, v1(3), 195-228.

[116] Goyal, A. and I. Welch, 2007, *A Comprehensive Look at the Empirical Performance of Equity Premium Prediction,* Review of Financial Studies, v21, 1455-1508.

[117] Campbell, J.Y., and S.B. Thompson, 2008, *Predictive Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?* Review of Financial Studies, v21, 150-9-1531.

perform even worse as forecasts of actual risk premiums over the next 10 years. If predictive power were the only test, historical premiums clearly fail the test.

b. Beliefs about markets: Implicit in the use of each approach are assumptions about market efficiency or lack thereof. If you believe that markets are efficient in the aggregate, or at least that you cannot forecast the direction of overall market movements, the current implied equity premium is the most logical choice, since it is estimated from the current level of the index. If you believe that markets, in the aggregate, can be significantly overvalued or undervalued, the historical risk premium or the average implied equity risk premium over long periods becomes a better choice. If you have absolutely no faith in markets, survey premiums will be the choice.

c. Purpose of the analysis: Notwithstanding your beliefs about market efficiency, the task for which you are using equity risk premiums may determine the right risk premium to use. In acquisition valuations and equity research, for instance, you are asked to assess the value of an individual company and not take a view on the level of the overall market. This will require you to use the current implied equity risk premium, since using any other number will bring your market views into the valuation. To see why, assume that the current implied premium is 4% and you decide to use a historical premium of 6% in your company valuation. Odds are that you will find the company to be over valued, but a big reason for your conclusion is that you started off with the assumption that the market itself is over valued by about 25-30%.[118] To make yourself market neutral, you will have to stick with the current implied premium. In corporate finance, where the equity risk premium is used to come up with a cost of capital, which in turn determines the long-term investments of the company, it may be more prudent to build in a long-term average (historical or implied) premium.

In conclusion, there is no one approach to estimating equity risk premiums that will work for all analyses. If predictive power is critical or if market neutrality is a pre-requisite, the current implied equity risk premium is the best choice. For those more skeptical about markets, the choices are broader, with the average implied equity risk premium over a long time period having the strongest predictive power. Historical risk premiums are very poor predictors of both short-term movements in implied premiums or long-term returns on stocks.

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[118] If the current implied premium is 4%, using a 6% premium on the market will reduce the value of the index by about 25-30%.

Five myths about equity risk premiums

There are widely held misconceptions about equity risk premiums that we would like to dispel in this section.

1. Services "know" the risk premium: When Ibbotson and Sinquefield put together the first database of historical returns on stocks, bonds and bills in the 1970s, the data that they used was unique and not easily replicable, even for professional money managers. The niche they created, based on proprietary data, has led some to believe that Ibbotson Associates, and data services like them, have the capacity to read the historical data better than the rest of us, and therefore come up with better estimates. Now that the access to data has been democratized, and we face a much more even playing field, there is no reason to believe that any service has an advantage over any other, when it comes to historical premiums. Analysts should no longer be allowed to hide behind the defense that the equity risk premiums they use come from a reputable service and are thus beyond questioning.
2. There is no right risk premium: The flip side of the "services know it best" argument is that the data is so noisy that no one knows what the right risk premium is, and that any risk premium within a wide range is therefore defensible. As we have noted in this paper, it is indeed possible to arrive at outlandishly high or low premiums, but only if you use estimation approaches that do not hold up to scrutiny. The arithmetic average premium from 2003 to 2012 for stocks over treasury bonds of 1.72% is an equity risk premium estimate, but it is not a good one.
3. The equity risk premium does not change much over time: Equity risk premiums reflect both economic fundamentals and investor risk aversion and they do change over time, sometimes over very short intervals, as evidenced by what happened in the last quarter of 2008. Shocks to the system – a collapse of a large company or sovereign entity or a terrorist attack – can cause premiums to shoot up overnight. A failure to recognize this reality will lead to analyses that lag reality.
4. Using the same premium is more important than using the right premium: Within many investment banks, corporations and consulting firms, the view seems to be that getting all analysts to use the same number as the risk premium is more important than testing to see whether that number makes sense. Thus, if all equity research analysts use 5% as the equity risk premium, the argument is that they are all being consistent. There are two problems with this argument. The first is that using a premium that is too high or low will lead to systematic errors in valuation. For instance, using a 5% risk premium across the board, when the implied premium is

4%, will lead you to find that most stocks are overvalued. . The second is that the impact of using too high a premium can vary across stocks, with growth stocks being affected more negatively than mature companies. A portfolio manager who followed the recommendations of these analysts would then be over invested in mature companies and under invested in growth companies.

5. <u>If you adjust the cash flows for risk, there is no need for a risk premium</u>: While statement is technically correct, adjusting cash flows for risk has to go beyond reflecting the likelihood of negative scenarios in the expected cash flow. The risk adjustment to expected cash flows to make them certainty equivalent cash flows requires us to answer exactly the same questions that we deal with when adjusting discount rates for risk.

Summary

The risk premium is a fundamental and critical component in portfolio management, corporate finance and valuation. Given its importance, it is surprising that more attention has not been paid in practical terms to estimation issues. In this paper, we began by looking at the determinants of equity risk premiums including macro economic volatility, investor risk aversion and behavioral components. We then looked at the three basic approaches used to estimate equity risk premiums – the survey approach, where investors or managers are asked to provide estimates of the equity risk premium for the future, the historical return approach, where the premium is based upon how well equities have done in the past and the implied approach, where we use future cash flows or observed bond default spreads to estimate the current equity risk premium.

The premiums we estimate can vary widely across approaches, and we considered two questions towards the end of the paper. The first is why the numbers vary across approaches and the second is how to choose the "right" number to use in analysis. For the latter question, we argued that the choice of a premium will depend upon the forecast period, whether your believe markets are efficient and whether you are required to be market neutral in your analysis.

Appendix 1: Historical Returns on Stocks, Bonds and Bills – United States

Year	*Stocks*	*T.Bills*	*T.Bonds*	*Stocks - T. Bills*	*Stocks - T.Bonds*	*Arithmetic Average: Stocks versus T. Bonds*	*Geometric average: Stocks vs T.Bonds*
1928	43.81%	3.08%	0.84%	40.73%	42.98%	42.98%	42.98%
1929	-8.30%	3.16%	4.20%	-11.46%	-12.50%	15.24%	12.33%
1930	-25.12%	4.55%	4.54%	-29.67%	-29.66%	0.27%	-3.60%
1931	-43.84%	2.31%	-2.56%	-46.15%	-41.28%	-10.12%	-15.42%
1932	-8.64%	1.07%	8.79%	-9.71%	-17.43%	-11.58%	-15.81%
1933	49.98%	0.96%	1.86%	49.02%	48.13%	-1.63%	-7.36%
1934	-1.19%	0.32%	7.96%	-1.51%	-9.15%	-2.70%	-7.61%
1935	46.74%	0.18%	4.47%	46.57%	42.27%	2.92%	-2.49%
1936	31.94%	0.17%	5.02%	31.77%	26.93%	5.59%	0.40%
1937	-35.34%	0.30%	1.38%	-35.64%	-36.72%	1.36%	-4.22%
1938	29.28%	0.08%	4.21%	29.21%	25.07%	3.51%	-1.87%
1939	-1.10%	0.04%	4.41%	-1.14%	-5.51%	2.76%	-2.17%
1940	-10.67%	0.03%	5.40%	-10.70%	-16.08%	1.31%	-3.30%
1941	-12.77%	0.08%	-2.02%	-12.85%	-10.75%	0.45%	-3.88%
1942	19.17%	0.34%	2.29%	18.84%	16.88%	1.54%	-2.61%
1943	25.06%	0.38%	2.49%	24.68%	22.57%	2.86%	-1.18%
1944	19.03%	0.38%	2.58%	18.65%	16.45%	3.66%	-0.21%
1945	35.82%	0.38%	3.80%	35.44%	32.02%	5.23%	1.35%
1946	-8.43%	0.38%	3.13%	-8.81%	-11.56%	4.35%	0.63%
1947	5.20%	0.57%	0.92%	4.63%	4.28%	4.35%	0.81%
1948	5.70%	1.02%	1.95%	4.68%	3.75%	4.32%	0.95%
1949	18.30%	1.10%	4.66%	17.20%	13.64%	4.74%	1.49%
1950	30.81%	1.17%	0.43%	29.63%	30.38%	5.86%	2.63%
1951	23.68%	1.48%	-0.30%	22.20%	23.97%	6.61%	3.46%
1952	18.15%	1.67%	2.27%	16.48%	15.88%	6.98%	3.94%
1953	-1.21%	1.89%	4.14%	-3.10%	-5.35%	6.51%	3.57%
1954	52.56%	0.96%	3.29%	51.60%	49.27%	8.09%	4.98%
1955	32.60%	1.66%	-1.34%	30.94%	33.93%	9.01%	5.93%
1956	7.44%	2.56%	-2.26%	4.88%	9.70%	9.04%	6.07%
1957	-10.46%	3.23%	6.80%	-13.69%	-17.25%	8.16%	5.23%
1958	43.72%	1.78%	-2.10%	41.94%	45.82%	9.38%	6.39%
1959	12.06%	3.26%	-2.65%	8.80%	14.70%	9.54%	6.66%
1960	0.34%	3.05%	11.64%	-2.71%	-11.30%	8.91%	6.11%
1961	26.64%	2.27%	2.06%	24.37%	24.58%	9.37%	6.62%
1962	-8.81%	2.78%	5.69%	-11.59%	-14.51%	8.69%	5.97%
1963	22.61%	3.11%	1.68%	19.50%	20.93%	9.03%	6.36%
1964	16.42%	3.51%	3.73%	12.91%	12.69%	9.13%	6.53%
1965	12.40%	3.90%	0.72%	8.50%	11.68%	9.20%	6.66%

Year	*Stocks*	*T.Bills*	*T.Bonds*	*Stocks - T. Bills*	*Stocks - T.Bonds*	*Arithmetic Average: Stocks versus T. Bonds*	*Geometric average: Stocks vs T.Bonds*
1966	-9.97%	4.84%	2.91%	-14.81%	-12.88%	8.63%	6.11%
1967	23.80%	4.33%	-1.58%	19.47%	25.38%	9.05%	6.57%
1968	10.81%	5.26%	3.27%	5.55%	7.54%	9.01%	6.60%
1969	-8.24%	6.56%	-5.01%	-14.80%	-3.23%	8.72%	6.33%
1970	3.56%	6.69%	16.75%	-3.12%	-13.19%	8.21%	5.90%
1971	14.22%	4.54%	9.79%	9.68%	4.43%	8.12%	5.87%
1972	18.76%	3.95%	2.82%	14.80%	15.94%	8.30%	6.08%
1973	-14.31%	6.73%	3.66%	-21.03%	-17.97%	7.73%	5.50%
1974	-25.90%	7.78%	1.99%	-33.68%	-27.89%	6.97%	4.64%
1975	37.00%	5.99%	3.61%	31.01%	33.39%	7.52%	5.17%
1976	23.83%	4.97%	15.98%	18.86%	7.85%	7.53%	5.22%
1977	-6.98%	5.13%	1.29%	-12.11%	-8.27%	7.21%	4.93%
1978	6.51%	6.93%	-0.78%	-0.42%	7.29%	7.21%	4.97%
1979	18.52%	9.94%	0.67%	8.58%	17.85%	7.42%	5.21%
1980	31.74%	11.22%	-2.99%	20.52%	34.72%	7.93%	5.73%
1981	-4.70%	14.30%	8.20%	-19.00%	-12.90%	7.55%	5.37%
1982	20.42%	11.01%	32.81%	9.41%	-12.40%	7.18%	5.10%
1983	22.34%	8.45%	3.20%	13.89%	19.14%	7.40%	5.34%
1984	6.15%	9.61%	13.73%	-3.47%	-7.59%	7.13%	5.12%
1985	31.24%	7.49%	25.71%	23.75%	5.52%	7.11%	5.13%
1986	18.49%	6.04%	24.28%	12.46%	-5.79%	6.89%	4.97%
1987	5.81%	5.72%	-4.96%	0.09%	10.77%	6.95%	5.07%
1988	16.54%	6.45%	8.22%	10.09%	8.31%	6.98%	5.12%
1989	31.48%	8.11%	17.69%	23.37%	13.78%	7.08%	5.24%
1990	-3.06%	7.55%	6.24%	-10.61%	-9.30%	6.82%	5.00%
1991	30.23%	5.61%	15.00%	24.62%	15.23%	6.96%	5.14%
1992	7.49%	3.41%	9.36%	4.09%	-1.87%	6.82%	5.03%
1993	9.97%	2.98%	14.21%	6.98%	-4.24%	6.65%	4.90%
1994	1.33%	3.99%	-8.04%	-2.66%	9.36%	6.69%	4.97%
1995	37.20%	5.52%	23.48%	31.68%	13.71%	6.80%	5.08%
1996	23.82%	5.02%	1.43%	18.79%	22.39%	7.02%	5.32%
1997	31.86%	5.05%	9.94%	26.81%	21.92%	7.24%	5.53%
1998	28.34%	4.73%	14.92%	23.61%	13.42%	7.32%	5.63%
1999	20.89%	4.51%	-8.25%	16.38%	29.14%	7.63%	5.96%
2000	-9.03%	5.76%	16.66%	-14.79%	-25.69%	7.17%	5.51%
2001	-11.85%	3.67%	5.57%	-15.52%	-17.42%	6.84%	5.17%
2002	-21.97%	1.66%	15.12%	-23.62%	-37.08%	6.25%	4.53%
2003	28.36%	1.03%	0.38%	27.33%	27.98%	6.54%	4.82%
2004	10.74%	1.23%	4.49%	9.52%	6.25%	6.53%	4.84%

Year	*Stocks*	*T.Bills*	*T.Bonds*	*Stocks - T. Bills*	*Stocks - T.Bonds*	*Arithmetic Average: Stocks versus T. Bonds*	*Geometric average: Stocks vs T.Bonds*
2005	4.83%	3.01%	2.87%	1.82%	1.97%	6.47%	4.80%
2006	15.61%	4.68%	1.96%	10.94%	13.65%	6.57%	4.91%
2007	5.48%	4.64%	10.21%	0.84%	-4.73%	6.42%	4.79%
2008	-36.55%	1.59%	20.10%	-38.14%	-56.65%	5.65%	3.88%
2009	25.94%	0.14%	-11.12%	25.80%	37.05%	6.03%	4.29%
2010	14.82%	0.13%	8.46%	14.69%	6.36%	6.03%	4.31%
2011	2.07%	0.03%	16.04%	2.04%	-13.97%	5.79%	4.10%
2012	15.83%	0.05%	2.97%	15.78%	12.86%	5.88%	4.20%

Appendix 2: Sovereign Ratings by Country- January 2013

	FC Rating	LC Rating		FC Rating	LC Rating		FC Rating	LC Rating
Albania	B1	B1	Germany	Aaa	Aaa	Panama	Baa2	-
Angola	Ba3	Ba3	Greece	C	C	Papua New Guinea	B1	B1
Argentina	B3	B3	Guatemala	Ba1	Ba1	Paraguay	B1	B1
Armenia	Ba2	Ba2	Honduras	B2	B2	Peru	Baa2	Baa2
Australia	Aaa	Aaa	Hong Kong	Aa1	Aa1	Philippines	Ba1	Ba1
Austria	Aaa	Aaa	Hungary	Ba1	Ba1	Poland	A2	A2
Azerbaijan	Baa3	Baa3	Iceland	Baa3	Baa3	Portugal	Ba3	Ba3
Bahamas	Baa1	Baa1	India	Baa3	Baa3	Qatar	Aa2	Aa2
Bahrain	Baa1	Baa1	Indonesia	Baa3	Baa3	Romania	Baa3	Baa3
Bangladesh	Ba3	Ba3	Ireland	Ba1	Ba1	Russia	Baa1	Baa1
Barbados	Baa3	Baa3	Isle of Man	Aaa	Aaa	Saudi Arabia	Aa3	Aa3
Belarus	B3	B3	Israel	A1	A1	Senegal	B1	B1
Belgium	Aa3	Aa3	Italy	Baa2	Baa2	Singapore	Aaa	Aaa
Belize	Ca	Caa3	Jamaica	B3	B3	Slovakia	A2	A2
Bermuda	Aa2	Aa2	Japan	Aa3	Aa3	Slovenia	Baa2	Baa2
Bolivia	Ba3	Ba3	Jordan	Ba2	Ba2	South Africa	Baa1	Baa1
Bosnia and Herzegovina	B3	B3	Kazakhstan	Baa2	Baa2	Spain	Baa3	Baa3
Botswana	A2	A2	Kenya	B1	B1	Sri Lanka	B1	-
Brazil	Baa2	Baa2	Korea	Aa3	Aa3	St. Maarten	Baa1	Baa1
Bulgaria	Baa2	Baa2	Kuwait	Aa2	Aa2	St. Vincent	B2	B2
Cambodia	B2	B2	Latvia	Baa3	Baa3	Suriname	Ba3	Ba3
Canada	Aaa	Aaa	Lebanon	B1	B1	Sweden	Aaa	Aaa
Cayman Islands	Aa3	-	Lithuania	Baa1	Baa1	Switzerland	Aaa	Aaa
Chile	Aa3	Aa3	Luxembourg	Aaa	Aaa	Taiwan	Aa3	Aa3
China	Aa3	Aa3	Macao	Aa3	Aa3	Thailand	Baa1	Baa1
Colombia	Baa3	Baa3	Malaysia	A3	A3	Trinidad and Tobago	Baa1	Baa1
Costa Rica	Baa3	Baa3	Malta	A3	A3	Tunisia	Baa3	Baa3
Croatia	Baa3	Baa3	Mauritius	Baa1	Baa1	Turkey	Ba1	Ba1
Cuba	Caa1	-	Mexico	Baa1	Baa1	Ukraine	B3	B3
Cyprus	B3	B3	Moldova	B3	B3	United Arab Emirates	Aa2	Aa2
Czech Republic	A1	A1	Mongolia	B1	B1	UK	Aaa	Aaa
Denmark	Aaa	Aaa	Montenegro	Ba3	-	US	Aaa	Aaa
Dominican Republic	B1	B1	Morocco	Ba1	Ba1	Uruguay	Baa3	Baa3
Ecuador	Caa1	-	Namibia	Baa3	Baa3	Venezuela	B2	B1
Egypt	B2	B2	Netherlands	Aaa	Aaa	Vietnam	B2	B2
El Salvador	Ba3	-	New Zealand	Aaa	Aaa	Zambia	B1	B1

	FC Rating	LC Rating		FC Rating	LC Rating
Estonia	A1	A1	Nicaragua	B3	B3
Fiji Islands	B1	B1	Nigeria	Ba3	Ba3
Finland	Aaa	Aaa	Norway	Aaa	Aaa
France	Aa1	Aa1	Oman	A1	A1
Georgia	Ba3	Ba3	Pakistan	Caa1	Caa1

FC Rating: Foreign Currency Rating

LC Rating: Local Currency Rating

Appendix 3: Country Risk Scores from the PRS Group – March 2013

Risk range	*Countries*	*Risk range*	*Countries*	*Risk range*	*Countries*	*Risk range*	*Countries*
	Sudan		Myanmar		Algeria		Hong Kong
<45	Somalia		Honduras		Azerbaijan		Netherlands
	Guinea		Albania		Ireland		Finland
45-50	Syria		Tanzania		Namibia		Korea, South
	Zimbabwe		Latvia		Zambia		Denmark
50-53	Congo, DR		India		Angola	80-83	Kuwait
	Niger		Indonesia		Israel		Saudi Arabia
	Korea, DPR		Cuba		Kazakhstan		New Zealand
53-56	Malawi		Ecuador		Panama		Taiwan
	Pakistan		Madagascar	71-74	Brazil		UAE
	Uganda	65-68	Cameroon		France		Qatar
	Venezuela		Croatia		Russia		Oman
	Egypt		Vietnam		Philippines		Canada
56-59	Belarus		Cyprus		Lithuania	83-86	Germany
	Ethiopia		Slovenia		Slovakia		Sweden
	Iran		Spain		Costa Rica		Singapore
	Liberia		Dominican Republic		Peru	86-89	Brunei
	Yemen		Jordan		Czech Republic		Luxembourg
	Haiti		Mongolia		Suriname	89-92	Switzerland
	Mozambique		Ukraine		United Kingdom		Norway
	Serbia		Guatemala		Mexico		
	Gambia		Argentina		Libya		
	Ivory Coast		Congo		China		
59-62	Iraq		Ghana		Bahamas		
	Kenya		Hungary		Malta		
	Togo		Portugal	74-77	Poland		
	Lebanon		South Africa		Uruguay		
	Mali		El Salvador		United States		
	Guinea-Bissau		Colombia		Belgium		
	Sri Lanka	68-71	Morocco		Gabon		
	Bangladesh		Romania		Malaysia		
	Nicaragua		Bahrain		Chile		
	Burkina Faso		Bulgaria		Austria		
	Tunisia		Estonia		Australia		
	Guyana		Thailand	77-80	Botswana		
	Sierra Leone		Bolivia		Iceland		
	Nigeria		Italy		Trinidad & Tobago		
62-65	Armenia		Portugal		Japan		
	Jamaica						
	Paraguay						
	Papua New Guinea						
	Senegal						
	Greece						
	Moldova						
	Turkey						

Appendix 4: Equity Market volatility, relative to S&P 500: Total Equity Risk Premiums and Country Risk Premiums

Country	*Std deviation in Equities (weekly)*	*Relative Volatility (to US)*	*Total Equity Risk Premium*	*Country risk premium*
Argentina	31.02%	1.76	10.18%	4.38%
Bahrain	7.76%	0.44	2.55%	-3.25%
Bangladesh	31.24%	1.77	10.25%	4.45%
Bosnia	12.71%	0.72	4.17%	-1.63%
Botswana	4.64%	0.26	1.52%	-4.28%
Brazil	21.62%	1.22	7.10%	1.30%
Bulgaria	13.75%	0.78	4.51%	-1.29%
Chile	14.14%	0.80	4.64%	-1.16%
China	23.79%	1.35	7.81%	2.01%
Colombia	14.31%	0.81	4.70%	-1.10%
Costa Rica	9.52%	0.54	3.12%	-2.68%
Croatia	13.30%	0.75	4.37%	-1.43%
Cyprus	67.75%	3.83	22.24%	16.44%
Czech Republic	19.61%	1.11	6.44%	0.64%
Egypt	25.18%	1.43	8.27%	2.47%
Estonia	17.21%	0.97	5.65%	-0.15%
Ghana	12.48%	0.71	4.10%	-1.70%
Greece	37.72%	2.13	12.38%	6.58%
Hungary	23.26%	1.32	7.63%	1.83%
Iceland	12.69%	0.72	4.17%	-1.63%
India	17.44%	0.99	5.72%	-0.08%
Indonesia	16.40%	0.93	5.38%	-0.42%
Ireland	18.32%	1.04	6.01%	0.21%
Israel	18.21%	1.03	5.98%	0.18%
Italy	30.14%	1.71	9.89%	4.09%
Jamaica	8.25%	0.47	2.71%	-3.09%
Jordan	7.31%	0.41	2.40%	-3.40%
Kazakhstan	23.03%	1.30	7.56%	1.76%
Kenya	13.37%	0.76	4.39%	-1.41%
Korea	19.10%	1.08	6.27%	0.47%
Kuwait	9.04%	0.51	2.97%	-2.83%
Laos	17.69%	1.00	5.81%	0.01%
Latvia	10.30%	0.58	3.38%	-2.42%
Lebanon	6.93%	0.39	2.27%	-3.53%
Lithuania	16.96%	0.96	5.57%	-0.23%
Macedonia	12.66%	0.72	4.16%	-1.64%
Malaysia	9.97%	0.56	3.27%	-2.53%
Malta	8.04%	0.46	2.64%	-3.16%

Mexico	16.58%	0.94	5.44%	-0.36%
Mongolia	22.05%	1.25	7.24%	1.44%
Montenegro	20.23%	1.14	6.64%	0.84%
Morocco	12.08%	0.68	3.97%	-1.83%
Namibia	15.82%	0.90	5.19%	-0.61%
Nigeria	13.20%	0.75	4.33%	-1.47%
Oman	11.07%	0.63	3.63%	-2.17%
Pakistan	13.45%	0.76	4.41%	-1.39%
Palestine	8.36%	0.47	2.74%	-3.06%
Panama	4.01%	0.23	1.32%	-4.48%
Peru	23.33%	1.32	7.66%	1.86%
Philippines	14.96%	0.85	4.91%	-0.89%
Poland	17.54%	0.99	5.76%	-0.04%
Portugal	19.69%	1.11	6.46%	0.66%
Qatar	9.85%	0.56	3.23%	-2.57%
Romania	19.56%	1.11	6.42%	0.62%
Russia	22.35%	1.26	7.34%	1.54%
Saudi Arabia	20.82%	1.18	6.83%	1.03%
Serbia	13.32%	0.75	4.37%	-1.43%
Singapore	14.82%	0.84	4.86%	-0.94%
Slovakia	12.20%	0.69	4.00%	-1.80%
Slovenia	18.50%	1.05	6.07%	0.27%
South Africa	13.70%	0.78	4.50%	-1.30%
Spain	28.64%	1.62	9.40%	3.60%
Sri Lanka	16.19%	0.92	5.31%	-0.49%
Taiwan	18.70%	1.06	6.14%	0.34%
Tanzania	7.93%	0.45	2.60%	-3.20%
Thailand	16.11%	0.91	5.29%	-0.51%
Tunisia	9.27%	0.52	3.04%	-2.76%
Turkey	21.69%	1.23	7.12%	1.32%
UAE	16.99%	0.96	5.58%	-0.22%
Ukraine	32.33%	1.83	10.61%	4.81%
US	**17.67%**	**1.00**	**5.80%**	**0.00%**
Venezuela	32.34%	1.83	10.62%	4.82%
Vietnam	24.06%	1.36	7.90%	2.10%

Appendix 5: Equity Market Volatility versus Bond Market/CDS volatility

Standard deviation in equity index (σ_{Equity}) and government bond price (σ_{Bond}) computed, using 100 trading weeks, where available. To compute the σ_{Yield}, we first computed the standard deviation of the bond yield in basis points and then divided by the level of the yield to get a coefficient of variation. To compute the σ_{CDS}, we first computed the standard deviation of the CDS in basis points and then divided by the level of the CDS to get a coefficient of variation.

Country	σ_{Equity}	σ_{Bond}	$\sigma_{Equity}/\sigma_{Bond}$	$/\sigma_{Yield}$	$\sigma_{Equity}/\sigma_{Yield}$	σ_{CDS}	$\sigma_{Equity}/\sigma_{CDS}$
Argentina	31.02%	NA	NA	NA	NA	13.83%	2.38
Brazil	21.62%	10.61%	2.04	11.51%	1.88	26.64%	1.08
Bulgaria	13.75%	NA	NA	NA	NA	38.00%	0.74
Chile	14.14%	4.19%	3.37	8.16%	1.73	49.19%	0.78
China	23.79%	9.93%	2.40	NA	NA	58.73%	0.99
Colombia	14.31%	13.85%	1.03	14.14%	1.01	32.54%	0.77
Costa Rica	9.52%	NA	NA	NA	NA	17.86%	0.71
Croatia	13.30%	NA	NA	NA	NA	11.52%	1.27
Cyprus	67.75%	NA	NA	NA	NA	26.26%	2.84
Czech Republic	19.61%	16.97%	1.16	41.28%	0.48	83.60%	1.07
Egypt	25.18%	NA	NA	NA	NA	7.17%	3.58
Estonia	17.21%	NA	NA	NA	NA	64.44%	0.91
Greece	37.72%	75.70%	0.50	82.76%	0.46	4.78%	7.93
Hungary	23.26%	15.85%	1.47	25.30%	0.92	12.47%	1.99
Iceland	12.69%	NA	NA	NA	NA	15.11%	0.99
India	17.44%	3.55%	4.91	4.72%	3.69	NA	NA
Indonesia	16.40%	8.84%	1.86	13.38%	1.23	54.12%	0.84
Ireland	18.32%	NA	NA	NA	NA	33.40%	0.88
Israel	18.21%	9.69%	1.88	9.76%	1.87	24.46%	0.99
Italy	30.14%	17.26%	1.75	20.88%	1.44	22.87%	1.55
Kazakhstan	23.03%	NA	NA	NA	NA	28.59%	1.09
Korea	19.10%	7.33%	2.61	13.01%	1.47	62.56%	0.93
Latvia	10.30%	NA	NA	NA	NA	29.98%	0.64
Lebanon	6.93%	5.05%	1.37	6.80%	1.02	3.88%	1.82
Lithuania	16.96%	NA	NA	NA	NA	28.03%	0.89
Malaysia	9.97%	2.93%	3.40	10.45%	0.95	50.59%	0.70
Mexico	16.58%	8.47%	1.96	21.59%	0.77	34.60%	0.83
Morocco	12.08%	NA	NA	NA	NA	14.90%	0.96
Pakistan	13.45%	NA	NA	NA	NA	35.40%	0.73

Panama	4.01%	NA	NA	NA	NA	36.61%	0.48
Peru	23.33%	9.69%	2.41	10.09%	2.31	34.64%	1.02
Philippines	14.96%	16.38%	0.91	7.99%	1.87	64.24%	0.88
Poland	17.54%	10.78%	1.63	20.53%	0.85	36.25%	0.85
Portugal	19.69%	30.65%	0.64	43.17%	0.46	17.52%	1.30
Qatar	9.85%	NA	NA	NA	NA	36.46%	0.63
Romania	19.56%	9.92%	1.97	22.85%	0.86	18.91%	1.22
Russia	22.35%	11.15%	2.00	23.52%	0.95	28.45%	1.07
Saudi Arabia	20.82%	NA	NA	NA	NA	40.92%	0.92
Slovakia	12.20%	15.35%	0.79	24.95%	0.49	47.33%	0.73
Slovenia	18.50%	NA	NA	NA	NA	21.17%	1.09
South Africa	13.70%	8.64%	1.59	11.36%	1.21	20.93%	0.86
Spain	28.64%	10.59%	2.70	16.97%	1.69	22.45%	1.50
Thailand	16.11%	5.97%	2.70	16.94%	0.95	42.57%	0.80
Tunisia	9.27%	NA	NA	NA	NA	6.67%	1.46
Turkey	21.69%	14.94%	1.45	20.39%	1.06	26.57%	1.08
Ukraine	32.33%	NA	NA	NA	NA	7.11%	4.62
Venezuela	32.34%	18.25%	1.77	23.56%	1.37	6.34%	5.16
Vietnam	24.06%	NA	NA	NA	NA	15.84%	1.68
Average			1.94		1.27		1.45
Median			1.86		1.04		0.99
Maximum			4.91		3.69		7.93
Minimum			0.50		0.46		0.48

Appendix 6: Year-end Implied Equity Risk Premiums: 1961-2012

Year	*S&P 500*	*Earnings*[a]	*Dividends*[a]	*T.Bond Rate*	*Estimated Growth*	*Implied Premium*
1961	71.55	3.37	2.04	2.35%	2.41%	2.92%
1962	63.1	3.67	2.15	3.85%	4.05%	3.56%
1963	75.02	4.13	2.35	4.14%	4.96%	3.38%
1964	84.75	4.76	2.58	4.21%	5.13%	3.31%
1965	92.43	5.30	2.83	4.65%	5.46%	3.32%
1966	80.33	5.41	2.88	4.64%	4.19%	3.68%
1967	96.47	5.46	2.98	5.70%	5.25%	3.20%
1968	103.86	5.72	3.04	6.16%	5.32%	3.00%
1969	92.06	6.10	3.24	7.88%	7.55%	3.74%
1970	92.15	5.51	3.19	6.50%	4.78%	3.41%
1971	102.09	5.57	3.16	5.89%	4.57%	3.09%
1972	118.05	6.17	3.19	6.41%	5.21%	2.72%
1973	97.55	7.96	3.61	6.90%	8.30%	4.30%
1974	68.56	9.35	3.72	7.40%	6.42%	5.59%
1975	90.19	7.71	3.73	7.76%	5.99%	4.13%
1976	107.46	9.75	4.22	6.81%	8.19%	4.55%
1977	95.1	10.87	4.86	7.78%	9.52%	5.92%
1978	96.11	11.64	5.18	9.15%	8.48%	5.72%
1979	107.94	14.55	5.97	10.33%	11.70%	6.45%
1980	135.76	14.99	6.44	12.43%	11.01%	5.03%
1981	122.55	15.18	6.83	13.98%	11.42%	5.73%
1982	140.64	13.82	6.93	10.47%	7.96%	4.90%
1983	164.93	13.29	7.12	11.80%	9.09%	4.31%
1984	167.24	16.84	7.83	11.51%	11.02%	5.11%
1985	211.28	15.68	8.20	8.99%	6.75%	3.84%
1986	242.17	14.43	8.19	7.22%	6.96%	3.58%
1987	247.08	16.04	9.17	8.86%	8.58%	3.99%
1988	277.72	24.12	10.22	9.14%	7.67%	3.77%
1989	353.4	24.32	11.73	7.93%	7.46%	3.51%
1990	330.22	22.65	12.35	8.07%	7.19%	3.89%
1991	417.09	19.30	12.97	6.70%	7.81%	3.48%
1992	435.71	20.87	12.64	6.68%	9.83%	3.55%
1993	466.45	26.90	12.69	5.79%	8.00%	3.17%
1994	459.27	31.75	13.36	7.82%	7.17%	3.55%
1995	615.93	37.70	14.17	5.57%	6.50%	3.29%
1996	740.74	40.63	14.89	6.41%	7.92%	3.20%
1997	970.43	44.09	15.52	5.74%	8.00%	2.73%
1998	1229.23	44.27	16.20	4.65%	7.20%	2.26%
1999	1469.25	51.68	16.71	6.44%	12.50%	2.05%

2000	1320.28	56.13	16.27	5.11%	12.00%	2.87%
2001	1148.09	38.85	15.74	5.05%	10.30%	3.62%
2002	879.82	46.04	16.08	3.81%	8.00%	4.10%
2003	1111.91	54.69	17.88	4.25%	11.00%	3.69%
2004	1211.92	67.68	19.407	4.22%	8.50%	3.65%
2005	1248.29	76.45	22.38	4.39%	8.00%	4.08%
2006	1418.3	87.72	25.05	4.70%	12.50%	4.16%
2007	1468.36	82.54	27.73	4.02%	5.00%	4.37%
2008	903.25	65.39	28.05	2.21%	4.00%	6.43%
2009	1115.10	59.65	22.31	3.84%	7.20%	4.36%
2010	1257.64	83.66	23.12	3.29%	6.95%	5.20%
2011	1257.60	97.05	26.02	1.87%	7.18%	6.01%
2012	1426.19	102.47	30.44	1.76%	5.27%	5.78%

[a] The earnings and dividend numbers for the S&P 500 represent the estimates that would have been available at the start of each of the years and thus may not match up to the actual numbers for the year. For instance, in January 2011, the estimated earnings for the S&P 500 index included actual earnings for three quarters of 2011 and the estimated earnings for the last quarter of 2011. The actual earnings for the last quarter would not have been available until March of 2011.

Graham and Harvey – MRPs 2013

The Equity Risk Premium in 2013

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ABSTRACT

We analyze the history of the equity risk premium from surveys of U.S. Chief Financial Officers (CFOs) conducted every quarter from June 2000 to December 2012. The risk premium is the expected 10-year S&P 500 return relative to a 10-year U.S. Treasury bond yield. While the risk premium sharply increased during the financial crisis peaking in February 2009, the premium has decreased to a level of 3.83% which is only slightly higher than the long-term average. However, the total market return forecast is at a historical low of 5.46%. The survey also provides measures of cross-sectional disagreement about the risk premium, skewness, and a measure of individual uncertainty. Consistent with the last four quarters of surveys, CFOs see more downside risks than upside risks. In addition, we find that dispersion of beliefs is above the long-term average as well as individual uncertainty. We also present evidence on the determinants of the long-run risk premium. Our analysis suggests the level of the risk premium closely tracks both market volatility (reflected in the VIX index) as well as credit spreads. However, the most recent data show a divergence between VIX and the risk premium.

JEL Classification: *G11, G31, G12, G14*

Keywords: *Cost of capital, financial crisis, equity premium, long-term market returns, stock return forecasts, long-term equity returns, expected excess returns, disagreement, individual uncertainty, skewness, asymmetry, survey methods, risk and reward, TIPs, VIX, credit spreads*

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1. Introduction

We analyze the results of the most recent survey of Chief Financial Officers (CFOs) conducted by Duke University and *CFO* Magazine. The survey closed on December 6, 2012 and measures expectations beginning in the first quarter of 2013. In particular, we poll CFOs about their long-term expected return on the S&P 500. Given the current 10-year T-bond yield, we provide estimates of the equity risk premium and show how the premium changes through time. We also provide information on the disagreement over the risk premium as well as average confidence intervals.

2. Method

2.1 Design

The quarterly survey of CFOs was initiated in the third quarter of 1996.[1] Every quarter, Duke University polls financial officers with a short survey on important topical issues (Graham and Harvey, 2009). The usual response rate for the quarterly survey is 5%-8%. Starting in June of 2000, a question on expected stock market returns was added to the survey. Fig. 1 summarizes the results from the risk premium question. While the survey asks for both the one-year and ten-year expected returns, we focus on the ten-year expected returns herein, as a proxy for the market risk premium.

The executives have the job title of CFO, Chief Accounting Officer, Treasurer, Assistant Treasurer, Controller, Assistant Controller, or Vice President (VP), Senior VP or Executive VP of Finance. Given that the overwhelming majority of survey respondents hold the CFO title, for simplicity we refer to the entire group as CFOs.

2.2 Delivery and response

In the early years of the survey, the surveys were faxed to executives. The delivery mechanism was changed to the Internet starting with the December 4, 2001 survey. Respondents are given four business days to fill out the survey, and then a reminder is sent allowing another four days. Usually, two-thirds of the surveys are returned within two business days.

[1] The surveys from 1996Q3-2004Q2 were partnered with a national organization of financial executives. The 2004Q3 and 2004Q4 surveys were solely Duke University surveys, which used Duke mailing lists (previous survey respondents who volunteered their email addresses) and purchased email lists. The surveys from 2005Q1 to present are partnered with *CFO Magazine*. The sample includes both the Duke mailing lists and the *CFO* subscribers that meet the criteria for policy-making positions.

The response rate of 5-8% could potentially lead to a non-response bias. There are five reasons why we are not overly concerned with the response rate. First, we do not manage our email list. If we deleted the email addresses that had not responded to the survey in the past 12 quarters, our response rate would be in the 15-20% range – which is a good response rate. Second, Graham and Harvey (2001) conduct a standard test for non-response biases (which involves comparing the results of those that fill out the survey early to the ones that fill it out late) and find no evidence of bias. Third, Brav, Graham, Harvey and Michaely (2005) conduct a captured sample survey at a national conference in addition to an Internet survey. The captured survey responses (to which over two-thirds participated) are qualitatively identical to those for the Internet survey (to which 8% responded), indicating that non-response bias does not significantly affect their results. Fourth, Brav et al. contrast survey responses to archival data from Compustat and find archival evidence for the universe of Compustat firms that is consistent with the responses from the survey sample. Fifth, Campello, Graham, and Harvey (2011) show that the December 2008 response sample is fairly representative of the firms included in the commonly used Compustat database.

2.3 Data integrity

In each quarter, implement a series of rules to ensure the integrity of the data. We have, on average, 352 responses each quarter. There are a total of 17,500 survey observations. There are six key pieces of data: 1) the 10-year forecast (LT); 2) lower 10% of 10-year forecast (LLT); and 3) upper 10% of the 10-year forecast (ULT). We collect the analogous information for the one-year S&P 500 forecasts too (ST). This paper focuses on the 10-year forecasts but the short-term forecasts factor into our data filters.

Our exclusion rules are the following:

1. Delete all missing forecasts, LT, ST
2. Delete all negative LT forecasts (not ST forecasts)
3. Delete all observations that failed to use percentages (forecasts<1.0 for both ST and LT)
4. Delete observations where they failed to annualize, i.e. delete if LT>30% (does not apply to ST)
5. Delete is ST>100%.
6. Delete if lower intervals inconsistent, i.e. LST>=ST or LLT>=LT.
7. Delete if upper intervals inconsistent, i.e. UST<=ST or ULT<=LT.
8. Delete if ST-LST and UST-ST both equal 1 (we call this lazy answer)
9. Delete if LT-LLT and ULT-LT both equal 1 (again, lazy answer)

2.4 The 2013 results

The expected market return questions are a subset of a larger set of questions in the quarterly survey of CFOs. The survey usually contains between eight and ten questions. Some of the questions are repeated every quarter and some change through time depending on economic conditions. The historical surveys can be accessed at http://www.cfosurvey.org. Appendix 1 shows the risk premium question in the most recent survey.

While the survey is anonymous, we collect demographic information on seven firm characteristics, including industry, sales revenue, number of employees, headquarters location, ownership (public or private), and proportion of foreign sales.

During the past ten years, we have collected over 17,500 responses to the survey. Panel A of Table 1 presents the date that the survey window opened, the number of responses for each survey, the 10-year Treasury bond rate, as well as the average and median expected excess returns. There is relatively little time variation in the risk premium. This is confirmed in Fig. 1, which displays the historical risk premiums contained in Table 1. The current premium, 3.83%, is well below the peak premium of 4.78% observed in February 2009. The December 2012 survey shows that the expected annual S&P 500 return is 5.46% (=3.83%+1.63%) which is the lowest in the history of the survey. The total return forecasts are presented in Fig. 2.[2]

Panel B of Table 1 presents some summary statistics that pool all responses through the history of the survey. The overall average ten-year risk premium return is 3.48%.[3] The standard deviation is 2.87% based on the individual responses and 0.60% based on the quarterly averages.

[2] See, for example, Ghysels (1998), Welch (2000, 2001, 2009), Ghysels (1998), Fraser (2001), Harris and Marston (2001), Pástor and Stambaugh (2001), Fama and French (2002), Goyal and Welch (2003), Graham and Harvey (2003), Ang and Bekaert (2005), Fernandez (2004, 2006, 2009) for studies of the risk premium.

[3] Using the Ibbotson Associates data from January 1926 through July 2010, the arithmetic (geometric) average return on the S&P 500 over and above the 30-day U.S. Treasury bill is 7.75% (5.80%). Using data from April 1953-July 2010, the arithmetic (geometric) risk premium is 6.27% (5.12%). The risk premium over the 10 year bond should be reduced by 212 basis points for the arithmetic premium and 174 basis points for the geometric premium. Fama and French (2002) study the risk premium on the S&P 500 from 1872-2000 using fundamental data. They argue that the ex ante risk premia is between 2.55% and 4.32% for 1951-2000 period. Ibbotson and Chen (2001) estimate a long-term risk premium between 4 and 6%. Also see Siegel (1999), Asness (2000), Heaton and Lucas (2000) and Jagannathan, McGratten and Scherbina (2001).

Figure 1a
10-year forecasted S&P 500 (mean) annual returns over and above the 10-year Treasury bond yield

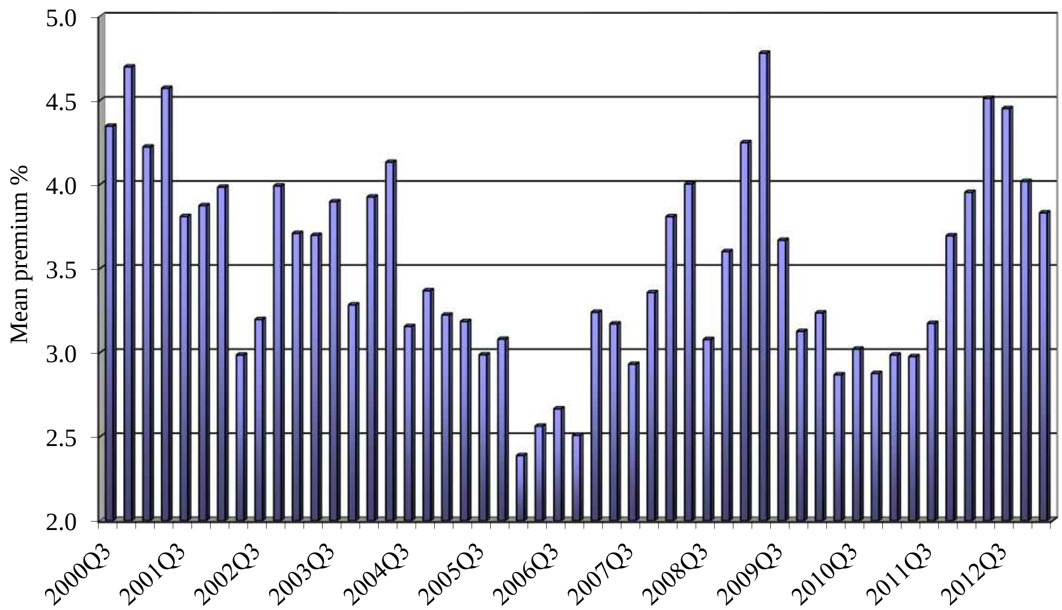
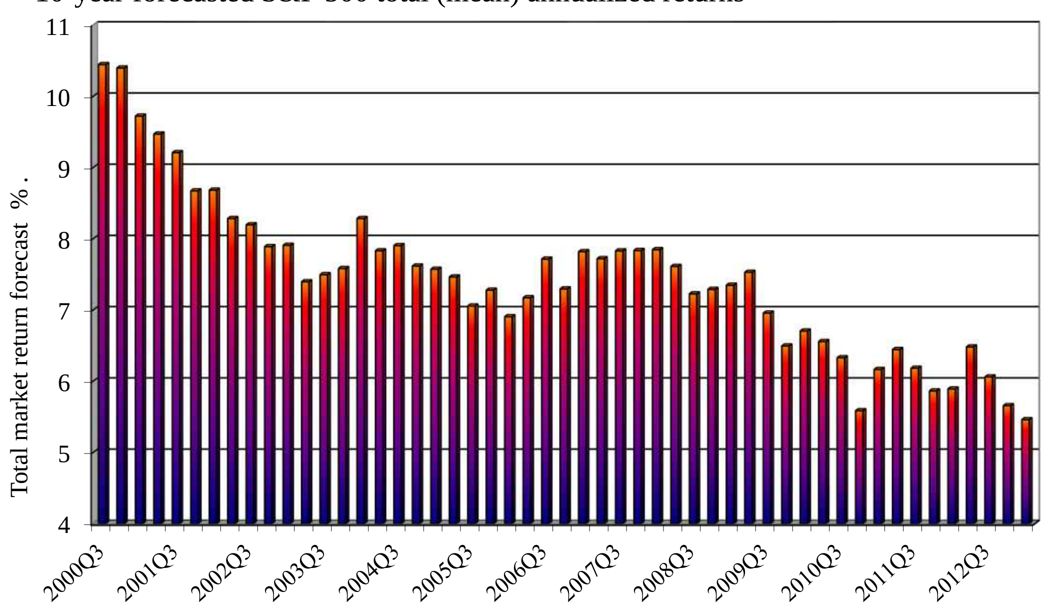


Figure 1b
10-year forecasted S&P 500 total (mean) annualized returns



The cross-sectional standard deviation across the individual CFO forecasts in a quarter is a measure of the disagreement or dispersion of the participants in each survey. Dispersion sharply increased during the global financial crisis. The average disagreement in 2005 was 2.39%. Disagreement increased in 2006 to 2.64%. As the crisis began in 2007, disagreement increased to

2.98 by March 2008. The peak disagreement was recorded in February 2009 (4.13%). The most recent observation is 2.59% which is considerably lower than 2009 and almost at pre-crisis levels.

We also report information on the average of the CFOs' assessments of the one in ten chance that the market will exceed or fall below a certain level. In the most recent survey, the worst case total return is -0.02% which is considerably lower than the average of 1.89%. The best-case return is 9.2% which is lower than the average of 11.4%.

With information on the 10% tails, we construct a probability distribution for each respondent. We use Davidson and Cooper's (1976) method to recover each respondent's probability distribution:

$$\text{Variance} = ([x(0.90)\text{-}x(0.10)]/2.65)^2$$

where $x(0.90)$ and $x(0.10)$ represent the 90th and 10th percentiles of the respondent's distribution, ULT and LLT. Keefer and Bodily (1983) show that this simple approximation is the preferred method of estimating the variance of a probability distribution of random variables, given information about the 10th and 90th percentiles. Like disagreement, the average of individual volatilities peaked in February 2009 at 4.29%. The current level, 3.69%, is still quite elevated. This reinforces the considerable uncertainty that exists today about economic prospects.

There is also a natural measure of asymmetry in each respondent's response. We look at the difference between each individual's 90% tail and the mean forecast and the mean minus the 10% tail. Hence, if the respondent's forecast of the excess return is 6% and the tails are -8% and +11%, then the distribution is negatively skewed with a value of -9% (=5%-14%). As with the usual measure of skewness, we cube this quantity and standardize by dividing by the cube of the individual standard deviation. In every quarter's survey, there is on average negative skewness in the individual forecasts. The average asymmetry -0.62 which is lower than the average of -0.44.

Overall, the survey points to: (a) reduction in the risk premium from peak levels, (b) uncertainty is elevated, and (c) CFOs see more downside risk than upside risk.

Table 1

Summary statistics based on the responses from the
51 CFO Outlook Surveys from June 2000 to December 2012

A. By quarter

Survey date	Survey for	Number of survey responses	10-year bond yield	Average risk premium	Median risk premium	Total market return forecast	Disagreement (standard deviation of risk premium estimates)	Average of individual standard deviations	Average of individuals' worst 10% market return scenario	Average of individuals' best 10% market return scenario	Skewness of risk premium estimates	Average of individuals' asymmetry
6-Jun-00	2000Q3	206	**6.10**	4.35	3.9	**10.45**	3.22				0.96	
7-Sep-00	2000Q4	184	5.70	4.70	4.3	10.40	3.03				0.84	
4-Dec-00	2001Q1	239	5.50	4.22	4.5	9.72	2.52				0.53	
12-Mar-01	2001Q2	137	4.90	4.57	**4.6**	9.47	2.91				0.79	
7-Jun-01	2001Q3	204	5.40	3.81	3.6	9.21	2.64				0.59	
10-Sep-01	2001Q4	198	4.80	3.87	3.2	8.67	2.53				**0.13**	
4-Dec-01	2002Q1	275	4.70	3.98	3.3	8.68	2.43				0.61	
11-Mar-02	2002Q2	234	5.30	2.99	2.7	8.29	2.43	3.28	**3.68**	12.38	1.06	-0.28
4-Jun-02	2002Q3	321	5.00	3.20	3.0	8.20	2.61	3.50	3.02	12.40	1.87	-0.39
16-Sep-02	2002Q4	363	3.90	3.99	4.1	7.89	2.31	3.39	3.02	12.14	0.87	-0.25
2-Dec-02	2003Q1	283	4.20	3.71	3.8	7.91	2.56	3.23	3.32	11.87	1.25	-0.28
19-Mar-03	2003Q2	180	3.70	3.70	3.3	7.40	2.37	3.59	1.95	11.47	0.84	-0.62
16-Jun-03	2003Q3	368	3.60	3.90	4.4	7.50	2.34	3.74	2.19	12.16	0.91	-0.33
18-Sep-03	2003Q4	165	4.30	3.28	3.7	7.58	**2.07**	**2.83**	3.30	10.80	0.35	-0.43
10-Dec-03	2004Q1	217	4.36	3.93	3.6	8.29	2.66	3.29	3.40	12.10	1.75	-0.45
24-Mar-04	2004Q2	202	3.70	4.13	4.3	7.83	2.37	3.46	2.85	12.02	0.51	-0.29
16-Jun-04	2004Q3	177	4.75	3.15	3.3	7.90	2.61	3.10	3.17	11.56	2.15	-0.40
12-Sep-04	2004Q4	177	4.25	3.37	3.3	7.62	2.92	3.27	2.61	11.29	2.04	-0.52
5-Dec-04	2005Q1	291	4.35	3.22	3.2	7.57	2.66	3.05	3.14	11.11	1.90	-0.37
28-Feb-05	2005Q2	275	4.28	3.18	3.5	7.46	2.52	3.06	3.15	11.42	1.29	-0.33
31-May-05	2005Q3	318	4.07	2.99	2.9	7.06	2.22	3.22	2.42	11.03	0.47	-0.26
29-Aug-05	2005Q4	325	4.20	3.08	2.8	7.28	2.61	3.36	2.15	11.06	2.43	-0.52
21-Nov-05	2006Q1	342	4.52	**2.39**	2.5	6.91	2.20	3.48	2.22	11.20	0.41	**-0.23**
6-Mar-06	2006Q2	278	4.61	2.56	2.4	7.17	2.40	3.44	2.07	11.18	1.03	-0.37
1-Jun-06	2006Q3	500	5.05	2.67	3.0	7.72	2.74	3.29	3.02	11.89	1.84	-0.24
11-Sep-06	2006Q4	465	4.79	2.51	**2.2**	7.30	2.49	3.32	2.58	11.37	1.32	-0.33
21-Nov-06	2007Q1	392	4.58	3.24	3.4	7.82	2.93	3.36	2.95	12.06	1.92	-0.30
1-Mar-07	2007Q2	388	4.55	3.17	3.5	7.72	2.39	3.38	2.75	12.00	1.81	-0.39
1-Jun-07	2007Q3	419	4.90	2.93	3.1	7.83	2.14	3.21	3.08	11.66	0.56	-0.37
7-Sep-07	2007Q4	486	4.48	3.36	3.5	7.84	2.82	3.12	3.35	11.77	1.80	-0.34
30-Nov-07	2008Q1	465	4.04	3.81	4.0	7.85	2.75	3.31	2.94	11.58	1.38	-0.32
7-Mar-08	2008Q2	388	3.61	4.00	4.4	7.61	2.98	3.21	3.16	11.70	2.24	-0.30
13-Jun-08	2008Q3	390	4.15	3.08	2.9	7.23	2.60	3.32	2.45	11.43	1.51	-0.41
5-Sep-08	2008Q4	439	3.69	3.60	3.3	7.29	2.79	3.31	2.35	11.44	1.72	-0.42
28-Nov-08	2009Q1	545	3.10	4.25	3.9	7.35	3.19	3.73	1.95	12.20	1.95	-0.37
26-Feb-09	2009Q2	452	2.75	**4.78**	4.3	7.53	**4.13**	**4.29**	1.25	**12.96**	1.81	-0.47
29-May-09	2009Q3	440	3.29	3.67	3.7	6.96	3.12	3.73	1.42	11.60	1.80	-0.42
11-Sep-09	2009Q4	546	3.37	3.13	2.6	6.50	2.88	3.87	0.76	11.75	1.83	-0.46
11-Dec-09	2010Q1	460	3.47	3.24	2.5	6.71	3.56	3.86	0.69	11.13	2.39	-0.52
26-Feb-10	2010Q2	485	3.69	2.87	2.3	6.56	3.28	3.96	0.53	11.53	2.32	-0.68
4-Jun-10	2010Q3	449	3.31	3.02	2.7	6.33	3.08	3.90	0.38	10.83	**2.62**	-0.64
10-Sep-10	2010Q4	461	2.71	2.88	2.3	5.59	2.53	4.21	**-1.09**	10.24	0.78	-0.67
10-Dec-10	2011Q1	415	3.18	2.99	2.8	6.17	2.62	3.91	0.39	11.09	1.90	-0.55
4-Mar-11	2011Q2	429	3.47	2.98	2.5	6.45	2.92	4.16	0.01	11.32	2.45	**-0.70**
3-Jun-11	2011Q3	406	3.01	3.17	3.0	6.18	2.90	3.90	0.18	10.71	2.10	-0.68
9-Sep-11	2011Q4	397	2.17	3.69	2.8	5.86	3.11	3.79	0.01	10.26	2.42	-0.54
16-Dec-11	2012Q1	439	1.94	3.95	3.1	5.89	2.98	4.07	-0.03	10.81	1.91	-0.36
1-Mar-12	2012Q2	406	1.97	4.51	4.0	6.48	2.97	4.07	0.32	11.48	2.26	-0.59
30-May-12	2012Q3	338	**1.61**	4.45	4.4	6.06	2.96	3.94	0.09	10.72	1.97	-0.59
7-Sep-12	2012Q4	**675**	1.64	4.02	3.4	5.66	3.00	3.66	0.01	9.90	2.04	-0.58
6-Dec-12	2013Q1	325	1.63	3.83	3.4	**5.46**	2.59	3.69	-0.02	**9.20**	1.42	-0.62
Average of quarters		352	3.93	3.53	3.35		2.74	3.54	1.89	11.40	1.48	-0.44
Standard deviation			1.08	0.60	0.65		0.38	0.36	1.32	0.70	0.68	0.14

B. By individual responses

Survey for	Number of survey responses	Average risk premium	Median risk premium	Disagreement	Average of individual standard deviations	Average of individuals' worst 10%	Average of individuals' best 10%	Skewness	Average of individuals' asymmetry
All dates	17,507	3.48	3.30	2.87	3.54	-0.42	11.57	1.77	-0.42

Note: Miniumum (blue) and Maximum (red)

2.5 Recessions, the financial crisis and risk premia

Our survey now spans two recessions: March 2001-September 2001 as well as the recession that begins in December 2007 and ends in June 2009. Financial theory would suggest that risk premia should vary with the business cycle. Premiums should be highest during recessions and lowest during recoveries. Previous research has used a variety of methods including looking at ex post realized returns to investigate whether there is business-cycle like variation in risk premia.

While we only have 51 observations and this limits our statistical analysis, we do see important differences. During recessions, the risk premium is 3.98% and during non-recessions, the premium falls to 3.42%.

2.6 Interviews

To further explore the risk premium, we conduct brief interviews on the topic of the cost of capital and the risk premium to understand the question that CFOs believe they are answering. We conducted 12 interviews over the 2003-2005 period.[4] We gain a number of insights from the interviews. There is remarkable consistency in the CFOs' views.

First, the CFOs closely track both their company's stock and the market. They are often called upon internally (e.g., Board of Directors) or externally (analyst conference calls) to explain their company's stock price. As a result, they need to try to separate out the systematic and idiosyncratic variation in their company's stock returns. To do this, they attempt to understand the forces that might cause systematic variation in the market.

Second, the CFOs believe that the "risk premium" is a longer-term measure of expected excess returns and best covered by our question on the expected excess return over the next ten years – rather than the one-year question. Three-fourths of the interviewees use a form of the Capital Asset Pricing Model (which is consistent with the evidence in Graham and Harvey, 2001). They use a measure of the risk premium in their implementation of the CAPM. Often their 10-year risk premium is supplemented so that that company's hurdle rate exceeds their expected excess return on

[4] Three of these interviews exclusively focused on the risk premium question. Eight interviews were non-exclusive and based on surplus time available in the interviews in Brav et al. (2005) and Graham, Harvey and Rajgopal (2005). The remaining interview was conducted in 2005.

the S&P 500. Also, while not specified in the question, CFOs interpret the 10-year expected market return as the return to a buy-and-hold strategy. As a result, our survey measures the geometric rather than arithmetic average return.

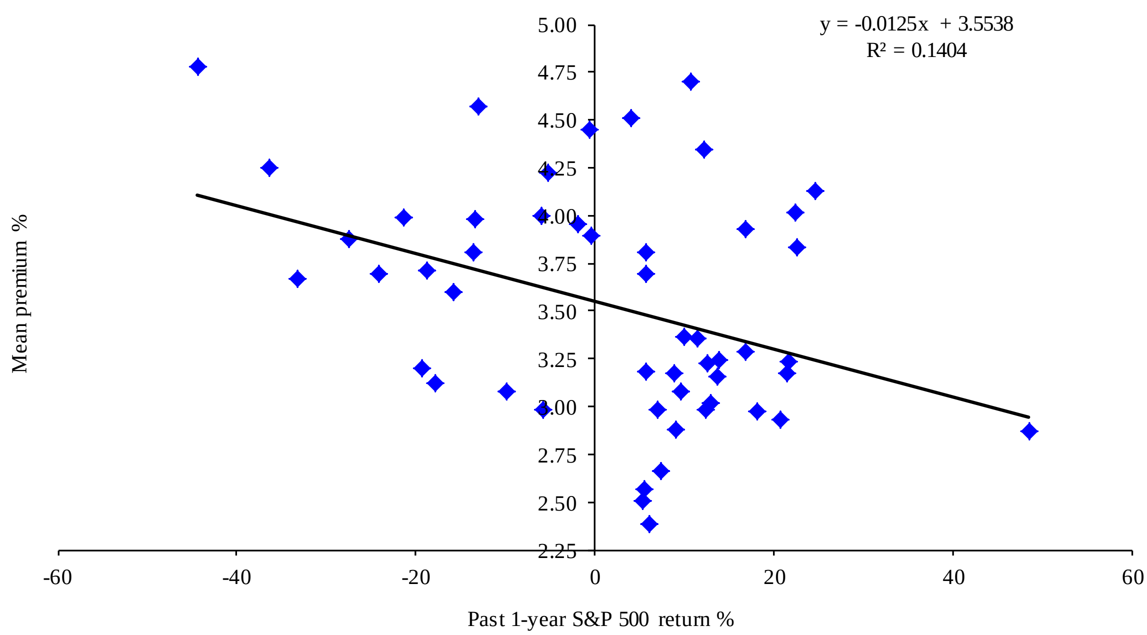
2.7 Explaining variation in the risk premium

While we document the level and a limited time-series of the long-run risk premium, statistical inference is complicated by the fact that the forecasting horizons are overlapping. First, we have no way of measuring the accuracy of the risk premiums as forecasts of equity returns. Second, any inference based on regression analysis is confounded by the fact that from one quarter to the next, there are 44 common quarters being forecasted. This naturally induces a moving-average process.

We do, however, try to characterize the time-variation in the risk premium without formal statistical tests. Figure 2 examines the relation between the mean premium and previous one-year returns on the S&P 500.

Figure 2

The equity risk premium and past 1-year returns on the S&P 500 index

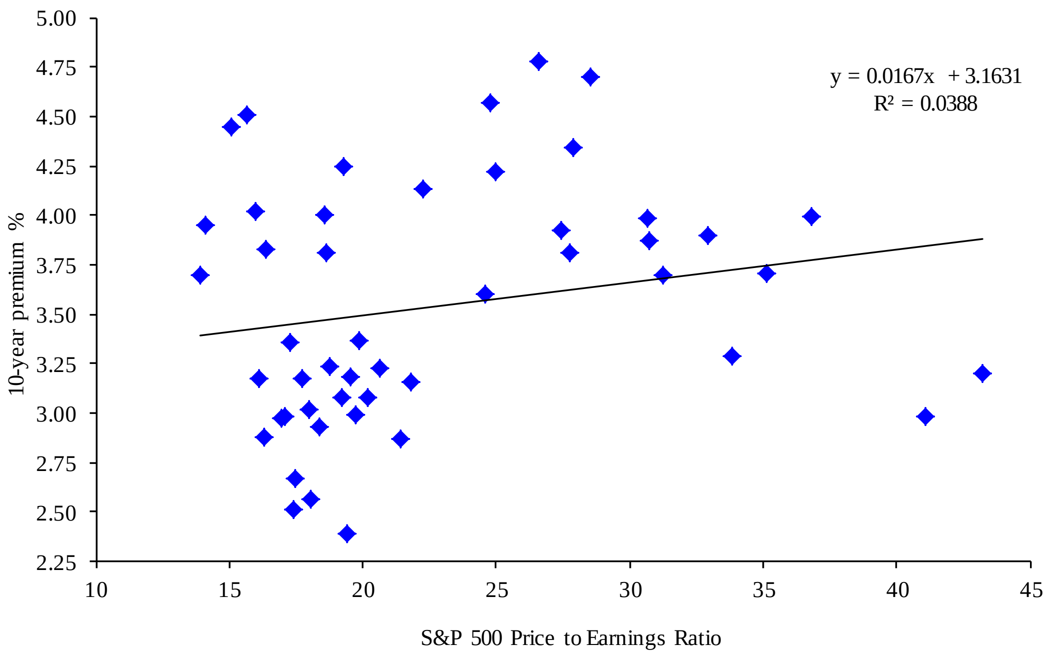


The evidence suggests that there is a weak negative correlation between past returns and the level of the long-run risk premium. This makes economic sense. When prices are low (after negative returns), expected return increase.

An alternative to using past-returns is to examine a measure of valuation. Figure 3 examines a scatter of the mean premium versus the price-to-earnings ratio of the S&P 500.

Figure 3a

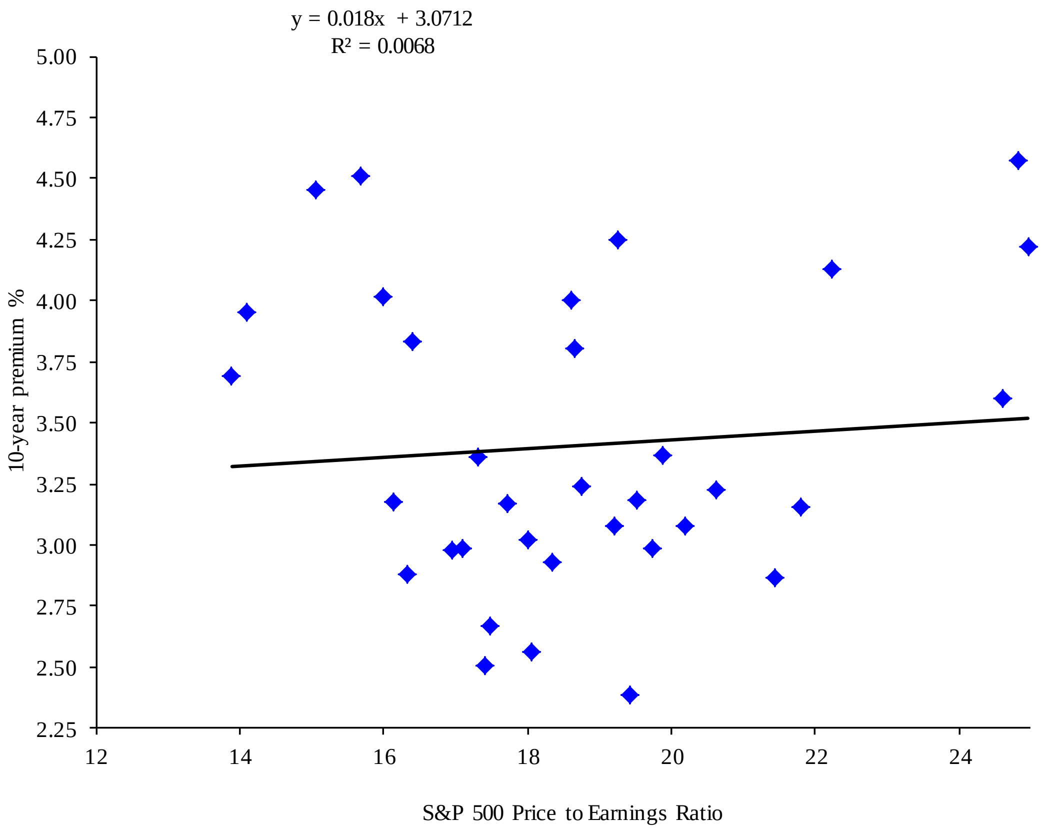
The equity risk premium and the S&P 500 price-to-earnings ratio: full sample



Looking at the data in Figure 3a, it appears that the inference is complicated by a non-linear relation. At very high levels of valuation, the expected return (the risk premium) was low. Figures 3b shows the a subset of the data where the PE level>25. In all graphs, three observations are excluded with PE ratio of 85, 123 and 130.

Figure 3b

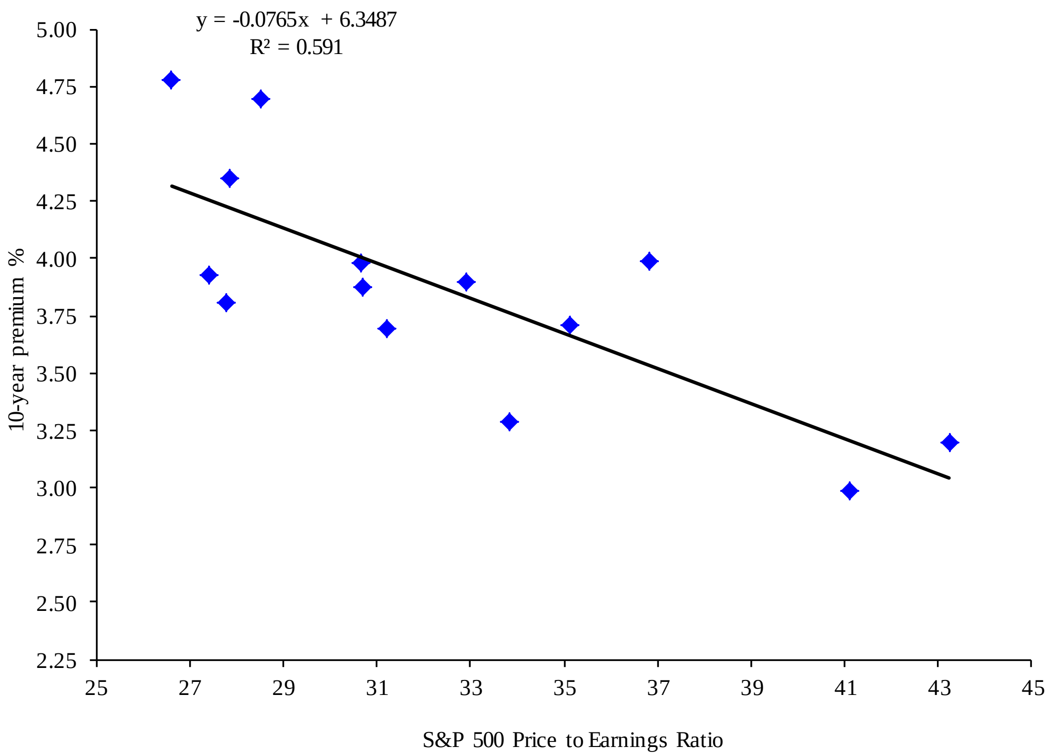
The equity risk premium and the S&P 500 price-to-earnings ratio when PE<25



The graph looks much different if we sample the PE ratios when they exceed 25. Very high PE ratios are associated with lower risk premia in Figure 3c.

Figure 3c

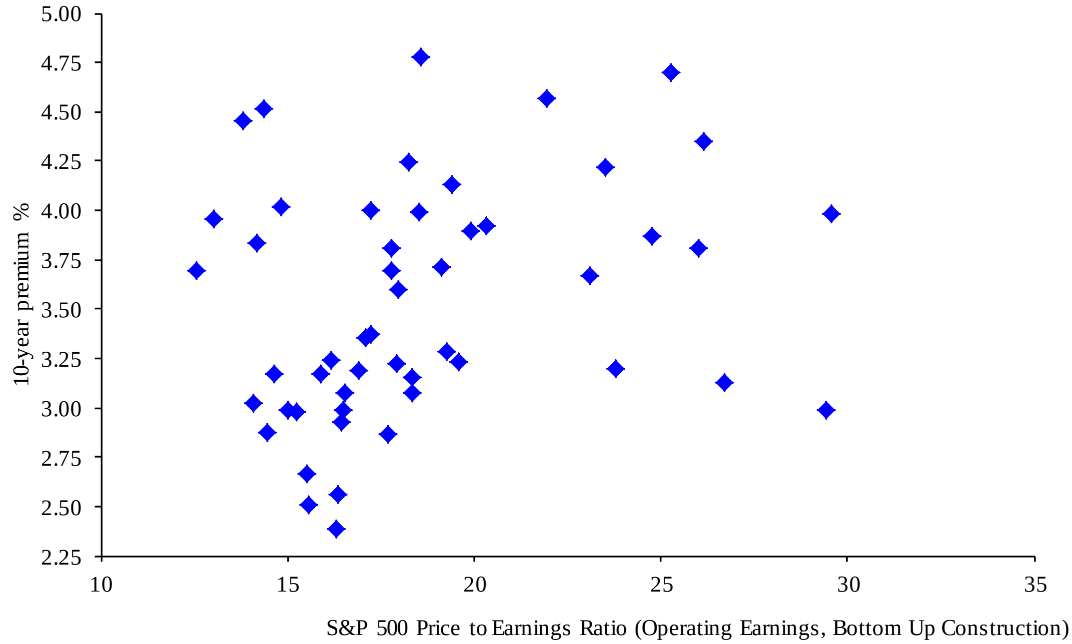
The equity risk premium and the S&P 500 price-to-earnings ratio when PE>25



The non-linear relation is not a quirk of the PE ratio that we use. Figure 3d uses the forward and actual P/E ratios that S&P constructs from bottom up data. There are no observations excluded in this graph.

Figure 3d

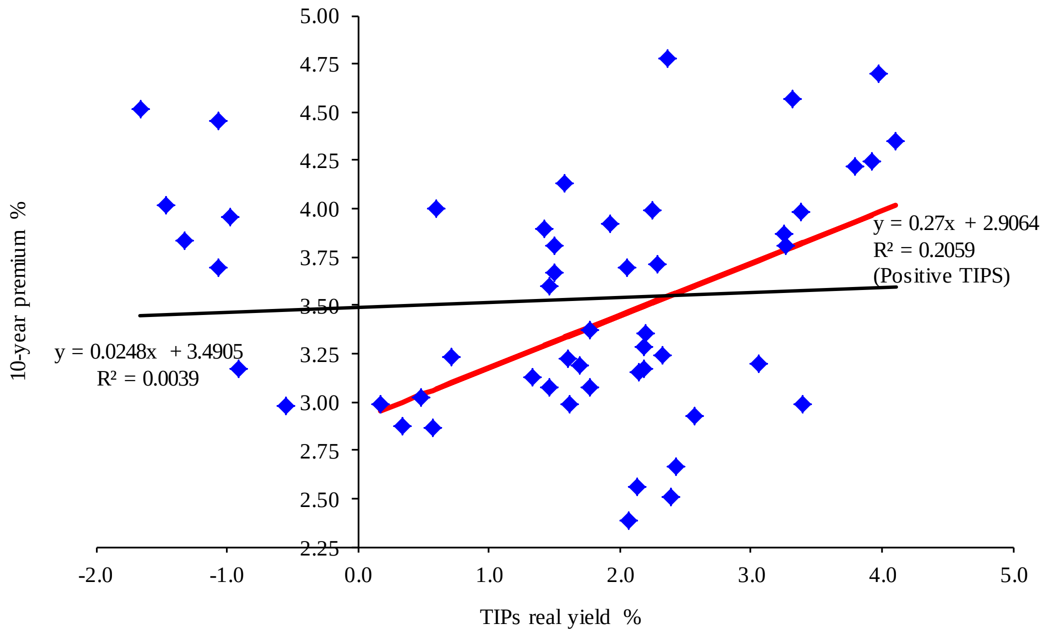
The equity risk premium and the S&P 500 forward and actual price-to-earnings ratio: full sample



We also examine the real yield on Treasury Inflation Indexed Notes. The risk premium is like an expected real return on the equity market. It seems reasonable that there could be a correlation between expected real rates of return stocks and bonds. Figure 4 examines the 10-year on the run yield on the Treasury Inflation Indexed Notes.

Figure 4

The equity risk premium and the real yield on Treasury Inflation Indexed Notes

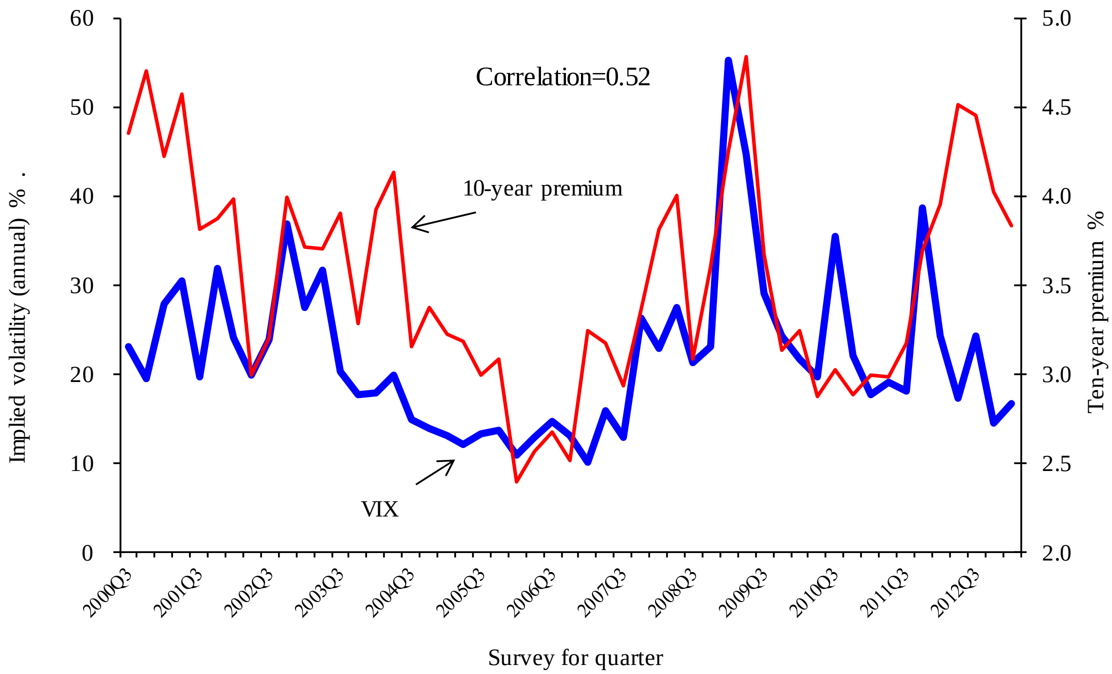


In this case, there is no significant correlation. However, the correlation is dramatically different, 0.45, when we examine only the positive TIP real yields. The positive yields may be more indicative for normal (or period where there is relatively less government manipulation).

Finally, we consider two measures of risk and the risk premium. Figure 5 shows that over our sample there is evidence of a strong positive correlation between market volatility and the long-term risk premium. We use a five-day moving average of the implied volatility on the S&P index option (VIX) as our volatility proxy. The correlation between the risk premium and volatility is 0.52. If the closing day of the survey is used, the correlation is roughly the same. Asset pricing theory suggests that there is a positive relation between risk and expected return. While our volatility proxy doesn't match the horizon of the risk premium, the evidence, nevertheless, is suggestive of a positive relation. Figure 5 also highlights a strong recent divergence between the risk premium and the VIX.

Figure 5

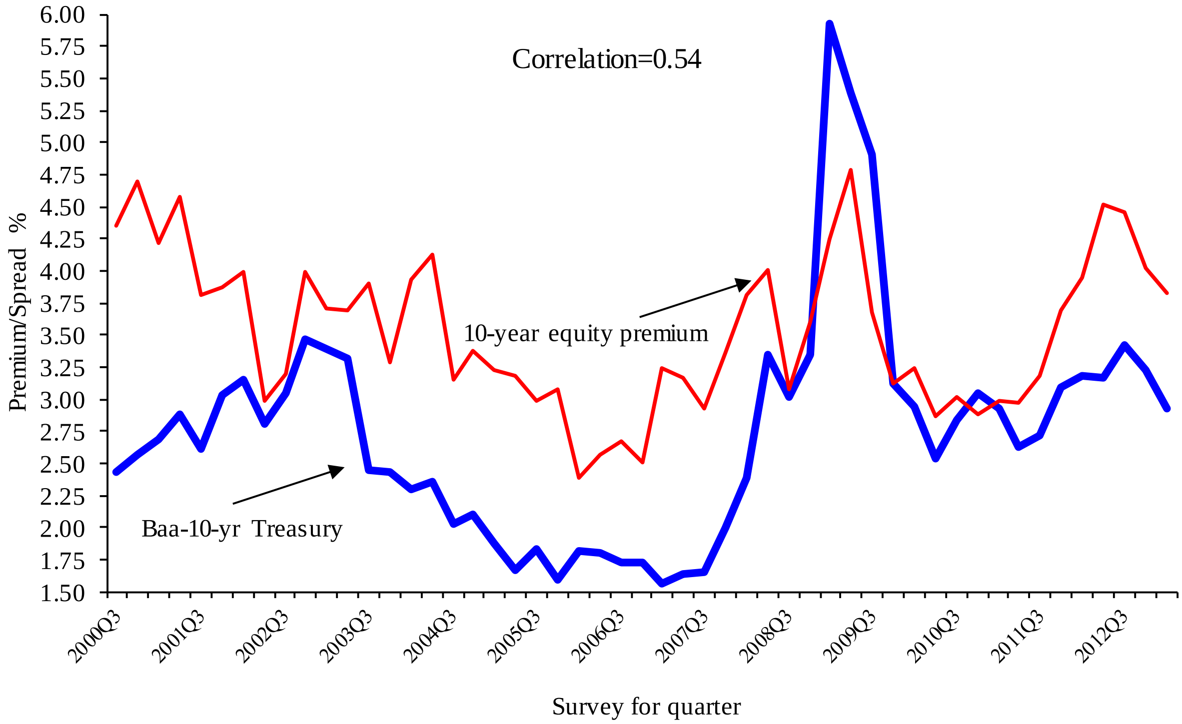
The equity risk premium and the implied volatility on the S&P 500 index option (VIX)



We also consider an alternative risk measure, the credit spread. We look at the correlation between Moody's Baa rated bond yields less the 10-year Treasury bond yield and the risk premium. Figure 6 shows a highly significant relation between the time-series with a correlation of 0.54.

Figure 6

The equity risk premium and credit spreads



2.8 Other survey questions

The December 2012 survey contains a number of other questions. http://www.cfosurvey.org presents the full results of these questions. The site also presents results conditional on demographic firm characteristics. For example, one can examine the CFOs views of the risk premium conditional on the industry in which the CFO works.

2.9 Risk premium data and corporate policies

New research by Ben-David, Graham and Harvey (2013) uses the one-year risk premium forecasts as a measure of optimism and the 80% confidence intervals as a direct measure of overconfidence. By linking email addresses that respondents provide to archival corporate data, Ben-David et al. find that the tightness of the confidence intervals is correlated with corporate investment. Overconfident managers invest more.

Campello, Graham and Harvey (2010) use the survey during the financial crisis and the higher risk premiums to examine the implications of financial constraints on the real activities of the firm. They provide new evidence on the negative impact of financial constraints on firms' investment plans.

Campello, Giambona, Graham and Harvey (2011) use the survey during to study how firms managed liquidity during the financial crisis.

Graham, Harvey and Puri (2012) use survey data to study how capital is allocated within the firm and the degree to which CEOs delegate decision making to CFOs.

Graham, Harvey and Puri (2013) administer a psychometric test using the survey instrument and link CEO optimism and risk aversion to corporate financial policies.

2.10 CFO Survey compared to other surveys

Table 2 compares the predictive ability of the Duke-CFO survey with other popular surveys. The table reports the correlations between the current quarter Duke-CFO survey of either optimism about the economy or optimism about the firm's prospects with the subsequent quarter's realization for five surveys: UBS-Gallup, CEO Survey, Conference Board Consumer Confidence, University of Michigan Consumer Confidence and ISM Purchasing Manager's Index. Both of the Duke-CFO optimism measures significantly predict all five of these popular barometers of economic confidence. Related analysis shows that our CFO survey anticipates economic activity sooner (usually one quarter sooner) than do the other surveys.

Table 2
The ability of the Duke CFO survey to predict other surveys

	Predictive correlations	
Survey	Optimism about economy	Optimism about firm's prospects
UBS-Gallup	0.289	0.380
CEO Survey	0.814	0.824
Conference Board Consumer Confidence	0.513	0.767
University of Michigan Consumer Confidence	0.341	0.253
ISM Purchasing Managers Index	0.694	0.497

3. Conclusions

We provide a direct measure of ten-year market returns based on a multi-year survey of Chief Financial Officers. Importantly, we have a 'measure' of expectations. We do not claim it is the true market expectation. Nevertheless, the CFO measure has not been studied before.

While there is relatively little time-variation in the risk premium, a number of patterns emerge. We offer evidence that the risk premium is higher during recessions and non-recessions. Given the recent global economic crisis, the risk premium has hit a record high for our ten years of surveys. We also present evidence on disagreement. With higher disagreement, people often have less confidence in their forecasts. While the risk premium has decreased since the peak during the crisis, our measures of disagreement are still elevated suggesting considerable uncertainty persists.

While we have 17,500 survey responses over more than 10 years, much of our analysis uses summary statistics for each survey. As such, with only 51 unique quarters of predictions and a variable of interest that has a 10-year horizon, it is impossible to evaluate the accuracy of the market excess return forecasts. For example, the December 2, 2002 10-year annual forecast was 7.91% and the realized annual S&P 500 return through December 6, 2012 is 4.23%. The forecast errors are larger for 10-year forecasts beginning in 2000 and 2001. Our analysis shows some some weak correlation between past returns, real interest rates and the risk premium. In contrast, there is significant evidence on the relation between two common measures of economic risk and the risk premium. We find that both the implied volatility on the S&P index as well as a commonly used measure of credit spreads are highly correlated with our measured equity risk premium.

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Appendix A

Excerpt from the Survey Instrument

10. On November 19, 2012 the annual yield on 10-yr treasury bonds was 1.6%. Please complete the following:

a. Over the <u>next 10 years</u>, I expect the <u>average annual</u> S&P 500 return will be:

Worst Case: There is a 1-in-10 chance the actual average return will be less than:	**<u>Best Guess</u>**: I expect the return to be:	Best Case: There is a 1-in-10 chance the actual average return will be greater than:
____ %	____ %	____ %

b. During the <u>next year</u>, I expect the S&P 500 return will be:

Worst Case: There is a 1-in-10 chance the actual return will be less than:	**<u>Best Guess</u>**: I expect the return to be:	Best Case: There is a 1-in-10 chance the actual return will be greater than:
____ %	____ %	____ %

Please check one from each category that best describes your company:

a. Industry

○ Retail/Wholesale	○ Tech [Software/Biotech]
○ Mining/Construction	○ Banking/Finance/Insurance
○ Manufacturing	○ Service/Consulting
○ Transportation/Energy	○ Healthcare/Pharmaceutical
○ Communications/Media	○ Other: ________

b. Sales Revenue	**c. Number of Employees**
○ Less than $25 million	○ Fewer than 100
○ $25-$99 million	○ 100-499
○ $100-$499 million	○ 500-999
○ $500-$999 million	○ 1,000-2,499
○ $1-$4.9 billion	○ 2,500-4,999
○ $5-$9.9 billion	○ 5,000-9,999

More than $10 billion	More than 10,000
d. Where are you personally located?	**e. Ownership**
Northeast U.S. Mountain U.S. Midwest U.S. South Central U.S. South Atlantic U.S. Pacific U.S. Canada Latin America Europe Asia Africa Other	Public Private Government Nonprofit
f. Foreign Sales	**g. What is your company's credit rating?**
0% 1-24% 25-50% More than 50%	Check here if you do not have a rating, and please estimate what your rating would be.
h. In 2012, by what amount did sales outside your (headquartered) country increase or decrease?	**i. Your job title (e.g., CFO, Asst. Treasurer, etc.)**
% Increase Decrease	

Submit

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Effect of Analysts' Optimism on Estimates of the Expected Rate of Return Implied by Earnings Forecasts

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ABSTRACT

Recent literature has used analysts' earnings forecasts, which are known to be optimistic, to estimate implied expected rates of return, yielding upwardly biased estimates. We estimate that the bias, computed as the difference between the estimates of the implied expected rate of return based on analysts' earnings forecasts and estimates based on current earnings realizations, is 2.84%. The importance of this bias is illustrated by the fact that several extant studies estimate an equity premium in the vicinity of 3%, which would be eliminated by the removal of the bias. We illustrate the point that cross-sample

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differences in the bias may lead to the erroneous conclusion that cost of capital differs across these samples by showing that analysts' optimism, and hence, bias in the implied estimates of the expected rate of return, differs with firm size and with analysts' recommendation. As an important aside, we show that the bias in a value-weighted estimate of the implied equity premium is 1.60% and that the unbiased value-weighted estimate of this premium is 4.43%.

1. *Introduction*

A large and expanding body of literature uses analysts' forecasts of earnings to determine the expected rate of return implied by these forecasts, current book values, and current prices.[1] These implied expected rates of return are often used as estimates of the market's expected rate of return and/or as estimates of the cost of capital.[2] Yet the earnings forecasts are optimistic, particularly as they are usually measured a year in advance of the earnings announcement.[3] Since these earnings forecasts are optimistically biased, the expected rates of return implied by these forecasts will be upward biased. We show that this bias is statistically and economically significant.[4]

The extant literature on analysts' optimism/pessimism generally compares forecasts of earnings with realizations of the earnings that are forecasted. This provides an ex post measure of optimism. Our primary analysis is a comparison of the expected rate of return implied by current market prices and analysts' earnings forecasts of next period's earnings with

[1] Literature that reverse-engineers valuation models to obtain estimates of the implied expected rate of return on equity investment is very new. These models include the dividend capitalization model in Botosan [1997]; the residual income valuation model in O'Hanlon and Steele [2000], Gebhardt, Lee, and Swaminathan [2001], Claus and Thomas [2001], Easton et al. [2002], and Baginski and Wahlen [2003]; and the abnormal growth in earnings model in Gode and Mohanram [2003] and Easton [2004]. Literature using these estimates to test hypotheses regarding factors that may affect the expected rate of return developed almost simultaneously; for example, see Daske [2006], Dhaliwal et al. [2005], Francis, Khurana, and Periera [2005], Francis et al. [2004], Hail and Leuz [2006], Hribar and Jenkins [2004], and Lee, Myers, and Swaminathan [1999]. This development took place despite the fact that (1) some of these methods were not designed to provide firm-specific estimates; see, in particular, Claus and Thomas [2001], Easton et al. [2002], and Easton [2004]; and (2) there is very little evidence regarding the empirical validity of these methods.

[2] Although the term cost of capital is commonly used to describe these implied expected rates of return, they are not the cost of capital unless the market prices are efficient and the earnings forecasts are the market's earnings expectations. A more precise term would be "the internal rate of return implied by market prices, accounting book values and analysts' forecasts of earnings."

[3] These forecasts tend to be much more optimistic than those made closer to the earnings announcement; see Richardson, Teoh, and Wysocki [2004].

[4] Claus and Thomas [2001] observe that the optimistic bias in analysts' forecasts will bias their estimate of the equity premium upward. Williams [2004] also makes this point in his discussion of Botosan, Plumlee, and Xie [2004]. This effect of analysts' optimism is exacerbated by the fact that all studies using analysts' forecasts to calculate an implied expected rate of return are based on forecasts made well in advance (usually at least a year ahead) of the earnings announcement.

the expected rate of return implied by these prices and current earnings. Since this comparison is done at the time the forecast is made, rather than after the realization, it provides an ex ante measure of the affect of optimism/pessimism. We are primarily interested in this ex ante comparison for two reasons. First, our goal is to determine the bias in estimates of expected rates of return implied by analysts' forecasts at the time that these forecasts are made. Second, this measure of optimism/pessimism is not affected by events that occur between the forecast date and the time of the earnings realization.[5]

The method we use for estimating the expected rate of return that is implied by prices, current book values, and forecasts of earnings is the method that Easton et al. [2002] use to estimate the equity premium in the United States. The method we use for estimating the expected rate of return that is implied by prices and current accounting data is an adaptation of the method that O'Hanlon and Steele [2000] use to estimate the expected market equity premium for the United Kingdom. Both of these methods simultaneously estimate the implied expected rate of return and the expected growth rate for portfolios/groups of stocks. The estimate of the expected growth rate is not important in and of itself in our study; but estimating it simultaneously with the estimation of the implied expected rate of return is critical because it avoids the introduction of error which will almost inevitably arise when the expected growth rate is assumed.[6]

The conclusion from the very recent studies that examine the validity of *firm-specific* estimates of the implied expected rate of return derived from reverse-engineering earnings-based valuation models (see, Botosan and Plumlee [2005], Easton and Monahan [2005], Guay, Kothari, and Shu [2005]) is that these estimates are poor, indeed. None of these studies address bias, that is, the *average* difference between the market expectation of the rate of return, which these studies purport to measure, and rates implied by analysts' forecasts. Yet it is possible that the bias in analysts' forecasts, and hence the likely bias in estimates of expected rates, of return may be affected by the factor that researchers are investigating. For example, it is possible that analysts' forecasts for firms under one accounting regime (say, accounting based on international accounting standards) may be more optimistic than analysts' forecasts for firms under a different accounting regime (say, accounting based on domestic standards). These optimistic forecasts may

[5] An obvious recent example of such an event is the tragedy of the terrorist attack of September 11, 2001. This event, which was not foreseen by analysts, would almost certainly have made their forecasts overly optimistic with the benefit of hindsight. We return to this example.

[6] Any assumed growth rate will almost invariably differ from the growth rate implied by the data. See Easton [2005] for a detailed discussion of this source of error. If the same (assumed) growth rate is applied to both the earnings forecast and actual earnings data, differences in optimism will mechanically produce differences in estimates of the implied expected rate of return. With simultaneous estimation of growth, the relation between optimism in analysts' forecasts and optimistic bias in estimates of the expected rate of return is not mechanical since the optimism may be mitigated or exaggerated by differing growth estimates.

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bias the estimate of the expected rate of return upward, potentially leading to the (possibly erroneous) conclusion that the cost of capital is higher for these firms. We illustrate this point by showing that analysts' optimism (and hence the bias in implied expected rates of return) varies with firm size and with analysts' recommendations.

All of our analyses are based on I/B/E/S forecasts of earnings and recommendations for the years 1993–2004 and actual prices and accounting data for 1992–2004.[7] Consistent with the extant literature, we show that the forecasts tend to be optimistic leading to an implied expected rate of return which is, on average, biased upward by 2.84%. Comparing this bias with the estimates of the expected equity premium based on these data (3% or less in Claus and Thomas [2001], between 2% and 3% in Gebhardt, Lee, and Swaminathan [1999], and 4.8% in Easton et al. [2002]) suggests that there **Q2** may be no premium at all! It is important to note, however, that each of these papers attributes equal weight to all stocks that are used in the calculation of the mean or median estimate of the market expected rate of return in Claus and Thomas [2001] and Gebhardt, Lee, and Swaminathan [1999], **Q3** and in the regression in Easton et al. [2002].

This equal-weighting has two potential effects. First, we show that analysts' optimism decreases as firm size increases so that small stocks unduly bias the estimate of an equally weighted estimate of the implied expected rate of return. Second, stocks with low or negative earnings, which are somewhat meaningless as summary valuation metrics, potentially have an influence that is similar to the influence of large stable firms where earnings are a much more meaningful valuation metric. In order to avoid these undue influences, we repeat all of the analyses weighting each of the observations by market capitalization.

Our estimate of the implied expected rate of return on the market from the value-weighted regression, after removing the effect of bias in analysts' forecasts, is 9.67% with an implied equity risk premium of 4.43%. Of course, this estimate of the equity risk premium is more reasonable than that obtained when all observations have equal weight.[8]

Studies such as Michaely and Womack [1999], Boni and Womack [2002], Eames, Glover, and Kennedy [2002], and Bradshaw [2004] show that analysts generally make "strong buy" and "buy" recommendations. They sometimes recommend "hold," and rarely recommend "sell." If strong buy or

[7] Our analyses of bias have direct implications for all of the papers that are based on these I/B/E/S forecasts of earnings and are likely to also apply to other papers based on buy-side analysts' earnings forecasts. We are silent on the effects of bias in studies based on the dividend capitalization model (such as Botosan [1997] and Brav, Lehavy, and Michaely [2005]) because the implied expected rates of return in these studies are based on forecasts of dividends and prices rather than on earnings forecasts.

[8] Since the extent of analysts' optimism decreases as firm size increases, the bias in the expected rate of return on the market estimated via the value-weighted regression is lower than the estimate from the equally weighted regression: 1.60% compared with 2.84%.

buy recommendations are associated with analysts' expectations of positive abnormal returns, the pervasiveness of these recommendations could be the reason for finding upwardly biased estimates of expected rates of return implied by analysts' earnings forecasts. To examine this issue further, we repeat the analyses for subsamples formed on the basis of percentage of analysts comprising the consensus who recommend strong buy or buy.

We show that the consensus analyst forecast is optimistic even when less than 30% of analysts comprising the consensus recommended strong buy or buy.[9] It follows that estimates of the implied expected rate of return are biased upward even for these subsamples. Interestingly, we show that the implied expected rate of return declines monotonically as the percentage of analysts recommending strong buy or buy declines. In other words, analysts' recommendations appear to be based on expected raw rates of return rather than the difference between the analysts' expectations and the market expectation (i.e., abnormal returns). This evidence is consistent with the observation in Groysberg et al. [2007] that analysts' salary increases and bonuses are based on stock returns subsequent to their recommendations adjusted for the return on the Standard and Poor's (S&P) 500 index.

The remainder of the paper proceeds as follows. In section 2, we outline the methods used in estimating the expected rate of return implied by market prices, current book value of equity, and current and forecasted accounting earnings. Section 3 describes the data used in our analyses. In section 4, we document the ex post and the ex ante bias in consensus analysts' forecasts and discuss the implications for cost of capital estimates in extant accounting research, which are generally based on equal weighting of observations from the entire sample of firms followed by analysts. In section 5, we repeat the analyses using value-weighting of firms to show that the estimate of the bias is lower and the estimate of the expected equity risk premium is more reasonable than that obtained in extant studies. Subsamples based on percentage of analysts recommending buy are analyzed in section 6. Section 7 concludes with a summary of implications for future research.

2. *Methods of Estimating the Implied Expected Rate of Return*

We develop three methods for estimating the implied expected rate of return. These estimates are based on (1) analysts' earnings forecasts of next year's earnings, (2) realized earnings for the current year, and (3) perfect foresight forecasts of next year's earnings. Comparing the estimates based on forecasts to the estimates based on actual earnings leads to two determinations of the bias when estimates of the market expected rate of return are based on analysts' forecasts of earnings. In each case, bias is the difference

[9] While it is reasonable to expect that the level of the analyst's recommendation should be associated with *expected* abnormal returns, it should be noted that Bradshaw [2004] finds analysts' recommendations are uncorrelated with future *realized* abnormal returns.

between estimates based on forecasts of earnings and estimates based on earnings realizations.

Our primary measure compares the estimates of the implied expected rate of return based on analysts' forecasts with estimates based on current earnings realizations. We refer to this measure as the ex ante measure of bias because it relies on information available at the time of the earnings forecast. The second measure compares estimates formed using analysts' forecasts with estimates based on perfect foresight of next-period earnings realizations. We refer to this as the ex post measure.[10]

2.1 EX ANTE DETERMINATION OF THE EFFECT OF BIAS

Each of the three methods for estimating the implied expected rate of return is derived from the residual income valuation model, which may be written as follows:

$$v_{jt} \equiv bps_{jt} + \sum_{\tau=1}^{\infty} \frac{eps_{jt+\tau} - r_j \times bps_{jt+\tau-1}}{(1+r_j)^{\tau}} \tag{1}$$

where v_{jt} is the intrinsic value per share of firm j at time t, bps_{jt} is the book value per share of common equity of firm j at time t, eps_{jt} is the earnings per share of firm j at time t, and r_j is the cost of capital for firm j.[11] Easton et al. [2002] rely on the following finite horizon version of this model:

$$p_{jt} \equiv bps_{jt} + \frac{eps_{jt+1}^{IBES} - r_j \times bps_{jt}}{(r_j - g_j)} \tag{2}$$

where p_{jt} is price per share for firm j at time t, eps_{jt+1}^{IBES} is an I/B/E/S forecast of earnings for period t+1, and g_j is the expected rate of growth in residual income beyond period t+1 required to equate ($p_{jt} - bps_{jt}$) and the present value of an infinite residual income stream.[12, 13]

Easton et al. [2002], like many other studies, implicitly use analysts' forecasts of earnings as a proxy for market expectations of next period earnings. Optimistic bias in analysts' forecasts may imply a bias in this proxy. In this

[10] There may be factors other than analysts' optimism affecting each of these measures of bias; but, since other factors affecting the ex ante measure would not affect the ex post measure (and vice versa), obtaining similar results based on both measures suggests that the effect of other factors is minimal. We elaborate on this point in section 2.3.

[11] Derivation of this model requires the no arbitrage assumption, which is necessary to derive the dividend capitalization formula, and that earnings are comprehensive – in other words, the articulation of earnings and book value is clean surplus.

[12] Price in this relation replaces intrinsic value. This form of the residual income model does not rely on the no-arbitrage assumption – rather it is simply based on the definition of the expected rate of return (the difference between current price and expected cum-dividend end-of-year price divided by current price).

13 In Easton et al. [2002] the period t to t+1 is 4 years so that eps_{jt+1} is aggregate expected cum-dividend earnings for the four years after date t. We use a one-year forecast horizon instead of four years in order to facilitate more effective use of the data. Easton et al. [2002] note that estimates of the expected rate of return based on just one year of forecasts are very similar to those based on four years of forecasts.

paper we use a modification of the method in O'Hanlon and Steele [2000] to determine, ex ante, an estimate of the expected rate of return that is not affected by this forecast error. This method provides an estimate of the expected rate of return implied by current realized accounting earnings; we compare this with the estimate implied by analysts' earnings forecasts from Easton et al. [2002] to measure bias ex ante.

The method adapted from O'Hanlon and Steele [2000] is based on the following form of the residual income valuation model:

$$p_{jt} \equiv bps_{jt} + \frac{(eps_{jt} - r_j \times bps_{jt-1})(1 + g'_j)}{(r_j - g'_j)} \tag{3}$$

The difference between this form of the model and the form used by Easton et al. [2002] is that g'_j is the perpetual growth rate starting from *current residual income* (i.e., residual income for time period $t-1$ to t) that implies a residual income stream such that the present value of this stream is equal to the difference between price and book value; in Easton et al. [2002], g_j is the perpetual growth rate starting from *next-period residual income* (i.e., expected residual income for time period t to $t+1$).

Since eps_{jt} (i.e., realized earnings) is the only payoff used in estimating the implied expected rate of return based on equation (3), this estimate is not affected by analysts' optimism unless that optimism is shared by the market and captured in p_{jt}. It follows that the difference between the estimate of the expected rate of return based on analysts' forecasts in equation (2) and the estimate based on current earnings in equation (3) is an ex ante estimate of bias introduced by using analysts' forecasts to estimate the markets' expected rate of return.

2.2 EX POST DETERMINATION OF THE EFFECT OF BIAS

Optimistic bias in analysts' earnings forecasts is well established in the literature; see, for example, O'Brien [1988], Mendenhall [1991], Brown [1993[, Dugar and Nathan [1995], and Das, Levine, and Sivaramakrishnan [1998]. Each of these studies estimates the ex post bias by comparing earnings forecasts with realizations of these forecasted earnings. We obtain an ex post measure of the bias in the estimate of the expected rate of return by comparing the estimate of the expected rate of return based on I/B/E/S analysts' forecasts in equation (2) with the expected rate of return based on (perfect foresight forecasts of) earnings realizations; that is, we replace eps^{IBES}_{jt+1} in equation (2) with earnings realizations for period $t+1$, denoted eps^{PF}_{jt+1}. Of course, this ex post comparison, like prior studies of bias in analysts' forecasts, is affected by events having an effect on earnings that happen between the time of the forecast and the date of the earnings announcement. Q4

2.3 EX ANTE AND EX POST COMPARISONS

In the ex post comparison of expected rates of return, unforeseen events are *omitted* from the market price but included in eps^{PF}_{jt+1}. On the other hand, in the ex ante comparison, expectations of future events are not included in eps_{jt} but are implicitly *included* in the market price. Since there is no obvious reason to expect a correlation between the information omitted from price in the analyses based on equation (2) and the information included in price but excluded from earnings in the analyses based on equation (3), we use the results from both methods to gain alternative, independent estimates of the bias. Our results are similar using either method.

Our maintained hypothesis in the ex ante comparison of implied expected rates of return is that the market at time t sees through (undoes) the optimistic bias in the analysts' forecasts. The empirical evidence that the implied expected rates of return based on current earnings and on realized future earnings are the same suggests that this maintained hypothesis is reasonable.

2.4 ESTIMATION BASED ON PRICES, BOOK VALUE, AND EARNINGS FORECASTS

Easton et al. [2002] transform equation (2) to form the following regression relation:

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p_{jt}}{bps_{jt}} + \mu_{jt} \tag{4}$$

where $\gamma_0 = g$ and $\gamma_1 = r - g$.[14] This regression may be estimated for any group/portfolio of stocks to obtain an estimate of the implied expected rate of return, r, and the implied expected growth rate in residual earnings, g, for the portfolio. Easton et al. [2002] run this regression for a sample of U.S. stocks to obtain an estimate of the expected rate of return on the U.S. equity market and hence an estimate of the equity premium for that market. In the empirical implementation of this model, eps_{jt+1} is the I/B/E/S forecast of earnings measured just after the announcement of eps_{jt}. Since this is the

[14] At the firm-specific level, the following relation between the regression variables, $\frac{eps_{jt+1}}{bps_{jt}} = \gamma_{0j} + \gamma_{1j}\frac{p_{jt}}{bps_{jt}}$, is readily obtained by rearranging the identity shown in equation (2). In the re-expression of this relation for a group of observations (as in equation (4)) as a regression relation, the coefficients γ_0 and γ_1 represent an average of the firm-specific γ_{0j} and γ_{1j} coefficients and the cross-sectional variation in these coefficients creates the regression residual. Easton et al. [2002] describe this regression in more detail pointing out that it involves the implicit assumption that it has the properties of a random coefficient regression. It is, of course, possible that the γ_{0j} and γ_{1j} are correlated in cross-section with either (or both) the dependent or (and) the independent variable and this correlation may introduce bias into the estimates of the regression coefficients (and, hence, into the estimates of the implied expected rates of return). It seems reasonable to assume, however, that this bias is very similar for the regressions based on analysts' earnings forecasts (eps^{IBES}_{jt+1}) and for those based on perfect foresight forecast of earnings (eps^{PF}_{jt+1}). Also, we can think of no reason why the effect of the bias in the analyses based regression (4) is the same as the effect for the analyses based on current accounting earnings (regression (5)). In other words, similar results from the analysis based on perfect foresight forecasts and from the analyses based on current accounting data support the conclusion that this bias does not unduly affect our estimates.

only payoff which is used in the estimation of the implied expected rate of return, any bias in the estimate of the implied expected rate of return would result from bias in the forecast.

2.5 ESTIMATION BASED ON CURRENT ACCOUNTING DATA

The analyses in O'Hanlon and Steele [2000] are based on realized earnings rather than earnings forecasts. Following the essence of the idea in O'Hanlon and Steele [2000], which is summarized in equation (3), we transform this equation to form the following regression relation:[15]

$$\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p_{jt} - bps_{jt}}{bps_{jt-1}} + \zeta_{jt} \tag{5}$$

where $\delta_0 = r$, $\delta_1 = (r - g')/(1 + g')$. This regression may be estimated for any group/portfolio of stocks to obtain an estimate of the expected rate of return, r, and the expected growth rate, g', for the portfolio. O'Hanlon and Steele [2000] run a regression similar to regression (5) for a sample of U.K. stocks to obtain an estimate of the expected rate of return on the U.K. equity market; and, hence, an estimate of the equity premium for that market. In the empirical implementation of regression (5), eps_{jt} is realized earnings. Since this is the only payoff used in estimating the implied expected rate of return, this estimate is not affected by analysts' optimism unless that optimism is shared by the market and captured in p_{jt}. It follows that the difference between the estimate of the expected rate of return obtained via regression (4) and the estimate based on regression (5) is an ex ante estimate of the bias when analysts' forecasts are used to estimate expected rates of return.

2.6 THE RELATION AMONG PRICES, ACTUAL EARNINGS, AND FORECASTS OF EARNINGS

In order to ensure that we obtain an estimate of the expected rate of return implied by analysts' forecasts we must use prices in regression (4) that reflect analysts' forecasts. Similarly, in regression (5) we must use prices that reflect earnings realizations to obtain an estimate of the markets' expected rate of return. The alignment of price dates, earnings announcement dates, and

[15] We attribute this model to O'Hanlon and Steele [2000] because they capture its essential elements. The similarity to their model may not, however, be immediately apparent. Since the derivation in O'Hanlon and Steele [2000] is based on Ohlson [1989], the observation that the regression intercept is an estimate of the implied expected rate of return is not evident and O'Hanlon and Steele [2000] do not use it in this way. Rather, they estimate the implied expected rate of return at the firm-specific level by applying their model to time-series data and then measuring the risk premium as the slope of the securities market line estimated from a regression of these firm-specific rates of return on corresponding beta estimates. Notice that, in addition to requiring earnings to be clean surplus in all future periods, this form of the residual income model also requires that the relation between earnings for period t and book value for periods t and $t-1$ follows the clean surplus relation.

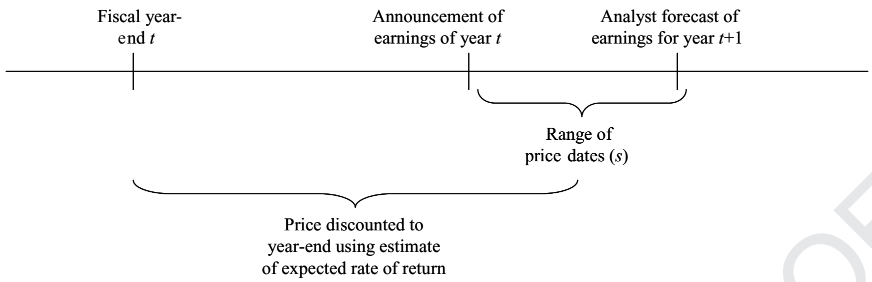

FIG. 1.—Alignment of price dates, earnings announcement dates, and analysts' forecast dates.

analysts' forecast dates is described in this subsection and summarized in figure 1.

We choose the first consensus forecast announced at least 14 days after the date of the earnings announcement.[16] In the analyses based on these forecasts, we use the price at the close of trade one day after the earnings announcement. Consistent with numerous studies of the information content of earnings, it seems reasonable to assume that this price incorporates the information in realized earnings. Further, we implicitly assume that this price is known to analysts at the time they form their earnings forecasts. In view of the fact that the forecasts comprising the consensus are formed at various points in time, this assumption may be invalid; some of the forecasts comprising the consensus may precede the earnings announcement date or they may have been issued a considerable time after this date. We examine the sensitivity of the results to this assumption by varying the price date from the day after the earnings announcement to one day after the consensus forecast is measured. This latter measurement date for price allows for the incorporation of the information in the analysts' forecasts in price. The results are not sensitive to this choice.

The residual income valuation model underlying regression (4) and regression (5) describes the value of a stock at the fiscal period end-date. Our analyses are based on prices after this date. To accommodate this difference, we replace price (p_{jt}) in equation (4) and equation (5) with price at the dates described above discounted by the expected rate of return ($\hat{r}$) back to the fiscal year-end; that is, $p_{jt+\tau}/(1+\hat{r})^{\tau/365}$, where τ is the number of days between the fiscal year-end and the price date. Since the discounting of price requires the expected rate of return we are attempting to estimate in equation (4) and equation (5), we use an iterative method as used in Easton et al. [2002]. We begin these iterations by assuming a discount rate for prices of 12%. We run each regression and obtain estimates of the expected rate of return which we then use as the new rate for discounting prices. We then rerun the regressions to re-estimate equation (4) and/or equation (5) and

[16] Use of the first forecast made after the earnings announcement from the I/B/E/S Detail History database does not alter any results.

provide another estimate of expected return. This procedure is repeated until the estimate of the expected return and the rate used in discounting price converge.[17]

3. *Description of the Data*

All earnings forecast and recommendation data are obtained from the I/B/E/S unadjusted research databases. We use the first median consensus forecast of earnings for year t+1 released 14 days or more after the announcement of earnings for year t.[18] This forecast is released on the third Thursday of each month. These data are obtained from the I/B/E/S Summary database. "Actual" earnings are also obtained from this database. The first year of our analyses uses forecasts and recommendations for 1993 in order to ensure the dates of the individual analysts' forecasts are reliable.[19] Book value of common equity and common shares outstanding are obtained from the Center for Research in Security Prices (CRSP)/Compustat annual merged database.[20] Prices are obtained from the CRSP daily price file.

We delete firms with non-December fiscal year-end so that the market-implied discount rate and growth rate are estimated at the same point in time for each firm-year observation. For each set of tests, firms with any of the dependent or independent variables for that year in the top or bottom 2% of observations are removed to reduce the effects of outliers. Dropping between 1% and 5% of observations does not affect the conclusions of our study. For December 1999, in particular, removal of only 1% of the observations has a large effect on that year's estimates in the value-weighted analyses; this is due to the extremely high price-to-book ratios of some internet firms prior to the market crash in 2000.

[17] This iterative process is repeated until none of the annual estimates changes by more than 0.00001%. In our samples, the annual estimates usually converged in five to six iterations. This iterative procedure is not sensitive to choices of beginning discount rates ranging from 5% to 20%.

[18] Results from repeating all analyses using individual analyst, rather than consensus, forecasts are qualitatively and quantitatively very similar.

[19] Zitzewitz [2002] describes the importance of not relying on forecast dates in the I/B/E/S database prior to 1993 due to potential errors in forecast dates. Since that time, forecasts are entered directly by analysts in real-time generally within 24 hours of making them available to clients.

[20] In order to ensure that the clean-surplus assumption required for the derivation of the residual income valuation model holds in the data for fiscal year t, contemporaneous book value in regression (5) – that is, b_{jt} – is calculated as Compustat book value of common equity minus Compustat net income plus I/B/E/S actual income. That is, we use the book value number that would have been reported if the (corresponding) income statement had been based on I/B/E/S actual earnings. We also remove year t dirty surplus items from Compustat book value. These adjustments are unnecessary for the book value variable in regression (4) because the clean-surplus assumption only refers to future income statements and balance sheets.

4. *Ex Post and Ex Ante Bias in Analysts' Consensus Forecasts*

We begin by documenting the accuracy (i.e., the mean/median *absolute* earnings forecast error) and the ex post bias (i.e., the mean/median earnings forecast error) in the analysts' earnings forecasts for the entire sample of stocks. We then compare the estimate of the expected rate of return implied by prices, book values, and analysts' forecasts of earnings with the estimate obtained from prices, book values, and actual current earnings. This is an estimate of ex ante bias in the estimates of the expected rate of return reported in the extant literature.

4.1 ACCURACY AND BIAS IN THE ANALYSTS' FORECASTS OF EARNINGS

Panel A of table 1 summarizes the accuracy and the ex post bias in the I/B/E/S consensus forecast of earnings at the end of each of the years 1992–2003. We use the mean and the median absolute forecast error as the measure of accuracy presenting the mean and the median absolute forecast error deflated by end-of-year price in order to give an indication of the scale of these errors. The mean absolute price-deflated forecast error ranges from 0.019 in 2003 to 0.052 in 2000; the median absolute price-deflated forecast error ranges from 0.008 in 2003 to 0.018 in 2000. We use the mean (median) forecast error as the measure of the ex post bias in the analysts' forecasts. The mean price-deflated forecast error ranges from −0.041 in 2000 to −0.003 in 2003. The median price-deflated forecast error ranges from −0.012 in 2000 to 0.000 in 2003.

These predominantly negative forecast errors are consistent with the prior literature, which concludes that analysts' forecasts, particularly long-run forecasts, tend to be optimistic; see, for example, O'Brien [1993[, Lin [1994], and Richardson, Teoh, and Wysocki [2004]. As noted earlier, these forecast errors compare forecasts with ex post realizations.

4.2 DESCRIPTION OF REGRESSION VARIABLES

The number of observations we use to estimate the annual regressions ranges from 1,418 at December 1992 to 2,137 at December 1997. As shown in panel B of table 1, the mean price-to-book ratio, which is the independent variable in regression (4), ranges from 1.945 at December 2002 to 3.398 at December 1999; the median price-to-book ratio ranges from 1.625 at December 2002 to 2.409 at December 1997. Regression (4) is run with the forecasted return-on-equity based on the I/B/E/S consensus forecast as the dependent variable. The mean forecasted return-on-equity ranges from 0.079 at December 2001 to 0.146 at December 1994; the median forecasted return-on-equity ranges from 0.111 at December 2001 to 0.145 at December 1994.

The annual mean and median current return-on-equity, which is the dependent variable in regression (5), is generally a little less than the corresponding mean and median forecasted return-on-equity. The mean current return-on-equity ranges from 0.077 at December 2001 to 0.122 at December

TABLE 1
Descriptive Statistics

Panel A: Forecast errors for the consensus sample

t	N	Accuracy $\lvert FE_{jt+1}\rvert/p_{jt}$ Mean	Median	Std. Dev.	Bias FE_{jt+1}/p_{jt} Mean	Median	Std. Dev.
12/92	1,418	0.030	0.014	0.054	−0.017	−0.007	0.060
12/93	1,544	0.028	0.009	0.143	−0.019	−0.003	0.144
12/94	1,781	0.030	0.012	0.061	−0.019	−0.004	0.066
12/95	1,939	0.028	0.011	0.062	−0.019	−0.004	0.065
12/96	2,006	0.027	0.010	0.067	−0.018	−0.005	0.070
12/97	2,137	0.031	0.013	0.059	−0.024	−0.009	0.062
12/98	2,044	0.040	0.012	0.094	−0.025	−0.004	0.099
12/99	1,854	0.046	0.012	0.177	−0.028	−0.004	0.180
12/00	1,729	0.052	0.018	0.134	−0.041	−0.012	0.138
12/01	1,809	0.033	0.011	0.204	−0.018	−0.003	0.206
12/02	1,825	0.031	0.011	0.065	−0.012	−0.002	0.071
12/03	2,000	0.019	0.008	0.037	−0.003	0.000	0.042
Mean across years	1,841	0.033	0.012	0.096	−0.020	−0.005	0.100

(Continued)

TABLE 1 — *Continued*

Panel B: Regression variables

Regressions:

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p_{jt}}{bps_{jt}} + \mu_{jt} \qquad (4)$$

$$\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p_{jt} - bps_{jt}}{bps_{jt-1}} + \zeta_{jt} \qquad (5)$$

		$\frac{eps^{Cons}_{jt+1}}{bps_{jt}}$			$\frac{eps_{jt}}{bps_{jt-1}}$			$\frac{p'_{jt}}{bps_{jt}}$			$\frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}}$		
t	N	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
12/92	1,418	0.138	0.132	0.076	0.104	0.110	0.097	2.193	1.792	1.254	1.265	0.854	1.357
12/93	1,544	0.138	0.138	0.095	0.113	0.122	0.111	2.374	1.929	1.364	1.505	0.994	1.481
12/94	1,781	0.146	0.145	0.105	0.121	0.126	0.118	2.114	1.706	1.241	1.334	0.834	1.491
12/95	1,939	0.145	0.142	0.107	0.122	0.132	0.136	2.454	1.906	1.695	1.679	1.060	1.943
12/96	2,006	0.135	0.139	0.120	0.108	0.126	0.146	2.654	2.114	1.768	1.851	1.228	1.973
12/97	2,137	0.125	0.140	0.145	0.102	0.125	0.153	2.998	2.409	1.963	2.132	1.491	2.156
12/98	2,044	0.118	0.134	0.160	0.093	0.116	0.155	2.728	1.974	2.302	1.810	0.959	2.499
12/99	1,854	0.126	0.141	0.140	0.094	0.124	0.167	3.398	1.883	4.247	2.699	0.996	4.878
12/00	1,729	0.116	0.136	0.152	0.100	0.130	0.181	2.749	1.964	2.420	2.022	1.109	2.748
12/01	1,809	0.079	0.111	0.155	0.068	0.100	0.156	2.457	1.928	1.668	1.548	0.989	1.896
12/02	1,825	0.093	0.117	0.150	0.077	0.102	0.146	1.945	1.625	1.248	1.007	0.662	1.427
12/03	2,000	0.106	0.121	0.142	0.090	0.111	0.167	2.883	2.314	1.801	2.198	1.450	2.393
Mean across years	1,841	0.122	0.133	0.129	0.099	0.119	0.144	2.579	1.962	1.914	1.754	1.052	2.187

t is the reference date around which all variables are identified. All estimates are based on calendar year-end; for example 12/92 indicates December 31, 1992. Prices are closing prices for the calendar year, book values are reported as at fiscal year end, which for our samples of firms is 12/31/1992, and earnings are for the period ending 12/31/1992. N is the number of observations. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is actual earnings per share for year t+1 as reported by I/B/E/S less the first median consensus forecast of earnings per share for year t+1 released at least 14 days after the announcement of year t earnings. p_{jt} is price per share as of the end of fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year t+1 released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time $t+\tau$ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

1995; the median current return-on-equity ranges from 0.010 at December 2001 to 0.132 at December 1995. The mean of the independent variable in this regression, the difference between price and current book value deflated by lagged book value, ranges from 1.007 at December 2002 to 2.699 at December 1999; the median ranges from 0.662 at December 2002 to 1.491 at December 1997.

4.3 COMPARISON OF IMPLIED EXPECTED RATES OF RETURN BASED ON I/B/E/S FORECASTS OF EARNINGS WITH IMPLIED EXPECTED RATE OF RETURN BASED ON EARNINGS REALIZATIONS

In this section, we compare the estimates of the implied expected rates of return based on the method in Easton et al. [2002], which uses one-year-ahead I/B/E/S consensus forecasts of earnings in regression (4), with the estimates obtained from the method adapted from O'Hanlon and Steele [2000], which uses current earnings and current and lagged book value in regression (5). We also compare the estimates based on analysts' forecasts to those implied by future earnings realizations; that is, by perfect foresight forecasts.

4.3.1. The Expected Rate of Return Implied by Analysts' Earnings Forecasts. The summary statistics from regression (4), where the dependent variable is I/B/E/S forecasted return-on-equity, are included in panel A of table 2. We provide year-by-year estimates of the regression coefficients and *t*-statistics for tests of their difference from zero. These *t*-statistics may be over-stated due to the possibility of correlated residuals; so we present the mean coefficient estimates and the related Fama and MacBeth [1973] *t*-statistics. The regression adjusted R^2 ranges from 0.73% at December 1999 to 36.60% at December 1992.[21] The mean estimate of the intercept coefficient $\gamma_{0,}$ an estimate of the implied growth in residual income beyond the one-year forecast horizon, is 0.074 with a *t*-statistic of 8.50. The mean estimate of the slope coefficient $\gamma_{1,}$ an estimate of the difference between the implied expected rate of return and the implied growth in residual income beyond the one-year forecast horizon, is 0.020 with a *t*-statistic of 5.86.

The estimates of the implied expected rate of return obtained from the estimates of the regression (4) coefficients, where the dependent variable is analysts' forecasts of return-on-equity, are in panel A of table 2. These

[21] We note the very low R^2 in some of these regressions. As a result we perform several analyses of the effects of outliers including more severe outlier removal – for example, removing up to the top and bottom 20% of observations or by eliminating all observations with an R-student statistic greater than 2 – the regression R^2 increases but none of our inferences based on the resulting estimates of the implied expected rate of return change. We also perform all analyses on the subset of observations for which analysts forecast positive earnings. Again we obtain much higher R^2 values but inferences remain unchanged. These further analyses of outliers are also performed on all subsequent regressions and, in all cases, our inferences are unchanged.

TABLE 2

Comparison of Implied Expected Rates of Return Based on I/B/E/S Forecasts of Earnings With Implied Expected Rate of Return Based on Current Accounting Data

Panel A: Estimates of expected rate of return based on analysts' forecasts and current accounting data

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression: $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data				
t	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (A)	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$ (B)	Difference between estimates (A − B)
12/92	1,418	0.057	0.037	36.60%	9.39%	0.057	0.037	27.09%	5.67%	3.72%
		(17.71)	(28.62)			(18.96)	(22.97)			
12/93	1,544	0.073	0.027	15.59%	10.08%	0.068	0.030	15.32%	6.83%	3.25%
		(16.53)	(16.91)			(18.37)	(16.74)			
12/94	1,781	0.073	0.035	16.81%	10.73%	0.069	0.039	24.00%	6.90%	3.83%
		(16.25)	(18.99)			(21.01)	(23.73)			
12/95	1,939	0.095	0.021	10.83%	11.53%	0.092	0.018	6.55%	9.22%	2.31%
		(23.47)	(15.38)			(23.40)	(11.70)			
12/96	2,006	0.089	0.018	6.66%	10.61%	0.073	0.019	6.77%	7.26%	3.35%
		(18.91)	(12.00)			(16.79)	(12.11)			
12/97	2,137	0.082	0.014	3.71%	9.64%	0.066	0.017	5.60%	6.62%	3.02%
		(14.64)	(9.13)			(14.61)	(11.30)			
12/98	2,044	0.082	0.013	3.50%	9.50%	0.065	0.016	6.43%	6.49%	3.01%
		(15.23)	(8.67)			(15.86)	(11.89)			
12/99	1,854	0.136	−0.003	0.73%	13.29%	0.100	−0.002	0.34%	9.97%	3.32%
		(32.67)	(−3.83)			(22.54)	(−2.71)			
12/00	1,729	0.084	0.012	3.38%	9.57%	0.086	0.007	1.00%	8.61%	0.96%
		(15.42)	(7.84)			(16.02)	(4.30)			

12/01	1,809	0.029	0.020	4.63%	4.93%	0.028	0.026	9.99%	2.82%	2.11%
		(4.64)	(9.42)			(6.30)	(14.20)			
12/02	1,825	0.019	0.038	9.83%	5.70%	0.030	0.047	21.13%	2.96%	2.74%
		(3.12)	(14.14)			(7.98)	(22.13)			
12/03	2,000	0.069	0.013	2.72%	8.18%	0.057	0.015	4.35%	5.74%	2.44%
		(11.65)	(7.55)			(11.55)	(9.59)			
Mean across years	1,841	0.074	0.020	9.58%	9.43%	0.066	0.022	10.71%	6.59%	2.84%
t-stat.		(8.50)	(5.86)		(14.16)	(10.50)	(5.51)		(10.50)	(12.33)

Panel B: Estimates of expected rate of return based on future realized earnings

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt} \quad (4)$$

	Estimates based on perfect foresight earnings forecasts				Difference between estimates	
t	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (C)	(A − C)	(B − C)
12/92	0.037	0.031	14.10%	6.77%	2.62%	−1.10%
	(7.09)	(15.31)				
12/93	0.049	0.026	7.97%	7.45%	2.63%	−0.62%
	(8.10)	(11.61)				
12/94	0.046	0.031	8.33%	7.71%	3.02%	−0.81%
	(7.56)	(12.77)				
12/95	0.076	0.013	2.22%	8.87%	2.66%	0.35%
	(13.29)	(6.69)				
12/96	0.082	0.004	0.12%	8.56%	2.05%	−1.30%
	(12.01)	(1.83)				
12/97	0.040	0.009	0.77%	4.89%	4.75%	1.73%
	(5.14)	(4.18)				
12/98	0.057	0.006	0.44%	6.27%	3.23%	0.22%
	(8.28)	(3.15)				

(*Continued*)

TABLE 2 — *Continued*

Panel B: Estimates of expected rate of return based on future realized earnings

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt} \quad (4)$$

	Estimates based on perfect foresight earnings forecasts				Difference between estimates	
t	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (C)	(A − C)	(B − C)
12/99	0.105	−0.007	1.87%	9.79%	3.50%	0.18%
	(17.73)	(−6.01)				
12/00	0.043	0.004	0.18%	4.70%	4.87%	3.91%
	(6.16)	(2.05)				
12/01	0.018	0.013	1.40%	3.13%	1.80%	−0.31%
	(2.47)	(5.16)				
12/02	−0.003	0.041	9.16%	3.77%	1.93%	−0.81%
	(−0.48)	(13.60)				
12/03	0.075	0.007	0.64%	8.28%	−0.10%	−2.54%
	(11.02)	(3.71)				
Mean across years	0.052	0.015	3.93%	6.68%	2.75%	−0.09%
t-stat.	(6.12)	(3.63)		(10.79)	(7.13)	(−0.19)

Panel A of the table reports the results of estimating annual cross-sectional regressions; regression (4) is based on I/B/E/S consensus forecasts and regression (5) is based on current accounting data. Panel B reports the results of estimating regression (4) based on subsequent earnings realizations, which are used as perfect foresight forecasts. Observations with any of the dependent or independent variables in the top and bottom 2% of observations are removed to reduce the effects of outliers. Summary means across the annual regressions and the related Fama and MacBeth [1973] t-statistics are provided. The last column of panel A contains the difference between estimates of expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. The last two columns of panel B contain the differences between perfect foresight estimates and the estimates of the expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. t is the reference date around which all variables are identified. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is actual earnings per share for year t+1 as reported by I/B/E/S less the first median consensus forecast of earnings per share for year t+1 released at least 14 days after the announcement of year t earnings. p_{jt} is price per share as of the end of the fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year t+1 released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time t+τ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

estimates range from 4.93% at December 2001 to 13.29% at December 1999, with a mean (*t*-statistic) of 9.43% (14.16).

4.3.2. The Expected Rate of Return Implied by Current Accounting Data. The summary statistics from regression (5) are included in panel A of table 2. The regression adjusted R^2 ranges from 0.34% at December 1999 to 27.09% at December 1992. The mean estimate of the intercept coefficient $\delta_{0,}$ which is an estimate of the implied expected rate of return, is 0.066 (*t*-statistic of 10.50), and the mean estimate of the slope coefficient $\delta_{1,}$ which is a function of the expected rate of return and the expected growth in residual income, is 0.022 (*t*-statistic of 5.51). The estimates of the implied expected rate of return are also included in panel A of table 3. These estimates range from 2.82% at December 2001 to 9.97% at December 1999, with a mean (*t*-statistic) of 6.59% (10.50).

The estimates of the implied expected rate of return are very low: they imply an average equity premium of 1.35%. We show, in section 5, that this is due to two related factors. First, since the variables in regression (5) are ratios, the size of the firms in the regression has no direct effect on the estimate of the equity premium. In other words, as in all extant studies that estimate an equity premium based on accounting earnings, all observations are essentially assigned equal (rather than value-based) weights so that small stocks have an undue effect on the estimate of the market return. Second, stocks with low or negative earnings, which are somewhat meaningless as summary valuation metrics, potentially have an influence that is similar to the influence of large stable firms where earnings are a much more meaningful valuation metric.

4.3.3. The Ex Ante Difference Between the Estimate of the Expected Rate of Return Based on Analysts' Earnings Forecasts and the Estimate of the Expected Rate of Return Based on Current Accounting Data. Differences between the estimates of expected rate of return based on regression (4) and regression (5) are included in the last column of panel A of table 2. On average, the difference between the estimate of the expected rate of return based on analysts' earnings forecasts and the estimate of the expected rate of return based on earnings realizations is 2.84% (*t*-statistic of 12.33). There are some years when the difference is quite large; for example, for the sample of stocks at December 1994, the difference is 3.83%. An implication of the observation that expected rates of return based on analysts' forecasts tend to be higher is that caution should be taken when interpreting the meaning of the rate of return that is implied by analysts' earnings forecasts; if, as is often the case in the extant literature, it is used as an estimate of the cost of capital, this estimate is likely upward biased.

4.3.4. Estimates of the Expected Rate of Return Based on Perfect Foresight Forecasts. The ex post forecast error documented in table 1 can be reparameterized as an error in the implied expected rate of return. This error may

TABLE 3

Value Weighting Observations, Results of Comparison of Implied Expected Rates of Return Based on I/B/E/S Forecasts of Earnings, Based on Current Accounting Data, and Based on Future Realizations of Earnings

Panel A: Descriptive statistics

	Decile of market capitalization at time t									
Mean of annual means	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Accuracy $\|FE_{jt+1}\|/p_{jt}$	0.102	0.053	0.040	0.034	0.026	0.023	0.018	0.017	0.015	0.012
Bias FE_{jt+1}/p_{jt}	−0.075	−0.033	−0.025	−0.021	−0.015	−0.013	−0.009	−0.009	−0.007	−0.005
$eps^{Cons}_{jt+1}/bps_{jt}$	0.065	0.081	0.093	0.095	0.113	0.128	0.140	0.149	0.160	0.186
eps_{jt}/bps_{jt-1}	0.002	0.050	0.066	0.075	0.095	0.113	0.126	0.134	0.145	0.168
p'_{jt}/bps_{jt}	1.707	1.954	2.188	2.362	2.482	2.676	2.794	2.895	2.941	3.593
$(p'_{jt} - bps^*_{jt})/bps_{jt-1}$	0.641	1.000	1.275	1.533	1.752	1.958	2.083	2.142	2.146	2.732
	Decile of market capitalization at time t									
Mean of annual medians	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Accuracy $\|FE_{jt+1}\|/p_{jt}$	0.042	0.024	0.018	0.016	0.012	0.010	0.009	0.008	0.007	0.006
Bias FE_{jt+1}/p_{jt}	−0.023	−0.012	−0.009	−0.007	−0.005	−0.004	−0.004	−0.003	−0.002	−0.002
$eps^{Cons}_{jt+1}/bps_{jt}$	0.095	0.110	0.115	0.118	0.126	0.134	0.143	0.148	0.155	0.176
eps_{jt}/bps_{jt-1}	0.052	0.086	0.097	0.104	0.114	0.125	0.131	0.136	0.142	0.160
p'_{jt}/bps_{jt}	1.316	1.577	1.748	1.836	1.926	2.060	2.183	2.221	2.304	2.829
$(p'_{jt} - bps^*_{jt})/bps_{jt-1}$	0.259	0.605	0.818	0.944	1.017	1.220	1.327	1.313	1.439	1.934

(Continued)

TABLE 3—*Continued*

Panel B: Value-weighted estimates of expected rate of return based on analysts' forecasts and current accounting data

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data				
t	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (A)	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$ (B)	Difference in estimates of expected rate of return (A − B)
12/92	1,418	0.047	0.047	57.76%	9.35%	0.062	0.044	46.89%	6.22%	3.13%
		(14.73)	(44.03)			(23.49)	(35.38)			
12/93	1,544	0.052	0.047	51.76%	9.82%	0.079	0.042	46.23%	7.87%	1.95%
		(14.70)	(40.70)			(29.00)	(36.43)			
12/94	1,781	0.072	0.049	52.03%	12.15%	0.084	0.050	57.05%	8.39%	3.76%
		(22.46)	(43.95)			(34.82)	(48.64)			
12/95	1,938	0.092	0.036	46.89%	12.76%	0.127	0.028	32.37%	12.65%	0.11%
		(26.96)	(41.36)			(41.25)	(30.46)			
12/96	2,006	0.081	0.034	51.09%	11.53%	0.106	0.029	44.72%	10.64%	0.89%
		(25.50)	(45.77)			(38.36)	(40.29)			
12/97	2,137	0.094	0.026	44.60%	12.01%	0.106	0.023	39.89%	10.58%	1.43%
		(28.17)	(41.48)			(41.10)	(37.67)			
12/98	2,044	0.093	0.022	47.17%	11.49%	0.090	0.022	49.99%	8.97%	2.52%
		(28.30)	(42.72)			(33.70)	(45.20)			
12/99	1,855	0.147	0.010	23.55%	15.69%	0.147	0.004	4.00%	14.66%	1.03%
		(35.74)	(23.92)			(36.07)	(8.85)			
12/00	1,729	0.091	0.022	43.02%	11.26%	0.110	0.021	33.61%	11.04%	0.22%
		(22.09)	(36.13)			(28.77)	(29.60)			
12/01	1,808	0.059	0.031	44.84%	8.98%	0.070	0.030	47.31%	6.98%	2.00%
		(15.74)	(38.34)			(22.45)	(40.29)			

(*Continued*)

TABLE 3 —*Continued*

Panel B: Value-weighted estimates of expected rate of return based on analysts' forecasts and current accounting data

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data				
t	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (A)	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$ (B)	Difference in estimates of expected rate of return (A − B)
12/02	1,825	0.055	0.043	59.95%	9.76%	0.083	0.041	61.56%	8.26%	1.50%
		(18.77)	(52.26)			(34.75)	(54.05)			
12/03	2,000	0.072	0.032	43.22%	10.41%	0.098	0.031	40.17%	9.76%	0.65%
		(21.58)	(39.02)			(27.36)	(36.65)			
Mean across years	1,841	0.079	0.033	47.16%	11.27%	0.097	0.030	41.98%	9.67%	1.60%
t-stat.		(10.09)	(9.62)		(21.20)	(13.90)	(8.38)		(13.90)	(4.91)

Panel A of the table reports the summary statistics from repeating the analysis performed in table 1 by annual decile of market capitalization at time t (decile 1 includes firms with the smallest market capitalization). Panel B repeats the analysis in table 2 using weighted least squares regression with regression weights equal to market capitalization at time t. The table reports the results of estimating annual cross-sectional regressions: regression (4) based on I/B/E/S consensus forecasts and regression (5) based on current accounting data. Observations with any of the dependent or independent variables in the top and bottom 2% of observations are removed to reduce the effects of outliers. Summary means across the annual regressions and the related Fama and MacBeth [1973] t-statistics are provided. The last column of panel A contains the difference between estimates of expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. The last two columns of panel B contain the differences between perfect foresight estimates and the estimates of expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. t is the reference date around which all variables are identified. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is the actual earnings per share for year t+1 as reported by I/B/E/S less the first median consensus forecast of earnings per share for year t+1 released at least 14 days after the announcement of year t earnings. p_{jt} is price per share as of the end of fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year t+1 released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time t+τ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

be estimated as the difference between the implied expected rate of return based on regression (4), where expected earnings are I/B/E/S forecasts (as in panel A of table 2), and the implied expected rate of return when these expected earnings are replaced in this regression by realized earnings for year t+1. The results of estimating the implied expected rate of return using realized earnings as "perfect foresight" forecasts are reported in panel B of table 2. Using perfect foresight earnings, the estimates of expected rate of return range from 3.13% at December 2001 to 9.79% at December 1999, with a mean (t-statistic) of 6.68% (10.79). Comparing perfect foresight to consensus forecasts, the mean bias is 2.75% (t-statistic of 7.13).[22]

4.3.5. Comparison of the Estimates of the Expected Rate of Return. The two estimates of expected rate of return that are not expected to contain bias, that is, those based on perfect foresight earnings and those based on current accounting data, are very similar. The difference of −0.09% between these estimates is not significantly different from zero with a t-statistic of −0.19. It follows that our estimates of the bias are similar using either method. That is, both methods yield alternative, independent estimates of the bias that do not differ significantly; this observation supports the maintained hypothesis that the market sees through the optimistic bias in the analysts' forecasts.

Further evidence consistent with the notion that the market sees through the optimistic bias is the fact that, consistent with Richardson, Teoh, and Wysocki [2004], the forecast error declines almost monotonically as the forecast horizon decreases from approximately 12 months (as in the analyses in panel B of table 2) to shortly before the earnings announcement date for year t+1. The untabulated associated implied expected rate of return based on earnings forecasts and prices also decreases almost monotonically to 6.47% for the consensus forecasts (of t+1 earnings) made in January of year t+2 (just before year t+1 earnings are announced). That is, the expected rate of return implied by analysts' forecasts declines to the ex ante estimate of the expected rate of return implied by accounting earnings at date t. Again these results suggest that the market at date t sees through the optimistic bias in the analysts' forecasts of earnings for period t+1.

Additional untabulated results show the primary result from panel A of table 2 of an average 2.84% difference between the analysts' and market's expected rate of return is virtually unchanged at 2.93, with a t-statistic of 14.69, when price is measured at the day after the consensus forecast is formed.[23] That is, changing the time period for discounting price back to

[22] These results are consistent with the results in table 1. For example, we saw, in table 1, that the mean deflated forecast error is −0.020. A crude price earning (PE) valuation model, which relies on full payout and earnings following a random walk, suggests that the price-to-forward-earnings ratio is equal to the inverse of the expected rate of return. Thus a deflated forecast error of −0.020 implies an error in the expected rate of return of 2%. **Q5**

[23] The results are virtually identical if we use prices taken from any date ranging from one day after the earnings announcement date to one day after the forecast announcement date (the set of s price dates shown in figure 1).

fiscal year-end has no statistically or economically significant effect on the results of our analyses.

4.3.6. Effects of Bias in Extant Research Contexts. In the preceding analyses, we calculated the average bias in the estimate of the expected rate of return. Since our estimates are for a cross-section of U.S. stocks, this estimate represents the bias in estimates of the expected rate of return on the U.S. market and, in turn, a bias in the estimate of the expected equity risk premium in the U.S. market. This provides an indication of the effect of the bias in estimates of the equity risk premium in the extant literature, all of which are, essentially, equally weighted (rather than value-weighted). Arguably, the estimate of the equity risk premium should be based on a value-weighted estimate of the expected rate of return on the market.[24] We provide a method for estimating this rate of return in section 5. We show that the bias in this value-weighted estimate is less than the bias in the equally weighted estimate because the bias tends to be greater for small firms. The implication for extant research is that optimism does not affect all observations equally and hence spurious inferences may be drawn from cross-sectional comparison of implied expected rates of return that are potentially affected by the bias.

5. *Value-Weighted Estimates of the Implied Expected Rate of Return*

The analyses in section 4 examine the average effect of bias in analysts' forecasts of earnings on estimates of the implied expected rate of return. All observations are given equal weight in the analyses. Such weighting is appropriate in some studies. Easton, Sommers, and Zmijewski [2007], for example, compare the difference between the expected rate of return implied by analysts' forecasts and the expected rate of return implied by current earnings for firms subject to litigation under section 10b-5 for alleged misrepresentation. Since the focus of their study is on average differences, they give each observation equal weight; value-weighting would lead to results that were dominated by cases associated with WorldCom and Enron.

Value-weighting is more appropriate in many studies. Perhaps the best example is the estimation of the equity risk premium, which is a central part of three well-known studies based on analysts' earnings forecasts by Gebhardt, Lee, and Swaminathan [2001], Claus and Thomas [2001], and Easton et al. [2002]. These studies give equal weighting to all stocks. Yet, estimating the

[24] The economic concept of an equity risk premium is based on a value-weighted market return. Bodie, Kane, and Marcus [2005, p. 283] describe the appropriate weighting of the market return as follows: "The proportion of each stock in the market portfolio equals the market value of the stock (price per share multiplied by the number of shares outstanding) divided by the total market value of all stocks."

risk premium from investing in the equity market is more meaningful if stocks are weighted by their market capitalization. In the equally weighted analyses in the papers referred to above, small stocks have an undue effect on the estimate of the market return. [25] In order to avoid these undue influences, and to provide an estimate of the equity risk premium that is (1) not affected by analysts' optimism, and (2) more representative of the risk premium for the market portfolio, we repeat all of the analyses weighting each of the observations by market capitalization.[26]

In order to provide a sense of the likely effect of value-weighting, we begin by describing the way that analysts' accuracy and bias differs with firm size. We also document the relation between firm size and the variables used in regression (4) and regression (5). Central to our analyses is the observation, documented in panel A of table 3, that the mean scaled absolute forecast error, a measure of the accuracy of the forecasts, declines monotonically from 0.102 for the decile of smallest firms to 0.012 for the decile of largest firms. Similarly, the median absolute scaled forecast error declines monotonically from 0.042 to 0.006.

Analysts' optimism, measured as the mean (median) scaled forecast error, declines monotonically from −0.075 (−0.023) for the decile of smallest firms to −0.005 (−0.002) for the decile of largest firms. The differences in optimistic bias across these size deciles illustrate the point that differences in bias across samples of observations may explain a significant portion of the difference in the implied expected rates of return across these samples; in other words, differences in bias across samples may lead to spurious inferences. Thus, unless researchers use unbiased estimates of expected rate of return or they can show that samples/firms have earnings forecasts that are equally optimistic, observed differences in estimates of expected rate of return may result from a difference in the bias across samples/firms rather than differences in the cost of capital.

Consistent with prior literature, see, for example, Fama and French [1992], the price-to-book ratio increases with firm size from a mean of 1.707 for the decile of smallest firms to a mean of 3.593 for the decile of largest firms. The forecasted and the realized return-on-equity also increase with firm size, suggesting that the smaller firms tend to be firms with higher expected earnings growth.

The results from the estimation of value-weighted regression (4) and regression (5) are summarized in panel B of table 3. A notable difference between these value-weighted regression results and the results for equally weighted regressions (see panels A and B of table 2) is the higher adjusted R^2 for the value-weighted regressions. For example, the average adjusted R^2 for

[25] Smaller firms tend to have a much greater proportion of losses (the proportion of losses decreases monotonically from 17.64% for the decile of smallest firms in our sample to 1.65% for the decile of largest firms).

[26] Value-weighted analyses are performed using PROC REG in SAS with weight equal to market capitalization.

regression (4) based on analysts' consensus forecasts is 47.16% for the value-weighted regression, whereas it is 9.58% for the equally weighted regression. As expected, t-statistics on the coefficient estimates in these value-weighted regressions are also higher.

The mean estimate (*t*-statistic) of the expected rate of return, also reported in panel B of table 3, is 11.27% (21.20) using analysts' forecasts and 9.67% (13.90) using current accounting data.[27] The untabulated minimum expected rate of return estimated using current accounting data is 6.22% at December 1992. The average of 9.67% yields a more reasonable estimate of the risk premium than the equal-weighted sample: 4.43% using five-year treasuries as a proxy for the risk-free rate. Differences between the estimates of the expected rate of return based on analysts' forecasts and the estimates based on current accounting data (i.e., the measure of ex ante bias) are also reported in the rightmost column of panel B of table 3. The average difference, though smaller in the value-weighted analyses than in the equally weighted analyses (1.60% compared with 2.84%), is still significantly positive (*t*-statistic of 4.90).

6. *Variation in the Implied Expected Rate of Return With Changes in the Percentage of Analysts Making Buy Recommendations*

Having documented a bias in the estimates of the expected rate of return based on analysts' forecasts of earnings, we now examine how the bias varies across analysts' recommendations. It is well known that analysts seldom issue "sell" recommendations. To the extent that our samples examined thus far contain a majority of firms with buy recommendations, the observed positive bias in the expected rate of return using analysts' forecasts simply may be capturing the analysts' expectation of the abnormal returns, which can be earned from these stocks. To examine this notion, we compare estimates of the expected rates of return for stocks where the consensus forecast is comprised of analysts with differing recommendation types.

6.1 SAMPLE DESCRIPTION

I/B/E/S provides data on the percentage of analysts whose forecasts comprise the consensus who also make either a strong buy or a buy recommendation. We repeat the analyses described in section 4.3 for subsamples with various percentages of these types of recommendations. Descriptive statistics are provided in table 4, panel A. The choice of the five partitions of the data is based on a desire to maintain a sufficient number of observations to provide reasonable confidence in the regression output in each year. We restrict the sample to those consensus forecasts which are comprised of at

[27] The mean estimate (*t*-statistic) of the expected rate of return based on perfect foresight forecasts is 10.63% (14.35).

TABLE 4

Variation in the Implied Expected Rate of Return With Changes in the Percentage of Analysts Making a Buy Recommendation – Minimum of Five Analysts Following Firm

Panel A: Descriptive statistics by percentage of buy recommendations

	$90 \le$ % Buy ≤ 100		$70 \le$ % Buy ≤ 90		$50 \le$ % Buy < 70		$30 \le$ % Buy < 50		$0 \le$ % Buy < 30	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Accuracy: $\|FE_{jt+1}\|/p_{jt}$	0.017	0.008	0.017	0.008	0.019	0.008	0.026	0.010	0.041	0.011
Bias: FE_{jt+1}/p_{jt}	−0.010	−0.004	−0.009	−0.003	−0.010	−0.003	−0.016	−0.004	−0.027	−0.004
$eps^{Cons}_{jt+1}/bps_{jt}$	0.140	0.157	0.164	0.162	0.159	0.153	0.134	0.131	0.108	0.112
eps_{jt}/bps_{jt-1}	0.125	0.150	0.152	0.151	0.143	0.140	0.120	0.120	0.091	0.101
p'_{jt}/bps_{jt}	3.860	3.011	3.435	2.686	2.848	2.305	2.371	1.921	2.029	1.649
$(p'_{jt} - bps^*_{jt})/bps_{jt-1}$	3.649	2.313	2.844	1.948	2.005	1.438	1.485	1.016	1.032	0.704
N	135		227		263		176		154	

Panel B: Summary of results of estimation by percentage of buy recommendations

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression: $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data			
Recommendation	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$
$90 \le$ % Buy ≤ 100	135	0.100	0.012	7.90%	11.20%	0.109	0.012	18.18%	10.94%
		(7.93)	(3.32)		(9.93)	(5.12)	(1.46)		(5.12)
$70 \le$ % Buy ≤ 90	227	0.098	0.021	16.82%	11.84%	0.102	0.020	17.42%	10.22%
		(9.87)	(7.73)		(14.29)	(10.23)	(5.88)		(10.23)
$50 \le$ % Buy < 70	263	0.080	0.029	34.28%	10.82%	0.028	0.028	30.29%	8.90%
		(13.67)	(12.69)		(20.84)	(10.96)	(10.96)		(18.09)
$30 \le$ % Buy < 50	176	0.060	0.031	28.31%	9.18%	0.033	0.033	26.85%	7.23%
		(7.04)	(6.80)		(16.25)	(8.38)	(8.38)		(13.25)
$0 \le$ % Buy < 30	154	0.032	0.037	32.00%	6.86%	0.044	0.044	30.09%	4.60%
		(3.13)	(9.60)		(8.85)	(5.60)	(9.67)		(5.60)

(Continued)

TABLE 4 — *Continued*

Panel C: Mean differences in (*t*-statistics for) estimates of expected rate of return

		Estimates based on analysts' consensus earnings forecasts					Estimates based on current accounting data			
		$90 \le \% \le 100$	$70 \le \% \le 90$	$50 \le \% < 70$	$30 \le \% < 50$	$0 \le \% < 30$	$90 \le \% \le 100$	$70 \le \% \le 90$	$50 \le \% < 70$	$30 \le \% < 50$
Estimates based on analysts' consensus earnings forecasts	$70 \le \% \le 90$	−0.64%								
		(−0.79)								
	$50 \le \% < 70$	0.38%	1.02%							
		(0.50)	(2.11)							
	$30 \le \% < 50$	2.02%	2.66%	1.64%						
		(2.50)	(4.76)	(3.96)						
	$0 \le \% < 30$	4.34%	4.97%	3.96%	2.31%					
		(5.46)	(9.01)	(8.90)	(5.04)					
Estimates based on current accounting data	$90 \le \% \le 100$	0.26%								
		(0.15)								
	$70 \le \% \le 90$		1.61%				0.72%			
			(3.14)				(0.30)			
	$50 \le \% < 70$			1.92%			2.04%	1.32%		
				(5.04)			(1.03)	(1.81)		
	$30 \le \% < 50$				1.95%		3.72%	3.00%	1.68%	
					(6.38)		(1.82)	(4.77)	(3.96)	
	$0 \le \% < 30$					2.27%	6.35%	5.63%	4.31%	2.63%
						(7.15)	(3.15)	(8.25)	(7.40)	(5.29)

Using the median consensus analysts' forecast and the percentage of buy recommendations from the summary I/B/E/S database, we estimate the expected rate of return by percentage of buy recommendations for all firms with at least five analysts included in the consensus. Panel A reports descriptive statistics by percentage of buy recommendations. The variables are as defined in the notes to table 1. Panel B reports the results of estimating regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data cross-sectionally using all available observations of that percentage of buy recommendations. Within the percentage of buy recommendations, observations with any of the dependent or independent variables in the top and bottom 2% of observations are removed to reduce the effects of outliers. The reported numbers are the summary means across the annual regressions and the related Fama and Macbeth [1973] *t*-statistics. The last column for each regression in panel B reports the annual estimates of expected rate of return by percentage of buy recommendations. Panel C reports summary means of the differences in estimates across the annual regressions and the related Fama and Macbeth [1973] *t*-statistics. t is the reference date around which all variables are identified. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is the actual earnings per share for year t+1 as reported by I/B/E/S less the first median consensus forecast of earnings per share for year t+1 released at least 14 days after the announcement of year t earnings. p_{jt} is the price per share as of the end of the fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year t+1 released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time $t+\tau$ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

least five analysts so that it is possible for a firm to appear in any of the partitions.[28]

The mean and median forecast error is always negative; that is, analysts are optimistic, regardless of the percentage of buy recommendations in the consensus. For example, the median deflated forecast error is −0.004 when the percentage of buy recommendations is greater than 90%, between 30% and 50%, and less than 30%.

Both the return-on-equity and the price-to-book ratio tend to be higher for the observations where there are more buy recommendations comprising the consensus. For example, the median forecasted return-on-equity for the subsamples where greater than 90% of the analysts recommend buy and where between 70% and 90% recommend buy is 0.157 and 0.162, respectively, while the median forecasted return-on-equity for the subsample where less than 30% of the analysts recommend buy is 0.112. The median price-to-book ratio for the subsamples where greater that 90% of the analysts recommend buy and where between 70% and 90% recommend buy is 3.011 and 2.686, respectively, while the median price-to-book ratio for the subsamples where less than 30% of the analysts recommend buy is 1.649.

6.2 ESTIMATES OF IMPLIED EXPECTED RATES OF RETURN

The results from the estimation of regression (4) based on price, I/B/E/S forecasts of earnings, and current book value and from the estimation of regression (5) based on price and current accounting data and are summarized in table 4, panel B. We focus our discussion on the estimates of the implied expected rates of return obtained from these regression parameters. These estimates are also included in panel B.

The estimates of the expected rates of return implied by I/B/E/S analysts' forecasts decline almost monotonically with the percentage of buy recommendations associated with the forecasts of earnings comprising the consensus; the means of these estimates are 11.20%, 11.84%, 10.82%, 9.18%, and 6.86%. The estimates of the expected rates of return based on prices and current accounting data show a pattern that is very similar to that of those based on analysts' forecasts. The mean estimates of the expected rate of return for each of the groups of data decline monotonically with the percentage of buy recommendations associated with the forecasts of earnings comprising the consensus; the means of these estimates are 10.94%, 10.22%, 8.90%, 7.23%, and 4.60%. This suggests that analysts' recommendations are consistent with the implied expectations of raw rates of return; they do not appear to be based on expectations of abnormal returns.

Differences between the estimates of expected rate of return based on percentage of buy recommendations are included in table 4, panel C. Comparing the expected rates of return based on prices and current accounting

[28] Our findings and conclusions are unchanged when firms with consensus forecasts comprised of less than five analysts are included.

data with the estimates based on analysts' forecasts reveals that even when the analysts are not recommending to buy their forecasts imply a rate of return that is higher than expectations based on current accounting data; these mean differences between the estimates based on analysts' forecasts and estimates based on current accounting data are 0.26%, 1.61%, 1.92%, 1.95%, and 2.27%. Four of these differences are significant. This pervasive optimism in the expected return measured by comparing analysts' return expectations with return expectations based on current accounting data is quite similar to the pervasive optimism observed when comparing expectations of future earnings with actual realizations of earnings (see table 4, panel A).

6.3 SUMMARY

To summarize the analyses in this section, we observe that analysts' recommendations are consistent with their expectations of raw returns; that is, there is a monotonic decrease in expected rate of return as the percentage of buy recommendations declines.[29] Expected rates of return based on analysts' earnings forecasts are higher than expectations based on current accounting data regardless of the analysts' recommendation. An interpretation of this result is that analysts are most-often optimistic, even when they are not issuing buy recommendations.[30] The bias in expected rates of return based on analysts' forecasts is not the result of analysts' expectations of positive abnormal returns isolated in firms with buy or strong buy recommendations. Analysis using subsamples based on recommendations provides further evidence that variations in optimism in analysts' forecasts result in variation in levels of bias in estimates of expected rates of return. Again this suggests that researchers should be cautious when using analysts' forecasts to estimate expected rates of return; differing levels of bias could lead to spurious results and incorrect conclusions.

7. *Summary and Conclusions*

We show that, on average, the difference between the estimate of the expected rate of return based on analysts' earnings forecasts and the estimate of based on current earnings realizations is 2.84%. When estimates of the expected rate of return in the extant literature are adjusted to remove the effect of optimistic bias in analysts' forecasts, the equally weighted estimate of the equity risk premium appears to be close to zero. We show, however, when

[29] Our analysis in section 6 employs equal-weighting because the context examines average effects of bias with differing recommendations. Though answering a somewhat different research question, value-weighted analyses similar to those in section 5 reveal that the expected rate of return monotonically decreases as the percentage of "buy" recommendations declines.

[30] This result is consistent with Barber et al. [2001], who show that analysts' recommendations (in their case, those summarized in the Zach's database) cannot be used to form profitable trading strategies.

estimates are based on value-weighted analyses, the bias in the estimate of the expected rate of return is lower and the estimate of the expected equity premium is more reasonable, 4.43%.

Results from subsamples formed on the basis of percentage of analysts comprising the consensus recommending buy show that the estimate of the expected rate of return, based on both analysts' forecasts of earnings and on current earnings, declines monotonically as the percentage of analysts recommending buy declines. A comparison of the estimates of the expected rate of return based on the analysts' forecasts, with estimates based on earnings realizations, suggests that analysts tend to be more optimistic than the market even when they are not making buy recommendations. That is, analysts recommend buy when they expect the future raw return to be high and sell when they expect the return to be low regardless of market expectations.

Our paper has two key implications for future research which uses market price, book value of equity, and accounting earnings to obtain estimates of the implied expected rate of return for a portfolio of stocks. First, since analysts' forecasts are pervasively (though not uniformly) optimistic, estimates of the implied expected rate of return formed using forecasts are pervasively and significantly upward biased. Since all observations are not equally affected by the bias (due to varying degrees of optimism), variation in the estimates of the implied expected rates of return may be partially caused by bias and not by the factors that are the focus of the research question. Bias may be avoided by estimating the rate of return implied by price, book values, and *realized* earnings rather than biased earnings *forecasts*.

Second, value-weighted analyses may be more appropriate in addressing certain issues such as estimating the equity premium, than equal-weighted analyses. The value-weighted analyses may provide more realistic estimates of the expected rate of return than are implied by equally weighted analyses, which may be unnecessarily affected by less representative observations, such as penny stocks, and stocks making losses.

When coupled with results from the papers that demonstrate the troublesome effects of measurement error in firm-specific estimates of the expected rate of return, the results in this study suggest that the extant measures of implied expected rate of return should be used with considerable caution. The challenge is to find means of reducing the measurement error and to mitigate the effects of bias. Easton and Monahan [2005] suggest focusing on subsamples where the measurement error is likely to be small. Our paper suggests that methods based on realized earnings rather than earnings forecasts avoid the effects of bias in analysts' forecasts. Another possible avenue may be to attempt to undo the bias, following, for example, the ideas in Frankel and Lee [1998].

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Queries

Q1 Author: Short running title okay as added?

Q2 Author: Gebhardt, Lee, and Swaminathan [1999] is not in the reference list. Please provide this reference or advise if this should be changed to Gebhardt, Lee, and Swaminathan [2001] to match the reference currently in the list.

Q3 Author: Gebhardt, Lee, and Swaminathan [1999] is not in the reference list. Please provide this reference or advise if this should be changed to Gebhardt, Lee, and Swaminathan [2001] to match the reference currently in the list.

Q4 Author: Author name spelled Sivaramakrishnan here is spelled as Sivaramankrishnan in the reference list. Please indicate which of these two spelling is correct.

Q5 Author: Please confirm if PE is defined okay as price earning in footnote 22, or revise.

Q6 Author: For reference Boni and Womack [2002], please provide additional details: volume and page numbers if this is a periodical. If this is a document of the Wharton Financial Institutions Center then please identify as such and provide the location of this organization.

Q7 Author: Easton [2006] is not cited within the text. Please indicate where you would like this reference to be cited or delete from reference list.

Q8 Author: Kutsoati and Bernhardt [1999] is not cited within the text. Please indicate where you would like this reference to be cited or delete from reference list.

Hydro One Inc.
Nov 2023 DBRS

Rating Report
Hydro One Inc.

DBRS Morningstar
November 20, 2023

Contents

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Ratings

Debt	Rating	Rating Action	Trend
Issuer Rating	A (high)	Confirmed	Stable
Senior Unsecured Debentures	A (high)	Confirmed	Stable
Commercial Paper	R-1 (low)	Confirmed	Stable

Rating Update

On November 2, 2023, DBRS Limited (DBRS Morningstar) confirmed Hydro One Inc.'s (HOI or the Company) Issuer Rating and Senior Unsecured Debentures rating at A (high), and the Commercial Paper (CP) rating at R-1 (low). All trends are Stable. The credit ratings of HOI are based on its regulated electricity distribution and transmission operations in the Province of Ontario (the Province or Ontario; 47.1%; rated AA (low) with a Positive trend by DBRS Morningstar), which operates under a reasonable regulatory framework by the Ontario Energy Board (OEB). The Stable trends reflect the Company's financial risk assessment, with all key credit metrics in line with the "A" credit rating category.

In November 2022, the OEB approved HOI's first Joint Rate Application (JRAP) for 2023 to 2027 transmission revenue requirement and distribution rates. The approved settlement agreement, which was largely based on a continuation of the previous Custom Incentive Rate-making (IR) framework, provides the Company with certainty of funding for its substantial capital expenditures (capex) program over the next five years. DBRS Morningstar notes that the Province has since directed HOI to develop additional transmission projects, such as the $1.2 billion Waasigan Transmission Line. As such, annual capex over the next five years is expected to average over $2.7 billion, up from $2.1 billion in 2022.

While HOI's financial risk assessment remains reasonable, the Company's key credit metrics may see pressure over the next few years because of the large capex spend. DBRS Morningstar expects HOI to manage its capex and dividend requirements through a prudent mix of debt issuances and operating cash flows in order to maintain leverage in line with the regulatory capital structure and other key ratios within the "A" credit rating category. However, a negative credit rating action may occur should key metrics weaken to a level that no longer supports the current credit ratings (i.e. debt-to-capital above 60% and cash flow-to-debt below 12.5% for a sustained period).

Financial Information

	12 mos. ended June 30	For the year ended December 31				
	2023	**2022**	**2021**	**2020**	**2019**	**2018**
Cash flow/total debt (%)[1]	14.1	14.5	13.8	12.7	13.7	13.0
Total debt in capital structure (%)[1, 2]	55.6	55.8	55.9	56.1	56.6	56.7
EBIT gross interest coverage (times)[1]	3.13	3.41	3.24	3.05	2.96	2.87

1 Adjusted for operating leases.
2 Adjusted for accumulated other comprehensive income.

Issuer Description

HOI is a fully owned subsidiary of Hydro One Limited (HOL; rated "A" with a Stable trend by DBRS Morningstar) and is the largest electricity transmission and distribution company in Ontario. The Company owns and operates around 30,000 circuit kilometres (km) of high-voltage transmission lines and approximately 125,000 circuit km of low-voltage distribution lines, serving around 1.5 million customers.

Rating Considerations

Strengths

1. Reasonable regulatory environment

HOI’s earnings are contributed by its low-risk regulated transmission and distribution businesses that operate under a reasonable regulatory framework. The regulatory regime under the OEB permits the Company a reasonable opportunity to recover operating and capital costs and earn the approved rates of return. HOI's deemed capital structure (debt-to-equity of 60%:40%) has remained unchanged for several years. DBRS Morningstar views the utility regulatory framework in Ontario as transparent and supportive for regulated transmission and distribution operators.

2. Extensive franchise area

HOI owns the largest transmission and distribution businesses in Ontario. The Company operates approximately 95% of the Province's transmission infrastructure, based on revenues approved by the OEB, and is connected to 35 local distribution companies (including HOI’s own distribution business) and 85 large, directly connected industrial customers. The Company’s transmission system is also interconnected to systems in Manitoba, Michigan, Minnesota, New York, and Québec through interties. Load growth is expected to be modest and in line with economic growth in the Province. The distribution business serves around 1.5 million customers, or approximately 28% of the Province's customers.

3. Reasonable financial profile

HOI continues to maintain a reasonably healthy balance sheet, with all key credit metrics reasonable for the current rating category (debt-to-capital ratio at 55.6%, cash flow-to-debt at 14.1%, and EBIT interest coverage at 3.13 times (x) for the 12 months ended June 30, 2023 (LTM 2023)).

Challenges

1. High level of planned capex

The Company has a large capital program that is expected to continue over the next several years and could pressure credit metrics. Capex was approximately $2.1 billion for 2022 (approximately $1,209 million for transmission and approximately $889 million for distribution), with a plan for approximately $13.7 billion in the next five years. A major part of HOI's capital program is for the essential replacement of aging infrastructure to maintain the reliability of aging transmission and distribution assets.

2. High dividend payouts

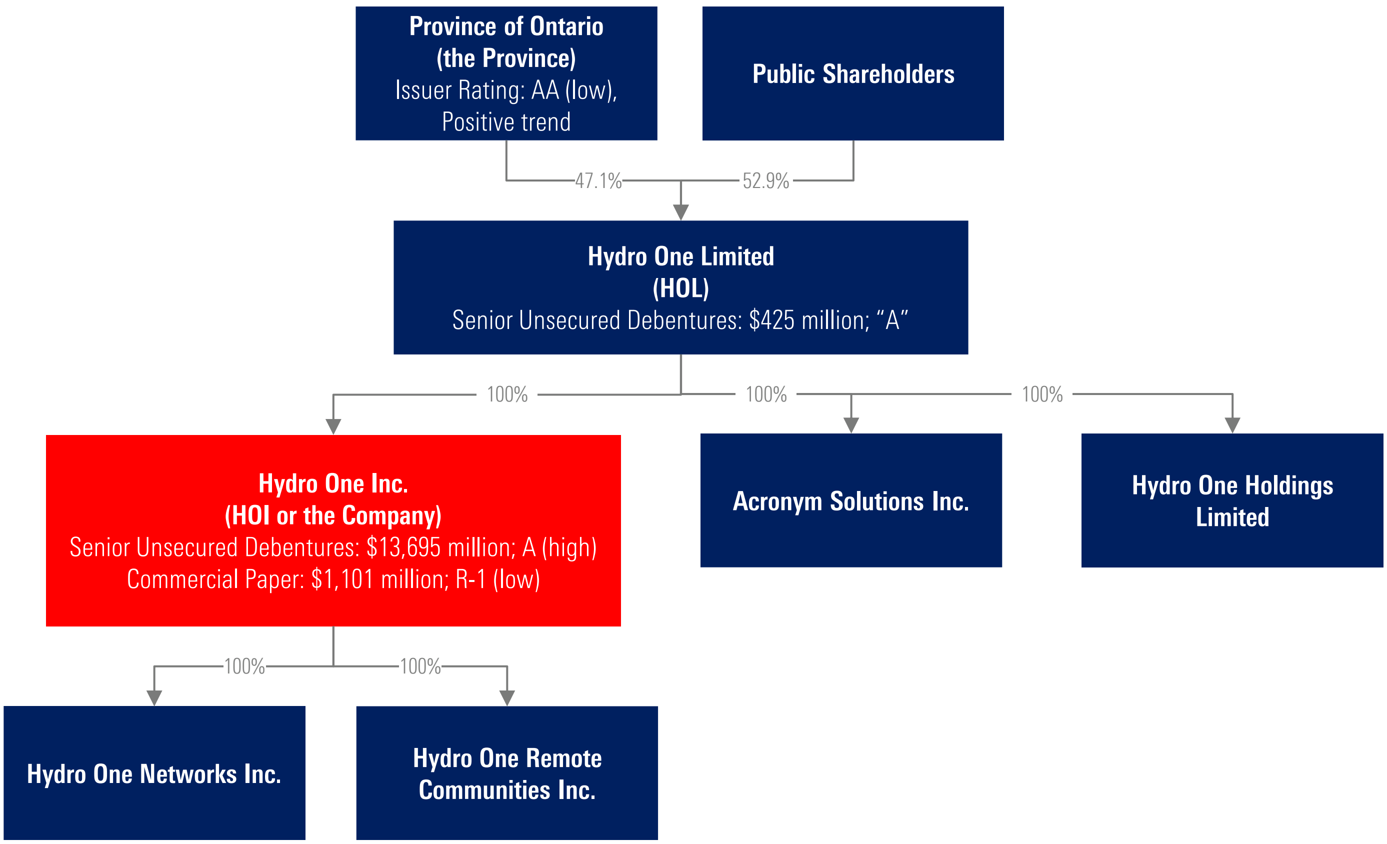
HOI's dividend payout ratio (dividends relative to net earnings) is high in order to support HOL's dividend policy (payout approximately 70% to 80% of consolidated net income). DBRS Morningstar expects the Company's dividend payout ratio to remain high in order to meet HOL's dividend objectives; consequently, HOI will provide significant funding to finance the sizable free cash flow deficits because of the dividends and capex commitments expected over the medium term.

3. Earnings sensitive to volume and costs

HOI's earnings can be affected by weather patterns, seasonality, and economic conditions. The OEB approves the Company's transmission and distribution rates based on forecast electricity load and consumption levels. Cooler summers and warmer winters could reduce demand for electricity below forecast levels and negatively affect revenues. Furthermore, current revenue requirements are approved based on cost assumptions that could materially differ from actual costs. There is no assurance that the OEB would allow rate increases to offset the financial impacts of unanticipated changes in electricity demand or in costs. However, this risk is expected to be partially mitigated as the OEB has implemented a fixed monthly distribution charge for residential customers, and HOI is currently phasing in a fixed monthly rate for most of its residential customers by 2024. However, some seasonality will remain because a major part of the Company's earnings is generated from transmission revenues.

Ownership Structure

Simplified Organizational Structure



As at June 30, 2023.
Source: HOL.

- HOI is 100% owned by HOL, which is in turn 47.1% owned by the Province, with the remainder held by public shareholders.
- HOI's major subsidiaries include two regulated utilities, Hydro One Networks Inc. (HONI) and Hydro One Remote Communities Inc. (Remotes).
  - HONI carries out the rate-regulated transmission and distribution businesses.
  - Remotes generates and supplies electricity to remote communities in Northern Ontario. This segment is 100% debt financed and operates as a breakeven company with no return on equity (ROE).
- HOI also owns Hydro One Sault Ste. Marie Limited Partnership (HOSSM), Bruce to Milton Limited Partnership (B2M LP), and Niagara Reinforcement Limited Partnership (NRLP).
  - HOSSM owns transmission infrastructure in the East Lake Superior area.
  - HOI has a 66% interest in B2M LP, which operates a transmission line that runs from the Bruce Nuclear Generation Station to HOI's Milton Switching Station.
  - HOI has a 55% interest in NRLP, which operates a transmission line in the Niagara area.
- Acronym Solutions Inc. carries out a nonregulated telecommunications business.

Earnings and Outlook

	12 mos. ended June 30	For the year ended December 31				
(CAD millions where applicable)	**2023**	**2022**	**2021**	**2020**	**2019**	**2018**
Net revenues	4,117	4,016	3,606	3,396	3,331	3,211
EBITDA	2,677	2,655	2,433	2,311	2,239	2,066
EBIT	1,805	1,794	1,619	1,536	1,469	1,326
Gross interest expense	577	526	500	503	497	461
Net income before nonrecurring items	1,006	1,026	986	971	952	854
Reported net income	1,041	1,057	972	1,792	952	(31)
ROE (%)	8.6	8.9	8.9	9.4	9.7	8.3
Segmented Reported EBIT						
Transmission	1,136	1,107	927	878	823	829
Distribution	729	744	688	613	653	520
Other	(21)	(18)	(3)	(5)	(7)	(23)
Total EBIT	**1,844**	**1,833**	**1,612**	**1,486**	**1,469**	**1,326**
Transmission rate base[1]		14,450	13,745	13,185	12,609	11,870
Approved ROE—transmission (%)[2]		8.52	8.52	8.52	9.00	9.00
Actual ROE—transmission (%)[2]		N/A	N/A	9.29	9.53	11.08
Distribution rate base		9,155	8,854	8,505	8,101	7,852
Approved ROE—distribution (%)		9.00	9.00	9.00	9.00	9.00
Actual ROE—distribution (%)		10.10	10.99	10.48	10.85	8.06

1 Includes HONI, B2M LP, and HOSSM.
2 HONI only.

2022 Summary

- HOI's earnings are relatively stable, supported by a reasonable regulatory environment, extensive franchise area, and a diverse customer base that is growing at a steady rate.
- Earnings increased in 2022 largely because of OEB-approved rate increases for the year. This was partly offset by higher operating, maintenance, and administrative (OM&A) costs because of higher work program expenditures, and higher depreciation from the growing rate base.

2023 Summary and Outlook

- EBITDA and EBIT continued to increase for LTM 2023 following the OEB's approval of HOI's JRAP for 2023 to 2027 transmission revenue requirements and distribution rates.
- Net income before nonrecurring items decreased modestly because of higher OM&A and depreciation, and higher interest expense from the increased debt load and higher interest rates.
- Overall, DBRS Morningstar expects HOI's earnings to be relatively stable for 2023.

Financial Profile

	12 mos. ended June 30	For the year ended December 31				
(CAD millions where applicable)	**2023**	**2022**	**2021**	**2020**	**2019**	**2018**
Net income before nonrecurring items	1,006	1,026	986	971	952	854
Depreciation & amortization	833	822	806	775	770	740
Deferred income taxes and other	255	299	177	24	18	25
Cash flow from operations	**2,094**	**2,147**	**1,969**	**1,770**	**1,740**	**1,619**
Dividends[1]	(671)	(652)	(620)	(608)	(751)	(559)
Capex	(2,092)	(2,050)	(2,036)	(1,835)	(1,622)	(1,524)
Free cash flow (bef. working cap. changes)	**(669)**	**(555)**	**(687)**	**(673)**	**(633)**	**(464)**
Changes in noncash working capital	39	(6)	69	159	27	(50)
Changes in regulatory assets	(2)	44	70	68	(48)	35
Net free cash flow	**(632)**	**(517)**	**(548)**	**(446)**	**(654)**	**(479)**
Acquisitions & long-term investments	0	0	0	(126)	0	0
Net equity change	0	0	0	0	(486)	0
Net debt change[1]	696	482	341	1,284	661	970
Other	(78)	(6)	(6)	(7)	(6)	1
Change in cash	**618**	**(41)**	**(213)**	**705**	**(485)**	**492**
Total debt	14,859	14,766	14,297	13,984	12,692	12,447
Cash flow/total debt (%)[2]	14.1	14.5	13.8	12.7	13.7	13.0
Total debt in capital structure (%)[2, 3]	55.6	55.8	55.9	56.1	56.6	56.7
EBIT gross interest coverage (x)[2]	3.13	3.41	3.24	3.05	2.96	2.87
Dividend payout ratio (%)	66.7	63.5	62.9	62.6	78.9	65.5

1 Includes preferred shares of $486 million in 2017 that DBRS Morningstar has treated as debt because the shares were redeemed in 2019.
2 Adjusted for operating leases.
3 Adjusted for accumulated other comprehensive income.

2022 Summary

- HOI's key credit metrics improved modestly in 2022.
    - The Company's cash flow-to-debt ratio increased because of stronger cash flows for the year, which were partially due to the benefit from the OEB decision on the deferred tax asset. This resulted in an increase of approximately $135 million for the recovery of previously shared deferred tax amounts.
    - The OEB decision also required adjusting the transmission revenue requirement and distribution rates for the year to eliminate any further tax savings flowing to customers, resulting in a $50 million increase to cash flows for 2022; this amount will decline over time.
    - Overall, HOI's key credit metrics remained supportive of the current ratings.
- Capex increased as HOI continued investing in maintaining and reinforcing the grid.
- Dividends maintained the regulatory capital structure broadly in line with the regulatory construct.
- The Company used cash on hand as well as net proceeds from $750 million of long-term debt issuances to repay maturing long- and short-term debt, and to fund the capex program.

2023 Summary and Outlook

- HOI's key credit metrics weakened moderately in LTM 2023.
  - Cash flow from operations decreased modestly, tracking the lower net income for the period.
- Overall, DBRS Morningstar expects HOI's credit metrics to remain in line with the "A" rating category.
- Cash flow is expected to be lower partly because the recovery of previously shared deferred tax amounts ended effective June 30, 2023.
- HOI has forecast capex of $2.6 billion for the year ($1.1 billion spent as of June 30, 2023), with the majority for sustainment projects.
- DBRS Morningstar expects the Company to support HOL's dividend policy (annual dividends of approximately 70% to 80% of consolidated net income) to the extent that such dividend payouts maintain HOI's regulatory capital structure. Consequently, DBRS Morningstar expects dividends to remain high.

Debt and Liquidity

Long-Term Debt Maturities

(CAD millions—as at December 31, 2022)	2023	2024	2025	2026	2027	Thereafter	Total
Principal repayments	731	700	750	500	0	10,695	**13,376**
% of total	5	5	6	4	0	80	**100**

- HOI's refinancing risk remains manageable with maturities well spread out.
- HOI has adequate access to debt markets and access to the equity market through its parent, HOL.
  - In October 2022, the Company issued $750 million under its Medium-Term Notes program, the proceeds of which were used to repay and prepay maturing long- and short-term debt, and to fund the capex program.
  - In 2023, the Company has issued $1,875 million under its Medium-Term Notes program and its Sustainable Financing Framework, the proceeds of which were used to finance and/or refinance Eligible Projects.
- HOI has credit covenants limiting the permissible debt to 75% of its total capitalization and limiting the ability to sell assets and impose negative pledge provisions, subject to customary exceptions. As of June 30, 2023, the Company was in compliance with all of the covenants and limitations.

Liquidity

(CAD millions—as at June 30, 2023)	Amount	Draw	Available	Maturity
Cash and cash equivalents	0	-	**0**	
Revolving standby credit facility	2,300	1,101	**1,199**	June 2028
Total	**2,300**	**1,101**	**1,199**	

- The Company's liquidity profile remains reasonable and adequate for its normal operating requirements.
- HOI has a revolving credit facility of $2.3 billion, maturing in June 2028. The CP program is backstopped by the revolving credit facility. As of June 30, 2023, approximately $1,101 million of CP was outstanding.

Major Projects and Acquisitions

Project	Estimated Cost (CAD millions)	Spent as of June 30, 2023 (CAD millions)	In-Service Target Date
Barrie Area Transmission Upgrade	125	76	2023
Beck #2 Transmission Station Circuit Breaker Replacement	135	118	2023
Cherrywood Transmission Station Circuit Breaker Replacement	115	95	2023
East-West Tie Station Expansion	191	185	2024
Bruce B Switching Station Circuit Breaker Replacement	185	169	2024
Chatham to Lakeshore Transmission Line	268	104	2025
Middleport Transmission Station Circuit Breaker Replacement	184	128	2025
Islington Transmission Station	109	3	2025
Lennox Transmission Station Circuit Breaker Replacement	152	122	2026
Esplanade x Terauley Underground Cable Replacement	117	26	2026
Waasigan Transmission Line	1,200	50	2027
Bruce A Transmission Station Switchyard Replacement	555	24	2027

- Most of HOI's capex is for capital sustainment purposes (62% expected for 2023).
- Development projects include the Barrie Area Transmission Upgrade, the East-West Tie Station Expansion, the Chatham to Lakeshore Transmission Line, and the Waasigan Transmission Line, which will be completed in two phases (phase one expected to be in-service by the end of 2025).

Regulation

Regulation Overview

- HOI is regulated by the OEB and operates under a supportive regulatory environment. The Company has a good track record of prudently managing its regulatory risk.
- Both of HONI’s transmission and distribution businesses operate under Custom IR.
    - The Custom IR framework is a hybrid between cost of service (COS) and an incentive rate mechanism (IRM). The rate setting for the term is based on the Company’s forecasts and the OEB’s incentive rate analysis using productivity benchmarking.
    - Custom IR is suited to utilities with large, broad, multiyear investment needs that require certainty of funding several years in advance.
- In July 2020, the Ontario Divisional Court set aside the OEB's decision that the deferred tax asset that resulted from the transition from the payments in lieu of the tax program to the federal and provincial tax regimes should be shared with ratepayers. The Ontario Divisional Court agreed with the Company that the deferred tax asset should have been allocated entirely to shareholders.
    - Following the decision, HOI reversed the $867 million impairment it had recorded in 2018.
    - In April 2021, the OEB approved the recovery of tax savings misallocated to ratepayers and included in rates for the 2017 to 2021 period, plus carrying charges, over a two-year period beginning July 1, 2021. The OEB also acknowledged that no future tax savings from the sale of HOL shares should be allocated to ratepayers.
    - The recovery led to an increase in the Company's cash flows of $65 million in 2021, $135 million in 2022, and $65 million in 2023.

    - The elimination of future tax savings flowing to customers is also expected to increase HOI's cash flows by $46 million in 2023, but will decline over time.
- In November 2022, the OEB approved HONI's first JRAP for 2023 to 2027 revenue requirements for its transmission and rates for its distribution businesses.
    - The revenue requirement and rate base for the transmission and distribution businesses will continue to remain separate and be recovered through separate rates.
    - The application was based on a Custom IR approach, where the revenue requirements for 2023 are based on COS while subsequent years will increase by a revenue cap index (RCI) based on inflation, productivity (0.15% for transmission and 0.45% for distribution), and custom capital factors (including stretch of 0.20% for both transmission and distribution).
    - Deemed capital structure of 60% debt (56% long term and 4% short term) and 40% equity, and ROE of 9.36%.
    - There is an earnings sharing mechanism (ESM) whereby any earnings 100 basis points (bps) above the allowed ROE will be shared 50-50 with customers.
    - The settlement proposal included transmission capex of $6.9 million and distribution capex of $4.9 billion over the five-year term.

	For the year ended December 31				
(CAD millions where applicable)	**2023**	**2024**	**2025**	**2026**	**2027**
HONI transmission rate base	14,534	15,342	16,271	17,148	17,940
HONI distribution rate base	9,460	9,979	10,573	11,153	11,656

Transmission

	For the year ended December 31				
(CAD millions where applicable)	**2022**	**2021**	**2020**	**2019**	**2018**
Transmission rate base[1]	14,450	13,745	13,185	12,609	11,870
Deemed equity (%)	40.00	40.00	40.00	40.00	40.00
Allowed ROE—transmission (HONI) (%)	8.52	8.52	8.52	9.00	9.00
Allowed ROE—transmission (B2M LP) (%)	8.52	8.52	8.52	8.98	9.00
Allowed ROE—transmission (HOSSM) (%)	9.19	9.19	9.19	9.19	9.19
Allowed ROE—transmission (NRLP) (%)	8.52	8.52	8.52	N/A	N/A
Actual ROE—transmission (HONI) (%)	N/A	N/A	9.29	9.53	11.08

1 Includes HONI, B2M LP, and HOSSM.

- In November 2022, the OEB approved HONI's first JRAP for 2023 to 2027 revenue requirements for its transmission and rates for its distribution businesses.
    - For 2023, the OEB approved the revenue requirement of $1,952 million.
    - In September 2023, the OEB approved HONI's 2024 transmission revenue requirement of $2,024 million based on an RCI of 6.52%, with inflation of 5.40%, a productivity and stretch factor of 0.15%, and a capital factor of 1.27%.
- In January 2020, the OEB approved B2M LP’s 2020 to 2024 transmission revenue requirement.

    - For 2021 to 2024, revenue will increase annually by an RCI based on inflation less a Settlement Capital Adjustment Factor (SCAF) of 0.6%.
    - The application also includes an ESM that allows customers to share 50% of earnings that exceed the regulatory ROE by more than 100 bps in any year.
    - In September 2023, the OEB approved B2M LP's 2024 revenue requirement of $36.4 million based on an RCI of 4.80% (inflation of 5.4% less a SCAF of 0.6%).
- HOSSM currently operates under a 10-year deferred rebasing period until 2026. Rates are adjusted annually by an RCI based on inflation less a productivity and stretch factor.
    - In October 2023, the OEB approved HOSSM's 2024 revenue requirement of $43.1 million based on an RCI of 5.1% (inflation of 5.4% less a stretch factor of 0.3%).
- In April 2020, the OEB approved NRLP's 2020 to 2024 transmission revenue requirement.
    - For 2021 to 2024, revenue will increase annually by an RCI based on 50% of inflation less a SCAF of 0.6%.
    - The application also includes an ESM that allows customers to share 50% of earnings that exceed the regulatory ROE by more than 100 bps in any year.
    - In September 2023, the OEB approved NRLP's 2023 revenue requirement of $8.6 million based on an RCI of 2.1% (50% of inflation at 2.7% less a SCAF factor of 0.6%).

Distribution

	For the year ended December 31				
(CAD millions where applicable)	**2022**	**2021**	**2020**	**2019**	**2018**
Distribution rate base	9,155	8,854	8,505	8,101	7,852
Deemed equity (%)	40.00	40.00	40.00	40.00	40.00
Allowed ROE—distribution (%)	9.00	9.00	9.00	9.00	9.00
Actual ROE—distribution (%)	10.10	10.99	10.48	10.85	8.06

- In November 2022, the OEB approved HONI's first JRAP for 2023 to 2027 revenue requirements for its transmission and rates for its distribution businesses.
    - For 2023, the OEB approved the revenue requirement of $1,727 million.
    - For 2024, HONI has applied for distribution revenue requirement of $1,776 million based on an RCI of 5.36%, with inflation of 4.80%, a productivity and stretch factor of 0.45%, and a custom capital factor of 1.01%.

Assessment of Regulatory Framework

Criteria	Score	Analysis
1. Deemed Equity	Excellent Good **Satisfactory** Below Average Poor	The OEB allows HOI's transmission and distribution businesses to have a deemed equity of 40%, which has been consistent historically.
2. Allowed ROE	Excellent **Good** Satisfactory Below Average Poor	ROE for the transmission and distribution businesses are set at 9.36% for 2023 to 2027.
3. Energy Cost Recovery	**Excellent** Good Satisfactory Below Average Poor	There is no power price risk as HOI is not responsible for purchasing power from generation facilities or the wholesale market. Power costs are passed on to ratepayers, and HOI collects the payments from its customers on a monthly basis.
4. Capital and Operating Cost Recovery	Excellent **Good** Satisfactory Below Average Poor	Major capital costs are preapproved by the OEB and added to the rate base after project completion. In addition, the OEB can approve rate riders to allow for the recovery or disposition of specific regulatory accounts over specified time frames.
5. COS versus IRM	Excellent **Good** Satisfactory Below Average Poor	HONI's transmission and distribution businesses operate under Custom IR for 2023 to 2027.
6. Political Interference	Excellent Good Satisfactory **Below Average** Poor	The government of Ontario plays a significant role in the electricity sector in Ontario, given that the majority of the utilities are government owned (HOL is 47.1% owned by the Province). Furthermore, stakeholders, such as the Independent Electricity System Operator, are also government owned. As a result, the government has direct and indirect influence on Ontario's electricity industry.
7. Stranded Cost Recovery	Excellent **Good** Satisfactory Below Average Poor	HOI has a limited history of stranded costs. All prudently incurred or budgeted capex are approved by the OEB.
8. Rate Freeze	Excellent Good **Satisfactory** Below Average Poor	From 2002 to 2005, because of rising rates during Ontario's experimental utility deregulation phase, a distribution rate freeze was imposed. There have been no subsequent provincewide rate freezes.

Environmental, Social, and Governance (ESG) Credit Risk Considerations

Environmental

There were no environmental factors that had a relevant or significant effect on the credit analysis. For more details about which environmental factors could have an effect on the credit analysis, please refer to the following checklist. DBRS Morningstar notes regulated utilities may be exposed to severe weather events. DBRS Morningstar expects any costs associated with these events to be recovered through rates.

Social

There were no social factors that had a relevant or significant effect on the credit analysis. For more details about which social factors could have an effect on the credit analysis, please refer to the following checklist.

Governance

There were no governance factors that had a relevant or significant effect on the credit analysis. For more details about which governance factors could have an effect on the credit analysis, please refer to the following checklist.

A description of how DBRS Morningstar considers ESG factors within the DBRS Morningstar analytical framework can be found in *DBRS Morningstar Criteria: Approach to Environmental, Social, and Governance Risk Factors in Credit Ratings* at www.dbrsmorningstar.com/research/416784.

ESG Factor		ESG Credit Consideration Applicable to the Credit Analysis: Y/N		Extent of the Effect on the ESG Factor on the Credit Analysis: Relevant (R) or Significant (S)*
Environmental		**Overall:**	N	N
	Emissions, Effluents, and Waste	Do we consider that the costs or risks for the issuer or its clients result, or could result, in changes to an issuerÆs financial, operational, and/or reputational standing?	N	N
	Carbon and GHG Costs	Does the issuer face increased regulatory pressure relating to the carbon impact of its or its clients' operations resulting in additional costs and/or will such costs increase over time affecting the long term credit profile?	N	N
	Resource and Energy Management	Does the scarcity of sourcing key resources hinder the production or operations of the issuer, resulting in lower productivity and therefore revenues?	N	N
	Land Impact and Biodiversity	Is there a financial risk to the issuer for failing to effectively manage land conversion, rehabilitation, land impact, or biodiversity activities?	N	N
	Climate and Weather Risks	In the near term, will climate change and adverse weather events potentially disrupt issuer or client operations, causing a negative financial impact? In the long term, will the issuer's or client's business activities and infrastructure be materially affected financially by a 2C rise in temperature?	N	N
Social		**Overall:**	N	N
	Social Impact of Products and Services	Do we consider that the social impact of the issuer's products and services could pose a financial or regulatory risk to the issuer?	N	N
	Human Capital and Human Rights	Is the issuer exposed to staffing risks, such as the scarcity of skilled labour, uncompetitive wages, or frequent labour relations conflicts that could result in a material financial or operational impact?	N	N
		Do violations of rights create a potential liability that can negatively affect the issue's financial wellbeing or reputation?	N	N
		Human Capital and Human Rights	N	N
	Product Governance	Does failure in delivering quality products and services cause damage to customers and expose the issuer to financial and legal liability?	N	N
	Data Privacy and Security	Has misuse or negligence in maintaining private client or stakeholder data resulted, or could it result, in financial penalties or client attrition to the issuer?	N	N
	Occupational Health and Safety	Would the failure to address workplace hazards have a negative financial impact on the issuer?	N	N
	Community Relations	Does engagement, or lack of engagement, with local communities pose a financial or reputational risk to the issuer?	N	N
	Access to Basic Services	Does a failure to provide or protect with respect to essential products or services have the potential to result in any significant negative financial impact on the issuer?	N	N
Governance		**Overall:**	N	N
	Bribery, Corruption, and Political Risks	Do alleged or actual illicit payments pose a financial or reputational risk to the issuer?	N	N
		Are there any political risks that could impact the issuer's financial position or its reputation?	N	N
		Bribery, Corruption, and Political Risks	N	N
	Business Ethics	Do general professional ethics pose a financial or reputational risk to the issuer?	N	N
	Corporate / Transaction Governance	Does the issuer's corporate structure allow for appropriate board and audit independence?	N	N
		Have there been significant governance failures that could negatively affect the issuer's financial wellbeing or reputation?	N	N
		Does the Board and/or management have a formal framework to assess climate-related financial risks to the issuer?	N	N
		Corporate / Transaction Governance	N	N
	Institutional Strength, Governance, and Transparency (Governments Only)	Compared with other governments, do institutional arrangements provide a similar degree of accountability, transparency, and effectiveness?	N	N
		Are regulatory and oversight bodies protected from inappropriate political influence?	N	N
		Are government officials exposed to public scrutiny and held to high ethical standards of conduct?	N	N
		Institutional Strength, Governance, and Transparency (Governments Only)	N	N
		Consolidated ESG Criteria Output:	N	N

Balance Sheet

(CAD millions)	June 30 2023	Dec. 31 2022	Dec. 31 2021		June 30 2023	Dec. 31 2022	Dec. 31 2021
Assets				**Liabilities & Equity**			
Cash and equivalents	0	458	499	Short-term borrowings	1,159	1,374	1,045
Accounts receivable	747	765	697	Accounts payable	1,065	957	855
Inventories	40	24	22	Current portion long-term debt	709	744	615
Other current assets	652	705	678	Other current liabilities	321	533	430
Total Current Assets	**1,439**	**1,952**	**1,896**	**Total Current Liabilities**	**3,254**	**3,608**	**2,945**
Net fixed assets	25,784	25,023	23,801	Long-term debt	12,991	12,648	12,637
Future income tax assets	4	4	10	Deferred income taxes	890	713	367
Goodwill and intangibles	995	978	940	Regulatory liabilities	1,226	1,123	362
Regulatory assets	3,072	2,964	3,561	Provisions and other liabilities	1,534	1,516	2,650
Investments and others	480	369	13	Minority interest	84	86	88
				Common equity	11,795	11,596	11,172
Total Assets	**31,774**	**31,290**	**30,221**	**Total Liabilities and Equity**	**31,774**	**31,290**	**30,221**

Ratios

	12 mos. ended June 30	For the year ended December 31				
Balance Sheet, Liquidity, and Capital Ratios	**2023**	**2022**	**2021**	**2020**	**2019**	**2018**
Current ratio	0.44	0.54	0.64	0.69	0.43	0.51
Cash flow/total debt (%)	14.1	14.5	13.8	12.7	13.7	13.0
Cash flow/total debt (%)[1]	14.1	14.5	13.8	12.7	13.7	13.0
Total debt in capital structure (%)	55.6	55.8	55.9	56.1	56.6	56.7
Total debt in capital structure (%)[1, 2]	55.6	55.8	55.9	56.1	56.6	56.7
(Cash flow-dividends)/capex (x)	14.1	14.5	13.8	12.7	13.7	13.0
Dividend payout ratio (%)	0.68	0.73	0.66	0.63	0.61	0.70
Coverage Ratios (x)	66.7	63.5	62.9	62.6	78.9	65.5
EBIT gross interest coverage						
EBIT gross interest coverage[1]	3.13	3.41	3.24	3.05	2.96	2.87
EBITDA gross interest coverage	3.13	3.41	3.24	3.05	2.96	2.87
Fixed-charge coverage	4.64	5.05	4.87	4.59	4.51	4.48
Profitability Ratios	3.13	3.41	3.24	3.05	2.96	2.87
EBITDA margin (%)						
EBIT margin (%)	65.0	66.1	67.5	68.1	67.2	64.3
Profit margin (%)	43.8	44.7	44.9	45.2	44.1	41.3
ROE (%)	24.4	25.6	27.3	28.6	28.6	26.6
Return on capital (%)	8.6	8.9	8.9	9.4	9.7	8.3

1 Adjusted for operating leases.
2 Adjusted for accumulated other comprehensive income.

Rating History

	Current	2022	2021	2020	2019	2018
Issuer Rating	A (high)	A (high)	A (high)	A (high)	A (high)	A (high)
Senior Unsecured Debentures	A (high)	A (high)	A (high)	A (high)	A (high)	A (high)
Commercial Paper	R-1 (low)	R-1 (low)	R-1 (low)	R-1 (low)	R-1 (low)	R-1 (low)

Commercial Paper Limit

- $2.3 billion.

Related Research

- "DBRS Morningstar Confirms Ratings of Hydro One Limited at 'A,' Stable Trends," April 14, 2022.

Previous Actions

- "DBRS Morningstar Assigns Credit Rating of A (high) With a Stable Trend to Hydro One Inc.'s $400 Million Medium-Term Notes Issue," October 20, 2023.
- "DBRS Morningstar Assigns Rating of A (high) With a Stable Trend to Hydro One Inc.'s $425 Million Medium-Term Notes Issue," September 21, 2023.
- "DBRS Morningstar Assigns Ratings of A (high) with Stable Trends to Hydro One Inc.'s $1,050 Million Medium-Term Notes Issues," January 27, 2023.
- "DBRS Morningstar Confirms Ratings of Hydro One Inc. at A (high)/R-1 (low), Stable Trends," November 4, 2022.

Previous Report

- Hydro One Inc.: Rating Report, May 3, 2022.

Notes:
All figures are in Canadian dollars unless otherwise noted.

For the definition of Issuer Rating, please refer to Rating Definitions under Rating Policy on www.dbrsmorningstar.com.

Generally, Issuer Ratings apply to all senior unsecured obligations of an applicable issuer, except when an issuer has a significant or unique level of secured debt.

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We rate more than 4,000 issuers and nearly 60,000 securities worldwide, providing independent credit ratings for financial institutions, corporate and sovereign entities, and structured finance products and instruments. Market innovators choose to work with us because of our agility, transparency, and tech-forward approach.

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Hydro One Investor Overview Post 1A24

Investor overview

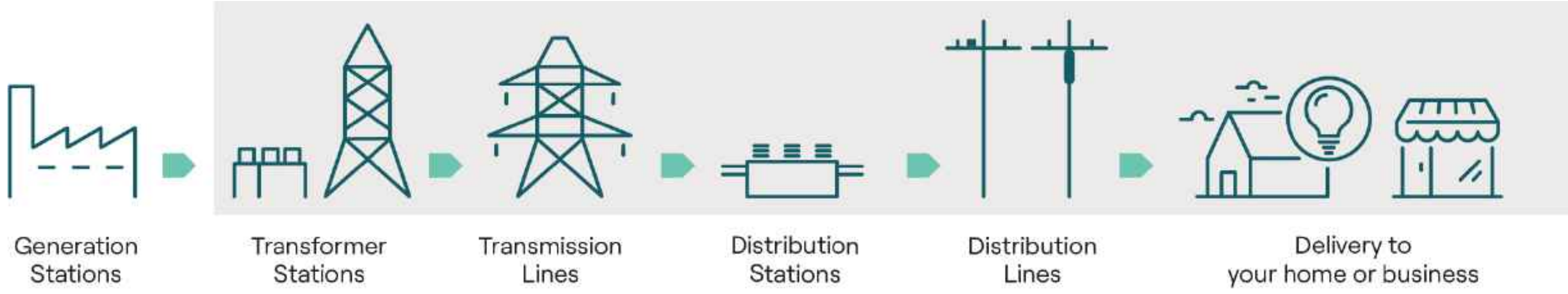
Post first quarter 2024

Why invest in Hydro One

A unique low-risk opportunity to participate in the growth of a premium, large scale regulated electric utility

- One of the largest electric utilities in North America with significant scale and leadership position across Canada's most populated province.
- One of the strongest investment grade balance sheets in the North American utility sector.
- Unique combination of pure-play electric power transmission and local distribution, with no generation or material exposure to commodity prices.
- Stable and growing cash flows with 99% of business fully rate-regulated in a constructive, transparent and collaborative regulatory environment.
- Predictable self-funding organic growth profile with expanding rate base and strong cash flows, together with broad support for refurbishment of aging infrastructure and with ~6% expected rate base CAGR. No external equity required to fund planned growth.
- Transparency in our Environmental, Social and Governance (ESG) reporting.
- Annualized dividend of $1.2568 with 70% - 80% target payout ratio.
- Opportunity for continued dividend growth with rate base expansion, continued consolidation and efficiency realization.

Hydro One's role in the Ontario electric system

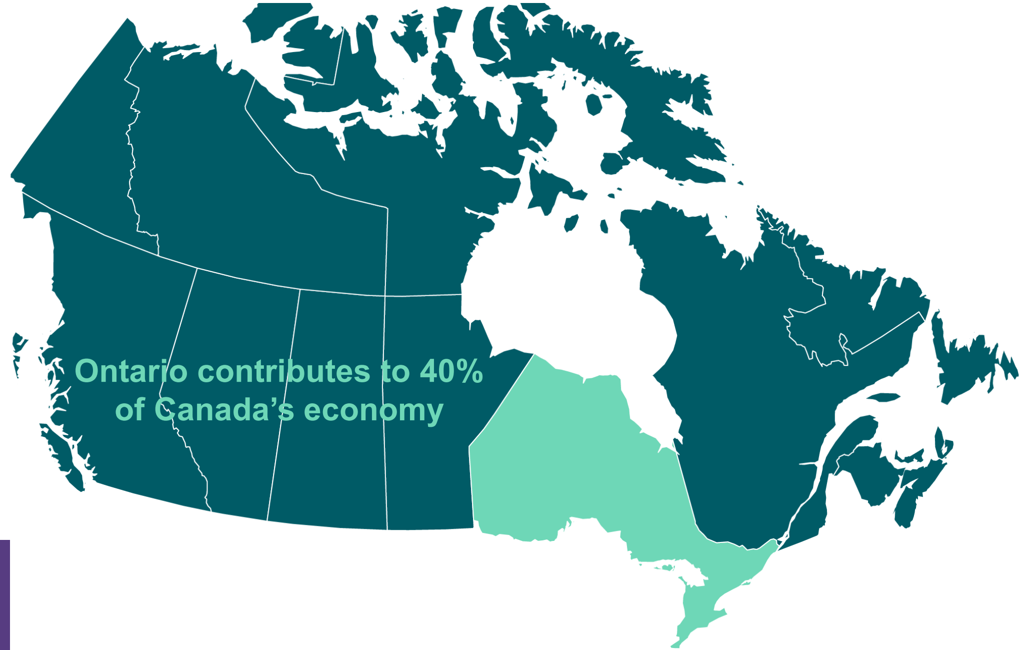


2022-2027

~6%	Rate base growth
5-7%	EPS growth
~6%	Average annual dividend growth

Why Ontario

Ontario growth in electricity demand



Canada's electricity demand expected to grow between 120% - 135% from 2021 to 2050 to achieve Net Zero target

- Consumer choices, corporate ESG targets and government policies are driving the electrification of transportation, home heating and heavy industry
- Technological advancements and focus on decarbonization expected to drive additional connection to new sources/uses of power

There has been an acceleration and resurgence in industrial activities in Ontario – affects peak demand (Tx)

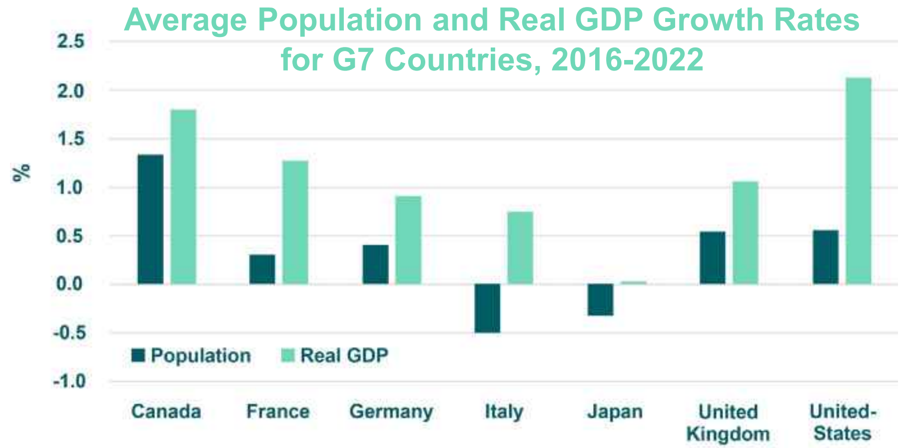
- Over 90% of the electricity generated in Ontario came from non-emitting sources, attracting investment[1]
- EV battery manufacturing in Windsor
- Mining activities in northern Ontario
- Agricultural development in southern Ontario

There is a large influx of immigrants to support this growth – affects the number of connections (Dx)

- Immigration targets of 0.5 million for 2024 and 2025 up from 0.3 million historical average
- 58% of new immigrants are selected on economic basis, supporting a knowledge-based economy

Canada is among the fastest growing nations within G7

- Highest population growth in G7
- Second highest GDP growth in G7
- Commitment by Federal government for further growth through immigration



Source: Canada Energy Regulator, IMF Reports, IMF – World Development Indicators for 2016-2021, Government of Canada, Government of Ontario

1) IESO, Pathways to Decarbonization, December 15, 2022. https://www.ieso.ca/-/media/Files/IESO/Document-Library/gas-phase-out/Pathways-to-Decarbonization.ashx

Increased capital investment to enable energy transition and enhance grid stability

Recent developments

First quarter 2024 highlights

- First quarter basic earnings per share (EPS) of $0.49 was higher than EPS of $0.47 for the same period in 2023.
- EPS for the quarter was higher year-over-year largely due to higher revenues resulting from Ontario Energy Board (OEB)-approved 2024 transmission and distribution rates, partially offset by higher income tax expense, when excluding the impact of the cessation of DTA recovery in the prior year, and higher financing charges.
- Hydro One restored power to approximately 190,000 customers affected by the damaging high winds in parts of central, southern and eastern Ontario in late February to early March.
- Hydro One is proud to be once again listed in the Globe & Mail Women Lead Here Report on Business magazine's annual benchmark of gender diversity in executive roles in Corporate Canada.
- Hydro One sponsored the Little Native Hockey League's (LNHL) 50th anniversary tournament. Hydro One was recently inducted into the LNHL Hall of Fame as a "Friend of the Little NHL," honouring a partnership that first began in 2003.
- Hydro One is proud to be listed on the Corporate Knights' 2024 Global 100 ranking of the world's most sustainable companies.
- Subsequent to quarter end, the Company received OEB approval of the Section 92 Leave to Construct application for the Waasigan Transmission Line.
- Subsequent to quarter end, the Company also received OEB approval to proceed with the acquisition of the Chapleau Public Utilities Corporation, that was previously announced in November 2023.
- Hydro One strengthened its leadership team with the addition of Renée McKenzie as Executive Vice President (EVP), Digital and Technology Solutions.
- The Company's capital investments and in-service additions for the quarter were $673 million and $240 million, respectively, compared to $499 million and $237 million in 2023
- Quarterly dividend declared at $0.3142 per share, payable June 28, 2024.

The value of Hydro One

About the company

Transmission & Distribution

~30,000 circuit KMs of transmission lines

Largest Local Distribution Company (LDC) in Ontario with approximately 1.5 million customers

Combined 2024 Transmission & Distribution Rate Base of $26.3B[1]

Market Capitalization of ~$23.7B[2]

Regulated and Privatized Operations

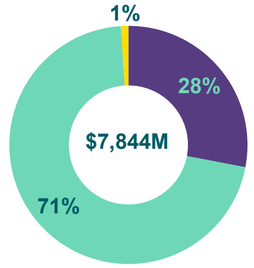
99% of revenue from regulated operations

Privatization initiative by Province of Ontario to divest majority stake in Hydro One largely complete with post November 2015 IPO (15%), April 2016 secondary (15%), and May 2017 secondary (20%) offerings

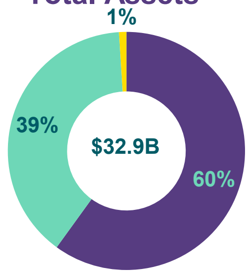
How we did in 2023

Transmission Distribution Other

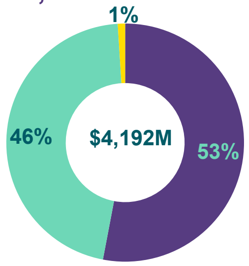
Revenues



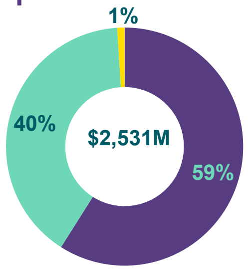
Total Assets



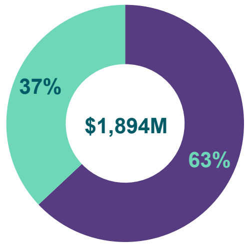
Revenues , Net of Purchased Power[4]



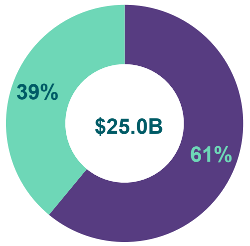
Capital Investments



Regulated EBIT[3]



Rate Base



Why invest

Stable Operations

Stable and growing cash flows with 99% of overall revenues fully rate-regulated

No generation or material exposure to commodity prices

Financial Performance

Predictable self-funding organic growth profile with ~6% expected rate base CAGR

Attractive 70% - 80% target dividend payout ratio

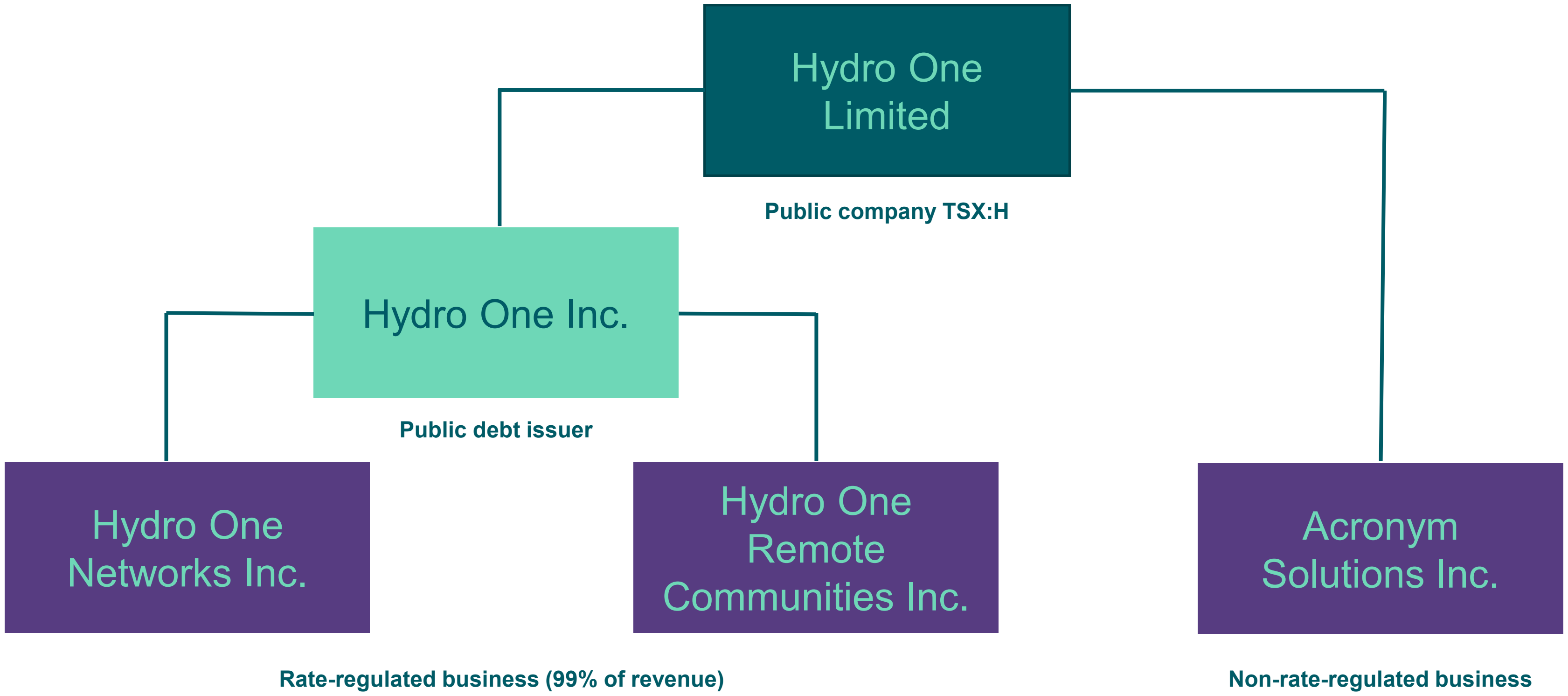
Annualized dividend of $1.2568 per share

Strong balance sheet with investment grade credit ratings

1) Company estimates subject to change.
2) Based on closing share price of the common shares of Hydro One Limited on March 28, 2024.
3) Income before financing charges and income tax expense.
4) Revenues, net of purchased power is a non-GAAP financial measure. Non-GAAP financial measures do not have a standardized meaning under United States (US) generally accepted accounting principles (GAAP), which is used to prepare the Company's financial statements and accordingly, these measures might not be comparable to similar financial measures presented by other entities. Additional disclosure in respect of this non-GAAP financial measure is incorporated by reference herein and can be found under the section titled "Non-GAAP Financial Measures" in the Company's annual management's discussion and analysis for the year ended December 31, 2023 (Annual MD&A) available on SEDAR+ under the Company's profile at. www.sedarplus.com.

A look at the organization

Corporate structure



Executive leadership team

A leadership team with strong operational experience committed to achieving efficiencies at Hydro One

David Lebeter
President and CEO

Teri French
EVP, Safety, Operations and Customer Experience

Cassidy McFarlane
General Counsel

Renée McKenzie
EVP, Digital and Technology Solutions

Lisa Pearson
SVP, Corporate Affairs

Andrew Spencer
EVP, Capital Portfolio Delivery

Harry Taylor
EVP, Chief Financial and Regulatory Officer

Megan Telford
EVP, Strategy, Energy Transition and Human Resources

Our refreshed strategy

Our purpose

Energize life with reliable and sustainable solutions for a brighter future

Our vision

A better and brighter future for all

Strategic priorities

Our values

Safety comes first
We make the world a safer place

Stand for people
We believe in equity, diversity and inclusion as the source of our strength

Empowered to act
We recognize our power to improve people's lives

Optimism charges us
We see potential in everything

Win as one
We work together to deliver results

Enrich our customers' experience

1. We deliver easy and exceptional customer experiences
2. We understand and solve our customers' evolving needs
3. We empower our customers to make informed decisions

Create new solutions for an electrified future

1. We use advanced analytics and digital capabilities to manage an electrified future
2. We collaborate and foster innovation
3. We actively position ourselves as an enabler of the energy transition

Enhance grid value needed for sustainable growth

1. We optimize grid assets to create financial value
2. We acknowledge our Indigenous partners as core to our growth
3. We deliver sustainable growth by seizing regulated and unregulated opportunities

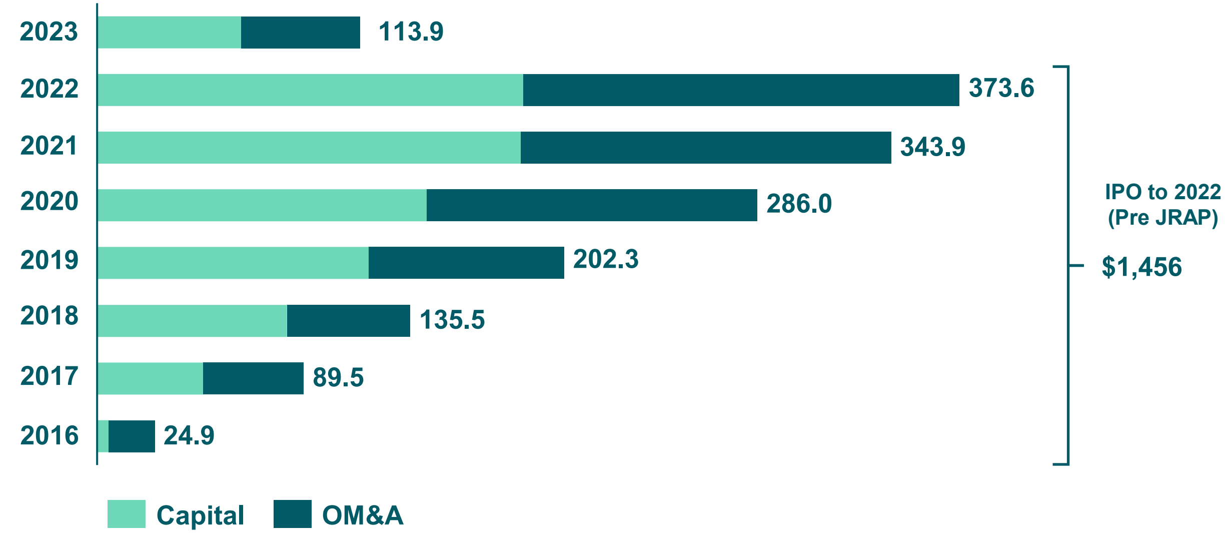
Win with partners

1. We collaborate with partners to deliver high value results
2. We create mutually beneficial solutions
3. We are part of a coalition that shapes our net-zero future

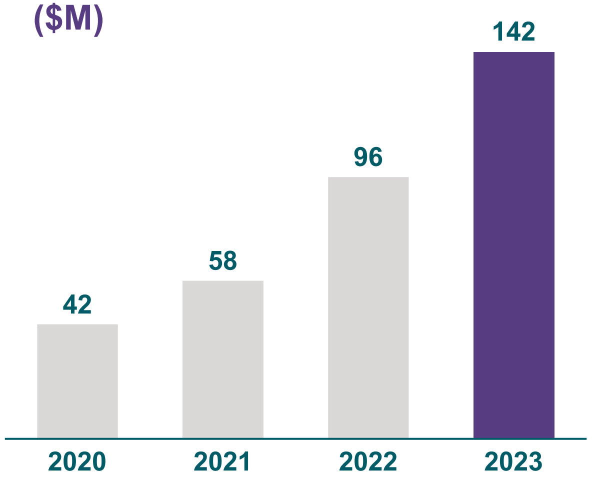
Achievements and efficiencies

hydro One

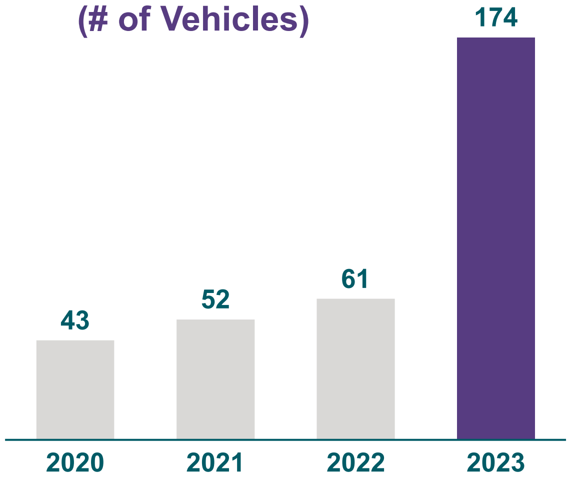
Paving New Paths in Productivity Savings ($M)



Indigenous Procurement Spend ($M)



Greening the Fleet (# of Vehicles)



Generated productivity savings of $113.9 million in 2023 comprised of $62.4 million in OM&A and $51.5 million in capital

Cost efficiencies from outsourcing equipment testing and inspecting, pole refurbishments, clearing of vegetation growth, and station planning & construction

Strategic sourcing initiatives led to cost reductions for materials and services by leveraging index and market information along with vendor diversification

Managing our Facilities and Real Estate contracts led to reduced lease and operating costs

The regulated business

Transmission (Tx)

- Transmission produces reliable cash flow with low volatility under the OEB Custom Incentive Rate Making (IR) framework
- OEB-approved 5-year Custom IR application for Transmission from 2023-2027
- Growing rate base with planned annual capital investments of ~$1,500 - ~$2,000 million till 2027[1]
- ROE of 9.36% with 40% / 60% deemed equity/debt capital structure through 2027
- Hydro One owns and operates 92% of Ontario's transmission capacity[2]
- Emerging industries and system requirements helping drive expansion of transmission network

35
LDC customers

87
Large directly connected industrial customers

~30,000
Transmission lines (circuit km)

309
Transmission stations in service

Distribution (Dx)

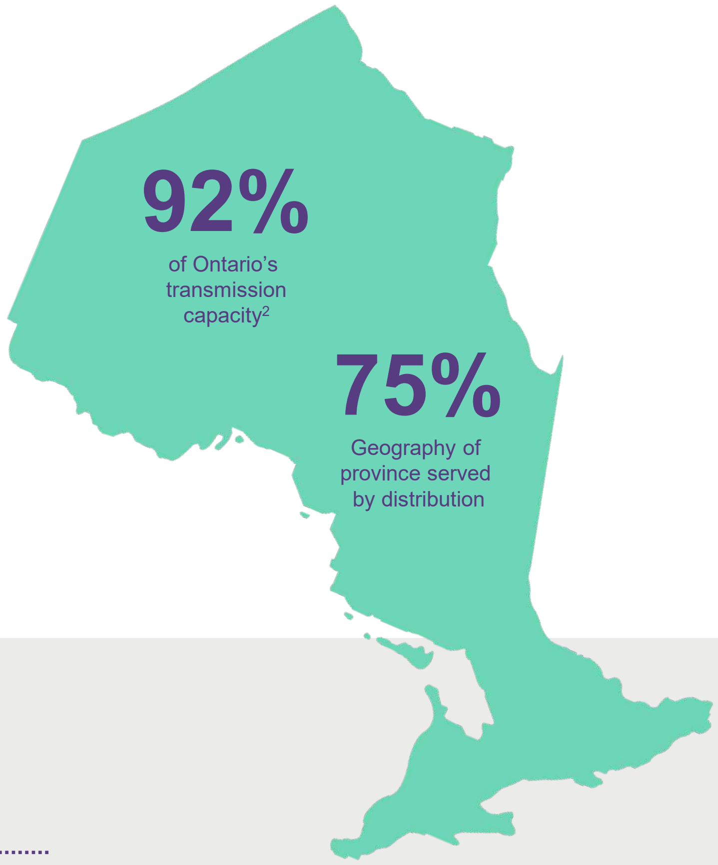
- Distribution is a stable, rate-regulated business operating under the OEB's Custom IR framework
- OEB approved 5-year Custom IR application for Distribution from 2023-2027
- Growing rate base with planned annual capital investments of ~$880 - ~$1,100 million till 2027[1]
- ROE of 9.36% with 40% / 60% deemed equity/debt capital structure through 2027
- OEB decision in place transitioning residential distribution rates to fully fixed
- Acquired Orillia, Peterborough, Haldimand, Woodstock, Norfolk LDC

over **90**
LDCs consolidated since 1999

~1.5M
Distribution end customers

~125,000
Distribution lines (circuit km)

~1,000
Distribution and regulating stations



1) Estimates included from the filed Joint Rate Application which was approved on November 29, 2022. Estimates contain Chatham to Lakeshore and Waasigan Transmission Line.
2) Based on the network component of the revenue requirement approved by the OEB. The network component of the revenue requirement is Hydro One's portion of the transmission revenue requirement attributed to assets that are used for the common benefit of all Hydro One and non-Hydro One customers in the province. Hydro One owns and operates approximately 95% of the transmission system in Ontario when based on the total OEB approved revenue requirement.

Electric Local Distribution Company (LDC) consolidation

Consolidator of Choice

- Hydro One is the largest LDC in Ontario; 52 LDCs are Hydro One transmission or distribution customers
- Hydro One has significant scale in Ontario and serves customers through a distribution system spanning 125,000 circuit kilometers

Historical Acquisitions

- Hydro One has acquired more than 90 LDCs in Ontario since the year 1999
- Recent acquisitions include Peterborough and Orillia (2020), Woodstock and Haldimand (2015) and Norfolk (2014)

Synergy Potential

- Hydro One can offer Ontario's fragmented distribution sector significant synergies
- Peterborough, Orillia, Woodstock, Haldimand and Norfolk are anticipated or have realized OM&A savings of over 50%

Addressable Market

- 54 LDCs[1] in Ontario
- Total rate base of approximately $15B[1], of which the largest 5 LDCs account for approximately $11B[1]

Consolidation Strategy

- Hydro One is focused on engaging communities, municipalities and LDCs as partners in a number of ways
- Hydro One will likely realize greater synergies than other potential acquirers especially if a target is contiguous to Hydro One's existing service territory

Announced transaction

Chapleau Hydro

OEB approval on April 19, 2024, expected close in H2 2024

Completed transactions

Orillia Power Distribution Corporation

Transaction closed on September 1, 2020, integrated in June 2021

Peterborough Distribution Inc.

Transaction closed on August 1, 2020, integrated in June 2021

1) Excluding Hydro One Networks Inc.

Growth opportunities for the telecom business focus on value-added services

ACRONYM

Acronym Client Value Exchange

Network & Internet

Network connectivity and access to improve the efficiency and security of Client data communications
- Secure SD-WAN
- High Performance Network Broadband Connectivity
- Internet Transit
- Data Centre access

Security

Comprehensive managed cybersecurity ecosystem
- DDoS protection, Mail, Firewall, Endpoint, Wifi
- SOC / SIEM
- IT audit, vulnerability & penetration testing

Managed IT

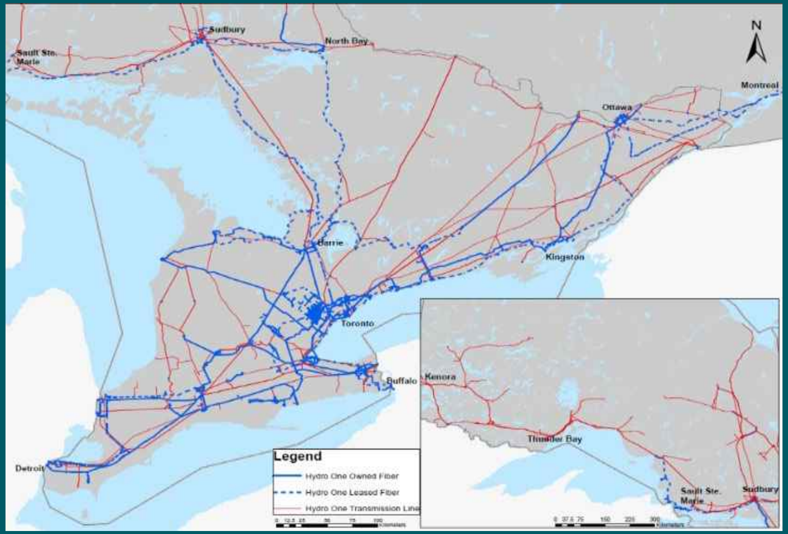
Outsourced operational and IT solutions that simplify operations and reduce operating expenses
- Network Operations-as-a-Service (NOS)
- Field Operations-as-a-Service (FOS)
- Monitoring, management & reporting of communications services & infrastructure
- Equipment spares management & network planning

Cloud

Platforms, applications and storage pools
- Backup-as-a-Service (BaaS)
- Infrastructure-as-a-Service (IaaS)

Voice & Collaboration

VoIP infrastructure and advanced telephony and collaboration solutions
- SIP Trunking
- Unified Communications as a Service



The market

- Core connectivity revenues declining; a shift towards cloud connectivity, managed services & security-based services with increasing bandwidth demand
- Modest CAGR of 3.2% predicted from 2022-2027. Total market to grow from $56B to $65.6B
- Ontario represents approximately 40% of national total

Sustainability at Hydro One

Hydro One is committed to energizing life for people, the planet and communities across Ontario.

Our 2022

ESG Highlights and Scorecard

Guided by our greater purpose of energizing life, we feel a responsibility to put people, the planet and communities first. Energizing life means so much more than keeping the lights on: it represents our commitment to contribute to a better quality of life for all Ontarians. In 2022, we made good progress on advancing our performance in our priority areas of people, planet and community.

People

Highlights

- Achieved the best safety record in our history, delivering a **recordable injury rate of 0.62**, per 200,000 hours worked.
- Continued to **build a diverse pipeline** of talent across our skilled trades workforce. An **Inclusion Index** score of **73%** across our workforce, emphasizes our commitment to DEI.[1]

Goals

- Have 30% female executives and Board members.
- Have 3.5% Black executives and Board members, and 5% Black students by 2025.

Performance[3]

- Our annual average of executives and Board members identifying as female:
  - 32.5%† of executives
  - 40.0% of Board members
- 3% Black students and no Black executives in our workforce.

Planet

Highlights

- Received two **Emergency Response Awards** from the Edison Electric Institute for storm recovery efforts, bringing our total to 13.
- Won Electricity Distributors Association's (EDA) 2022 **Environmental Excellence Award** for the Wetland Habitat Program.

Goals

- Achieve net-zero GHG emissions by 2050, with a target of 30% GHG reduction by 2030.[2]
- Convert 50% of our fleet of sedans and SUVs to EVs or hybrids by 2025 and 100% by 2030.

Performance[3]

- Reduced our GHG emissions by 7%‡,[2]
- 17%† of our fleet of sedans and SUVs are EVs or hybrids.

Community

Highlights

- Launched our new **Equity Partnership Model**, through which First Nations communities can invest in 50% of equity in new, future large-scale capital transmission line projects (> $100 million).
- Positively impacted **715,000+ individuals** through our community investment program.

Goals

- Increase our Indigenous procurement spend to 5% of Company's purchase of materials and services by 2026.
- Commit 20% of our corporate donations and sponsorships to support Indigenous communities.

Performance[3]

- $95.9 million or 5.2%† of our total sourceable spend was with Indigenous businesses, our highest to date.
- Allocated 23% of our corporate donations and sponsorships to support Indigenous communities.

1 The Inclusion Index, introduced in the 2022 myExperience survey, examines current employee sentiment around inclusion.
2 Compared to the 2018 baseline.
3 Unless otherwise noted, performance is for the year end 2022.
KPMG performed a limited assurance conclusion on indicators identified with † and GHD verified GHG emissions data indicated by ‡.

Note: The above data and highlights are from our 2022 Sustainability Report, available on our website. KPMG has performed a limited assurance on three indicators – executive gender diversity, fleet electrification and Indigenous Procurement Spend. GHD Limited has externally assured our GHG emissions data. The data in the report is as of December 31, 2022. In 2023, Hydro One has received an Emergency Response Award from the Edison Electric Institute, bringing our total to 14.

HydroOne.com/Sustainability

Sustainability at Hydro One

At Hydro One, we are committed to operating safely in an environmentally and socially responsible manner and to partnering with our customers and community stakeholders to build a brighter future for all.

A Sustainable Future for All

- 45% of Board of Directors are women and 50% of Executive leadership team are women. 18% of Board self identify as an Indigenous Person. For Executives[1], 19% self identify as Black and People of Colour (BPOC) and 3% self identify as an Indigenous Person.
- ~$2.5 billion in capital investments in 2023 to expand electricity grid and renew and modernize existing infrastructure.
- Achieved best safety record in our history, delivering a recordable injury rate of 0.62, per 200,000 hours worked.
- Hydro One created the Hydro One Business Grant, in partnership with the Canadian Council for Aboriginal Business (CCAB), to provide direct financial support to 28 Indigenous-owned businesses.
- Ontario's electricity sources are largely carbon free. Over 90% of the electricity generated in Ontario comes from non-emitting sources.[2]
- Hydro One avoided over 2,900 tCO2e of emissions as a result of renewable energy technology, conservation programs, the expansion of the Ivy network and the increase in paperless billing.
- These avoided emissions are equivalent to a year's exhaust from approximately 890+ passenger vehicles.[3]
- Designated as a Sustainable Electricity Company by Electricity Canada.
- Positively impacted 715,000+ individuals through our community investment program.
- Residential and small business customer satisfaction score was 87% and transmission customer satisfaction was 88%.
- ~$4 million in sponsorships and donations.
- Hydro One recognized as one of the Best 50 Corporate Citizens in Canada by Corporate Knights and also named on Forbes' annual list of Canada's Best Employers.
- Hydro One is proud to be on the Corporate Knights' 2024 Global 100 ranking of the world's most sustainable companies.

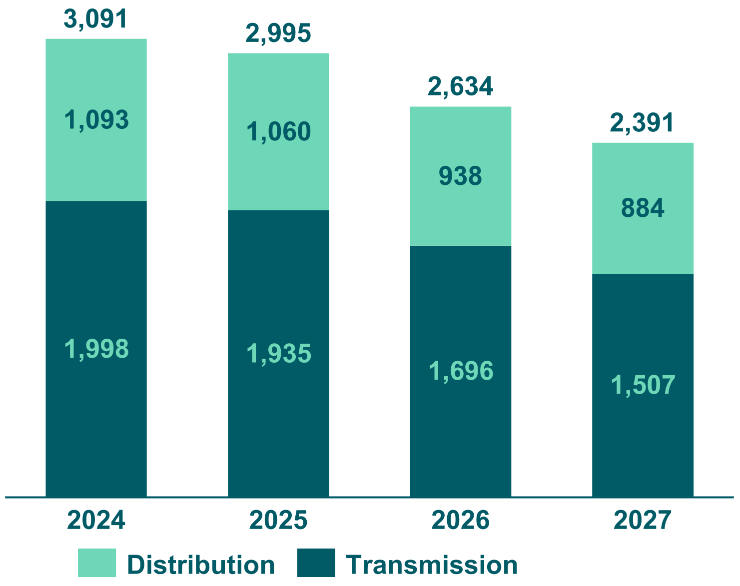
Note: As of 2022 Sustainability Report on the Company's website except for Note 1 below which is from our 2024 Management Information Circular.

1) As of May 3, 2024. We define executive as VP and above, which also includes the Executive Leadership team.
2) IESO, Pathways to Decarbonization, December 15, 2022. https://www.ieso.ca/-/media/Files/IESO/Document-Library/gas-phase-out/Pathways-to-Decarbonization.ashx
3) Calculated from https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/calculator/ghg-calculator.cfm.

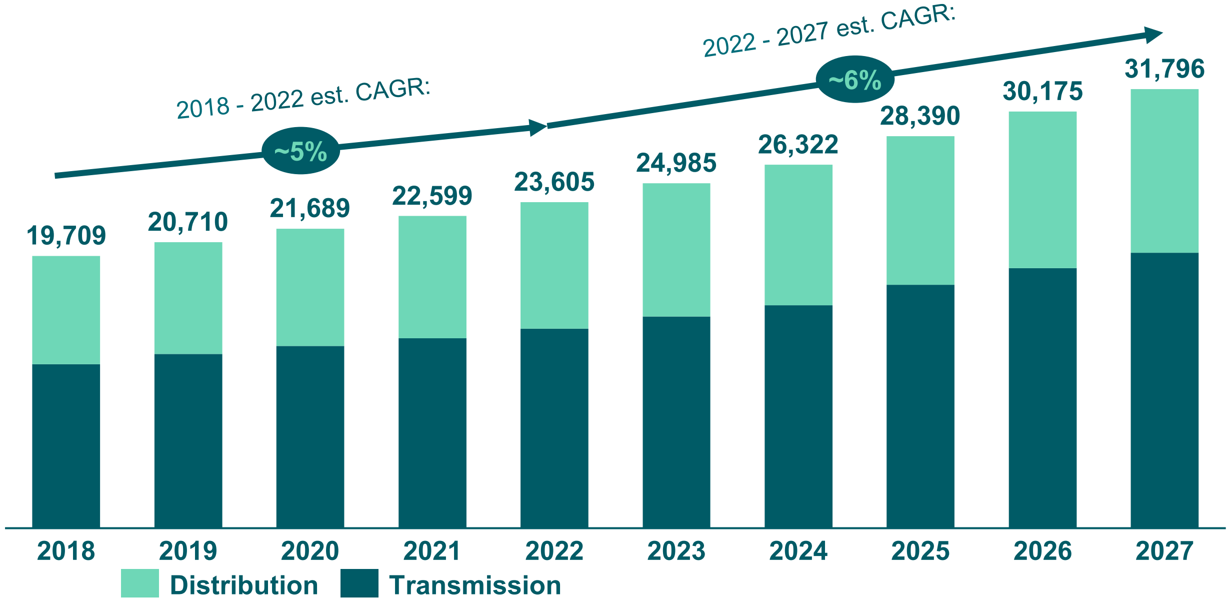
Capital investment driving rate base growth

Consistent and predictable organic growth profile underpinned by required replacement of aging infrastructure

Projected Regulated Capital Investments ($M)



Historical and Projected Rate Base Growth[1,2] ($M)



1. Figures include investments in certain development projects of Hydro One Networks not included in the investment plan approved with JRAP.
2. 2025-2027 years contain Chatham by Lakeshore Transmission Line, and Waasigan Transmission Line.

Comments

- Organic growth underpinned by continued rate base expansion to both renew and modernize the grid
- Material amounts of deteriorated, end-of-service life infrastructure must be upgraded or replaced
- Customers supportive of replacing aging infrastructure that is in poor condition
- Equity issuance not anticipated for planned capital investment program which is self-funded

Guidance range

1) Normalizing for 2023 rebase includes 100 basis points over-earn.
2) EPS growth does not include Local Distribution Company Acquisitions, and 7 out of the 9 Transmission Lines. Growth includes the Chatham to Lakeshore and Waasigan transmission lines .

Note: The forward-looking information in this presentation is based on a variety of factors and assumptions described in the Annual MD&A. Actual results may differ from those predicted by such forward-looking information. See "Disclaimers – Forward-Looking Information."

Capital investment driving rate base growth

Chatham by Lakeshore Transmission Line[1]

Estimated Total Project Cost: $253 million

Capital Cost To Date: $168 million

Anticipated In-Service Date: 2024

The Chatham by Lakeshore Transmission Line consists of the construction of a new double-circuit 230 kilovolt line between Chatham and Lakeshore and associated transmission stations and connections.

Waasigan Transmission Line[2]

Estimated Total Project Cost: $1.2 billion

Capital Cost to Date: $100 million

Anticipated In-Service Date: 2025/2027

The Waasigan transmission Line is a two-phase project with phase one encompassing a double-circuit 230 kilovolt line connecting the Lakehead Transformer Station in the Municipality of Shuniah to the Mackenzie Transformer Station in Atikokan. Phase two is a single-circuit 230 kilovolt line from Mackenzie station to the Dryden transformer station.

Lennox Transmission Station Circuit Breaker Replacement[3]

Estimated Total Project Cost: $152 million

Capital Cost To Date: $133 million

Anticipated In-Service Date: 2026

Lennox Transmission Station is based in Napanee, Southeastern Ontario. The circuit breaker project is a station sustainment initiative scheduled for completion in 2026.

East-West Tie Station Expansion[4]

Estimated Total Project Cost: $191 million

Capital Cost to Date: $189 million

Anticipated In-Service Date: 2024

The East-West Tie transmission project is a 450 km double-circuit 230 kV transmission line connecting the Lakehead Transfer Station in the Municipality of Shuniah near the city of Thunder Bay to the Wawa Transfer Station located east of the Municipality of Wawa.

1) The Chatham by Lakeshore Transmission Line project includes the line and associated facilities.
2) The Waasigan Transmission Line Project includes both phase 1 and phase 2, inclusive of necessary stations enhancements to support energization of the new lines. The estimated cost relates to the development and construction phases of the project and the anticipated in-service date reflects the anticipated completion of Phase 2 in 2027. The first phase of the project is expected to be in-serviced as close to the end of 2025 as possible.
3) Image below represents a generic circuit breaker, not the particular Lennox Transmission Station project.
4) The East-West Tie Station Expansion project has been placed in-service in phases, with significant portions of the project placed in-service over the 2021-2023 period, and final project in-service expected in 2024.

Constructive rate regulator

Ontario Energy Board (OEB) is a consistent, independent regulator with a transparent rate-setting process

- Transmission and Distribution businesses rate-regulated by the OEB
- Deemed debt / equity ratio of 60% / 40% for both transmission and distribution segments
- Reduced regulatory lag through forward-looking test years, revenue decoupling and adjustment mechanisms
- JRAP proposal for transmission and distribution under the OEB's Custom Incentive Rate Making Framework for 2023 – 2027 (5-year term) was successfully settled and approved by the OEB on November 29, 2022

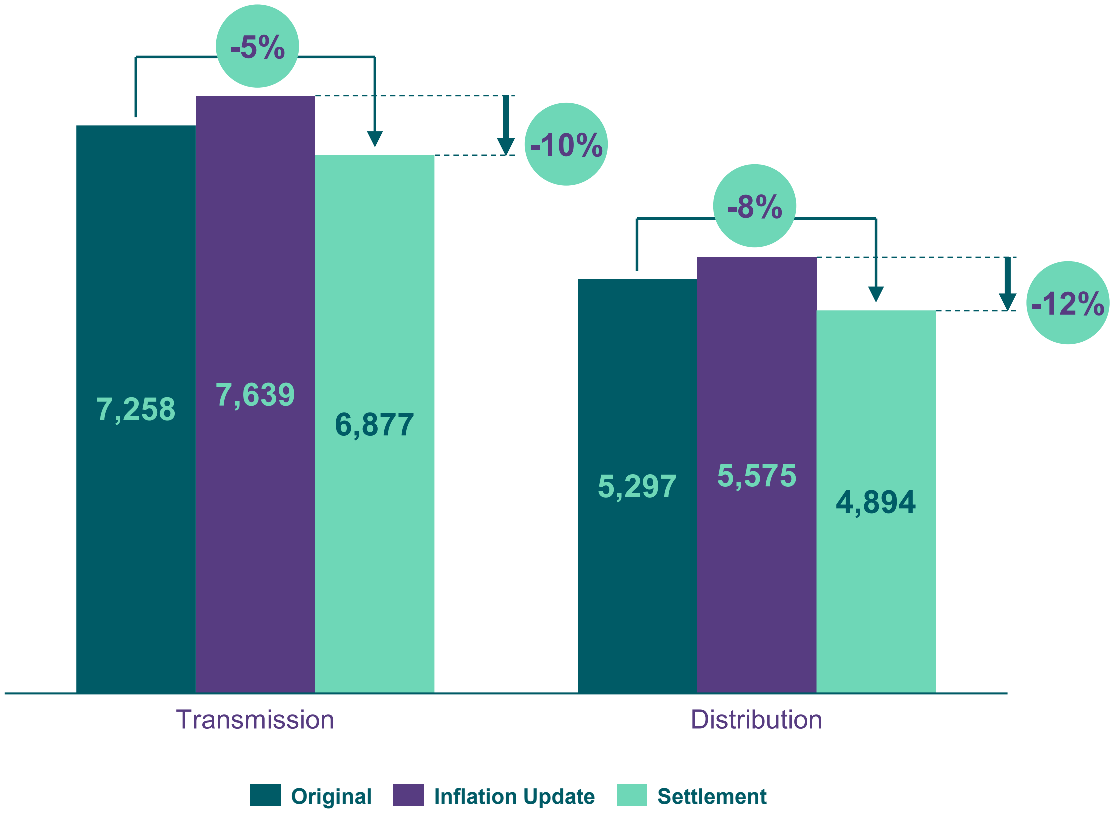
	Rate methodology	Allowed ROE[1]	Expected JRAP rate base	Effective term of application	Comments
Transmission	Custom IR	2024 9.36%	2024 $15.3B[2,4]	2023–27	Custom incentives rates. Application approved November 29, 2022
Distribution	Custom IR	2024 9.36%	2024 $10.0B[3,4]	2023–27	Custom incentives rates. Application approved November 29, 2022

1) Allowed ROE for 2023-2027 for JRAP Transmission and Distribution reflects the cost of capital update from the OEB on October 20, 2022.
2) JRAP Transmission rate base excludes 100% of B2M Limited Partnership (LP), Niagara Reinforcement LP, Hydro One Sault Ste. Marie LP and new transmission lines.
3) JRAP Distribution rate base excludes LDC acquisitions (Peterborough Distribution Inc., Orillia Power Distribution Corporation) and Hydro One Remote Communities.
4) Reflects OEB Approved Settlement on November 29, 2022.

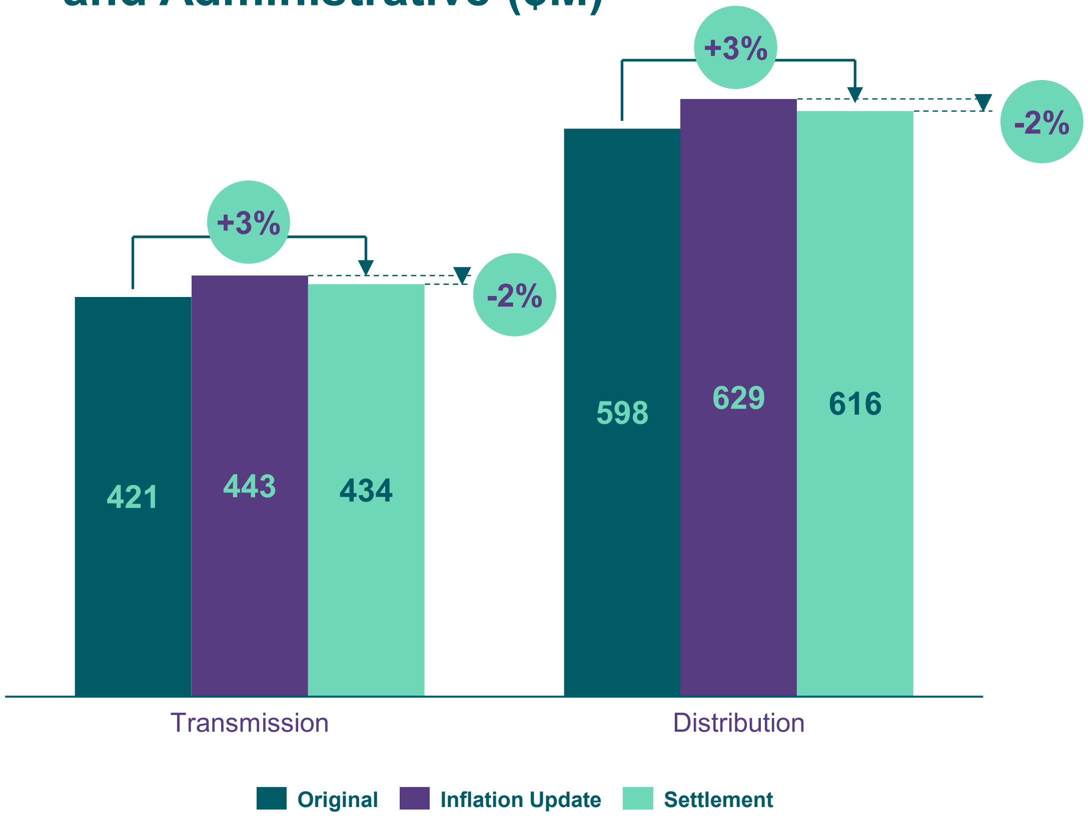
JRAP Expenditure

Agreement on ~$11.8 billion in capital expenditure reflects a balanced settlement for all stakeholders[1]

2023- 2027 Capital ($M)



2023 Operating, Maintenance, and Administrative ($M)



1) Reflects settlement agreement approved by the OEB on November 29, 2022.

JRAP – Segmented incentive regulatory construct

	Distribution OEB Approved[1] 2023-2027	Transmission OEB Approved[1] 2023-2027
Rebasing Year	**2023**	**2023**
Revenue Requirement Determined By	Custom Revenue Cap Index (RCI) by Component (%) **(A)** Inflation Adjustment Factor **(B)** Less: Productivity Stretch Factor Offset **(C)** Add: Capital Factor[2] **(D)** Equals: Custom Revenue Cap Index Total	Custom Revenue Cap Index (RCI) by Component (%) **(A)** Inflation Adjustment Factor **(B)** Less: Productivity Stretch Factor Offset **(C)** Add: Capital Factor[2] **(D)** Equals: Custom Revenue Cap Index Total
Earnings Sharing Method	50% of earnings that exceed allowed ROE by more than 100 basis points in any year of the term of the filing is shared with customers	
OEB ROE (Cost of Capital)	9.36% through test years (2023-2027)	9.36% through test years (2023-2027)
Effective Rate Setting	January 1, 2023	January 1, 2023

Distribution:

	2023	2024[3]	2025	2026	2027
(A)	2023 revenue requirement of $1,727 million	4.80%	3.70%	3.70%	3.70%
(B)		(0.45%)	(0.45%)	(0.45%)	(0.45%)
(C)		1.01%	0.79%	1.96%	1.12%
(D)		5.36%	4.04%	5.21%	4.37%

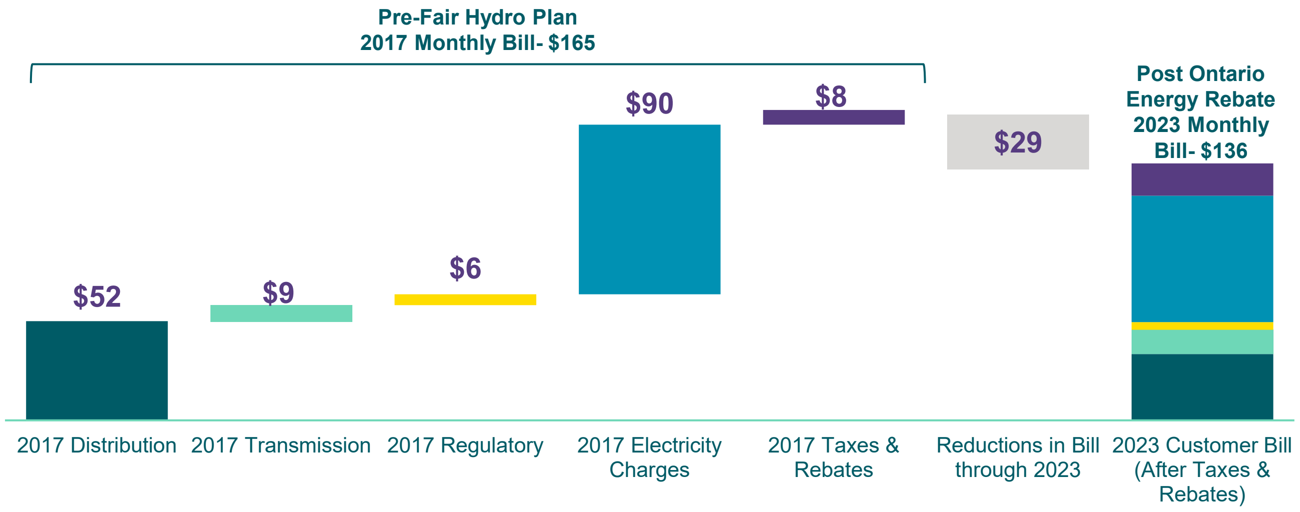
Transmission:

	2023	2024[4]	2025	2026	2027
(A)	2023 revenue requirement of $1,952 million	5.40%	3.80%	3.80%	3.80%
(B)		(0.15%)	(0.15%)	(0.15%)	(0.15%)
(C)		1.27%	0.93%	1.38%	0.08%
(D)		6.52%	4.58%	5.03%	3.73%

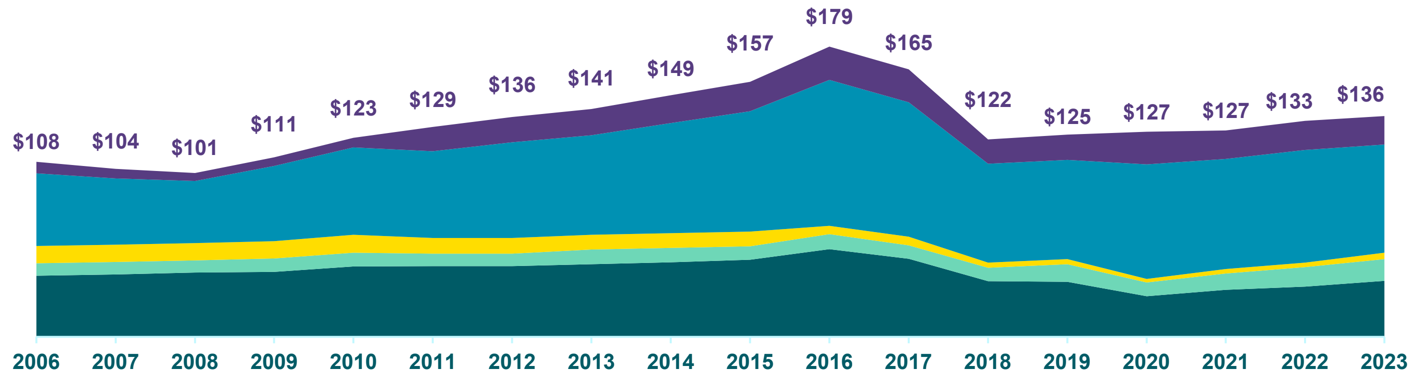
1) Source: 2023-2027 Distribution and Transmission Revenue Requirement, Custom Revenue Cap Index Parameters and ROE as approved by the OEB on November 29, 2022.
2) The capital factor will be adjusted each year depending on changes to inflation to ensure that Hydro One recovers the OEB-approved capital related revenue requirement adjusted for productivity.
3) 2024 Distribution revenue requirements and the associated RCI components as approved by the OEB on December 14, 2023.
4) 2024 Transmission revenue requirements and the associated RCI components as approved by the OEB on September 19, 2023.

Reducing our customer bills

Since 2017, typical Hydro One residential customer bills have decreased on average from $165 to $136 per month



	% of 2023 Bill[1]
Taxes	13%
Electricity Charges	49%
Regulatory	3%
Transmission	10%
Distribution	25%



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Annual changes to customer bill	(4.0%)	(2.5%)	9.6%	10.8%	5.5%	4.8%	3.6%	5.9%	5.6%	13.9%	(7.7%)	(26.3%)	2.4%	1.5%	0.5%	4.7%	2.2%

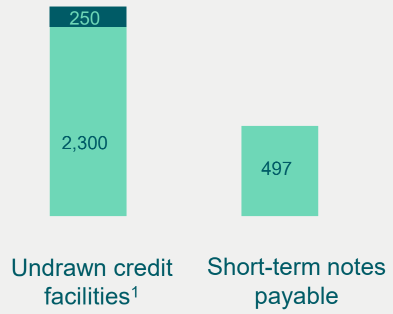
	Pre-Fair Hydro Plan CAGR[1,2] 2006-2017	Post Ontario Energy Rebate CAGR[1,2] 2006-2023	
Taxes	1.0%	5.5%	Electricity & other charges
Electricity Charges	6.6%	2.4%	
Regulatory	(5.4%)	(5.7%)	
Transmission	1.4%	3.3%	Hydro One's Portion
Distribution	3.0%	(0.5%)	

Note: The charts represent the breakdown of a typical bill for a Hydro One medium-density residential local distribution end customer using 750 kWh a month. Subject to update upon effective rate setting.
1) Each component includes applicable bill rebates.
2) Compounded Annual Growth Rate.

Strong balance sheet and liquidity (as at March 31, 2024)

Investment grade balance sheet with one of lowest debt costs in utility sector

Significant available liquidity ($M)



Strong investment grade debt ratings (long-term/short-term/outlook)

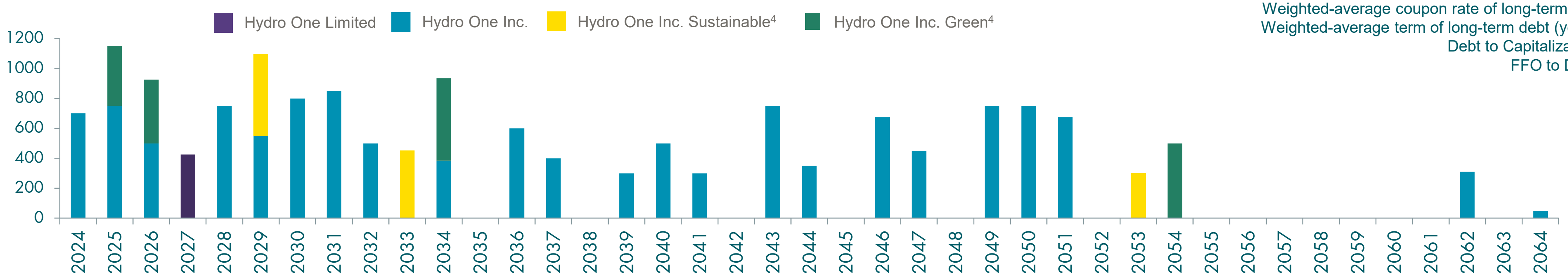
	Hydro One Limited (HOL)	Hydro One Inc. (HOI)
S&P	A- / n/a / stable	A / A-1 (mid) / stable
DBRS	A / n/a / stable	A (high) / R-1 (low) / stable
Moody's	n/a	A3 / Prime-2 / stable

Shelf registrations

HOL
Universal shelf[2]
$2.0B

HOI
Medium-Term Note shelf[3]

Debt maturity schedule ($M)

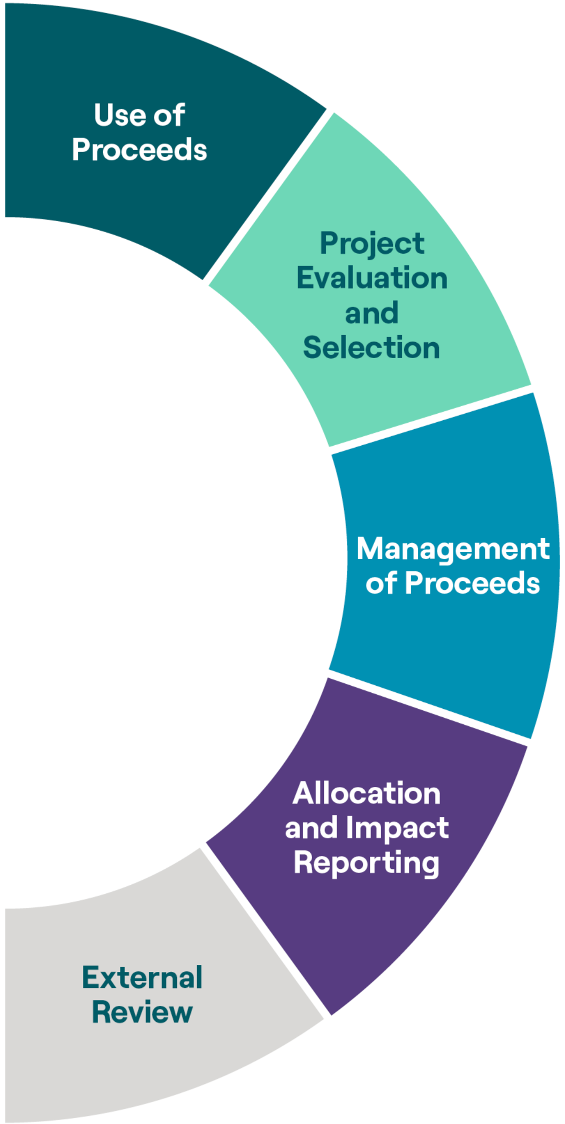


Weighted-average coupon rate of long-term debt:	4.1%
Weighted-average term of long-term debt (years):	13.2
Debt to Capitalization[5]:	57.6%
FFO to Debt[6]:	14.1%

1. The Operating Credit Facilities include a pricing adjustment which can increase or decrease Hydro One's cost of funding based on its performance on certain Sustainability Performance Measures, which are related to Hydro One's sustainability goals.
2. In August 2022, HOL filed a universal short form base shelf prospectus (Universal Base Shelf Prospectus) with securities regulatory authorities in Canada, which allows it to offer, from time to time in one or more public offerings, up to $2.0 billion of debt, equity or other securities, or any combination thereof, and expires in September 2024. At March 31, 2024, $2.0 billion remained available for issuance under the Universal Base Shelf Prospectus. A new universal base shelf prospectus is expected to be filed in the third quarter of 2024.
3. In February 2024, HOI filed a short form base shelf prospectus in connection with its Medium-Term Note (MTN) Program, which expires in March 2026.
4. Sustainable and Green bonds (MTN) issued pursuant to Hydro One's Sustainable Financing Framework.
5. Debt to capitalization is a non-GAAP ratio. See the section titled "Non-GAAP Financial Measures" in the Annual MD&A which is incorporated by reference, for a discussion of this non-GAAP ratio and its component elements.
6. FFO to Debt is a non-GAAP ratio. See the section titled "Non-GAAP Financial Measures" in the Annual MD&A for a discussion of these component elements.

Hydro One Sustainable Financing Framework Overview

Under the Framework, Hydro One may issue Sustainable, Green or Social bonds, loans or commercial paper



1. Use of Proceeds

- **Clean Energy**
  - transmission and distribution infrastructure that delivers low-carbon electricity
- **Energy Efficiency**
  - smart grid technology, energy storage, monitoring equipment
- **Clean Transportation**
  - EVs, hybrids, electric charging stations
- **Biodiversity Conservation**
  - natural habitat protection initiatives
- **Climate Change Adaptation**
  - investments to enhance resiliency of electrical grid from extreme weather-related events
- **Socio-economic advancement of Indigenous Peoples**
  - procurement from Indigenous Businesses
- **Access to Essential Services**
  - enabling high-speed broadband internet access to unserved and underserved

2. Project Evaluation and Selection

Process for the evaluation and selection of eligible projects:

- Sustainable Finance Working Group will be responsible for the review and recommendation for approval by the Sustainability Committee
- Eligible Projects will be evaluated for alignment with the Framework, Hydro One's sustainability objectives, and internal policies and guidelines
- Final allocation and determination of Eligible Projects will be reviewed and approved by the Chief Financial Officer of Hydro One

3. Management Of Proceeds

- Net proceeds will be deposited to Hydro One's general account and will be earmarked for allocation to Eligible Projects, which will be maintained in the Sustainable Financing Register
- Net proceeds may be used for investments associated with Eligible Projects during the 24 months preceding and following issuance
- Prior to allocation, net proceeds from an issuance may be temporarily utilized for repayment of indebtedness, or investments in bank deposits or other cash equivalents, in each case in accordance with Hydro One's internal liquidity management policies

4. Allocation and Impact Reporting

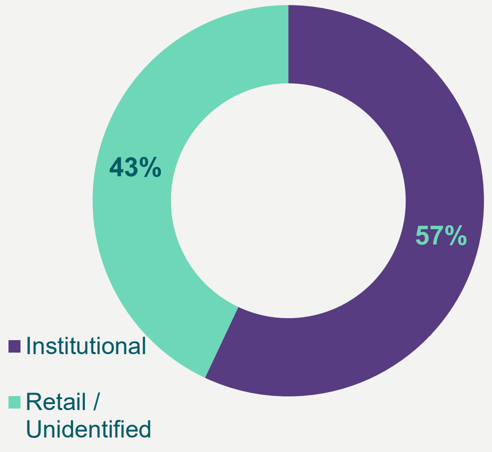
- Hydro One will engage a third party to complete an annual verification of its allocation of net proceeds to Eligible Projects until full allocation
- Allocation reporting will include the amount of net proceeds allocated to each Eligible Project, the remaining balance of unallocated proceeds that remain outstanding, the share of proceeds used for financing vs. refinancing, and brief descriptions on selected projects
- Impact reporting will include qualitative and quantitative impact metrics related to the Eligible Projects financed
- Hydro One's latest Allocation and Impact Reports can be found here

5. External Review

- Hydro One obtained an independent second party opinion (SPO) from Sustainalytics on its Sustainable Financing Framework, confirming that the Framework aligns with the Green Bond Principles, Social Bond Principles, Sustainability Bond Guidelines, Green Loan Principles and Social Loan Principles
- Hydro One will seek a limited assurance over the allocation of proceeds until complete allocation

Equity market cap overview

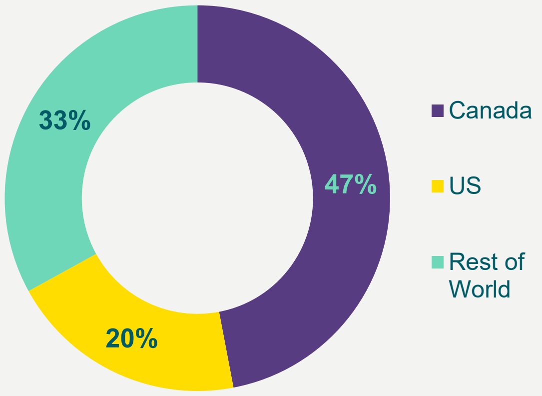
Approximate Ownership of Public Float[1]



Equity Index Inclusions

S&P/TSX Composite Index	S&P/TSX Composite Dividend Index	FTSE All-World (Canada)
S&P/TSX 60 Index	S&P/TSX Composite High Dividend Index	MSCI World (Canada)
S&P/TSX Utilities Index	S&P/TSX Composite Low Volatility Index	Dow Jones Canada Select Utilities
S&P/TSX Canadian Dividend Aristocrats Index		

Approximate Geographic Dispersion of Public Float[1]



Comments

- ~599.1 million common shares outstanding, listed on Toronto Stock Exchange (TSX: H)
- Equity market capitalization[2] of ~$23.7 billion and public float of ~$12.5 billion
- Equity market capitalization amongst the top 50 of all TSX-listed Canadian companies

1) Provincial Government ownership as at March 28, 2024 was 47.1%. Numbers reflects new data source: S&P Global.
2) Based on closing share price of the common shares of Hydro One Limited on March 28, 2024.

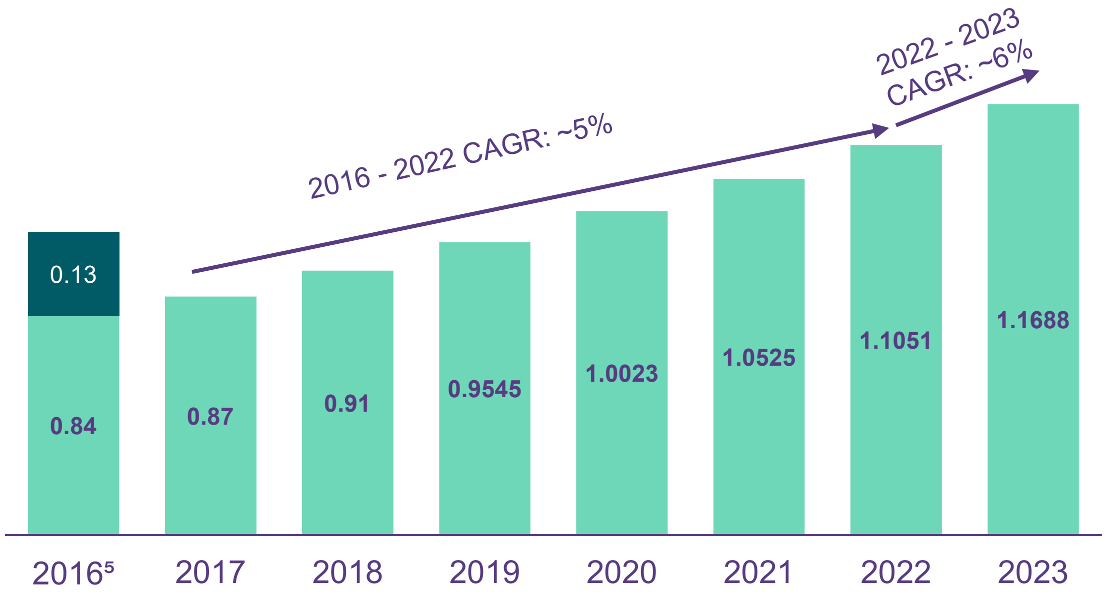
Common share dividends

Key Points

- Quarterly dividend declared at $0.3142 per common share ($1.2568 annualized)
- Targeted dividend payout ratio remains at 70% - 80% of net income
- Attractive and growing dividend supported by stable, regulated cash flows and planned rate base growth
- No equity issuance anticipated to fund planned capital investment program
- Non-dilutive dividend reinvestment plan (DRIP) in place (shares purchased on open market, not issued from treasury)

Dividend Statistics	
Yield[1]	3.2%
Annualized Dividend[2,3]	$1.2568 / share

A Growing and Sustainable Dividend[4]



Expected Quarterly Dividend Dates[3]

Declaration date	Record date	Payment date
May 13, 2024	June 12, 2024	June 28, 2024
August 13, 2024	September 11, 2024	September 27, 2024
November 6, 2024	December 11, 2024	December 31, 2024

1) Yield is calculated based on annualized dividend divided by closing share price of the common shares of Hydro One Limited on March 28, 2024.
2) Unless indicated otherwise, all common share dividends are designated as "eligible" dividends for the purpose of the Income Tax Act (Canada).
3) All dividend declarations and related dates are subject to Board approval.
4) Denotes annual cash dividends paid.
5) The first common share dividend declared by Hydro One Limited following the November 5, 2015 initial public offering of its common stock included 13 cents for the post IPO fourth quarter period of November 5 through December 31, 2015.

Appendix

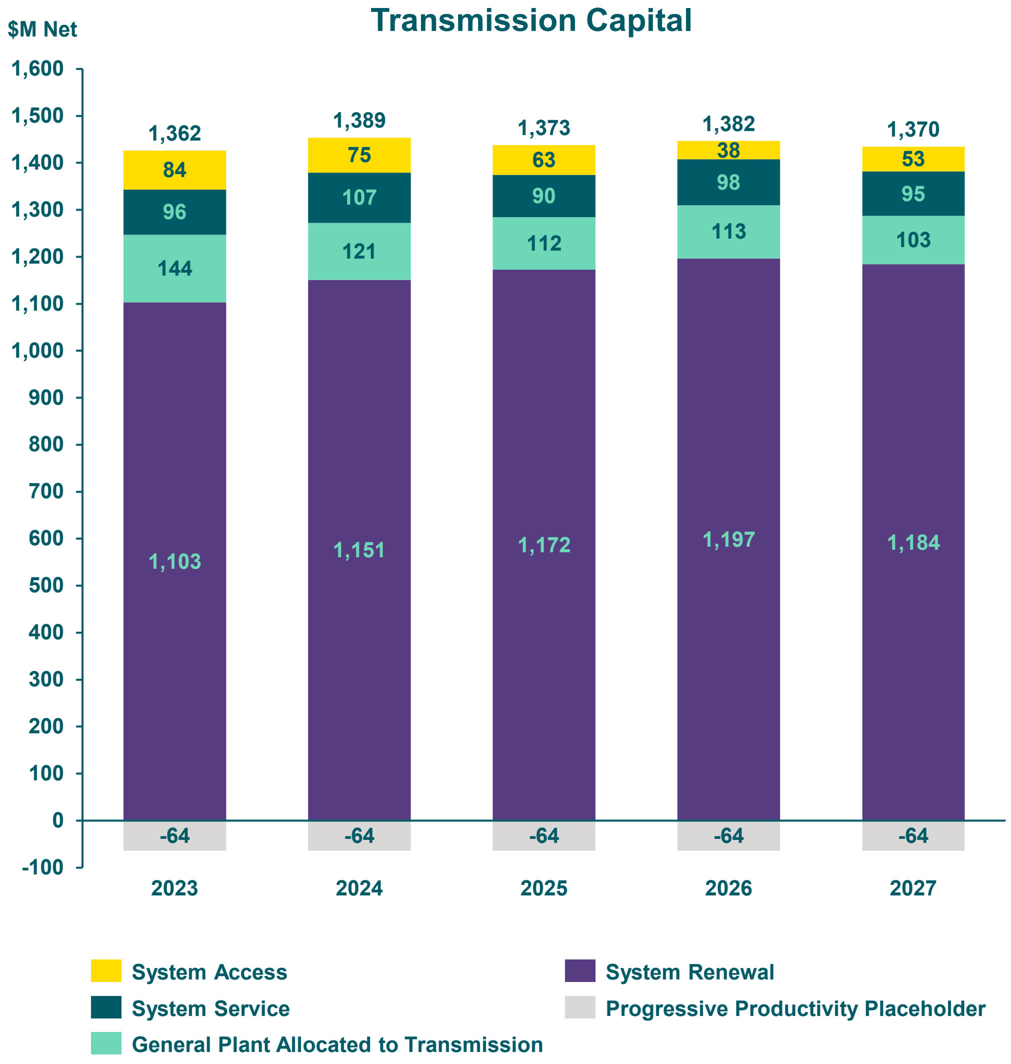
JRAP - Investments: Transmission

Maintaining the System

- Reinvesting in existing infrastructure to maintain the health of the system, sustain performance and address safety and environmental risk.

To address **station assets**, including those which link major generation resources to major load centers and those that serve electric Local Distribution Companies (LDCs) and large industrial facilities.

To address **lines assets**, which serve smaller towns, First Nations communities and businesses, pipeline compressor stations, and large load facilities such as mines and paper mills.



Reflects Settlement Agreement approved by the OEB on November 29, 2022.

JRAP - Investments: Distribution

New Infrastructure:

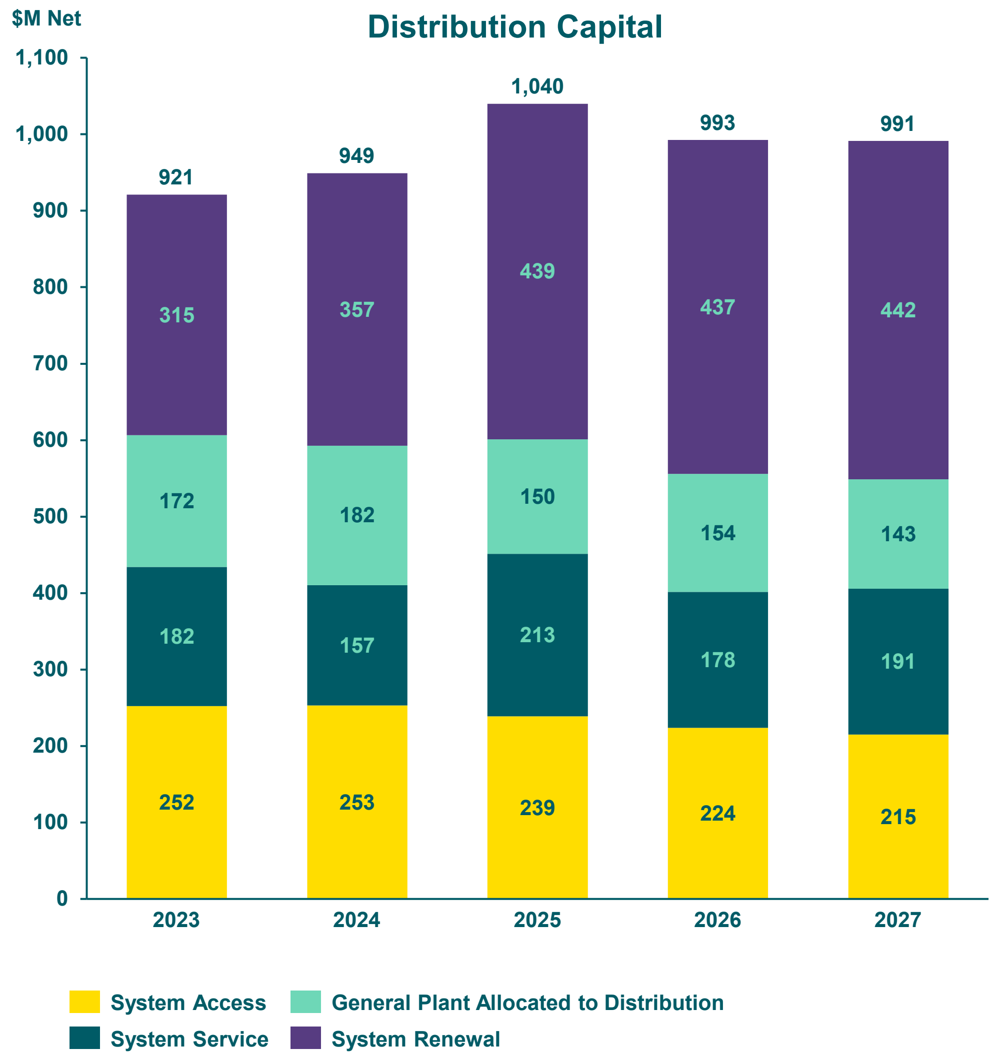
Modernize infrastructure to detect, repair & restore power.

Significant investments to **accommodate increase in regional load demand** (e.g. **in the Leamington area** to support the growth of the greenhouse sector).

Maintaining the System:

To address poor condition wood poles to **maintain overall health** of system, reduce likelihood of extended outages and **enable broadband**.

Mass meter and network replacement is planned.



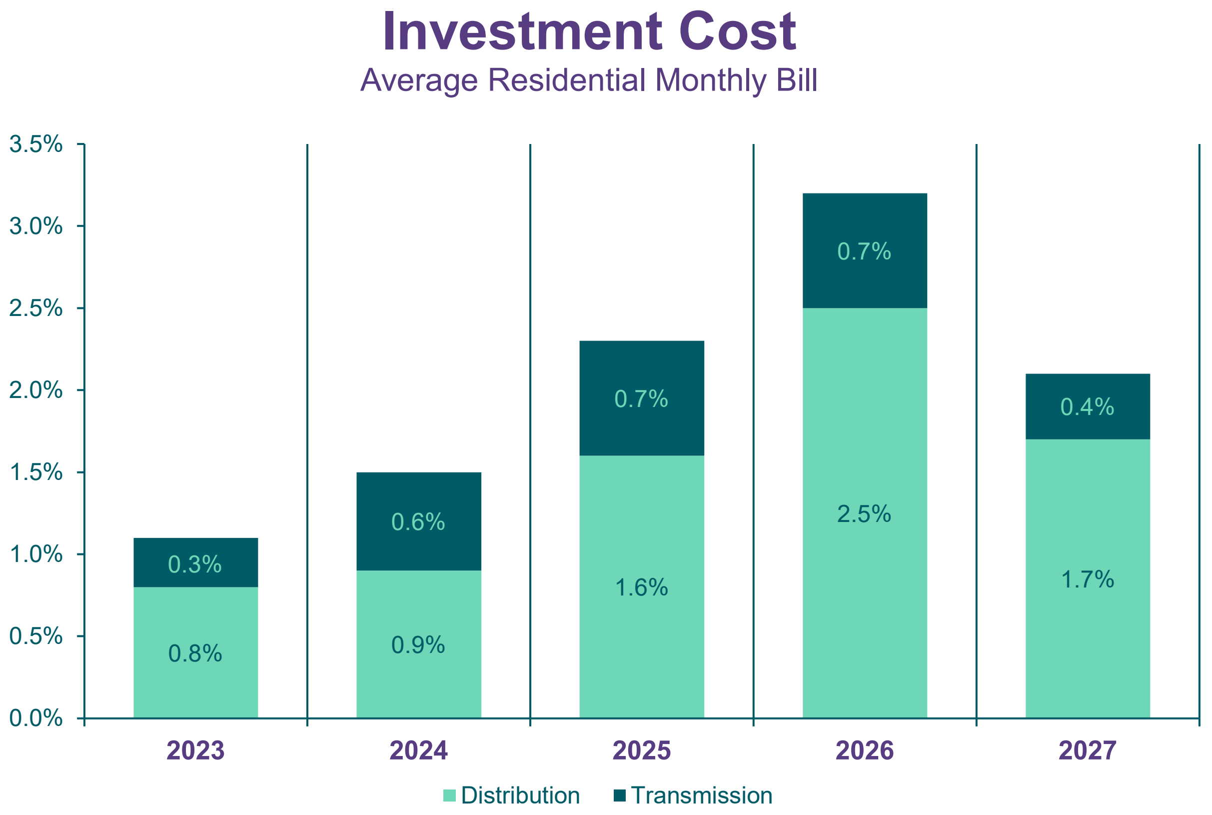
Note: Reflects Settlement Agreement approved by the OEB on November 29, 2022.

JRAP - Cost of plan[1]

A typical residential customer's monthly bill will increase by an average of

$3.12

each year over the five-year period.



1) As approved by the OEB on November 29, 2022.

1Q24 Financial summary

(millions of dollars, except EPS)	First Quarter 2024	First Quarter 2023	First Quarter % Change	Full Year 2023	Full Year 2022	Full Year % Change
Revenues						
Transmission	553	555	(0.4%)	2,214	2,077	6.6%
Distribution	1,605	1,509	6.4%	5,582	5,660	(1.4%)
Distribution Revenues (Net of Purchased Power)[1]	509	499	2.0%	1,930	1,936	(0.3%)
Other	8	10	(20.0%)	48	43	11.6%
Consolidated	2,166	2,074	4.4%	7,844	7,780	0.8%
Consolidated Revenue (Net of Purchased Power)[1]	1,070	1,064	0.6%	4,192	4,056	3.4%
OM&A Costs	322	328	(1.8%)	1,354	1,258	7.6%
Earnings before financing charges and income taxes (EBIT)						
Transmission	299	304	(1.6%)	1,189	1,123	5.9%
Distribution	211	192	9.9%	705	749	(5.9%)
Other	(16)	(12)	(33.3%)	(52)	(40)	(30.0%)
Consolidated	494	484	2.1%	1,842	1,832	0.5%
Net income[2]	293	282	3.9%	1,085	1,050	3.3%
Basic EPS	$0.49	$0.47	4.3%	$1.81	$1.75	3.4%
Capital investments	673	499	34.9%	2,531	2,132	18.7%
Assets placed in-service						
Transmission	64	115	(44.3%)	1,296	1,405	(7.8%)
Distribution	172	122	41.0%	994	853	16.5%
Other	4	0	N/A	34	9	277.8%
Total assets placed in-service	240	237	1.3%	2,324	2,267	2.5%

Financial Statements reported under U.S. GAAP

1) Revenues, Net of Purchased Power is a non-GAAP financial measure. Non-GAAP financial measures do not have a standardized meaning under US GAAP, which is used to prepare the Company's financial statements and accordingly, these measures might not be comparable to similar financial measures presented by other entities. Additional disclosure for this non-GAAP financial measure is incorporated by reference herein and can be found under the section titled "Non-GAAP Financial Measures" in the Annual MD&A available on SEDAR+ under the Company's profile at www.sedarplus.com.

2) Net Income is attributable to common shareholders and is after non-controlling interest.

Regulatory stakeholders

Ontario

Who: Provincial Government, Ministry of Energy
What: Policy, legislation, regulations

ONTARIO ENERGY BOARD

Who: Ontario Energy Board (OEB)
What: Independent electric utility price and service quality regulation

ieso Connecting Today. Powering Tomorrow.

Who: Independent Electricity System Operator
What: Wholesale power market rules, intermediary, North American reliability standards

Canada Energy Regulator

Who: Canadian Energy Regulator
What: Federal regulator, international power lines and substations

NERC NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Who: North American Electric Reliability Corporation
What: Continent-wide bulk power reliability standards, certification, monitoring

NPCC, Inc.

Who: Northeast Power Coordinating Council
What: Northeastern North American grid reliability, standards, compliance

Independent board of directors

Timothy Hodgson
Chair of the Board
Director since 2018

Cherie Brant
Director since 2018

David Hay
Chair of the Indigenous Peoples, Safety & Operating Committee
Director since 2018

Stacey Mowbray
Chair of the Audit Committee
Director since 2020

Mitch Panciuk
Director since 2023

Mark Podlasly
Director since 2022

Helga Reidel
Director since 2023

Melissa Sonberg
Chair of the Human Resources Committee
Director since 2018

Brian Vaasjo
Director since 2023

Susan Wolburgh Jenah
Chair of the Governance & Regulatory Committee
Director since 2020

Note: The only non-independent director is David Lebeter, President and CEO of Hydro One Limited.

Board of Director full bios are available at: https://www.hydroone.com/about/corporate-information/senior-leadership-and-board.

Disclaimers

Forward Looking Information

This presentation contains “forward-looking information” within the meaning of applicable Canadian securities laws that is based on current expectations, estimates, forecasts and projections about Hydro One Limited’s (Hydro One or the Company) business and the industry in which Hydro One operates and includes beliefs of and assumptions made by management of Hydro One. Such information includes, but is not limited to: statements related to Hydro One’s transmission and distribution regulatory applications, and expected impacts and timing; Hydro One’s projected rate base, cash flows and EPS; statements regarding Hydro One’s organic growth profile and expected rate base CAGR; expectations regarding future equity issuances; expectations to modernize infrastructure and to invest in the health of the distribution system, including through mass meter and network replacements; statements regarding Hydro One’s projected capital investments, and related plans, funding and expectations; statements related to Hydro One’s ongoing and planned projects, including estimated cost and anticipated in-service dates of capital projects; expectations regarding the Chapleau Hydro transaction, including the anticipated timing of closing of the transaction and integration; statements regarding Hydro One’s consolidation strategy, including expectations regarding potential synergies to the Company; statements relating to Hydro One’s strategy, expectations regarding growth opportunities for the telecom business; statements about Hydro One’s ongoing and planned sustainability priorities and commitments, including target dates, as they relate to diversity, equity and inclusion, climate change mitigation and adaption, Indigenous and community partnerships and other initiatives and related plans; Hydro One's commitment to achieving 30% female executives and female board members; Hydro One's commitment to achieving 3.5% Black executives and board directors and 5% Black student hires by 2025; Hydro One's commitment to achieving a target of 30% reduction of GHG emissions by 2030 and net-zero GHG emissions by 2050; Hydro One's commitment to increasing Indigenous procurement spend to 5% of total procurement spend by 2026; Hydro One’s commitment to ensure 20% of corporate donations and sponsorships support Indigenous communities; plans to convert 50% of Hydro One's fleet of sedans and SUVs to electric or hybrid EVs by 2025 and 100% by 2030; expectations regarding Hydro One’s maturing debt and standby credit facilities; expectations that a new universal shelf will be filed for HOL in the third quarter of 2024; statements related to dividends, dividend growth, Hydro One Limited’s targeted payout ratio of 70-80%; statements and guidance relating to EPS growth over 2023 to 2027, relative to a normalized 2022 earnings; and statements related to credit ratings.

Words such as “aim”, “could”, “would”, “expect”, “anticipate”, “intend”, “attempt”, “may”, “plan”, “will”, “believe”, “seek”, “estimate”, “goal”, “target” and variations of such words and similar expression are intended to identify such forward-looking information. These statements are not guarantees of future performance and involve assumptions and risks and uncertainties that are difficult to predict. In particular, the forward-looking information contained in this presentation is based on a variety of factors and assumptions including, but not limited to: the scope of the COVID-19 pandemic and duration thereof as well as the effect and severity of corporate and other mitigation measures on Hydro One’s operations, supply chain or employees; no unforeseen changes in the legislative and operating framework for Ontario’s electricity market or for Hydro One specifically; favourable decisions from the OEB and other regulatory bodies concerning outstanding and future rate and other applications; no unexpected delays in obtaining required approvals; no unforeseen changes in rate orders or rate setting methodologies for Hydro One’s distribution and transmission businesses; no unfavourable changes in environmental regulation; the continued use and availability of US GAAP; a stable regulatory environment; no significant changes to Hydro One’s current credit ratings; no unforeseen impacts of new accounting pronouncements; no changes to expectations regarding electricity consumption; no unforeseen changes to economic and market conditions; recoverability of costs and expenses related to the COVID-19 pandemic, including the costs of customer defaults resulting from the pandemic; completion of operating and capital projects that have been deferred; and no significant event occurring outside the ordinary course of business. These assumptions are based on information currently available to Hydro One including information obtained by Hydro One from third-party sources. Actual results may differ materially from those predicted by such forward-looking information. While Hydro One does not know what impact any of these differences may have, Hydro One’s business and results of operations, financial condition and credit stability may be materially adversely affected if any such differences occur.

Factors that could cause actual results or outcomes to differ materially from the results expressed or implied by forward-looking information are discussed in more detail in the sections entitled “Forward-Looking Information” and “Risk Factors” in Hydro One Limited’s most recent annual information form and the sections entitled “Risk Management and Risk Factors” and “Forward-Looking Statements and Information” in the Annual MD&A. Hydro One does not intend, and it disclaims any obligation to update any forward-looking information, except as required by law.

In this presentation, Hydro One presents information about future rate base growth and potential future capital investments and guidance in respect of 2027 basic earnings per share. The purpose of providing information about future rate base growth, potential future capital investments and financial guidance is to give context to the nature of some of Hydro One’s future plans and may not be appropriate for other purposes. Information about future rate base growth, potential future capital investments and financial guidance, including the various assumptions underlying it, should be read in conjunction with “Forward-Looking Information” above and as may be found in Hydro One's filings with the securities regulatory authorities in Canada, which are available under its profile on SEDAR+ at www.sedarplus.com. Hydro One does not intend to update the information about future rate base growth or future capital investments or guidance about 2027 EPS except as required by applicable securities laws.

All dollar amounts in this presentation are in Canadian dollars, unless otherwise indicated. Unless otherwise expressly stated herein, all information in this presentation is presented as at March 31, 2024.

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DBRS Global Ratings Methodologies for Utilities

Methodology

Global Methodology for Rating Companies in the Regulated Utility and Independent Power Producer Industries

Morningstar DBRS
June 2024

Previous Release
April 2024

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Scope and Limitations

This methodology represents our current approach for rating companies in the regulated utility and independent power producer (IPP) industries globally. It includes consideration of historical and expected business and financial risk factors as well as industry-specific issues, regional nuances, and other subjective factors and intangible considerations. Our approach incorporates a combination of both quantitative and qualitative factors. This methodology provides guidance regarding our methods used in the sector and should not be interpreted with formulaic inflexibility but rather should be understood in the context of the dynamic environment in which it is intended to be applied. The methods described herein may not be applicable in all cases; the considerations outlined in our methodologies are not exhaustive and the relative importance of any specific consideration can vary by issuer. In certain cases, a major strength can compensate for a weakness and, conversely, a single weakness can override major strengths of the issuer in other areas. We may use, and appropriately weight, several methodologies when rating issuers that are involved in multiple business lines.

In cases where an applicable methodology does not address one or more elements or factors relevant to analyze an issuer or a debt obligation, or where one or more such elements or factors differ from the expectations contemplated when each applicable methodology was approved, we may apply analytical judgment in the determination of any related analytical factor, assumption, credit rating or other opinion. When a rating committee determines a credit rating with a material deviation, we disclose the material deviation and the analytical rationale for the material deviation.

Introduction to Morningstar DBRS Corporate Finance Methodologies

- We publish rating methodologies to give issuers and investors insight into the rationale behind our rating opinions.
- In general terms, our ratings are opinions that reflect the creditworthiness of an issuer, a security, or an obligation.[1] Our ratings assess an issuer's ability to make timely payments on outstanding financial obligations (whether principal, interest, or preferred share dividends), consistent with the terms of those long-term obligations.[2] In some cases (e.g., non-investment-grade corporate issuers), our ratings may also address recovery prospects for a specific instrument given the assumption of an issuer default.[3]
- We operate with a stable rating philosophy; in other words, we seek to avoid unnecessary rating volatility.[4]

1 For more information, see Credit Ratings Global Policy.
2 For more information, see Long-Term Obligations Rating Scale.
3 For more information, see Recovery Ratings for Non-Investment-Grade Corporate Issuers.
4 For more information, see Credit Ratings Global Policy.

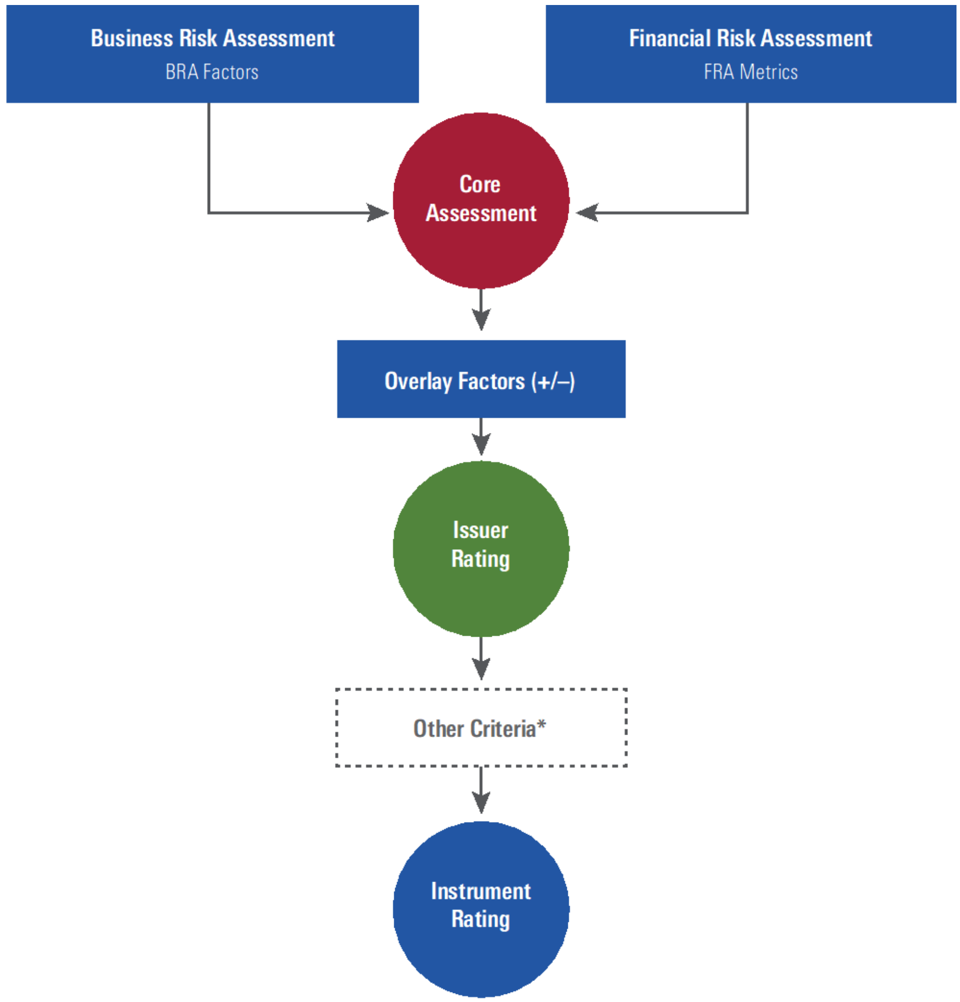
- We also publish criteria, which are an important part of the rating process. Criteria typically cover areas that apply to more than one industry. Both methodologies and criteria are publicly available on our website.
- *Morningstar DBRS Global Corporate Criteria* is incorporated by reference into this methodology. This document contains information on how we assess certain related corporate credit issues such as (1) holding companies and parent/subsidiary relationships, (2) common adjustments to financial ratios, (3) recovery for non-investment-grade corporate issuers, (4) guarantees and other forms of support such as third-party support arrangements and implicit support, (5) commercial paper liquidity backup, and (6) hybrid securities and preferred shares.
- Also incorporated by reference into this document is *Morningstar DBRS Criteria: Approach to Environmental, Social, and Governance Risk Factors in Credit Ratings*, which discusses our approach to assessing environmental, social, and governance risks in credit ratings.

Overview of the Morningstar DBRS Corporate Finance Rating Process

- As illustrated below, there are generally four key components to our corporate rating process: (1) the Business Risk Assessment (BRA), (2) the Financial Risk Assessment (FRA), (3) overlay considerations, and (4) specific instrument considerations.
- The BRA captures the major business risk aspects of the issuer and is determined by assessing each of the BRA factors outlined in the industry-specific BRA grid. The FRA pertains to financial soundness and is determined by assessing each of the FRA factors. Throughout the FRA and BRA determination process, we perform a consistency check of these factors relative to the issuer's rated industry peers.
- The BRA and FRA are then combined to derive the issuer's core assessment. For investment-grade issuers, the BRA will typically have greater weight than the FRA in determining the core assessment.
- The core assessment may then be adjusted up or down, as applicable, if any of the general or sector-specific overlay factors is deemed applicable and material to the credit profile in order to arrive at the issuer rating, which represents our assessment of the issuer's likelihood of default.[5]
- The issuer rating is then used as the basis for specific instrument ratings, which may differ from the issuer rating due to seniority or, in the case of non-investment-grade issuers, expected recovery considerations. (See the Rating the Specific Instrument and Other Criteria section below.)

5 For more information, see Long-Term Obligations Rating Scale.

Morningstar DBRS Corporate Finance Credit Rating Analysis Process



Source: Morningstar DBRS.
* Depending on the instrument, "other criteria" may include certain sections of *Morningstar DBRS Global Corporate Criteria* that address recovery or hybrids/preferred shares, for example. Please refer to the section below entitled Rating the Specific Instrument and Other Criteria for a discussion of criteria that may be applicable at any stage of the credit rating process.
Note: The Credit Rating Analysis Process is applicable to both regulated utilities and IPPs.

Regulated Utility Segment

- The global regulated utility segment comprises rate-regulated utilities whose primary businesses typically operate within a monopoly franchise area and may include one or more of the following business lines: (1) regulated electric generation, transmission, and distribution; (2) natural gas transmission and distribution; and (3) water and waste-water utilities.
- We may also use this methodology for utilities that are nonregulated but effectively share many features with a regulated utility, such as operating as a natural monopoly, providing an essential service, and/or having strong market power (e.g., district energy). For these entities, the Regulation and Operating Efficiency factors are not applicable and are instead replaced by the Competitive/Contractual Position.
- Per the three-tier Industry Risk Assessment (IRA) system (i.e., "A," BBB, or BB), this industry's IRA is "A."[6]
- For the electric-related utilities, there are three broad business areas: generation, transmission, and distribution. Some utilities are fully integrated and participate in all three, while others may be involved in only one or two segments.
- Regulated utilities are typically monopolistic. Because of the large number of fixed costs, one large utility firm can generally provide service at a lower cost than two or more firms serving the same customer base. Utilities are generally regulated by an administrative tribunal (i.e., a government agency) created by statute to assist ratepayers in obtaining reliable energy services on a cost-effective basis. Rate-setting mechanisms generally ensure that utilities receive adequate revenue to recover all costs prudently incurred to provide service and a return on capital.
- Utilities are typically regulated under either a traditional cost-of-service (COS) framework or some form of incentive regulation mechanism (IRM).
- The risks associated with environmental regulation are growing, particularly for the electric industry; however, for a regulated utility, future cost increases attributable to environmental regulation should be recoverable from ratepayers.
- Long-term threats include competition from new distributed energy resources (such as solar and geothermal power) and small-scale power generation sources located close to end users that provide an alternative to traditional electric power generation as well as the transmission and distribution grid.
- Water and waste-water utilities typically operate under similar regulatory frameworks to other regulated distribution utility operations; however, water and waste-water sector regulations can vary widely given that regulation may be at the municipal level rather than the national/state/provincial level. In addition, capital spending may be more volatile for water and waste-water utilities.

6. The IRA is a general indication of an industry's business risk using just three categories of our long-term rating scale (i.e., BB, BBB, and "A"). It results from a relative ranking of most industries that have a methodology from us largely based on (1) profitability and cash flow, (2) competitive landscape, (3) stability, (4) regulation, and (5) other factors. An "industry," for the purposes of the IRA, is defined as firms that are generally the larger, more established firms within the countries where the majority of our rated issuers are based. The BRA grid (see the Regulated Utility BRA section) is calibrated with the assistance of the IRA, which positions an average firm in the industry onto the BRA grid in an approximate way.

Regulated Utility Business Risk Assessment

BRA Factors

The BRA grid below shows the factors used in determining the BRA of an issuer. A BRA Score is assigned for each of the factors relevant to a given issuer. These factors are shown in general order of importance below, but their actual importance at a given time can vary based on a firm's specific situation and circumstances. For each of the BRA factors, the grid below provides a general description of the credit drivers (in bullet point format) often associated with a given broad category score. The description of the credit drivers is not exhaustive; nor does it mean that each such driver is always relevant. Furthermore, depending on the specific situation and circumstance of an issuer, the individual BRA factor scores or the overall BRA can be outside of the range described below when the issuer exhibits very strong or very weak characteristics.

Regulated Utility – BRA Factors

Regulation (For Regulated Entities Only) – The quality of the regulatory regime is typically the most important BRA factor, as it lays the foundation for utilities' earning capacity, cost recovery mechanisms, and capital structure. A supportive regulatory framework contributes to stable cash flow and earnings, underpinned by a fair rate of return and a full and timely recovery of costs. To determine the BRA for regulation, we review eight considerations (see Appendix 1) to assess the regulatory framework in which the utility conducts its business. The eight considerations include the following: (1) deemed equity ratio, (2) allowed return on equity (ROE), (3) energy cost recovery, (4) capital cost recovery (CCR) and operating cost recovery (OCR), (5) COS versus IRM, (6) political interference, (7) stranded cost recovery, and (8) rate freeze.

AA	A	BBB	BB/B
• Highly supportive regulatory framework with the weighted-average relevant key regulatory risk factors in Appendix 1 considered to be "excellent."	• Supportive regulatory framework with the weighted-average relevant key regulatory risk factors in Appendix 1 considered to be "good" or better.	• Reasonable regulatory framework with the weighted-average relevant key regulatory risk factors in Appendix 1 considered to be "satisfactory" or better.	• Poor regulatory framework with the weighted-average relevant key regulatory risk factors in Appendix 1 considered to be "below average" and/or "poor."

Competitive/Contractual Position (For Nonregulated Entities Only) – For applicable nonregulated entities, we focus on the contractual and market position. Contractual arrangements can mitigate a issuer's business risk. Earnings and cash flows from companies that are contractually secured on a long-term basis by strong counterparties are generally more stable and predictable, and may eliminate volume and commodity risk while mitigating the risk of near-term recontracting. Nevertheless, companies with significant exposure to energy activities that result in exposure to price and/or volume carry higher earnings volatility and risk. We also take into consideration the monopolistic nature of the market.

AA	A	BBB	BB/B
• Not applicable.	• Largely contracted on a long-term basis. • Minimal recontracting and early contract termination risk. • Minimal merchant energy operations. • Fuel and purchase energy costs are fully passed through with an automatic adjustment mechanism on a quarterly basis. • Some volume risk exists but is mitigated by a high portion of rates being fixed.	• Partly contracted on a medium-term basis. • Moderate recontracting and early contract termination risk. • Modest exposure to merchant energy operations. • Fuel and purchase energy costs are fully passed through, subject to review. • Some volume risk exists but is mitigated by historically stable throughputs.	• Partly contracted on a short-term basis. • High recontracting and early contract termination risk. • Significant exposure to merchant energy operations. • Fuel and purchase energy costs are not fully passed through. • Volume risk exists because of a high portion of rates being variable.

Diversification (Products/Markets) (For Both Regulated and Nonregulated Entities) – We view the electricity transmission segment as having the lowest risk, as the transmission grid forms the backbone of the industry and generally represents the smallest portion of the average residential electricity bill. As a result, there is strong political will to support the transmission owner to maintain safe, reliable operation of the system. The electricity distribution and gas transmission/distribution segments generally entail modestly higher risk, as the distribution segment accounts for a greater portion of the average residential bill, and the gas segment is exposed to integrity management risk. The generator segment has the highest risk, as it is exposed to fuel risk and higher operating risk than that of other segments; it also represents the highest portion of the electricity bill, which makes it more susceptible to political risk especially in a rising power cost environment. Diversification across low-risk multiline businesses is positive, limiting the impact of changes in one particular segment. We also view diversification across multiple regulatory regimes as positive, as this limits the impact of negative regulatory decisions in one jurisdiction. This is particularly true if a utility has sizable operations in multiple jurisdictions versus a utility with a significant portion of its operations in one area while having multiple smaller operations in others.

AA	A	BBB	BB/B
• Utility has operations in multiple regulatory jurisdictions. • Primarily electric transmission. • Well-diversified utility with a range of businesses throughout the utility value chain (natural gas transmission and distribution, electricity transmission and distribution).	• Electric or gas distribution, water or waste-water distribution/services, or an integrated utility or generator with a low-risk profile.	• Integrated utility or generator with a moderate-risk profile.	• Integrated utility or generator with a high-risk profile.

Franchise and Customer Mix (For Both Regulated and Nonregulated Entities) – Operating in stable and economically strong service areas generally results in revenue stability and low accounts-receivable write-offs, as well as minimizing political interference risk in a rising electricity rate environment. We consider both the economic strength of a utility's customer base and the size of the customer base when assessing whether customers will be able to absorb rate increases. Customers in an economically strong service territory are more able to absorb higher rate increases, while a larger customer base would allow capital and operating costs to be spread out over a greater number of customers. Utilities with a higher proportion of residential and commercial customers and load also possess the ability to better weather economic downturns and demonstrate more stable operating performances than utilities with a greater exposure to industrial customers and load, which are more inclined to seek lower-cost or more reliable suppliers and are prone to economic cyclicality. However, utilities with a large residential customer base are generally more sensitive to weather conditions, exposing the utilities to greater volume risk.

AA	A	BBB	BB/B
• Economically vibrant service territory, with income that is significantly above the national average. • Utility has a significant customer base (i.e., large metropolitan area or province/state). • Customer and load mix predominantly residential and commercial.	• Economically strong service territory, with income above the national average. • Utility has a sizable customer base. • Customer and load mix heavily weighted toward residential and commercial.	• Economically stagnant service territory, with income that is in line with the national average. • Utility has a reasonably sized customer base. • Customer and load mix a balance of residential and commercial versus industrial.	• Economically weak service territory, with income that is below the national average. • Utility has a small customer base. • Customer and load mix weighted toward cyclical industrials.

Operating Efficiency (Inputs and Costs) (For Regulated Entities Only) – Utilities with a proven track record of superior operating efficiency generally sustain profitability above their respective regulatory return parameters (i.e., the allowed or deemed ROE as distinct from the actual ROE, which is the company's reported ROE as presented in regulatory filings) and record above-average profitability relative to their peers. Improving operating efficiency also helps minimize political interference (e.g., in the form of the creation of stranded costs, a rate freeze, or regulatory lag in the recoupment of costs) in recovering rising input costs and refurbishment costs for aging infrastructure. We note that while a bigger utility (by asset or rate base) should possess a stronger ability to achieve economies of scale as well as raise funds and execute capital projects, it may be under extra scrutiny by the regulator to meet higher thresholds.

AA	A	BBB	BB/B
• Actual ROE has significantly exceeded the allowed ROE as a result of continued operating efficiency. • Strong ROE outperformance is expected to be well sustained in the foreseeable future through incremental cost savings accruing to the company. • Utility is of large comparative size, allowing for significant economies of scale.	• Actual ROE has been in line with the allowed ROE, or a difference between the allowed ROE and the actual ROE has not been material. • ROE performance is expected to remain in line with the allowed ROE for the foreseeable future. There is no expectation of material incremental cost savings arising in the foreseeable future. • Utility is of sufficiently large size to achieve economies of scale.	• Actual ROE has been somewhat below the allowed ROE, and this negative ROE performance relative to allowed ROE is expected to continue for the foreseeable future with no expectation of any material incremental cost savings. • Utility is of reasonable size to achieve some economies of scale.	• The utility has generated much lower actual ROE than the allowed ROE, and this negative ROE performance relative to allowed ROE is expected to continue for the foreseeable future with no expectation of any material incremental cost savings. • Small utility that can only achieve modest, if any, economies of scale.

Regulated Utility Financial Risk Assessment

FRA Metrics

The FRA grid below shows the metrics used to determine the FRA of an issuer. An FRA score is assigned for each of the metrics. While these FRA metrics are shown in general order of importance below, their actual importance at a given time can vary based on an issuer's specific situation and circumstances. Depending on the specific situation and circumstances of an issuer, the individual FRA metric scores or the overall FRA can be outside of the range described below when the issuer exhibits very strong or very weak characteristics.

- Our ratings are primarily based on future performance expectations, so while past metrics are important, any final rating will incorporate our on future metrics, a subjective but critical consideration. This includes, for example, situations where an issuer has an aggressive financial governance policy.
- It is not unusual for a company's metrics to move in and out of the ranges noted in the grid below, particularly for cyclical industries. In the application of this matrix, we look beyond the point-in-time ratio.
- Financial metrics depend on accounting data whose governing principles vary by jurisdiction. We may adjust financial statements to permit comparisons with issuers using different accounting principles (e.g., U.S. GAAP versus IFRS).
- Appendix 3 to this methodology provides definitions for the FRA metrics in the table below as well as a discussion of common financial statement adjustments for regulated utilities. Please refer to the section addressing common adjustments for calculating financial ratios in *Morningstar DBRS Global Corporate Criteria*.

- Liquidity can be an important credit risk factor, especially for lower-rated, non-investment-grade issuers. While ratios such as the current or quick ratio can give an indication of certain short-term assets in comparison with short-term liabilities, we will typically review all material sources of liquidity (including cash on hand, cash flow from operations, availability of bank and capital market funding, etc.) in comparison with all material short- and medium-term uses of liquidity (such as operations, capital expenditures (capex), mandatory debt repayments, share buybacks, dividends, etc.).
- Profitability, particularly in the medium term, can be an important differentiator of credit risk. We may assess profitability through a variety of metrics, including return on capital.
- While free cash flow (i.e., net of changes in working capital, dividends, capex, etc.) can be volatile and, on occasion, negative, we may use this concept and/or other cash flow metrics, such as cash flow from operations, to assess a company's ability to generate cash to repay debt.
- We considers an issuer's financial policies, including factors such as its targeted financial leverage, its dividend policy and the likelihood of share buybacks, or other management actions that may favour equityholders over creditors.
- While market pricing information (such as market capitalization or credit spreads) may be of interest to us, particularly where the information suggests that an issuer may have difficulty in raising capital, it does not usually play a material role in our more fundamental approach to assessing credit risk.

The following table represents financial metrics related to fully regulated utilities with only modest exposure to nonregulated operations. Significant exposure to nonregulated operations would result in increasingly stringent financial metrics criteria at the various rating levels.

Regulated Utility – FRA Metrics

Metric	AA	A	BBB	BB/B
Cash flow-to-debt (%)	> 17.5	12.5 to 17.5	10.0 to 12.5	0.0 to 10.0
Debt-to-capital (%)	< 55	55 to 65	65 to 75	75 to 90
EBIT-to-interest (x)	> 2.8	1.8 to 2.8	1.5 to 1.8	1.0 to 1.5

Blending the BRA and FRA into a Core Assessment

- The core assessment is a blend of the BRA and FRA. For investment-grade issuers, the BRA will typically have greater weight than the FRA in determining the core assessment. For most non-investment-grade issuers, the BRA and FRA are typically weighted equally.
- At the low end of the rating scale, however, particularly in the B range and below, the FRA and liquidity factors play a much larger role, and the BRA would, therefore, typically receive a lower weighting than it would at higher rating levels.
- In addition, we also take into consideration the volatility of a company's FRA in arriving at the final rating. A company with more volatile credit metrics than its industry peers may be rated lower than it would otherwise be based on a blend of the BRA and FRA. The lower rating reflects the higher risk, especially in a downturn, associated with the increased volatility.

Overlay Factors

The overlay factors are the last consideration in the determination of the issuer rating. When deemed relevant and material to the analysis of an issuer, an overlay factor positively or negatively modifies the core assessment derived from the combination of the BRA and FRA, with the impact of a single factor potentially ranging from less than one notch to as much as several notches in the case of more significant factors. We consider both sector-specific and general overlay factors, which are outlined in the two sections that follow.

Sector-Specific Overlays

Capital Spending

- Utilities are capital-intensive businesses, especially when nuclear generation is involved. A utility might undertake large capital projects to either meet growing demand in a high-growth franchise area or replace significant aging assets. Particularly for multiyear capital spending programs, the risk of cost overruns and weaker financial metrics can be high.

Energy Supply Considerations

- The provision of utility services depends on the presence of adequate supplies of energy (e.g., natural gas and electricity) to meet end-user demand. We may penalize utilities (including distributors) that have a history of service interruptions because of inadequate or unreliable energy supply.

Ownership

- The existence of a highly rated parent typically does not result in a lift to a stand-alone utility's rating; however, we may impute some level of implicit support (see the section discussing guarantees in *Morningstar DBRS Global Corporate Criteria*) in a utility's rating if it is owned by a highly rated city, despite no explicit guarantee being in place, given the potential unique circumstances of the city-utility relationship.

Retail Exposure and Other Business Exposure

- Distribution companies may be required to provide retail services to customers, such as electricity supply. Under this framework, utilities, depending on commercial arrangements, could be exposed to significant market risk. Key areas of analysis, therefore, include hedging policies, counterparty risk, and the size of the operation. Rates are, however, generally passed on to ratepayers, thereby reducing the risk to the utility.
- If the utility has other nonregulated businesses and these businesses are sizable but not sufficiently material to be assessed under a different methodology, we will also assess the risk profile of these businesses and will make an adjustment to the overall risk profile of the utility accordingly.

Competitive Environment

- We assess the degree of competition from other forms of energy or any other potential threats to natural monopoly, including material development of new distributed energy resources and small-scale power generation sources close to end users that could ultimately provide an alternative to the traditional electric power transmission and distribution grid.

General Overlays

Strategic Advantage or Impediment

- Strategic advantage or impediments not otherwise captured by BRA factors may include an exceptional brand, a unique product or process, or unusually large or small operations.

Parent-Subsidiary Relationship

- Various aspects of an issuer's corporate structure have the potential to positively or negatively influence the rating of that issuer. This may include the potential presence of structural subordination when the issuer is a holding company or the possibility of implicit support from a strong parent when the issuer is an important subsidiary of a broader corporate group. For more details, please refer to the section dealing with holding companies and parent/subsidiary relationships in *Morningstar DBRS Global Corporate Criteria*.

Other Financial Considerations

- Beyond the FRA metrics, many other financial factors reviewed as part of the rating process may point to material sources of credit risk. Such factors may include, but are not limited to (1) a strained liquidity position; (2) unusually high cash flow volatility relative to peers; (3) considerable uncertainty in the issuer's financial outlook owing, for example, to a recent large acquisition, an aggressive acquisition strategy, or a rapidly changing competitive environment; (4) unduly large unfunded pension liabilities; or (5) weak financial policies as evidenced, for example, by a significant currency mismatch in the issuer's business or debt structure or significant refinancing risk. In contrast, substantial financial resources or other noncore valuable assets that can easily be monetized, if necessary, could potentially provide uplift to a rating.

Environmental, Social, and Governance (ESG) Considerations

- ESG factors may affect a credit rating and/or the related credit analysis. The impact of ESG factors may vary across industries, sectors, or asset classes and is described in the *Morningstar DBRS Criteria: Approach to Environmental, Social, and Governance Risk Factors in Credit Ratings*. Where an ESG factor is material to a corporate rating, but is not otherwise addressed in a BRA/FRA factor or other overlay, we will reflect the impact of the ESG factor on the rating through this general ESG overlay.

Sovereign Risk

- The issuer rating may, in some cases, be constrained by the credit quality of a sovereign. If the issuer operates in a lower-rated country or operates in multiple countries but a material amount of its business is conducted in that lower-rated country, we may reflect this risk by lowering the issuer rating. Please refer to Appendix C of the *Global Methodology for Rating Sovereign Governments* for further information.

Independent Power Producer Segment

- IPPs are companies that produce and sell electricity to wholesale customers/markets from multiple and dispersed power-generating assets that use a variety of proven fuel and technology types. Note that electric-generation projects comprising a single (or few) asset(s) are covered in the *Global Methodology for Rating Project Finance*.
- Per the three-tier IRA system (i.e., "A," BBB, or BB), the IRA for IPPs is BBB.[7]
- The IPP industry is primarily characterized by (1) power price volatility, although the impact varies for each company depending on the degree of merchant (uncontracted, unhedged) exposure; (2) fuel cost volatility (for gas-fired generation); (3) unpredictability with respect to utilization factors (for run-of-river hydro, wind, and solar); (4) the use of long-term power contracts (power purchase agreements (PPAs)) and short-term hedges, particularly with investment-grade counterparties, for the offtake of electricity and input factors, such as fuel, to partially mitigate the merchant exposure; (5) significant barriers to entry, including large capital requirements, long developmental lead times, and a new facility approval process susceptible to regulatory, political, and social issues; and (6) the significant influence of government policy, which could vary by country, state, and/or province.
- Electricity is an essential product critical to the functioning of the broader economy, whose demand is correlated with general economic growth. Electricity is unique among commodity products in that it cannot be stored efficiently and must be consumed when produced. However, this may gradually change in coming years as energy storage becomes economical.
- Base-load assets (using coal, nuclear fuel, or hydro resources, in some cases) typically operate all day. Mid-merit or intermittent assets (such as combined-cycle gas-fired plants) typically operate only at peak times during the day, whereas peaking units (such as combustion turbines) typically only operate at peak times during the year.
- Wholesale electric markets are driven largely by regional supply and demand dynamics. These dynamics reflect, among other things, the cost of access to transmission lines as well as political issues among jurisdictions. Power markets remain largely regional (albeit with some interregional flows). Transmission constraints can also act as a natural barrier to entry within a region.
- Power generators with a heavily contracted generation portfolio are more likely to experience less volatility in profitability and cash flow compared with ones with significant merchant exposure. In addition, the average length of contracts, the recontracting risk, and the credit strength of counterparty(ies) play a key part in our analysis of power contracts. Short-term hedges also mitigate the exposure to merchant risk of a generator. However, we view short-term hedges as higher risk than long-term PPAs as the hedges are short in nature and some of the hedges could entail risk associated with certain output obligations.
- Operational expertise is an important credit consideration. In the event of a prolonged non-force majeure outage, power generators remain liable for their contracted output. Sustained low output levels could have a material negative impact on cash flow and profitability and, hence, on the issuer's rating.

7. The IRA is a general indication of an industry's business risk using just three categories of our long-term rating scale (i.e., BB, BBB, and "A"). It results from a relative ranking of most industries that have a methodology from us largely based on (1) profitability and cash flow, (2) competitive landscape, (3) stability, (4) regulation, and (5) other factors. An "industry," for the purposes of the IRA, is defined as firms that are generally the larger, more established firms within the countries where the majority of our rated issuers are based. The BRA grid (see below) is calibrated with the assistance of the IRA, which positions an average firm in the industry onto the BRA grid in an approximate way.

- Geographic and technological diversification are also important credit considerations. The stability of any individual operator can arise from diversification by operating region, by customer, by fuel, weather effects, and regulatory and political factors.
- Profitability and cash flow are partially influenced by fuel cost and the efficiency of a generator's assets compared with other assets in the same region (e.g., age, type of generating asset, and the asset's position compared with the overall fuel mix of the region in which it operates). Lower production cost producers will have a competitive advantage over higher-cost producers in the same wholesale market.
- Renewable-energy generators have a distinct production risk linked to the variable nature of their respective resources, particularly for hydroelectric, wind-powered, and solar-powered generators.
- The industry is operationally regulated, particularly with respect to the permitting of new facilities, the operations of existing assets (i.e., safety and emissions) and environmental regulation; therefore, assessing the issuer's track records in capital project execution is essential.
- Natural gas-fired and oil-based generation is subject to risks associated with rising energy prices. These risks include, but are not limited to, liquidity issues, supply disruptions, and much higher marginal costs for the power generator.
- Coal-fired generation faces significant unexpected costs with respect to complying with greenhouse gas emission reduction regulations or the potential of being shut down.
- In addition, evolving government policies, particularly related to long-term energy planning, continue to drive the growth strategy for electric generation companies and the resulting generation mix of their respective regions. For example, environmental targets and renewable generation credits have led to significant investments in the renewable energy sector.
- Environmental regulation and/or legislation has become more stringent over time, leading to higher capital and/or operating costs. The ability for any generator to pass on these higher costs is dependent on the regions in which they operate.
- In North America, market structures vary by region, which may or may not follow provincial or state boundaries.

Independent Power Producer Business Risk Assessment

BRA Factors

The BRA grid below shows the factors we use in determining the BRA of an issuer. A BRA Score is assigned for each of the factors relevant to a given issuer. These factors are shown in general order of importance below, but their actual importance at a given time can vary based on a firm's specific situation and circumstances. For each of the BRA factors, the grid below provides a general description of the credit drivers (in bullet point format) often associated with a given broad category score. The description of the credit drivers is not exhaustive; nor does it mean that each such driver is always relevant. Furthermore, depending on the specific situation and circumstance of an issuer, the individual BRA factor scores or the overall BRA can be outside of the range described below when the issuer exhibits very strong or very weak characteristics.

Independent Power Producer – BRA Factors

Contractual/Hedging/Position – Long-term PPAs are defined as power contracts that are longer than 10 years, which, when combined with a large base of strong investment-grade counterparties, can significantly mitigate a producer's exposure to commodity price risk and payment default risk. Additionally, if a contract has a take-or-pay feature on a substantial portion of its capacity, this can significantly reduce power production risk, subject to plant availability. If a contract is reasonably priced compared with the current and future spot market prices in which it operates, the recontracting risk will also be mitigated. These factors together form a good basis to measure the quality and stability of cash flow over the period of the contractual arrangement and beyond. Short-term hedges also mitigate exposure to merchant risk but are riskier than PPAs.

A	BBB	BB	B
• Most capacity under long-term PPAs. • Significant capacity payments. • Very strong investment-grade counterparties. • Very long remaining contract tenor versus the term of the debt. • Contracted pricing is highly protected from inflation risk. • Minimal recontracting price risk. • Minimal early contract termination risk.	• Significant portion of capacity under PPAs . • Considerable capacity payments. • Good investment-grade counterparties. • Long remaining contract tenor versus the term of the debt. • Contracted pricing is reasonably protected from inflation risk. • Some recontracting risk. • Low-to-modest early contract termination risk.	• Modest portion of capacity under PPAs. • Modest capacity payments. • Below investment-grade counterparties. • Modest remaining contract tenor versus the term of the debt. • Contracted pricing is exposed to inflation risk. • High recontracting risk. • High early contract termination risk.	• No-to-minimal capacity under PPAs. • No or minimal capacity payments. • Below investment-grade counterparties. • Short remaining contract tenor versus the term of the debt. • Contracted pricing is significantly exposed to inflation risk. • Very high recontracting risk. • Very high early contract termination risk.

Size and Cost Competitiveness – Size is an important factor to assess the risk profile of an IPP. Larger power producers may have more leverage when negotiating contracts, greater access to the capital markets, stronger liquidity, better operational and geographical diversification, and could even influence prices in some markets. A low-cost producer tends to compete better in the energy and capacity markets, with a better ability to cope with price volatility than higher-cost producers.

A	BBB	BB	B
• Large size within the respective market. • Low-cost producer.	• Medium size within the respective market. • Average-cost producer.	• Small size within the respective market. • High-cost producer.	• Very small size within the respective market. • Very high-cost producer.

Market Structure – The market structure and environment in which an issuer competes play an important role in determining the profitability of an IPP. A regulated market where power prices are set or influenced by the regulator (or governmental policies) will have different implications for IPPs than a market where power prices are determined by demand and supply fundamentals. Similarly, an environment where bilateral capacity contracts are allowed will have a different impact on IPPs than in a capacity-auction market. We view markets with weak demand, surplus of supply, high degree of political intervention, or lack of liquidity as being higher-risk.

A	BBB	BB	B
• Strong long-term demand in the region in which the issuer competes with tight reserve margins. • Low political risk/interference. • Very high barriers to entry in the markets in which the issuer competes.	• Reasonable long-term demand in the region in which the issuer competes with adequate reserve margins. • Modest political risk/interference. • High barriers to entry in the markets in which the issuer competes.	• Modest long-term demand in the region in which the issuer competes with high reserve margins. • High political risk/interference. • Low barriers to entry in the markets in which the issuer competes.	• Weak long-term demand in the region in which the issuer competes with very high reserve margins. • Very high political risk/interference. • Very low barriers to entry in the markets in which the issuer competes.

Diversification – We view geographical, fuel, and technological diversification as positive factors. Geographical diversification can reduce the concentration risk related to regulatory and political intervention within a single market or jurisdiction. Fuel and technological diversification can reduce the risk of operational outages caused by technological complexity (such as for nuclear), water flow/wind/weather conditions (hydro/wind/solar), or fuel cost volatility (natural gas and oil).

A	BBB	BB	B
• High fuel and technology diversification. • Minimal fuel supply risk. • High geographic diversification. • Low correlation in pricing among respective markets.	• Average fuel and technology diversification. • Modest fuel supply risk. • Average geographic diversification. • Some correlation in pricing among respective markets.	• Low fuel and technology diversification. • High fuel supply risk. • Minimal geographic diversification. • High correlation in pricing among respective markets.	• Minimal fuel and technology diversification. • Very high fuel supply risk. • Highly concentrated in one geographic area. • Very high correlation in pricing among respective markets.

Operational Expertise – Operational expertise refers to the ability of an IPP to develop and manage its power projects on time and within budget, and to maintain its operating assets and facilities in good working conditions in order to reduce outages and/or meet availability targets under contract. Good operational expertise can prevent prolonged or unplanned outages and thus reduce the risk of loss of production. We give higher scores for IPPs with good track records of project development and asset operations.

A	BBB	BB	B
• Very strong asset operator. • Extensive history of minimal unplanned outages. • Highly experienced asset developer with a long track record of developing assets on time and on or under budget.	• Strong asset operator. • Moderate level of unplanned outages. • Experienced asset developer with a good track record of developing assets on time and on budget.	• Weaker asset operator. • High level of unplanned outages. • Less experienced asset developer with a shorter track record and less success in past development.	• Poor asset operator. • Very high level of unplanned outages. • Minimal to no experience as an asset developer.

Asset Conditions and Complexity – Asset conditions refer to the quality and the remaining life of the assets. Other things being equal, the higher the quality and the longer the remaining life of an asset, the greater the cash flow generated to service debt. Good asset conditions also reduce future maintenance capex, which could improve the free cash flow for an IPP. Complexity refers to operational complexity; for example, a nuclear reactor would have a higher degree of operational complexity than a gas-fired generator, which means higher operational risk for nuclear operations.

A	BBB	BB	B
• Maintained in excellent working conditions. • Very long-term average asset life. • Simple asset complexity.	• Maintained in good working conditions. • Long-term average asset life. • Modest asset complexity.	• Maintained in below-average working conditions. • Short-term average asset life. • High asset complexity.	• Maintained in poor working conditions. • Very short-term average asset life. • Very high asset complexity.

Independent Power Producer Financial Risk Assessment

FRA Metrics

The FRA grid below shows the metrics used to determine the FRA of an issuer. While these FRA metrics are shown below, the ranking can vary by issuer. their actual importance at a given time can vary based on an issuer's specific situation and circumstances. Depending on the specific situation and circumstances of an issuer, the individual FRA metric scores or the overall FRA can be outside of the range described below when the issuer exhibits very strong or very weak characteristics.

- Our ratings are primarily based on future performance expectations, so while past metrics are important, any final rating will incorporate our opinion on future metrics, a subjective but critical consideration. This includes, for example, situations where an issuer has an aggressive financial governance policy.
- It is not unusual for a company's metrics to move in and out of the ranges noted in the grid below, particularly for cyclical industries. In the application of this matrix, we look beyond the point-in-time ratio.
- Financial metrics depend on accounting data whose governing principles vary by jurisdiction. We may adjust financial statements to permit comparisons with issuers using different accounting principles (e.g., U.S. GAAP versus IFRS).
- Appendix 3 to this methodology provides definitions for the FRA metrics in the table below as well as a discussion of common financial statement adjustments for IPPs. Please refer to the section addressing common adjustments for calculating financial ratios in *Morningstar DBRS Global Corporate Criteria*.
- Liquidity can be an important credit risk factor, especially for lower-rated non-investment-grade issuers. While ratios such as the current or quick ratio can give an indication of certain short-term assets in comparison with short-term liabilities, we will typically review all material sources of liquidity (including cash on hand, cash flow from operations, availability of bank and capital market funding, etc.) in comparison with all material short- and medium-term uses of liquidity (such as operations, capex, mandatory debt repayments, share buybacks, dividends, etc.).
- Profitability, particularly in the medium term, can be an important differentiator of credit risk. We may assess profitability through a variety of metrics, including return on capital.
- While free cash flow (i.e., net of changes in working capital, dividends, capex, etc.) can be volatile and, on occasion, negative, we may use this concept and/or other cash flow metrics, such as cash flow from operations, to assess a company's ability to generate cash to repay debt.

- We consider an issuer's financial policies, including factors such as its targeted financial leverage, its dividend policy and the likelihood of share buybacks, or other management actions that may favour equityholders over creditors.
- While market pricing information (such as market capitalization or credit spreads) may be of interest to us, particularly where it suggests that an issuer may have difficulty in raising capital, this information does not usually play a material role in our more fundamental approach to assessing credit risk.

Independent Power Producer – FRA Metrics

Metric	A	BBB	BB	B
Cash flow-to-debt (%)	> 35	15 to 35	7 to 15	0 to 7
EBITDA-to-interest (x)	> 7.0	4.0 to 7.0	2.0 to 4.0	1.0 to 2.0
Debt-to-capital (%)	< 30	30 to 50	50 to 65	65 to 90

- In addition to the standard key credit metrics, for high-growth companies that have large expansionary projects with low construction execution risk and long-term power purchase contracts with high-quality counterparties, we may also consider the companies' key credit metrics on a run-rate basis to address the timing mismatches between debt servicing obligations and the receipt of revenue that can arise during the development phase. Typically, adjustments are made to the incremental debt, interest expense, EBITDA, and/or incremental cash flows associated with the new expansionary projects.

Blending the BRA and FRA into a Core Assessment

- The core assessment is a blend of the BRA and FRA. For investment-grade issuers, the BRA will typically have greater weight than the FRA in determining the core assessment. For most non-investment-grade issuers, the BRA and FRA are typically weighted equally.
- At the low end of the rating scale, however, particularly in the B range and below, the FRA and liquidity factors play a much larger role, and the BRA would, therefore, typically receive a lower weighting than it would at higher rating levels.
- In addition, we also take into consideration the volatility of a company's FRA in arriving at the final rating. A company with more volatile credit metrics than its industry peers may be rated lower than it would otherwise be based on a blend of the BRA and FRA. The lower rating reflects the higher risk, especially in a downturn, associated with the increased volatility.

Overlay Factors

The overlay factors are the last consideration in the determination of the issuer rating. When deemed relevant and material to the analysis of an issuer, an overlay factor positively or negatively modifies the core assessment derived from the combination of the BRA and FRA, with the impact of a single factor potentially ranging from less than one notch to as much as several notches in the case of more significant factors. We consider both sector-specific and general overlay factors, which are outlined in the two sections that follow.

Sector-Specific Overlays

Capital Requirements

- For companies that pursue large expansionary projects, we will assess the risk associated with the size and complexity of the capital project and how the capital project fits into its current portfolio of assets and into the region in which it will operate. We will assess the company's ability and expertise to undertake such a large capital project. The extent of the company's flexibility to alter the timing and scale of a significant project is also a consideration.
- We will also assess the financing plans for such growth projects and the related impact on the company's financial and credit profile. Generally, we would expect growth capex for assets with a risk profile consistent with the current portfolio to be financed on a basis consistent with the company's existing leverage target. An analysis of construction risk mitigation is also an area of focus for a company that takes on significant capex.

Marketing and Trading Activities

- Companies that engage in marketing and trading activities that go beyond the scope of clearing a generator's own production (i.e., making large speculative bets) would be viewed negatively from a business risk perspective.

Power Retail and Other Business Exposure

- Power generators with significant power retail operations could have a different risk profile than a pure power producer. Retail operations tend to have higher risk than pure power producers because of intense competition due to low barriers to entry and generally weaker credit-counterparties, particularly if substantial retail loads consumed by industrial customers. We recognize, however, that retail operations could provide a natural hedge to a power generator. Retail operations without contracts or long-term contracts (two to five years) could expose the company to high churn rates.
- We will assess the risk of a power generator's retail operations and will adjust the rating score accordingly. If a power generator has other businesses and these businesses are sizable but not sufficiently material to be assessed under a different methodology, we will also assess the risk profile of these businesses and will make an adjustment to the overall risk profile of the power generator accordingly.
- We will also assess potential risks associated with rising fuel costs such as natural gas; if these risks are likely and material, their impacts could be reflected in the rating assessment.

General Overlays

Strategic Advantage or Impediment

- Strategic advantages or impediments not otherwise captured by BRA factors may include an exceptional brand, a unique product or process, or unusually large or small operations.

Parent-Subsidiary Relationship

- Various aspects of an issuer's corporate structure have the potential to positively or negatively influence the rating of that issuer. This may include the potential presence of structural subordination when the issuer is a holding company or the possibility of implicit support from a strong parent when the issuer is an important subsidiary of a broader corporate group. For more details, please refer to the section dealing with holding companies and parent/subsidiary relationships in *Morningstar DBRS Global Corporate Criteria*.

Other Financial Considerations

- Beyond the FRA metrics, many other financial factors reviewed as part of the rating process may point to material sources of credit risk. Such factors may include, but are not limited to (1) a strained liquidity position; (2) unusually high cash flow volatility relative to peers; (3) considerable uncertainty in the issuer's financial outlook owing, for example, to a recent large acquisition, an aggressive acquisition strategy or a rapidly changing competitive environment; (4) unduly large unfunded pension liabilities; or (5) weak financial policies as evidenced, for example, by a significant currency mismatch in the issuer's business or debt structure or significant refinancing risk. In contrast, substantial financial resources or other noncore valuable assets that can easily be monetized, if necessary, could potentially provide uplift to a rating.

ESG Considerations

- ESG factors may affect a credit rating and/or the related credit analysis. The impact of ESG factors may vary across industries, sectors, or asset classes and is described in the *Morningstar DBRS Criteria: Approach to Environmental, Social, and Governance Risk Factors in Credit Ratings*. Where an ESG factor is material to a corporate rating, but is not otherwise addressed in a BRA/FRA factor or other overlay, we will reflect the impact of the ESG factor on the rating through this general ESG overlay.

Sovereign Risk

- The issuer rating may, in some cases, be constrained by the credit quality of a sovereign. If the issuer operates in a lower-rated country or operates in multiple countries but a material amount of its business is conducted in that lower-rated country, we may reflect this risk by lowering the issuer rating. Please refer to Appendix C of *Global Methodology for Rating Sovereign Governments* for further information.

Rating the Specific Instrument and Other Criteria

- The issuer rating is an indicator of the likelihood of default of an issuer's debt and forms the basis for rating specific instruments of an issuer, where applicable. We use a hierarchy in rating long-term debt that affects issuers that have classes of debt that do not rank equally. In most cases, lower-ranking classes would receive a lower rating from us. For more detail on this subject, please refer to the general rating information contained in our Credit Ratings Global Policy.
- In addition to this methodology, *Morningstar DBRS Global Corporate Criteria* may be used from time to time in determining a credit rating. More specifically, sections of this criteria address recovery for non-investment-grade issuers, hybrid and preferred share considerations, commercial paper backup liquidity, as well as guarantees and other forms of support.
- For information on the relationship between short- and long-term credit ratings, please refer to our policy Short-Term and Long-Term Rating Relationships.

Appendix 1: Regulation

- To determine the BRA for regulation (see the Regulated Utility BRA section), we review the eight considerations found below, which assess the regulatory framework in which the utility conducts its business.
- The ranking of the factors is based on a five-point scale (excellent, good, satisfactory, below average, and poor).
- The first four factors are generally of greater importance than the others when assessing regulatory risk.
- While Considerations 1 to 5 can differ between utilities operating in the same jurisdiction, we typically view Considerations 6, 7, and 8 as the same for all utilities within the same jurisdiction.

Consideration 1: Deemed Equity Ratio

Definition

The deemed equity ratio is the percentage of equity investment in the rate base on which a utility could earn a return. In general, the higher the deemed equity ratio, the higher the earnings for a utility.

Score	Item (%)	Definition
Excellent	50.00+	• The deemed equity ratio represents 50.00% or more of the utility's rate base. • The treatment of the deemed equity ratio is consistent historically.
Good	45.00 to 49.99	• The deemed equity ratio represents 45.00% to 49.99% of the utility's capital structure. • The treatment of the deemed equity ratio is consistent historically.
Satisfactory	40.00 to 44.99	• The deemed equity ratio represents 40.00% to 44.99% of the utility's capital structure. • The treatment of the deemed equity ratio has not been consistent historically.
Below Average	35.00 to 39.99	• The deemed equity ratio represents 35.00% to 39.99% of the utility's capital structure. • The treatment of the deemed equity ratio has not been consistent historically.
Poor	Below 35.00	• The deemed equity ratio represents less than 35.00% of the utility's capital structure. • The treatment of the deemed equity ratio has not been consistent historically.

Consideration 2: Allowed ROE

Definition

Allowed ROE is a measurement of returns on the deemed equity portion of the rate base. The regulator assesses and sets an allowed ROE based on a utility's business risk level. These allowed ROE levels assume a current North American or Western European inflationary environment.

Score	Item (%)	Definition
Excellent	10+	• An allowed ROE is set at 10.00% or higher. • The regulatory treatment of allowed ROE has been consistent historically.
Good	9.00 to 10.00	• An allowed ROE is set at 9.00% to 10.00%. • The regulatory treatment of allowed ROE has been consistent historically.
Satisfactory	8.00 to 8.99	• An allowed ROE is set at 8.00% to 8.99%. • The regulatory treatment of allowed ROE has been consistent historically.
Below Average	7.00 to 7.99	• An allowed ROE is set at 7.00% to 7.99%. • The regulatory treatment of allowed ROE has not been consistent historically.
Poor	Below 7.00	• An allowed ROE is set at below 7.00%. • The regulatory treatment of allowed ROE has not been consistent historically.

Consideration 3: Energy Cost Recovery

Definition

Fuel and purchased energy (F&PE) cost recovery certainty and the timing of recovery are critical in our assessment of a regulatory system within a certain jurisdiction. We look at the following factors: (1) whether F&PE costs are fully passed through to the customers, (2) how often a utility is allowed to adjust the F&PE costs in retail rates charged to customers, and (3) if there is a mechanism within a jurisdiction to allow utilities to make F&PE cost adjustments with no or minimal regulatory review. In addition, we focus on the generation mix within a certain market. A high power cost market could have an impact on the utility's ability to recover the purchased power costs in a timely manner. We note that this factor is not applicable for water and waste-water utilities.

Score	Item	Definition
Excellent	Monthly/bimonthly	• F&PE costs are fully passed through. • Adjustment is made on a monthly basis. • There is an automatic adjustment mechanism. • The jurisdiction is in a favourable generation mix market, resulting in low power cost.
Good	Quarterly	• F&PE costs are fully passed through. • Adjustment is made on a quarterly basis. • There is an automatic adjustment mechanism. • The jurisdiction is in a favourable generation mix market, resulting in low power cost.
Satisfactory	Quarterly with regulatory review	• F&PE costs are fully passed through. • Adjustment is made on a quarterly basis. • F&PE cost deferrals are subject to some regulatory review. • The jurisdiction is in a good generation mix market.
Below Average	Annually with automatic adjustment	• F&PE costs are fully passed through, or utilities have minimal exposure to energy price volatility. • Adjustment is made on an annual basis and is subject to minimal or some regulatory review. • The jurisdiction is in a relatively high power cost market.
Poor	Annually with no automatic adjustment mechanism	• F&PE costs are fully passed through or utilities have minimal exposure to energy price volatility. • Adjustment is made on an annual basis. • F&PE cost deferrals are subject to regulatory review. • The jurisdiction is in a relatively high power cost market.

Consideration 4: Capital and Operating Cost Recoveries

Definition

In assessing CCR and OCR, we focus on the likelihood of a utility's capex being added to its rate base, along with the timing of such an addition. In addition, we focus on cost-inflation adjustments that could affect the timing of the OCR. In particular, we look at the following factors: (1) the utilization of future test periods for rate decisions, (2) whether the spending is allowed to be added to the rate base during the construction or will only be added when the project is completed, (3) the level of upfront capital spending required without regulatory approval, (4) the degree of regulatory lag and uncertainty with respect to the CCR, (5) whether or not there is a reasonable mechanism to deal with cost overruns, and (6) the degree of volume risk for the recovery of both capital and operating costs.

Score	Item	Definition
Excellent	Minimal CCR and OCR lag risk	• Work-in-progress costs can be added to the rate base if capex is significant. • Interim base-rate increases have been frequently authorized. • Future test periods are fully incorporated for rate-case decisions. • Rate cases are typically decided well within one year unless the rate cases are litigated or unusual circumstances occur. • There is a reasonable mechanism to deal with cost overruns. • No volume risk.
Good	Reasonable CCR and OCR lag risk	• Capital costs are added to the rate base after completion of work. • Interim base-rate increases have been authorized from time to time. • Future test periods are at least partially incorporated for rate-case decisions. • Rate cases are typically decided within one year unless the rate cases are litigated or unusual circumstances occur. • There is a reasonable mechanism to deal with cost overruns. • Some volume risk exists but is mitigated by either a high portion of rates being fixed or the use of deferral accounts.
Satisfactory	Modestly elevated CCR and OCR lag risk	• Capex is generally preapproved by the regulator, but there is some modest upfront capital spending before regulatory approval. • Interim base-rate increases have been rarely authorized. • Historical test periods are commonly incorporated for rate-case decisions. • Rate cases are typically decided within one year unless the rate cases are litigated or unusual circumstances occur. • There is a reasonable mechanism to deal with cost overruns. • Some volume risk exists but is mitigated by historically stable throughputs.
Below Average	Below-average CCR and OCR lag risk	• There is significant upfront capital spending before regulatory approval. • Interim base-rate increases have been rarely authorized. • Historical test periods are commonly incorporated for rate-case decisions. • Rate-case decisions typically take more than one year because of frequent court cases and other circumstances. • There are some mechanisms to deal with cost overruns. • Some volume risk exists due to a high portion of rates being variable.
Poor	Significant CCR and OCR lag risk	• Capex is generally not preapproved by the regulator. • Capital costs are added to the rate base after completion of work. • Utilities face significant regulatory lag risk with respect to the CCR and the OCR. • There is no meaningful mechanism to deal with cost overruns. • Rates are fully variable with no fixed components.

Consideration 5: COS Versus IRM

Definition

In general, under COS, regulated utilities are allowed to recover prudently incurred operating costs and earn a reasonable return on their investment. Under IRM, revenue requirements for the year are based on a COS base year, adjusted for inflation (using the CPI) and subtracting a productivity factor, which is set by the regulator. This forces utilities to maintain their operational efficiency to achieve allowed ROE. We view COS as lower risk than IRM. In addition, we also consider the length of an IRM period between COS years. Our scoring system gives a higher score for a shorter IRM period.

Score	Item	Definition
Excellent	COS	• The COS regime allows utilities to recover prudently and reasonably incurred operating costs.
Good	IRM (three years or shorter)	• The IRM regime is a maximum of three years between COS years. • For an IRM period of more than three years, there are reasonable mechanisms in place to mitigate unexpected capital investment and operating costs (i.e., downside protection). In addition, key IRM assumptions, including CPI and productivity factors, are reasonable.
Satisfactory	IRM (four- to five-year framework)	• The IRM period is four to five years.
Below Average	IRM (six- to 10-year framework)	• The IRM period is six to 10 years.
Poor	IRM (10-plus years)	• The IRM period is more than 10 years.

Consideration 6: Political Interference

Definition

Political interference refers to political risk that could occur within a jurisdiction. Political interference could be in the following forms: (1) influence on the regulator's ability to independently and impartially arrive at a decision, (2) passing legislation to override a decision made by the regulator, and (3) the regulator is elected instead of appointed.

Score	Definition
Excellent	• There is no government influence on the regulatory decision-making process. • There has been no adverse legislation in the regulated utility sector. • The regulator is appointed.
Good	• There is a low degree of government influence on the regulatory decision-making process. • There has been no adverse legislation in the regulated utility sector. • The regulator is appointed.
Satisfactory	• There is a low degree of government influence on the regulatory decision-making process. • There has been no adverse legislation in the regulated utility sector. • The regulator is appointed or elected.
Below Average	• There is a modest degree of government influence on the regulatory decision-making process. • There has been no adverse legislation in the regulated utility sector. • The regulator is appointed or elected.
Poor	• There is a high degree of government influence on the regulatory decision-making process. • There has been some adverse legislation in the regulated utility sector. • The regulator is appointed or elected.

Consideration 7: Stranded Cost Recovery

Definition

Stranded costs occur when a utility has already incurred costs (F&PE, operating cost, or capital spending) and faces uncertainty as to when it can recover these costs. In some cases, stranded costs are written off if it is certain that these costs cannot be recovered. We look at the following factors: (1) whether stranded costs exist and their magnitude, (2) the likelihood of recovering stranded costs, (3) the frequency and materiality of writedowns, and (4) the time it takes to recover these costs.

Score	Item	Definition
Excellent	No stranded cost	• No stranded costs associated with legitimate or reasonable costs incurred by utilities.
Good	Full recovery	• Some stranded costs exist. • Stranded costs are fully recovered in a timely manner. • No historical stranded cost writedowns.
Satisfactory	Occasional writedowns	• Some stranded costs exist. • Stranded costs are recovered but subject to some regulatory lag. • Occasional writedowns.
Below Average	Frequent writedowns	• Some stranded costs exist. • Stranded costs are sometimes recovered. • Frequent writedowns. • Takes considerable time to recover costs.
Poor	Frequent significant writedowns	• Significant stranded costs exist. • Stranded costs are not fully recovered. • Significant writedowns occur. • Significant regulatory lag associated with the recovery.

Consideration 8: Rate Freeze

Definition

A rate freeze refers to a fixed retail rate that is charged to customers during a period of time (more than two years) set by a regulator. We do not typically penalize a utility for rate freezes that are part of an acquisition settlement agreement, as they are temporary in nature and only for a set period. During the rate-freeze period, utilities are exposed to increases in operating and energy costs. The longer the rate-freeze period or the more frequency with which a rate freeze occurs within a jurisdiction, the riskier it is for the utility.

Score	Item	Definition
Excellent	Never	• Rates are never frozen.
Good	Potential	• Rates have the potential to be frozen.
Satisfactory	Occasional	• Rates are occasionally frozen. • The frozen period is fewer than three years.
Below Average	Frequently	• Rates are frequently frozen. • The frozen period is fewer than three years.
Poor	Rate freeze	• Rates are currently frozen. • The frozen period is three years and longer.

Appendix 2: Independent System Operators

Independent System Operators (ISO) are typically not-for-profit organizations[8] responsible for managing the electricity market within a jurisdiction. The role of an ISO typically includes (1) balancing the demand and supply of electricity, (2) dispatching power from facility owners, and (3) planning for the system's future transmission and generation needs.

We consider ISOs to have two important similar characteristics as a regulated utility: (1) ISOs provide an essential service and (2) operating costs of an ISO are recovered through tariffs approved by a regulator and charged to participants in the electricity market. Unlike a regulated utility, however, the business of an ISO is not capital intensive and, as they are not-for-profit organizations, operate on a cost-recovery basis. As such, when assessing the FRA of an ISO, we do not focus on the FRA metrics.

We also take into consideration the independence of the ISO from governmental and political interference. If we determine an ISO receives support from the government (i.e., financial support or major legislative directives), we will apply the section discussing guarantees in *Morningstar DBRS Global Corporate Criteria*, and the ratings of the ISO could then be uplifted to, or capped by, the ratings of the corresponding government.

When evaluating an ISO, we assess, among other criteria, the major factors outlined below.

8. This appendix only applies to not-for-profit ISOs.

BRA Factors

Regulation/Legislation – In assessing the regulatory and legislative framework for an ISO, we focus on the ability of the ISO to pass on all costs to market participants and the timeliness of the recovery. To determine the BRA for regulation/legislation, we review five considerations (see Appendix 1) to assess the regulatory/legislative framework in which the ISO conducts its business. The five considerations include the following: (1) CCR and OCR, (2) COS versus IRM, (3) political interference, (4) stranded cost recovery, and (5) rate freeze.

AA	A	BBB	BB/B
• Highly supportive regulatory/legislative framework with the majority of relevant key regulatory risk factors in Appendix 1 considered to be "excellent."	• Supportive regulatory/legislative framework with the majority of relevant key regulatory risk factors in Appendix 1 considered to be "good" or better.	• Reasonable regulatory/legislative framework with the majority of relevant key regulatory risk factors in Appendix 1 considered to be "satisfactory" or better.	• • Poor regulatory/legislative framework with the majority of relevant key regulatory risk factors in Appendix 1 considered to be "below average" and/or "poor."

Franchise and Customer Mix – As the operating costs of an ISO are recovered from market participants, we assess the economic strength of an ISO's jurisdiction as well as the number of customers in order to determine the likelihood of the ISO's being able to recover its costs. Jurisdictions with a higher proportion of residential and commercial customers also possess the ability to better weather economic downturns than those with a greater number of industrial customers, which are more inclined to seek lower-cost or more reliable suppliers and are prone to economic cyclicality.

AA	A	BBB	BB/B
• Economically vibrant service territory, with income that is significantly above the national average. • ISO has a significant customer base (i.e., large metropolitan area or province/state). • Customer and load mix predominantly residential and commercial.	• Economically strong service territory, with income above the national average. • ISO has a sizable customer base. • Customer and load mix heavily weighted toward residential and commercial.	• Economically stagnant service territory, with income that is in line with the national average. • ISO has a reasonably sized customer base. • Customer and load mix a balance of residential and commercial versus industrial.	• Economically weak service territory, with income that is below the national average. • ISO has a shrinking customer base. • Customer and load mix weighted toward cyclical industrials.

FRA Factors

In assessing the FRA of an ISO, we focus on the liquidity in place for the ISO's day-to-day operations. We also review the annual surplus and deficit of an ISO to determine if it is consistently under-collecting from market participants, as (1) costs are then not fully recovered from market participants and (2) the accumulated deficit may become stranded and will have to be absorbed by the ISO.

Appendix 3: FRA Ratio Definitions and Common Adjustments for the Regulated Utility and Independent Power Producer Industries

The FRA metrics cited in Regulated Utility - FRA Metrics and Independent Power Producer - FRA Metrics tables above are defined below, with a discussion of common adjustments that are made for the regulated utility and IPP industries. For related definitions and a broader discussion of the common adjustments made to the accounting data to permit ratio comparability between issuers, please refer to the section on common adjustments for calculating financial ratios found in *Morningstar DBRS Global Corporate Criteria*.

CASH FLOW-TO-DEBT = CASH FLOW FROM OPERATIONS/TOTAL DEBT

Cash flow from operations = core net income + depreciation + amortization + deferred taxes + other noncash items from income statement (before changes in noncash working capital items).

Total debt[9] = short-term debt + long-term debt + hybrid debt portion + preferred share debt portion + capital leases.

DEBT-TO-CAPITAL = TOTAL DEBT/TOTAL CAPITAL

Total capital = short-term debt + long-term debt + total hybrids + total preferred equity + total common equity + minority interest.

EBIT-TO-INTEREST = EBIT/GROSS INTEREST EXPENSE

EBIT = revenue – cost of goods sold – selling, general, and administrative expenses – depreciation – amortization.

Gross interest expense = all interest expense + debt hybrid interest expenses + capitalized interest.

EBITDA-TO-INTEREST = EBITDA/GROSS INTEREST EXPENSE

EBITDA = revenue – cost of goods sold – selling, general, and administrative expenses.

We may adjust certain inputs used in the calculation of the FRAs in order to better assess such metrics relative to an issuer's peers. In the regulated utility and IPP industries, we typically adjust debt and interest expense amounts for operating leases, notwithstanding that these amounts may not be

9 Please refer to the Morningstar DBRS Global Corporate Criteria for an explanation regarding the inclusion of on balance sheet lease liabilities in total debt and other related adjustments.

material. Additionally, in rare cases, we also consider net debt amounts in the case of large companies with a long history of maintaining significant cash or equivalents on the balance sheet.

About Morningstar DBRS

Morningstar DBRS is a full-service global credit ratings business with approximately 700 employees around the world. We're a market leader in Canada, and in multiple asset classes across the U.S. and Europe.

We rate more than 4,000 issuers and nearly 60,000 securities worldwide, providing independent credit ratings for financial institutions, corporate and sovereign entities, and structured finance products and instruments. Market innovators choose to work with us because of our agility, transparency, and tech-forward approach.

Morningstar DBRS is empowering investor success as the go-to source for independent credit ratings. And we are bringing transparency, responsiveness, and leading-edge technology to the industry.

That's why Morningstar DBRS is the next generation of credit ratings.

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Data Source for:

Figure A1.1
- Long-Term Canada Bond Yields v. Forecasts (2011-2023)

Table A1.1 – Statistics for Long-Term Canada Bond Yield Forecasts (2011-2013)

Canadian Energy Regulator (National Energy Board) Actuals[1]			
	Base ROE	GOC (November Consensus Forecast)	ERP Including 0.50% Flotation Allowance (Basis Points)
RH-2-94	12.25	9.25	300
Adjustment:		75%	
Letter Decision October 8, 2009			
	Suspended		
Year	**ROE**	**GOC (November Consensus Forecast)**	**ERP Including 0.50% Flotation Allowance (Basis Points)**
1995	12.25	9.25	300
1996	11.25	7.92	333
1997	10.67	7.14	353
1998	10.21	6.53	368
1999	9.58	5.69	389
2000	9.90	6.12	378
2001	9.61	5.73	388
2002	9.53	5.63	390
2003	9.79	5.98	381
2004	9.56	5.68	388
2005	9.46	5.55	391
2006	8.88	4.78	410
2007	8.46	4.22	424
2008	8.71	4.55	416
2009	8.57	4.36	421
2010	*8.52*	*4.30*	*422*
2011	*8.08*	*3.72*	*436*
2012	*7.58*	*3.06*	*452*
2013	*7.23*	*2.59*	*464*
2014	*7.93*	*3.52*	*441*
2015	*7.64*	*3.14*	*450*
2016	*7.38*	*2.79*	*459*
2017	*6.86*	*2.10*	*476*
2018	*7.36*	*2.76*	*460*
2019	*7.44*	*2.87*	*457*
2020	*6.63*	*1.79*	*484*
2021	*6.40*	*1.49*	*491*
2022	*6.98*	*2.26*	*472*
2023	*7.88*	*3.45*	*443*

Canadian Energy Regulator (National Energy Board) Pro-Forma[2]			
	Base ROE	GOC (November Consensus Forecast)	ERP Including 0.50% Flotation Allowance (Basis Points)
Metrics:	12.25	9.25	300
Adjustment:		50%	
Year	**ROE**	**GOC (November Consensus Forecast)**	**ERP Including 0.50% Flotation Allowance (Basis Points)**
1995	12.25	9.25	300
1996	11.58	7.92	367
1997	11.20	7.14	405
1998	10.89	6.53	436
1999	10.47	5.69	478
2000	10.68	6.12	457
2001	10.49	5.73	476
2002	10.44	5.63	481
2003	10.62	5.98	464
2004	10.47	5.68	479
2005	10.40	5.55	485
2006	10.02	4.78	524
2007	9.74	4.22	552
2008	9.90	4.55	535
2009	9.81	4.36	545
2010	9.78	4.30	548
2011	9.49	3.72	577
2012	9.16	3.06	610
2013	8.92	2.59	633
2014	9.39	3.52	587
2015	9.20	3.14	606
2016	9.02	2.79	623
2017	8.68	2.10	658
2018	9.01	2.76	625
2019	9.06	2.87	619
2020	8.52	1.79	673
2021	8.37	1.49	688
2022	8.76	2.26	650
2023	9.35	3.45	590

Notes:
1. RH-2-94 suspended October 9, 2009. Published annually thereafter for the convenience of parties
2. Proforma.

Ontario Energy Board Actuals[1]				
	Base ROE	GOC (September Consensus Forecast)	A-Rated Utility Bond Spread	ERP Including 0.50% Flotation Allowance (Basis Points)
RP-1998-0001/ EB-2006/0087/ 0088	9.35	5.50	N/A	385
Adjustment:		75%	N/A	
EB-2009-0084	9.75	4.25	1.415	550
Adjustment:		50%	50%	
Year	**ROE**	**GOC (September Consensus Forecast)**	**A-Rated Utility Bond Spread**	**ERP Including 0.50% Flotation Allowance (Basis Points)**
1999	*9.35*	*5.50*	*N/A*	*385*
2000	*9.88*			
2001	*9.88*			
2002	*9.88*			
2003	*9.88*			
2004	*9.88*			
2005	*9.88*			
2006	*9.00*			
2007	*9.00*			
2008	*8.57*	*4.46*	*N/A*	*411*
2009	*8.01*	*3.71*	*N/A*	*430*
2010	9.85	4.46	1.41	539
2011	9.66	3.94	1.54	572
2012	9.42	3.40	1.61	602
2013	8.93	2.58	1.46	635
2014	9.36	3.40	1.48	596
2015	9.30	3.38	1.39	592
2016	9.19	2.71	1.83	648
2017	8.78	2.04	1.68	674
2018	9.00	2.76	1.40	624
2019	8.98	2.71	1.42	627
2020	8.52	1.70	1.52	682
2021	8.34	1.37	1.48	697
2022	8.66	2.14	1.35	652
2023	9.36	3.23	1.65	613

1. Single-factor formula approved in RP-1998-001/EB-2006-0087/0088 was reset and refined in EB-2009-0084 dated December 11, 2009.

Oliver Wyman 2015

OLIVER WYMAN

NORTH AMERICAN UTILITIES: STILL A SMART BET FOR THE NEW GRID

NEW OLIVER WYMAN ANALYSIS FINDS A SOLID FOUNDATION FOR EARNINGS GROWTH EVEN WITH COMING CHANGES

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The warnings of competitive threats to the US utility industry have sounded as the new smart electric network begins to evolve and develop and new distributed solar and wind generation finds traction in the market.

The threats are real, but a new analysis from Oliver Wyman suggests that utilities have a solid foundation to participate, grow, and deliver strong investor returns in the North American market.

MARSH & McLENNAN COMPANIES

Many recent analyses focus on the bleak outlook and dire consequences that the competitive dynamics of the new smart electric grid will have on utilities, especially electric utilities. Our new analysis evaluates and focuses on the strong foundation that utilities have, especially with future rate base and earnings growth, to be successful in the energy market. During the next 15 years, Oliver Wyman expects utility earnings will grow 3% to 4% annually, with upside if utilities change smartly in the face of the new competition. The smart grid can enable utilities to thrive, not wither.

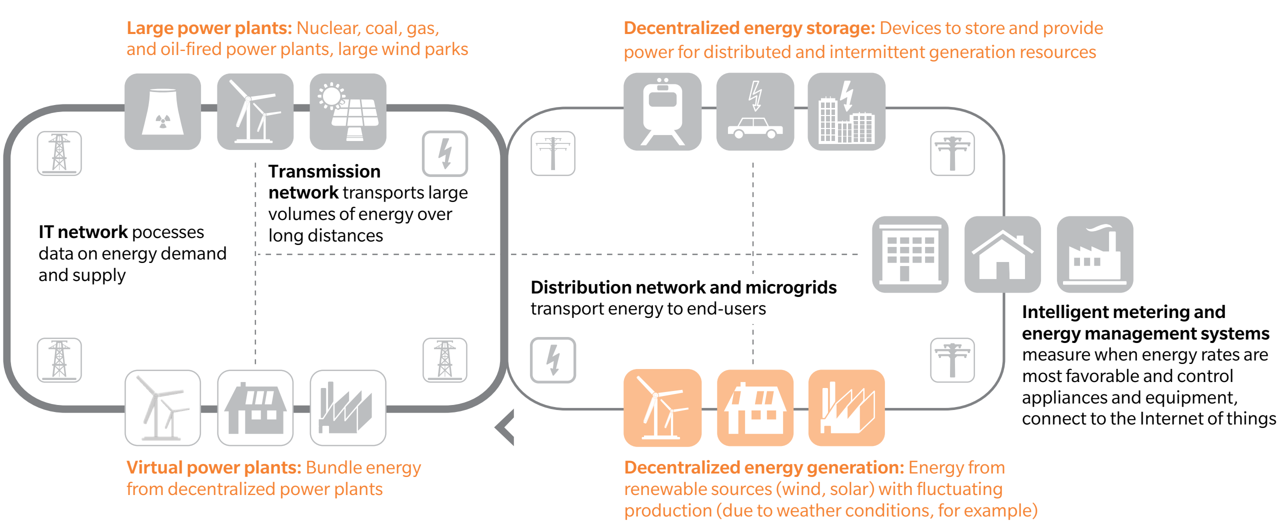
Change in the utility business is inevitable, and key customer segments will demand greater control and choice over their energy decisions. Customer demand and technological innovation will create sizable profit pools and invite new entrants and stronger competition.

However, the North American utility model works well for most customers, regulators, and investors. To continue their strong performance, utilities will need to alter their business models. In the future, utilities can lead and achieve stellar financial results. As long as they meet changing customer needs while helping shape regulations, there is good reason to believe that utilities can prosper while capitalizing on opportunities.

1. THE NETWORK: THE NORTH AMERICAN SMART GRID OPENS OPPORTUNITIES FOR MANY

Oliver Wyman believes that the traditional centralized grid will remain relevant, but decentralized energy resources, as their economics improve, will be the new building blocks in the industry. With the new grid, consumers will have more control and more choices. Consumers can monitor, analyze, and adjust usage based on the information at hand. They will be able to choose a range of distributed generation resources – and not just solar – thanks to innovative energy storage technologies. The old grid and centralized resources will still be around, but new technologies will proliferate (Exhibit 1).

Exhibit 1: Electric network of the future



Source: Oliver Wyman analysis

2. ENERGY CUSTOMERS: WHAT CHANGES DO THEY REALLY WANT?

Customers, not ratepayers, rule markets, even in the utility business. Clearly, some customer segments in North America will demand greater control and choice over their energy decisions. Today, there is a lot of rhetoric about the power of the new grid, usually from energy market entrants who want to encourage purchasing or financing to build their businesses. In North America, one has to be careful to not over-hype the new grid, at least in the short term.

Consumer marketers targeting North America have long considered utilities – electricity, natural gas, and water – to represent low involvement categories of consumer spending. Simply put, consumers want these basic services always there when they need them at a reasonable price. Most consumers spend little time fretting over their utility. There are much more important things to spend their time and effort on, like housing, vacations, cars, mobile phones, clothing, and other higher involvement categories of consumer spending. Energy's place in the pecking order dampens demand for change and innovation.

Additionally, utility costs represent a tiny percentage of a consumer's income. In 2013, consumer spending for electricity, natural gas, and other fuels represented only about 3% of a consumer's before-tax income

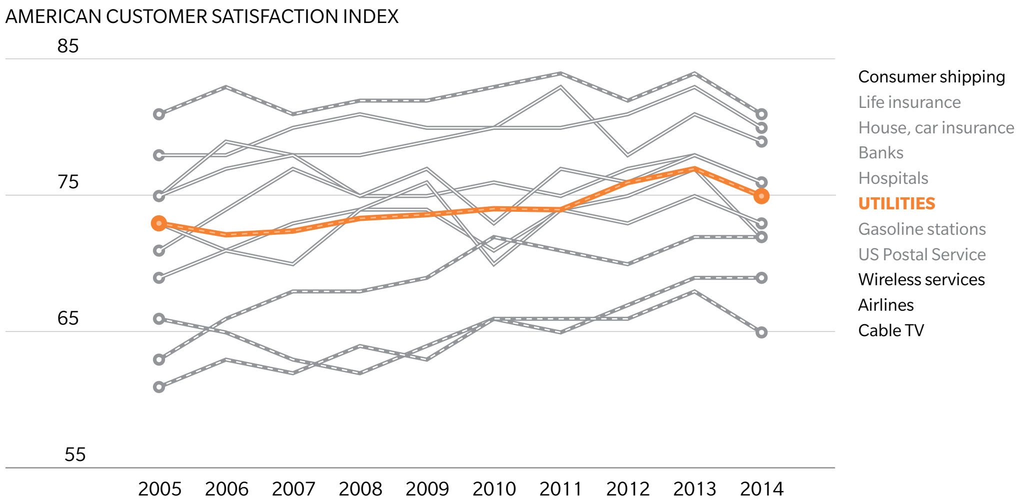
There may be a sizable segment of the North American consumer market that will become highly engaged in energy decisions – at minimum 10%, perhaps 25%, or maybe more. However, the overall tone of segmentation studies is that most North American consumers expect cost savings in order to change their behavior. Particularly noteworthy: There is small interest in changing energy behavior in a big way for environmental reasons. In a nutshell, many consumers say, *"If I can achieve savings with no hassles, by all means sign me up! Show me the money, but do not put me through hoops or expose me to risks I do not understand to cut my bill."*

So how about future cost savings in energy spending? According to Oliver Wyman's work with the World Energy Council for its World Energy Trilemma report, the US continues to be the top-ranked country in "energy equity" since the rankings began in 2010. Utility-related services in the US are cheap and accessible to the entire population compared to the rest of the world. In a low involvement category, cheap and accessible is not a significant call to action for most consumers.

How about the future? At least for the near term, North America has bountiful supplies of energy, especially driven by the shale gas revolution. Real electricity prices to residential consumers should rise minimally, maybe less than 0.5% per year over the next 15 years. Furthermore, North Americans have a range of energy-efficiency programs already in place or planned over the next few years. Total residential energy use most likely will remain flat and may even drop. Therefore, the overall energy bill, which is what consumers are really concerned about, should not change much, especially relative to other categories of spending. The energy bill may actually fall when considering real income growth. Again, a flat bill suggests there may be limited opportunities for cost savings, dampening consumer interest in change.

Past utility customer satisfaction ratings echo the overall place of utilities in the North American consumer marketplace. According to the American Customer Satisfaction Index (Exhibit 2), utilities have ranked right in the middle of the pack across service categories in the US over the last decade. Residential consumers find utility service generally acceptable compared to other services. Note the ranges of performance, both good and bad, across higher involvement categories – package shipping (FedEx, UPS) representing the good, and airlines and cable TV representing the bad. In addition, consumer satisfaction with wireless services has increased significantly over the period due to heightened consumer interest and the growth of smart phones. A warning to utilities as innovation and the grid develop? Yes, you better believe it, but perhaps at a lower decibel than higher involvement categories.

Exhibit 2: US customer satisfaction with services



3. THE NEWCOMERS: MULTIPLE BREEDS OF COMPETITORS EMERGE BUT WILL THEIR BUSINESS MODELS WORK?

There is no doubt that the new grid will unleash a wave of innovation and entrants into the market for utility services. North America already has a plethora of new publicly traded companies in residential solar, distributed generation, battery storage, energy services of various shapes, natural gas vehicles, and wind, bio, ocean, and other fuel sources. Workers in offices and labs from Massachusetts to Texas to the Silicon Valley work tirelessly to prep the next wave of energy IPOs. Do they represent competitors for utilities? Absolutely. However, the competitive threat from these entrants is difficult to ascertain. According to Value Line, the more than 30 new entrants it covers that have a focus on North America collectively generated about $20 BN in sales in both 2013 and 2014. However, these entrants were generally unprofitable. The median after-tax income margin for these companies was -1.3% in 2013, which worsened to -5.5% in 2014. Half had negative cash flow. Do not even ask about return on equity or capital employed. Looking ahead, analysts expect 60%

to remain unprofitable over the coming years. In contrast, in 2014, the average after-tax operating margin of a utility was 7.5%, the average return on equity was 8.1%, and each and every utility was profitable. Utility operating activities provided over $88 BN of cash that was used to pay more than $21 BN in dividends to investors.

Many of the entrants have not figured out a business model that works. They are still formulating their target customers, developing their product and service offers, understanding how to become profitable and sustain performance, and building their operating models. It is difficult to envision many of these companies offering continued cost savings to consumers. Burning through cash is plainly not sustainable. Of course, many will not succeed and just fade away or be gobbled up by others.

Excluded from the above analysis are those relatively new publicly traded energy companies that develop large-scale wind and solar projects and sell the capacity and output to utilities under profitable long-term contracts. In general, investors view these companies positively because of their steady long-term cash flows and the creditworthiness of the counterparties (e.g. the utility). The current utility model works very well for this type of entrant.

Of course, an 800-pound gorilla could emerge from the pack. The favorite is not clear and may not be clear until much later, say 2040 or beyond. Google's acquisition of Nest in 2013 certainly created a stir in the energy industry. However, Google's acquisition and positioning may be more about developing the connected home and the larger Internet of things rather than the energy market. There is no doubt that Google represents a strong future competitor. In announcing the Nest deal, Google highlighted the shared values of the two companies with "both of us [believing] that technology should be doing the hard work so that people can get on with their lives and do great things." If Google or another company should figure it out on energy, this is an ominous competitive threat even for utilities in a low involvement sector where most customers are already getting on with their lives. Replacement of utilities by a Google is a scary long-term value proposition.

4. THE MOST IMPORTANT STAKEHOLDER: REGULATORS AND REGULATIONS WILL OF COURSE ADJUST BUT THE UTILITY FRAMEWORK ENDURES

Changing customer demands? New entrants and competitors? This much is certain: The states – governors, legislatures, and especially the state public utility commissions – and the federal government will step in.

While we see regulatory change as inevitable, we doubt there will be fundamental change in the utility operating model. The regulatory compact (see Exhibit 3) will continue. In return for monopoly franchise rights and cost recovery, the utility's obligation to serve and its obligation to the community will continue. The utility model will still be front and center in providing safe, reliable, and reasonably priced service to customers.

Exhibit 3: The US utility regulatory compact

FOR RATEPAYERS/COMMUNITY

- Reasonable utility rates
- Reliable utility service
- Safe delivery
- Infrastructure investment
- Service provided to all community members
- Single entity responsible for providing service
- Operating and financial transparency

FOR THE UTILITY

- Monopoly service provider
- Assured revenue stream
- Steady profits
- Assured return on capital invested
- Investment grade credit to lower borrowing costs
- Eminent domain

PUBLIC UTILITY COMMISSIONS
STATE EXECUTIVE
STATE LEGISLATURE

Will regulatory change occur? Absolutely. How might these changes evolve? Current regulatory proceedings provide some hints that utilities will still play crucial roles.

- New York's Reforming the Energy Vision proceeding clearly outlines the utility's role as the distribution provider but limits utility ownership in distributed energy resources markets. However, the door is open even in a challenging regulatory state such as New York for large utility investment in the grid, utility use of data and information to improve service, and even third-party utility ownership of utility-scale renewables.
- Massachusetts' grid modernization plans suggest continued utility involvement in reducing outages, optimizing peak demand, integrating distributed resources, and improving workforce and asset management.
- California's grid modernization proceedings place the utility at the forefront in developing and implementing distribution resource plans.

Different states have different views of the utility of the future, depending upon the state or region-specific generation and policy mix. Consequently, there is no standard operating model across the US, leaving the states to experiment with various frameworks (see Exhibit 4).

US utility commissions are increasingly grappling with cross-subsidization as they take up proposed changes to rate design. Although specifics of rate design plans vary from state to state, the proposals all attempt to make monthly utility bills less sensitive to volumetric changes.

But PUCs and state governments clearly recognize that the US utility model delivers world-class service.

Equity and bond investors are happy with this business model, too. Steady, stable financial returns lead to robust debt coverage ratios and superior bond ratings. Stable, growing profits lead to safe and consistently rising dividends. Is there huge upside? Probably not. But many private investors and infrastructure funds would gladly add a utility to their investment portfolios if they could buy one. Billionaire investor Warren Buffet likes utilities a lot. Demand outstrips supply. The high multiples that utilities are paying to acquire other utilities suggest that they, too, know a good thing when they see it.

Rating agencies and stock analysts know the deal that is the regulatory compact. Stable and sufficient cash flow is king and that's the typical utility business model.

- **From Moody's:** *"Our stable outlook for the US regulated utility industry is based on our expectation that regulatory support will continue to help utilities recover costs and maintain stable cash flow, even with competition from distributed generation or energy-efficiency efforts that keep overall demand growth low."*
- **From S&P:** *"Our fundamental view of the sector is a stable one, supported by the essential nature of the services provided, making the companies somewhat insensitive to economic fluctuations; the rate-regulated nature of the business, which lends a measure of stability and predictability to cash flow generation; and the generally supportive posture of regulators toward cost recovery of incremental investments facilitated by the ongoing low power prices."*
- **From Warren Buffet:** *"Our utility subsidiary is one of our 'Powerhouse Five' [of major lines of business. ... [A] key characteristic is [its] huge investment in very long-lived, regulated assets. ... Factors ensure the [utility's] ability to service its debt under all circumstances ... [and] recession-resistant earnings, which results from these companies exclusively offering an essential service. ... Our confidence is justified ... by the knowledge that society will forever need massive investments in ... energy. It is in the self-interest of governments to treat capital providers in a manner that will ensure the continued flow of funds to essential projects. It is meanwhile in our self-interest to conduct our operations in a way that earns the approval of our regulators and the people they represent."*

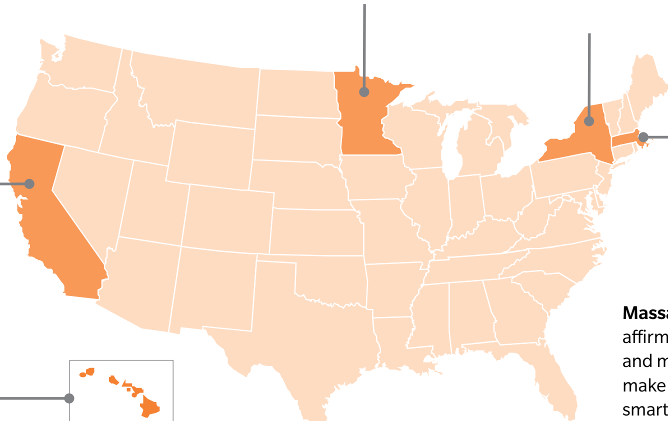
Exhibit 4: Shaping the future utility operating model

SELECTED EXAMPLES OF REGULATORY PERSPECTIVES

California has aggressive carbon reductions targets and renewable distributed generation will play a key role. California is working on methods to incorporate distributed energy into system planning and is pursing tariffs that favor consumer generators

Minnesota is creating a value-of-solar tariff to replace traditional net metering at retail rates. Furthermore, Minnesota's e21 initiative (a public-private working group) is proposing performance-based rates for utilities

New York's Reform the Energy Vision program relies on utilities to create a distribution system platform for the integration of distributed energy. Utilities would retain their role in maintaining the distribution platform and ensuring reliability. Some safeguards would ensure fair market access



Hawaii wants to capture the benefits of solar PV to reduce high generation costs. Energy storage, microgrids, and virtual power plants may provide solutions to maximize the value of solar, handle overfeed situations, and reduce costs

Massachusetts requires utilities to take affirmative action to install advanced metering and modernize the electric grid. Utilities should make use of distributed energy resources, smart metering, and time-of-use rates in distribution planning

- But of course there are elements of risk. **From Barclay's:** *"Valuations suggest credit investors are depending on the 'regulatory compact' (whereby the monopoly utility agrees to invest in assets to service customers in return for prices that are set to allow them a reasonable return) to give sufficient protection from industry changes. While the regulator/utility construct has usually resulted in low-risk returns to credit in the past, technological change creates precisely the environment where slower-moving incumbents and their regulators can fall behind the curve, risking credit volatility, or disrupt the regulatory compact, possibly leading to unexpected losses for bondholders."*

Are there future risks to the utility business model? Of course. But overall, the utility business is a good business.

5. THE GROWTH CHALLENGE: THE NEXT 15 YEARS

What do all the opportunities, threats, and changes mean, especially for North American utilities? Oliver Wyman's new analysis and forecast for utility earnings growth suggests utilities have a strong foundation for success over the next 15 years: long-term earnings for utilities should grow at least 3% per year. This represents a solid starting point for competing in the world of the new grid.

Our new analysis and forecast are built on our worldwide work for and support of the World Energy Council and our consulting work in the North American markets.

A number of factors shape our forecast for utility earnings.

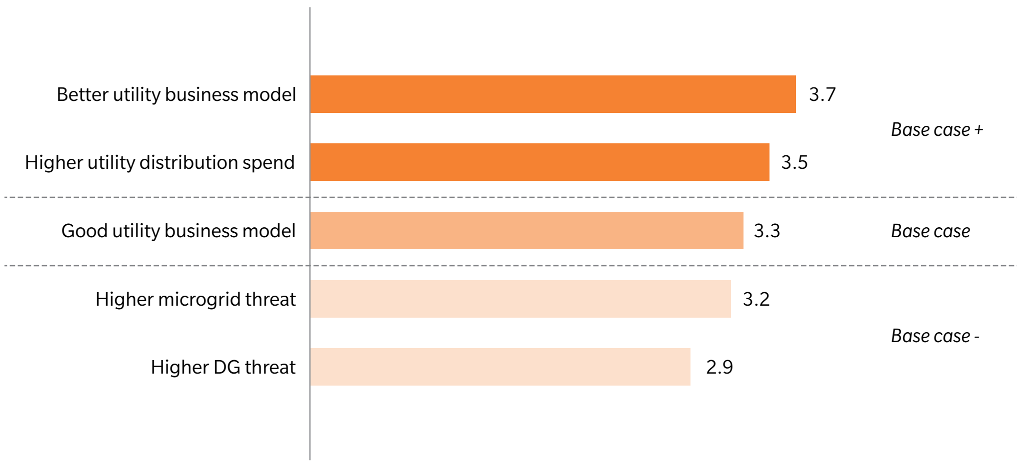
- **Electric distribution:** continuing significant and increasing investment in electric distribution to replace aging infrastructure, to build the network of the future, and to accommodate distributed resources.
- **Electric transmission:** tapering but steady investment in new transmission as the near-term build-out is completed and more distributed resources hit the market.
- **Generation:** continuing utility investment in a portfolio of generation resources (in states where utilities can invest in generation), offset with a significant increase of predominantly non-utility investment in distributed resources.

  As the US Environmental Protection Agency works to decarbonize the energy sector, the Clean Power Plan presents a huge growth opportunity for many utilities. Hundreds of gigawatts of new natural gas and renewable generation along with new transmission will be needed to comply with the regulations.
- **Gas transmission and distribution:** for the utilities that also have gas business, a doubling of spending for gas distribution and transmission to enable ample and price-competitive gas to reach end-users, including power generators.

What does it all mean for utility earnings? Well, it is not all that bad. **Oliver Wyman's most likely market scenario suggests that utility earnings will grow on average about 3.3% annually during the next 15 years.** That's not bad a starting point at all – not superb but not a death spiral either.

Exhibit 5: New Oliver Wyman forecast: US utility earnings growth

2014–2030
PERCENT PER YEAR



Sure, there is downside, but the customer, regulatory, and competitive factors tend to mitigate any chance of free fall.

- **More distributed resources:** A higher penetration of non-utility resources negatively impacts utility profitably. A tripling of the penetration over our base case assumptions lowers earnings growth to under 3% per year.
- **More non-utility microgrids:** A small but significant increase in non-utility investment through microgrids has less of a negative impact. Our forecast suggests that higher non-utility distribution investment, predominantly in microgrids, will slow utility earnings growth marginally, by only 0.1% annually to 3.2%.

It is hard to get excited about 3% per year earnings growth – yes, a secure and growing dividend helps. And certainly Oliver Wyman's analysis suggests that earnings growth will be less than the 4% to 6% range that many utilities have touted and delivered during the recent period of exemplary utility stock performance.

So where does a utility CEO look for higher earnings growth?

Many believe that our aging utility infrastructure needs even more investment to continue the high levels of service that we enjoy. Investing an additional 20% in electrical distribution will drive the growth rate to 3.5%. Want more? Shaping the regulatory environment to allow the utilities to participate and invest in the majority of distributed resources, either as part of rate base or as non-regulated activities, might add 10 or 20 basis points, to top out at 3.7% annually.

Utilities will continue to be a solid business, but not the growth engine that they have been recently. Is Oliver Wyman being boring in its estimates? We do not think so: Our belief is that this forecast represents the new reality for utilities. Where is the catastrophic death spiral? We do not believe there will be one. The cry for change is too weak and the fundamental utility business model is too strong in North America.

Our bottom line: We would still hold.

6. ON THE PATH TO HIGHER UTILITY EXECUTIVE COMPENSATION: EXPECTATIONS FOR THE UTILITY OF THE FUTURE

So what is a utility leadership team to do? Certainly there will be challenges: changing customer expectations, the threat of new entrants, the need to shape and set the regulatory agenda – the list goes on and on. The biggest challenge? It is meeting Wall Street's expectations of continued 4% to 6% annual earnings growth.

There is a solid list of levers for utility leaders to think about pulling now and hard:

- **Undertake solid strategic and business planning now:** Undoubtedly, the energy business holds great unknowns, uncertainties, and risks. Despite its detractors, utilities can pave the way for success with strategic planning. Good planning examines opportunities, business design, and profit models focusing on the new grid, distributed resources, microgrids, energy storage, and other initiatives. Good planning can still result in bad outcomes. Therefore, a clear focus and commitment from strategic planning to implementation and communication is more likely to increase earnings.
- **Become customer-centric:** Our research suggests that utilities that deliver exemplary customer service earn 50 to 100 basis points more than those that are less customer-focused. Happy customers lead to more responsive, flexible regulators, which lead to greater opportunities to achieve higher earnings. Yes, focusing on the customer works even in the utility industry! Let's be honest: Customer experience data suggest that utilities are average at best. The world is changing: We are transitioning from an institutional era to a more human era. It is the end of putting the company first, speaking from a script and talking at customers. Customers want to buy from companies that show empathy, have conversations with them, and engage them at eye level. And consumers want these behaviors even from their utility. Consumers will be even more open to leaving the utility if new entrants get with the program first (hello distributed resources).
- **Use natural gas expansion as a customer-centric lever:** The US will be awash in natural gas for a good while. Many utilities also have a natural gas distribution business. What better time to make it unbelievably easy for utility customers to convert or expand their use of natural gas? Low oil prices and more modest conversion demand provide a great time to get the basics right. This will set the stage for utilities to act when oil prices inevitably rise again. Utilities need to build relationships with the community in target areas, hone their segmentation skills, develop their marketing and communication capabilities, get the proper regulatory rules in place, and align their operations for swift response to customers. If customers call to convert, utilities need to deliver new gas service, following the model of Amazon and other leading retailers.

- **Position for increased electric T&D investment:** Core future earnings may be lower than what Wall Street demands. The infrastructure is more than aging. Utilities must set the customer and regulatory stage to accelerate investment in the future. It is crucial that they act now to ensure a customer price path through operational and capital efficiency that will support more investment later.
- **Take the regulatory initiative – position to dominate, not just stay in the game:** Utilities have delivered big time to their customers and regulators. They need to tell their story! Regale the listener with facts about how great utility service is and how low utility bills really are. Continue to position the utility as the linchpin of the future. Be a leader with the state executive branch, the legislature, and big-city mayors. Position the utility to sit at the head of the table, not just to have a seat.
- **Develop a fresh approach to non-regulated activities and business models:** The last round of energy retail and wholesale deregulation went down in flames, capped off with the Enron fiasco. Utility after utility went back to basics, focused on regulated operations. The trend is continuing (see PPL, Duke, NiSource, etc.). If non-regulated earnings growth is needed, do not repeat the mistakes of the mid-1990s to early 2000s. Think differently and smartly. It is hard to compete with new entrants that do not make any money. Obtain enabling regulation. No copycats allowed: avoid embracing non-regulated initiatives if you do not have a snowball's chance to execute them effectively and profitably.
- **Focus on cost management to better earn allowed returns:** Look within first. The average utility does not earn its allowed return on equity. In 2014, the average return on equity was 8.1%. To earn their allowed returns, utilities need to reduce non-fuel operating and maintenance expenses about 10% annually. In general, most utilities could stand to improve their management performance. A 10% expense reduction is difficult to achieve and sustain but certainly would go a long way to improve future earnings. For many utilities, trying to hold expenses flat represents a good first step. The future business environment may require more.
- **Reconsider M&A, especially small acquisitions:** Future utility earnings (~3% +/- per year) may be lower than recent performance and less than future market expectations. Slow underlying demand growth plus lower-than-expected earnings strongly suggest further industry consolidation. We still have a lot of utilities in the US. Management teams will need to double down on acquisitions to fuel growth. Sure, go after the big ones if you can make the management, social issues and regulatory barriers work. But do not forget smaller acquisitions: There are more than 200 small utilities with $30 BN of rate base and $1.3 BN of annual earnings. Small may be beautiful, too!

Based on our experience, Oliver Wyman believes that utilities are a smart bet for the new grid. Our new analysis suggests that utilities will have a strong earnings platform, especially for the near term. Though it will be challenging, pulling the right management levers smartly should lead to outstanding financial performance. However, there may be real customer, competitive, or technological game changers out there that we – along with others – are clueless about now. We don't know the next Apple or Google or even Uber that will hit and stick in the energy business. Good utility management provides the best chance to change and succeed.

ABOUT OLIVER WYMAN

Oliver Wyman is a global leader in management consulting that combines deep industry knowledge with specialised expertise in strategy, operations, risk management, and organisation transformation.

Oliver Wyman's energy practice helps companies address strategic and operational challenges through proven, results-oriented approaches across all sectors of the market. The practice bases its on deep industry expertise across the energy sector, informed by decades of work with industry leaders. The energy team has worked with leading international and domestic oil and gas companies operating in the Americas, Europe, Asia, Africa, and the Middle East.

ABOUT OUR ENERGY PRACTICE

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