

# Equity Premium and Risk in a Global Portfolio

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## Presentation Overview

- **Equity Premium:**
  - Historical Returns
  - Prospective Approaches:
    - Breakdown of Returns
    - Edwards, Bell, Ohlson (EBO) Model
- **Risk and Return of Global Portfolios:**
  - Asset Optimization
  - Surplus Optimization



## Historical Returns

1900-2000 (Dimson, March and Staunton)

Country	Geometric Return			Standard Deviation	Inflation
	Equities	Bonds	Excess Return		
South Africa	12.0	6.3	5.7	19.7	4.8
Germany	9.7	2.8	6.7	28.4	5.1*
Australia	11.9	5.2	6.3	18.9	4.1
Belgium	8.2	5.1	3.1	20.7	5.5
<b>Canada</b>	<b>9.7</b>	<b>5.0</b>	<b>4.5</b>	<b>17.8</b>	<b>3.1</b>
Denmark	8.9	6.8	2.0	16.9	4.1
Spain	10.0	7.5	2.3	20.3	6.1
United States	10.1	4.8	5.0	20.0	3.2
France	12.1	6.8	4.9	21.6	7.9
Ireland	9.5	6.0	3.2	17.4	4.5
Italy	12.0	6.7	5.0	30.0	9.1
Japan	12.5	5.9	6.2	33.2	7.6
Netherlands	9.0	4.1	4.7	21.4	3.0
United Kingdom	10.1	5.4	4.4	16.7	4.1
Sweden	11.6	6.2	5.2	22.1	3.7
Switzerland	7.6	5.1	2.7	17.9	2.2
<b>World Average</b>			<b>4.5</b>		
<b>World Weighted Average</b>			<b>4.6</b>	<b>14.5</b>	

\* For Germany, years 1922-23 are excluded.

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## Historical Returns

Importance of the Horizon: 1802-2001 (Siegel, 2002, United States)

Holding Period	Equities		Bonds		Equities > Bonds	Risk	
	Min.	Max.	Min.	Max.		Equities	Bonds
1 year	-38.6	66.6	-21.9	35.1	61	18.1	8.6
5 years	-11.0	26.7	-10.1	17.7	71	7.5	5.2
10 years	-4.1	16.9	-5.4	12.4	80	4.3	4.0
20 years	1.0	12.6	-3.1	8.8	92	2.9	3.1
30 years	2.6	10.6	-2.0	7.4	99	1.5	2.6

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## Historical Real Returns

1956-2002: Impact of Years 2001 and 2002

In Percentage	Canada		United States	
	S&P/TSX	Bonds*	S&P 500	Bonds**
1956-2002				
Total Real Return	4.5	3.6	5.8	2.6
Standard Deviation	15.8	8.8	14.9	8.7
Excess Return		0.8		3.1
1956-2000				
Excess Return		1.8		4.6

\* Canada: Long-Term SC bondholder indices (1956-1979) and Long-Term Canada SC (1980-2002).

\*\* United States: Rate of interest on Federal Long-Term liabilities adjusted for the duration (1956-1972) and Lehman Brothers Long-Term US Treasury (1973-2002).

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## Breakdown of Historical Real Returns

- Real Return on Equities:  $RRE_t = DY_t + RCG_t$   
Where:  $DY_t$ : Dividend Yield  
 $RCG_t$ : Real Capital Gains

- $RCG_t \approx g_{P/E} + g_E$   
Where:  $g_{P/E}$ : Growth in Price Earnings (P/E)  
 $g_E$ : Real Earnings Growth

	Year 0	Year 1	Year 0	Year 1
P/E	10.0	10.0	10.0	11.0
E	1.0	1.1	1.0	1.0
P	10.0	11.0	10.0	11.0
$g_{P/E}$			0%	10%
$g_E$			10%	0%
$RCG_t = g_{P/E} + g_E$			10%	10%

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## Breakdown of Historical Real Returns

1956 to 2002

<i>In Percentage</i>	Canada	US
	S&P/TSX	S&P 500
<b>Total Real Return</b>	<b>4.5</b>	<b>5.8</b>
Dividend Yield	3.2	3.4
Real Capital Gain	1.2	2.3
<b>Capital Gain Breakdown</b>		
Real Growth in Earnings	-0.6	0.5
Changes in Price Earnings	1.8	1.9

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## Prospective Approach 1: Breakdown of Returns

*Which Real Growth?*

- GAP in real growth in the United States:
  - GDP: 3.3% (1.9% per capita)
  - Earnings: 1.5%
  - Dividends: 1.1%
- Why?
  - Transfer of wealth to employees and managers?
  - Problem with indices measurement?
    - Discontinuity in earnings and dividends: replacing value by growth securities
  - Structural change in business distribution policies?
  - Substitution of dividends by stock repurchases
    - In the United States, 4% of earnings in 1972 versus 42% in 2000
    - In 2000, \$172 B for dividends versus \$194 B for repurchases
- Consensus Forecast: Real GDP growth of 2.6%

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## Prospective Approach 1: Breakdown of Returns

*Equity Premium – As at June 2003*

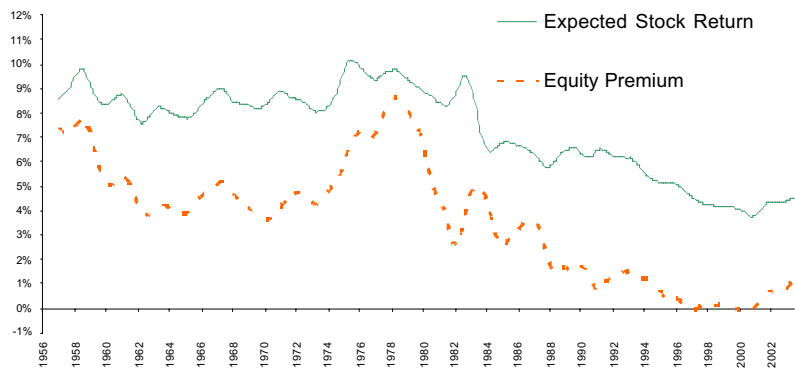
*In Percentage*

Dividend Yield:		1.9
Real Growth (GDP):	+	2.6
Growth in P/E:	+	0.0

- Real Equity Return: 4.5
- Real Bond Return: 3.0
- Equity Premium: 1.5

## Prospective Approach 1: Breakdown of Returns

*Equity Premium in Canada – 12-Month Moving Average*



## Prospective Approach 2: Implicit Equity Premium

$$v_t = P_t = \sum_{s=1}^{\infty} \frac{CF_{t+s}}{(1+k)^{t+s}}$$

• Example:

$$P_{2003} = 1000$$

$$CF = 80 \text{ (Perpetuity)}$$

$$K = 8\%$$

$$YTM_{2003} = 5\%$$

$$\text{Premium} = 8\% - 5\% = 3\%$$

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## EBO Model

*A Model Based on Inputs Available: p, bv and e*

$$p_t = bv_t + \sum_{s=1}^{\infty} \frac{e_{t+s} - k_t \times bv_{t+s-1}}{(1+k_t)^{t+s}}$$

Where:

- $p_t$  = Current price of the index
- $bv_t$  = Book value of equity at time  $t$
- $e_{t+s}$  = Earnings projections at time  $t+s$

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## EBO Model

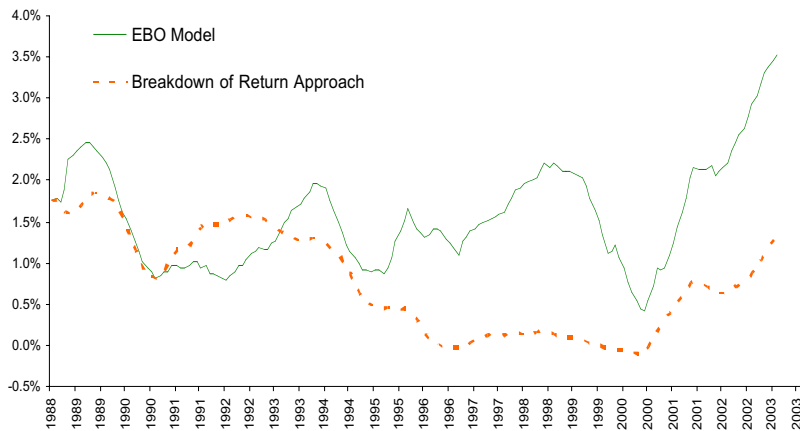
Equity Premium – As at June 2003

	MSCI Canada	As % of Price	MSCI USA	As % of Price
Price of Index	880.0		934.6	
EPS $t+1$	56.6	6.4%	49.7	5.3%
EPS $t+2$	63.2	7.2%	56.5	6.0%
EPS $t+3$	68.8	7.8%	61.9	6.6%
$g$ (Long-term)	2.0%		2.0%	
$bv_t$	461.8	52.5%	312.9	33.5%
$k_t$	8.1%		7.3%	
YTM $t$	4.3%		3.3%	
<b>Premium <math>t</math></b>	<b>3.8%</b>		<b>4.0%</b>	

EPS : Earnings Purchases.

## Comparing Approaches 1 and 2

Equity Premium in Canada – 12-Month Moving Average



## Comparing Approaches 1 and 2

Equity Premium in Canada – As at June 2003

*In percentage*

- Minimum threshold: Breakdown approach
  - Prospective equity premium (12-Month MA) = 1.3
  - Correction for stock repurchases ≈ +0.5
  - 1.8
  
- Maximum threshold: EBO model
  - Projected equity premium (12-Month MA) = 3.5
  - Correction for optimistic bias (-10%) ≈ -0.7
  - 2.8
  
- Best choice: EBO model

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## Projecting Stock Returns

EBO approach – Correction of 10% for Optimistic Bias in Earnings – As at June 2003

<i>In Percentage</i>	Implicit Premium (12-Month MA)	Projected Local Return	Interest Rate Differential	Projected Hedged Return
Country	(1)	(2)	(3)	(4) = (2) + (3)
Canada	2.8	7.3	0.0	7.3
United States	3.2	6.7	0.9	7.7
United Kingdom	2.1	7.4	-0.8	6.5
Germany	4.5	8.3	0.7	9.0
Italy	3.0	6.9	0.7	7.6
France	4.0	7.8	0.7	8.5
Japan	4.9	5.7	3.6	9.3
Australia	2.5	7.5	-0.6	6.9
Netherlands	4.8	8.7	0.7	9.4
Sweden	3.8	8.1	0.2	8.2
EAFE				8.2

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## Risk and Return Projections

Ten-Year Horizon Annual

<i>In Percentage</i>	<b>Projected Return</b>	<b>Projected Risk</b>
T-Bills	3.1	1.0
Bonds	4.4	6.5
Canadian Equities	7.3	16.7
US Equities	7.7	17.8
EAFE Equities	8.2	19.9
Private Equity	12.0	31.5
Real Estate	9.0	13.1
Hedge Funds	7.1	10.0

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## Projected Risk and Return for Optimal Portfolios

Asset Optimization

<i>In Percentage</i>	<b>Optimal Portfolios</b>			
	<b>6% Risk</b>	<b>8% Risk</b>	<b>10% Risk</b>	<b>Maximum Return</b>
<i>% in Stocks and Real Estate</i>	38	51	66	75
<b>Assets</b>				
Asset Return	5.9	6.6	7.1	0.1
Asset Risk	6.0	8.0	10.0	12.7
Sharpe Ratio	47	43	40	35
<b>Surplus</b>				
Surplus Return	0.4	1.1	1.6	2.0
Surplus Risk	8.6	10.0	11.9	14.6

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## Probabilities Related to Some Risk Thresholds

### Asset Optimization

In Percentage	Optimal Portfolios			
	6% Risk	8% Risk	10% Risk	Maximum Return
<i>% in Stocks and Real Estate</i>	38	51	66	75
<b>One-Year Horizon</b>				
More than 10%	25	33	38	42
Less than 4%	37	37	38	39
Less than 0%	16	21	24	28
<b>Five-Year Horizon</b>				
More than 10%	6	17	26	33
Less than 4%	24	24	25	27
Less than 0%	1	3	6	9

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## Probabilities Related to Some Risk Thresholds

### Asset/Liability Ratio (Surplus) – Asset Optimization

In Percentage	Optimal Portfolios			
	6% Risk	8% Risk	10% Risk	Maximum Return
<i>% in Stocks and Real Estate</i>	38	51	66	75
<b>One-Year Horizon</b>				
Ratio higher than 1.1	13	19	24	29
Ratio lower than 0.9	11	13	17	21
<b>Five-Year Horizon</b>				
Ratio higher than 1.2	18	26	33	38
Ratio lower than 0.9	26	25	25	27

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## Asset Optimization vs Surplus Optimization

*In Percentage*

**Optimal Portfolios**

<b>Asset Optimization</b>				
<i>% in Stocks and Real Estate</i>	38	51	66	75
Asset Risk	6.0	8.0	10.0	12.7
Surplus Return	0.4	1.1	1.6	2.0
Surplus Risk	8.6	10.0	11.9	14.6
<b>Surplus Optimization</b>				
<i>% in Stocks and Real Estate</i>	47	60	74	75
Asset Risk	8.0	9.8	11.1	12.7
Surplus Return	0.9	1.3	1.7	2.0
Surplus Risk	8.6	10.0	11.9	14.6

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## Conclusion

- Expected equity premium of 3% (approx.)
- Increasing equities and Real Estate from 0% to 50%:
  - Adds 2% on portfolio return (approx.)
  - Risk on surplus reaches 10%
- Non traditional assets (Real Estate, Private Equities and Hedge Funds) look dominant but induce an important "Manager's Risk"

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