Quantitative finance

Lecture 9

Real Estate

- Real Estate Investment Trusts (REITs)
  - Investment fund that invests in variety of real estate properties, similar to stock or bond mutual fund
  - Construction and development trusts provide builders with construction financing
  - Mortgage trusts provide long-term financing for properties
  - Equity trusts own various income-producing properties

Real Estate

- Direct Real Estate Investment
  - Purchase of a home
  - Purchase of raw land
    - Intention of selling in future for a profit
    - Ownership provides a negative cash flow due to mortgage payments, taxes, and property maintenance
  - Land Development
    - Divide the land into individual lots
    - Build houses or a shopping mall on it
    - Requires capital, time, and expertise

Low Liquidity Investments

- Some investments don’t trade on securities markets
- Lack of liquidity keeps many investors away
- Auction sales create wide fluctuations in prices
- Without notional markets, dealers incur high transaction costs
- Some may consider them more as hobbies than investments

Low Liquidity Investments

- Antiques
  - Dealers buy at estate sales, refurbish, and sell at a profit
  - Serious collectors may enjoy good returns
  - Individuals buying a few pieces to decorate a home may have difficulty overcoming transaction costs to ever enjoy a profit them more as hobbies than investments

Low Liquidity Investments

- Art
  - Investment requires substantial knowledge of art and the art world
  - Acquisition of work from a well-known artist requires large capital commitments and patience
  - High transaction costs
  - Uncertainty and illiquidity

Low Liquidity Investments

- Coins and Stamps
  - Enjoyed by many as hobby and as an investment
  - Market is more fragmented than stock market, but more liquid than art and antiques markets
  - Price lists are published weekly and monthly
  - Grading specifications aid sales
  - Widespread between bid and ask prices

Low Liquidity Investments

- Diamonds
  - Can be illiquid
  - Grading determines value, but is subjective
  - Investment-grade gems require substantial investments
  - No positive cash flow until sold
  - Costs of insurance, storage, and appraisal

Historical Risk Returns on Investments

- Reilly and Wright (2004) examined the performance of various investment alternatives from the Canada, the U.S, Europe, Japan, and the emerging markets for the period 1993-2009 (CAD)

EXHIBIT 3.9 Summary Risk-Return Results for various Capital Market Assets (Canadian dollars): 1993–March 2009

Index	Arithmetic Mean Return	Geometric Mean Return	Standard Deviation Annual Return	Beta with S&P/TSX Composite Index
S&P/TSX Composite Index	10.08%	8.47%	17.68%	1.00
Russell 3000 Index[a]	5.46%	3.87%	18.24%	0.71
S&P 500 Index	8.05%	6.39%	18.77%	0.67
Dow Jones Industrial Average	9.58%	8.37%	16.09%	0.49
FTSE 100 Index	7.83%	5.98%	19.07%	0.58
Nikkei 225 Index	0.90%	−1.47%	21.90%	0.48
MSCI EAFE Index[b]	1.92%	0.13%	18.35%	0.72
MSCI World Index[b]	−1.16%	−2.27%	15.78%	0.60
91 Day Cdn T-bill Rate	4.03%	4.02%	1.28%	0.00
Inflation (CPI Index)	1.93%	1.93%	0.64%	0.00

[a] Statistics for Russell 3000 index are based on 1996–March 2009 data.
[b] Statistics for MSCI EAFE and MSCI World Index are based on 2002–March 2009 data.

Note: MSCI EAFE is monthly from 2002–2008
Note: MSCI World Index is monthly from Feb. 2002–2008
Note: Russell 3000 Index is monthly from 1996–2009

Source: Bloomberg and author calculations.

Historical Risk Returns on Investments

- The expected relationship between annual rates of return and total risk (standard deviation) of these securities was confirmed

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Note: MSCI World Index is monthly from Feb. 2002–2008

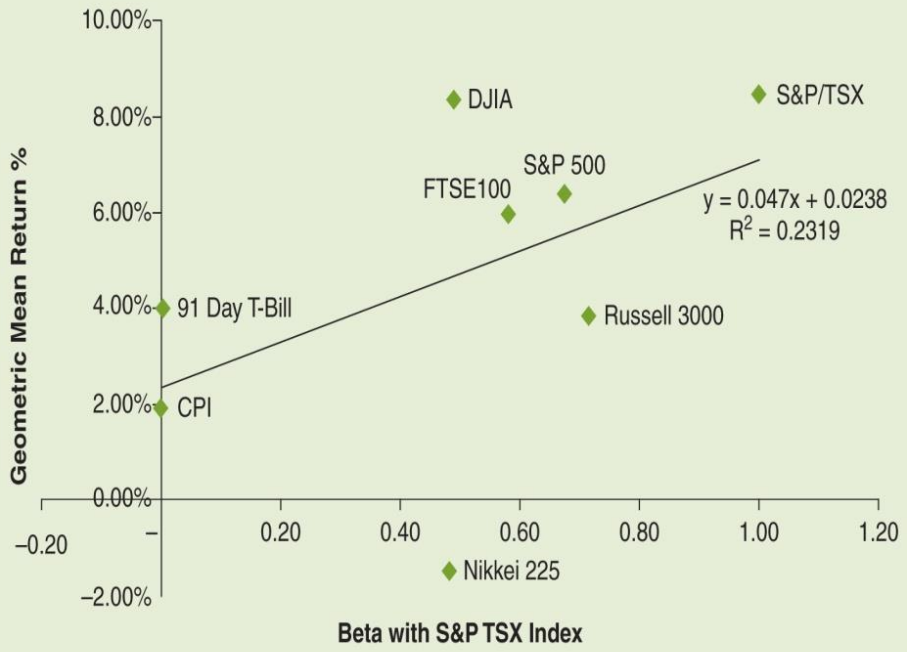
Note: Russell 3000 Index is monthly from 1996–2009

Source: Bloomberg and author calculations.

Comparing the TSX & Other Stock Markets

- The systematic risk measure (beta) did a better job of explaining the returns during the period than did the total risk measure

EXHIBIT 3.10 Geometric Mean Return versus S&P/TSX Composite Beta for Various Capital Market Assets, 1993–March 2009



Note: MSCI EAFE and MSCI World are excluded; Russell 3000 Index is 1996–2009

Source: Bloomberg.

Correlations Between Various Capital Markets

- A good hedge should have a strong positive correlation with inflation

EXHIBIT 3.11 Correlations among Various Capital Market Assets Annual Returns (Canadian dollars): 1993–March 2009

Index	S&P/TSX Composite	DJIA	MSCI EAFE	MSCI World
S&P/TSX Composite	1.000	0.537	0.696	0.676
S&P 500	0.635	0.918	0.821	0.955
DJIA	0.537	1.000	0.737	0.878
Russell 3000[a]	0.692	0.892	0.835	0.961
FTSE 225	0.538	0.672	0.909	0.892
Nikkei 100	0.389	0.373	0.645	0.533
MSCI EAFE[b]	0.696	0.737	1.000	0.953
MSCI World[b]	0.676	0.878	0.953	1.000
T-bill-90 day	0.410	0.138	0.098	0.102
Inflation (CPI Canada)	−0.220	−0.156	−0.291	−0.238

[a] Statistics for Russell 3000 index are based on 1996–March 2009 data.
[b] Statistics for MSCI EAFE and MSCI World Index are based on 2002–March 2009 data.

Source: Bloomberg and author calculations.