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# Assessing Risk & Risk Budgeting

Foundation Investment Forum 2009

October 23, 2009

# Agenda

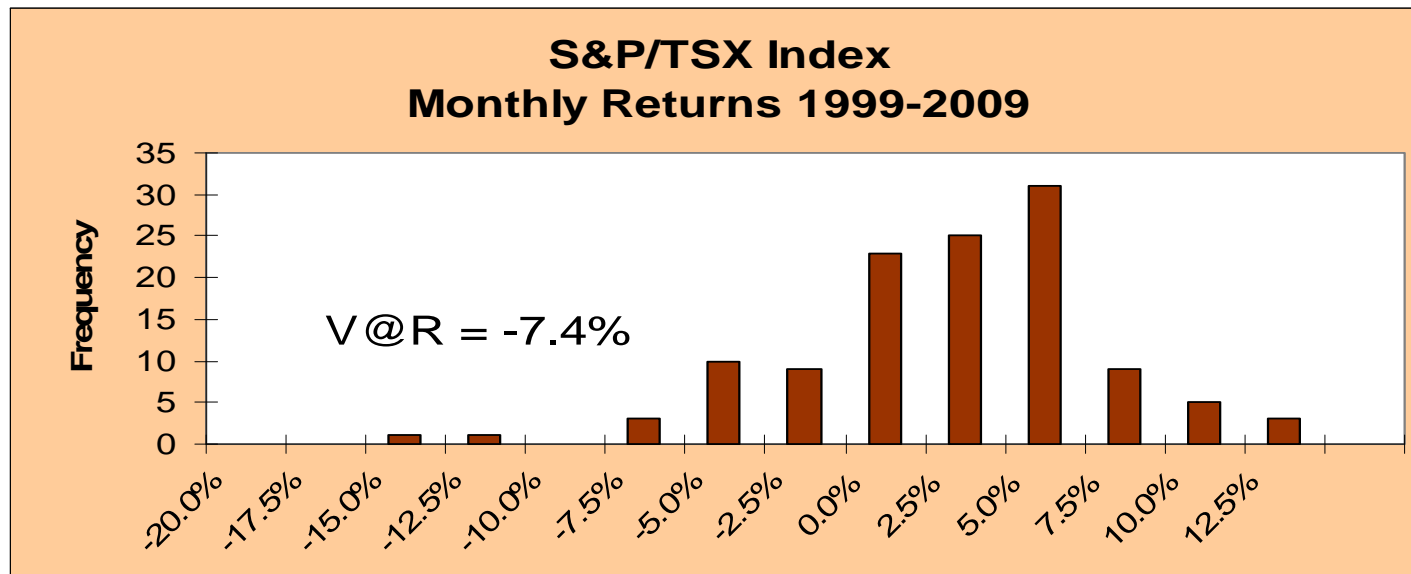
1. Tools for Assessing Risk
2. Long Term vs. Short Term Risk
3. A Solution: Risk Budgeting
4. Final Thoughts

## Tools for Assessing Risk

- Standard approach: focus on how much I can lose - what is my downside?
- Know your client (KYC): what is your appetite for risk?
- Key is to balance risk/reward tradeoff:
  - GICs => no risk / little return
  - Emerging Markets Equities => high risk / high return
  - Balanced mix (equities/fixed income) => moderate risk/ moderate return

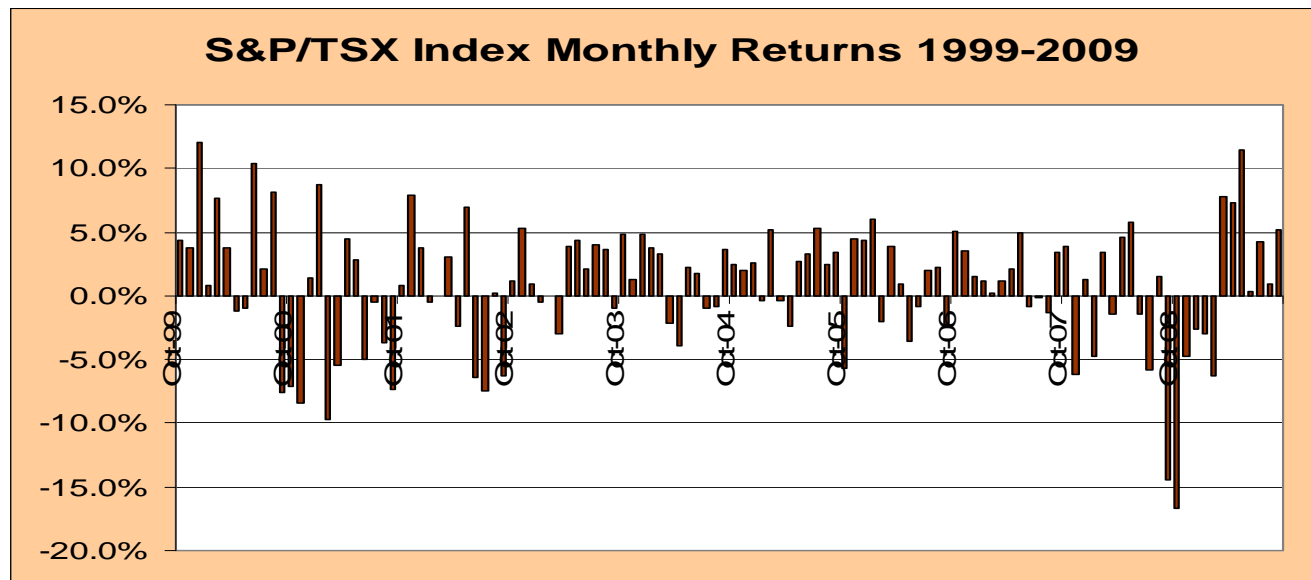
## Tools for Assessing Risk - VaR

- Downside risk measure: Value at Risk (VaR)
- VaR measures worst case loss - typically defined as the return that is expected to occur only 5% of the time:



## Tools for Assessing Risk - Volatility

- Another risk measure: Volatility
- Volatility measures the average deviation in returns



## Tools for Assessing Risk - Implied Volatility

- Implied Volatility: market volatility that is derived (ie. implied) from option prices
- Investors who buy or sell options (e.g. “put” options) influence the level of implied vol.
- Widely followed index is the “VIX” - measures the implied vol. of large US stocks
- VIX is often used as a gauge of sentiment - “fear factor”

## Tools for Assessing Risk

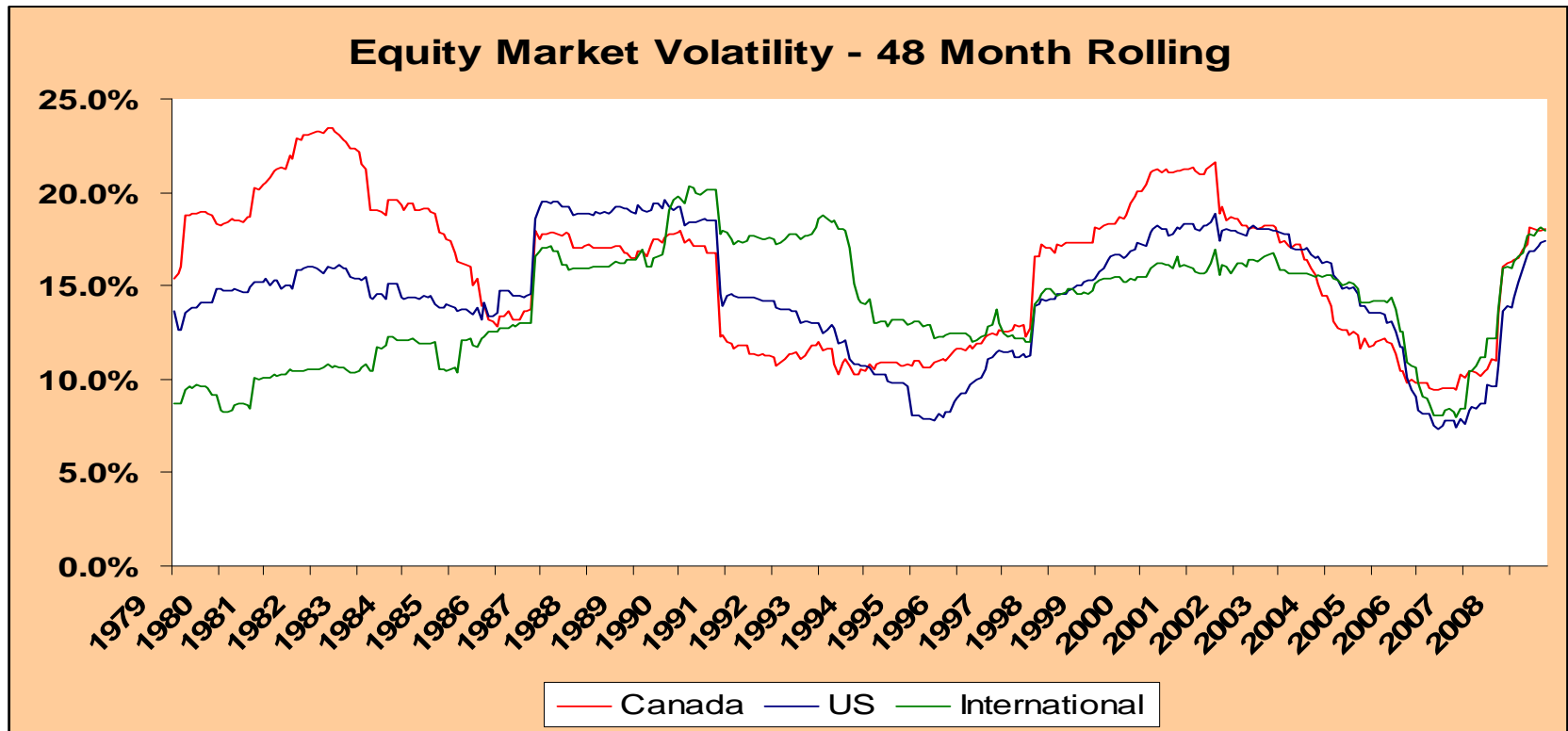
- Problems with risk measures:
  - most are statistically based and rely on historical data (rear-view mirror)
  - “fat tails” (non-normal returns) occur much more often than they should
  - Cannot capture all possible risks
- Solution is to use risk measures as a guide and observe changes over time

## Long Term vs. Short Term Risk

- Important to assess both long term and short term risk
- Different estimation periods tell different stories: 4 year reveals macro trends (pension view) whereas 10 day signals market dynamics (trader view)
- Volatility tends to be inversely correlated to returns: as vol. trends higher, returns trend lower and vice-versa
- Risk budgeting is a good tool for blending long and short term risk (as we will discuss)

# Long Term Risk

- Equities (in native currencies):

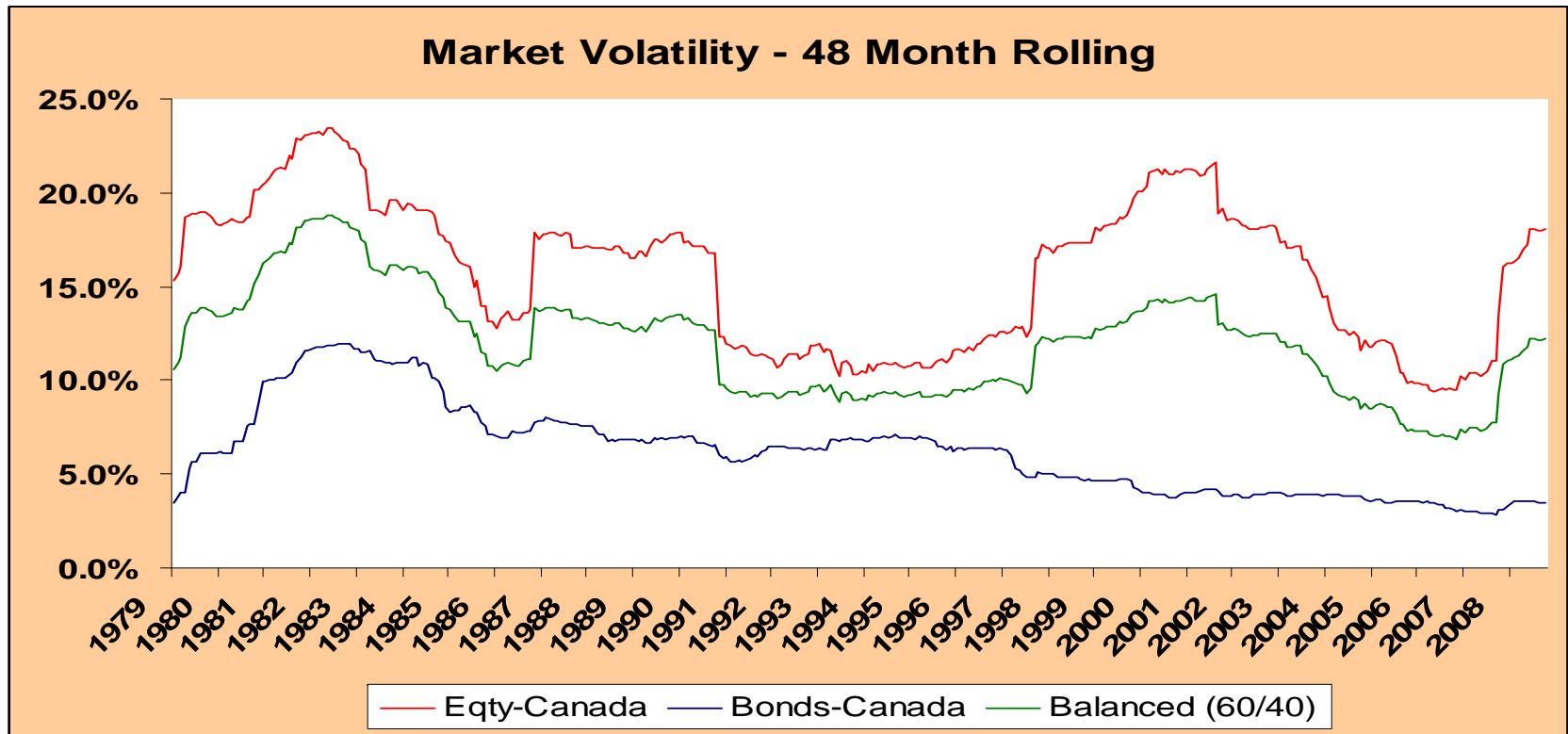


## Long Term - Equities

- Chart reveals the following:
  - Equity markets exhibit similar patterns
  - Prior to 2000 there were periods of disconnect, especially in the '80's (less unified government/monetary policies?)
  - Currency has an impact - foreign equities denominated in CAD have higher vol.

# Long Term Risk

- Equities vs. Bonds vs. Balanced:

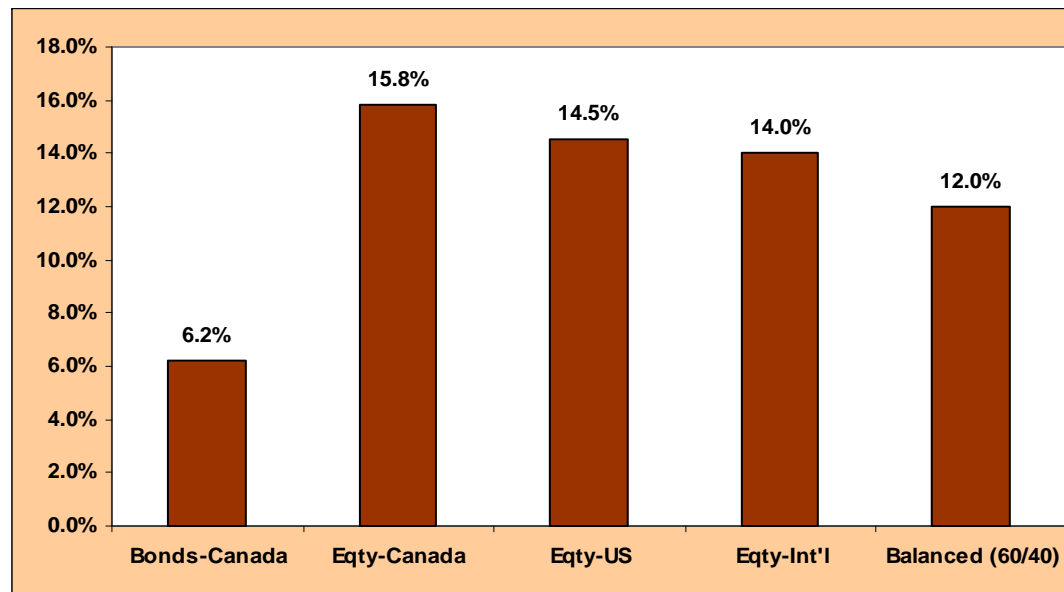


## Long Term - Balanced

- Chart reveals the following:
  - Bond vol. has steadily declined and is low - prolonged period of low interest rates
  - Balanced mix provides dampening of equity risk
  - 2008/09 does not reveal the extent of the credit crisis

## Long Term Risk

- Averages of 4 Year rolling volatility:

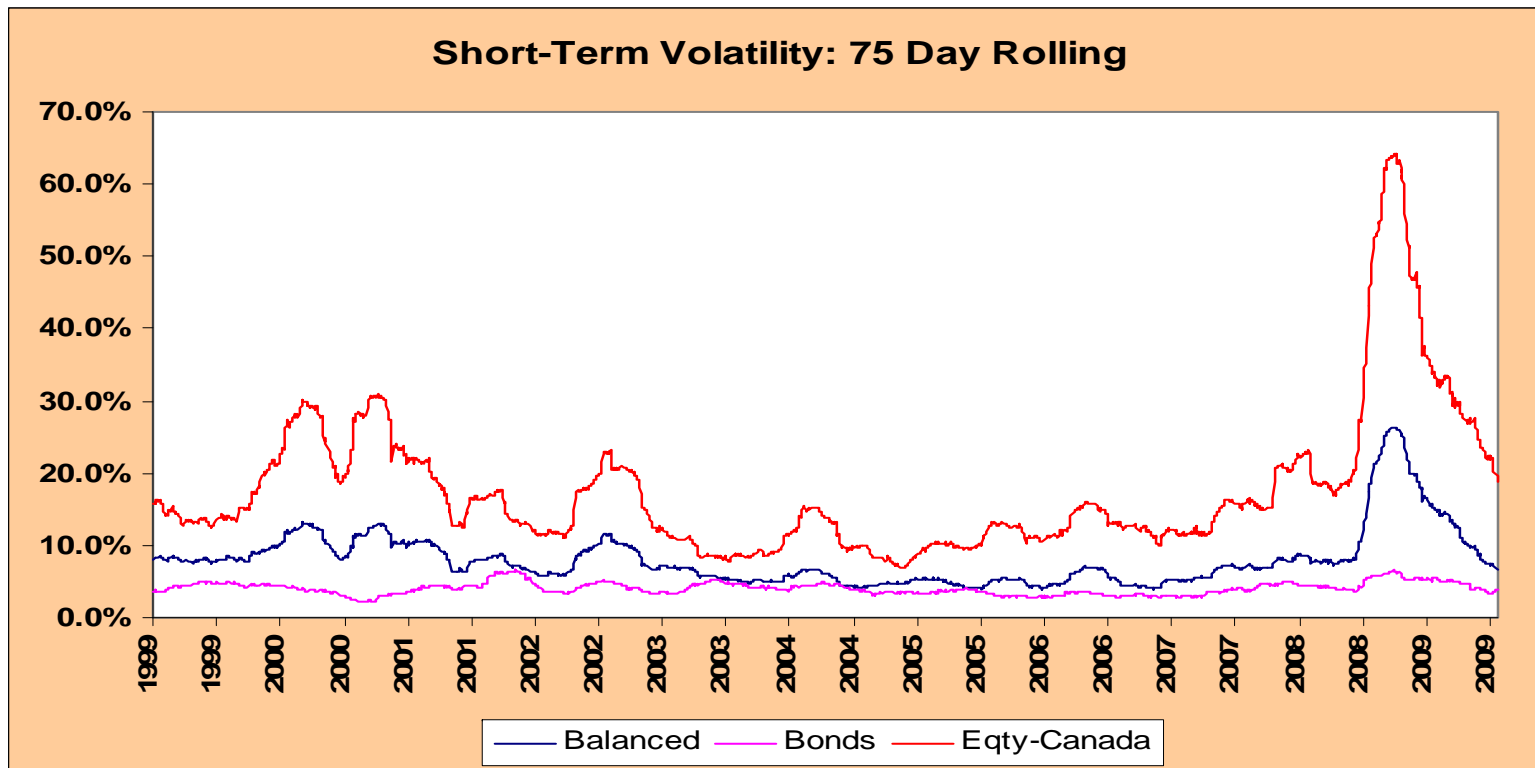


## Short Term Risk

- We assess risk using daily returns over a 75 day basis
- Adapts to changes in market dynamics
- Aligns nicely with portfolio management view - level of portfolio turnover
- Daily swings can be pronounced - need to focus on trends as stressed earlier

# Short Term Risk

- Equities vs. Bonds vs. Balanced:

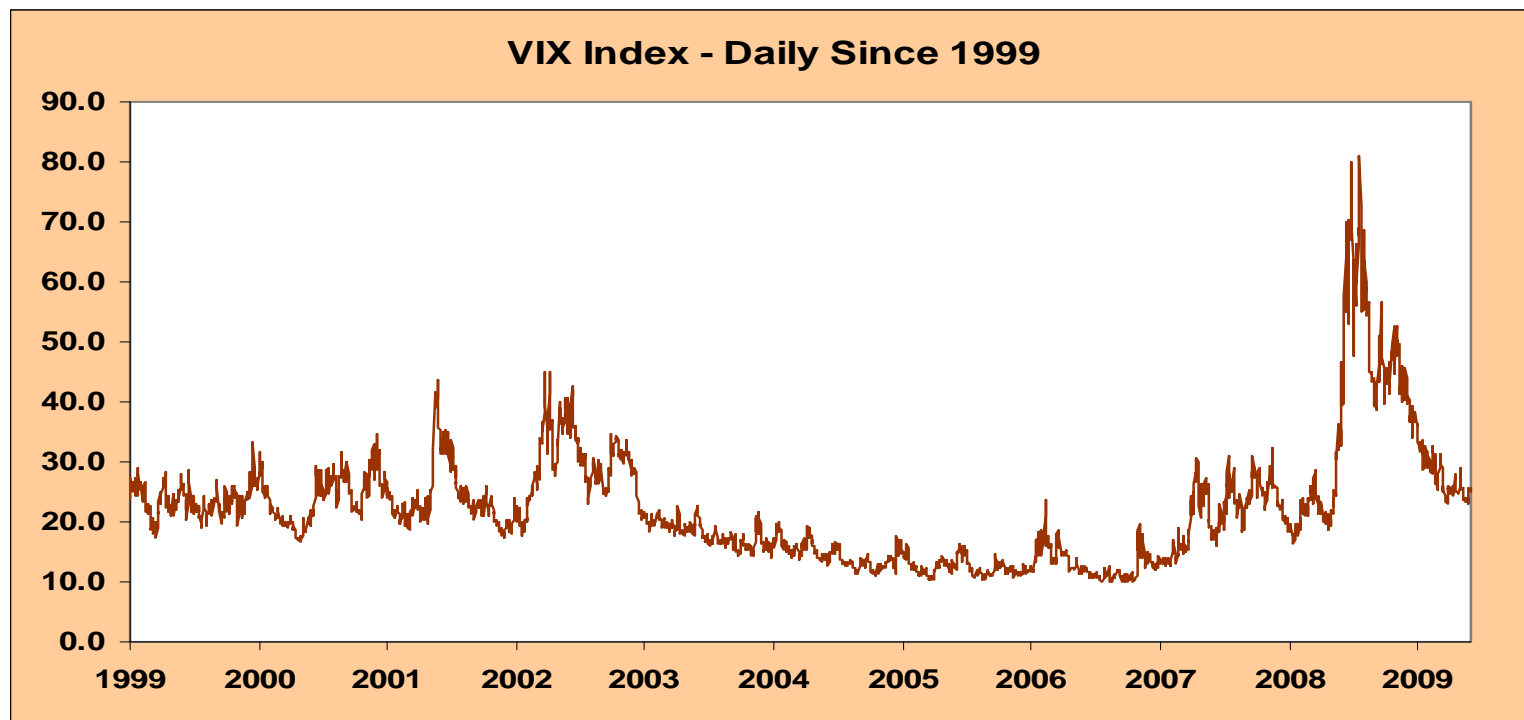


## Short Term Risk

- Chart reveals the following:
  - Short-term picture can be very different from long-term
  - Prior to 2008, volatility peaked during the Tech bubble - 30% vs. Long-term average = 16%
  - Fall of 2008, volatility reached an all-time high - over 60!
  - Bond vol. did not move
  - Equities exposed investors to much more risk than they bargained for

## Short Term Risk

- VIX Index:



## Short Term Risk

- VIX chart reveals the following:
  - Pattern is very similar to the previous Canadian equity vol. chart
  - Extremes are very different: tech bubble peaked at 40% (vs. 30% in Canada) and 2008 peaked at 80% (vs. 60% in Canada)
  - 2005-2007 was a period of extremely low volatility (masking the underlying problems...)

## A Solution: Risk Budgeting

- How do we address the 2008 market implosion?  
Equity heavy investors lost 35-50%; Balanced investors lost 10-20% - beyond expectations
- Balanced funds - typically have a 60% allocation to equities  
allocation determined by “optimal” risk/return tradeoff
- Risk Budgeting: determine asset class allocations by risk  
instead of return expectations

## A Solution: Risk Budgeting

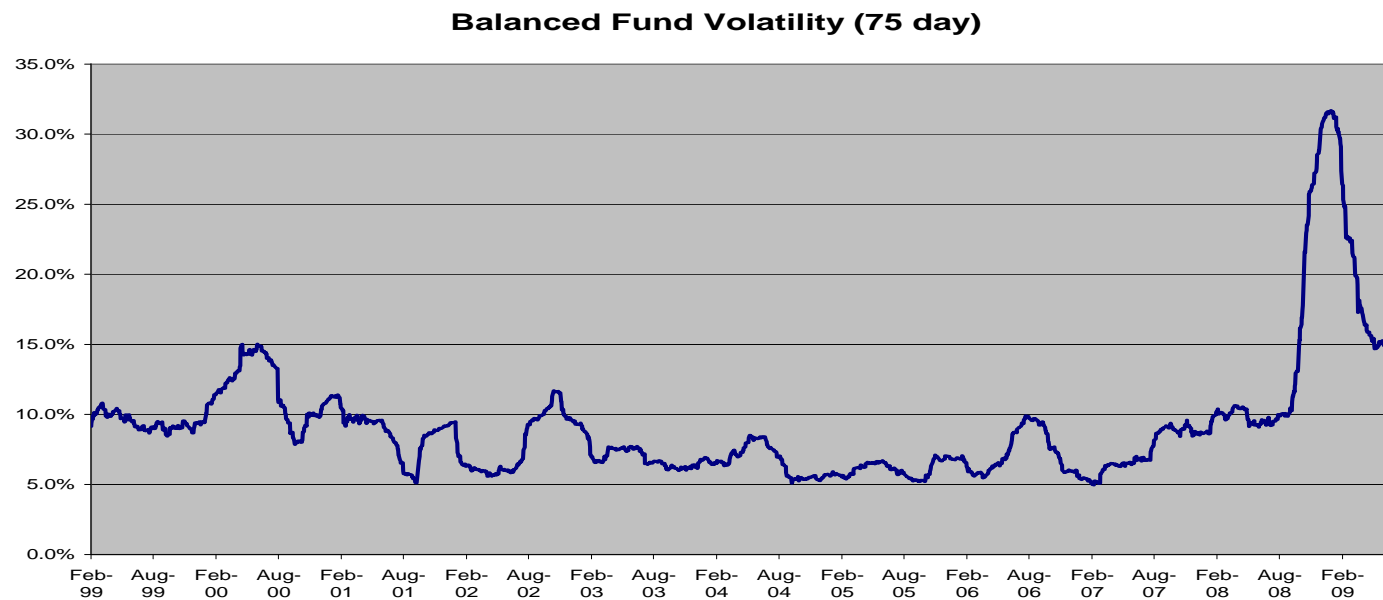
- Using historical long-term data, determine annualized risk and return levels:

	Weight	Annual Return	Annual Volatility
Equity - Canada TSX	33%	8.7%	16.9%
Equity - US S&P 500	22%	6.6%	16.6%
Equity - Intern. EAFE	5%	7.3%	17.8%
Bond - Canada DEX	40%	3.1%	3.1%
Tbill - Canada 91 Day	0%	1.6%	0.9%
<b>Balanced</b>		<b>5.9%</b>	<b>9.4%</b>

- Target return = 6% ; target risk = 9%
- Premise is that we cannot control returns, but we can control risk
- Our approach: if short-term risk significantly exceeds target, adjust asset mix to lower risk closer to target

## A Solution: Risk Budgeting

- Impose upper bound on fund volatility (e.g. 15%)
- With 15% upper bound, fund would have only been affected in 2008/2009



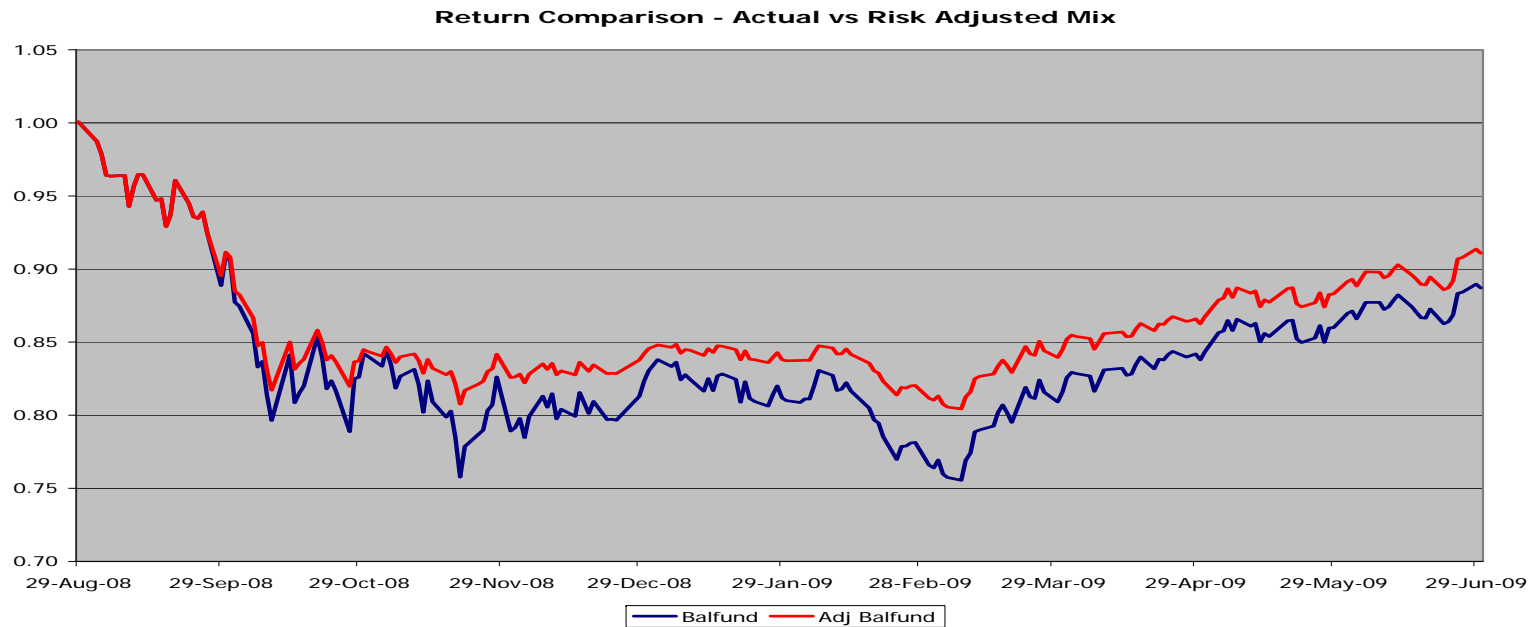
## A Solution: Risk Budgeting

- Goal is reduce equity weights and go to cash for safety and lowest risk
- Process: if fund vol. > 15% then reduce equity exposure and go to cash; as vol. falls below 11% then increase equity exposure
- During the crisis, equity exposure reduced 4 times
- Starting in Feb/09, risk increased 4 times, back to normal at the end of June

Date	Fund Volatility	New Asset Mix					New Volatility
		Cdn Equity	US Equity	Int. Equity	Cdn Bond	Cash	
9/29/2008	15.4%	28%	17%	5%	40%	10%	12.7%
10/10/2008	15.3%	23%	15%	5%	40%	17%	12.8%
10/15/2008	15.7%	20%	12%	2%	40%	26%	12.7%
10/28/2008	15.0%	17%	9%	0%	40%	34%	11.8%
2/12/2009	10.9%	20%	12%	2%	40%	26%	13.6%
3/19/2009	10.8%	23%	15%	5%	40%	17%	13.2%
4/23/2009	10.9%	28%	17%	5%	40%	10%	12.9%
6/24/2009	10.9%	33%	22%	5%	40%	0%	13.2%

## A Solution: Risk Budgeting

- End result: risk is contained and return is enhanced
- From 9/1/08 to 6/30/09 fund return improved by 2.4%



## A Solution: Risk Budgeting

- Important points:
  - Risk budgeting is not foolproof - no guarantee that return enhancement will be achieved
  - Controlling risk is paramount, returns are an outcome
  - Important to determine appropriate risk levels; both for ongoing asset mix and for upper bounds
  - Can extend risk budgeting technique to include lower bound

## Final Thoughts

- Credit crisis (a.k.a. “Great Recession”) was a serious wake-up call
- Conservatism ruled - those who assume risk were punished
- Risk models were not the problem - we will never be able to measure and assess ALL risks
- Key is to learn from the past 12-18 months - what will you do differently?

## Final Thoughts

- Our thoughts:
  - We have had 2 bubbles in the past 10 years, another will likely happen (so get ready)
  - Key is to maintain focus on your long-term strategy - stay the course
  - Make necessary adjustments during extremes - all balanced investors should adopt risk budgeting