



TURBULENCE REVISITED

Windham Investment Review

Mark Kritzman

Windham Capital Management, LLC
5 Revere Street
Cambridge, MA 02138
www.windhamcapital.com
617.576.7360

October, 2008

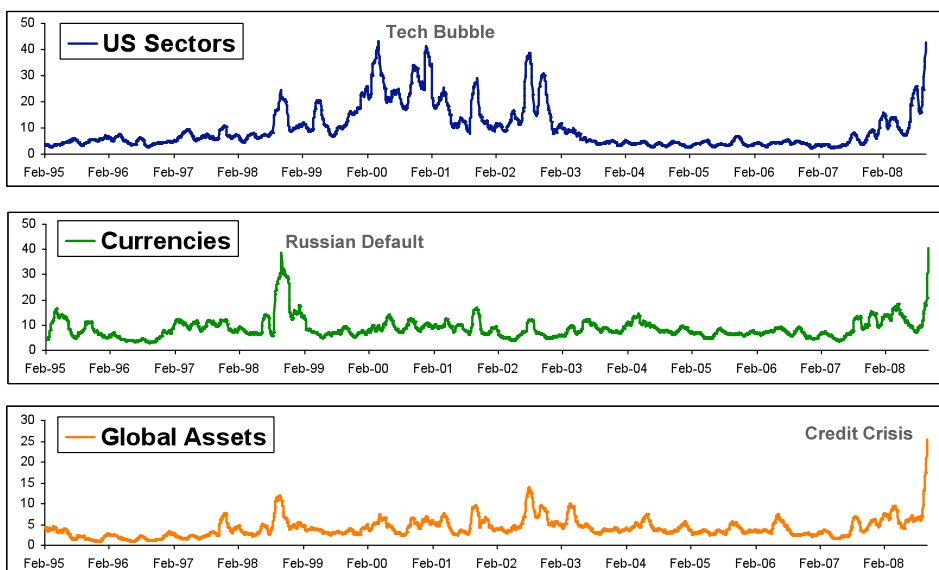
TURBULENCE REVISITED

In our winter issue of the Windham Investment Review we presented a statistical procedure for partitioning historical returns into periods of turbulence and quiescence, and based on this procedure, we compared the sub-prime crisis to previous turbulent periods. We never expected to revisit this topic so soon, but in light of the unprecedented meltdown of the capital markets we again find ourselves drawn to a discussion of turbulence. Our purpose this time is twofold: first to reveal just how extraordinary these last few months have been, and second, to describe opportunities for enhancing return during turbulent markets. But before we address these issues let us review our measure of turbulence. A day or a month is turbulent if the returns across a set of assets behave in a significantly uncharacteristic fashion. One or more assets' returns, for example, may be unusually high or low, or two assets which are highly positively correlated may move in the opposite direction. This measure of turbulence tends to be more robust than measures which focus only on volatility such as the VIX Index, because it captures strange interactions among a wider set of assets.

01 The Current Crisis in Perspective

Exhibit 1 shows 30-day moving averages of daily turbulence for three sets of assets: U.S. equity sectors, currencies, and global assets including stocks, bonds, and commodities.

Exhibit 1: Smooth Turbulence Indexes



It reveals that the current crisis ranks among the most turbulent periods in recent history no matter which set of assets we choose to measure turbulence. The turbulence we've been experiencing in the U.S. equity markets, for example, is as high as it was during the tech bubble. And for currencies, it rivals the turbulence following Russia's default on its sovereign debt in 1998. For global assets, it's significantly higher than any period in recent history.

02 How to Invest during Turbulent Times

Is there anything we can do to protect our investments or at least limit the damage during turbulent markets? The short answer seems to be yes. There are two features about turbulence that could prove to be useful to investors. First of all, turbulence is not random. It may arrive randomly, but once it arrives it persists for a while, just like the turbulence we encounter when we fly. The good news in this otherwise bleak story is that investors have time to react to turbulence. Exhibit 2 provides evidence of the persistence of turbulence.

Exhibit 2: Persistence of Turbulence

	US Sectors	Currencies	Global Assets
1 Week	22.66	14.39	6.47
2 Weeks	22.19	13.09	6.23
1 Month	21.33	12.18	6.00
Sample Average	10.0	9.0	4.0
10% Threshold	15.99	14.68	7.78
15% Threshold	14.53	13.29	6.74
20% Threshold	13.44	12.24	5.99

Exhibit 2 records the average daily turbulence score during the following week, two week period, and month following the appearance of a turbulent day, defined as one of the 10% most turbulent days in the sample. Consider, for example, U.S. equity sectors. A turbulence score of 16 separates the 10% most turbulent days from the rest of the sample. In the week following a turbulent day, the average daily turbulence score was 22.7, well above the 10% cutoff for turbulence and far above the full-sample average of 10. Moreover, average daily turbulence remained high even one month after its arrival. Similar patterns prevail for currencies and global assets. This persistence is welcome news because it implies that investors have time to react to continued turbulence.

The other welcome feature about turbulence is that assets and strategies experience different performance during quiet and turbulent periods. Exhibit 3 shows the annualized return of several assets and strategies during quiet and turbulent times.

Exhibit 3: Differential Performance During Quiet and Turbulent Periods

Asset/Strategy	90% Most Quiet	10% Most Turbulent
US Equities	10.27%	-7.00%
Global Equities	10.07%	-26.07%
Forward Rate Bias	3.37%	-8.69%
Size Premium	3.72%	-2.75%
Value Premium	-1.00%	7.01%

Exhibit 3 shows that most assets and strategies experienced sharply higher returns in quiet periods than in turbulent periods. Only the value premium did better during turbulent times, which we can perhaps explain by the low beta of value versus growth stocks. This is extremely welcome news, especially in light of the persistence of turbulence. The combination of persistence and differential performance suggests that we should be able to enhance return by scaling exposure to these strategies according to the relative turbulence we observe in a given period, unless the return differential occurs before we have time to react.

03

Summary

- ▶ It is possible to measure turbulence statistically by accounting for unusual return patterns across a set of assets.
- ▶ In recent weeks daily turbulence scores for U.S. equities, currencies, and global assets have spiked to multiples of their long run averages.
- ▶ The good news in this otherwise bleak story is that turbulence is both persistent and correlated with asset and strategy performance.
- ▶ By reacting promptly to the arrival of turbulence, investors should be able to enhance returns across a variety of assets and strategies.