



## Models of Uncertainty and Recession Recent Predictions and Insights

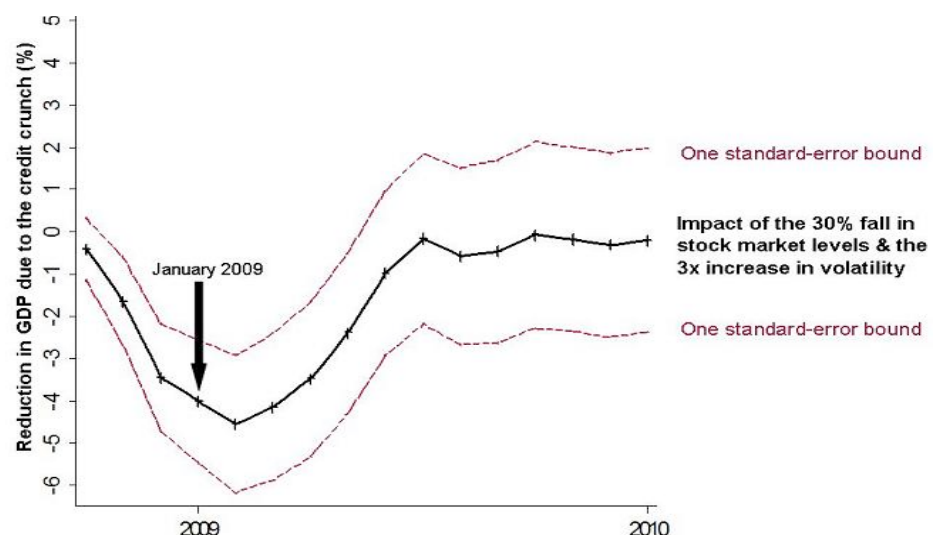
At Hammond Associates, we pay attention to industry and academic research on macroeconomic growth and forecasting because we believe it offers valuable insights into both Fed policy-making and changing financial market conditions. Of particular interest is the current business-cycle research being undertaken by Stanford University colleagues Nicholas Bloom<sup>1</sup> and Bloom, Flotoetto, and Jaimovich.<sup>2</sup> Their models focus more intensively on the impact of uncertainty in recessions than previous work and can be used to forecast economic variables like GDP, growth in GDP, employment and investment. We have prepared this note because their most recent forecast<sup>3</sup> on January 12, 2009 is timely, a quite upbeat revision of Bloom's November 18, 2008 forecast,<sup>4</sup> and is optimistic compared to forecasts and outlooks of many other economists. Having said this much, we feel compelled to proceed quickly to the bottom-line forecast—but not before making several cautionary points: 1) Professor Bloom's forecasts flow from a VAR (Vector Auto Regression) model that is quite successful in terms of explaining past recessionary outcomes but is surely not infallible in predicting the future, 2) Hammond Associates neither rejects nor adopts Bloom's forecast, and 3) we insist on briefly summarizing particular aspects of the research that we believe offer useful insights for money managers and investors regardless of its success or failure in forecasting the trough of this recession. Now to Bloom's forecasting:

### Recession Forecasts

Based on conditions as of November 18, 2008, Professor Bloom's model predicted GDP growth in 2009 could be reduced by as much as 4.5% (down from a base of 1.5% to -3.0%). Bloom indicated that growth would not rebound in 2009 but could be back to trend in 2010 provided politicians and other policy-makers do not make "new" mistakes analogous to those made at the onset of and during the Great Depression. It is important to point out that key to this particular forecast was Bloom's estimate that uncertainty would not be significantly resolved until mid-2009.

By January 10, 2009, Bloom's model was predicting a different outcome. Uncertainty, which is the key driver of the model (we will discuss this "second moment" factor later) had fallen sufficiently that the model was predicting resumption in growth by mid-2009, as shown in the graph to the right:

**Figure 1: The estimated combined stock market levels and volatility impact of the credit crunch on GDP**



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<sup>1</sup> Nicholas Bloom, "The Impact of Uncertainty Shocks," December 2008, forthcoming *Econometrica*.

<sup>2</sup> Nicholas Bloom, Max Flotoetto, and Nir Jaimovich, "Really Uncertain Business Cycles," December 2008, Working Paper, Department of Economics, Stanford University.

<sup>3</sup> Nicholas Bloom and Max Flotoetto, "The recession will be over sooner than you think," VOX (voxeu.org), January 12, 2009.

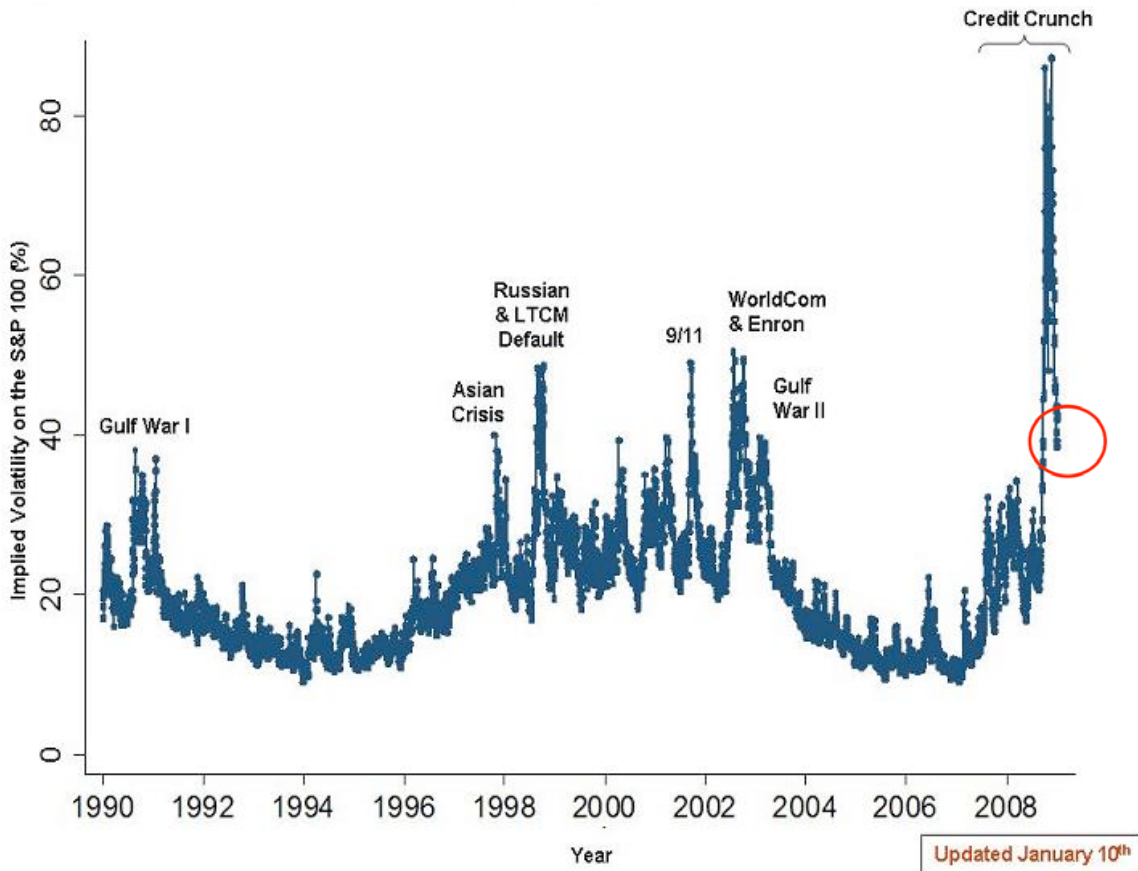
<sup>4</sup> Nicholas Bloom, "2009 will be the nightmare on Main Street," VOX, November 18, 2008.

## The Role of Uncertainty

What happened between November 18, 2008 and January 10, 2009 to alter the model's predicted course of output growth? Quite simply, the proxies for uncertainty declined significantly.

The model's uncertainty input is an index of reasonable proxies (since there is no easy direct measure of uncertainty) including inter- and intra-industry variance in the growth rates of sales, output, and productivity, variance in firm-level and industry-level stock returns, disagreement among macro forecasters, and overall stock market volatility. All of these measures are highly correlated with each other and all tend to be counter-cyclical. We reproduce one to which the financial investment community easily relates: the implied volatility of the S&P 100. As Bloom's graph (below) shows, this "fear factor" more than tripled after the collapse of Lehman Brothers in September 2008 but fell back 50% during the three weeks before January 10, 2009.

**Figure 2: The financial "fear Factor": daily US implied stock market volatility**



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What do experience and theory tell us about the relationship between uncertainty and recession? From experience, we know uncertainty often leads to inaction—both households and firms wait for resolution of that uncertainty before making decisions. For a firm, the option to postpone decision-making is valuable because reversals of hiring, firing, and investment are typically expensive. Marginal decisions—particularly those that would increase output—are therefore postponed in periods of above-average uncertainty. Productivity commonly decreases as this inaction prevents the reallocation of capital and labor.

Even in times when there is no first-order shock to the economy (examples of first-order shocks include the Cuban-Missile Crisis, the OPEC oil crisis of the 1970's, 9/11, and the financial crises of 1990 and today), Bloom shows that recession can occur when producers and consumers are confronted with high levels of uncertainty. A first-order shock can lead to a recession, but uncertainty about economic variables and policy-

makers' decisions has a second-order impact that can extend its duration and depth.<sup>5</sup> So—with apologies to economists and econometricians for not discussing the fine (and finer) improvements and contributions to the literature—that's the basic role of uncertainty in these models.

### **Comments and Insights for Investors**

First, the data analysis in Bloom (2008) shows that stock market volatility is strongly linked to measures of uncertainty about the productivity and output levels of firms and industries. These uncertainties translate into fatter-tailed probability distributions of everything from firm revenues to profit margins to cash flow. We expect that a diverse set of security analysts and investors would arrive at a more dispersed range of valuations, which would, in turn, be accompanied by a wide range of revisions as the uncertainty was resolved. (Think about the divergence of analysts' valuations of financial stocks in 2007 and 2008!) The data remind us that when volatility is high, there are usually very fundamental economic and business reasons for it. Volatility is down from its recent peak, but it is still extremely high relative to its long-run average. An increase in volatility at this time should be viewed negatively since it would signal increased uncertainty and risk. While stock traders may love volatility, it means that investors have a more difficult time valuing stocks and trusting market prices.

Second, if Bloom and others with relatively optimistic forecasts are correct, it will not be long before key sales, profit, and output measures provide supporting evidence. Inaction will not be rewarded once a rebound begins. We are working diligently to analyze the fat-tailed distributions, assess the reward to risk, and then reassess with each new piece of information. Investors must prepare now to be ready to take advantage of opportunities that rarely arise. An objective, un-panicked reexamination of risk tolerance, cash needs, and current positioning is a necessity.

Third, while not suggesting that we all should do macroeconomic research, these articles remind us that there can only be a disconnect between financial assets and economic fundamentals for so long. Undoubtedly, there have been too many people who have believed that paper assets could be valued independently of the values of the underlying real assets.

Fourth, these Real Business Cycles articles are recent contributions to a vast body of research and literature that macro and monetary policymakers have both helped to create and continue to utilize. Certainly, Bernanke has been a contributor to this literature.<sup>6</sup> We know the overall limitations of macroeconomic modeling and know that it is not generally undertaken for the sole benefit of Wall Street and financial markets, but keeping current with the research keeps us current with information and ideas that could be shaping policy.

Finally, depending on what financial news-reporting channel you watch or columns and blogs you read, you could have a very pessimistic outlook for the economy. While not dismissing the possible severity of this recession, we welcome what is a relatively positive forecast to balance the very negative outlook posited by some economists and pundits. We just hope that this dispersion of macro forecasts does not lead to a spike in the uncertainty index.

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<sup>5</sup> Bloom, among many others, points out that political and/or policy-making uncertainty further slows firms' decision-making and prescribes quick action by the Fed and Congress, even at the risk of being somewhat wrong. Bloom also warns that, based on his projected trajectory of growth, delaying the stimulus package until summer may mean it is too late because natural healing will be well under way.

<sup>6</sup> A partial list of research articles by Ben Bernanke: Ben Bernanke & Jean Boivin & Piotr S. Elias, 2005. "[Measuring the Effects of Monetary Policy: A Factor-augmented Vector Autoregressive \(FAVAR\) Approach](#)," *The Quarterly Journal of Economics*, MIT Press, vol. 120(1), pages 387-422, January; Ben S. Bernanke & Mark Gertler, 2001. "[Should Central Banks Respond to Movements in Asset Prices?](#)," *American Economic Review*, American Economic Association, vol. 91(2), pages 253-257, May; Bernanke, Ben S & Carey, Kevin, 1996. "[Nominal Wage Stickiness and Aggregate Supply in the Great Depression](#)," *The Quarterly Journal of Economics*, MIT Press, vol. 111(3), pages 853-83, August; Bernanke, Ben S, 1995. "[The Macroeconomics of the Great Depression: A Comparative Approach](#)," *Journal of Money, Credit and Banking*, Blackwell Publishing, vol. 27(1), pages 1-28, February; Bernanke, Ben S & Parkinson, Martin L, 1991. "[Procyclical Labor Productivity and Competing Theories of the Business Cycle: Some Evidence from Interwar U.S. Manufacturing Industries](#)," *Journal of Political Economy*, University of Chicago Press, vol. 99(3), pages 439-59, June; "[Employment, Hours, and Earnings in the Depression: An Analysis of Eight Manufacturing Industries](#)," *American Economic Review*, American Economic Association, vol. 76(1), pages 82-109, March; Bernanke, Ben S, 1983. "[Irreversibility, Uncertainty, and Cyclical Investment](#)," *The Quarterly Journal of Economics*, MIT Press, vol. 98(1), pages 85-106, February; Bernanke, Ben S, 1983. "[Nonmonetary Effects of the Financial Crisis in Propagation of the Great Depression](#)," *American Economic Review*, American Economic Association, vol. 73(3), pages 257-76, June.