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Good and bad uncertainty: Macroeconomic and financial market implications ☆

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ABSTRACT

Does macroeconomic uncertainty increase or decrease aggregate growth and asset prices? To address this question, we decompose aggregate uncertainty into 'good' and 'bad' volatility components, associated with positive and negative innovations to macroeconomic growth. We document that in line with our theoretical framework, these two uncertainties have opposite impact on aggregate growth and asset prices. Good uncertainty predicts an increase in future economic activity, such as consumption, output, and investment, and is positively related to valuation ratios, while bad uncertainty forecasts a decline in economic growth and depresses asset prices. Further, the market price of risk and equity beta of good uncertainty are positive, while negative for bad uncertainty. Hence, both uncertainty risks contribute positively to risk premia, and help explain the cross-section of expected returns beyond cash flow risk.

1. Introduction

How do changes in economic uncertainty affect macroeconomic quantities and asset prices? We show that the answer to this question hinges on the type of uncertainty one considers. 'Bad' uncertainty is the volatility that is associated with negative innovations to macroeconomic quantities (e.g., output, consumption, earnings), and with lower prices and investment, while 'good' uncertainty is the volatility that is associated with positive shocks to these variables, and with higher asset prices and investment.

To illustrate these two types of uncertainties, it is instructive to consider two episodes: (i) the high-tech revolution of early-mid 1990s, and (ii) the recent collapse of Lehman Brothers in the fall of 2008. In the first case, and with the introduction of the world-wide-web, a common view was that this technology would provide many positive growth opportunities that would enhance the economy, yet it was unknown by *how much*? We refer to such a situation as 'good' uncertainty. Alternatively, the second

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case marked the beginning of the global financial crisis, and with many of the ensuing bankruptcy cases one knew that the state of economy was deteriorating—yet, again, it was not clear by *how much*? We consider this situation as a rise in 'bad' uncertainty. In both cases, uncertainty level rises relative to its long-run steady-state level, yet, the first case coincides with an optimistic view, and the second with a pessimistic one.

In this paper, we demonstrate that variations in good and bad uncertainty have separate and significant opposing impacts on the real economy and asset prices. We use an extended version of the long-run risks model of Bansal and Yaron (2004) to theoretically show conditions under which good and bad uncertainty have different impacts on prices. To make a meaningful distinction between good and bad uncertainty, we decompose, within the model, the overall shocks to consumption into two separate zero-mean components (e.g., jumps) which capture positive and negative growth innovations. The volatilities of these two shocks are time varying, and capture uncertainty fluctuations associated with the positive and negative parts of the distribution of consumption growth. Thus, in the model, valuation ratios are driven by three state variables: predictable consumption growth, good uncertainty, and bad uncertainty. Consequently, the stochastic discount factor, and therefore risk premia, are determined by three sources of risk: cash flow, good uncertainty, and bad uncertainty risks.

We show that with a preference for early resolution of uncertainty, the direct impact of both types of uncertainty shocks is to reduce prices, though, prices respond more to bad than to good uncertainty. For prices to rise in response to a good uncertainty shock there has to be an explicit positive link between good uncertainty and future growth prospects—a feature that we impose in our benchmark model.[2] We further show that the market price of good uncertainty risk and its equity beta have the same (positive) sign. Thus, even though prices can rise in response to good uncertainty, it commands a positive risk premium.

Overall, the model's key empirical implications include: (i) good uncertainty positively predicts future measures of economic activity, while bad uncertainty negatively forecasts future economic growth; (ii) good uncertainty fluctuations are positively related to asset valuations and to the real risk-free rate, while an increase in bad uncertainty depresses asset prices and the riskless yield; and (iii) the shocks to good and bad uncertainty carry positive and negative market prices of risk, respectively, yet both contribute positively to the risk premium.[3]

We evaluate our model's empirical implications by utilizing a novel econometric approach to identify good and bad uncertainty from higher-frequency realized variation in the variables of interest (see Barndorff-Nielsen, Kinnebrock, and Shephard, 2010). Empirically, we use the ex ante predictable components of the positive and negative realized semivariances of industrial production growth rate as the respective proxies for good and bad uncertainty.[4] In its limiting behavior, positive (negative) semivariance captures one-half of the variation in any Gaussian symmetric movements in the growth rate of the variable of interest, as well as the variation of any non-Gaussian positive (negative) component in it. Thus, in our empirical work the positive (negative) semivariance captures the volatility component that is associated with the positive (negative) part of the total variation of industrial production growth, and its predictive component corresponds to the model concept for good (bad) uncertainty.

Consistent with the model, we document in the data that across various macroeconomic growth rates, and across various horizons, good economic uncertainty positively predicts future growth. This evidence includes growth for horizons of one to five years in consumption, output, investment, research and development (R&D), market earnings, and dividends. Similarly, we find a negative relationship between bad uncertainty and future growth rates of these macro variables. Together, these findings support the model feedback channel from macroeconomic uncertainty to future growth rates. Quantitatively, the impact of uncertainty has a large economic effect on the macro variables. For example, the private gross domestic product (GDP) growth increases by about 2.5% one year after a one standard deviation shock to good uncertainty, and this positive effect persists over the next three years. On the other hand, bad uncertainty shocks decrease output growth by about 1.3% one year after and their effects remain negative for several years. The responses of investment and R&D to these shocks are even stronger. Both capital and R&D investment significantly increase with good uncertainty and remain positive five years out, while they significantly drop with a shock to bad uncertainty. An implication of the offsetting responses to good and bad uncertainty is that the measured responses to overall uncertainty are going to be muted. Indeed, GDP growth declines only by about 0.25% after a shock to total uncertainty. The response to total uncertainty is significantly weaker than that to bad uncertainty, which underscores the potential importance of decomposing uncertainty into good and bad components.

The empirical evidence in the data is further consistent with the model's key asset-pricing implications. We document that the market price–dividend ratio and the risk-free rate appreciate with good uncertainty and decline with bad uncertainty. Quantitatively, the market log price–dividend ratio rises by about 0.07 one year out in response to a one standard deviation shock to good uncertainty and remains positive ten years afterward. Bad uncertainty shock depresses the log price–dividend ratio by 0.06 on impact and remains negative for ten years out. Similar to the macroeconomic growth rates, the response of the price–dividend ratio to total uncertainty is negative, but

[2] Backus, Routledge, and Zin (2010) also feature a direct feedback from volatility to future growth. However, they focus on total volatility and show the importance of this feedback for reconciling various lead-lag correlations between consumption growth and market returns.

[3] Although both uncertainties carry positive risk premium, their covariance, which may capture a common component, could contribute negatively to the risk premium.

[4] We use industrial production because high-frequency real consumption data are not available for the long sample.