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Determinants of systemic risk and information dissemination ☆

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ABSTRACT

We introduce a measure of information dissemination for the determination of systemic risk, print-media consumer pessimism, controlling for VIX volatility. VIX volatility has a significant direct impact upon systemic risk of financial firms under distress, and consumer pessimism does impact upon firm's financial stress via the externality of other firm's financial stress. In the internet bubble of the 1990s, pessimism predicts larger systemic risk in the whole period of exuberance while the VIX predicts a sharp larger systemic risk in the height of the bubble. Our evidence suggests that consumer pessimism might be dominated by the VIX when predicting systemic risk.

1. Introduction

The recent financial crisis of 2008 has brought about a fruitful financial economics research agenda that discriminates between systematic and systemic risk. In the latter vein, the recent contribution of Adrian and Brunnermeier (2011) has become influential in measuring the value-at-risk (VaR) of a financial system conditional on a financial institution being in some state of financial distress.[1]

In parallel, many researchers argue that news media plays an important role in stock market movements both theoretically and empirically. Shiller (2000) makes the conjecture that investors follow the printed word suggesting that market sentiment is driven by news' content. Empirically, Tetlock (2007) is one of the first to show that news media content can predict movements in broad indicators of stock market activity. He shows that the number of negative words in the daily "abreast of the market" column of the Wall Street Journal can predict the daily stock return from 1984 to 1999. More recently, on the same vein Garcia (2013) shows that a one standard deviation shock to a measure of market pessimism generated from the financial section of the New York Times during recessions predicts a change in the conditional average return on the Dow Jones of twelve basis points at the daily frequency from 1905 to 2005.

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[1] Authors such as Chernozhukov and Umantsev (2001), Engle and Manganelli (2004), Kuan, Yeh, and Hsu (2009) propose alternative measures of value-at-risk.

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This paper measures the potential effect of printed news on the VaR of financial institution conditional on another financial institution being in some state of financial distress. A common determinant of systemic risk is the Chicago Board Options Exchange VIX, also known as the "fear" index, e.g. Adrian and Brunnermeier (2011), Chao, Hardle, and Wang (2012), Chicago Board of Exchange (CBOE, 2009). We argue here that the VIX contains information about future expectations of market volatility embodied in prices of calls and options by market participants, but this may be different from real time news data and/or the current printed word that becomes available to market participants at the time of their decision making. A key distinction in this paper is that the two forms of information dissemination presented refer to real-time printed-word information versus information about future expectations. We argue that real-time printed word information is backward/current looking while VIX is forward looking, thus providing two distinct channels of information dissemination. In fact, from the actual data, we found a lack of strong correlation between our measure of real-time printed word and the VIX, being this a key reason it might be useful to include a measure of printed news as an additional source of information for predicting tail risks.

We use Garcia's (2013) data as a real time measure of market sentiment and the CBOE Volatility Index VIX as a measure of future expectations. Our main contribution is to use information dissemination via consumer pessimism to predict extreme risk of financial institutions in the framework of Adrian and Brunnermeier (2011). Our contribution is unique, to our knowledge, in that while others have studied average returns conditional on consumer pessimism, none have studied the tail risk of financial institutions conditional, on consumer pessimism and essentially how these risks spillover to other financial institutions.

Our sample consists of daily observations from January 2, 1992 to January 3, 2006.[2] We focus on fourteen top financial institutions, namely Citigroup (CITI), American International Group Inc. (AIG), Bank of America (BofA), Jefferies Group LLC (JEF), JPMorgan Chase & Co (JPM), Morgan Stanley (MS), Goldman Sachs (GS), Raymond James Financial, Inc. (RJF), Stifel Financial Corporation (SF), Wells Fargo (WF), Berkshire-Hathway (BRK), Lehman Brothers (LEH), Merrill Lynch (MLC) and Bear Stearns (BSC).

Our key result is that the print-media consumer pessimism variable, that we call *pessi*, has a limited direct effect on the financial stress of institutions whereas the VIX has a more significant direct effect. When the VIX is added to the state vector for the VaR estimation, the coefficients for the consumer pessimism are no longer statistically significant in most of the cases while the coefficients of the VIX are significant. However, the print-media consumer pessimism variable has a significant effect on systemic risk via the externality of stress in one institution impinged on another. This effect is identified even in the presence of similar VIX impact, thus showing that the two sources of information dissemination are distinctly identified. The time variation of the predicted VaR and the conditional VaR for a representative case shows that the inclusion of the consumer pessimism renders a more volatile predicted pattern and a notable reduction in financial stress after the internet bubble of the late 1990s. However, the inclusion of the VIX shows a less volatile time pattern and a sharper increase in financial stress in the late 1990s only.[3]

Our empirical results extend the results of several papers that examine the effects of consumer pessimism of stock returns, by examining those effects from a more general information dissemination perspective on tail risk and on the externalities of tail risk of one institution into another, e.g. Da, Engelberg, and Gao (2011), Jegadeesh and Wu (2013), Kissan, Wintoki, and Zhang (2011), Klubmann and Hautsch (2011), and Uhl (2014). We also extend the results of authors such as Chen, De, Hu, and Hwang (2014) who compare the information dissemination impact on stock returns of print media versus social media, and Mao, Counts, and Bollen (2011) who compare several measures of sentiment relative to more traditional state variables. Hence, while several recent contributions focus on the effects of consumer pessimism on average returns, our key contribution is to examine these effects on tail risk. Our evidence suggests that the VIX dominates the print-media consumer pessimism as a determinant of systemic risk.

Lastly, we find that at the one and two day horizon, print-media consumer pessimism and VIX have dynamic feedback in the Granger sense, but at longer lags the VIX Granger causes the consumer pessimism measure; and in terms of volatility, we find dynamic feedback in the same day only. The VIX performs better for the in-sample and out-of-sample forecasting of conditional VaR and the in-sample forecast is more accurate overall for either measure, but the discrepancy between consumer pessimism and VIX accuracy is larger. In the out-of-sample case, the forecasts are less accurate for both measures overall, but the discrepancy between consumer pessimism and VIX is smaller relative to the in-sample case.

The rest of the paper is organized as follows. Section 2 presents a brief discussion of the two information measures used in the paper and a literature review. Section 3 presents the determinants of tail and systemic risk used in the empirical analysis and Section 4 describes the econometric models and data. Section 5 is the core of the paper where the empirical analysis is discussed and Section 6 concludes.[4]

2. Information dissemination

In this section, we discuss two sources of information dissemination used in this paper and provide a short review of the related literature. Information dissemination traditionally refers to a message sent out to a wide audience.[5] In this paper, we interpret those messages as information that is sent out either via newspaper articles or via the observed prices of call and put options. The first is under the general rubric of market sentiment and the second is the CBOE's VIX. The key attribute is that market sentiment can be

[2] The sample period is where the daily data on market sentiment of Garcia (2013) overlaps with daily data of the VIX.

[3] We envision some possibilities for why news-based consumer pessimism should affect the joint tail risk of financial institutions. First, negative financial news could lead consumers to seek cash liquidity. Second, negative financial news could trigger outflow from equity mutual funds and cause correlated funding liquidity shocks. In both cases, banks would be in stress leading to potential negative impacts on their equity returns.

[4] An extended appendix presents several econometric models discussed in the text, additional models and is available online.

[5] For example, Merton (1987) is a classic paper that studies capital markets with alternative assumptions about information dissemination.