



Assessing the impact of macroeconomic news on the U.S. forest products industry portfolio across business cycles: 1963–2010

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ABSTRACT

Macroeconomic news is viewed as the source of systematic risk in financial markets. This study investigated the impact of macroeconomic news on the returns and volatilities of the lumber and paper industry portfolios in the United States over 1963–2010. Using ARMA–EGARCH models, we examined the impact of consumer price index (CPI), industrial production (IP), and unemployment (UNEMP) on daily industry portfolios. Empirical results indicated the existence of volatility clustering and leverage effect in the industry portfolios. The same macroeconomic news had different impacts on the lumber and paper industry portfolios. The lumber industry was more responsive to the IP and UNEMP news, whereas the paper industry was more responsive to the CPI news. The impact of macroeconomic news on industry portfolio returns and volatilities varied across business cycles. Negative shocks had greater impact on portfolio volatilities in recessions than in expansions.

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1. Introduction and motivations

The forest products industry as one of the top ten manufacturing industries plays an important role in the United States. However, its financial performance has been volatile in recent decades (Mei and Sun, 2008). The financial performance of the forest products industry has been investigated through a variety of asset pricing models. From the portfolio perspective, Sun and Zhang (2001) assess the financial performance of medium and large size portfolios of forest industry firms with capital asset pricing model (CAPM) and arbitrage pricing theory and conclude that both portfolios seemed unable to earn risk-adjusted returns between 1986 and 1997. With respect to individual forest companies, Niquidet (2010) examines forty-five forest industry firms by CAPM and Fama–French three-factor model and find that the forest sector has not earned the cost of equity over 2003–2008. Overall, previous studies examine the relationship between the risk-adjusted excess return and systematic risk.

Macroeconomic news, the unanticipated part of economic indicators, is usually viewed as the source of systematic risk. Therefore, the

relationship between macroeconomic news and asset returns has been examined to understand how investors are compensated for bearing the systematic risk. Based on the semi-strong form of efficient market hypothesis, stock prices reflect all publicly available information and adjust instantly to reflect new information. The fundamental reason for this price adjustment is that changing economic information usually affects the discount rate, or the expected future cash flow, or both. The key study by Chen et al. (1986) finds that macroeconomic indicators such as industrial production and inflation are risks rewarded in stock markets. Other studies indicate that state variables such as gross domestic product (GDP) should be considered in asset pricing models (Merton, 1973). Furthermore, macroeconomic news released periodically is known to create market volatility (Jones et al., 1998). Some macroeconomic news may increase the heterogeneity of beliefs since market participants have different responses to the news. Therefore, it is important for market participants and academic researchers to understand the relationship between macroeconomic news and asset returns.

The forest products industry portfolio is affected by states of the economy to a great extent (Sadorsky and Henriques, 2001). The lumber and wood products industry usually involves the production and development of raw materials for other industries. The lumber sector is sensitive to changes across business cycles because it supplies materials for the housing construction industry which mainly depends on the state of the economy. Moreover, prices of raw materials are largely demand driven. When the economy is on the

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upswing, the rising demand can lead to higher prices and vice versa. For the paper industry, its allied products are essential components in modern life. This industry is also related to the state of the economy and crucial to the U.S. economy. Overall, the forest products industry portfolio is sensitive to macroeconomic conditions.

Given that few rigorous studies have been conducted regarding the relationship between macroeconomic news and the forest products industry portfolio, the overall objective of this study was to investigate the impact of macroeconomic news on the U.S. lumber and paper industry portfolios across business cycles over 1963–2010. First, the response of daily returns of these two industry portfolios to macroeconomic news was investigated. Specifically, the lumber and paper industry portfolios were examined and their reaction to macroeconomic news was compared. The well-known regularly released macroeconomic news was considered in this study because it was widely watched and then passed homogeneously through the market.

Next, the impacts of macroeconomic news on the forest products industry portfolio returns and volatilities were simultaneously assessed. Previous studies assume a constant volatility and examine the impact of macroeconomic news on stock returns. However, this assumption is not realistic because the volatility may vary over time. A common feature of financial time series is the existence of the volatility clustering. That is, large changes of returns tend to be followed by large changes and small changes tend to be followed by small changes (Mandelbrot, 1963). Hence, the use of the ordinary least squares may not be appropriate if this occurs. On the other hand, volatility is unobservable and, therefore, we need a model to quantify it. The EGARCH-type model facilitates the simultaneous examination of the impacts of news on portfolio returns and volatilities.

Whether the impact of macroeconomic news on the forest products industry portfolio varied across business cycles was further examined. Previous studies find that the responses of stock markets are different depending on the state of the economy, i.e., expansions or recessions (Blanchard, 1981). For instance, McQueen and Roley (1993) find that the stock market responds negatively to news about the industrial production when the economy is in expansion. Additionally, Boyd et al. (2005) find that stock prices could respond positively to a rising unemployment rate during economic expansions, whereas they might react negatively to the same news in recessions. Hence, the impact of macroeconomic news on the lumber and paper industry portfolios across business cycles was compared in this study.

Our study extended previous research in the following ways. First, disaggregated industry portfolios were used to analyze the impact of macroeconomic news across the forest products industries, given the fact that earlier studies concentrate on aggregate indices such as S&P 500 and assess market-wide responses (Ewing, 2002; Boyd et al., 2005; Funke and Matsuda, 2006; Hanousek et al., 2009). Industry level data can shed some light on how different industries react to macroeconomic news. Second, high-frequency (daily portfolio) returns of the forest products industry portfolio were employed in this study in contrast to previous studies using low frequency data such as monthly and quarterly returns (Ewing, 2002). Lastly, leverage effect was investigated to understand the asymmetric impact of positive and negative shocks on industry portfolio volatilities. In sum, our study can help market participants make decisions across business cycles as well as assist academic researchers in identifying sources of the systematic risk.

The rest of this paper was organized as follows. Section 2 reviewed the literature on how financial markets were affected by macroeconomic news. Section 3 described the ARMA-EGARCH model. Section 4 presented data, including NBER business cycles, macroeconomic indicators, and forest products industry portfolios. Section 5 reported the empirical results and Section 6 consisted of discussion and concluding remarks.

2. Comprehensive review on previous studies

The U.S. government regularly releases macroeconomic indicators of the performance of the nation's economy. Financial markets usually adjust to the releases of this information because market participants reevaluate their assets based on their current view and future expectations of the economy. The magnitude of market response depends on the type or nature of the announced news. Some economic indicators affect only the stock markets, whereas others may influence solely the bond markets. For example, news related to the interest rate may have a direct impact on the discount factor, whereas news that conveys information about the growth expectation (GDP and unemployment) is expected to affect stock prices. Some unexpected big changes in macroeconomic indicators may be quickly priced into assets, while some small shifts may lead to a permanent impact on asset prices. Moreover, the same type of news may generate different impact on financial markets across business cycles. Due to the close relationship between macroeconomic news and financial markets, a considerable number of studies in this area have been conducted in recent decades.

Some studies mainly focused on the relationship between macroeconomic news and asset returns. In their seminal study, Chen et al. (1986) find that macroeconomic variables such as industrial production and inflation constituted risks rewarded in stock markets. Thereafter, various macroeconomic variables have been used to test these relationships, and these studies have been extended to analyze the impact of macroeconomic news on stock and portfolio volatilities. Jones et al. (1998) examine the impact of released macroeconomic news on daily Treasury bond prices and found that announcement-day volatility did not persist because the information was immediately incorporated into prices. Flannery and Protopapadakis (2002) seek to identify macroeconomic risk factor candidates by simultaneously examining the impact of news announcements on the levels and conditional volatilities of daily stock returns. They find that inflation measures (e.g., CPI) affect only portfolio returns and real factors (e.g., unemployment) affect only portfolio volatilities.

Empirical studies have been conducted across different financial markets including stock markets (Chen et al., 1986; Boyd et al., 2005), bond markets (Jones et al., 1998; Balduzzi et al., 2001), and foreign exchange markets (Almeida et al., 1998). They concentrate on the extent to which macroeconomic news is priced into assets. Other researchers compare the response of stock, bond, and foreign exchange markets to the same macroeconomic news. For instance, Kim et al. (2004) investigate the impact of the releases of six important macroeconomic indicators on the U.S. stock, bond, and foreign exchange markets. Their study highlights the importance of simultaneous examination of the announced news across financial markets. Anderson et al. (2007) examine the response of the stock, bond, and foreign exchange markets in the U.S., Germany, and the U.K. to real-time U.S. macroeconomic news announcements. They conclude that bond markets reacted most strongly to macroeconomic news, whereas the stock and foreign exchange markets seem equally responsive.

The studies discussed above implicitly assume that the responses of investors are the same under different states of the economy. However, this assumption may be too restrictive. Blanchard (1981) shows that the same macroeconomic news can be good or bad for financial assets in equilibrium, depending on the economic conditions. His study lays the foundation of the relationship between economic news and the states of the economy. McQueen and Roley (1993) provide the evidence of a different relationship between stock prices and news announcements across business cycles. In particular, higher-than-expected news in expansions can result in lower stock prices, whereas the same news is associated with higher stock prices in recessions. Moreover, Boyd et al. (2005) construct their own measure of unemployment news based on econometric techniques

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