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Financial stress spillovers across the banking, securities and foreign exchange markets

George Apostolakis [a,*], Athanasios P. Papadopoulos [b]

[a] Nyenrode Business Universiteit, Straatweg 25, 3621 BG Breukelen, P.O. Box 130, 3620 AC Breukelen, The Netherlands
[b] Department of Economics, University of Crete, Rethymno Campus, 74100 Rethymno, Greece

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ABSTRACT

In this paper, we measure the interdependence of three financial stress sub-indices (banking, securities and foreign exchange) for the major advanced economies during the 1981–2009 period using a single index based on the generalized variance decompositions developed by Diebold and Yilmaz (2012). We present spillover tables and indices that demonstrate financial stress innovations to and from other indices, in addition to spillover plots that show the dynamics of stress. Furthermore, we examine the relationship between financial stability and macroeconomic fundamentals by investigating the effects of financial stress on growth and on price levels. We proxy financial stability and monetary stability with a financial stress index (FSI) and a consumer price index (CPI), respectively, and examine their interdependence. Our findings indicate that the securities markets are the main net transmitters of stress to the other markets. In addition, up to 42.8% of the forecast error variance in all the markets examined emanates from stress spillovers. Finally, our findings highlight the interrelationship of financial and monetary stability.

1. Introduction

This paper aims to provide a detailed assessment of financial stability, a concept that has gained in importance over the last two decades in general and after the most recent financial crisis in particular. This paper seeks to examine the heightened imbalances in the financial sector that originated with the collapse of Lehman Brothers and that rapidly evolved into global turmoil thereafter. In reaction to these events, many central banks attempted to prevent deeper downturns by stabilizing their respective economies and bolstering their respective banking sectors.

Due to the novelty of the notion of financial stability in the literature, we find several definitions for the concept. Some scholars define financial stability in terms of the desired stability of financial system (Crockett, 1996; Schinasi, 2004; Allen and Wood, 2006), whereas other scholars define financial stability in terms of instability and describe situations in which financial instability impairs the real economy (Mishkin, 1999; Davis, 2003). For instance, Mishkin (1999) indicates that a state of financial instability is characterized by information problems that undermine the financial system's ability to allocate funds to productive investment opportunities. In this paper, we adopt a definition that is closer to the second strand of the literature and understand financial stability as the absence of or low stress in the financial system, which leads to decreased uncertainty.

We first study the underlying dynamic relationships of financial stress in the banking, securities, and foreign exchange markets for the G7 over a period that lasts almost 30 years. Although the literature on the transmission of stress spillovers through these markets remains in its nascency, recent scholarship has examined the importance of these three markets in transmitting financial distress (Balakrishnan et al., 2009; Cardarelli et al., 2011). Financial stress episodes are frequently related to economic downturns because these episodes destabilize the financial system and undermine its ability to operate smoothly. In this paper, we study financial stress linkages among the three markets and across the G7 countries by using the vector autoregressive (VAR) framework developed by Diebold and Yilmaz (2012).

Following our examination of the domestic and international linkages of financial stress and in a different vein from the spillover

* Corresponding author. Tel.: +31 346291560; fax: +31 346291250.
E-mail address: g.apostolakis@nyenrode.nl (G. Apostolakis).

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analysis, we examine the relationship between financial stress – as manifest through the three channels of transmission – and macroeconomic fundamentals. Specifically, we estimate impulse response functions to determine the influence of financial stress shocks on output growth and monetary stability. In addition, we examine the effects of monetary shocks on financial stability. In this section of our study, we link the mechanisms that propagate financial shocks to the economy and the transmission channels of stress that we examine in the first part of our study.

Our study contributes to the literature on financial and monetary stability in the following ways. We apply the generalized VAR spillover framework developed by Diebold and Yilmaz (2012) to examine stress spillovers, and we thereby build on recent research that has examined the interconnectedness of volatility in financial markets (Yilmaz, 2010; Antonakakis and Vergos, 2013). In addition, we employ a financial stress index (FSI) to measure financial stress, following an approach previously used by several scholars (Balakrishnan et al., 2009; Cardarelli et al., 2009; Melvin and Taylor, 2009). In particular, FSIs have been used in recent studies to study the relationship between monetary and financial instability (Baxa et al., 2013; Martin and Milas, 2013) and to analyze the 2007 foreign exchange market crisis (Melvin and Taylor, 2009).

The results of our analysis suggest that policy measures should safeguard and strengthen financial stability. Based on an analysis of the stress spillover indices, our findings stress the securities markets as the major net transmitter of stress not only to the domestic banking and exchange markets but also across international financial markets. Our findings are bolstered by the analysis of the plots of the directional stress spillovers. The net directional stress spillovers highlight the significance of the US securities market as a net stress transmitter. Finally and most importantly, almost 43% of the forecast error variance in all the markets examined in the US economy derives from spillovers.

The analysis of generalized impulse responses (GIRs) to aggregate financial stress shocks indicates that financial stress has a significant and negative effect on both output growth and price levels for a short period. An examination of the GIRs to each of the financial stress subcomponent shocks yields similar results. In addition, we utilize a sign restriction approach to verify our findings. Finally, we check the robustness of our results by employing different approaches to calculate the impulse response functions and alternative indicators of financial stress and economic activity.

The remainder of the paper proceeds as follows. In Section 2, we briefly review the literature regarding financial stability and financial stress indices. Sections 3 and 4 describe our methods and data, respectively. Section 5 examines the stress tables and spillover plots based on the generalized VAR framework. Section 6 presents the impulse responses to financial instability and inflation shocks. Section 7 includes our sensitivity analysis, which incorporates alternate measures of financial stress, economic activity, and monetary stability. Finally, we summarize and conclude in Section 8.

2. Literature review

2.1. The linkages of financial stress

The recent financial crisis revealed the importance of international financial spillovers. Financial stress co-movements and the risk of contagion increase during periods of extreme turbulence because the financial markets have gradually become more interconnected. The literature indicates that trade and financial linkages are the two main channels of international financial stress transmission (Balakrishnan et al., 2009; Forbes, 2002; Forbes and Chinn, 2004). We examine the linkages of financial stress among the international markets and offer an interpretation of how financial stress spreads, in addition to identifying the spillover channels both within and across countries.

Previous studies have demonstrated that credit plays a key role in the transmission of financial distress to the broader economy. Several studies indicate that the credit channel is the main channel of transmission of financial distress (Jacobson et al., 2005; Gilchrist et al., 2009; Carlson et al., 2011), This transmission channel may be further influenced by the financial accelerator mechanism (Kiyotaki and Moore, 1997; Bernanke et al., 1999), and Bernanke et al. (1999) argue that monetary policy, in particular, impacts the real economy through the financial accelerator mechanism. Alternatively, Goodhart et al. (2006) analyze financial fragility by means of a micro-founded general equilibrium model featuring endogenous default and heterogeneous agents that is distinct from, but complementary to, the role of the financial accelerator. Recent theoretical developments move in the direction of incorporating the financial sector into a macroeconomic framework, thus relating financial frictions to economic activity (Cúrdia and Woodford, 2009; Gertler and Karadi, 2011; Gertler and Kiyotaki, 2010). Several scholars focus on the relationship between asset prices and monetary policy and seek to determine whether monetary policy should react to asset price movements (Bernanke and Gertler, 2000, 2001; Mishkin, 2001; Bordo and Jeanne, 2002; Dupor, 2005).

The link between financial development and growth is well established in the literature. For instance, King and Levine (1993) find that financial development is positively correlated with capital accumulation, per capita GDP and future growth. Rajan and Zingales (1998) investigate how financial development facilitates growth and posit that there is a linkage from financial development to growth via the interdependence of those industries that are most reliant on external financing. In contrast to the literature that examines the effects on growth over the long term, there is limited research on the link between financial stability and growth and how short-run effects are established (Cevik et al., 2013; Hakkio and Keeton, 2009; Mallick and Sousa, 2013). Bloom (2009) argues that uncertainty shocks lead to drops in output because higher uncertainty causes firms to temporarily halt investment plans. However, the causal relationship between financial stability and growth might run the other direction. Scholars have found evidence of a reverse relationship in which growth negatively affects financial instability (Beck et al., 2006; Demirgüç-Kunt and Detragiache, 1998; Klomp and De Haan, 2009).

Another strand of the literature investigates linkages between financial stability and monetary stability. Schwartz (1995) finds that achieving price stability over the medium term is sufficient to prevent financial crises. Borio and Lowe (2002) argue that there is the possibility of financial instability even in conditions of low inflation and growth when there is a combination of supply shocks and asset price booms with overoptimistic assessments of risk. De Graeve et al. (2008) find evidence of a tradeoff between monetary stability and financial stability and suggest that an unexpected tightening of monetary policy increases the mean probability of distress. Thus, a key challenge for central banks is to maintain both monetary and financial stability simultaneously.

Another strand of the literature investigates bank lending stability and the transmission of financial shocks by examining the cross-sectional transmission of stress via the banking channel (Van Rijckeghem and Weder, 2001, 2003; Popov and Udell, 2010; Cetorelli and Goldberg, 2010; De Haas and Van Horen, 2012; Haas and Horen, 2013).

2.2. Different measures of financial stress

An examination of the literature in search of an appropriate financial stability measure reveals different approaches. One