THE CROSS-BORDER CREDIT CHANNEL AND LENDING STANDARDS SURVEYS:

IMPLICATIONS FOR THE EFFECTIVENESS OF UNCONVENTIONAL MONETARY POLICIES

ANDREW J. FILARDO, BANK FOR INTERNATIONAL SETTLEMENTS
PIERRE L. SIKLOS, WILFRID LAURIER UNIVERSITY AND BALSILLIE SCHOOL OF INTERNATIONAL AFFAIRS

3/31/2016

Not to quoted or cited without permission

The second author is grateful to the Bank for International Settlements for financial support as a Visiting Research Fellow in 2015. Portions of this paper were also written while the second author was a National Fellow at the Hoover Institution, Stanford University. Their financial support is also gratefully acknowledged. A separate data appendix is available with details not provided in the study. Cinzia Guerrieri provided research assistance. Bernard Hodgetts of the Reserve Bank of New Zealand provided us with some New Zealand data. An Appendix with additional data related and estimation details is available on request.

ABSTRACT

The role of credit conditions is critical. This paper argues that an underused indicator, obtained from surveys conducted among Senior Loan Officers and often cited by central bankers, offers some important new insights about the effects of unconventional monetary policies (UMP) and the potential size and impact of cross-border spillovers. Surveys of credit standards or conditions represent a useful proxy to assess whether the transmission mechanism of monetary policy may be impaired, especially under crisis conditions and during the recovery and return to normality phases in monetary conditions.

We are able to employ data from 16 economies, 10 of which belong to the Eurozone, for a sample covering the 2002-2014. We then apply the Global VARs (GVAR) methodology that seems best-suited to account for domestic and international real and financial sources of shocks to the aggregate economy. We find that cross-border effects of QE significantly interact with domestic lending conditions. As a result, our approach provides insights into why the credit boom that preceded the GFC was felt more keenly in some economies than in others. Our study also leads to some policy implications. For example, it is important that policy makers survey more than just domestic credit conditions. Cross-border influences on domestic credit conditions need to be separately identified if surveys of the kind that have become more visible are to provide some insights into the evolving monetary policy transmission mechanism.

Andrew Filardo, andrew.filardo@bis.org

Pierre L. Siklos, psiklos@wlu.ca

Keywords: global VAR, lending standards and credit conditions, unconventional monetary policies

JEL Classification codes: F44, F36, F15, E5, E32

1. Introduction

As this is written monetary policy around the globe struggles to normalize. An obvious indicator for the U.S. is that members of the Fed's FOMC have repeatedly delayed the dating of the liftoff from the zero lower bound (ZLB) where has remained between December 2008 and 2015.[1] Meanwhile, several other central banks in advanced economies have continued to reduce their policy rate, in some cases into negative territory (e.g., the ECB, the Bank of Japan, the Swiss National Bank, and the Riksbank). Indeed, as pointed out by the BIS (BIS 2015), many central banks actually eased monetary policy in 2014 often resorting to unconventional means to effect policy loosening. Debate continues about the extent to which unconventional monetary policies (UMP), whose impact is arguably most visible from an examination of central bank balance sheets, are to blame. Policy makers continue to discuss whether the prolonged era of ultra-loose monetary policies has impaired, damaged, or even altered the effectiveness of monetary policy.

Pre-crisis there was a consensus on how the monetary transmission mechanism operates, that is, the channels through which changes in a central bank policy rate impacts the real economy, especially output and inflation. Post-crisis, however, academics and policy makers have placed a greater emphasis on the role of what has since been referred to as the financial cycle (e.g., Borio 2012, Claessens et. al. 2011). This became necessary when central banks shifted away from reliance on policy rate changes alone towards the use of central bank balance sheet instruments (i.e., quantitative easing; QE). While the adoption of UMP has been primarily limited to the systemically important central banks (viz., the Fed, the Bank of England (BoE), the Bank of Japan (BoJ), and the European Central Bank (ECB)), the potential for spillovers continue to preoccupy smaller economies, especially in emerging markets.

The deleveraging that follows in the wake of financial crises shows up in weak loan demand while financial institutions, understandably worried about the potential risks of lending in such an environment, potentially also restrict loan supply. This development has been termed the

[1] This is reflected in the so-called 'dot chart', that is, the Figure entitled "Appropriate Pace of Policy Fine Tuning" that appears in the section "Summary of Policy Projections" contained in each Monetary Policy Report. See http://www.federalreserve.gov/monetarypolicy/mpr_default.htm.

risk-taking channel (e.g., Bruno and Shin 2015, Borio and Zhu 2012). Consequently, the role of credit conditions is critical. Indeed, Jorda et.al. (2013) marshal empirical evidence since 1870 and show that financial stability risks are more likely to originate from credit booms followed by busts than from excessive expansion of government debt. Lopez-Salido et. al. (2015) also associate economic downturns with credit conditions, thought to be mean reverting, and find that these are linked to credit spreads.

The extant literature has typically relied upon observed measures of (bank) loans and varieties of interest rate spreads, to give two examples, to empirically capture the potential for monetary policy to interfere with the credit channel in the transmission mechanism. This paper argues that an underused indicator, obtained from surveys conducted among Senior Loan Officers (SLO) and cited often by central bankers, offers some important new insights about the effects of UMP and the potential size and impact of cross-border spillovers. Indeed, the impact of the financial crisis would have been lessened had the authorities stepped in earlier, and more aggressively, to ease credit conditions. By the time UMP were deployed the damage from a rapid tightening of credit standards was felt in the global economy. It is also interesting to note, as we shall see below, that an increasing number of central banks have begun to collect and disseminate this kind of data.

Surveys of credit standards or conditions represent a very useful proxy for the degree to which the transmission mechanism of monetary policy is impaired, especially under crisis conditions and during the recovery and return to normality phases in monetary conditions. Beginning with only three economies, the U.S., Canada, and Japan, the number of surveys, and their scope, has greatly expanded in recent years. Whereas the originals surveys were intended as an evaluation of the overall environment for lending and were always backward-looking, many of these surveys are now aimed at finding out about the expectations of lending conditions. Additionally, in several economies, surveys of lending standards now also discriminate between different lending market (e.g., mortgage versus household and commercial loans).

A challenge is that the span of the available data remains rather short to be effectively used in econometric estimation in many economies where such series recently became available. Nevertheless, we are able to employ data from 16 economies, 10 of which belong to the Eurozone, for a sample covering the 2002-2014 period.

We then apply the Global VARs (GVAR) methodology that seems best-suited to account for domestic and international real and financial sources of shocks to the aggregate economy. Our sample is almost equally divided between the period before and since the Global Financial Crisis (GFC). Moreover, even if the financial crisis was global in nature there is considerable diversity in the impact of this event across the economies in our dataset. Briefly, we find that inclusion of lending standards data critically affects the interpretation of the influence of UMP. We also find that cross-border effects of QE significantly interact with domestic lending conditions. As a result, our approach provides insights into why the credit boom that preceded the GFC was felt more keenly in some economies than in others. Our study also leads to some policy implications. While the lending standards surveys are a useful addition to models of the type estimated below it is important that policy makers survey more than just domestic credit conditions. Cross-border influences on domestic credit conditions need to be separately identified if surveys of the kind that have become more visible are to provide some insights into the evolving monetary policy transmission mechanism.

The rest of the paper is structured as follows. The following section is a brief review of the literature on the sources of changes in the channels of monetary policy transmission. Next, we briefly outline the methodology. The data, their construction, sources, and some stylized facts are explained in section 4. Section 5 describes the empirical results which are followed, in section 6, by some conclusions and policy implications.

2. The Channels of Monetary Policy Transmissions: A Brief Review

Until the GFC explaining changes in the supply of credit could arguably be explained by a single variable, namely the price of credit. This concept is often proxied by a credit spread. For example, researchers would often resort to the differential between a long-term and a short-term government bond. This approach also neatly fit the pre-crisis consensus of assuming that

the stance of monetary policy could be evaluated by looking at changes in the central bank policy rate. This state of affairs became entrenched by the late 1990s. However, an earlier literature that dates at least to the 1950s, and given proper theoretical foundations by the 1980s, always hypothesized that the supply of credit was determined by both price and non-price factors.[2] Asymmetric information, transactions costs, and other institutional constraints on the supply of credit implied that various forms of rationing existed resulting in a mismatch between borrowers needs and lenders ability to supply credit. As a result, observed interest rates need not always reflect market clearing conditions.

More recently, UMP in the major advanced industrial economies (i.e., U.S., U.K., Japan and the Eurozone) heralded a return to a new form of financial repression as central banks succeed in compressing the spread between long and short rates (e.g., see Reinhart (2012)). The resulting distortions in spreads further contribute to reducing their ability to be informative about the state of the credit channel of monetary policy. Indeed, UMP have partly been blamed for modifying the monetary policy transmission mechanism. As argued in the BIS's 2014 Annual Report[3] it is not surprising that global financial markets have come "under the spell" of monetary policy. An additional complication has been the reduction of policy rates by central banks among several advanced economies to the zero lower bound (ZLB) and beyond. Theory would have us believe that monetary (and fiscal) policies would become less effective at this point but the combinations of UMP and ZLB may well explain the continued effectiveness of monetary policy (e.g., see Swanson and Williams 2015).

A common theme in the foregoing literature is the notion that financial conditions help determine the real economic effects of monetary policy. However, as Adrian and Liang (2014) remind us, it is also useful to distinguish between financial conditions (e.g., whether markets are stressed or not) and financial vulnerabilities. The latter concept stems from the implications of, say, easy monetary policies on the behavior of borrowers who, for example, have the incentive to become over-leveraged, take on too many risks in chasing returns, or both. Whereas financial conditions provide information about the current environment financial

[2] Siklos and Lavender (2015) provide a brief survey for the U.S. and Canada.
[3] See http://www.bis.org/publ/arpdf/ar2014e2.htm.

vulnerabilities represent the dangers that lurk within the financial system and portend a future financial crisis.

Just as conventional macroeconomic models struggle to incorporate financial frictions into the New Keynesian consensus model that prevailed almost unchallenged until the GFC, empirical models which attempt to capture the degree to which the transmission mechanism of monetary policy has been impaired since 2007[4] also have difficulty establishing which channels from the financial sector to the real sector matter most. More generally, financial crises are thought to impair the transmission mechanism meaning that the ability of interest rates to signal changes in credit conditions suffers (e.g., also see Munro and Wong (2014)). Bech, Gambacorta and Kharroubi (2014) conclude this is the case for advanced economies covering a sample that extends several decades. As a result, many channels have been put forward as having implications for the effectiveness of monetary policy. A partial list includes: a credit or asset price channel; a bank lending channel; a risk channel; a balance sheet or portfolio balance channel; an exchange rate channel; a signaling channel and, finally, a risk-taking channel. Of course, it needs to be underscored that some or all of the channels can operate simultaneously.[5]

Critical to the evaluation of the potential for monetary policy transmission mechanisms to become impaired is whether or not monetary policy loses its effectiveness with the onset of a financial crisis. Perhaps unsurprisingly, the evidence is mixed. While Bech, Gambacorta, and Kharroubi (2014) find that monetary policy becomes less effective in crisis conditions, Dreschler, Savov, and Schnabl (2014) and Dalhaus (2014) are just two examples of studies that conclude otherwise.

---

[4] There exist different views about when the crisis began and whether it has ended. For the United States the Federal Reserve Bank of St. Louis' timeline of events, prepared with the benefit of hindsight, begins in February 2007 (https://www.stlouisfed.org/financial-crisis/full-timeline). Many empirical studies date the beginning of the crisis later that year (e.g., see Rogers, Scotti, and Wright (2014)). The crisis is thought to have ended sometime in early 2011. However, studies of UMP must also contend with the continuing financial crisis in the Eurozone which appears to end in May 2014, at least according to the European Central Bank's own timeline which has since been removed (old link was https://www.ecb.europa.eu/ecb/html/crisis.en.html). A reading of the financial press suggests that the ECB's interpretation of history is rather optimistic especially as policy rates in several major central banks continue to remain at or near the ZLB.

[5] Peek and Rosengren (2013), and Boivin, Kiley, and Mishkin (2010), provide recent reviews of the relevant literature.

Central to our understanding of the role of the financial system in the real economy is the relative importance of banks versus non-bank financial institutions. Gambacorta, Yang, and Tsatsaronis (2014) report that in advanced economies financial systems remain more bank-centered than in emerging markets and, with the possible exception of Japan and Ireland, changes in the ratio of bank credit to the sum of bank credit, stock and bond market capitalization have been modest since 1991. It is also well-known that bank lending is far more critical in the Eurozone than in the US (e.g., see Siklos 2015, and references therein). In contrast, in emerging markets, there has been a noticeable decline over the same period in in bank-oriented credit a reflection no doubt of the growing maturity of financial systems in those countries. Beck and Demigüç-Kunt (2009) confirm much the same result.[6] In addition, the range of values for the indicator of bank-centered financial systems is quite large. Among advanced economies, the U.S. is lowest, at approximately 20%, while the figure for New Zealand is almost 80%. In general, bank-centered financial systems dominate in the Eurozone providing an important contrast with the U.S. case (e.g., see Hempell and Kok (2010), and Cappiello et. al. (2010)). A similarly large range describes the data for emerging markets but for two of the emerging markets in our sample, Thailand and Turkey, the ratios are roughly 60% and 50%, respectively.

Over and above the relative importance of the banking sector is the increasing role played by cross-border flows. Cetorelli and Goldberg (2011) conclude that lending supply shocks are transmitted globally. Emerging markets are especially vulnerable because of the outsized role played by foreign banks in many of these economies.[7] Rey (2013) argues that cross-border flows exacerbate the volatility of gross flows rendering booms and busts more volatile. Bruno and Shin (2015) also highlight the importance of the movement of global liquidity across borders but underscore the vital role played by the banking sector in the transmission of financial shocks. In part for these reasons concerns have been expressed, particularly among

[6] Both studies rely on data collected by the World Bank, namely the Financial Development and Structure database and the Global Financial Development database. Both are available from http://data.worldbank.org/.
[7] See also Goldberg (2009) for a survey of globalization in banking.

policy makers in emerging markets (e.g., Rajan 2014), about the implications of spillovers from unconventional monetary policies followed by the major central banks in advanced economies[8]

Ultimately, what needs to be evaluated are the links between the financial and real sectors of the economy. An extensive empirical analysis is contained in Hubrich et. al. (2013) who examine the record for Eurozone, European Union (EU), and OECD economies over three decades beginning in 1980. Their study confirms that spillovers have always played a role, even before the GFC (also see Che, Griffoli, and Shay 2014). Needless to say there is a growing literature in this area that, owing to space limitations, cannot be surveyed here (e.g., see Jermann and Quadrini (2012) for the U.S.).

So far we have not discussed the requirement that, in order to properly understand the connection between the financial system and the real economy, it is useful to identify the proximate demand side versus supply side factors in evaluating credit conditions. This has long been a concern of empirical studies of real-financial sector links in the macroeconomy. Both factors play a role though it appears that the relative importance of, say, supply side factors, namely the degree to which banks supply funds, depending on economic and financial conditions, is partially dependent on whether micro (i.e., bank or firm level) data are employed. For example, Bassett et. al. (2014), Demiroglu, James, Kizilaslan (2012), Blaes (2011), Kwan (2010), and Ciccarelli, Maddaloni, and Peydro (2010), are studies that stress that new insights about credit conditions are obtained from highly disaggregated data. Generally, however, the necessary data are available only for a few economies such as the U.S. and, more recently, the Eurozone. While the overall conclusions of studies that resort to micro level data are not necessarily in conflict with ones that rely on more highly aggregated data (see below) one important insight from this literature is that disaggregated data can assist in understanding the incentives of loan officers to influence lending standards and, as a result, influence the supply of credit to the real economy (Agarwal and Ben-David (2014)).

[8] Chen, Filardo, He, and Zhu (2014), and Lombardi, Siklos, and St. Amand (2015) survey the relevant literature while Avdjef and Takáts (2014) consider the case of the Fed's taper tantrum of 2013. A consequence of these developments has been a return to favor in the imposition of capital controls, often labelled measures of the macroprudential variety nowadays, when these are deemed to be excessive (inter alia, Ostry et. al. (2011), Brunnermeier and Sannikov (2015)).

Not surprisingly, much of the discussion has centered on the role of domestic factors, including the relative importance of domestic credit conditions. Yet, finance is global and banks borrow and lend across borders. Clearly, there is some scope for global influences on domestic economic activity. Borio and Filardo (2007), for example, hypothesized that a measure of global slack could have a separate effect on inflation. Calza (2008) concludes otherwise. More recently, Anundsen et.al. (2014) suggest that credit and housing price shocks can be transmitted globally.

As discussed in the introduction we are interested in whether macroeconomic effects of financial conditions are influenced by lending standards. Data availability has largely limited studies to the U.S., Canada, and the Eurozone. Siklos and Lavender (2015), and Siklos (2015) provide brief surveys of the extant literature but Bassett et. al. (2014), del Giovani et. al. (2011), IMF (2013), van der Veer and Hoebricht (2013), and Ciccarelli et.al. (2010), are other recent studies where lending standards data play an explicit role in explaining macroeconomic outcomes. Nevertheless, the available studies are few relative to the large number of studies that rely on spreads, proxies for financial conditions, or other similar indicators. Moreover, existing studies focus on the domestic effects of lending standards and not cross-border effects.

3. An Outline of the GVAR Methodology

The GVAR model, proposed by Pesaran et al. (2004), is a global modelling framework that links $N+1$ country-specific (or some other entity) VAR models (VARX*) to empirically identify global links. The principal advantage of the GVAR is that it represents a practical and coherent solution to the 'curse of dimensionality' that stems from global modelling that resort to standard VARs. In addition to providing an alternative method that addresses endogeneity and model specification issues within the financial integration literature discussed above, the GVAR methodology is particularly attractive in the present context where cross-border capital flows are boosted by the ongoing reliance on unconventional monetary policies (UMP) in several advanced economies coupled with investors' search for yield.

We only briefly outline the GVAR methodology. Pesaran and Chudik (2016) is a recent comprehensive literature review while di Mauro and Pesaran (2013) contains not only an

updated version of the Dées et. al. (2007) approach but they collect a large number of empirical applications in different fields of economics.

The first step of the GVAR estimates individual country models as a VAR. Each country model includes domestic and foreign variables, as well as global variables capturing international factors (e.g., oil price, volatility in financial markets based on the VIX). After estimating the individual country models, their corresponding estimates are combined through link matrices (here based on countries' bilateral trade). The individual country models are then stacked together in order to build the GVAR model. The estimation of the GVAR is made feasible by assuming weak exogeneity for both foreign and global variables in individual country models in the first step, which can be empirically validated through appropriate testing (see below).

The econometric framework of the GVAR is as follows. First, the individual country VARX* (p, p^*) for country $i = 0,1, \dots, N$ is given by

$$x_{it} = a_{i0} + a_{i1}t + \sum_{j=1}^{p} \psi_{ij} x_{i,t-j} + \sum_{j^*=0}^{p^*} \Lambda_{ij^*} x^*_{i,t-j^*} + \vartheta_{i0} d_t + \vartheta_{i1} d_{t-1} + \varepsilon_{it} \qquad (1)$$

where x_{it} is a $k_i \times 1$ matrix of endogenous domestic variables in country i at time t; a_{i0} and a_{i1} denotes the coefficients on the constant and deterministic time trend respectively; d_t is a $k^{ex} \times 1$ matrix of global exogenous variables; and the white noise process is denoted by $\varepsilon_{it} \sim \mathcal{N}(0, \sum_i)$. In the actual estimation phase the intercepts are unrestricted while any deterministic trend is restricted. Finally, the weakly exogenous foreign variables, denoted with a '*', are defined as

$$x^*_{i,t} = \sum_{r \neq i}^{N} \omega_{i,r} x_{r,t} \qquad (2)$$

where $x^*_{i,t}$ is $k^*_i \times 1$ and $\omega_{i,r}$ denote bilateral weights between countries i and r, such that $w_{ii} = 0$ and $\sum_{j=0}^{N} w_{i,j} = 1$. These weights are intended to capture the economic importance of country j's economy to country i and, as noted previously, are based on trade flows.

To illustrate the basic structure of the GVAR, assume that a VARX (1, 1) model is specified and set $\vartheta_{i0} = \vartheta_{i1} = 0$. To solve the model, we specify the matrix $z_{i,t} = (x_{i,t}, x^*_{i,t})'$ with dimension

$(k_i + k_i^*) \times 1$. Collecting all contemporaneous terms on the left-hand side, together with other simplifications of the notation (see Pesaran and Chudik 2016), yields

$$A_i z_{it} = a_{i0} + a_{i1} t + B_i z_{i,t-1} + \varepsilon_{it} \quad (3)$$

where $A_i = (I_{ki}, -\psi_{i,0})$ and $B_i = (\psi_{i,1}, \Lambda_{i,1})$. Defining z_{it} in terms of the global vector $x_t = (x_{0t}', x_{1t}', \dots, x_{Nt}')$ alongside the weight matrix W_i such that $z_{it} = W_i x_t$, we can re-write (1) as

$$A_i W_i x_t = a_{i0} + a_{i1} t + B_i W_i x_{t-1} + \varepsilon_{it} \quad (4)$$

Stacking all country models yields

$$G x_t = a_0 + a_1 t + H x_{t-1} + u_t \quad (5)$$

where

$$a_0 = \begin{pmatrix} a_{00} \\ a_{10} \\ \vdots \\ a_{N0} \end{pmatrix}, a_1 = \begin{pmatrix} a_{01} \\ a_{11} \\ \vdots \\ a_{N1} \end{pmatrix}, u_t = \begin{pmatrix} \varepsilon_{0t} \\ \varepsilon_{1t} \\ \vdots \\ \varepsilon_{Nt} \end{pmatrix}, G = \begin{pmatrix} A_0 W_0 \\ A_1 W_1 \\ \vdots \\ A_N W_N \end{pmatrix}, H = \begin{pmatrix} B_0 W_0 \\ B_1 W_1 \\ \vdots \\ B_N W_N \end{pmatrix}$$

Pre-multiplying (5) by G^{-1}, the GVAR model, obtained from the estimated individual country models, can be expressed as follows:

$$x_t = G^{-1} a_0 + G^{-1} a_1 t + G^{-1} H x_{t-1} + G^{-1} u_t = b_0 + b_1 t + F x_{t-1} + e_t \quad (6)$$

Note that (6) resembles a VAR (1) model with a deterministic trend, and therefore can be used to generate forecasts, impulse response functions (IRFs) and forecast error variance decompositions (FEVDs). These are used to investigate the dynamic properties of the global model as well as the time-varying effects of variable-specific shocks across economies. In particular, IRFs trace out the responsiveness of all variables in the model to shocks to each of the variables across time, while FEVDs display the proportion of the forecast errors in the variables that are due to their own shocks versus shocks to the other variables. Each can be employed to analyze global spillovers of a particular shock (e.g. US interest rate hike, global credit shock, oil price shock) on other countries' macroeconomic variables.

The setup of our GVAR model is as follows. Using the Schwartz Bayesian criterion (SBC) the number of lags for domestic variables is set to 1 for all country models. The maximum number of lags for foreign variables is also set to 1. All non-US country models contain as endogenous (domestic) variables real GDP, inflation, real equity prices, the short-term interest rate, real bilateral exchange rate against the US dollar, cross-border claims from BIS reporting countries and total credit to the non-financial sector. These models also contain their corresponding foreign variables (except the foreign real bilateral exchange rate) as well as the oil price as global variable, all of which enter as weakly exogenous.

All of the series are in levels or in log levels before unit root tests are applied (not shown). Unit roots are found in the (log) levels of real GDP, equity prices, cross-border claims, the real exchange rate, the level of short-term interest rates, and the inflation rate. These conclusions seem consistent with previous GVAR applications (e.g., Dées et. al. 2007, Feldkircher and Huber 2015, Eickmeier and Ng 2015).

The US model is treated differently given its dominant role in the global economy. In particular, the US model does not contain the domestic real bilateral exchange rate, foreign real equity prices as well as foreign short-term interest rate. However, oil prices and the US VIX are included as endogenous variables. These model specifications are similar to Dées et al. (2007). Moreover, US shocks are identified by imposing a specific ordering (see section 5 below).

4. Data and Stylized Facts

a. Data

Many available lending standards series raise an identification problem since the surveys are informative about the supply of credit but these may also incorporate a response to demand conditions. While a growing number of central banks, or other agencies, are separately surveying credit demand conditions these data are available with more limited coverage.

Another difficulty with the existing data is that the precise questions being posed can differ across surveys and countries. Space constraints prevent a complete listing of the questions

posed.[9] Nevertheless, all of the surveys used below do display some common features. First, SLO in commercial banks typically respond to these surveys. Second, the aim of the principal question being posed is an assessment of whether lending conditions have been, or are likely to be tighter or looser in the past and in the near future. When demand conditions are surveyed this is not usually done separately but represents the opinion of the same individuals who respond to the survey of supply conditions. We do not, however, have a clear understanding of the precise origins of views about past or anticipated future demand for loan conditions.

The open-ended nature of the relevant questions leaves also open, for example, the extent to which changes in lending conditions, or borrowing when data availability permits, are due to the stance of monetary policy, or in response to other economic conditions that may have prompted a change of view among loan officers' about credit conditions.

Countries with the longest span of lending survey data (viz., U.S., Japan, Canada) originally did not distinguish between types of loans. In recent years the data began to discriminate between residential, commercial or loans to households. The ECB was a pioneer but many central banks have joined this trend. Nevertheless, differences between types of loans seem neither large nor persistent, an indication perhaps that common standards for loans predominate.[10] Accordingly, all estimates below use aggregate indicators of lending standards.

Survey data are typically sampled at the quarterly frequency. We collected data for 17 economies. In addition, for the Eurozone, 15 member countries are also considered.[11] The economies considered cover most regions of the globe and include: U.S., Japan, U.K., Canada, Australia, the Eurozone, Denmark, Norway, Poland, Czech republic, Romania, Hungary, Turkey, Philippines, Thailand, New Zealand, and Sweden. As noted earlier, data limitations prevent us from using all the available data.

When estimating the GVARs, the following economies are included: Australia, Canada, Eurozone, Japan, Sweden, the UK and the US. The countries in the Eurozone grouped together

[9] Details are, however, available on request.
[10] Of course, this result may also reflect a flaw of the survey itself. We do not pursue this question further.
[11] The ECB does not release data for all members of the single currency area.

in one region are as follows: Austria, Belgium, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. There were too few observations available for the other economies to include them in econometric estimation.

Data for the U.S. begin in 1990, 1999 for Canada, 2000 for Australia and Japan, 2002, and 2007 for the UK.[12] For Eurozone economies the relevant survey data begin in 2002 although data for several Eurozone members, particularly countries that joined the European Union (EU) after 2004, only starts in 2009. For the remaining countries in our dataset the start date for lending standards data ranges from 2003 (e.g., Poland) to 2012 (e.g., Czech Republic). In terms of sample sizes this implies anywhere from 10 to 99 observations per economy are available. Since the data are occasionally quantified slightly differently across economies all observations were converted such that a positive value for the standards data implies a tightening of credit conditions while a negative value means a loosening of standards. The same interpretation applies to estimates of loan demand side conditions based on survey data. It is worth noting, however, that there are fewer surveys of senior loan officers' views concerning past or anticipated loan demand. Credit conditions survey data are also available since 2009 for several regional groupings (e.g., Asia, Emerging markets, Latin America, Middle East). The surveys are carried out by the Institute of International Finance (https://www.iif.com/). The remaining surveys are usually carried out by the central bank although there are some exceptions (e.g., Australia, New Zealand).

Next, a set of macroeconomic and financial determinants of the core economic variables of interest, that is, real GDP growth and inflation, were compiled. In the case of inflation both core and non-core versions are considered although, as conclusions are unaffected, the results discussed in the following section rely on headline inflation. Among the real economic variables we include oil prices. Turning to financial variables, other than the lending standards data, we include the term spread, that is, the long-short government bond yield differential, total bank

[12] Actually, U.S. data go back as far as the 1970s and the series was interrupted during the 1980s. See, for example, Siklos and Lavender (2015), and references therein, for more details. Partly because the earlier U.S. data may not, strictly speaking, be comparable with data beginning in the late 1980s, we do not examine data prior to 1990.

credit (e.g., as a share of the private non-financial sector), and the VIX. All data are from the BIS, individual central banks, and the International Monetary Fund.

b. A Few Stylized Facts

One of the contributions of this study is to highlight the existence of various proxies for loan demand and credit supply conditions based on lending standards surveys. Accordingly, we report here only stylized facts as they pertain to credit conditions. Figures 1A and 1B aggregate some of the available data according to the size or type of monetary policy regime in place. The large economies include the G4 (i.e., U.S., U.K., Eurozone and Japan). Emerging markets in our sample are grouped separately as are the inflation targeting (IT) economies which tend to be small and open (e.g., Australia, Canada, and Sweden). In one case we have disaggregated the Eurozone economies according to whether they are members of the core (viz., France, Germany, and Italy), or are part of the periphery relying on two definitions (see Figure 1A). We also consider EU member states not in the Eurozone (Hungary, Poland, Romania, and the Czech Republic).

Figure 1A illustrates that credit supply conditions are over time quite heterogeneous around the globe. Nevertheless, as shown by the dashed vertical lines which capture the timing of QE policies introduced by the G4, these are generally seen as loosening credit conditions, although the impact of these policies appears to diminish over time. When data permit we can also illustrate the diversity of global credit supply conditions by asking how SLO expectations of lending standards evolve over a 6 month horizon. The results are shown in Figure 1B which further highlights the diversity of loan supply conditions across different economies. It is especially notable that conditions in the EMEs, for which data are available, reveal the large impact of the GFC as well as being suggestive of the spillovers from various attempts at QE by the G4.

Figures 2A and 2B focus on the experience of the Eurozone economies. Whereas the behavior of changes in loan demand is similar among Eurozone members (Figure 2A), in both core and in the periphery there is considerable variation in perceptions of the degree of ease or tightening

in the supply of credit across various Eurozone members for which data are available.[13] Also, it is worthwhile pointing out that credit conditions tightened considerably precisely at the time loan demand rose sharply, and not necessarily in the periphery economies identified here. Rather the impact was most acute in the less widely publicized periphery economies in the wake of the sovereign debt crisis in that region of the world (e.g., Estonia, Malta, Slovakia, Slovenia).

The potential role of spillover effects is again illustrated in Figure 3. While the extant literature has focused its attention on global spillovers of QE into asset prices the impact is also visible in the evolution of credit supply standards. It is also apparent that the impact of various attempts at QE is, at best, temporary. In every single case shown a tightening (i.e., a rise in the index) is followed by a loosening of standards in the next quarter. In a couple of cases a loosening of standards is offset by a subsequent tightening. Overall, it is no wonder that QE is seen as having mixed effects on the macroeconomy, at least as it impacts credit supply conditions.

Remaining with the EMEs in our sample, Figure 4A suggests that loan demand conditions, at least as measured by the surveys, appear to mirror conditions in the economy more generally. By contrast, as shown in Figure 4B, credit standards in various part of the globe seem relatively volatile and, at least visually, there are no obvious links with global economic performance. We turn next to the econometric evidence.

5. Empirical Results

Figures 5 through 8 display the impulse responses for two sets of shocks.[14] They are: a positive shock to lending standards in the US or the Eurozone (Figures 5 and 6) and a negative shock to the demand for loans (Figures 7 and 8), again originating either from the US or the Eurozone.

[13] It is unclear how significant the omission of data from certain Eurozone members (e.g., Greece) is. A comparison of Eurozone-wide data and the mean of individual Eurozone member countries for which data are available suggest that the unavailable data have only a modest overall effect (plot not shown).

[14] In many GVAR applications it is common to show the large number of impulse responses together with (bootstrapped with 5000 replications here) confidence bands. Instead, these are relegated to a separate appendix as many are either uninformative or show impulse responses that are of secondary interest to the main objectives of the paper. Hence, point estimates are shown so that the individual economy responses can be seen more clearly.

Both type of shocks are ones that central banks have underscored as one of the principal targets of QE type policies.

We first examine the positive shocks to lending standards which implies that senior loan officers tighten credit. Hence, one also expects a tightening of loan supply. As Figure 5 demonstrates (top left hand side set of responses) the largest responses are own shock responses. Moreover, a tightening of US lending standards is seen as reverberating across the advanced economies with the exception of Japan. Not surprisingly, the largest response tends to be in the US but this is closely followed by a similarly large response in Canada, its largest trading partner. Notice also that the responses parallel each other across the economies considered. Hence, one may think of a lending standard shock as having the flavor of a common global financial shock. Whether this is a reflection of the globalization of finance or a manifestation of the global financial cycle we cannot say. Nevertheless, since this shock is one that has generally been ignored in macro models of the kind estimated here this represents a significant omission.

Next, we turn to the impact of a tightening of loan supply on real GDP growth (top right hand plot of Figure 5). Unsurprisingly, a tightening of lending standards tends to be contractionary, again on a global scale, though the impact appears to diminish after two to three years. Other than Japan the impact is strongest for the US and is permanent.

There is considerably more diversity to a lending standards shock in the responses of the term spread and total credit growth (bottom two plots in Figure 5). Although the impact of a loan supply tightening is to raise the term spread[15] the effect is reversed after about three years except for Australia, Sweden and Canada which overshoot on the negative side. Meanwhile the rise in the spread is permanent for the US and the Eurozone. Similarly, the tightening in the US appears to result in an expansion of credit elsewhere, except in Australia, another indication perhaps on the impact of the globalization of credit. The negative effect is especially notable for the US and is again permanent in nature.

[15] Of course, this can be a lowering of the short-term interest rate, a rise in the long-term rate, or a combination of the two.

Figure 6 represents the same exercise but now the positive lending shock originates from the Eurozone. Like its US counterpart the lending standards shock produces the largest responses. However, in contrast to the US results, the impact of the tightening of loan supply is smaller and tends to be reversed in many economies other than the US, the Eurozone and Canada. Paralleling the US results a Eurozone lending standards shock is contractionary at first globally but the responses eventually turn positive in the US and Japan. The impact is, however, negative and permanent for the Eurozone. The differential impulse responses for the US against the Eurozone could well indirectly reflect the divergences in monetary policy over the years. In addition, it is worth noting that the size of the impulse responses from a Eurozone shock is smaller by a factor of almost three than what was reported for the same US shock. Finally, the impulse responses for the term spread and total credit growth are broadly comparable to the ones found for the US although, as is true for the other variables shown, the size of the responses is much smaller than the ones shown in Figure 5. Indeed, total credit growth only responds noticeably in the Eurozone and Australia. The other responses are, for the most part, negligible.

Figures 7 and 8 consider the other side of the loan markets by investigating the impact of a negative loan demand shock. When the shock originates from the US (Figure7) we see a large tightening of standards especially in Canada and the US. Clearly, loan supply and loan demand do not move independently of each other. Indeed, much as was found in Figure 5, this result is a global one. Only Japan sees little response from a US loan demand shock.

Interestingly, a negative US loan demand shock is strongly and unambiguously contractionary only for the US and Japan. Even for Japan the effect of the shock is temporarily expansionary and the same is found elsewhere. This result may well reflect spillovers and would suggest, assuming that the impact of this shock is symmetric, that an unexpected positive shock to US loan demand would spillover negatively elsewhere.

The impulse responses for the term spread (bottom left hand plot in Figure 7) suggest that, other than in the US, where a negative loan demand shock permanently raises the spread, the spread at first declines, consistent with the impulse responses for real GDP and total credit

growth, and then rise before falling once again in all of the economies included in the GVAR. Indeed, the impulse responses for total credit growth reflect the spillovers referred to above. Moreover, it would seem that the impact of a loan demand shock parallels the one found for a tightening of lending standards. Since the latter are observed more quickly than the former, which are only observed with a considerable lag, Figure 7 appears to confirm the usefulness of relying on lending standards data to capture an important element of the transmission of financial shocks around the globe.

Finally, Figure 8 reveals that the response to a negative Eurozone loan demand shock is largely the mirror image of the one reported for the US. Lending standards ease around much of the globe and more so in the US than in the Eurozone itself. Nevertheless, the effects appear permanent in both cases. In contrast to the real GDP response to a US loan demand shock, a Eurozone shock is found to result not only in relatively larger impulse responses but the impact of a negative Eurozone shock is on the whole more contractionary. This result may well be explained by the significantly larger role played by banks in the common currency area than in the US. The impulse responses for the term spread and total credit growth generally parallel the one shown in Figure 7 although the impact of the negative loan demand shock is more muted when the shock originates in the Eurozone than in the US.

Figures 9 and 10 plot in the form of stacked bar charts the forecast error variance decompositions (FEVD) for the cases shown in Figures 5 through 8. Even if the responses to the two shocks examined are sometimes comparable as between the US and the Eurozone it is clearly not the case that the explanatory power of the same variables is also comparable. As seen in Figure 9 loan standards explain the largest portion of the variance though the relative importance of this variable declines as lags increase. However, the role of loan standards is dwarfed in the Eurozone after the first year while the same variable remains important even 5 years after the original shock. Clearly, when the shock originates from a tightening of lending standards, loan demand and real GDP growth are the other two principal determinants of the forecast error variances. Notice also how unimportant inflation is. This likely reflects the remarkably low and stable inflation rates especially in the US and the Eurozone throughout the

sample but also in the other economies sampled. Finally, the term spread and total credit growth are considerably less influential than ending standards, loan demand, and real GDP growth.

Figure 10 shows the FEVDs for the negative loan demand shock. Once again differences between the US and the Eurozone are plain to see. Loan demand plays an importance but diminishing role as the number of lags rises while the relative importance of this variable increases in the Eurozone case. Lending standards play an important role in both cases while the term spread plays a relatively more significant role for the Eurozone case than in the US GVAR. Finally, the explanatory power for real GDP growth is considerably larger for the Eurozone model than for the US case.

6. Conclusions and Policy Implications

It is frequently claimed that the GFC impaired the normal monetary policy transmission mechanism. The implementation of quantitative easing policies in systemically important economies (U.S., U.K., Eurozone, and Japan) is intended to alleviate the added frictions posed by the financial strains generated since the events that began in 2007 took place. Much as there is an ongoing debate about the impact of QE on financial markets around the world it has proved difficult to empirically determine the extent to which QE policies have been able to assist in the healing process of monetary policy transmission.

Banks, for the most part, stand in the way of the restoration of normal monetary conditions and policy makers continue to grapple with ways to ease the sharp reduction in lending activity since the onset of the global financial crisis. Perhaps surprisingly, the extant empirical literature has shied away from using data based on surveys of Senior Loan Officers even if central bankers themselves regularly discuss the findings from such surveys and a few studies, largely confined to central banks, use the available data. Indeed, a growing number of central banks now publish such surveys.

An objective of this paper seeks to empirically determine the extent to which data from lending surveys can help us understand not only whether the monetary policy transmission mechanism has been impaired but also the implications for monetary policy spillovers.

Employing data from 16 economies, 10 of which belong to the Eurozone, for a sample covering the 2002-2014 we estimate Global VARs (GVAR). This methodology seems best-suited to account for domestic and international real and financial sources of shocks to the aggregate economy. We focus on two sets of shocks to the U.S. and the Eurozone and examine their potential spillovers to the rest of the world. A positive shock to lending standards (i.e., an effective tightening of policy) and a negative shock to loan demand. QE is intended, at least in principle, to offset these two types of shocks. We find that cross-border effects of QE significantly interact with domestic lending conditions. More precisely, unless these shocks are offset they have significant negative effects on economic growth and interest rate spreads, to give two examples. Moreover, the effects are quantitatively larger for the Eurozone than the U.S. likely because bank lending is considerably more important in the former economy than in the latter. Finally, spillovers are varied but it is not clear that these are always negative for emerging market economies. Data limitations, to a large extent, prevent us from being more definite.

Our approach provides insights into why the credit boom that preceded the GFC was felt more keenly in some economies than in others. Our study also leads to some policy implications. For example, it is important that policy makers survey more than just domestic credit conditions. Cross-border influences on domestic credit conditions need to be separately identified if surveys of the kind that have become more visible are to provide some insights into the evolving monetary policy transmission mechanism. Finally, more data will allow a more definitive evaluation of the role of QE and lending standards on emerging market economies.

References

Adrian, T., and N. Liang (2014), "Monetary Policy, Financial Conditions, and Financial Stability", Federal Reserve Bank of New York Staff Reports 690, September.

Agarwal, S., and I. Ben-David (2014), "Do Loan Officers Incentives Lead to Lax Lending Standards?", NBER working paper 19445, February.

Avdjiev, S., and E. Takáts (2014), "Cross-Border Bank Lending During the Taper Tantrum: The Role of Emerging Market Fundamentals", BIS *Quarterly Review* (September): 49-60.

Bech, M.L., L. Gambacorta, and E. Kharroubi (2014), "Monetary Policy in a Downturn: Are Financial Crises Special?", *International Finance* 17 (1): 99-119.

Beck, T., and A. Demigüç-Kunt (2009), "Financial Institutions and Markets Across Countries and Over Time – Data and Analysis", working paper, World Bank, May.

Bassett, W. F., M.B. Chosak, J.C. Driscoll and E. Jakrakšek (2014), "Changes in Bank Lending Standards and the Macroeconomy", *Journal of Monetary Economics* 62 : 23-40.

Blaes, B. (2011), "Bank-Related Loan Supply Factors During the Crisis: An Analysis Based on the German Bank Lending Survey", Bundesbank discussion paper 31.

Boivin, J., M.T. Kiley, and F. S. Mishkin (2010), "How Has the Monetary Transmission Mechanism Evolved Over Time?", NBER working paper 15879, April.

Borio, C. (2012), "The Financial Cycle and Macroeconomics: What Have We Leant?", BIS working paper 395, December.

Borio, C., and A. Filardo (2007), "Globalization and Inflation: New Cross-Country Evidence on the Global Determinants of Domestic Inflation", BIS working paper 227, May.

Bruno, V., and H.S. Shin (2015), "Capital Flows and the Risk-Taking Channel of Monetary Policy", *Journal of Monetary Economics* 71 (April): 119-132.

Brunnermeier, M.K., and Y. Sannikov (2014), "International Credit Flows and Pecuniary Externalities", *American Economic Journal: Macroeconomics* 7(1): 297-338.

Calza, A. (2008), "Globalisation, Domestic Inflation and Global Output Gaps", ECB working paper series 890, April.

Cappiello, A. Kadareja, C. Kok Sorensen, and M. Protopapa (2010), "Do Bank Loans and Credit Standards Have an Effect on Output? A Panel Approach for the Europ Area", ECB working paper 1150, January.

Caruana, J., A. Filardo, and B. Hofmann (2014), "Post-Crsis Monetary Policy", Bank for International Settlements, 27 March.

Ciccarelli, M., A. Maddaloni, and J.-L. Peydró (2010), "Trusting the Bankers" A New Look at the Credit Channel of Monetary Policy", ECB working paper 1228, July.

Cerutti, E., G. Hale, and C. Minoiu (2014), "Financial Crises and the Composition of Cross-Border Lending", IMF working paper 14/185.

Cerutti, E., S. Claessens and L. Ratnowski (2014), "Global Liquidity and Drivers of Cross-Border Flows", CEPR discussion paper 10314, December.

Cetorelli, N., and L. S. Goldberg (2011), "Global Banks and International Shock Transmission: Evidence from the Crisis", *IMF Review* 59 (1): 41-76.

Claessens, S., M.A. Kose, and M. E. Terrones (2011), "Financial Cycles: What? How? When?, IMF working paper 11/76, April.

Dahlhaus, T. (2014), "Monetary Policy Transmission During Financial Crises: An Empirical Analysis", Bank of Canada working paper 2014-21, June.

Dées, S., F. di Mauro, M. Hashem Pesaran, and V. L. Smith (2007), "Exploring the International Linkages of the Euro Area: A Global VAR Analysis", *Journal of Applied Econometrics* 22: 1-38.

Demiroglu, C. James, and A. Kizilaslan (2012), "Bank Lending Standards and Access to Lines of Credit", *Journal of Money, Credit and Banking* 44 (September): 1063-1089.

Di Mauro, F., and M. H. Pesaran (2013), *The GVAR Handbook: Structure and Applications of a Macro Model of the Global Economy for Policy Analysis* (Oxford: Oxford University Press).

Dreschler, I., A. Savov, an P. Schnabl (2014), "The Deposit Channel of Monetary Policy", working paper, New York University, November.

Eickmeier, S., and T. Ng (2015), "How Do US Credit Supply Shocks Propagate Internationally? A GVAR Approach", *European Economic Review* 74: 128-145.

Everaert, G., N. Che, N. Geng, B. Grass, G. Impavido, Y. Lu, C. Saborowski, J. Vandenbussche, and L. Zeng (2015), "Does Supply or Demand Drive the Credit Cyclke? Evidence from Central, Easter, and Southeastern Europe", IMF working paper 15/15, January.

Feldkircher, M., and F. Huber (2016), "The International Transmission of US Shocks – Evidence from Bayesian Global Vector Autoregressions", *European Economic Review* 81 (January): 167-88.

Gambacorta, L., J. Yang, amd K. Tstatsaronis (2014), "Financial Structure and Growth", BIS *Quarterly Review*, March: 21-35.

Gertler, M., and P. Karadi (2015), "Monetary Policy Surprises, Credit Costs, and Economioc Activity", *American Economic Journal: Macroeconomics* 7(1): 44-76.

Jannsen, N., G. Potjagailo, and M.H. Wolters (2014), "Monetary Policy During Financial Crises: Is the Transmission Mechanism Impaired?", working paper, September.

Jermann, U., and V. Quadrini (2012), "Macroeconomic Effects of Financial Shocks", *American Economic Review* 102 (1): 238-271.

Hale, G., and M. Obstfeld (2014), "The Euro and the Geography of International Debt Flows", working paper 2014-10, Federal Reserve Bank of San Francisco, March.

Hempel, H. S., and C. Kok Sprensen (2010), "The Impact of Supply Constraints on Bank Lending in the Euro Area Crsiis Induced Crunching?", ECB working paper 1262, November.

Jordà, O., M.H.P. Schularik and A. M. Taylor (2013), "Sovereign versus Banks: Credit, Crises and Consequences", IMET working paper 3.

Lopez-Salido, D., J.C. Stein, and E. Zakrajsek (2015), "Credit-Market Sentiment and the Business Cycle", Finance and Economics Discussion Series, Federal Reserve Board, 2015-028, April.

Mendoza, E.G., and M.E. Terrones (2012), "An Anatomy of Credit Booms and Their Demise", NBER working paper 18379, September.

Pesaran, M. H., and A. Chudik (2016), "Theory and Practice of GVAR Modeling", *Journal of Economic Surveys* 30 (February): 165-197.

Pesaran, M. H., T. Schuermann, and S. M. Weiner (2004), "Modelling Regional Interdependencies Using a Global Error Correcting Macroeconometric Model", *Journal of Business and Economic Statistics* 22: 129-162.

Peek, J., and E. Rosengren (2013), "The Role of Banks in the Transmission of Monetary Policy", Public Policy Discussion Papers 13-5, Federal Reserve Bank of Boston, September.

Popov, A., and G.F. Udell (2011), "Cross-Border Lending, Credit Access, and the Financial Crisis", working paper, European Central Bank, December.

Reinhart, C. (2012), "The Return of Financial Repression", Banque de France *Financial Stability Review*, 16, April: 37-48.

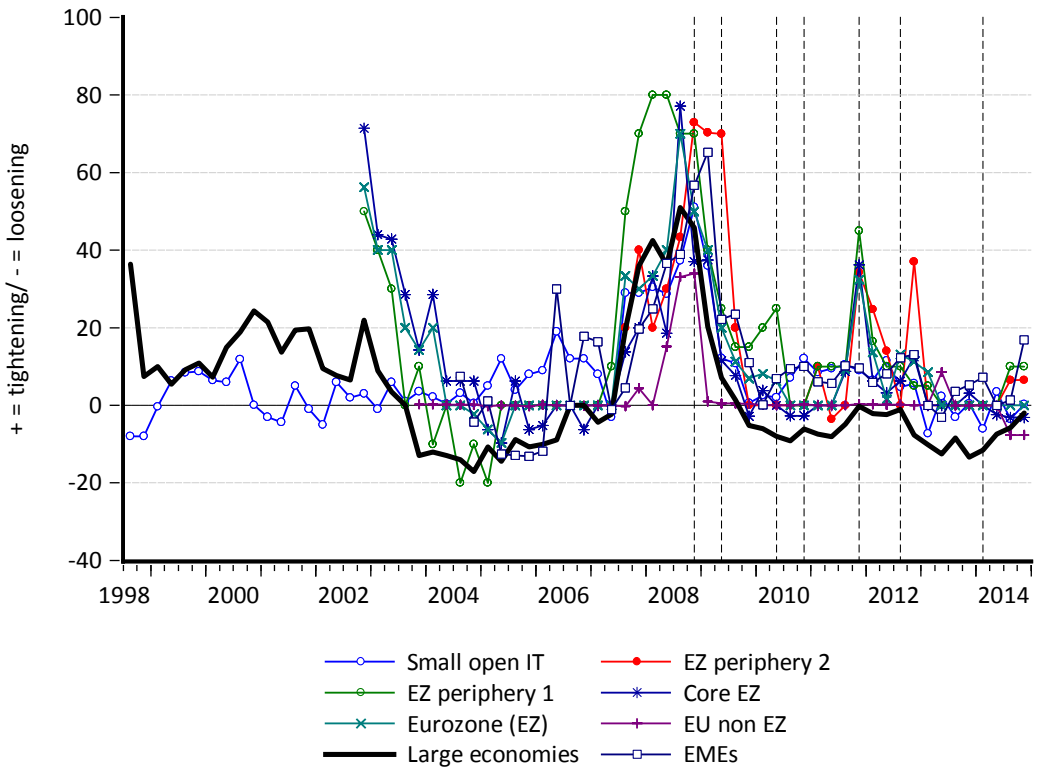
Stein, J.C., (2014), "Incorporating Financial Stability Considerations into a Monetary Policy Framework", remarks at the International Forum on Monetary Policy, Washington, D.C., 21 March.

Swanson, N., and J. C. Williams (2014), "Measuring the Effects of the Zero Lower Bound on medium- and Longer-Term Interest Rates", *American Economic Review*, 104(10): 3154-85.

Van der Veer, K., and M. Hoebrichts (2013), "The Effect of Bank Lending Standards on Business Lending", DNB working paper 396, October.

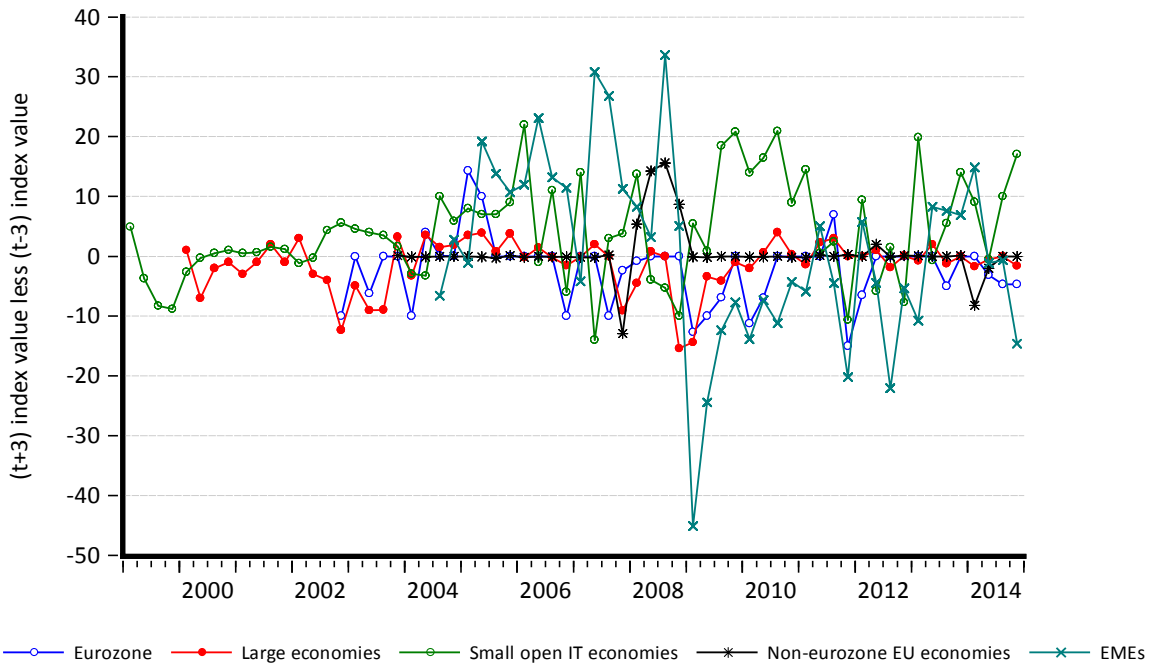
Walsh, C. (2014), "Monetary Policy Transmission Channels and Policy Instruments", working paper, UC Santa Cruz, May.

Figure 1A - Survey of Lending Standards In a Selection of Economies



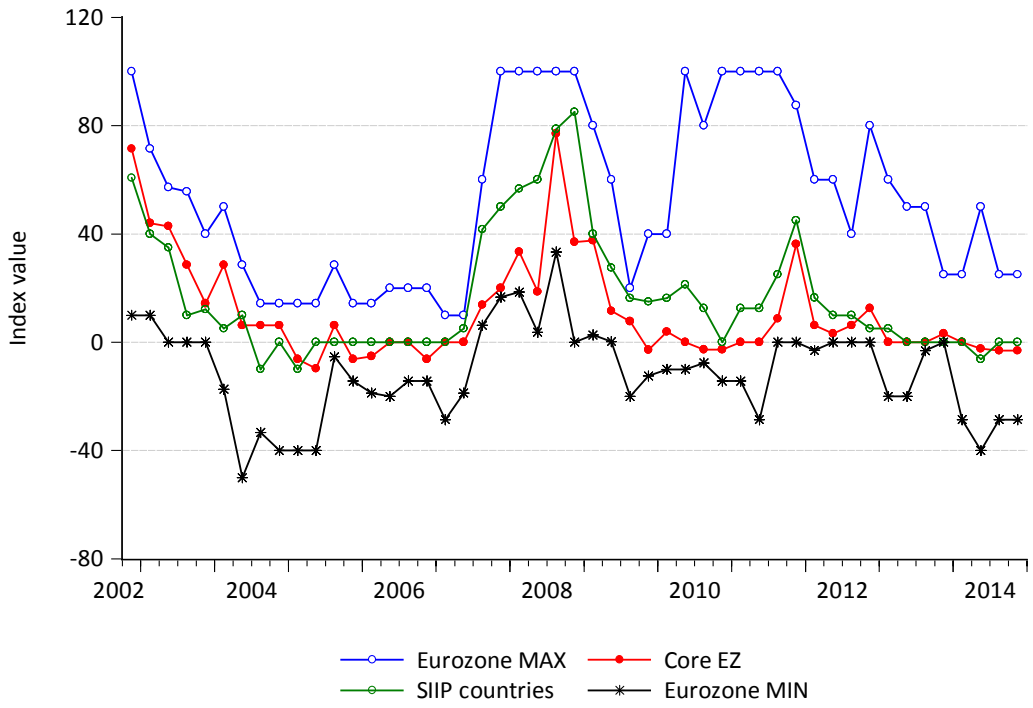
Note: Vertical dashed lines refer to the UMP actions taken by the central banks in the four large economies. See Figure 3 for the precise dates used. Data refer to senior loan officers' views about conditions over the previous three months.

Figure 1B - Expected Movements in Lending Standards – Global



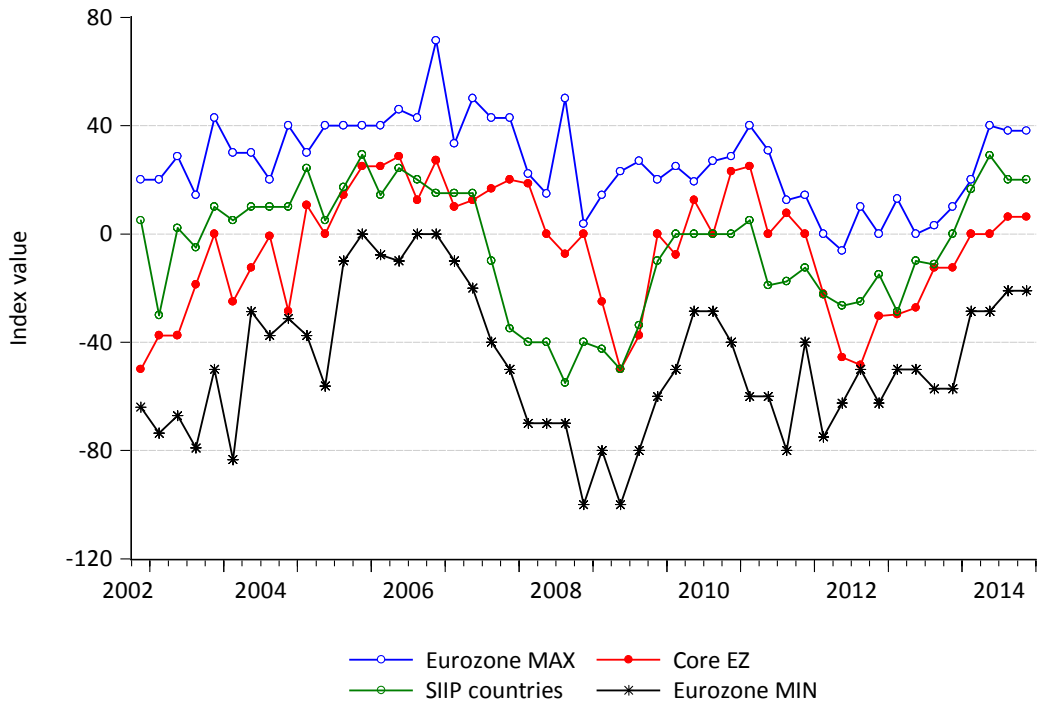
Note: Eurozone defined previously. Large economies consist of the US, Eurozone, Japan, and the UK. Small open IT economies include: Canada, New Zealand, Sweden, Australia, and Norway. Expected movements refer to senior loan officers' views about conditions three months ahead.

Figure 2A - Lending Standards: Eurozone and SIIP Countries



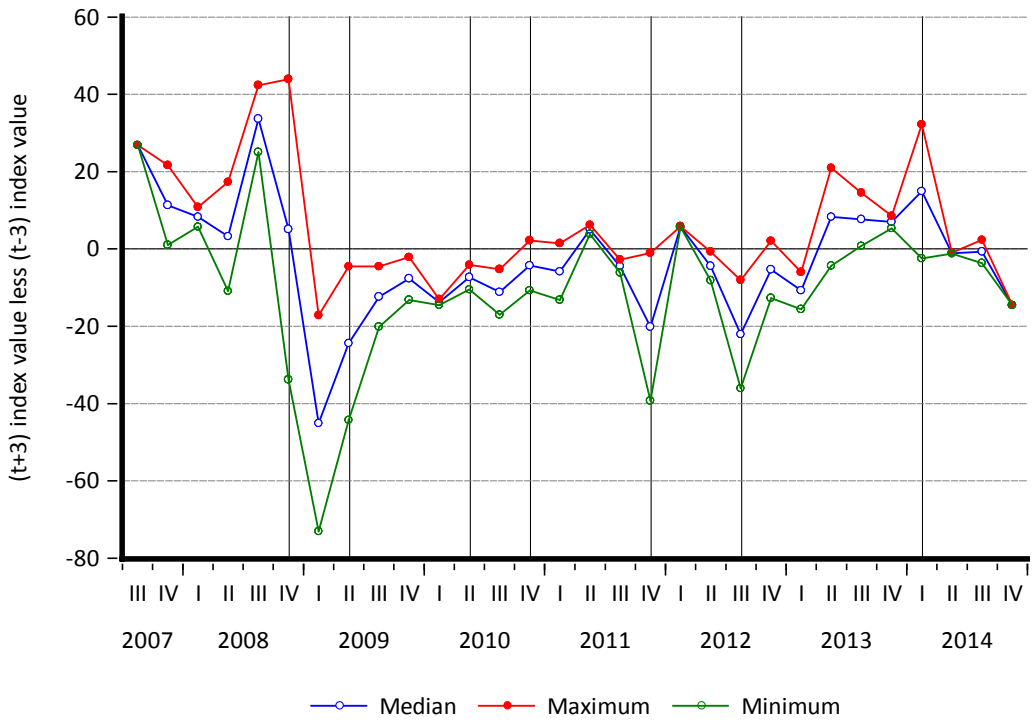
Note: SIIP Countries are: Spain, Italy, Ireland, and Portugal. Core EZ countries defined above. MAX, MIN refer to the maximum and minimum values obtained from the Survey for the entire Eurozone.

Figure 2B - Loan Demand: Eurozone and SIIP Countries



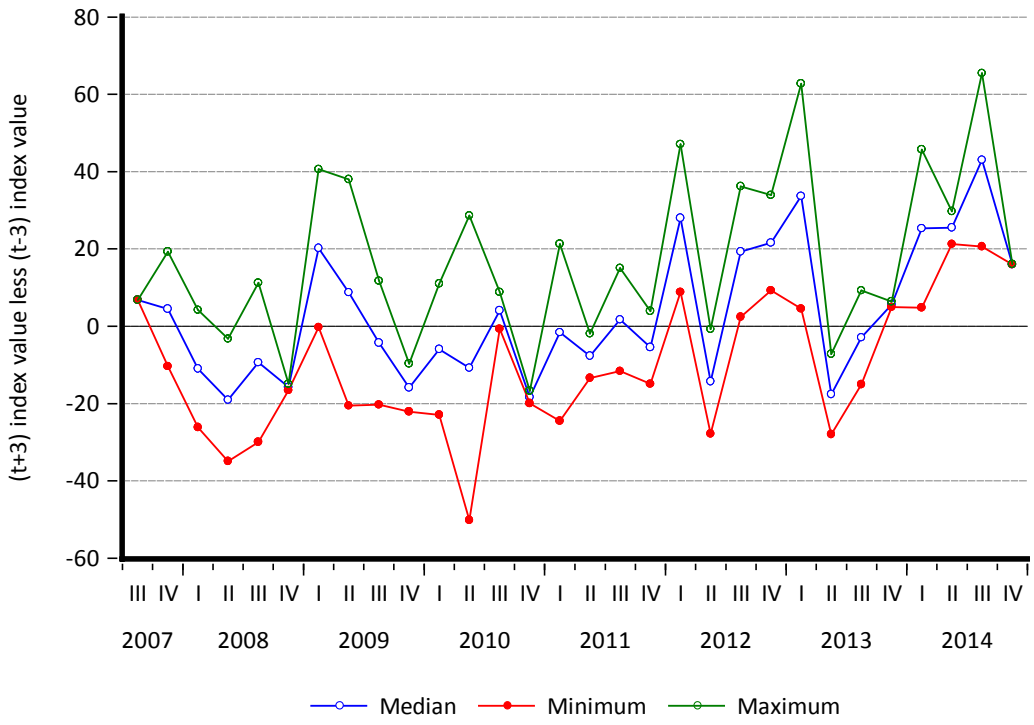
Note: See note to Figure 2A.

Figure 3 - Expected Movements in Lending Standards – Emerging Market Economies



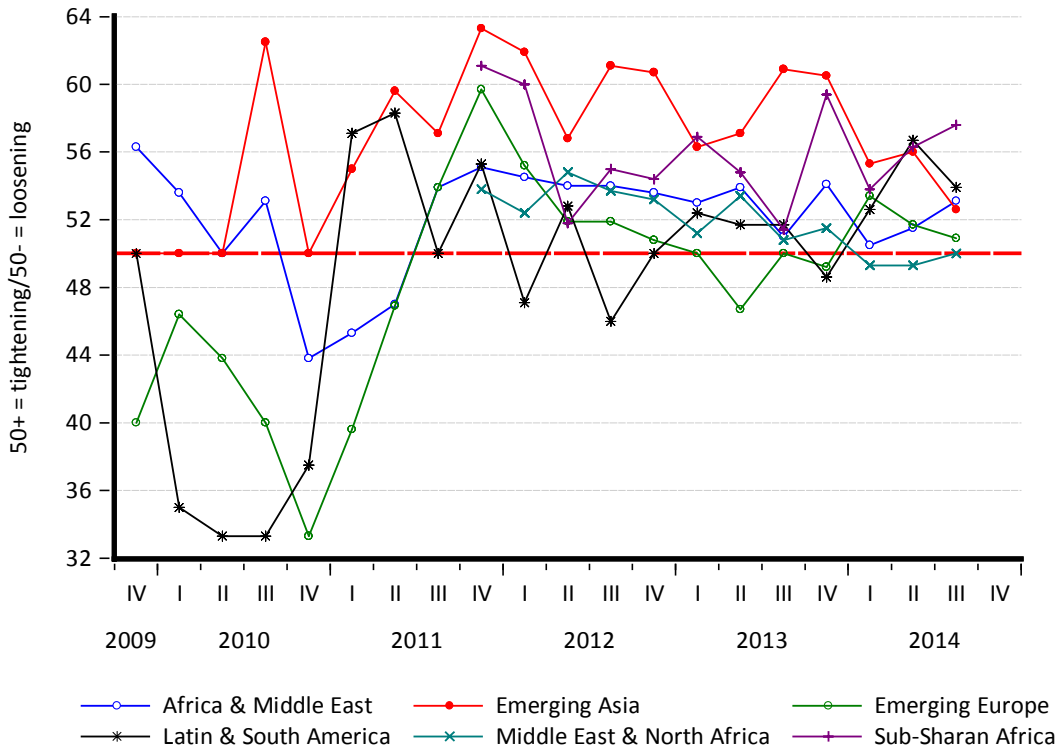
Note: EMEs are Turkey, Thailand, and Philippines. Vertical lines indicate UMP (CE, QE) policies by the major central banks. 2008Q4 (Fed), 2009Q2 (ECB/BoE), 2010Q2 (ECB), 2010Q4 (Fed), 2011Q4 (BoE), 2012Q3 (BoE), 2012Q3 (Fed/ECB), 2014Q1 (BoJ).

Figure 4A - Expected Movements in Loan Demand in Emerging Market Economies



Note: See note to Figure 2A.

Figure 4B - Institute of International Finance Lending Standards Survey – Regional Groupings



Note: Regional definitions follow those of the International Monetary Fund.

Figure 5 Impulse Responses to a Positive Lending Standards Shock from the US

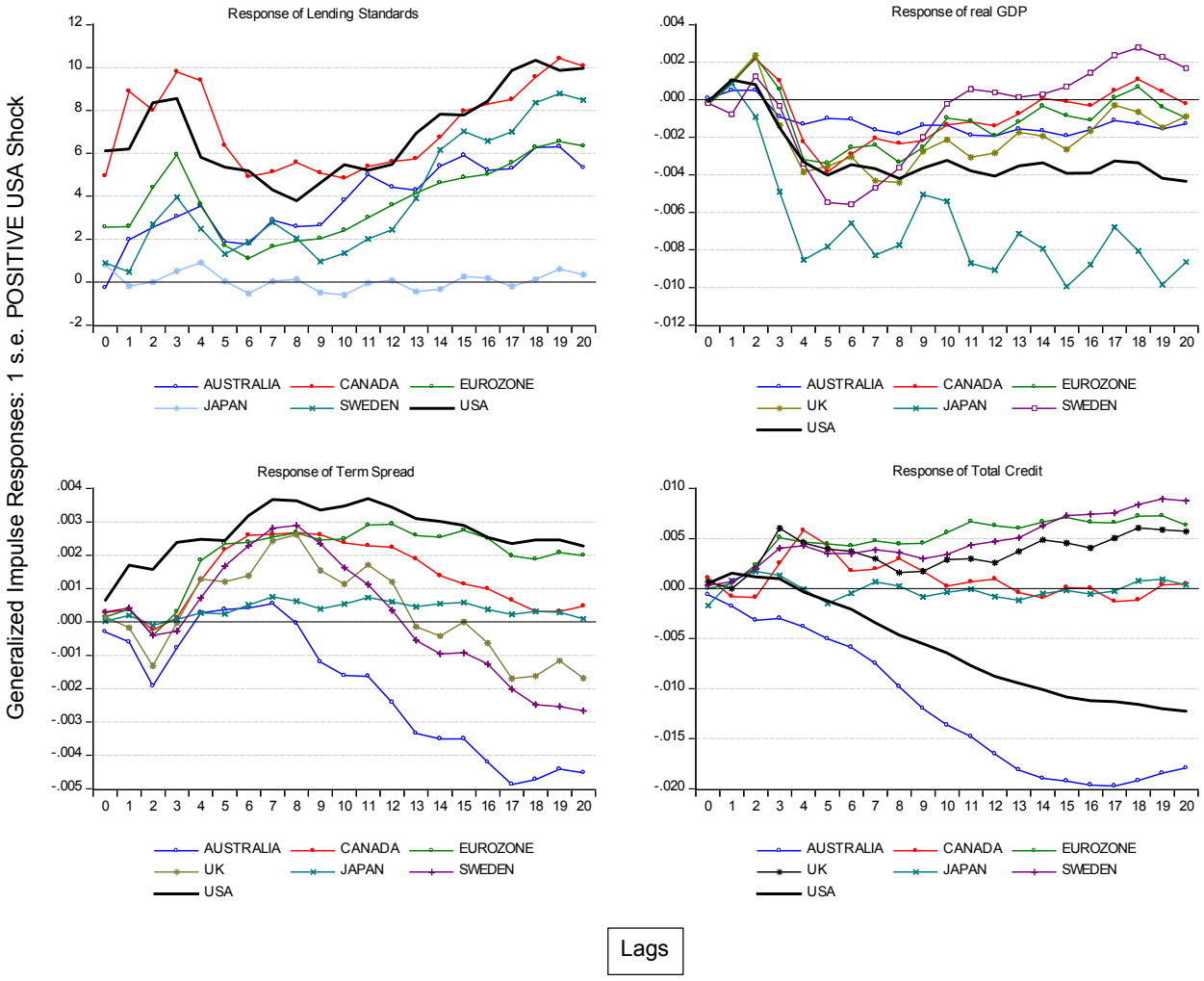


Figure 6 Impulse Responses to a Positive Lending Standards Shock from the Eurozone

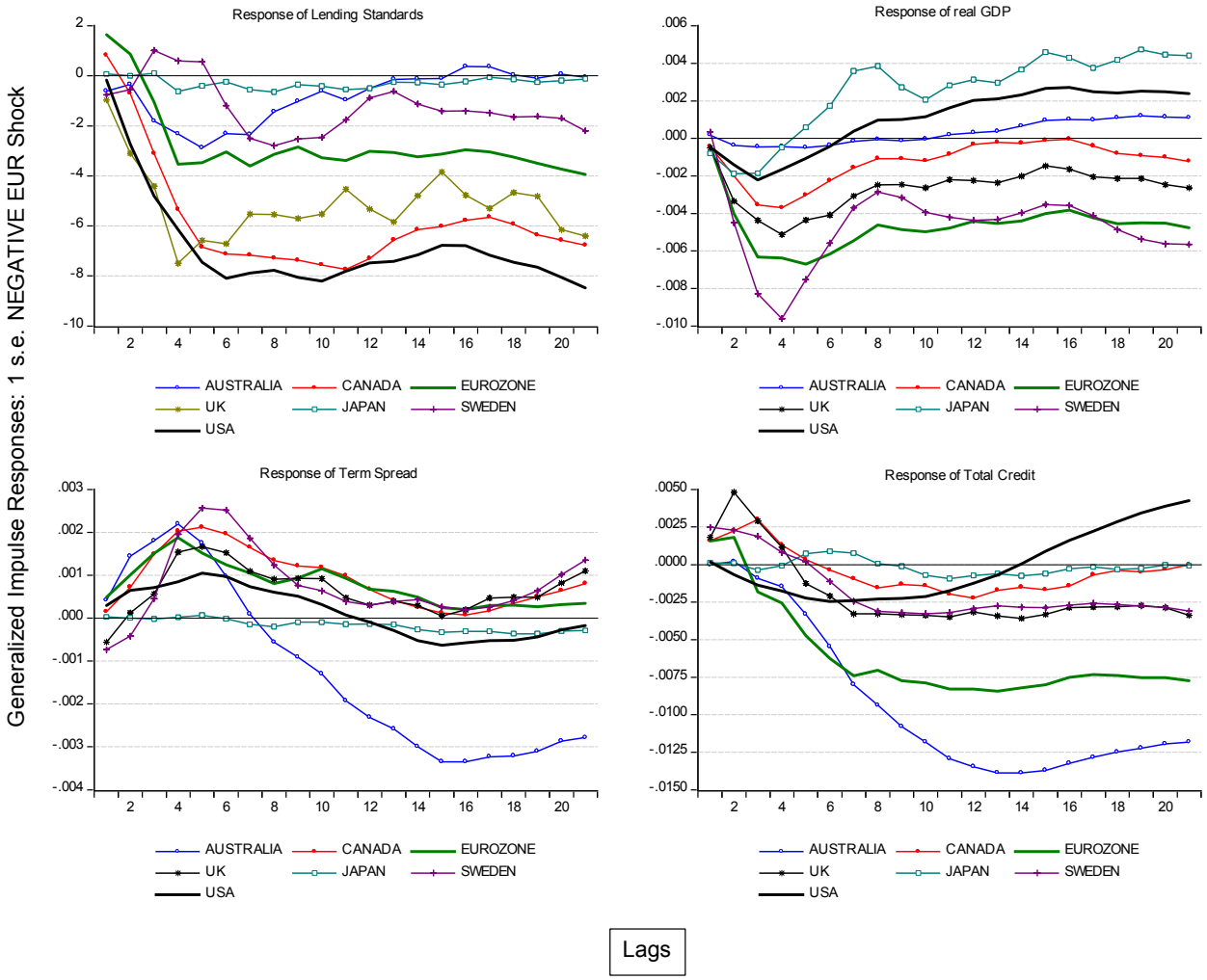


Figure 7 Impulse Responses to a Negative Loan Demand Shock from the USA

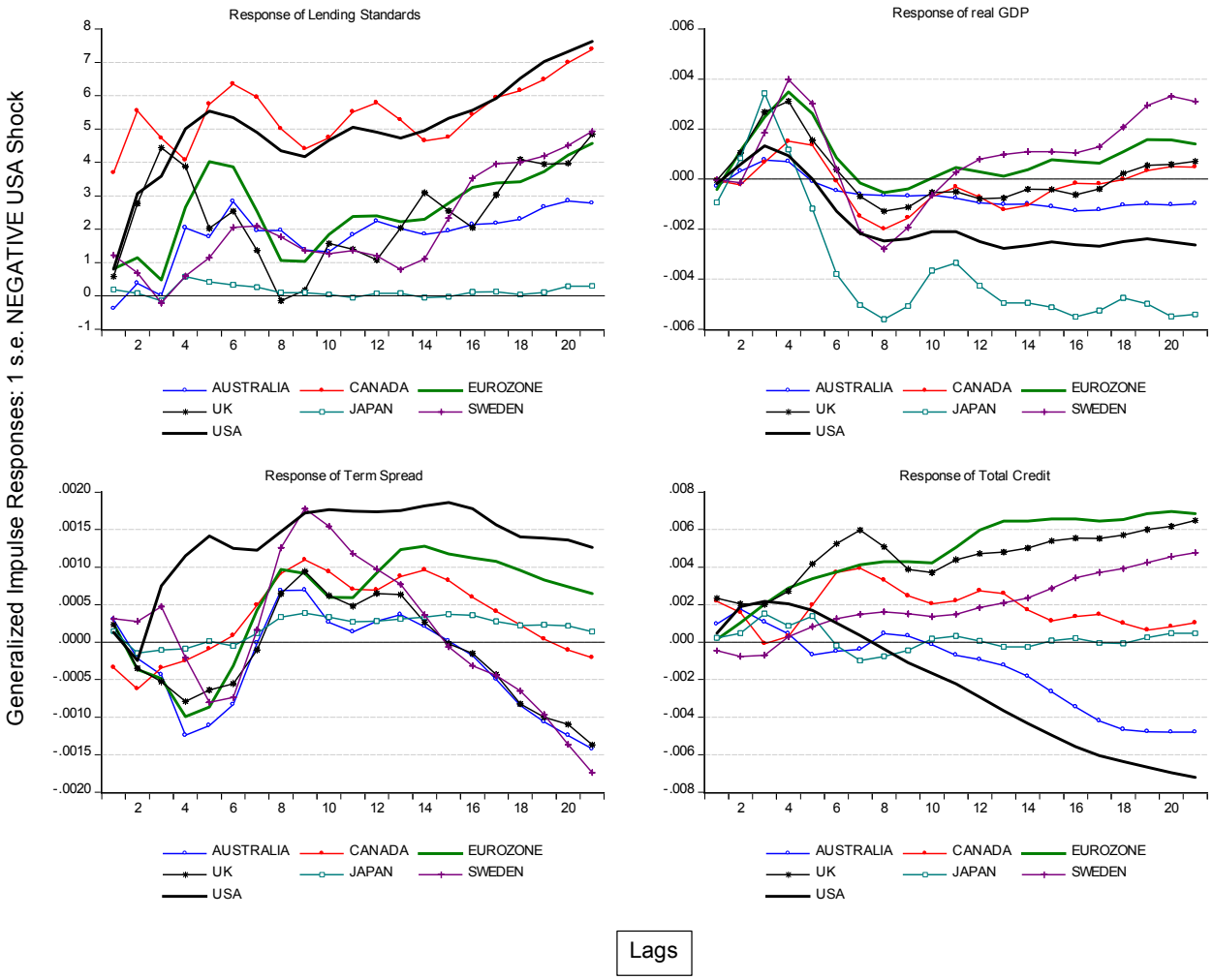


Figure 8 Impulse Responses to a Negative Loan Demand Shock from the Eurozone

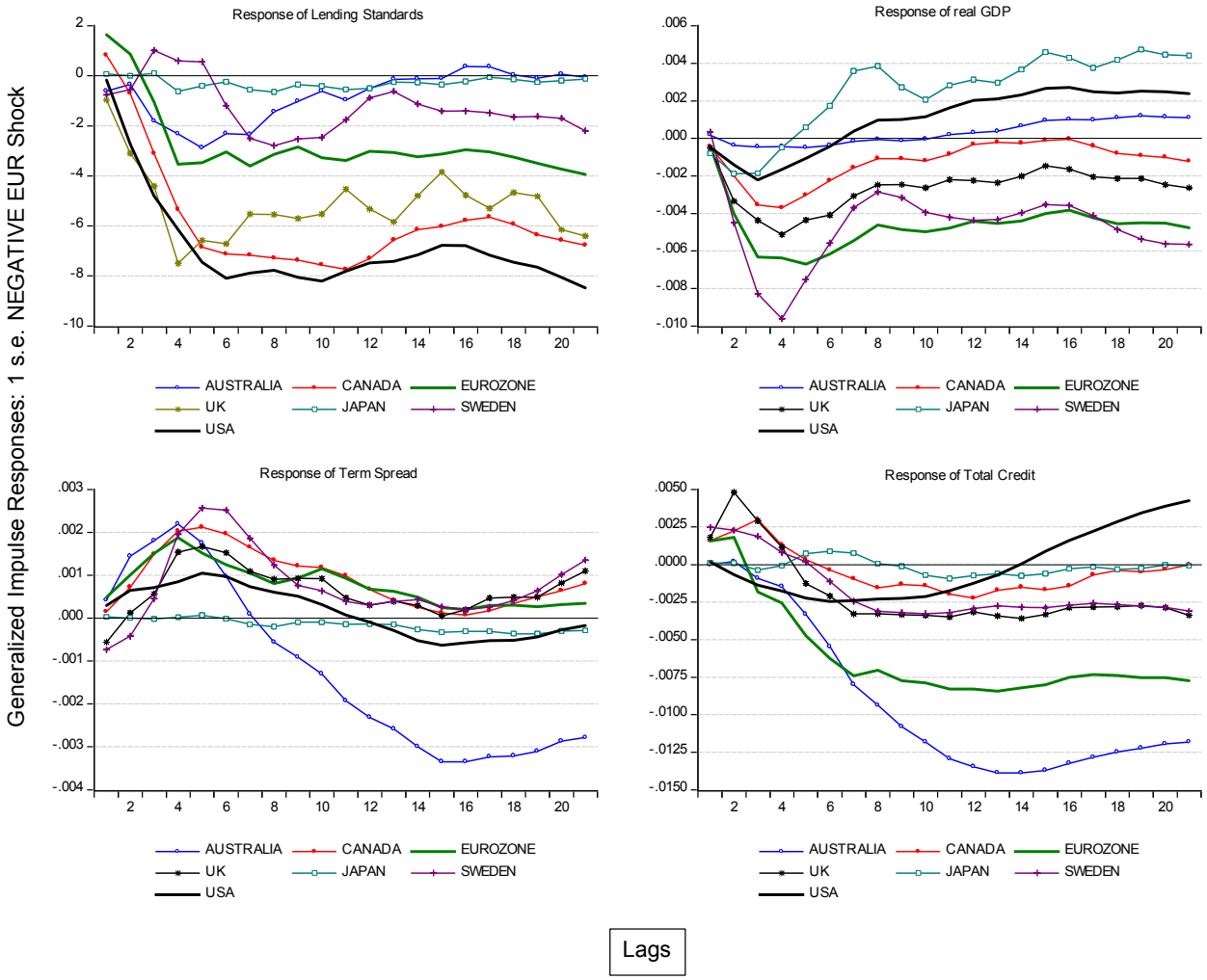
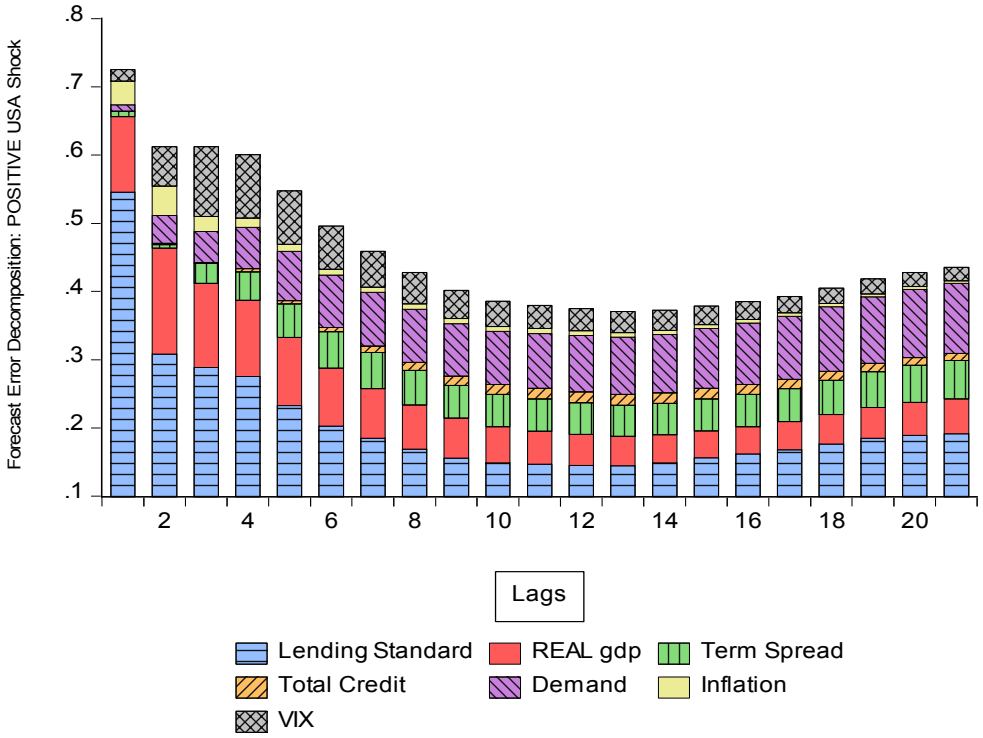


Figure 9 Forecast Error Variance Decompositions: Positive Lending Standards Shock from the USA



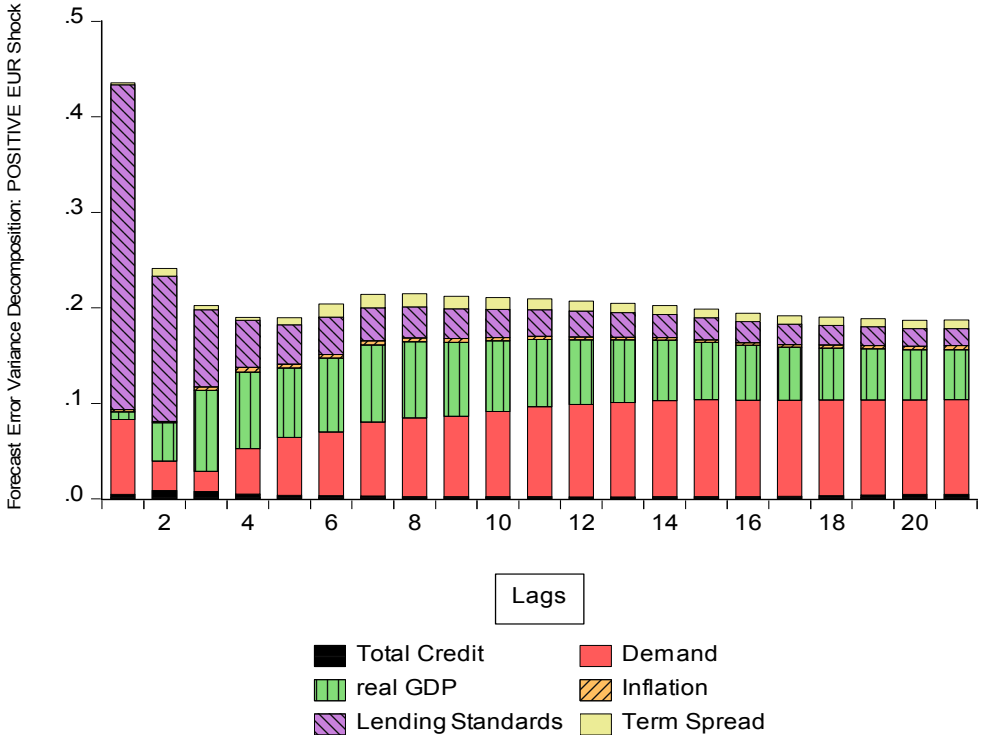


Figure 10

Forecast Error Variance Decompositions: Positive Lending Standards Shock from the Eurozone