The Great Recession: US dynamics and spillovers to the world economy

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Abstract

This paper provides an empirical investigation of both the within-US and international channels of transmission of macroeconomic and financial shocks by means of a 50-country macroeconometric model (estimated over the 1980-2009 period), including measures of excess liquidity and financial fragility, specifically designed in order to evaluate the relevance of the boom-bust credit cycle view put forward as an interpretation of the recent "Great Recession" episode. We find that such a view is consistent with the empirical evidence. Moreover, concerning the real effects of financial shocks within the US, we detect stronger evidence of an asset prices channel, rather than a liquidity channel. Concerning the spillovers to the world economy, we find that while financial disturbances are transmitted to foreign countries through US house and stock price dynamics, as well as excess liquidity creation, the trade channel is the key trasmission mechanism of real shocks.

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1. Introduction

The recent severe economic recession and financial crisis, originated in the US and rapidly spread to other advanced countries, have rekindled interest in the empirical investigation of the shock transmission mechanisms linking real activity and financial markets, operating both within the US and across world economies (Kose et al., 2008; Claessens et al., 2009; Dees et al., 2010). Though the "Great Recession" started in 2007 has been of unprecedented magnitude, various severe recession episodes may be relevant to a better understanding of recent US and international macroeconomic and financial developments: in particular the 1929-1933 Great Depression and the Savings and Loans (S&L) crisis of the 1990s. In fact, likewise the Great Depression and the S&L crisis, a boom-bust cycle in credit volumes and house and stock prices, fostered by procyclical bank loans, well summarizes the key ingredients of the recent crisis. Moreover, likewise in the S&L episode, both a benign price stability environment and deregulated financial markets worked as amplifying mechanisms.[1] Indeed, following the 2000 stock market crash and 2001 recession, monetary policy was extremely accommodating, while the deepening of the "originate to distribute" banking model and financial engineering allowed for over stretching of credit. In addition, since the late 1990s,

[1] Bernanke (1983) and Eichengreen and Mitchener (2004) support a boom-bust interpretation of the Great Depression and the 1990 S&L crisis. See also Almunia et al. (2009), Bordo and James (2009), Bordo and Landon-Lane (2010) and Temin (2010) for insightful comparisons of the recent crisis with the Great Depression. Reinhart and Rogoff (2009) provide an extensive analysis of financial crises in a long-run historical perspective. See Levine (2010) for an insightful account of the contribution of financial deregulation and policies, by creating incentives for excessive risk taking, in paving the way to the crisis since the mid 1990s.

large capital inflows were also financing a growing current account deficit in the US, mirrored by a specular surplus in emerging Asian economies. Asset prices misalignments, particularly in the housing and stock markets, then built up as a consequence of the savings-corporate investment imbalance: increasingly risky investments were underwritten and bad loans generated, sowing the seeds of the following bust phase. Still similar to the S&L crisis, the setting in of the bust phase followed expected, yet not materialized, housing price appreciations, which caused the predatory lending mechanism to break down, leading to a generalized decline in asset prices and tight credit conditions. From an US domestic phenomenon, the crisis has then quickly spread to the other industrialized countries, due to the tight linkages that the process of securitization and reinsurance in the derivatives market created across major financial institutions worldwide, and, more in general, to the strong degree of international financial and economic integration, triggering local credit crunches and consequent economic crises. Second round effects, albeit delayed, can also be found for emerging economies, particularly for those more heavily relying on external financing.

Against this background, this paper provides a thorough empirical investigation of the main channels of (economic and financial) shock transmission, addressing both the domestic propagation in the US and the spillovers to the other OECD countries, as well as to major emerging economies. To this aim, we build a large-scale open economy macroeconometric model, composed of near 300 equations and covering a total of 50 countries, in the factor vector autoregressive (F-VAR) framework. Relative to the existing literature, the current paper innovates as to the depth and wideness of the analysis and econometric methodology, providing an accurate analysis of the macro-finance interface within the US and between the US and the world economy. We estimate the model on quarterly data for the period 1980:1-2009:1. While the "Great Recession" episode has been deeper than any other occurred since the Great Depression, the selected sample is however long enough to cover meaningful previous boom-bust credit cycle episodes, as for instance the US S&L crisis. To be able to evaluate the boom-bust view of recent crisis episodes and current economic and financial developments, we include in the model several variables capturing excess liquidity conditions and financial fragility.

To preview, the main conclusions of the paper are the following. First, concerning dynamics within the US, our findings are quite consistent with a boom-bust credit cycle view of US fluctuations, as there is evidence that buoyant US housing and stock markets, as well as low real interest rates over the boom phase of the cycle might have been driven by excessively generous liquidity. Second, concerning the spillovers of the crisis to foreign advanced and emerging economies, we find that the trade channel is the key transmission mechanism of US-originated macroeconomic shocks to the rest of the world, while US housing and stock price dynamics, as well as excess liquidity generation, are the key mechanisms whereby the US financial disturbances may have spilled over to foreign countries.

The rest of the paper is organized as follows. The next section introduces the econometric methodology, while section 3 discusses the data and the model specification. Then, section 4 presents the empirical results on shock transmission within the US, whereas section 5 deals with spillovers from the US economy to foreign countries. Finally, section 6 contains the the main conclusions.

2. Econometric methodology

The econometric model is set up in the factor vector autoregressive (F-VAR) framework, derived from a dynamic factor model as in Stock and Watson (2005). Observed comovements in the series are attributed to a (relatively small) number of common dynamic factors, driven by common structural economic disturbances. The dynamics of the observed variables not due to the common factors are attributed to idiosyncratic (country-specific) shocks, uncorrelated with the common disturbances.

Operationally, the model is composed of two sets of equations. The first refers to the "domestic" US economy (with variables collected in vector $\mathbf{X}_t$), while the second to the other $m-1$ "foreign", non-US countries ($\mathbf{Y}_t$). The joint dynamics of q macroeconomic variables for each of the m countries of interest (in vector $\mathbf{Z}_t = [\mathbf{X}_t \ \mathbf{Y}_t]'$) are modelled by means of the following reduced form dynamic factor model:

$$\mathbf{F}_t = \mathbf{\Phi}(L)\,\mathbf{F}_{t-1} + \boldsymbol{\eta}_t \tag{1}$$

$$\mathbf{G}_t = \mathbf{\Psi}(L)\,\mathbf{G}_{t-1} + \boldsymbol{\zeta}_t \tag{2}$$

$$(\mathbf{Z}_t - \boldsymbol{\mu}_t) = \mathbf{\Lambda}\,\mathbf{F}_t + \mathbf{\Xi}\,\mathbf{G}_t + \mathbf{D}(L)\left(\mathbf{Z}_{t-1} - \boldsymbol{\mu}_{t-1}\right) + \mathbf{v}_t \tag{3}$$

In Eq.(3) $(\mathbf{Z}_t - \boldsymbol{\mu}_t) \sim I(0)$ is the $n \times 1$ stationary vector of variables of interest, with $n = m \times q$, and $\boldsymbol{\mu}_t = \begin{bmatrix} \boldsymbol{\mu}_t^X & \boldsymbol{\mu}_t^Y \end{bmatrix}'$ is a $n \times 1$ vector of deterministic components, including an intercept term, and linear or non linear trends components.[2] $\mathbf{F}_t$ is a $r \times 1$ vector of (observed or unobserved) *common factors*, generated by the stationary autoregressive process in Eq. (1) where $\boldsymbol{\Phi}(L)$ is a $r \times r$ finite order matrix lag polynomial, and $\boldsymbol{\eta}_t$ is a vector of shocks driving the $\mathbf{F}_t$ factors. $\mathbf{G}_t$ is a $s \times 1$ vector of stationary *foreign factors*, generated by the autoregressive process in Eq. (2) where $\boldsymbol{\Psi}(L)$ is a $s \times s$ finite order matrix lag polynomial, and $\boldsymbol{\zeta}_t$ is a vector of disturbances driving the $\mathbf{G}_t$ factors. The effects of both sets of factors on the US and non-US variables in $\mathbf{Z}_t$ are captured by the loading coefficients collected in the matrices $\boldsymbol{\Lambda} = \begin{bmatrix} \boldsymbol{\Lambda}^X & \boldsymbol{\Lambda}^Y \end{bmatrix}'$ and $\boldsymbol{\Xi} = \begin{bmatrix} \boldsymbol{\Xi}^X & \boldsymbol{\Xi}^Y \end{bmatrix}'$ (of dimension $n \times r$ and $n \times s$, respectively). Finally, $\mathbf{D}(L)$ is a $n \times n$ finite order matrix lag polynomial, partitioned as

$$\mathbf{D}(L) = \begin{bmatrix} \underset{q \times q}{\mathbf{D}_{XX}(L)} & \underset{q \times (m-1)q}{\mathbf{0}} \\ \underset{(m-1)q \times q}{\mathbf{D}_{YX}(L)} & \underset{(m-1)q \times (m-1)q}{\mathbf{D}_{YY}(L)} \end{bmatrix} \tag{4}$$

[2] In the empirical analysis of the next section, we model deterministic non stationarity, as described by the time-varying deterministic component μ_t, by means of the Gallant (1984) flexible functional form, whereby $\mu_t = \mu_0 + \mu_1 t + \mu_2 \sin(2\pi t/T) + \mu_3 \cos(2\pi t/T)$, capturing not only various forms of non linear smooth deterministic trends, but also being able to account for the presence of (realtively) sharp breaks.

with

$$\mathbf{D}_{YY}(L) = \begin{bmatrix} \underset{q\times q}{\mathbf{d}_{11}(L)} & \mathbf{0} & \dots & \mathbf{0} \\ \mathbf{0} & \underset{q\times q}{\mathbf{d}_{22}(L)} & \dots & \mathbf{0} \\ \vdots & \dots & \ddots & \vdots \\ \mathbf{0} & \mathbf{0} & \dots & \underset{q\times q}{\mathbf{d}_{m-1,m-1}(L)} \end{bmatrix} \tag{5}$$

and $\mathbf{v}_t = \begin{bmatrix} \mathbf{v}_t^X & \mathbf{v}_t^Y \end{bmatrix}'$ is the $n \times 1$ vector of reduced-form idiosyncratic (i.e. country-specific) disturbances. We assume that all polynomial matrices $\mathbf{\Phi}(L)$, $\mathbf{\Psi}(L)$, and $\mathbf{D}(L)$ have all roots outside the unit circle. Moreover, $E\left[\eta_{jt}v_{is}\right] = 0$, $E\left[\eta_{jt}\zeta_{is}\right] = 0$ and $E\left[\zeta_{jt}v_{is}\right] = 0$ for all i, j, t, s.

The specification of the model in Eqs. (1)-(5) embeds a set of important assumptions on the structure of linkages across countries: (i) US idiosyncratic shocks ($\mathbf{v}_t^X$) do not only affect the US economy (through $\mathbf{D}_{XX}(L)$), but also have spillovers on foreign countries (through $\mathbf{D}_{YX}(L)$); (ii) differently, foreign idiosyncratic disturbances ($\mathbf{v}_t^Y$) do not affect US variables, while only own-country linkages are relevant for non-US economies ($\mathbf{D}_{YY}(L)$ is block diagonal). The selected specification is then consistent with the view that the US play a leading role in the transmission of macroeconomic shocks; however, this does not prevent feedbacks from the rest of the world to the US economy, which are parsimoniously described by means of the foreign, non-US factors $\mathbf{G}_t$ which contribute to shape macroeconomic dynamics in all countries.

By substituting Eqs. (1) and (2) into Eq. (3), we write the dynamic factor model in standard vector autoregressive (VAR) form as

$$\begin{pmatrix} \mathbf{F}_t \\ \mathbf{G}_t \\ (\mathbf{Z}_t - \boldsymbol{\mu}_t) \end{pmatrix} = \begin{pmatrix} \boldsymbol{\Phi}(L) & \mathbf{0} & \mathbf{0} \\ \mathbf{0} & \boldsymbol{\Psi}(L) & \mathbf{0} \\ \boldsymbol{\Lambda}\,\boldsymbol{\Phi}(L) & \boldsymbol{\Xi}\boldsymbol{\Psi}(L) & \mathbf{D}(L) \end{pmatrix} \begin{pmatrix} \mathbf{F}_{t-1} \\ \mathbf{G}_{t-1} \\ \left(\mathbf{Z}_{t-1} - \boldsymbol{\mu}_{t-1}\right) \end{pmatrix} + \begin{pmatrix} \boldsymbol{\varepsilon}_t^F \\ \boldsymbol{\varepsilon}_t^G \\ \boldsymbol{\varepsilon}_t^Z \end{pmatrix} \tag{6}$$

where

$$\begin{pmatrix} \boldsymbol{\varepsilon}_t^F \\ \boldsymbol{\varepsilon}_t^G \\ \boldsymbol{\varepsilon}_t^Z \end{pmatrix} = \begin{pmatrix} \mathbf{I} \\ \mathbf{0} \\ \boldsymbol{\Lambda} \end{pmatrix} \boldsymbol{\eta}_t + \begin{pmatrix} \mathbf{0} \\ \mathbf{I} \\ \boldsymbol{\Xi} \end{pmatrix} \boldsymbol{\zeta}_t + \begin{pmatrix} \mathbf{0} \\ \mathbf{0} \\ \mathbf{v}_t \end{pmatrix},$$

or, more compactly

$$\mathbf{Z}_t^* = \mathbf{H}^*(L)\mathbf{Z}_{t-1}^* + \boldsymbol{\varepsilon}_t, \tag{7}$$

with $\mathbf{Z}_t^* = \begin{bmatrix} \mathbf{F}_t & \mathbf{G}_t & \mathbf{Z}_t - \boldsymbol{\mu}_t \end{bmatrix}'$, and variance-covariance matrix

$$E(\boldsymbol{\varepsilon}_t\boldsymbol{\varepsilon}_t') = \boldsymbol{\Sigma}_\varepsilon = \begin{pmatrix} \boldsymbol{\Sigma}_\eta & \mathbf{0} & \boldsymbol{\Sigma}_\eta\,\boldsymbol{\Lambda}' \\ \mathbf{0} & \boldsymbol{\Sigma}_\zeta & \boldsymbol{\Sigma}_\zeta\,\boldsymbol{\Xi}' \\ \boldsymbol{\Lambda}\,\boldsymbol{\Sigma}_\eta & \boldsymbol{\Xi}\boldsymbol{\Sigma}_\zeta & \boldsymbol{\Lambda}\,\boldsymbol{\Sigma}_\eta\boldsymbol{\Lambda}' + \boldsymbol{\Xi}\boldsymbol{\Sigma}_\zeta\,\boldsymbol{\Xi}' + \boldsymbol{\Sigma}_v \end{pmatrix}$$

where $E(\boldsymbol{\eta}_t\boldsymbol{\eta}_t') = \boldsymbol{\Sigma}_\eta$, $E(\mathbf{v}_t\mathbf{v}_t') = \boldsymbol{\Sigma}_v$ and $E(\boldsymbol{\zeta}_t\boldsymbol{\zeta}_t') = \boldsymbol{\Sigma}_\zeta$. Finally, we invert the F-VAR form in Eq. (7) to obtain the following reduced-form vector moving average (VMA) representation for the $\mathbf{Z}_t^*$ process:

$$\mathbf{Z}_t^* = \mathbf{H}(L)\,\boldsymbol{\varepsilon}_t, \tag{8}$$

where $\mathbf{H}(L) = (\mathbf{I} - \mathbf{H}^*(L)L)^{-1}$. The VMA form describes the impulse responses of the variables in $\mathbf{Z}_t^*$ to the factor disturbances and idiosyncratic shocks in all countries.

The shocks in $\boldsymbol{\varepsilon}_t$ have the nature of reduced-form innovations, and are linear combinations of the underlying structural disturbances driving the factors in $\mathbf{F}_t$ and $\mathbf{G}_t$ and the country-specific dynamics due to idiosyncratic shocks. In order to investigate the transmission *within the US economy* of several structural disturbances, it is then necessary to impose identification schemes to extract the relevant structural shocks from the reduced-form factor disturbances in $\boldsymbol{\eta}_t$ and $\boldsymbol{\zeta}_t$, and from the vector of US-specific disturbances $\mathbf{v}_t^X$. To this aim, we impose a set of exclusion restrictions on the contemporaneous responses of the factors and the US variables to the structural disturbances, implying a precise "ordering" for the elements in the $\mathbf{F}_t$, $\mathbf{G}_t$ and $\mathbf{X}_t$ vectors, based on plausible assumptions on the relative speed of adjustment to shocks.

Finally, in order to investigate the consequences of unanticipated changes in US macroeconomic dynamics on foreign countries (i.e. the *spillovers from the US* to other economies), we rely directly on the impulse response functions obtained from the reduced form F-VAR representation in Eq. (6), which is appropriate when the focus is on the impact of a change in a given forcing variable, say the US GDP growth rate, on the macroeconomic variables of all foreign countries independently of the underlying economic cause (i.e. a given structural shock). More precisely, the impact of a change in the variables of interest (the common factors in $\mathbf{F}_t$, $\mathbf{G}_t$ and the US series in $\mathbf{X}_t$,) on the non-US variables in $\mathbf{Y}_t$ is obtained from the relevant block of Eq. (6):

$$\begin{aligned}\mathbf{Y}_t - \boldsymbol{\mu}_t^Y &= \boldsymbol{\Lambda}^Y \boldsymbol{\Phi}(L)\,\mathbf{F}_{t-1} + \boldsymbol{\Xi}^Y \boldsymbol{\Psi}(L)\,\mathbf{G}_{t-1} + \mathbf{D}_{YX}(L)\,\left(\mathbf{X}_{t-1} - \boldsymbol{\mu}_{t-1}^X\right) \\ &\quad + \mathbf{D}_{YY}(L)\,\left(\mathbf{Y}_{t-1} - \boldsymbol{\mu}_{t-1}^Y\right) + \boldsymbol{\varepsilon}_t^Y \end{aligned} \tag{9}$$

by computing the dynamic multipliers, i.e.

$$\mathbf{Y}_t - \boldsymbol{\mu}_t^Y = \mathbf{V}(L) \begin{pmatrix} \mathbf{F}_{t-1} \\ \mathbf{G}_{t-1} \\ \mathbf{X}_{t-1} - \boldsymbol{\mu}_{t-1}^X \end{pmatrix} + \boldsymbol{\varepsilon}_t^Y \tag{10}$$

where $\mathbf{V}(L) = [\mathbf{I} - \mathbf{D}_{YY}(L)L]^{-1} \left(\boldsymbol{\Lambda}^Y \boldsymbol{\Phi}(L) \quad \boldsymbol{\Xi}^Y \boldsymbol{\Psi}(L) \quad \mathbf{D}_{YX}(L)\right)$.

We provide details on the iterative estimation procedure used, following the lines of Stock and Watson (2005), in Bagliano and Morana (2009, 2010).

3. Model specification and estimation

3.1. The data

We use seasonally adjusted quarterly macroeconomic time series data for the US and 30 advanced economies (Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom), 5 advanced emerging economies (according to the *IMF* classification: Brazil, Hungary, Mexico, Poland, South Africa), and 14 secondary emerging economies (Argentina, Chile, China, Colombia, India, Indonesia, Malaysia, Morocco, Pakistan, Peru, Philippines, Russia, Thailand, Turkey), for a total of 50 countries.[3]

The US vector $\mathbf{X}_t$ includes 14 variables, ordered as follows: employment growth (denoted by e), real GDP growth (g), the federal deficit/GDP ratio (pd), real private consumption growth (c), real private investment growth (i), the current account/GDP ratio (cad), the CPI inflation rate (π), the rate of change of an excess liquidity index (exl), the real three-month Treasury bills rate (s), the real ten-year Government Bonds rate (l), real house price returns (h), real effective exchange rate returns (er), real stock price returns on the S&P500 index (f), and the rate of change of a financial fragility index (fr). The two index variables are intended to capture financial distress (fr) and liquidity conditions (exl), and obtained as the first principal component extracted from the BAA-AAA, AGENCY and TED spreads[4] (fr) and M2 and bank loans (relative to GDP) growth (exl), respectively.

[3]US data are from FRED2 (Federal Reserve Bank of St. Louis); OECD countries data are from the OECD *Main Economic Indicators*, integrated with the IMF *International Financial Statistics* (bank loans series); data for the other countries are from the IMF *International Financial Statistics*; house price series for OECD countries are taken from a non official OECD database (see http://www.olis.oecd.org/olis/2006doc.nsf/linkto/ECO-WKP282006293). In the working paper version of this paper, Bagliano and Morana (2010), we provide detailed results from the analysis of the persistence properties of the series.

[4]TED is the spread between the 3-month LIBOR rate (Euro-dollar deposit rate) and the yield on 3-month Treasury bills, and can be taken as a measure of credit/liquidity risk, being the difference between an unsecured deposit rate and the risk-free rate. The Agency spread is the spread between agency (Freddie Mae, Fannie Mac) 30-year bonds and 30-year Treasury bonds, capturing stress in the mortgage market. Finally, the BAA-AAA spread is the spread between corporate BAA and AAA bonds; it is a measure of corporate default risk and also risk-taking, as a contraction of the spread implies an increase in the demand for riskier bonds relative to safer ones. See also Nippani and Smith (2010) and Dominik (2010).

The commonality in the two sets of variables is strong, as the extracted common factor accounts for about 80% of total variance in both cases. Figure 1(a) portrays the behavior of the three spreads and the fr factor over the estimation sample, showing two major peaks at the beginning of the 1980s and in 2008. Similarly, Figure 1(b) shows that the exl factor captures the gradual build-up of liquidity that started around 1995 and accelerated over the period 2006-2008. The time span of the US data is from 1980:1 to 2009:1, for a total of 117 observations.

Differently, we consider a smaller set of variables for the other countries (all expressed in local currency), collected in the $\mathbf{Y}_t$ vector. Due to data availability, we partition non-US countries into two groups.

The first group is composed of the 16 largest OECD economies (Australia, Canada, Japan, New Zealand, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK). For each of these countries, we consider 6 macroeconomic variables, including real GDP growth (g), CPI inflation (π), bank loans (to the private sector) relative to GDP growth (lo), the real short-term interest rate (either a 3-month interbank rate or a 3-month Treasury Bills rate, depending on availability) (s), and real house (h) and stock (f) price returns. As for the US, the sample period runs from 1980:1 to 2009:1.

The second group is composed of both advanced and emerging countries, for a total of 33 countries, including few European (OECD) economies (Austria, Belgium, Greece, Iceland, Luxembourg, Portugal), some Asian countries (Russia from Northern Asia, China, Hong Kong, Taiwan, and South Korea from Eastern

Asia, Indonesia, Malaysia, Philippines, Singapore, and Thailand from Southeastern Asia, India and Pakistan from Southern Asia, and Israel and Turkey from Western Asia), some Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, and Peru), some emerging European countries (the Czech Republic, Hungary, Poland, Slovakia, and Slovenia); and one Northern (Morocco) and one Southern Africa countries (South Africa). Differently from the former group, we consider only 5 macroeconomic variables for these economies, omitting the house price series, and employ a shorter sample period, from 1995:1 through 2009:1.

Concerning the non-US factors, we include a single common component (accounting for about 20% of total variance) in the $\mathbf{G}_t$ vector, extracted from the real GDP growth series of the 37 countries for which data are available since 1980:1,[5] and capturing common movements in the (non-US) level of world economic activity. Figure 1(c) portrays the (standardized) non-US common GDP growth factor and the US GDP growth rate over the sample, and shows a sizable positive correlation (0.43) between the two series.

The vector of (observed) common factors $\mathbf{F}_t$, affecting both the US and non-US economies, finally includes crude oil price and primary commodities (excluding energy) price shocks, constructed following the procedure set out by Hamilton (1996).

[5] This list includes the largest 18 OECD countries (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK, Australia, Canada, Japan and New Zealand), and a selection of the Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru), Asian countries (China, Hong Kong, Korea, Taiwan, Indonesia, Malaysia, Philippines, Singapore, Thailand, India, Pakistan, Turkey) and African countries (Morocco, South Africa).

3.2. F-VAR specification and estimation

On the basis of the BIC information criterion, we set the optimal lag length of the F-VAR system equal to one. Then, consistently with the Granger and Jeon (2004) thick modelling approach, we consider up to three lags in estimation, and obtain median estimates for the parameters of interest through simulation (with 1000 replications). Moreover, for parsimony reasons, we include only five lagged US variables (real GDP growth, the excess liquidity index, real house price returns, real stock price returns and the financial fragility index) in the equations for the non-US series.

The whole estimated system then counts 278 equations. In particular, the 14 equations corresponding to the US block $\mathbf{X}_t$ contain a minimum (maximum) of 21 (65) parameters, of which 14 (52) are for the lagged US series, 3 (9) for the lagged $\mathbf{F}_t$ and $\mathbf{G}_t$ series, and 4 are for the deterministic component (including a constant, a linear trend and two trigonometric components, as described in the methodological section). The vector $\mathbf{X}_t$ collects the 14 US endogenous macroeconomic variables, namely $e, g,\ pd, c,\ i, cad,\ \pi, exl,\ s, l, h, er, f$ and fr, in this order. The rationale for the chosen ordering is based on the variables' speed of adjustment to shocks, with a distinction between relatively slow-moving variables (mainly related to real activity, ordered first) and fast-moving variables (notably financial quantities, ordered last).[6]

Assuming an own-variable block diagonal structure for the corresponding elements of the $\mathbf{D}(L)$ matrix for the foreign countries, i.e. a diagonal $\mathbf{D}_{YY}(L)$ as in

[6] Bagliano and Morana (2010) provide a detailed account of the identification procedure.

Eq. (5), the block of equations for the 16 largest OECD countries counts a total of 96 equations, each containing a minimum (maximum) of 13 (31) parameters, of which 1 (3) for the lagged own variable, 5 (15) are for the lagged US series, 3 (9) for the lagged $\mathbf{F}_t$ and $\mathbf{G}_t$ series, and 4 for the deterministic component. For each of the 16 above countries the vector $\mathbf{Y}_t$ collects 6 endogenous macroeconomic variables (namely g, π, lo, s, h,and f, in this order). The block of equations corresponding to the remaining 33 countries, counts a total of 165 equations, with similar specification. For each of the latter 33 countries the vector $\mathbf{Y}_t$ collects 5 endogenous variables (namely g, π, lo, s, and f, in this order). Finally, the last 3 equations describe the dynamics of the common factors (oil and commodities price shocks) and the non-US common GDP growth factor.

4. Shock transmission in the US

In this section, we use the estimated F-VAR model to explore the economic mechanisms that transmit various shocks hitting the US economy to a large set of domestic variables (collected in $\mathbf{X}_t$), in order to gain insights on the empirically most relevant macro-financial interactions. In particular, we analyze the impulse response functions obtained from the econometric model to assess the coherence of the mechanics uncovered with the boom-bust credit cycle hypothesis, put forward for the understanding of the most recent "Great Recession" episode. Operationally, we achieve identification of the structural shocks by means of a Choleski procedure based on the variables' speed of adjustment to shocks, with the relatively slow-moving variables ordered first, and the fast-moving variables ordered last.

Concerning the slow-moving variables, the economic rationale behind the assumed recursive structure (going from employment to GDP growth, the public deficit to GDP ratio, consumption and investment growth, the current account to GDP ratio, and inflation), lies on the assumption that, over the business cycle, real activity is contemporaneously determined by employment (through a short-run production function), with the latter adjusting to the phase of the cycle only with a (one-quarter) delay. Moreover, output contemporaneously determines private consumption (consumption function), investment (investment function) and net import, while the fiscal stance is adjusted according to output dynamics; private consumption and investment contemporaneously adjust to changes in the fiscal stance (either anticipating future output growth or due to Barro-Ricardo and/or crowding out effects), and net import is contemporaneously determined by the state of domestic demand; aggregate demand then feedbacks, with a (one-quarter) delay, to aggregate supply, and prices adjust according to aggregate demand and supply interactions.

On the other hand, concerning the fast-moving variables, the assumed ordering (going from excess liquidity to real short- and long-run interest rates, real house prices, the real exchange rate, real stock prices, and the financial fragility index) implies that liquidity conditions contemporaneously determine interest rates and asset prices, while liquidity may respond to asset prices developments only with a (one-quarter) delay. This is consistent with asset prices rapidly adjusting to the stance of monetary policy, with the Fed at most implementing a leaning-against-the-wind strategy, relatively to asset price dynamics; hence, the real short-term rate is contemporaneously determined by liquidity conditions, while the real long-term rate is contemporaneously determined by the real short-term rate. Real house prices and the real effective exchange rate are contemporaneously determined by liquidity conditions and interest rates, while real stock prices contemporaneously react to any change in the economy. Finally, the financial fragility index embeds all contemporaneous information on the state of the business cycle. Note also that the slow- to fast-moving ordering implies that monetary policy, the key determinant of liquidity and interest rates in the economy, is set according to the state of the business cycle.

Table 1 reports the median cumulated responses of the US variables to unitary shocks over a two-quarter, one-year and three year-horizons; significant figures at the 10% level are shown in bold.[7]

4.1. Financial linkages

As shown in Table 1, asset prices misalignments in the housing and stock markets are initially fuelled by the availability of excess liquidity and low interest rates. Following a positive shock to excess liquidity, the short- and long-term rates decrease (by 14 basis points), with a temporary contraction in the real short-term interest rate then leading to a significant increase in house (0.6% in the medium-

[7] Only selected results are reported for reasons of space. Results from the forecast error variance decomposition analysis and the robustness checks summarized at the end of this section are available in the working paper version (Bagliano and Morana, 2010). A full set of results is available upon request from the authors.

term) and stock prices (0.9% in the very short-term).

Different economic mechanisms can explain the correlations between asset prices, interest rates and liquidity, providing a causal interpretation of the observed linkages. Portfolio rebalancing would predict a positive relationship between excess liquidity and asset prices, as the increased liquidity would be allocated to the various assets, increasing their demand and price; moreover, from the present value model, a reduction in the interest rate leads to lower discounting of the flow of expected future dividends (rents), increasing stock (house) prices; finally, a contraction in the mortgage rate can ease liquidity constraints, boosting housing demand and prices (Alm and Follain, 1984). Other linkages may also operate, as higher asset prices may boost the value of firms' collateral, increasing their borrowing ability, and at the same time improving the balance sheets of financial institutions and increasing leverage. Financial accelerator mechanisms may also amplify the above effects, fuelling an asset price-balance-sheet-credit spiral. The significance of feedback effects from stock prices to liquidity becomes apparent if, rather than focusing on excess liquidity, just liquidity (lo) is considered. As $exl = lo - g$, the response of liquidity to a stock prices increase can be obtained as $lo = exl + g$, yielding 0.05%, 0.36% and 0.83% at the 2-, 4- and 12-quarter horizons, respectively.

Concerning the generation of excess liquidity, a potential role can finally be ascribed to the current account deficit, consistent with the view that huge US trade deficits contributed to the boom phase of the credit cycle, fostering growth of global liquidity and further debt accumulation. As reported in Table 1, an increase in the current account deficit/GDP ratio leads in fact to a sizable increase in excess liquidity (0.4%) and depreciation of the real exchange rate (-0.84%), with a negative medium-term impact on real activity (consumption, -0.3%; investment, -0.8%) and stock prices (-2.7%).[8]

With reference to the current financial and economic crisis, a common rationale for the setting-in of the bust phase points to expected, but not materialized, house price appreciation, leading to the breakdown of the predatory lending mechanism and to a generalized decline in asset prices and tight credit conditions, as financial institutions were forced into deleveraging and recapitalization. On our 1980-2009 sample period, while the evidence on the asset prices-balance-sheet-credit spiral is weak, the positive and significant correlation between house and stock prices may indeed be useful to describe the effects of the deleveraging process, with a negative house price shock leading to a contraction in stock prices (-1.3%) in the short-term (flexible adjustment), and a negative stock price disturbance leading to a contraction in house prices (-0.3%) in the medium-term (sluggish adjustment). Yet, the correlation is also consistent with a portfolio model where prices depend on net inflows. Then, a change in wealth determined by a contraction in house (stock) prices would lead agents to rebalance their portfolios by selling stocks (housing) as well (see Beltratti and Morana, 2010, for similar findings).

4.2. Real effects of financial disturbances

[8] According to Jagannathan et al. (2009), behind US trade dynamics there would however be inadequate financial markets, preventing higher levels of domestic consumption and investment in emerging economies, as well as currency controls, motivated by export-led growth objectives, particularly in China.

Concerning the real effects of financial shocks, different theoretical relationships link asset prices and credit conditions to real activity. First, tight credit conditions may constrain consumption and investment expenditure (Gauger and Snyder, 2003; Leamer, 2007; Greenlaw et al., 2008; Dell'Ariccia et al., 2008; Bayoumi and Mellander, 2008; Goodhart and Hoffman, 2008; Schularick and Taylor, 2009). Our empirical evidence is not clear-cut on this issue, pointing to a positive correlation between excess liquidity and employment (0.02%), as well as to a negative correlation between excess liquidity and investment (-0.11%) in the very short-term.

Second, falling asset prices may affect real activity also through wealth effects on consumption and Tobin's "q" effects on investment. According to the life-cycle model, a permanent increase in housing wealth leads in fact to an increase in spending and borrowing by homeowners, as they try to smooth consumption over the life cycle. The increase in property value actually enables them to borrow more as it increases the value of collateral. Additional effects can be expected through a Tobin's "q" channel, as an increase in house prices determines an increase in property values over construction costs, stimulating residential investment. Our empirical evidence is fairly consistent with the above channels. A negative house price shock does indeed lead to a significant contraction in consumption (up to -0.2%) and investment (up to -0.6%), as well as in output and employment in the short-term. We detect similar evidence for a negative stock price disturbance, though with a weaker impact (-02.% and -0.1% for consumption and investment, respectively). Overall, the findings are consistent with previous evidence in the literature, pointing to an inelastic impact of asset prices on real activity, and stronger for house prices than for stock prices (Beltratti and Morana, 2010; Bagliano and Morana, 2009; Case et al., 2005; Chirinko et al., 2004; Carrol et al., 2006).

Finally, the results in Table 2 establish a linkage between asset price busts and inflation, with a negative house price shock leading to a significant contraction in consumer prices in the short-term (-0.12%), pointing to potential deflation risks in the bust phase of a credit cycle, especially when the boom phase occurs in a low-inflation environment.

4.3. Feedbacks from the real to the financial side

Second-round effects from the downturn in real activity on asset prices can also be expected. The empirical evidence is not fully clear-cut, since a negative output shock, that we interpret (due to the positive short-term median correlation with inflation and interest rate responses) as a negative aggregate demand disturbance, leads to a (not significant) contraction in house prices in the medium-term and in stock prices at all horizons (significant only in the short-term). On the other hand, a stronger impact is attributable to the aggregate supply (productivity) shock,[9] which is significant at any horizon, with a 1% medium-term output contraction,

[9] In our framework, as in Bagliano and Morana (2009), the inflation disturbance may bear the interpretation of a productivity shock. The argument follows from the fact that the structural inflation shock is estimated from dynamics around the non linear deterministic trend, which can be related to the disinflationary policy carried out by the Fed over the 1980s, and the successful inflation control thereafter, i.e. to long-term monetary policy management. The proposed interpretation is consistent with the results in Table 1, showing that a negative productivity shock (positive inflation shock) leads to an increase in the price level and a contraction in output, as well as with Gordon (2005), pointing to an important role of productivity growth for US inflation dynamics.

following a negative productivity shock, being associated with a 2.5% reduction in house prices and with a 8% contraction in stock prices over the same horizon. A present value model, relating future developments in dividends and rents to output dynamics, can account for the observed features, as a negative productivity shock (positive inflation shock), by decreasing dividends and rents, and increasing the discount factor (due to the inflation component in nominal interest rates), leads to a contraction in asset prices.[10]

4.4. The role of external demand

Second-round effects on the US economy may be expected also through an external demand channel, as US-originated disturbances may well spillover to foreign economies (see the next section). As shown in Table 1, a foreign output contraction has a negative and significant impact on US real activity (0.10% reduction in output in the short-term) and employment (up to 0.07%), leading to a short-term increase in the fiscal deficit (0.04%) and excess liquidity (0.13%), and to an improvement in the current account (-0.07%). Moreover, a short-term contraction in consumer prices (-0.05%), as well as in stock prices (-4.5%), is observed. Hence, second-round effects should not be neglected when assessing the real costs of the financial crisis for the US economy.

4.5. The effects of economic policies

To offset the real effects of various disturbances hitting the US economy, fis-

[10] The identification of global (US) aggregate demand and supply shocks, as well as of a monetary policy shock related to the short-term rate management by the Fed, is broadly consistent with the results of Dees et al. (2010), who also estimate a multi-country macroeconometric model.

cal and monetary policy measures have been implemented over the years. Table 1 shows that a negative aggregate demand (output) shock leads to a significant short-term increase in excess liquidity (0.4%), as well as to contraction in the short-term real interest rate (by 10 basis points) over the first two quarters. We also observe similar dynamics in the aftermath of a negative employment shock, which also triggers an expansionary fiscal policy in the very short-term. Similarly, the implementation of expansionary fiscal policy measures follows a positive shock to the financial fragility index (i.e. an increase in liquidity/credit risk, corporate risk/risk appetite, and stress in the mortgage market), to which a positive response of real activity (consumption, 0.2%) may be associated, as well as an improvement in stock (0.3%) and house prices (0.2%). The effectiveness of the expansionary fiscal policy is also supported by the significant medium-term expansion of output (0.2%) and employment (0.1%), following a positive fiscal deficit shock. The presence of idle resources in the economy, i.e. unemployed labour and underutilized capital, liquidity constraints and low interest rates, which can make crowding out effects on private spending negligible, may explain the findings. A significant impact on output (0.3%) and real activity, as well as on house (0.6%) and stock prices (0.9% in the short-term), is also triggered by a short-term rate cut, pointing to the effectiveness of an expansionary monetary policy implemented through the standard interest rate channel. Overall, our findings are consistent with Almunia et al. (2009), pointing to the effectiveness of fiscal and monetary policies during the Great Depression, where macroeconomic conditions were close to those currently prevailing in the major world economies, as well as with Buiter

(2009), pointing to the effectiveness of interest rate policies, while quantitative and credit easing strategies would have failed at avoiding credit crunch effects.

4.6. The contribution of adverse supply shocks

The response of the US macroeconomy to oil and commodity price shocks is consistent with expectations. In fact, an oil price hike has a “stagflationary” effect, leading to a contraction in real activity (-0.8%) and employment (-0.5%) in the medium-term, and to an increase in the general price level (1.1%). Accommodation of the shock is observed, with sizable interest rates cuts (by 286 basis points), in the face of falling asset prices (-3.6% and -18% for house and stock prices, respectively). The current account deficit also worsens in the short-term, consistently with the increased oil price. Similar dynamics are observed for commodity prices.

4.7. Determinants of financial fragility

Finally, concerning the financial fragility index, we obtain some interesting results from its response to various structural shocks. First, negative productivity and negative aggregate demand disturbances lead to a significant increase in fragility in the short-term. Sizable and significant positive short-term impacts on fragility can also be associated with a short-term rate increase and oil and commodity price hikes. Finally, a positive excess liquidity shock also leads to an increase in the financial fragility index in the short-term. Hence, the latter variable may be retained as a summary measure of incoming financial stress, complementary to the observation of house and stock price dynamics. Yet, it is worthwhile noting that the financial fragility index used in this paper shares some of the properties of the leading indicator for an incoming bust phase proposed by Borio (2008), which exploits the joint occurrence of rapid credit growth and higher risk taking, but not increasing asset prices.

4.8. Robustness issues

The chosen ordering of the US variables is based on two main assumptions: (i) supply-side disturbances have a contemporaneous effect on aggregate demand components, while demand feedbacks to supply with a (one-quarter) delay; (ii) liquidity conditions determine contemporaneously the short-term real interest rate, while the latter feedbacks to liquidity conditions only with a (one-quarter) delay. In order to assess the robustness of the main results presented in this section to the above assumptions, we repeat the analysis for a different ordering the variables, inverting the contemporaneous role of supply and demand, and liquidity and the short-term rate. In particular, for the slow-moving variables the following alternative ordering is considered: consumption, investment, public deficit to GDP ratio, current account deficit to GDP ratio, output, employment and inflation; for the fast-moving variables the alternative ordering is: real short-term interest rate, excess liquidity, real long-term interest rate, real house prices, real effective exchange rate, real stock prices and the financial fragility index.

The results of the impulse response analysis are remarkably robust to the ordering reversal considered, as no major changes concerning median responses can in general be noted. There are however two interesting differences with respect to the results reported in Table 1 which are worth mentioning. First, the median response of real activity to an employment shock, and of domestic demand to an output/aggregate demand shock, although of the same sign, are more muted than what found for the original ordering; second, the output/aggregate demand shock would seem to be deflationary and neutral on stock prices. Concerning the latter feature, our results show that, for the modified ordering, it is the consumption shock which should probably bear the interpretation of aggregated demand shock, positively affecting output, the price level, interest rates and stock prices.

5. Spillovers effects outside the US

Rather than reporting results on a country by country basis, figures in Table 2 display descriptive statistics of the cross-country distribution of the dynamic multipliers at the 2-quarter (short-term) and 12-quarter (medium-term) horizons for selected foreign variables (output, excess credit, house prices and stock prices), of OECD (+ Israel) and non-OECD economies, following US unitary percentage changes in output, excess liquidity, house and stock prices, and financial fragility.

5.1. Responses to US output dynamics

As shown in Table 2, changes in US GDP dynamics are quickly transmitted across both advanced and emerging economies. A unitary percentage change in US GDP leads in fact to a significant increase in median GDP for both OECD and non OECD countries at both horizons (0.16% and 0.53%, respectively, in the medium-term).[11] By further grouping the countries in four groups (Tables 3 and 4), i.e. advanced Europe (plus Canada), Eastern Europe, Asia and Latin America, we note that the median medium-term responses for Europe and Eastern Europe are similar to those for the OECD group (0.15%), while for Asia and Latin America we observe a stronger response (0.33% and 0.66%).

Overall, economic slowdowns in the US may be expected to play a significant and sizable role in worldwide economic recessions, with a stronger effect for Latin American and Asian countries (South-Eastern Asia, especially) than for Eastern European and advanced economies, consistently with the broad pattern of international trade linkages. These findings are also consistent with Dooley and Hutchinson (2009) and Levchenko et al. (2010), reporting a large decline in international trade (about 30%-40%) during the current crisis, and with Berken et al. (2009), Bems et al. (2010) and Grossman and Meissner (2010), pointing to the importance of the trade channel, particularly for countries exporting manufacturing and durable goods. Interestingly, our evidence actually contrasts with the decoupling of advanced and emerging economies business cycles hypothesis, recently put forward by Kose et al. (2008).

US economic slowdowns are also likely to play a significant role in determining stock price developments in both advanced and emerging countries. In fact, Table 2 shows that a similar median medium-term responses of foreign stock prices to

[11] In general, the dispersion of the cross-sectional distribution tends to be larger for non-OECD than OECD countries, revealing stronger commonalities in economic dynamics for the latter group of economies. Moreover, for both groups of countries and both horizons, the cross-sectional distribution features asymmetries and positive excess kurtosis, i.e. a larger number of outlying observations than compatible with a normal cross-sectional distribution.

US output dynamics is observed for both OECD (20%) and non-OECD countries (27%). Results for the European group are again consistent with the findings for the OECD group (22%), while the Eastern European countries show a more muted reaction (11%); on the other hand, stronger median responses are found for the Asian (25%) and Latin American (26%) areas, also consistent with the deeper impact of US economic recessions on foreign output for the latter groups of countries.

Finally, while for house prices the connection with US GDP dynamics is negligible, the response of excess credit is sizable and different across groups, i.e. positive for OECD countries (1.6%) and negative for non-OECD countries (-1.9%), and stronger for Eastern Europe (+2.36%) and Latin America (-1.65%) than for Europe (1%) and Asia (-0.5%). This pattern is possibly explained by a different monetary policy reaction across the two sub-groups of countries, being procyclical for OECD economies and countercyclical for non-OECD countries.

5.2. Responses to US financial developments

According to the results reported in Table 2, the effects of US financial developments on foreign output are not fully clear-cut. US stock price dynamics do not have any relevant effect on foreign GDP, while US house price dynamics do exercise some negative effects for the non-OECD group (-0.22% in the medium-term). Yet, a worsening of financial fragility conditions in the US leads to an output contraction for both groups (-0.12%, OECD, short-term; -0.13%, non OECD, medium-term). Moreover, the sub-group analysis reveals that US house price dynamics and financial fragility conditions are particularly relevant for Eastern Europe (-0.25% and -0.89%) and Latin America (-0.30% and -0.60%), leaving almost unaffected the European (0.02% and -0.03%) and Asian (0.04% and -0.1%) groups.

Other interesting conclusions can be drawn for the foreign financial variables. First, US excess liquidity is positively associated with excess credit for OECD countries at both horizons (0.2% to 0.5%), and house prices in the medium-term only (0.17%); differently, the median impact on excess credit for non-OECD countries is negative (-0.66% in the medium-term). Consistent results are delivered by the sub-group analysis, pointing to sizable medium-term median contractions in excess credit for Eastern Europe (-2.8%) and Latin America (-1.1%), to a weaker response for Asia (-0.2%), and to a positive response for Europe (0.5%). Moreover, the effect of an increase in US excess liquidity on foreign stock prices is sizable and positive for both groups in the medium-term (5%), but negative for non-OECD countries in the short-term (-6%). Interestingly, the positive medium-term response found for non-OECD countries concerns Eastern Europe (3.1%) and Latin America (6.6%) only, as for Asia the response is still negative (-0.9%). Also, the short-term negative response for non-OECD economies appears to be particularly strong for Asia and Latin America (-8%), and much smaller for Eastern Europe (-1.2%); rather, figures for Europe are in line with what found for the OECD group (3.2% to 7.3%).

Second, US housing and stock prices do affect foreign financial markets of both group of countries. An increase in US house prices lead to a median increase in house prices for OECD countries, particularly in the medium-term (0.8%), and to an increase in stock prices for both OECD (16% to 18%) and non-OECD economies (9% to 23%); on the other hand, an increase in US stock prices causes an increase in stock prices in the OECD countries (0.15% in the short-term), but a contraction in non-OECD stock markets (-5%). Interestingly, the sub-group analysis reveals that while the positive effect of a US house price increase on international stock markets is similar in magnitude across sub-groups, the negative effect of a US stock prices increase would be larger for Latin American (-9% to -11%) than for Asian and Eastern European (-2% to -4%) countries.

We conclude that a generous stance in US liquidity might lead to a rebalancing of international investor portfolios in favor of advanced and safer financial markets; hence, excess liquidity in the US, as well as buoyant US housing and stock markets, may have contributed to keep momentum in foreign advanced country stock and housing markets (and to their depression during the bust phase). Should the trend in liquidity creation be reversed, stock markets in advanced economies would suffer more than those in emerging countries, as international investors appear to switch to emerging countries' stock markets when the US markes stagnates or is depressed. This is also confirmed by the fact that a worsening of economic and financial fragility conditions in the US leads to a medium-term contraction in house (-0.1%) and stock prices (-5%) in OECD countries, but to an increase in stock prices in non-OECD economies (14% in the short-term), particularly in Asia and Latin America (12% and 5%; -26% for Eastern Europe). Overall, our findings are only partially consistent with Galesi and Sgherri (2009). Likewise the latter authors, we do find evidence of transmission of negative US stock price shocks to advanced and emerging European stock markets in the short-term; yet, we do also find that the effects of US shocks, instead of fading away, still last also in the medium-term.

6. Conclusions

This paper investigates the channels of transmission of macroeconomic and financial shocks both within the US economy and from the US to other advanced and emerging countries. We specify a large-scale open economy factor vector autoregressive (F-VAR) macroeconometric model, covering a total of 50 advanced and major emerging countries and comprising 278 equations, and estimate it over the 1980-2009 sample, thereby including the most severe phase of the recent economic recession and financial crisis. Moreover, the inclusion, together with key macroeconomic and financial variables, of specifically designed measures of excess liquidity and financial fragility, makes the model useful in evaluating the relevance of a boom-bust credit cycle view of recent macroeconomic fluctuations.

The paper reaches the following main conclusions. First, concerning the mechanics of shock transmission within the US, the empirical results are quite consistent with the boom-bust credit cycle view. In fact, there is evidence that asset prices misalignments in the housing and stock markets, as well as low real interest rates, over the boom cyclical phases, might have been driven by excessively generous liquidity. Large US trade deficits likely contributed to the latter dynamics, as huge capital inflows were redirected from the bond and stock markets to the housing market. Moreover, there is also evidence that the bust phases of the cycle may have been precipitated by declining house prices and the consequent breakdown in the predatory lending mechanism. The empirical evidence obtained from our thirty-year sample does in fact point to a bidirectional linkage relating house and stock prices, consistent with generalized declines in asset prices and tight credit conditions resulting from deleveraging and recapitalization of financial institutions. In addition, concerning the real effects of financial shocks, we detect stronger evidence of an asset price channel rather than a liquidity channel. Moreover, the finding of a negative effect of asset price declines on inflation points to potential deflation risks in the bust phases of the cycle. Finally, recessions in the US have been made worse by the second-round effects due to weakened external demand, as foreign output is found to significantly affect US real activity, as well as US house and stock prices.

Second, concerning the spillovers to foreign advanced and emerging economies, contractions in the US real economic activity have played a sizable role in the slowdown of foreign economic growth, negatively affecting foreign financial markets as well. Interestingly, we find a stronger response for emerging economies, especially in Latin America and Asia, than for advanced countries, consistently with international trade linkages of the US economy. On the other hand, adverse US financial developments do not have a clear-cut impact on foreign economic activity. Hence, the trade channel appears to be the key transmission mechanism of US economic developments to the rest of the world.

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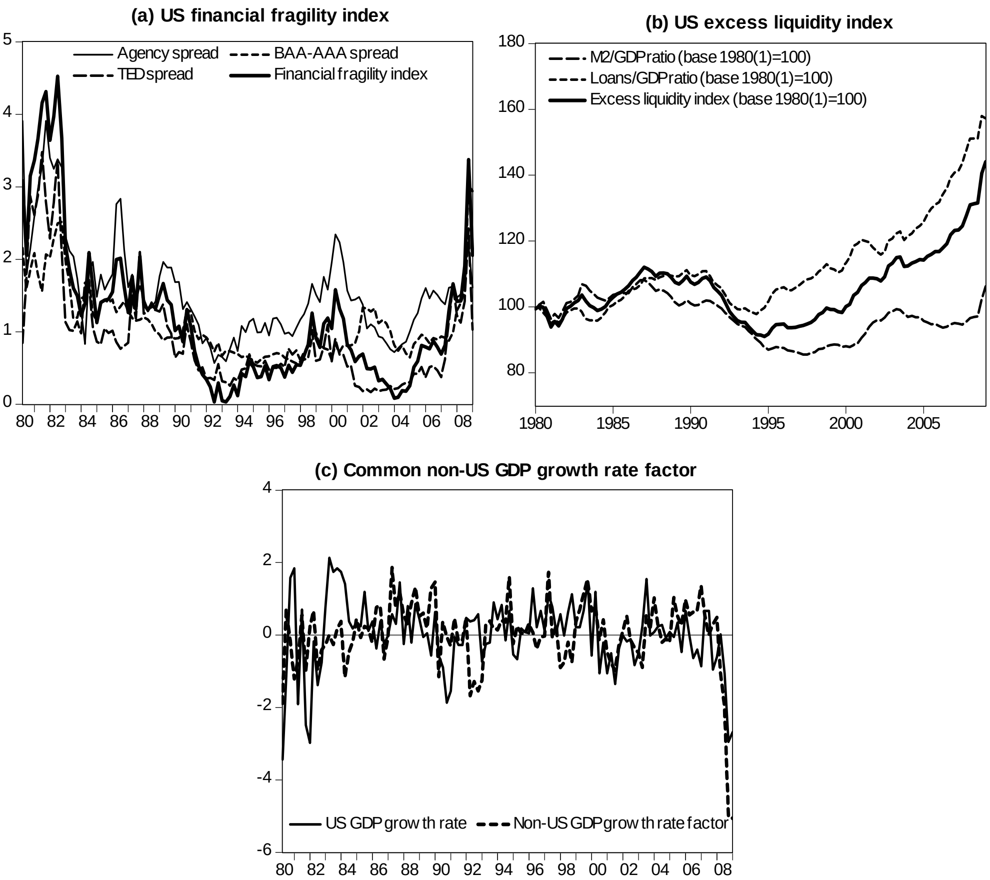

Fig. 1. US financial fragility and excess liquidity indices; common GDP factor

Panel (a) shows the US financial fragility index and the three spread series (Agency, BAA-AAA, and TED); panel (b) plots the US M2 to GDP ratio, Bank loans to GDP ratio (both in index form) and the extracted US excess liquidity index; panel (c) portrays the (standardized) non-US common GDP growth factor together with the US GDP growth rate. The sample is: 1980:1-2009:1.

Table 1: Median cumulated impulse response analysis for US variables (selected shocks)

sh↓	**Resp→**	***e***	***g***	***pd***	***c***	***i***	***cad***	***π***	***exl***	***s***	***l***	***h***	***er***	***f***	***fr***
	2	**0.32**	**0.31**	**-0.08**	**0.24**	**0.79**	0.05	0.04	**-0.12**	0.09	-0.11	-0.02	**0.34**	0.28	0.00
e	***4***	**0.33**	**0.30**	-0.03	**0.23**	**0.99**	0.05	**0.12**	-0.03	**0.19**	0.08	-0.10	**0.43**	0.00	**0.05**
	12	**0.25**	**0.18**	0.00	**0.24**	0.50	-0.01	0.15	0.22	0.05	0.04	-0.22	**0.43**	-0.08	0.02
	2	**0.11**	**0.43**	0.05	**0.22**	**0.85**	0.04	0.03	**-0.43**	0.10	**0.17**	-0.10	**-0.25**	**0.65**	-0.01
g	***4***	**0.15**	**0.48**	0.00	**0.21**	**0.92**	0.06	-0.01	**-0.35**	**0.10**	**0.14**	-0.01	0.01	0.15	0.02
	12	**0.18**	**0.50**	0.01	**0.23**	**0.91**	0.05	-0.07	-0.16	0.00	0.00	0.17	-0.23	0.68	0.00
	2	0.02	0.03	**0.06**	**-0.08**	-0.05	-0.02	-0.07	-0.03	**0.24**	**0.40**	-0.06	0.18	**-1.29**	0.01
pd	***4***	0.02	0.07	0.02	-0.10	0.00	-0.02	-0.13	-0.05	0.09	**0.16**	0.03	-0.08	-0.90	-0.05
	12	**0.10**	**0.19**	0.00	-0.12	0.26	0.02	**-0.24**	-0.15	-0.03	-0.03	0.20	-0.32	0.21	-0.03
	2	0.02	0.00	**0.06**	**-0.07**	-0.06	**0.26**	**-0.13**	0.07	0.01	0.08	-0.11	-0.18	**-1.94**	0.00
cad	***4***	-0.01	-0.06	0.04	**-0.18**	**-0.38**	**0.19**	**-0.22**	**0.27**	-0.07	-0.02	-0.12	-0.17	**-2.67**	0.02
	12	-0.06	-0.16	0.00	**-0.28**	**-0.84**	0.04	**-0.28**	**0.44**	-0.02	-0.04	0.05	**-0.84**	**-2.67**	0.00
	2	**-0.02**	**-0.17**	**0.04**	**-0.06**	**-0.13**	-0.04	**0.46**	-0.06	**-0.19**	**-0.19**	**-0.43**	-0.10	**-1.53**	**0.14**
π	***4***	**-0.11**	**-0.25**	0.02	-0.01	-0.22	-0.07	**0.51**	-0.03	0.09	0.05	**-0.45**	0.04	**-1.77**	**0.11**
	12	**-0.12**	**-0.24**	0.00	0.12	-0.24	-0.01	**0.56**	0.06	**0.09**	0.10	**-0.51**	0.43	**-1.57**	0.03
	2	**0.02**	0.00	-0.06	0.00	**-0.11**	0.00	**0.04**	**0.41**	-0.13	**-0.14**	-0.06	0.06	-0.60	**0.05**
exl	***4***	0.02	0.05	0.01	0.04	0.08	0.00	0.06	**0.41**	0.10	0.07	-0.12	0.04	0.21	**0.04**
	12	0.03	0.05	0.00	0.05	-0.01	0.00	0.03	**0.49**	0.02	0.02	-0.11	0.06	0.15	0.00
	2	-0.02	**-0.06**	**-0.05**	**-0.06**	**-0.33**	**-0.07**	**0.09**	0.03	**0.19**	-0.13	**-0.13**	**0.33**	**-0.90**	**0.11**
s	***4***	**-0.12**	**-0.27**	**-0.09**	-0.04	**-0.70**	**-0.13**	**0.21**	**0.27**	**0.17**	0.00	-0.20	**0.42**	-0.51	**0.10**
	12	**-0.22**	**-0.34**	0.00	0.05	**-0.98**	**-0.07**	**0.30**	**0.29**	0.06	**0.08**	**-0.61**	**0.86**	-0.68	0.03
	2	0.01	**0.04**	**-0.10**	**0.10**	**0.13**	0.02	**0.06**	-0.05	**-0.17**	**-0.22**	**0.62**	-0.16	**1.08**	-0.04
h	***4***	**0.09**	0.09	**-0.05**	**0.20**	**0.60**	**0.09**	**0.12**	**-0.14**	0.08	-0.05	**0.79**	-0.28	**1.31**	-0.01
	12	0.03	-0.07	0.00	**0.19**	0.23	0.03	0.20	0.05	0.02	-0.01	**0.87**	-0.28	0.66	0.03
	2	0.01	**0.04**	**0.06**	-0.02	**0.18**	**0.09**	-0.03	**-0.06**	0.02	0.08	0.02	**0.24**	**3.47**	-0.03
f	***4***	0.02	**0.08**	0.01	0.00	0.10	**0.08**	-0.08	-0.02	-0.01	0.00	**0.16**	-0.11	**3.69**	-0.04
	12	0.06	0.07	0.00	-0.06	0.13	0.03	-0.12	0.01	-0.02	-0.03	**0.29**	-0.42	**3.85**	0.00
	2	-0.03	-0.05	**0.03**	**0.07**	-0.19	0.03	-0.02	0.01	0.02	0.07	**0.06**	0.03	**0.33**	**0.17**
fr	***4***	0.01	0.06	0.00	**0.15**	0.11	0.06	-0.04	0.00	0.06	-0.01	**0.17**	0.02	0.34	**0.08**
	12	-0.01	-0.03	0.01	**0.21**	-0.12	0.02	0.01	**0.26**	0.05	0.04	0.20	0.12	-0.11	0.03
	2	0.00	**-0.15**	-0.08	**0.31**	0.33	**0.21**	**0.65**	0.01	**-2.86**	**-3.10**	**-1.30**	**-5.35**	-12.0	0.32
o	***4***	-0.17	**-0.43**	0.02	-0.01	-0.68	-0.33	**0.81**	**0.49**	-0.58	-0.68	**-2.38**	**-6.20**	-12.1	**0.38**
	12	**-0.52**	**-0.77**	-0.01	-0.02	-1.22	-0.25	**1.07**	0.12	0.13	0.20	**-3.64**	-3.43	**-17.6**	0.06
	2	0.01	**0.39**	**-0.54**	0.43	-1.86	-0.16	0.31	**-1.24**	-1.65	-1.59	**-1.66**	**-9.60**	**-85.5**	**1.95**
cp	***4***	-0.27	-0.41	-0.73	0.61	-3.65	**-1.80**	**1.78**	-0.07	-2.60	-2.90	**-5.05**	**-12.9**	**-84.9**	0.65
	12	-1.23	-1.37	-0.05	1.14	-4.94	-0.81	2.36	-1.11	0.40	0.50	**-8.75**	-0.79	**-91.9**	0.13
	2	**0.03**	**0.07**	**-0.04**	**0.09**	**0.32**	-0.01	**0.05**	**-0.10**	**-0.08**	**-0.12**	-0.02	**-0.51**	**4.50**	**-0.13**
gf	***4***	**0.04**	**0.10**	0.03	0.04	**0.38**	**0.07**	-0.05	**-0.13**	0.17	**0.20**	0.08	-0.16	**3.56**	0.03
	12	**0.07**	0.09	0.00	0.03	**0.38**	0.03	-0.02	-0.05	-0.01	-0.03	0.16	**-0.59**	**3.78**	0.00

The Table reports the results of the median cumulated impulse response analysis for the US variables (columns), relative to the various shocks (rows). The variables are real GDP (*g*), civilian employment (*e*), real private consumption (*c*), real private investment (*i*), fiscal deficit to GDP (*pd*), current account deficit to GDP (*cad*), CPI all items index (*π*), three-month Treasury Bills real rate (*s*), 10-year Federal government securities real rate (*l*), real house prices (*h*), real share prices (*f*), the economic/financial fragility index (*fr*), the excess liquidity index (*exl*), the oil price (*o*), the ex-energy commodity price index (*cp*), and foreign output (*gf*). Figures in bold are significant at the 10% level.

Table 2: Median cumulated response of (selected) foreign variables to US shocks for OECD and non OECD countries

Response of foreign output to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	OECD		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	0.25	0.27	0.96	1.58	-0.07	-0.03	0.15	0.54	-0.01	0.03	-0.20	-0.32	0.00	0.00	0.07	0.02	-0.18	-0.15	-0.53	-0.99
Std	0.37	0.33	1.75	2.78	0.28	0.32	2.03	2.03	0.50	0.37	1.86	2.02	0.05	0.05	0.26	0.23	0.91	0.67	8.10	8.29
Q1	0.03	0.06	0.21	0.12	-0.09	-0.05	-0.31	-0.42	-0.09	-0.08	-1.05	-1.07	-0.01	-0.01	-0.02	-0.05	-0.53	-0.32	-1.10	-1.40
Median	0.12	0.16	0.49	0.53	-0.01	0.01	-0.02	0.01	0.01	0.02	-0.10	-0.22	0.00	0.00	0.01	0.00	-0.12	-0.06	0.09	-0.13
Q3	0.29	0.39	1.38	2.31	0.05	0.08	0.53	0.71	0.07	0.10	0.24	-0.01	0.01	0.01	0.09	0.05	0.02	0.02	0.83	0.39
Sk	2.19	1.41	1.89	2.25	-1.04	-2.35	-0.94	0.58	-2.43	-0.33	0.06	0.34	-0.67	0.39	0.96	-0.98	-0.88	-2.28	-1.39	-1.08
Ku	8.36	5.76	6.99	8.15	5.20	12.61	5.58	2.98	14.69	8.62	3.41	4.66	6.76	6.06	5.31	5.69	9.11	11.92	8.06	7.49

Response of foreign excess credit to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	OECD		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	3.09	5.25	-3.22	-3.16	0.59	0.11	-0.58	-1.82	0.13	0.28	-0.95	-1.86	-0.03	-0.09	-0.22	0.01	2.34	2.74	1.41	0.80
Std	6.30	10.37	6.63	7.08	2.51	4.01	6.19	7.79	2.60	2.25	6.90	7.61	0.65	0.77	1.83	1.74	5.80	4.45	15.80	13.56
Q1	-0.35	-0.01	-3.69	-5.64	-0.27	-0.27	-1.81	-4.59	-0.55	-0.27	-1.18	-1.64	-0.09	-0.09	-0.27	-0.15	-0.06	0.11	-7.21	-5.16
Median	0.55	1.61	-0.67	-1.87	0.23	0.51	0.07	-0.66	-0.01	0.08	-0.09	-0.07	0.00	0.00	-0.10	-0.05	0.59	0.82	-1.30	-0.43
Q3	3.84	5.29	-0.22	0.07	0.88	1.70	1.42	1.48	0.92	0.86	1.63	1.48	0.09	0.16	0.08	0.17	2.10	3.10	7.36	3.32
Sk	2.66	3.17	-2.50	-1.62	-1.28	-2.23	-2.27	-1.98	-0.28	-0.06	-2.95	-2.30	-1.55	-2.68	-2.08	-0.66	1.27	1.92	1.33	1.31
Ku	10.75	14.33	8.93	6.13	8.56	8.87	9.12	7.43	11.10	5.99	11.31	7.56	8.36	12.29	9.13	7.15	5.00	5.78	6.32	6.44

Response of foreign house prices to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	OECD		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	0.09	-0.04			-0.15	-0.06			0.43	0.94			0.01	-0.01			0.33	-0.05		
Std	0.55	1.29			0.26	0.86			0.67	0.86			0.06	0.11			0.79	0.88		
Q1	-0.13	-0.56			-0.33	-0.84			-0.03	0.20			-0.04	-0.12			-0.38	-1.01		
Median	-0.01	-0.16			-0.09	0.17			0.15	0.78			-0.01	-0.02			0.14	-0.10		
Q3	0.41	0.62			-0.02	0.31			0.52	1.79			0.01	0.04			0.59	0.60		
Sk	-0.72	-0.50			-0.85	-0.04			1.15	0.24			1.14	0.35			0.37	0.09		
Ku	3.13	4.38			3.64	2.91			3.50	1.59			3.51	2.19			2.00	2.10		

Response of foreign stock prices to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	OECD		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**		**OECD**		**non OECD**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	25.53	27.16	46.04	52.04	0.07	5.76	-10.06	11.44	22.09	18.97	30.25	18.05	-1.22	-1.61	-4.38	-5.34	-9.48	-17.76	22.77	-3.00
Std	28.69	35.14	50.29	64.32	18.17	21.55	19.30	33.84	14.93	12.78	30.14	29.66	4.33	5.39	7.75	9.43	52.08	45.65	57.54	56.73
Q1	8.28	10.31	14.25	9.33	-3.91	-2.53	-25.43	-22.98	11.90	11.30	2.38	-4.55	-1.95	-3.08	-8.47	-10.24	-13.40	-34.10	-6.49	-20.98
Median	19.10	20.20	22.15	26.65	1.44	5.21	-6.19	5.50	17.50	15.70	23.00	9.42	0.15	0.11	-5.32	-5.57	4.25	-4.91	14.02	0.30
Q3	24.30	30.60	68.78	64.53	4.30	12.70	-0.03	30.45	25.22	26.89	33.58	20.45	1.28	1.10	-0.65	-0.11	9.41	5.52	39.48	13.93
Sk	2.52	1.89	1.80	2.23	-1.99	-0.88	-0.83	0.67	1.27	0.74	0.67	1.07	-2.25	-1.80	-0.38	-1.07	-3.76	-1.92	0.10	0.74
Ku	9.68	9.06	5.95	7.89	10.40	7.52	3.13	2.65	4.15	2.95	2.25	2.83	8.14	5.96	3.46	4.79	18.79	7.40	3.42	5.05

The Table reports descriptive statistics for the cross section of dynamic responses of selected foreign variables to US shocks: mean (Mean), standard deviation (Std), first (Q1), second (Median) and third (Q3) quartile, index of skewness (Sk) and kurtosis (Ku). Results refers to OECD (+ Israel) and non OECD countries.

Table 3: Median cumulated response of (selected) foreign variables to US shocks for European and Eastern European countries

Response of foreign output to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	Europe		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	0.18	0.21	0.63	0.79	-0.05	-0.01	-0.13	0.06	0.08	0.08	-0.61	-0.39	0.01	0.02	-0.04	-0.03	-0.02	-0.02	-1.16	-0.66
Std	0.25	0.24	0.79	1.02	0.23	0.17	0.29	0.08	0.28	0.27	0.89	0.56	0.04	0.04	0.08	0.06	0.69	0.30	1.38	1.24
Q1	0.02	0.06	0.05	0.06	-0.05	-0.03	-0.46	0.00	-0.04	-0.06	-1.62	-1.07	0.00	0.00	-0.11	-0.10	-0.25	-0.12	-2.73	-1.92
Median	0.10	0.15	0.12	0.15	-0.01	0.03	0.00	0.01	0.01	0.02	-0.34	-0.25	0.00	0.01	-0.02	-0.01	-0.03	-0.03	-0.89	-0.32
Q3	0.22	0.31	0.94	0.95	0.05	0.07	0.03	0.07	0.07	0.11	-0.08	0.02	0.01	0.01	0.00	-0.01	0.02	0.02	-0.36	0.00
Sk	1.42	0.76	0.51	0.77	-2.27	-1.70	-0.99	0.70	3.02	2.60	-0.93	-0.60	1.90	1.96	-1.07	-0.48	2.26	2.03	-0.75	-1.14
Ku	4.53	3.21	1.05	1.71	8.08	5.65	2.20	1.48	11.79	10.24	2.09	1.38	5.49	6.41	2.47	1.36	9.56	8.72	1.85	2.53

Response of foreign excess credit to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	Europe		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	1.58	2.48	-2.37	0.63	0.45	1.04	-0.56	-2.86	-0.47	0.09	1.77	-1.38	0.08	0.06	0.43	0.58	2.23	1.96	5.70	2.86
Std	3.48	4.81	11.95	13.29	1.21	1.79	4.60	6.77	2.34	1.77	3.93	7.07	0.32	0.25	1.38	1.92	4.36	3.14	8.91	3.05
Q1	-0.25	-0.02	-13.44	-12.03	-0.28	-0.10	-5.16	-9.92	-0.56	-0.09	-1.45	-8.21	-0.07	-0.09	-0.47	-0.66	-0.01	0.09	-2.25	-0.39
Median	0.41	0.97	0.35	2.36	0.16	0.52	0.05	-2.80	-0.06	0.15	1.07	-1.73	0.00	0.00	-0.14	0.00	0.64	0.73	-0.50	3.12
Q3	1.51	2.28	3.91	7.50	0.39	1.79	1.64	0.41	0.21	0.56	1.60	1.41	0.03	0.04	0.28	0.22	1.84	2.43	9.76	3.73
Sk	2.83	2.64	-1.27	-1.13	1.85	1.10	-0.94	-0.70	-3.10	-2.61	0.96	-0.64	2.66	1.69	1.08	1.13	2.29	2.11	0.39	-0.05
Ku	11.00	9.86	2.77	2.55	6.08	4.50	2.30	2.00	12.54	10.60	2.34	2.05	9.93	5.49	2.49	2.62	7.03	6.93	1.29	1.65

Response of foreign house prices to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	Europe		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	0.06	-0.06			-0.19	-0.02			0.52	1.08			0.01	0.00			0.43	-0.06		
Std	0.58	1.42			0.25	0.89			0.72	0.86			0.07	0.11			0.85	0.91		
Q1	-0.14	-0.52			-0.37	-0.79			-0.01	0.48			-0.04	-0.10			-0.33	-0.88		
Median	-0.01	-0.22			-0.10	0.14			0.33	0.81			-0.01	-0.01			0.34	-0.21		
Q3	0.38	0.61			-0.05	0.33			0.81	1.81			0.02	0.08			0.98	0.50		
Sk	-0.68	-0.43			-1.21	-0.02			0.85	0.05			1.01	0.24			0.12	0.18		
Ku	2.75	3.64			3.63	2.86			2.76	1.45			2.88	2.10			1.71	2.10		

Response of foreign stock prices to unitary US shocks

	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	Europe		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**		**Europe**		**Eastern Europe**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	25.21	26.77	47.33	47.11	4.05	7.36	2.85	6.48	21.27	18.97	32.19	25.42	-0.17	-0.10	-4.50	-6.66	-7.87	-12.07	-10.21	-43.16
Std	22.84	19.81	77.25	112.31	7.77	9.76	22.29	21.88	13.50	11.78	33.54	24.63	2.27	2.21	9.58	13.48	65.11	46.55	47.69	40.20
Q1	9.87	11.43	8.07	-20.10	-2.14	0.96	-19.75	-18.95	10.93	8.03	6.90	6.64	-1.73	-1.66	-13.60	-19.78	-0.43	-12.28	-45.40	-87.25
Median	19.55	21.45	19.90	11.53	3.15	7.30	-1.21	3.10	16.93	15.95	19.52	12.80	0.48	0.56	-1.74	-3.52	6.41	-3.58	-26.20	-55.50
Q3	25.63	32.10	21.98	20.65	5.11	12.18	12.96	21.10	24.23	27.17	33.42	28.96	1.20	1.14	0.32	-1.58	10.50	4.66	-10.98	-17.75
Sk	1.68	1.37	1.32	1.18	1.42	0.45	0.23	-0.21	1.33	0.39	0.81	0.72	-1.23	-1.07	-1.25	-1.04	-3.28	-2.97	0.83	-0.03
Ku	4.82	4.71	2.86	2.68	5.08	3.70	1.07	1.05	4.10	2.09	1.98	1.76	3.97	3.16	2.74	2.48	13.24	11.82	2.14	1.03

The Table reports descriptive statistics for the cross section of dynamic responses of selected foreign variables to US shocks: mean (Mean), standard deviation (Std), first (Q1), second (Median) and third (Q3) quartile, index of skewness (Sk) and kurtosis (Ku). Results refer to European (+ Canada) and Eastern European (+ Russia) countries.

Table 4: Median cumulated response of (selected) foreign variables to US shocks for Asian and Latin American countries

Response of foreign output to unitary US shocks																				
	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	Asia		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	0.94	1.46	0.42	0.67	0.13	0.52	0.06	0.02	0.05	-0.07	-0.11	-0.40	0.06	0.00	0.01	0.02	-0.60	-0.90	-0.17	-0.05
Std	1.79	2.86	0.90	1.50	2.17	2.18	0.49	0.75	1.91	2.15	0.62	0.52	0.28	0.24	0.04	0.05	8.62	8.79	1.02	1.09
Q1	0.17	0.15	-0.39	-0.67	-0.44	-0.49	-0.42	-0.74	-0.10	-0.46	-0.66	-0.89	-0.06	-0.06	-0.03	-0.03	-0.47	-0.75	-1.04	-0.80
Median	0.32	0.33	0.38	0.66	-0.04	-0.04	-0.06	-0.20	0.04	0.00	-0.21	-0.30	-0.01	-0.03	-0.01	0.00	-0.03	-0.10	-0.56	-0.62
Q3	0.90	1.25	0.57	0.73	0.47	0.64	0.32	0.41	0.36	0.24	0.00	-0.14	0.10	0.02	0.01	0.04	0.60	0.33	0.06	0.00
Sk	2.07	2.49	-0.09	0.37	-0.85	0.53	-0.17	-0.08	-0.26	0.01	-0.01	-1.24	0.91	-0.73	0.85	0.41	-1.28	-1.05	0.53	0.88
Ku	7.11	8.56	1.95	2.04	4.83	2.57	1.40	1.32	3.50	4.05	1.92	2.72	4.56	4.82	2.08	1.53	7.09	6.75	1.42	1.94
Response of foreign excess credit to unitary US shocks																				
	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	Asia		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	2.45	3.67	-0.72	1.11	-0.42	-1.73	0.65	-2.14	-1.29	-1.26	0.70	0.33	-0.75	-0.72	0.46	0.52	0.93	2.39	2.76	2.27
Std	8.65	14.64	7.09	10.26	6.77	8.04	1.98	5.48	7.24	7.36	2.05	2.75	1.77	1.57	0.53	0.53	16.44	14.08	7.93	10.15
Q1	-1.45	-2.38	-6.77	-7.82	-1.83	-2.45	-1.01	-8.44	-1.03	-0.79	-1.56	-2.84	-0.80	-0.68	0.07	0.02	-6.69	-2.83	-5.20	-7.14
Median	-0.45	-0.45	-1.80	-1.65	-0.16	-0.21	0.37	-1.11	-0.11	-0.24	0.92	0.86	-0.11	-0.11	0.10	0.26	-0.29	0.27	-0.02	-0.93
Q3	1.17	0.85	-0.36	2.52	1.70	1.18	0.59	0.89	0.31	0.77	1.67	1.50	-0.02	-0.03	0.62	0.83	2.74	3.13	6.85	6.21
Sk	2.11	2.50	0.50	0.64	-1.97	-2.10	0.92	-0.67	-2.77	-2.82	-0.58	-0.30	-2.36	-1.86	0.57	0.18	1.40	1.12	-0.07	0.13
Ku	6.86	8.66	2.09	1.76	7.44	7.46	2.28	1.73	10.03	10.20	1.80	1.43	7.86	5.22	1.23	1.07	6.26	5.71	1.35	1.33
Response of foreign stock prices to unitary US shocks																				
	output shock				**excess liquidity shock**				**house price shock**				**stock price shock**				**fragility shock**			
	Asia		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**		**Asia**		**Latin America**	
	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12	2	12
Mean	34.68	38.14	43.28	47.82	-15.30	4.65	-7.68	14.53	24.02	17.00	36.07	17.71	0.93	2.39	-6.49	-7.37	28.52	6.53	-18.03	-30.92
Std	38.43	43.17	37.20	40.04	23.75	41.81	18.09	25.90	23.71	25.41	25.84	27.54	16.44	14.08	5.34	5.87	45.81	54.47	48.83	52.68
Q1	6.83	3.85	13.55	18.00	-28.43	-24.13	-27.00	-13.87	8.34	-5.72	11.67	-0.14	-6.69	-2.83	-11.27	-12.35	-5.83	-20.18	-73.55	-94.80
Median	19.75	25.20	18.20	26.00	-8.32	-0.94	-7.99	6.58	20.40	13.00	23.80	7.50	-0.29	0.27	-8.74	-10.70	11.57	5.13	4.82	-20.00
Q3	39.45	58.00	55.20	55.45	0.67	11.19	-0.41	34.05	28.78	22.53	50.85	13.25	2.74	3.13	-3.85	-4.46	34.83	18.10	6.91	2.26
Sk	1.46	1.63	0.57	0.66	-1.39	0.43	-0.27	-0.35	0.91	1.11	0.27	1.21	1.40	1.12	0.24	0.43	1.47	0.97	-0.95	-0.54
Ku	4.37	5.48	1.42	1.45	3.73	2.62	1.66	1.22	3.26	3.86	1.04	2.68	6.26	5.71	1.13	1.03	3.91	4.93	2.11	1.36

The Table reports descriptive statistics for the cross section of dynamic responses of selected foreign variables to US shocks: mean (Mean), standard deviation (Std), first (Q1), second (Median) and third (Q3) quartile, index of skewness (Sk) and kurtosis (Ku). Results refer to Asian and Latin American countries.