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Discussion Paper

Deutsche Bundesbank
No 23/2016

Transmission of global financial shocks to EMU member states: the role of monetary policy and national factors

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Internet http://www.bundesbank.de

ISBN 978–3–95729–271–1 (Printversion)
ISBN 978–3–95729–272–8 (Internetversion)

Non-technical summary

Research Question

The experience of emerging market economies (EMEs) in the context of the international financial crisis has redirected attention to the dominating influence of global factors on international financial markets and the limited scope of national policymakers to smooth inflows and outflows of capital. This phenomenon seems to be relevant irrespective of the prevailing exchange rate system, leading to the theory that the well-known "impossible trinity" has morphed into a "dilemma" where an independent monetary policy is only possible if the global financial cycle is reined in by managing capital flows. The problem is also relevant to member states of the European Monetary Union (EMU), in which monetary policy is delegated to the ECB and financial markets are fully integrated. An important question is whether a common monetary policy absorbs global shocks or instead serves to aggravate the vulnerability of member states to exogenous shocks.

Contribution

The task of this paper is to fill the gap in the literature with regard to the role of a common monetary policy in the transmission of global financial shocks to individual EMU member states. We use a panel VAR model to assess the interrelationship between various global, European and national variables that commonly determine the inflows and outflows of capital. Furthermore, we use cointegration analyses to fathom the scope of action that can be taken by national policymakers to prevent the emergence of macroeconomic imbalances and maintain viable internal and external conditions.

Results

All in all, the EMU fosters the resilience of individual member states in the presence of a dominating global financial cycle. The asymmetric effects of global shocks on member states are partly offset by the uniform access of commercial banks to the Eurosystem's open market operations in conjunction with the redistribution of liquidity via the TARGET mechanism. However, an appropriate policy mix of sound public finances, solid financial regulation and targeted macroprudential measures is necessary in order to safeguard macroeconomic sustainability in the long run without needing to manage capital flows.

Nichttechnische Zusammenfassung

Fragestellung

In den vergangenen Jahren haben die Erfahrungen einiger Schwellenländer im Zusammenhang mit der internationalen Finanzkrise den dominierenden Einfluss globaler Faktoren auf die internationalen Finanzmärkte und die begrenzten Möglichkeiten nationaler Wirtschaftspolitik zur Glättung von Kapitalzu- und -abflüssen erneut vor Augen geführt. Dieses Phänomen ist unabhängig von dem geltenden Wechselkursregime und führte zu der These, dass die bekannte „unmögliche Dreiheit“ von einem Dilemma abgelöst wurde, demzufolge eine eigenständige Geldpolitik nur möglich ist, wenn der globale Finanzzyklus durch eine Regulierung des Kapitalverkehrs gezügelt wird. Das Problem ist auch für die Mitgliedsländer der Europäischen Währungsunion relevant, in der die Geldpolitik an die EZB delegiert ist und die Finanzmärkte vollständig integriert sind. Eine wichtige Frage ist, ob die gemeinsame Geldpolitik globale Schocks eher dämpft oder die Abhängigkeit der Mitgliedstaaten von externen Faktoren noch verstärkt.

Beitrag

Das Papier soll die Lücke in der existierenden Literatur zur Rolle der gemeinsamen Geldpolitik für die Übertragung globaler finanzieller Schocks auf einzelne EWU-Mitgliedsländer füllen. Wir verwenden ein Panel VAR-Modell, um die wechselseitigen Beziehungen zwischen verschiedenen globalen, europäischen und nationalen Variablen zu schätzen, welche die Zu- und Abflüsse von Kapital determinieren. Darüber hinaus loten wir mithilfe von Panel Kointegrationsanalysen die Möglichkeiten der nationalen Wirtschaftspolitik aus, makroökonomischen Ungleichgewichten vorzubeugen und nachhaltige interne und nachhaltige externe Bedingungen zu gewährleisten.

Ergebnisse

Insgesamt ist festzustellen, dass die Europäische Währungsunion die Widerstandsfähigkeit der Mitgliedstaaten im globalen finanziellen Umfeld stärkt. Asymmetrische Effekte globaler Schocks auf die verschiedenen Länder werden durch den einheitlichen Zugang der Geschäftsbanken zu den Offenmarktgeschäften des Eurosystems und die Umverteilung von Liquidität durch den TARGET-Mechanismus teilweise kompensiert. Jedoch kann nur eine angemessene Politikmischung aus gesunden öffentlichen Finanzen, einer wirksamen finanziellen Regulierung und zielgerichteten makroprudenziellen Maßnahmen makroökonomische Stabilität auch langfristig sicherstellen, ohne dass auf ein Management von Kapitalflüssen zurückgegriffen werden müsste.

BUNDESBANK DISCUSSION PAPER NO 23/2016

Transmission of Global Financial Shocks to EMU Member States: The Role of Monetary Policy and National Factors*)

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Abstract

The paper analyses the transmission of global financial shocks to individual member states of the European Monetary Union (EMU), in which monetary policy is delegated to the ECB and financial markets are fully integrated. Using a panel VAR model, we show that the asymmetric effects of global shocks on member states are partly offset by the uniform access of commercial banks to the Eurosystem's open market operations in conjunction with the redistribution of liquidity via the TARGET mechanism. However, an appropriate policy mix of sound public finances, solid financial regulation and targeted macroprudential measures is necessary in order to safeguard macroeconomic sustainability without needing to manage capital flows.

Keywords: monetary union, capital flows, global financial cycle, macroeconomic imbalances

JEL classification: F32, F36, F45

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* We are indebted to Georg Stadtmann, Ulrich Grosch and the participants of a research seminar at the Deutsche Bundesbank for their valuable comments. Of course, all remaining errors are our own.

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I. Introduction

In recent years, the experience of emerging market economies (EMEs) in the context of the international financial crisis has redirected attention to the dominating influence of global factors on international financial markets and the limited scope of national policymakers to smooth inflows and outflows of capital. This phenomenon seems to be relevant irrespective of the prevailing exchange rate system, leading to the theory postulated by Rey (2015) that the well-known "impossible trinity" has morphed into a "dilemma" where an independent monetary policy is only possible if the global financial cycle is reined in by managing capital flows. Alternatively, Milne (2014) proposes a "new" policy trilemma, according to which "it is not possible to have at the same time international market integration, independent macroeconomic policy and be assured of financial stability". The issue of a policy dilemma is disputed by Georgiadis and Mehl (2015), who argue that – given flexible exchange rates – financial integration may render monetary policy more effective.

The discussion on the impact of global factors on the domestic economy and the scope of action that can be taken by national economic policymakers has mainly focused on the policy options open to EMEs. However, the same problem may be even more relevant to member states of the European Monetary Union (EMU), in which monetary policy is delegated to the Eurosystem and financial markets are fully integrated. Restrictions on the free movement of capital such as those in Greece or formerly in Cyprus are only tolerated as an emergency measure as they impede the transmission mechanism of European monetary policy. The crucial question addressed in this paper is whether a common monetary policy absorbs global shocks or instead serves to simply aggravate the vulnerability of member states to exogenous shocks. The paper also addresses the question of how external positions and national policy interact with respect to the emergence or prevention of macroeconomic imbalances.

After a short literature review (Section II), Section III uses a panel VAR model to empirically assess the transmission of global financial shocks to credit growth in EMU member states via the interest rate and exchange rate channels. While the time horizon of this analysis is oriented towards the short to medium term, Section IV tackles the issue of policy measures that are appropriate to prevent macroeconomic disequilibria and to maintain viable internal and external conditions in the long term. Section V concludes.

II. Literature

The literature on the volatility of capital flows and the role of global versus domestic factors can be separated into two strands. The first strand focuses on the determinants of

capital flows and the ability of economies to isolate themselves from external shocks and the capital flow volatility to which they are exposed. The second strand deals with the impact of capital flow volatility on the domestic economy, especially on relative prices and financial stability.

In their seminal paper on the "push" and "pull" factors of capital flows, Calvo et al. (1993) find that global factors are more important as drivers of capital flows than domestic factors. Other studies, such as Fernandez-Arias (1996), Calvo et al. (1996) and Chuhan et al. (1998), come to the same conclusion. More recently, Forbes and Warnock (2012) analyze the causes of capital waves and distinguish episodes that they call "surge" or "stop" (for gross capital inflows) and "flight" or "entrenchment" (for gross outflows). Using a complementary log-log model, they show that global risk factors are significantly associated with extreme capital flow episodes, whereas domestic macroeconomic characteristics are generally less important. Eichengreen and Gupta (2014) also determine that robust fundamentals did not help EMEs alleviate spillovers from the "tapering debate" on future US monetary policy. Bruno and Shin (2014) find that lower interest rates in advanced economies dampen measured risks and stimulate cross-border credit flows to EMEs. The dominant impact of global factors on international financial flows is also confirmed by Shirota (2015) and Sarno et al. (2015). By contrast, Obstfeld (1993) underlines the capacity of flexible exchange rates to absorb the effects of external shocks even if financial markets are highly integrated, but states a worsened trade-off between multiple domestic objectives. Förster et al. (2012) identify domestic factors as the most important drivers of capital inflows, whereas the impact of the global factor is highly sensitive to the development of the domestic financial system. Further groups of authors, such as Chen et al. (2014), Mishra et al. (2014) and Bowman et al. (2014), confirm the relevance of US monetary policy and global factors to capital flows and asset prices in EMEs. Nevertheless, they consider domestic fundamentals to still be relevant to EMEs' vulnerability to exogenous shocks and contagion effects. In the same vein, Griffin et al. (2004) demonstrate that both push and pull factors contribute to the understanding of daily cross-border equity flows.

Becker and Noone (2008) argue that the volatility of total capital flows also depends substantially on their composition and the flexible use of financial instruments. They show that the substitutability between different forms of capital is greater in industrialized economies than in EMEs and suggest that openness to capital flows may be positively related to overall stability in the financial and the current accounts. Bluedorn et al. (2013) scrutinize the substitutability of gross capital inflows as well as the complementarity between gross inflows and outflows. They come to the conclusion that fickle capital flows are unavoidable and that policy should focus on the question of how to adapt to this fact.

This argument leads to the second strand of literature, which places emphasis on the effects of capital waves on macroeconomic and financial stability. Aizenman and Pasricha (2012) find evidence supporting the hypothesis that openness increases exposure to global shocks. That being said, a more competitive and better supervised banking sector and lower balance sheet exposures tend to increase market resilience. In a recent study, Forbes and Klein (2015) analyze the consequences of different policy responses to a sudden stop in capital inflows. The results indicate that none of the traditional instruments − interest rate increases, intervention in foreign exchange markets, currency depreciation or capital controls − significantly improve the performance of GDP, unemployment or inflation. However, both Forbes et al. (2015) and Habermeier et al. (2011) point out that macroprudential measures may significantly reduce some measures of financial fragility without affecting other key targets of economic policy, whereas managing capital flows does little, by and large, to stabilize capital flows.

The discussion on the impact of global financial variables and the role of internationally active banks is condensed by Drehmann et al. (2012) to the concept of the global financial cycle, which is characterized by synchronous cycles in credit flows and asset prices. Since cross-border banking by multinational banks suppresses the interest rate channel as the most important transmission mechanism of monetary policy, Rey (2015) raises the trilemma-dilemma debate outlined in the introduction. In response, Georgiadis and Mehl (2015) recognize that international financial integration may render interest rate policy ineffective, but they emphasize the corresponding strengthening of the exchange rate channel: If foreign assets are mainly denominated in foreign currency and foreign liabilities are mainly denominated in domestic currency, the valuation effect of exchange rate changes enforces the effectiveness of monetary policy. The argument is that a depreciation of the domestic currency as a consequence of a loose monetary policy would induce an appreciation of the international investment position and hence entail a positive wealth effect.

The central aim of this paper is to fill the gap in the literature with regard to the role of a common monetary policy in the transmission of global financial shocks to individual EMU member states. We scrutinize both the spillover from a rise in US stock market uncertainty via the interest rate channel and the cross-border effects of a surprise liquidity injection by the FED, which is associated with an immediate response of exchange rates. Furthermore, we fathom the scope of action that can be taken by national policymakers to prevent the emergence of macroeconomic imbalances induced by an economy's exposure to external factors. Rey (2015) also focuses on the interest rate channel and the role of cross-border credit flows to EMEs, but she disregards the special case of European periphery countries that are part of the Eurosystem. Georgiadis and Mehl (2015), by contrast, deal with the

effectiveness of European monetary policy, but do not analyze whether monetary union has an effect on the exposure of member states to the global financial cycle.

III. Transmission of global shocks via capital flows

1. Stock market uncertainty and the interest rate channel

1.1 Methodology

In this section, we borrow heavily from the paper by Rey (2015). However, instead of analyzing EMEs, we focus on the interdependence of global, European and national factors that determine net capital flows to EMU member states. The model assumes a rise in stock market uncertainty measured by the Chicago Board Options Exchange Volatility Index, or the VIX (*vix*), that induces responses in the overnight rates of the effective federal fund rate (*fed*) and the European overnight index average, or the EONIA (*eonia*). Cross-border credit flows, which are at the center of the interest rate channel described in the literature, are split into net private capital flows (*opr*) and net inflows via TARGET (*targ*).[1] Both variables are measured relative to domestic GDP. The effects on national variables in the EMU member states are reflected in the growth rates of national GDP (*gdp*) and new bank credits to the private sector (*cred*).

The panel comprises the 11 original EMU member states plus Greece, with quarterly data from the first quarter of 1999 to the fourth quarter of 2014. We explicitly differentiate between two groups of countries: the so-called periphery, consisting of Greece, Ireland, Italy, Portugal and Spain (GIIPS) on one side, and the remaining EMU members on the other. The analysis is performed on the basis of a panel VAR model. We use a least squares dummy variable estimator (LSDV), which is consistent if the number of time observations in the dataset tends to infinity (Nickell, 1981; Bun and Kiviet, 2006). The program is provided by Cagala and Glogowsky (2014) for STATA. Standard information criteria (AIC and HQIC) suggest an optimal lag length of four quarters. The ordering of the variables is inspired by Rey (2015) and implies contemporaneous Cholesky restrictions based on institutional knowledge. Each variable may respond to contemporaneous shocks to the preceding variables, but does not respond to contemporaneous shocks to the subsequent variables. However, all of the variables may respond to lagged shocks to any other variable and to itself. Domestic GDP growth is assumed to be the most sluggish

[1] This postulate also holds for financial spillovers between EMU countries; see Hale and Obstfeld (2014). In addition to changes in TARGET balances with the ECB, this item also includes capital inflows from official assistance.

variable and is therefore placed first. It is followed by the growth rate of domestic credits granted to the private sector. Cross-border private credit flows and official flows are assumed to respond immediately to these domestic factors and to have, for their part, an immediate impact on the VIX, the effective federal fund rate and EONIA. The resulting order of variables is hence given by:[2]

gdp cred opr targ vix fed eonia

The data for the VIX and the federal fund rate are taken from the Thomson Reuters Datastream, while the EONIA is calculated by the ECB. Capital flows are from the Eurostat balance of payments statistics. Information about official assistance and individual disbursements can be found on the homepages of the European Commission and the IMF. TARGET balances are published in the ECB Statistical Data Warehouse. Time series for GDP and new bank credits to the private sector are provided by Eurostat. All variables in the sample are stationary according to standard panel unit root tests.[3]

1.2 Differences between groups of EMU countries

For now, we are mainly interested in the impact of global shocks on, and their transmission to, national credit growth. The impulse-response functions in *Figure 1* represent the responses of the individual variables to an innovation of *vix* by one standard deviation (sd). Confidence intervals are computed using the Monte Carlo simulation algorithm with 1,000 repetitions and have a probability of 66% (see Doan, 2007; Hamilton, 1994).[4] Chow tests confirm significant differences in the responses of national variables in GIIPS relative to the remaining countries in the sample.[5] Consequently, we depict separate graphs for the two country groups.

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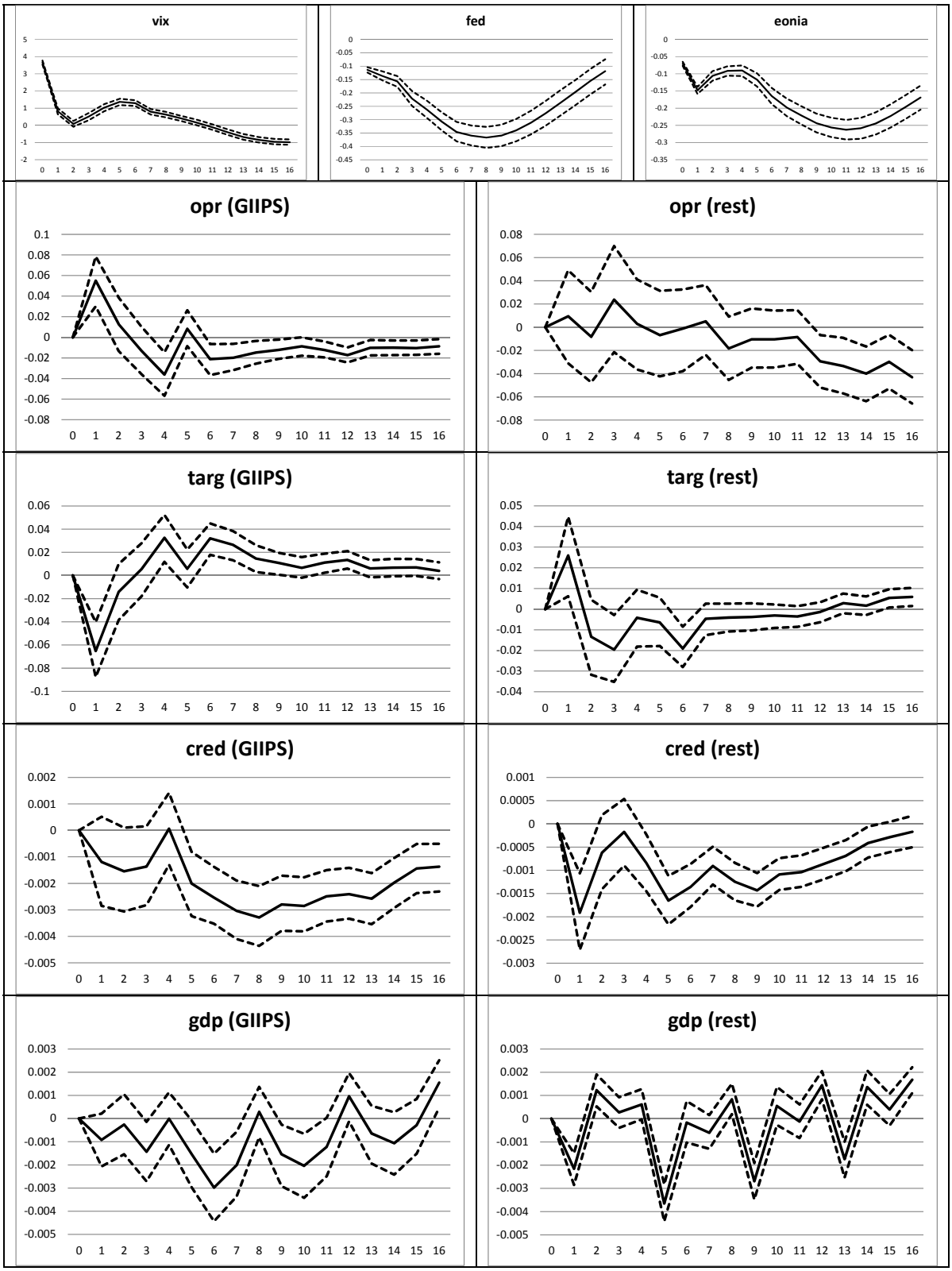
[2] The estimates of financial shocks transmission are very similar, if we use alternative orderings.

[3] In this paper, we use the panel unit root test outlined by Im, Pesaran and Shin (2003) and the Fisher PP and ADF tests described by Maddala and Wu (1999).

[4] The 66% confidence interval for each of the impulse responses corresponds approximately to ± one standard error bands and is often used in VAR analyses; see Sims and Zha (1999) and Stock and Watson (2001).

[5] The corresponding F-Statistics are $F_{28,440}(opr)=2.16$; $F_{28,440}(targ)=2.06$; $F_{28,440}(cred)=0.27$; $F_{28,440}(gdp)=1.59$.

Figure 1: Responses to one standard deviation of *vix*



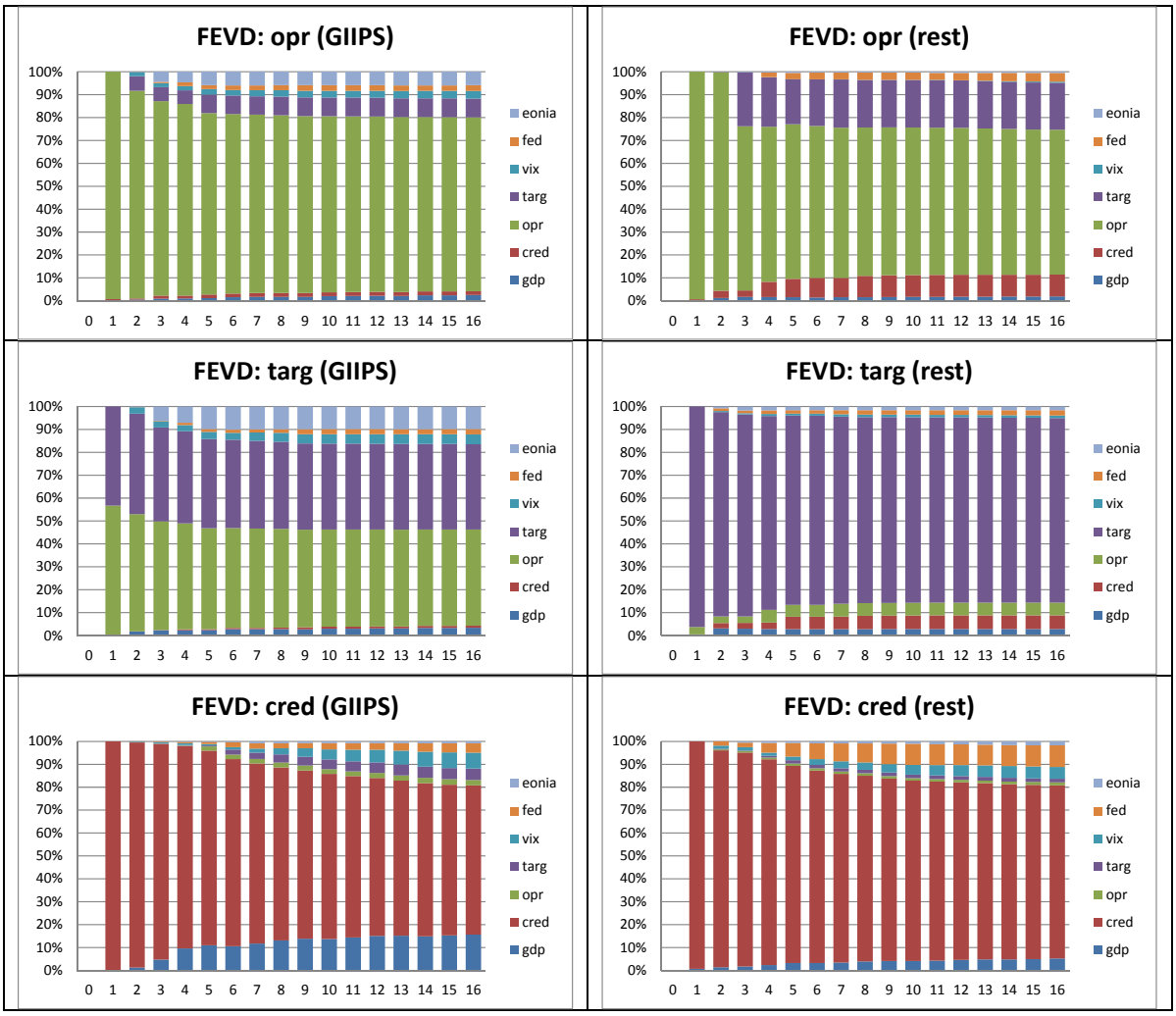
Notes: Quarterly impulse responses to a one standard deviation shock of the vix. For the imposed Cholesky restrictions see the ordering of variables (p. 6). Dotted lines indicate the 66 % confidence intervals.

An increase in the VIX is followed by a decline in the effective federal funds rate. This response is mirrored by the EONIA. Despite the counteracting of monetary policy, net private capital flows to the European periphery ebb away, while flows to other European countries stay broadly constant. The capital drain from GIIPS is partly offset by a surge in their TARGET liabilities, which also levels the effects on domestic credit growth. Nevertheless, differences between the two country groups in the responses of GDP growth rates are still significant.

The relevance of global or US variables to international credit flows and domestic credit growth in EMU countries can also be illustrated by a forecast error decomposition of variances. The graphs in *Figure 2* clearly show that idiosyncratic shocks are the most important source of forecast uncertainty for the individual variables. However, they also confirm the greater impact of the VIX on the EMU periphery in comparison with the rest of the EMU. After 16 quarters, uncertainty in US stock markets accounts for 3% of the forecast error variance of net international credit flows to GIIPS and for 7% of the variance of domestic credit growth in the region. The contribution to forecast error variance in the other EMU member states is about 1% and 5% respectively. For these countries, US monetary policy seems to be the most important external impact factor for domestic credit growth, contributing more than 9% to the total forecast error variance after 16 quarters.

Turning to European factors, the EONIA constitutes a noteworthy source of uncertainty only for net private credit flows to GIIPS. Here, TARGET positions mostly respond endogenously to shortages in private financing, whereas, in other EMU member states, changes in *targ* are an important exogenous source of interference. This dichotomy between the two country groups reflects the disparate use of open market operations with the Eurosystem as a source of refinancing. The trigger for net TARGET flows usually originates in countries where commercial banks rely on high-powered money to meet their liquidity needs.

Figure 2: Forecast error variance decomposition (FEVD) − GIIPS versus rest of EMU



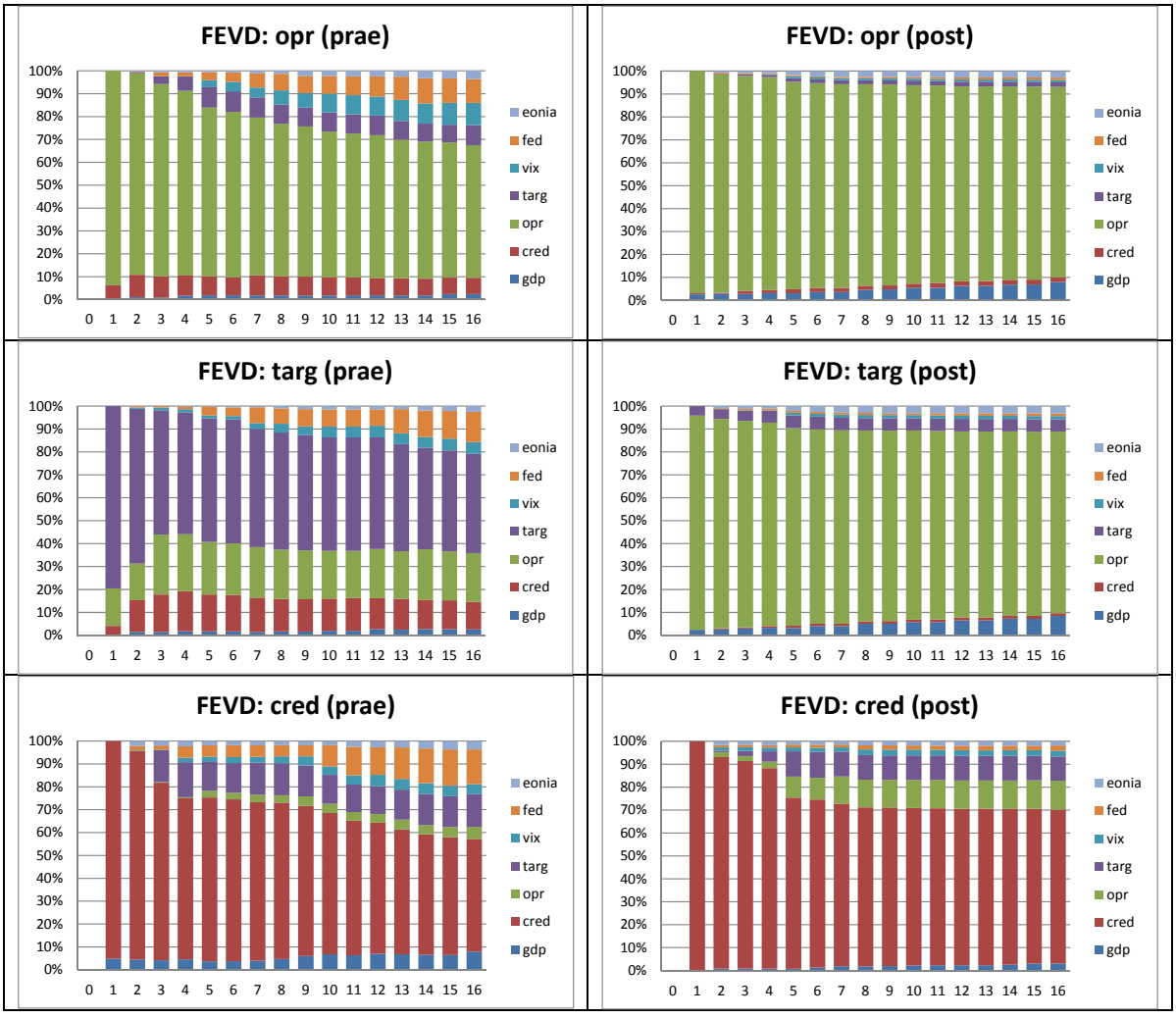
1.3 Role of the European debt crisis

An important question is whether the outbreak of the European debt crisis in 2010 caused a structural break in cross-border financing and affected the transmission mechanisms. Splitting the sample into two sub-periods of 1999 to 2009 and 2010 to 2014 makes it possible to test for a structural break in the VAR analysis. Chow tests confirm significant differences in the interaction of global, European and domestic variables between the pre-crisis period and the years thereafter.[6] In particular, the cross-border correlation of variables has declined since 2010, both between the United States and Europe and between the European and the national level. While the lack of significance of individual

[6] Due to the shorter time periods of the two sub-samples, the number of lags has been restricted to two. The F-Statistics of the Chow test are $F_{50,456}$(*vix*)=16.9; $F_{50,456}$ (*fed*)=14.6; $F_{50,456}$ (*eonia*)=30.4; $F_{50,456}$ (*opr*)=3.50; $F_{50,456}$ (*targ*)=4.76; $F_{50,456}$ (*cred*)=22.6; $F_{50,456}$ (*gdp*)=2.17.

relationships may be partly due to the short time span of the second panel, the finding may also reflect deleveraging tendencies in the banking sector involving a concentration of banks on their core business and a decline in cross-border banking. The differences in results between the pre-crisis period and the years thereafter are most distinctive in GIIPS, where the breakdown of the interbank market and the necessary adjustment of the domestic financial sector entailed a decoupling of domestic credit development from international financial variables. The forecast error variance decomposition reveals that net other private investment is largely isolated from external influences, while its impact on TARGET flows has markedly increased since 2010 (*Figure 3*). This phenomenon is due to the decoupling of some banks from the interbank market, but was only made possible by the non-standard policy measures that have been implemented by the Eurosystem since October 2008. Private capital flows have also gained in importance with respect to the development of domestic credit growth in GIIPS. Here, capital flight and the withdrawal of foreign investors played a key role.

Figure 3: FEVD − GIIPS before and during the European debt crisis



2. Monetary policy and the exchange rate channel

So far, the transmission of global financial shocks via the interest rate channel appears to have been smoothened by the European monetary framework, since the uniform access of commercial banks to high-powered money and the possible redistribution of liquidity via the TARGET system help spread the asymmetric effects of shocks among EMU member states. In addition, deleveraging by European banks and increasing risk awareness of investors have segmented the financial markets in Europe and raised the importance of domestic factors if compared with global determinants.

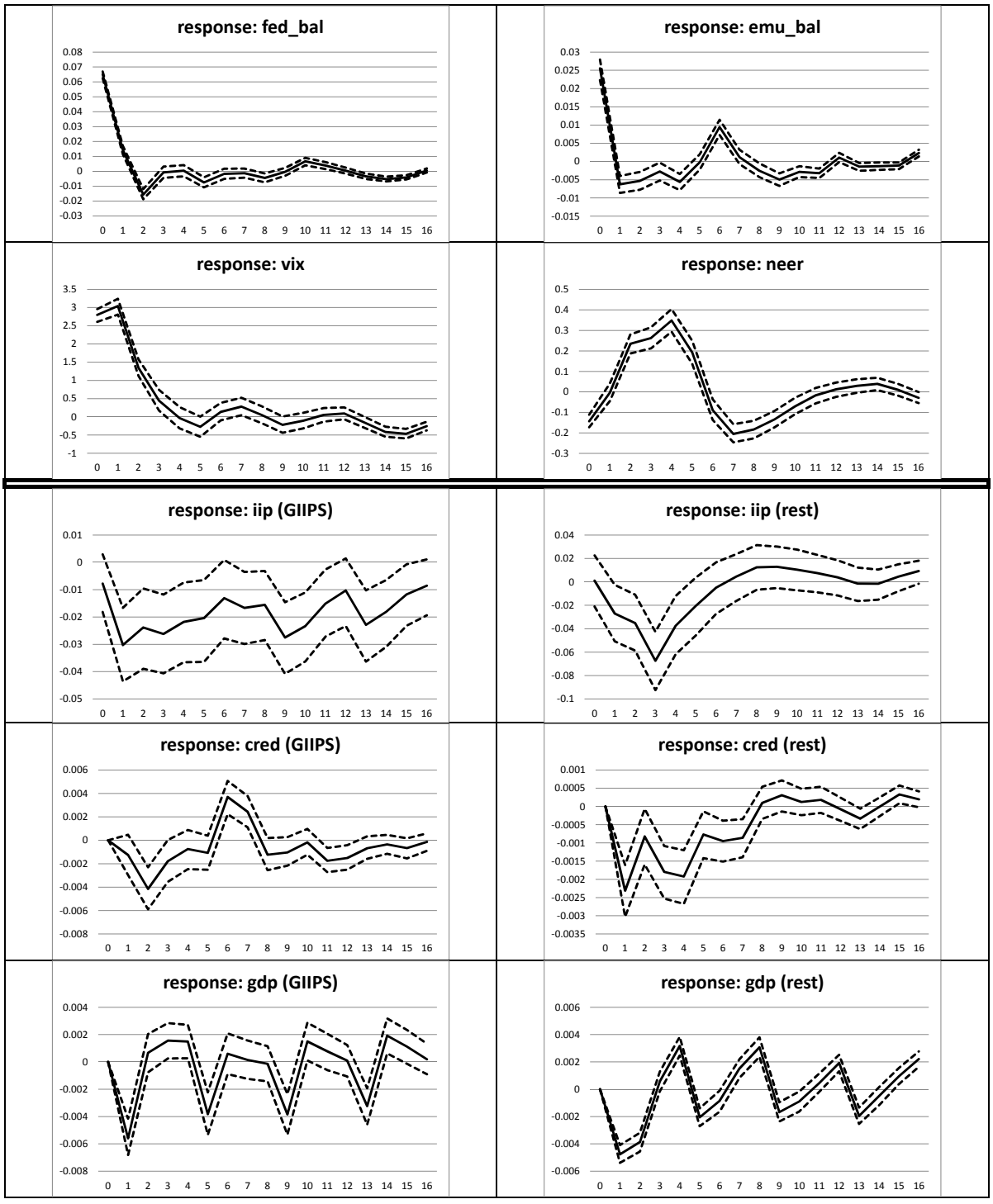
However, global shocks − particularly monetary innovations by the FED − could still spill over into the euro area via exchange rates and have specific effects on individual economies. Especially in a low interest rate environment, the monetary authority may change policy instruments from interest rate policy to quantitative liquidity provision with a focus on the balance sheet total of the central bank. This strategy, known as quantitative easing (QE), was implemented in the United States in 2009. In the euro area, QE was not officially introduced until March 2015 in the form of the extended asset purchase program (APP). However, the use of a wide range of extraordinary monetary policy measures since October 2008 had marked a clear move from traditional interest rate policy well beforehand. In order to compare the exchange rate transmission model with the preceding interest rate transition model, we use the same panel as before and take a special look at the post-crisis period, during which extensive liquidity provision became an important task of monetary policy.

We implement the transition mechanism described by Georgiadis and Mehl (2015). However, instead of a monetary policy shock in the Eurosystem, the innovation emanates from an unexpected increase in the balance sheet total of the Federal Reserve (*fed_bal*), which represents the monetary policy stance of the FED in times when the interest rate channel is suspended.[7] The US monetary shock entails an adjustment of international risk perception (measured by *vix*) and the balance sheet total of the Eurosystem (*emu_bal*). The induced change in the nominal effective exchange rate of the euro (*neer*) implies valuation effects on the international investment position (*iip*) and could affect the growth rates of domestic private credit (*cred*) and GDP (*gdp*). The structural VAR model with contemporaneous Cholesky restrictions is given by:

gdp cred fed_bal emu_bal vix neer iip

[7] For instance, Sun, T. (2015) uses balance sheets of central banks in the G4 to assess the transmission of global liquidity to the ASEAN-5 countries.

Figure 4: Responses to one standard deviation of *fed_bal*



Notes: Quarterly impulse responses to a one standard deviation shock of the fed_bal. For the imposed Cholesky restrictions see the ordering of variables (p. 11). Dotted lines indicate the 66 % confidence intervals.

Again, domestic GDP and credit growth are placed first because they are assumed to be the most sluggish variables in the dataset. They are followed by *fed_bal*, which may contemporaneously evoke a response from *emu_bal*, *vix* and *neer*. The international

investment position (*iip*) is listed last because we are mainly interested in the immediate valuation effects resulting from exchange rate variations. In order to capture them adequately, the variable must be ordered behind *neer*. Other effects, especially valuation effects resulting from changes in asset prices or cumulative current account balances, only occur in the medium to long term.

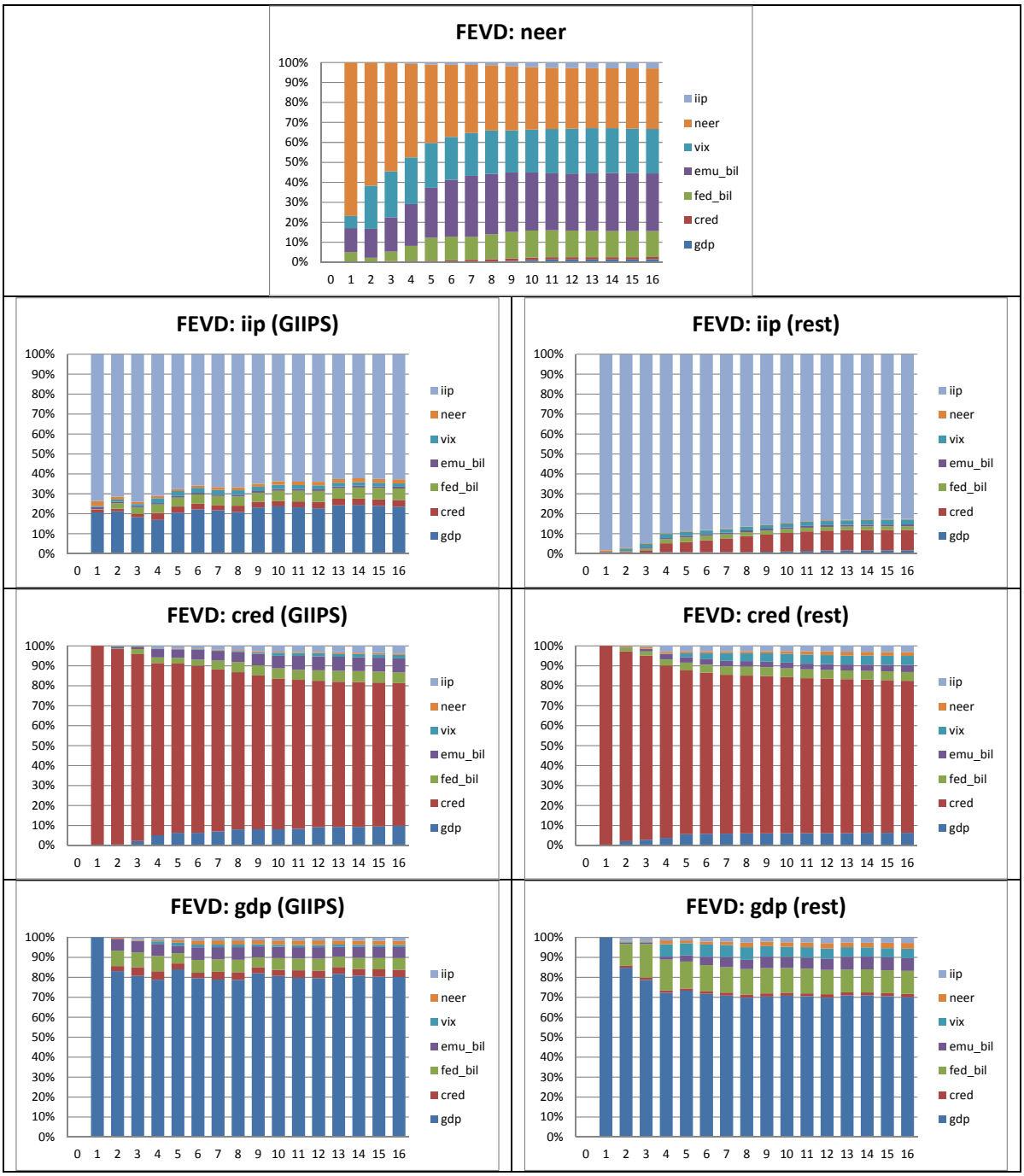
The responses of the model variables to an innovation in US monetary policy are given by the graphs in *Figure 4*. The nominal effective exchange rate of the euro rises as European monetary policy does not mirror the US move in full. Simultaneously, the international investment position of non-GIIPS EMU countries deteriorates before recovering after about four quarters. The response in GIIPS is less sharp in the short run, but more persistent. Credit growth goes down in both country groups, with GIIPS seeming to be somewhat less affected than other EMU member states. By contrast, leaving the strong cyclical component in GDP growth to one side, the dampening effect on economic output is more pronounced in the periphery countries.

All in all, the effectiveness of the exchange rate channel described above seems to be confirmed at first glance. In contrast to the interest rate channel, a common monetary policy does not rebalance asynchronous effects on the international investment position, and the eventual pass-through to the real economy remains heterogeneous. However, a look at the economic relevance of specific variables, represented by the forecast error variance decomposition, does not support the hypothesis that the exchange rate channel is characterized by the induced revaluation effects on international assets and liabilities (*Figure 5*).

While the nominal effective exchange rate of the euro is clearly influenced by monetary policy in the United States and Europe, the volatility of *neer* does not, for its part, have a discernible effect on the forecast errors for the international investment position of either GIIPS or the other EMU countries. Nevertheless, monetary policy and the exchange rate have an impact on the growth rates of credits to the private sector and of GDP. The transmission mechanism, however, does not seem to work primarily via financial channels. Effects on international price competitiveness and the current account might be more important. The limited weight of revaluation effects on the international investment position does not come as a surprise: On average, almost half of the international assets and liabilities of EMU member states are allocated inside the euro area and hence

denominated in euro.[8] In addition, changes in asset prices may counteract the short-run effect of exchange rate variations in the medium run.

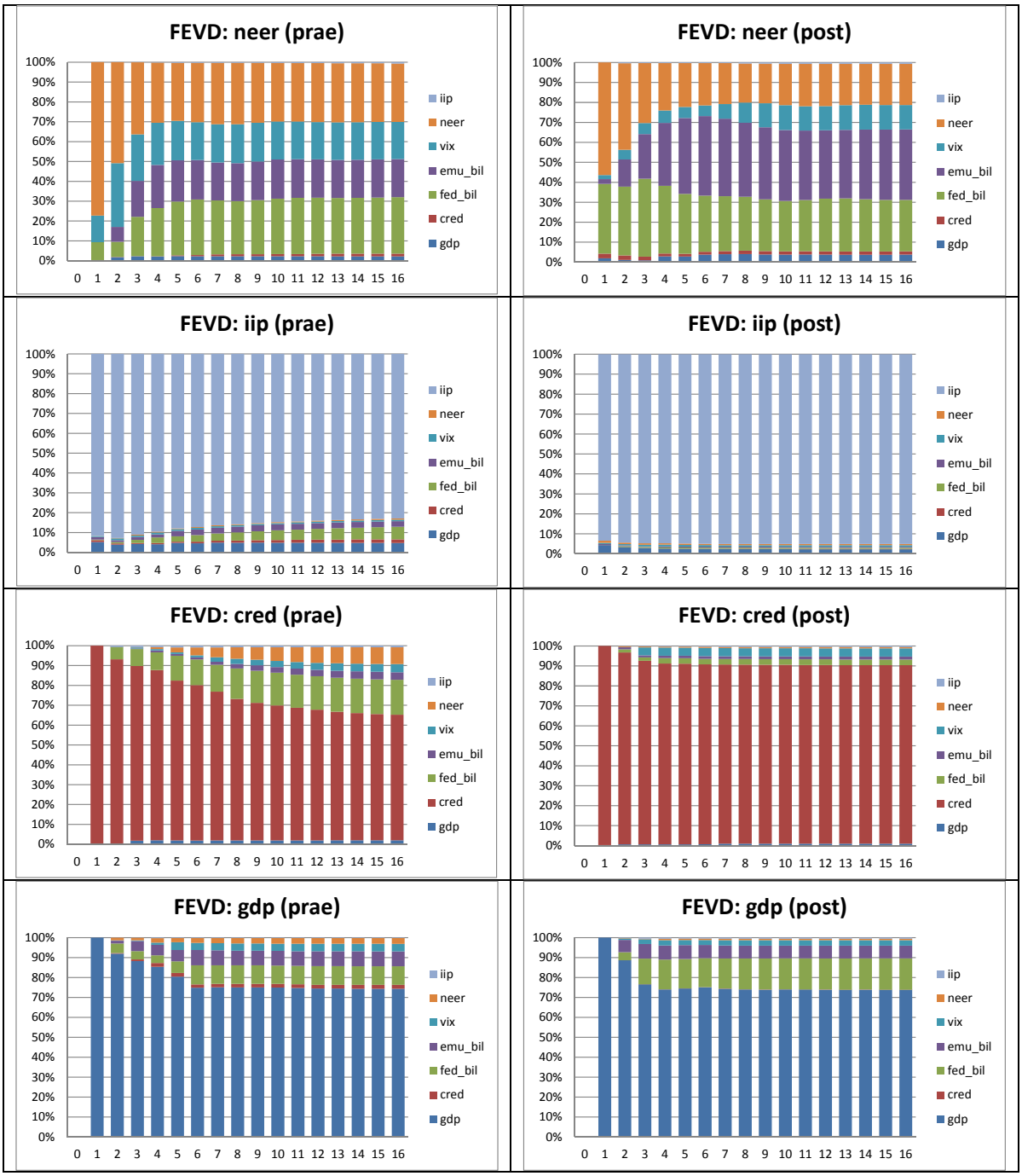
Figure 5: FEVD − exchange rate channel in GIIPS and other EMU member states



[8] According to Eurostat figures, 47% of foreign assets or 45% of foreign liabilities accumulated by EMU member states are intra-EMU positions (end-2014).

The importance of *iip* as a transmission vehicle of monetary policy has diminished further since the outbreak of the European debt crisis, although the balance sheet totals of the Eurosystem and the FED still have a marked impact on the nominal effective exchange rate (*Figure 6*). This means that monetary policy may still translate into the real economy via changes in price competitiveness and the current account. However, using this transmission channel is a risky strategy that could provoke retaliatory measures from other central banks. Furthermore, the aim of this paper is to fathom the transmission of global shocks via financial channels. The remainder therefore focuses on the interest rate channel and the factors that may influence it.

Figure 6: FEVD − exchange rate channel before and during the debt crisis



3. Robustness check

3.1 Bank credit flows

Using bank credit flows instead of total credit flows shows that cross-border bank credits are even more sensitive to financial shocks in GIIPS than total credits. The reason is that the impact of financial shocks on banking flows is mitigated not only by TARGET, but

also by credit flows of other sectors. Consequently, the transmission of financial shocks is better reflected by total credit flows than by banking flows alone. Furthermore, the correlation between TARGET flows and total credit flows is stronger than between TARGET flows and banking flows.

3.2 Gross capital flows

Domestic credit to the private sector may be affected by not only net capital inflows but also gross inflows. Among other factors, low risk perception or loose monetary conditions may foster financial intermediation as a whole, thereby stimulating financial flows in both directions against the backdrop of boosting lending in all countries. In order to check whether the transmission of global factors to domestic credit growth works primarily via gross or net flows, we reran the interest rate channel model described earlier in this section with gross flows instead of net flows. The results are very similar to the net model. This means that gross and net flows are highly correlated with regard to their responses to exogenous shocks and that aspects of macroeconomic relevance (net flows) usually go hand in hand with issues of financial stability (gross flows).

3.3 Additional variables

In order to check for omitted variables, we modified the interest rate channel model by using various alternative specifications. However, adding or substituting variables does not noticeably change the transmission of global shocks to domestic credit growth or domestic GDP. In particular, we included a volatility index based on the EURO STOXX 50 real-time option prices (VSTOXX). It proves to be closely correlated with the VIX and supplies no additional information to the model. The inclusion of the real exchange rate defined as the relative price of tradable and non-tradable goods does not enhance the explanatory power of the models either. In addition, neither variable has a discernible effect on the interrelationship between the other variables. The fiscal balance is broadly exogenous to the model and has no distinct influence on global or European variables. Therefore, this variable is part of the subsequent analysis that deals with adequate policy measures aiming to smooth the effects of volatile capital flows on asset prices and international competitiveness.

IV. Long-run effects of shocks and macroeconomic imbalances

1. Trade-off between shock absorption and the peril of long-term imbalances

So far, we can note that global factors play an important role in cross-border banking activity and domestic credit growth in the EMU. Apart from their own precedent values, these variables are mostly affected by global risk perception as measured by the VIX and the effective federal fund rate. However, especially for GIIPS, the European monetary framework is an important factor for the transmission of global shocks to the domestic economy. Since the outbreak of the European debt crisis, TARGET flows have worked as a cushion to compensate for substantial capital outflows from the European periphery. Thus, the potentially substantial costs of abrupt capital withdrawal have been mitigated.[9] However, this dampening capacity is also the subject of some criticism, since it impedes an economy's necessary adjustment and may lower the commitment to reforms in the economies of concern.[10] Apart from necessary institutional reforms and enhanced policy coordination in the EU, the key question is how national economic policy can enhance robustness against economic shocks and prevent the emergence of macroeconomic imbalances.

One way to identify the role of domestic economic policy is to analyze the causes of cross-country differences in the output responses to global shocks by regressing the extent of the responses on domestic structural or economic policy variables. This methodology, adopted by Georgiadis and Mehl (2015) in order to shed light on the role of global exposure and currency denomination, is particularly appealing if resilience to global shocks in the short run is of primary interest.[11] Another important question is how economic policy can address the effects of cumulative capital flows on key domestic variables in the long run. This aspect stretches beyond the short to medium-run responses revealed by the VAR analysis and refers to the relationship between external exposure and asset prices, which may also be determined by the global financial cycle. Thus, we analyze the effects of international and national debt indicators in concert with monetary policy on real asset prices and international price competitiveness. Both aspects are of crucial importance for internal and external economic equilibrium. The aim is to identify policy variables that

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9 See Deutsche Bundesbank (2014).

10 See Sinn and Wollmershäuser (2012), Gros and Alcidi (2015) and Herrmann and Jochem (2013).

11 However, this method brings with it the problem of a very limited number of observations that depends on the number of countries or country groups estimated separately in the VAR analysis. In addition, confidence levels cannot be computed by using standard t-statistics since the left-hand variable is not directly observed but rather obtained from the preceding VAR analysis.

may be used to exert influence on the linkages between internal and external variables and thus help enforce macroeconomic and financial stability.

2. The data

The analysis of capital flow impacts on macroeconomic and financial stability and adequate policy measures ties in with the second strand of literature mentioned in Section II. In our approach, the choice of variables is inspired by Aizenman and Pasricha (2012) and Forbes et al. (2015). However, we adjust the setting to the context of EMU so that some variables, such as the exchange rate regime, foreign exchange reserve or different institutional settings, are less relevant than they would be in a panel of EMEs. In the base analysis, real asset prices are measured by the logarithm of real house prices (*house*). The other variables included are gross external debt excluding TARGET liabilities normalized by GDP (*liab_debtp*) and the capital-to-asset ratio of the consolidated banking sector (*car*). The influence of the common monetary policy is approximated by the consolidated Eurosystem balance sheet total in logarithms (*emu_bal*).

In an alternative setting, we extend the analysis to include equity instruments and examine the relationship between the real effective financial exchange rate (*refer*) based on stocks and the international investment position, disaggregated into net equity liabilities (*liab_equ*) and net debt liabilities (*liab_debt*). General government debt relative to GDP (*debt_gov*) turns out to be an additional significant variable in this context. The real effective financial exchange rate, developed by Gelman et al. (2015), corresponds to the real effective exchange rate for goods, but the weights of partner countries are given according to their importance in mutual portfolio holdings and exchange rates are deflated by national stock market indices. The real effective financial exchange rate is an adequate measure to assess the relative development of a country's stock market in the international context. Lastly, we replace *refer* with the corresponding measure for goods markets, i.e. the standard real effective exchange rate (*reer*).

Real house prices are calculated on the basis of the nominal house price index published by the ECB, which is deflated by the harmonized consumer price index as computed by Eurostat. The capital-to-asset ratio of commercial banks is provided by Eurostat, too. Time series of non-central-bank gross external debt are obtained from the Quarterly External Debt Statistics published by the World Bank. Similar to other private capital flows, TARGET liabilities are not included. The reasons for excluding TARGET liabilities is that they principally emerge as a counterpart to net capital outflows and thus cannot cause private-sector financial booms. This implies that TARGET balances are a residual of market-based capital flows and are not based on independent financial decisions.

Consequently, they are not a suitable policy instrument. The real effective exchange rates are taken from the Bundesbank and are based on relative consumer prices vis-à-vis 42 countries. The consolidated balance sheet of the Eurosystem and various monetary aggregates for the euro area are provided by the ECB Statistical Data Warehouse. Lastly, indices of the real effective financial exchange rate are calculated by the authors according to the methodology of Gelman et al. (2015) and can be obtained upon request.

Again, the sample comprises the 11 founding members of the euro area plus Greece. Since quarterly data on the international investment position and its components are not fully available until 2004, the observation period covers the time from the first quarter of 2005 to the fourth quarter of 2014.[12] Panel unit root tests do not reject the hypothesis of a unit root in the individual variables. Since we are mainly interested in the issue of sustainability and long-run equilibria, our focus is on cointegration relationships that describe a steady state and give advice on viable policy decisions.

3. Dynamic OLS (DOLS) analysis

3.1 Real house prices

Experience from past financial crises has shown that the market for real estate often plays a key role in bubble-building in the banking sector. In addition, it is closely connected to cross-border bank credits, which have proved crucial to the transmission of global financial shocks via the interest rate channel. In the long run, cumulative net flows accrue to the level of private gross external debt. ADF and PP tests with individual AR coefficients according to Pedroni (2001) confirm that house prices (*house*) are cointegrated with private gross external debt (*liab_debtp*), the capital-to-asset ratio of the banking sector (*car*) and the consolidated Eurosystem balance sheet total (*emu_bal*).[13] In addition, we also use the panel cointegration test outlined by Kao et al. (1999).[14]

Following Kao and Chiang (2000), we use the DOLS estimator described by Saikkonen (1992) and Stock and Watson (1993) adapted to panel data. Endogeneity between the

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12 Due to the reduced number of observations and the more fundamental character of the cointegration analysis, we refrain from a sample split between GIIPS countries and other EMU member countries in this section. A split in terms of time is obsolete as the sample only starts in 2005.

13 In this section, cointegration relationships are generally tested bottom-up, i.e. additional variables are only included if we cannot find a cointegration relationship for a smaller subset. This procedure excludes the existence of several cointegration relationships in the individual models.

14 Here and for the following cointegration relationships, the number of lags included was determined by the Schwarz criterion. The relevant significance level was 5%.

variables and serial correlation are eliminated by including cross-section specific leads and lags of the first differences of the right-hand variables. While the differences also enter contemporaneously, the number of leads and lags is restricted to one:

$$house_{i,t} =$$

$$\alpha_{0,i} + \alpha_1 liab\_debtp_{i,t} + \alpha_2 car_{i,t} + \alpha_3 emu\_bal_t$$

$$+ \sum_{k=-1}^{1} \gamma_{i,k} \Delta liab\_debtp_{i,t+k} + \sum_{k=-1}^{1} \delta_{i,k} \Delta car_{i,t+k} + \sum_{k=-1}^{1} \vartheta_{i,k} \Delta emu\_bal_{t+k} + \varepsilon_{i,t} \quad (1)$$

We estimate equation (1) using the DOLS tool of EVIEWS 9. The estimated coefficients of the leads and lags are not part of the long-run relationship, which is given by:[15]

$$house_{i,t} = \underset{(0.0005)}{0.0019}{}^{***} liab\_debtp_{i,t} - \underset{(0.940)}{5.118}{}^{***} car_{i,t} + \underset{(0.039)}{0.078}{}^{**} emu\_bal_t \quad (2)$$

As expected, high external indebtedness appears together with elevated real house prices. However, this effect may be counteracted by restrictions on the capital-to-asset ratio of banks, which has a dampening impact on real house prices. On the other hand, a widening of the consolidated balance sheet total of the Eurosystem is associated with a rise in real house prices. This means that there are various toeholds for monetary and economic policy to address an overheating of the real estate market with the related risks of financial and macroeconomic imbalances. Principally, macroprudential measures that aim to control capital inflows may shape the development of the real estate market. However, there are other measures that may be less at odds with the free movement of capital as guaranteed by EU law or the OECD's Code of Liberalisation of Capital Movements. First, banking regulation that confines leverage and stipulates specific capital-to-asset ratios does more than enhance financial stability − it may also help prevent the emergence of asset price bubbles.[16] Second, monetary policy also has a significant impact on real asset prices and can counteract unjustified exuberance, provided individual member states face similar challenges.

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15 The short-term adjustment process of the error term derived from (2) is presented in the Annex.

16 The use of the capital-to-asset ratio as an instrument of macroprudential policy might be subject to the Lucas critique. This means that the estimated long-run effects on real house prices might differ from the estimation results in (2), if the capital-to-asset ratio becomes a policy target and is used as a regulatory instrument.

3.2 Real effective financial exchange rate

Besides the real estate sector, stock markets are another possible target of capital inflows. Changes in the price level of domestic shares relative to the development of stock prices abroad reflect the varying demand of investors for individual host countries. As argued in Gelman et al (2015), permanent shocks to *refer* signal a fundamental reappraisal of future returns, while temporary variations may be interpreted as an overvaluation or undervaluation of domestic asset prices relative to foreign assets. Accordingly, the development of *refer* can provide useful information in assessing how an economy is affected by capital inflows and outflows. Gelman et al. (2015) postulate a cointegration relationship between *refer* and the net position in the international equity portfolio holdings of 15 countries that hold roughly 65% of global equity securities documented in the Coordinated Portfolio Investment Survey (CPIS) of the IMF.

With regard to the euro area, we identify a similar but somewhat modified cointegration relationship between *refer* and the international investment position:

$$refer_{i,t} = \underset{(3.092)}{15.820}{}^{***} liab\_equ_{i,t} + \underset{(3.090)}{14.128}{}^{***} liab\_debt_{i,t} - \underset{(16.043)}{102.149}{}^{***} gov\_debt_{i,t} \qquad (3)$$

For EMU countries, both external equity (*liab_equ*) and external debt liabilities (*liab_debt*) correspond to relatively high domestic stock prices. Although a Wald test on identical coefficients for external equity liabilities and external debt liabilities is rejected at the 5% level,[17] the coefficients are very similar. The overall international investment position seems to be more relevant to the price level of stocks than the net position of portfolio equity. A possible reason might be that other types of capital inflows are also used for the purchase of domestic shares.

By contrast, general government debt relative to GDP (*gov_debt*) has a significant negative impact on the valuation level of domestic financial assets. While high cumulative capital inflows and the resulting stock of external liabilities reflect a high attractiveness of the domestic economy, government debt itself undermines investor confidence and works in the opposite direction. This is an important finding and shows that – in the long run – fiscal policy is a tool to enhance a country's international financial competitiveness. Not surprisingly, monetary policy does not play a lasting role in the valuation of financial assets if adjusted for exchange rates and price developments abroad. In comparison with asset prices in the real economy represented by real house prices, the toolkit for

[17] The F-statistic of the Wald test is given by $F_{36,341}=1.59$.

policymakers to influence financial asset prices is limited. However, with regard to macroeconomic or financial stability, management of equity prices is neither necessary nor advisable. Changes in the valuation of equity may be an important risk absorber in case of changing investor sentiment that does not directly affect the real economy. The real financial exchange rate should rather serve as an indicator than an autonomous target of economic policy.

3.3 Real effective exchange rate

Besides asset prices, abundant capital inflows may also push inflation and affect international price competitiveness. While this effect often enters with some time lag, it may be of high relevance to the real economy and welfare. Just as for the real effective exchange rate for financial assets (*refer*), we find evidence that the real effective exchange rate for goods (*reer*) is cointegrated with international liabilities in terms of equity and debt as well as general government debt. This relationship is independent of the monetary policy stance, too:

$$reer_{i,t} = \underset{(0.446)}{0.870}{}^{*} liab\_equ_{i,t} + \underset{(0.418)}{0.826}{}^{**} liab\_debt_{i,t} - \underset{(1.605)}{6.791}{}^{***} gov\_debt_{\mathrm{i,t}} \qquad (4)$$

It appears that net external liabilities are relevant to the relative price level of goods, although the significance levels, especially with regard to equity liabilities, are lower than in the case of financial assets. Similarly to the financial indicator, a high real effective exchange rate for goods implies a lack of international price competitiveness but may also reflect a high external demand for domestic products. An economic assessment of an economy's overall competitiveness has to determine the underlying causes. Conversely, high public indebtedness is associated with a low *reer*. This long-run relationship reflects the need to compensate for an inferior macroeconomic environment in terms of high government debt with high price competitiveness in order to achieve sustainable steady-state equilibrium as defined in the cointegration relationship of equation (4).

V. Conclusion

While international economic and financial integration entails uncontested efficiency gains and amplifies the possibilities of risk diversification, it also raises countries' vulnerability to global shocks. The surge and reflux of capital flows in the aftermath of the international financial crisis have fuelled the debate on the adequacy of managing capital flows in EMEs. EU countries, especially those that had already introduced the euro, initially seemed to be protected against these exogenous disturbances. However, the subsequent European debt crisis exposed this optimism as delusive and resulted in the imposition of

painful consolidation measures that might have been avoidable if adjustment needs had been detected earlier.

In this paper, we have shown that the EMU does indeed provide some shelter against exogenous global shocks. The main reason for this is the absorption of asymmetric effects on net private capital flows owing to the uniform access of commercial banks to the Eurosystem's open market operations in conjunction with the redistribution of liquidity via the TARGET mechanism, which settles financial flows between participating central banks. Exchange rate changes triggered by monetary policy also pass through to the economies of EMU member states. In contrast to other findings in the literature, however, we cannot confirm a transmission of exchange rate shifts via a country's financial exposure; instead, we would suggest that international price competitiveness and the current account are at work. Furthermore, the interconnection between global, regional and national variables has loosened somewhat since the outbreak of the European debt crisis, which may partly be due to the deleveraging process of European banks and regulatory reforms.

It appears that the EMU institutional framework leads to a trade-off between shock absorption in the short to medium run and the peril of emerging macroeconomic imbalances in the long run. Against this background, national economic policy is still of high relevance with respect to ensuring that economies remain on a sustainable path. Important indicators that are often used in the analysis of macroeconomic imbalances are closely linked to policy variables. Real house prices may reveal bubbles in the real estate sector and show a long-term relationship with international indebtedness, the capital-to-asset ratio of the consolidated banking sector and European monetary policy modeled by the consolidated balance sheet total of the Eurosystem. Other asset prices, represented by the real effective financial exchange rate for portfolio equity, show a stable long-term relationship with the international investment position and general government debt. The same is true for international price competitiveness on the goods markets.

To sum up, the EMU mitigates the dilemma of independent monetary policy and free capital mobility that was stated by Rey (2015). Due to the size of the euro area, the Eurosystem has a bigger impact on financial conditions in its area of competence than the national central banks of small countries. Asymmetric effects of global shocks on individual member states are partly offset by the uniform access of commercial banks to high-powered money and the redistribution of liquidity between national central banks. Furthermore, analysis has shown that an appropriate policy mix of sound public finances, solid financial regulation and targeted macroprudential measures is capable of safeguarding macroeconomic sustainability without needing to manage capital flows. That

being said, the framework of the EMU demands high standards for a responsible and consistent macroeconomic policy.

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Annex A

A I. Error correction of cointegration relationships

1. House prices

To further investigate the adjustment process after a disturbance, we estimate the error correction equations for each variable in the previously defined long-run equilibrium relationship. The error correction terms are transformed in a way that the loading coefficient can be directly interpreted and should have a negative sign in case of error correction.[18] Using country fixed effects, we estimate the response of the dependent variable to a deviation from long-run equilibrium and show the speed of adjustment towards long-run equilibrium. Additionally, we control for the business cycle as measured by the logarithm of real GDP (*lnGDP*) and for disturbances caused by global factors, which were modeled in Section III. These factors are global risk perception as measured by the logarithm of the VIX (*lnVIX*) and the effective federal fund rate (*fed*).

According to the first column of *Table A1*, the error correction coefficient in the house price equation is not significant, implying that any shock that induces disequilibrium in the long-run cointegration relationship will not be corrected by changes in house prices. This finding, together with the significant positive autocorrelation of house prices, suggests a susceptibility of the real estate sector to speculative bubbles. In addition, house prices positively depend on economic growth. Turning to columns 3 and 4 of *Table A1*, the capital-to-asset ratio of banks and the consolidated balance sheet total of the Eurosystem − which are both subject to economic or monetary policy − provide significant negative loading coefficients, ensuring the stability of the cointegration system. An increase in risk perception on stock markets leads to an increase in the consolidated balance sheet total, confirming the ECB's accommodative policy during riskier periods; this was also observed in the earlier VAR analysis.

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18 $ec_{t-1}^{house} = house_{t-1} - 0.0019\, liab\_debtp_{t-1} + 5.118\, car_{t-1} - 0.078\, emu\_bal_{t-1}$

$ec_{t-1}^{liab\_debtp} = liab\_debtp_{t-1} - \frac{1}{0.0019} house_{t-1} - \frac{5.118}{0.0019} car_{t-1} + \frac{0.078}{0.0019}\, emu\_bal_{t-1}$

$ec_{t-1}^{car} = car_{t-1} + \frac{1}{5.118} house_{t-1} - \frac{0.0019}{5.118} liab\_debtp_{t-1} - \frac{0.078}{5.118} emu\_bal_{t-1}$

$ec_{t-1}^{emu\_bal} = emu\_bal_{t-1} - \frac{1}{0.078} house_{t-1} + \frac{0.0019}{0.078} liab\_debtp_{t-1} - \frac{5.118}{0.078}\, car_{t-1}$

Table A1: Error correction of *house* model

Dependent variable	$\Delta house_t$	$\Delta liab\_debtp_t$	$\Delta\, car_t$	$\Delta\, emu\_bal_t$
Constant	-0.02 (0.04)	0.54 (7.38)	0.05*** (0.01)	-0.28 (0.17)
Error correction	0.005 (0.01)	0.0002 (0.003)	-0.07*** (0.02)	-0.006* (0.004)
$\Delta house_{t-1}$	0.21*** (0.05)	4.31 (10.40)	-0.000 (0.02)	0.37 (0.24)
$\Delta liab\_debtp_{t-1}$	0.0004 (0.0003)	0.016 (0.055)	-0.000 (0.000)	0.003*** (0.001)
Δcar_{t-1}	-0.20 (0.16)	-15.11 (32.56)	-0.21*** (0.05)	-0.78 (0.74)
Δemu_bal_{t-1}	-0.02** (0.01)	5.71*** (2.04)	-0.008** (0.003)	0.08* (0.05)
$\Delta lnVIX_t$	0.005 (0.004)	-0.72 (0.71)	-0.001 (0.001)	0.16*** (0.02)
ΔFED_t	0.007*** (0.002)	0.40 (0.47)	0.001 (0.001)	-0.02 (0.01)
$\Delta lnGDP_{t-1}$	0.13*** (0.02)	9.59** (3.71)	0.004 (0.006)	-0.44*** (0.08)
R^2-*adj*	0.30	0.04	0.11	0.32

Notes: * (**, ***) denote significance at the 10% (5%, 1%) level. Standard errors are in parentheses.

2. Real effective financial exchange rate

Based on the cointegration relationship, we can again estimate the error correction model, constructed in the same manner as previously. The estimates reveal that both domestic financial asset prices and the international investment position respond significantly to deviations from equilibrium (*Table A2*, columns 2 and 3), which is consistent with the findings of Gelman et al. (2015). However, only *refer* and external equity liabilities adjust to restore the equilibrium value, whereas external debt liabilities tend to respond procyclically (positive sign of the loading coefficient). At the same time, general government debt relative to GDP shows no significant response to any shock in the long-run relationship and can be interpreted as (weakly) exogenous.

Table A2: Error correction of *refer* model

Dependent variable	$\Delta refer_t$	$\Delta liab\_equ_t$	$\Delta liab\_debt_t$	Δgov_debt_t
Constant	11.28***	-4.02***	4.19***	0.02
	(2.53)	(1.19)	(1.21)	(0.01)
Error correction	-0.07***	-0.37***	0.34***	-0.007
	(0.01)	(0.11)	(0.10)	(0.008)
$\Delta refer_{t-1}$	0.31***	0.03	-0.03	-0.0003
	(0.05)	(0.02)	(0.02)	(0.0002)
$\Delta liab\_equ_{t-1}$	0.31	-0.21	0.004	0.007
	(0.91)	(0.43)	(0.44)	(0.005)
$\Delta liab\_debt_{t-1}$	0.40	0.27	-0.47	0.006
	(0.90)	(0.42)	(0.43)	(0.005)
Δgov_debt_{t-1}	6.57	-0.49	1.44	-0.11**
	(9.84)	(4.63)	(4.72)	(0.05)
$\Delta lnVIX_t$	-3.30***	0.32	-0.32	0.004
	(1.23)	(0.58)	(0.59)	(0.006)
ΔFED_t	0.26	-0.25	0.29	-0.006
	(0.74)	(0.35)	(0.35)	(0.004)
$\Delta lnGDP_{t-1}$	-8.65	-4.38	4.84*	-0.02
	(5.84)	(2.74)	(2.80)	(0.03)
R^2-*adj*	0.14	0.21	0.20	0.05

Notes: * (**, ***) denote significance at the 10% (5%, 1%) level. Standard errors are in parentheses.

3. Real effective exchange rate

Using the results of the cointegration analysis, we proceed with the estimation of the error correction model, which is constructed in a same way as previously. The resulting coefficients of the empirical model are contained in *Table A3*. The error correction model with the real effective exchange rate based on goods prices instead of asset prices confirms the findings of Gelman et al. (2015): Only the real effective exchange rate adjusts to restore equilibrium, whereas the international investment position and general government debt are weakly exogenous and play no role in restoring long-run equilibrium. The global factors − the VIX and the federal fund rate − included in the model are significant, with an error probability of less than 1%. However, the coefficient for risk perception is more than three times smaller than in the model with real effective exchanges rate based on asset prices. That is reasonable, since uncertainty in the stock markets is of lesser significance to goods markets than to financial markets.

Table A3: Error correction of *reer* model

Dependent variable	$\Delta reer_t$	$\Delta liab\_equ_t$	$\Delta\, liab\_debt_t$	$\Delta\, gov\_debt_t$
Constant	24.63***	-4.76	4.88	-0.08
	(2.86)	(7.80)	(7.96)	(0.08)
Error correction	-0.24***	-0.04	0.04	0.006
	(0.03)	(0.06)	(0.06)	(0.005)
$\Delta reer_{t-1}$	0.09*	-0.08	0.09	-0.002
	(0.05)	(0.12)	(0.13)	(0.001)
$\Delta liab\_equ_{t-1}$	0.27*	-0.44	0.24	0.008*
	(0.16)	(0.43)	(0.43)	(0.005)
$\Delta liab\_debt_{t-1}$	0.26*	0.06	-0.24	0.007
	(0.15)	(0.42)	(0.43)	(0.005)
Δgov_debt_{t-1}	-0.39	0.05	0.82	-0.12**
	(1.74)	(4.75)	(4.85)	(0.05)
$\Delta lnVIX_t$	-0.86***	0.27	-0.26	0.003
	(0.22)	(0.60)	(0.61)	(0.006)
ΔFED_t	-0.74***	-0.35	0.40	-0.006
	(0.13)	(0.35)	(0.36)	(0.004)
$\Delta lnGDP_{t-1}$	-5.03***	-3.41	3.74	-0.01
	(1.04)	(2.85)	(2.91)	(0.03)
R^2-*adj*	0.24	0.18	0.17	0.05

Notes: * (**,***) denote significance at the 10% (5%, 1%) level. Standard errors are in parentheses.