Financial Globalisation, Monetary Policy Spillovers and Macro-modelling: Tales from One Hundred and One Shocks*

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Abstract

We hypothesise that standard structural monetary macroeconomic models do not adequately account for the importance of cross-country financial spillover channels in the data. We derive and test predictions from this hypothesis using a database of monetary policy shock estimates from more than 100 macro models in the literature. Consistent with our hypothesis we find that standard structural macroeconomic models produce cross-country correlated monetary policy shock estimates. Moreover, consistent with our hypothesis, we find that the magnitude of the cross-country correlation in monetary policy shock estimates from structural macroeconomic models is stronger for country pairs that are more financially integrated with global and US financial markets in the data. Our findings imply that accounting for powerful financial spillover channels in structural macroeconomic models is critical in order to unravel the domestic and international effects of monetary policy.

Keywords: Financial spillover channels, monetary policy shocks, DSGE models, macro-modelling.
JEL-Classification: F42, E52, C50.

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1 Introduction

A salient feature of the global economy since the 1990s has been the dramatic rise of financial globalisation. Whether measured by (gross) capital flows or indicators reflecting the extent of legal capital account restrictions, economies' financial markets have been exhibiting an increasing degree of interdependence. As a result, the global economy has become subject to large cross-country spillovers through financial channels, in particular in case of monetary policies in systemic economies. Indeed, a quickly growing body of empirical research has provided ample evidence that financial globalisation is playing a critical role in the transmission of shocks across economies. For example, a large amount of work documents the existence of large financial spillovers that arise independent of real linkages (Ehrmann and Fratzscher, 2003, 2005, 2009; Ehrmann et al., 2011). Similarly, several studies document the sizable impact of US monetary policy on output and inflation in the rest of the world that materialises through financial spillover channels (Kim, 2001; Canova, 2005; Nobili and Neri, 2006; Dedola et al., 2015; Feldkircher and Huber, 2015; Georgiadis, forthcoming). And related work even suggests that world financial markets are subject to a global financial cycle, which is argued to materialise in variations in global risk aversion, the leverage of global banks, and to be ultimately driven US monetary policy (Bekaert et al., 2013; Bruno and Shin, 2015; Miranda-Agrippino and Rey, 2015; Passari and Rey, 2015; Rey, 2015).

At the same time, important advances in structural monetary macroeconomic modelling have been achieved over the last two decades. In particular, New Keynesian dynamic stochastic general equilibrium (DSGE) models have been established as the standard monetary macroeconomic model (Smets and Wouters, 2003; Christiano et al., 2005). While the first New Keynesian DSGE models focused on the role of frictions in price setting and labor markets, the global financial crisis epitomised the role of frictions in financial markets for the transmission of shocks. The resulting wave of work has focused on the role of frictions in domestic financial markets (Gertler and Karadi, 2011; Christiano et al., 2014). Advances have also been made in opening the initially closed-economy New Keynesian DSGE models to analyse international transmission mechanisms and policy design in open economies, giving rise to New Open-Economy Macroeconomics (NOEM, Obstfeld and Rogoff, 1996). Despite this progress in structural macroeconomic modelling many—in particular medium-scale—models used for the analysis of monetary policy still do not routinely account for cross-country financial spillover channels.

In this paper we argue that financial spillover channels need to be taken more seriously in structural monetary macroeconomic models in order to understand the domestic and international effects of monetary policy: Structural models that do not account adequately for financial spillover channels are prone to providing misleading descriptions of the role of domestic and foreign monetary policy shocks. More specifically, we hypothesise that because they do not spell out adequately financial spillover channels, when confronted with the data standard New Keynesian DSGE models label foreign monetary policy shocks that transmit to the domestic economy through financial spillovers in the data as domestic ones. In general, the consequences of this mis-measurement of domestic monetary policy shocks include: Likelihood-based estimation of New Keynesian DSGE models is compromised as it builds on wrong measures of the true monetary policy shocks; and historical decompositions of macroeconomic variables are misleading as they are based on a convolution of the true domestic and foreign monetary policy shocks.

We test our hypothesis that standard New Keynesian DSGE models do not adequately account for financial spillover channels by verifying—in a meta-study-like fashion—if two predictions are reflected in the literature. Under the hypothesis that the failure to account for financial spillovers in New Keynesian DSGE models results in foreign monetary policy shocks being labelled as domestic ones, we expect estimates of domestic monetary policy shocks to contain a common, global component, and to be positively correlated across economies. Second, the common component in the domestic monetary policy shock estimates will be more important and give rise to a larger cross-country correlation for pairs of economies that are more strongly integrated in global financial markets. Third, under our hypothesis we expect estimates of the global spillovers from domestic monetary policy based on shock estimates obtained from standard New Keynesian DSGE models to be rather similar across spillover-sending economies, as they all reflect the response to a global monetary policy shock.

We provide empirical support for our hypothesis based on a database of monetary policy shock time series estimates obtained from more than 100 monetary macroeconomic models in the literature. First, consistent with our hypothesis we document that when confronted with the data New Keynesian DSGE models produce domestic monetary policy shock estimates that are positively correlated across economies. In contrast, monetary policy shock estimates obtained from reduced-form models, financial market expectations and the narrative approach are not correlated across economies. Second, also consistent with our hypothesis the cross-country correlation between monetary policy shock estimates obtained from New Keynesian DSGE models is particularly strong for pairs of economies that are more strongly integrated with global financial markets. Third, consistent with our hypothesis we find that spillover estimates based on monetary policy shock estimates from New Keynesian DSGE models are of similar magnitude for spillover-sending economies that are rather different in terms of their systemic importance in the global economy, such as the US and the UK.

Our paper is related to the literature finding that powerful financial spillover channels in structural macro-models are crucial to replicate cross-country business cycle correlations found in the data (Iacoviello and Minetti, 2006; Ueda, 2012; Yao, 2012). Within this literature, our paper is most closely related to Justiniano and Preston (2010) as well as Aysun and Alpanda (2014), who find that standard open-economy New Keynesian DSGE models fail to replicate the large degree of cross-country business cycle correlations in the data and that they imply only a minor role of foreign disturbances for domestic macroeconomic variables. Moreover, Justiniano and Preston (2010) as well as Aysun and Alpanda (2014) also find that the importance of foreign disturbances for domestic variables and the cross-country output correlations implied by the models are much closer to the empirical moments if it is assumed that the structural shocks are cross-country correlated. This result is consistent with our finding that New Keynesian DSGE models that do not account for financial spillover channels produce cross-country correlated monetary policy shock estimates. While the analyses of Justiniano and Preston (2010) as well as Aysun and Alpanda (2014) are based on counterfactual simulations of particular structural models, in this paper we consider a database of monetary policy shock time series estimates from more than 100 monetary—including non-structural—macroeconomic models.

Our paper also supports the hypothesis of the existence of a global financial cycle (Bekaert et al., 2013; Bruno and Shin, 2015; Miranda-Agrippino and Rey, 2015; Passari and Rey, 2015; Rey, 2015). Specifically, under the global financial cycle hypothesis it is core—in particular US—monetary policy which is driving domestic financial conditions in non-core economies. A prediction from this hypothesis in the light of our paper is that monetary policy shock time series estimates from New Keynesian DSGE models which do not feature financial spillover channels should contain a US component. Indeed, we find that monetary policy shock time series estimates from New Keynesian DSGE models are systematically correlated with the US counterparts, and that the cross-country correlation between monetary policy shock time series estimates is stronger for pairs of economies that are more financially integrated with US—in addition to global—financial markets.

The rest of this paper is organised as follows. In Section 2, we illustrate the mechanics and establish our hypothesis based on a counterfactual Monte Carlo experiment based on data-generating process given by a structural multi-country model. In Section 3 we present our monetary policy shock database and analyse the correlations between and the spillovers implied by the monetary policy shock time series. Section 2 puts forth the counterfactual experiments. Finally, Section 4 concludes.

2 Financial globalisation, monetary policy spillovers and structural macro-modeling

In this paper we consider the hypothesis that because they lack of powerful financial spillover channels, when confronted with the data standard New Keynesian DSGE models label foreign monetary policy shocks as domestic ones. We argue that this gives rise to positive cross-country correlations in monetary policy shock estimates from such structural models.

Moreover, we argue that estimates of the global spillovers from domestic monetary policy based on shock estimates obtained from such models are spuriously similar across spillover-sending economies, as they all reflect the response to a common, global monetary policy shock. In order to illustrate the mechanics underlying our hypothesis, in this section we consider a counterfactual Monte Carlo experiment. The purpose of this exercise is merely to illustrate and establish our hypothesis. We consider a stylised structural multi-country model with powerful financial spillovers that replicates the large spillovers from monetary policy found in the empirical work as true data-generating process. We then feed the simulated data in single-country versions of the true multi-country model that ignore the financial spillover channels between economies and obtain estimates of domestic monetary policy shocks for two economies.

2.1 The data-generating process

We consider the semi-structural multi-country model of Coenen and Wieland (2002) for the US, the euro area and Japan as data-generating process. The components of the model are not explicitly derived from micro-founded optimisation problems, but are very similar to those in rigorously constructed structural macroeconomic models. We choose the model of Coenen and Wieland (2002) as it is simple and intuitive, and because it allows us to easily trace the transmission of shocks. Moreover, given its semi-structural nature it is straightforward to introduce additional elements and transmission channels.[1] The model features an IS-curve, a Phillips curve, and a Taylor-rule for each economy.[2]. We modify the original specification in Coenen and Wieland (2002) of nominal long-term interest rate through the term structure and specify it as

$$i_{it}^{(l)} \quad = \quad (1-\vartheta_i)\cdot\left(\frac{1}{8}\sum_{j=0}^{8}E_t i_{i,t+j}^{(s)}\right)+\vartheta_i\cdot\left(\sum_{j=1,j\neq i}^{N}\omega_{ij}\, i_{jt}^{(l)}\right), \qquad (1)$$

where $i, j \in \{u, ea, ja\}$, $i \neq j$, $i_{it}^{(s)}$ represents the nominal short-term interest rate, and w_{ij} denotes bilateral trade shares. Equation (1) gives rise to potentially powerful cross-country financial spillovers.[3] The parameter ϑ_i can be interpreted as the strength of financial

[1]Another reason why we consider the model of Coenen and Wieland (2002) is that it is not computationally demanding, which is important for the Monte Carlo experiments below.

[2]See Appendix E

[3]In the original version of the model of Coenen and Wieland (2002) long-term interest rates are determined only by the first term in Equation (1), rather than being affected by foreign long-term interest rates as well. We modify the original specification for two reasons. First, cross-country spillovers in the original model of Coenen and Wieland (2002) arise only through trade. However, there is an abundant empirical literature that documents the existence of large financial spillovers that arise independent of real linkages (Ehrmann and Fratzscher, 2003, 2005, 2009; Ehrmann et al., 2011). Second, in the original model of Coenen and Wieland (2002), in the absence of financial spillovers through long-term interest rates output spillovers from a contractionary US monetary policy shock are positive: In response to a US monetary policy tightening the euro

spillovers: The higher ϑ_i the more important foreign long-term interest rates are for the determination in the domestic economy.

We consider two polar parameterisations for ϑ_{ea} and $\omega_{ea,us}$ in Equation (1). First, under a "small financial spillovers" scenario we set $\vartheta_{ea} = \omega_{ea,us} = 0.025$. Second, in a "large financial spillovers" scenario we set $\vartheta_{ea} = 0.4$ and $\omega_{ea,us} = 0.9$. For the US we fix $\vartheta_{us} = 0.2$ and $w_{us,ea} =$??. This asymmetry in the calibration—in particular under the "large financial spillovers" scenario—is consistent with the empirical evidence documenting that spillovers from the US to the rest of the world are stronger than vice versa (Ehrmann and Fratzscher, 2003, 2005; Ehrmann et al., 2011). Moreover, the asymmetry is also consistent with the—alleged—prominent role of US financial markets in driving the global financial cycle (Bekaert et al., 2013; Bruno and Shin, 2015; Miranda-Agrippino and Rey, 2015; Passari and Rey, 2015; Rey, 2015). The dynamics of domestic and foreign variables in response to domestic monetary policy shocks under the two polar calibrations are plausible and—for the "large financial spillovers" scenario—consistent with the findings in the empirical literature (see Appendix E).

Our counterfactual experiment consists of three steps. First, for a given replication of the Monte Carlo experiment we simulate data based on the multi-country model of Coenen and Wieland (2002) with our specification of financial spillovers. In the true data-generating process, the monetary policy shocks are uncorrelated across economies. Second, we feed the simulated data into single-country versions of the true data-generating process that do not feature financial spillovers as long-term interest rates are determined only by domestic short-term interest rates, and obtain smoothed monetary policy shock estimates for the US and the euro area economies using the Kalman filter. Third, we determine the cross-country correlation between the smoothed monetary policy shocks for the euro area and the US; we also utilise the smoothed shock time series estimates to obtain estimates of the spillovers to the US economy from monetary policy shocks in the euro area from local projections (see Jorda, 2005). We repeat steps one to three a large number of times, storing the values of the cross-country correlations between the smoothed monetary policy shock time series estimates for the euro area and the US as well as the spillover estimates in each replication. We carry out the counterfactual Monte Carlo experiment for the parameterisations under the "small financial spillovers" and the "large financial spillovers" scenarios.

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real exchange rate depreciates relative to the US dollar, boosting euro area exports and dampening imports. This is inconsistent with a large body of research that documents economically significant *contractionary* spillovers from a tightening in US monetary policy (Georgiadis, forthcoming; Dedola et al., 2015; Banerjee et al., 2015; Feldkircher and Huber, 2015). Appendix E shows that with financial spillovers in long-term interest rates the model generates spillovers that are consistent in size with those in the empirical literature.

2.2 Cross-country correlations of monetary policy shocks

Figure 1 presents the distribution of the correlation between the smoothed monetary policy shock time series estimates for the euro area and the US economies across replications. The dark green bars represent the distribution of the correlations under the "small financial spillovers" scenario, and the light yellow bars that under the "large financial spillovers" scenario. Under the calibration for the "large financial spillovers" scenario in the true data-generating process, the smoothed monetary policy shock time series estimates of the euro area and the US economies obtained from the corresponding single-country versions of the model exhibit a positive correlation: On average, the cross-country correlation is around 0.35.

2.3 Spillover estimates

Figure 2 exhibits the responses of the US output gap to a euro area monetary policy shock for the "small financial spillovers" (left-hand side panel) and "large financial spillovers" (right-hand side panel) scenarios. The solid lines represent the true responses, and the red dashed lines the averages of the estimated spillovers across all replications in the Monte Carlo experiment. The spillover estimates are obtained from local projections. Consistent with our hypothesis, using domestic monetary policy shock time series estimates that contain a foreign component produces spillover estimates which are much larger than the true values. This arises because the estimated responses actually represent the effects of a US monetary policy shock on US variables, which are large relative to the magnitude of the spillovers to the US from a euro area monetary policy shock (see Appendix E).

To sum up, the counterfactual domestic monetary policy shock time series estimates obtained from the single-country models are—in contrast to the true shocks—correlated across economies. Moreover, using the counterfactual shock time series estimates obtained from the single-country models grossly over-estimates the spillovers from domestic monetary policy to the rest of the world. We now turn to investigating in a meta-study-like fashion whether these findings prevail in a database of monetary policy shock time series estimates covering a large number of monetary macroeconomic models in the literature.

3 A monetary policy shock database

We set up a unique database with time series of monetary policy shock estimates from a large variety of model types and economies. Overall, the database contains 111 time series of monetary policy shock estimates which pertain to 14 different jurisdictions (see Table 1) and cover—at best—the time period from 1989q1 to 2007q4 (see Figure 4). The monetary policy shock estimates are obtained from estimated New Keynesian DSGE models (typically smoothed shock estimates obtained from the Kalman filter), empirical reduced-form models (single-equation models, structural VAR and VECM models, factor-augmented VAR models, dynamic factor models), approaches based on financial market expectations, and the narrative approach (see Table 2). Tables 3 to 6 provide more information on the models from which the monetary policy shock time series estimates are obtained.

3.1 Stylised facts

3.1.1 Unconditional analysis

Figure 3 displays a heat map of correlations between the monetary policy shock time series in our database. For each pair of monetary policy shock time series estimates, the correlations are computed for the maximum time period for which data for the two time series are available. Two observations stand out. First, correlations are typically positive and high for pairs of monetary policy shock time series estimates that pertain to the same economy. This is particularly so for pairs of US, euro area, Canadian and Kiwi monetary policy shock time series estimates. Second, for a non-negligible number of cross-country pairs of monetary policy shock time series estimates the correlations are positive and large too.

The top row in Figure 5 presents the distribution of the correlations between pairs of monetary policy shock time series that pertain to the same economy (left-hand side panel) and for cross-country pairs of monetary policy shock time series (right-hand side panel) in our database; in each panel, the vertical line represents the average of the correlations. For the full set of monetary policy shock time series estimates, the average correlation is higher for pairs of shock time series that pertain to the same economy than for cross-country pairs. The second row in Figure 5 displays the distribution of correlations between monetary policy shock time series estimates that stem from New Keynesian DSGE models. The average correlations between monetary policy shock time series estimates from New Keynesian DSGE models are higher than for the full set of shocks, both for pairs of shock time series that pertain to the same economy and for cross-country pairs. The third row in Figure 5 exhibits the distribution of correlations between monetary policy shock time series estimates that stem from empirical reduced-from models. As for the monetary policy shock time series obtained from New Keynesian DSGE models, the correlations between shock time series pertaining to the same economy are high on average. In contrast, the average correlation for pairs of monetary policy shock time series estimates that pertain to different economies is virtually zero for reduced-form models. The panels in the bottom row suggest that the latter result holds for monetary policy shock time series estimates that stem from macroeconomic models other than New Keynesian DSGE models, that is, reduced-form models, approaches based on financial market expectations and the narrative approach.

Finally, Figure 6 displays the averages of the correlations between monetary policy shock time series estimates for each economy in our database separately. The top panel displays the correlations for pairs of monetary policy shock time series estimates that pertain to the same economy, and the bottom panel for cross-country pairs. Figure 6 suggests that the finding that the correlations between monetary policy shock time series estimates that pertain to the same economy are high for monetary policy shock time series estimates from all models is generally the case across the economies in our sample. Similarly, the finding that average correlations for cross-country pairs of monetary policy shock time series estimates are substantially lower for shock time series from non-New Keynesian DSGE models is also generally the case across economies in our sample (see the bottom panel).

These results for unconditional correlations are consistent with our hypothesis that the failure to account for financial spillovers in New Keynesian DSGE models results in foreign monetary policy shocks being labelled as domestic ones thereby giving rise to a common global component and positive cross-country correlations. However, it needs to be investigated in more detail whether this result is driven by particular economies or pairs of economies as well as shock estimates from particular model types, ideally controlling for all these aspects simultaneously. We therefore consider analysis of the correlations based on regressions next.

3.1.2 Regression analysis

Suppose we have monetary policy shock time series estimates for N economies in our database. Furthermore, assume that for economy i we have a total of L_i monetary policy shock time series estimates, and that we refer to one of those series by ℓ_i; similarly, suppose we have a total of M_j monetary policy shock time series estimates for economy j, and that we refer to one of those series by m_j. In order to better understand the interrelations between the monetary policy shock time series estimates in our database, we consider regressions of the form

$$\rho_{\ell_i,m_j} = \alpha + \boldsymbol{\mathcal{I}}_{\ell_i,m_j} \cdot \boldsymbol{\beta} + u_{\ell_i,m_j}, \tag{2}$$
$$i,j = 1,2,\ldots,N, \quad \ell_i = 1,2,\ldots,L_i, \quad m_j = 1,2,\ldots,M_j,$$

where ρ_{ℓ_i,m_j} is the correlation between monetary policy shock time series estimate ℓ_i pertaining to economy i and monetary policy shock time series estimate m_j pertaining to economy j; $\boldsymbol{\mathcal{I}}_{\ell_i,m_j}$ is a vector of indicator variables that equals unity if the shock time series ℓ_i and m_j satisfy certain conditions.[4]

[4]We set correlations that are not statistically significantly different from zero to zero. Our regression results in Sections 3.1.2 and 3.2 are, however, virtually the same if we consider the original values of the correlations regardless of whether or not they are statistically significantly different from zero. Our regression results are also unchanged if we consider as dependent variable in Equation (2) the logit transformation of the correlation coefficients, which renders the dependent variable unbounded. Moreover, our regression results are

Column (1) in Table 7 reports results for a specification in which $\mathcal{I}_{\ell_i,m_j}$ includes indicator variables that equal unity when the two monetary policy shock time series estimates underlying the correlation ρ_{ℓ_i,m_j} (i) pertain to the same economy; (ii) stem from the same model type; and (iii) are originally available in the same frequency. We first focus on the US, euro area and UK monetary policy shock time series estimates, as these economies have been the subject of most monetary macroeconomic models. The results suggest that the correlation between pairs of monetary policy shock time series estimates in our database is higher when the shock estimates pertain to the same economy, consistent with the results discussed in Section 3.1.1. Moreover, the regression results suggest that the correlation is higher when the shock estimates stem from the same model type. Finally, the correlation is higher if the shock estimates are originally constructed in the same frequency.

Column (2) in Table 7 refines the specification in column (1) and considers indicator variables that equal unity when the two monetary policy shock time series estimates underlying the correlation ρ_{ℓ_i,m_j} on the left-hand side in Equation (2) (i) both pertain to the US, the UK or the euro area, respectively; (ii) are both obtained from New Keynesian DSGE models, empirical reduced-form models, approaches based on financial market expectations or the narrative approach, respectively; (iii) are both obtained from the same model type and both pertain to the same economy. The results suggest that the correlation is higher when both monetary policy shock time series estimates pertain to the US or the euro area, but not when they both pertain to the UK; this is consistent with the correlation heat map in Figure 3. Moreover, the correlation is higher when both shock estimates are obtained from New Keynesian DSGE models, *regardless* of whether or not they pertain to the same economy. In contrast, the correlation is higher when both shock estimates stem from empirical reduced-form models, approaches based on financial market expectations and narrative approaches *only if* they also pertain to the same economy. This result indicates that monetary policy shock time series obtained from New Keynesian DSGE models have noticeably different properties compared to shock estimates obtained from empirical reduced-form models, approaches based on financial market expectations or narrative approaches.

Finally, in column (3) we consider an additional indicator variable which equals unity if one of the monetary policy shock time series estimates is obtained from a structural multi-country model (see Tables 3 to 6). The results suggest that the correlation is lower when one of the monetary policy shock time series estimates stems from a multi-country model.

Columns (4) to (6) re-estimate the specifications in columns (1) to (3) for the full set of economies for which we have monetary policy shock time series estimates in our database. The results are consistent with those for the sample restricted to US, euro area and UK monetary policy shock time series estimates. The within-country correlations between the

also unchanged when we only consider the correlations between monetary policy shock time series estimates that are based on at least 32 overlapping quarterly observations.

monetary policy shock time series estimates are positive and statistically significant only for Canada and New Zealand, consistent with the correlation heat map in Figure 3, and also for Chile and Israel.

Table 8 reports results for further refined specifications of Equation (2) and samples restricted to correlations between monetary policy shock time series estimates obtained from New Keynesian DSGE models.[5] In particular, in addition to the right-hand side variables already included in columns (3) and (6) in Table 7 we enter indicator variables that equal unity if one of the shock time series estimates pertains to the US (columns (1) and (4)), the largest economy in terms of systemic importance of its financial markets in the global economy and—allegedly—the driver of the global financial cycle. The results demonstrate that the correlation between monetary policy shock time series estimates from New Keynesian DSGE models is higher if one of the time series estimates pertains to the US. Columns (2), (3) as well as (4) and (5) report results from further refined specifications, including indicator variables that equal unity when shocks pertain to particular country pairs. The results for these specifications suggest that the correlation is higher for several country pairs when one of the two economies is the US.[6]

The main results from this subsection can be summarised as follows. First, the correlation between pairs of monetary policy shock time series estimates in our database is higher when the shocks pertain to the same economy, if they pertain to the same economy and are obtained from the same model type, and if they are available in the same frequency originally. Second, the correlation is higher when both monetary policy shock time series estimates are obtained from New Keynesian DSGE models, even if they do *not* pertain to the same economy. Third, when monetary policy shock time series estimates stem from approaches other than New Keynesian DSGE models and do not pertain to the same economy the correlation is lower. Fourth, the correlation is low when one of the shocks stems from a structural multi-country model. Fifth, the correlation between monetary policy shock time series estimates obtained from New Keynesian DSGE models is higher when one of the two economies the shock time series estimates pertains to is the US. These results support our hypothesis that the failure to account for financial spillovers in New Keynesian DSGE models results in foreign monetary policy shocks being labelled as domestic ones.

[5]The indicator variables referring to model type are dropped as all shock time series estimates in this specification stem from New Keynesian DSGE models. Moreover, as all New Keynesian DSGE models in our database are estimated on quarterly data, the indicator variable that equals unity if the shock time series have the same frequency is dropped as well.

[6]The interpretation of the negative coefficient estimates is that the correlation for these country pairs is not statistically significantly different from zero: Testing the hypothesis that the sum of these coefficients and the intercept is different from zero cannot be rejected in most cases.

3.2 The role of financial integration for cross-country correlations between monetary policy shock time series estimates

Under our hypothesis we would not only expect positive cross-country correlations, as documented in the previous section but also that the correlations are stronger for pairs of economies which are more strongly integrated with global financial markets. Moreover, consistent with the "global financial cycle hypothesis" (Bekaert et al., 2013; Bruno and Shin, 2015; Miranda-Agrippino and Rey, 2015; Passari and Rey, 2015; Rey, 2015), if the common component is largely driven by the center economy's monetary policy the cross-country correlations should be larger for pairs of economies that are more strongly integrated with US financial markets. In order to test these predictions, we consider regressions of the form

$$\rho_{\ell_i,m_j} = \alpha_i + \gamma_j + \boldsymbol{x}_{ij} \cdot \boldsymbol{\beta} + u_{\ell_i,m_j}, \qquad (3)$$
$$i,j = 1,2,\ldots,N, \quad i \neq j, \quad \ell_i = 1,2,\ldots,L_i, \quad m_j = 1,2,\ldots,M_j,$$

where $\boldsymbol{x}_{ij}$ is vector of bilateral country characteristics. Specifically, $\boldsymbol{x}_{ij}$ includes measures of economies i and j's overall financial integration with the rest of the world, and their bilateral financial integration with the US. We measure the former by the product of economies' gross foreign asset and liability position relative to GDP, and the latter by the product of their bilateral gross foreign asset and liability positions with the US.[7] The fixed effects α_i and γ_j account for country-specific factors that may have an impact on the cross-country correlation between the monetary policy shock time series estimates, including individual economies' gross foreign asset and liability positions. We run the regression of Equation (3) on the sample of cross-country correlations between monetary policy shock time series estimates obtained from New Keynesian DSGE models only. The estimation results are reported in Table 9. The results suggest that the cross-country correlation between monetary policy shock time series estimates obtained from New Keyesian DSGE models is higher for country pairs which are more strongly integrated with global and US financial markets.

One might argue that an alternative explanation for the positive cross-country correlation in the monetary policy shock time series estimates in our database could be the combination of trade spillovers and common mistakes in assessing current and future economic conditions in real time. Specifically, suppose the Federal Reserve and the ECB over-estimated real activity and inflation in the US in real time. As a result, the Federal Reserve would tighten monetary policy in order to avoid higher inflation from materialising. Similarly, in order to mitigate the inflationary pressures from the expected stronger import demand from the US, the ECB would also tighten euro area monetary policy. Ex post, the monetary policy tightening in the US and the euro area would represent contractionary monetary policy shocks. Importantly,

[7]The data are taken from the IMF's Coordinated Portfolio Investment Survey. The results are unchanged when we consider data from Lane and Milesi-Ferretti (2007) for economies' overall gross foreign asset and liability position.

the contractionary monetary policy shocks would be correlated across economies. In this scenario the cross-country correlation between the monetary policy shocks in the US and the euro area arises due to trade integration between the US and the euro area. As trade and financial market integration in the data are strongly positively correlated, our results in Table 9 might reflect omitted variable bias. However, Table 10 suggests that when we include measures of economies' overall trade integration and their bilateral trade integration with the US as additional explanatory variables our results are unchanged.

The empirical results for the role of economies' integration with global and US financial markets are thus consistent with our hypothesis that failure to account for financial spillovers in New Keynesian DSGE models results in cross-country correlated monetary policy shock estimates due to the labelling of foreign monetary policy shocks as domestic ones.

3.3 Spillover estimates

Under our hypothesis domestic monetary policy shock time series estimates from standard New Keynesian DSGE models in the literature contain a common, global component. As a consequence, when using these shock time series estimates in order to estimate the effects of domestic monetary policy on the rest of the world produces similar spillover estimates for different spillover-sending economies, as the spillover estimates represent the effects of a common, global rather than domestic monetary policy shock.

In order to estimate the global output spillovers from domestic monetary policy shocks for the economies in our database we consider local projections as introduced by Jorda (2005). In particular, we estimate equations of the form (see Teulings and Zubanov, 2014)

$$y_{j,t+h} - y_{j,t-1} = \alpha_j^{(h,i)} + \sum_{k=0}^{p} \gamma_{jk}^{(h,i)} s_{i,t-k} + \sum_{k=1}^{n} \delta_{jk}^{(h,i)} y_{j,t-k} + \sum_{k=0}^{q} \boldsymbol{x}_{j,t-k} \boldsymbol{\beta}_{jk}^{(h,i)} + u_{jt}^{(h,i)}, \qquad (4)$$

where $y_{j,t+h}$ represents economy j's output in period $t+h$, s_{it} is a domestic shock in economy i, and the vector $\boldsymbol{x}_{jt}$ includes control variables such as country-specific (trade-weighted) foreign output, inflation and financial market conditions. We estimate Equation (4) separately for each spillover horizon $h = 0, 1, 2, \ldots, H$. The coefficient estimate $\gamma_{j0}^{(h,i)}$ reflects the magnitude of the spillover from a shock in economy i to economy j at horizon h; put differently, the output response in economy j to a domestic shock in economy i is given by $\{\gamma_{j0}^{(h,i)}\}_{h=1,2,\ldots,H}$. We also consider panel local projections analogous to Equation (4)

$$y_{j,t+h} - y_{j,t-1} = \alpha_j^{(h,i)} + \sum_{k=0}^{p} \gamma_{k}^{(h,i)} s_{i,t-k} + \sum_{k=1}^{n} \delta_{k}^{(h,i)} y_{j,t-k} + \sum_{k=0}^{q} \boldsymbol{x}_{j,t-k} \boldsymbol{\beta}_{k}^{(h,i)} + u_{jt}^{(h,i)}. \qquad (5)$$

The sample we consider includes quarterly data for 45 economies spanning—depending on data availability—the time period from 1993q1 to 2007q2. The dataset is not balanced, as for some economies data are available only from later points in time. The selected lag orders p, n and q in Equations (4) and (5) minimise the AIC criterion. For y_{jt} we consider the logarithm of economies' real GDP. The control variables $\boldsymbol{x}_{jt}$ include the first difference of domestic and rest-of-the-world short-term interest rates, consumer price inflation, and real GDP.[8] We focus on the spillovers from three economies: The US, the euro area and the UK. Moreover, for each spillover-sending economy we extract the first principal component from all monetary policy shock time series estimates obtained from New Keynesian DSGE models which are available for the time period from 1993q1 to 2007q2, and use that principal component as shock measure s_{it} in the estimation of the local projections.

Figure 7 presents the global spillovers from US, euro area and UK monetary policy shocks. In particular, the left-hand side panel displays the average spillover estimate across all spillover-recipient economies j based on local projection estimates from Equation (4); the right-hand side panel displays the results from the panel local projections from Equation (5). The results suggest that the estimates of monetary policy shock spillovers from the US, the euro area and the UK based on monetary policy shock time series estimates obtained from New Keynesian DSGE models are very similar across spillover-sending economies. This is a surprising finding as these economies are rather different in terms of their systemic importance for the global economy. For example, over the sample period we consider the US accounted for roughly a fourth of world GDP and XX% of world trade, and has been the issuer of the dominant international currency. In contrast, the UK only accounted for XX% and XX% of world GDP and trade, and the British Pound is much less important in global financial markets. Against this background, it is implausible that these estimates reflect the true spillovers from domestic monetary policy shocks in the UK, and possibly the euro area. In contrast, the similarity in the magnitude of these spillover estimates is consistent with our hypothesis that they reflect the effects of a common, global monetary policy shock that is contained in the time series of domestic monetary policy shock estimates from New Keynesian DSGE models.

[8] For data on real GDP, consumer price inflation, short-term interest rates we draw on the GVAR Toolbox (see Smith and Galesi, 2011). The economies included are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Germany, Finland, France, Indonesia, India, Italy, Japan, Mexico, Malaysia, Netherlands, Norway, New Zealand, Peru, Philippines, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, UK, and the US. The GVAR Toolbox data do not include economies for which data series are available only since the 1990s and/or economies which are relatively small from a global perspective. We add data on real GDP, consumer price inflation and interest rates from Haver for Bolivia, Colombia, Croatia, Czech Republic, Denmark, Hungary, Ireland, Israel, Poland, Portugal, Paraguay, Romania, and Russia. The trade weights we use for the calculation of country-specific foreign variables in Equation (4) stem from the IMF Direction of Trade Statistics.

4 Conclusion

In this paper we explore the interrelations between estimates of monetary policy shock time series from 100 macroeconomic models, including New Keynesian DSGE models, empirical reduced-form models, approaches based on financial market expectations and the narrative approach. We document that there is a significant, positive cross-country correlation between monetary policy shock time series, in particular for monetary policy shock time series obtained from New Keynesian DSGE models, and that this correlation is likely to stem from a common US component. Moreover, we document that spillover estimates based on these monetary policy shock time series suggest domestic monetary policy affects the rest of the world by the same magnitude for spillover-sending economies that are rather different in terms of their systemic importance in the global economy. For example, spillover estimates from UK monetary policy to the rest of the world are of similar magnitude as those from US monetary policy.

We claim that these surprising and counter-intuitive results stem from the failure to adequately account for the dramatic degree of financial globalisation and the importance of financial spillover channels in the data, resulting in the estimates of monetary policy shocks obtained from the New Keynesian DSGE models being convolutions of the true domestic and US monetary policy shocks. We provide empirical evidence consistent with this hypothesis. In particular, we run regressions that analyse the determinants of the cross-country correlations between the monetary policy shock estimates in our database. Our regression results show that the cross-country correlation between monetary policy shock estimates in our database is indeed higher for economies which are more strongly integrated in global financial markets, and for economies which are more strongly integrated bilaterally with US financial markets.

The results from this paper imply that the modelling of powerful financial spillover channels in structural monetary macroeconomic models needs be taken more seriously and to become standard. Standard macroeconomic models without such elements might provide severely misleading results regarding spillovers, historical decompositions and estimation of parameters.

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B Construction of monetary policy shocks based on Consensus Forecast data

We use monthly data on three-month ahead financial market expectations about of short-term interest rates from Consensus Economics in order to form monetary policy shock time series. To identify the benchmark interest rate to use for the construction of monetary policy suprise series we follow closely the target interest rate for the surveyed financial institutions as reported by Consensus Economics and change the benchmark according to changes reported. For the US we first subtract from the actual realised short-term interest rate one-quarter lagged, three-month ahead Consensus Forecast short-term interest rate expectation. We then regress the resulting difference on four lags of the log-difference of US industrial production and the consumer price index. The residual from this regression in our time series of US monetary policy shocks constructed based on Consensus Forecast data. For the time period from 2003 onwards, we additionally regress this time series o fresiduals on Citi-Group macroeconomic surprises, and use the residuals from this regression as US monetary policy shocks. For the euro area and the UK, in the first regression in addition to domestic variables we also include US industrial production and inflation. For the euro area, prior to January 2005, when a euro area survey was established, the financial-market expectations are a weighted average of the euro area countries' data. From January 1990 through December 1998, the euro area average was weighted by GDP at purchasing power parities. From January 1999 onwards the euro area average was weighted by the nominal stock of government bonds.

C Tables

Table 1: Composition of the Monetary Policy Shocks Database—Country Coverage

	Number of shocks	Percent
AUS	7	6.3
CAN	7	6.3
CHE	4	3.6
CHL	2	1.8
CHN	2	1.8
EAR	21	18.9
GBR	12	10.8
ISR	2	1.8
JPN	3	2.7
KOR	3	2.7
NZL	3	2.7
SWE	4	3.6
USA	36	32.4
ZAF	5	4.5
Total	111	100.0
N	111	

Table 2: Composition of the Monetary Policy Shocks Database—Model Types

	Number of shocks	Percent
Financial market expectations	8	7.2
Narrative approach	2	1.8
New Keynesian DSGE models	69	62.2
Reduced-form models	32	28.8
Total	111	100.0
N	111	

Table 3: Overview of US Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database

Reference	Acronym	Type	Sample period	Frequency	Multi-country
Alpanda and Aysun (2014)	aya	DSGE	1996q1-2009q2	q	y
Bacchiocchi and Fanelli (2015)	bf	SVAR with identification through heteroskedasticity	1956q2-2008q3	q	n
Bacchiocchi et al. (2014)	bfc	non-standard SVAR	1961q1-2008q2	q	n
Barakchian and Crowe (2013)	bc	Financial market expectations	1988m12-2008m6	m	n
Bernanke and Kuttner (2005)	bk	Financial market expectations	1988m12-2008m6	q	n
Bernanke et al. (2005)	bbe	FAVAR	1960q1-2007q2	q	n
Bernanke and Mihov (1998)	bm	SVAR	1990m1-2007m11	m	n
Brayton et al. (2014)	frb	DSGE	1970q1-2010q4	q	n
Breuss and Fornero (2009)	forn	DSGE	1984q1-2015q3	q	y
Carabenciov et al. (2013)	gpm	DSGE	1994q1-2008q1	q	y
Ca'Zorzi et al. (2015)	jp	DSGE	1975q1-2013q3	q	n
Christiano et al. (1999)	cee	SVAR	1989q4-2007q3	q	n
Christiano et al. (2014)	cmr	DSGE	1981q1-2010q2	q	n
Claus and Dungey (2012)	cld	Financial market expectations	1994m1-2008m10	m	n
Consensus Forecast	cpf	Financial market expectations	1990q1-2013q1	q	n
Dungey et al. (2014)	dor	SVECM	1984q3-2008q1	q	n
Forni and Gambetti (2010)	fg	FAVAR	1990m1-2007m11	q	n
Fragetta and Melina (2013)	frm	SVAR	1965q4-2007q4	q	n
Galí and Gambetti (2015)	gag	TV-SVAR	1960q1-2011q4	q	n
Gertler and Karadi (2015)	kg	Financial market expectations	1991q1-2012q2	q	n
Gertler et al. (2008)	gst	DSGE	1960q1-2005q1	q	n
Iacoviello and Neri (2010)	in	DSGE	1965q1-2006q4	q	n
Kamber et al. (2015b)	kst	DSGE	1954q3-2011q4	q	n
Kollmann et al. (2011)	quest	DSGE	1999q1-2015q1	q	y
Luciani (2015)	luc	Dynamic factor model	1983q1-2010q4	q	n
Merola (2015)	swrm	DSGE	1965Q1-2012Q4	q	n
Merola (2015)	swrmff	DSGE	1965Q1-2012Q4	q	n
Pragidis et al. (2013)	pgt	LSTAR	1980m1-2011m10	m	n
Romer and Romer (2004)	rr	Narrative	1988m1-2008m6	m	n
Rossi and Zubairy (2011)	roz	SVAR	1955q3-2006q4	q	n
Rychalovska (2013)	ryc1	DSGE	1954q1-2008q3	q	n
Sims and Zha (2006)	sz	SVAR	1989q4-2008q2	q	n
Smets and Wouters (2007)	sw	DSGE	1947q3-2015q2	q	n
Villa (2014)	vbgg	DSGE	1983q1-2008q3	q	n
Villa (2014)	vgk	DSGE	1983q1-2008q3	q	n
Vitek (2015)	vit	DSGE	1999q3-2008q4	q	y
Voss and Willard (2009)	vow	SVAR	1985q2-2007q4	q	n

Note: The table provides an overview of the studies from which we obtained monetary policy shock time series for the US. We construct monetary policy shocks for the US based on Consensus Forecast data as described in Appendix B. The model used in Ca'Zorzi et al. (2015) is adopted from Justiniano and Preston (2010). The monetary policy shocks for Bernanke and Kuttner (2005), Bernanke and Mihov (1998), Christiano et al. (1999), Romer and Romer (2004) as well as Sims and Zha (2006) are taken from the data appendix of Barakchian and Crowe (2013). The data for Carabenciov et al. (2013) are taken from Doug Laxton's GPM website. We have replicated results based on code made available from the authors or the journal website for Forni and Gambetti (2010) as well as Christiano et al. (2014). We used Gary Koop's code to replicate the results of Bernanke et al. (2005).

Table 4: Overview of Euro Area Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database

Reference	**Acronym**	**Type**	**Sample period**	**Frequency**	**Multi-country**
Alpanda and Aysun (2014)	aya	DSGE	1996q1-2009q2	q	y
Bank of Finnland	ver	DSGE	1996q1-2014q3	q	n
Barigozzi et al. (2014)	bcl	Dynamic factor model	1984q1-2007q4	q	n
Benkovskis et al. (2011)	bbfw	VAR	1999q3-2010q3	q	n
Boivin et al. (2009)	bgm	FAVAR	1988q1-2007q3	q	n
Breuss and Fornero (2009)	forn	DSGE	1984q1-2015q3	q	y
Carabenciov et al. (2013)	gpm	DSGE	1994q1-2008q1	q	y
Ca'Zorzi et al. (2015)	jp	DSGE	1975q1-2013q3	q	n
Christoffel et al. (2008)	nawm	DSGE	1985q1-2011q4	q	n
ConsensusForecast	cpf	Financial market expectations	1990q1-2013q1	q	n
Dungey et al. (2014)	dor	SVECM	1984q3-2008q1	q	n
Gelain (2010)	gel	DSGE	1980q1-2008q3	q	n
Gerali et al. (2010)	ger	DSGE	1998q1-2009q4	q	n
Jannsen and Klein (2011)	jk	SVAR	1990q1-2008q4	q	n
Kollmann et al. (2011)	quest	DSGE	1999q1-2015q1	q	y
Kühl (2016)	kue	DSGE	1997q4-2013q3	q	n
Peersman and Smets (2001)	ovar	SVAR	1990q2-2011q2	q	n
Smets et al. (2013)	sww	DSGE	1970q2-2010q2	q	n
Villa (2014)	vbgg	DSGE	1983q1-2008q3	q	n
Villa (2014)	vgk	DSGE	1983q1-2008q3	q	n
Vitek (2015)	vit	DSGE	1999q3-2008q4	q	y

Note: The table provides an overview of the studies from which we obtained monetary policy shock time series for the euro area. We construct monetary policy shocks for the US based on Consensus Forecast data as described in Appendix B. The model used in Ca'Zorzi et al. (2015) is adopted from Justiniano and Preston (2010). The data for Carabenciov et al. (2013) are taken from Doug Laxton's GPM website. We have replicated results based on code made available from the authors or the journal website for Peersman and Smets (2001), Boivin et al. (2009) as well as Barigozzi et al. (2014).

Table 5: Overview of UK Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database

Reference	**Acronym**	**Type**	**Sample period**	**Frequency**	**Multi-country**
Andreasen (2011)	and	DSGE	1990q1-2008q3	q	n
Burgess et al. (2013)	boe	DSGE	1987q3-2007q4	q	n
Ca'Zorzi et al. (2015)	jp	DSGE	1975q1-2013q3	q	n
Cesa-Bianchi et al. (2016)	ctv	Financial market expectations	1997m7-2015m6	m	n
Cloyne and Hürtgen (forthcoming)	clh	Narrative	1975m1-2007m12	q	n
Consensus forecast	cpf	Financial market expectations	1990q1-2013q1	q	n
Ellis et al. (2014)	mum	TV-FAVAR	1976q1-2005q4	q	n
Faccini et al. (2013)	fmz	DSGE	1971q1-2009q4	q	n
Harrison and Oomen (2010)	harr	DSGE	1958q1-2007q1	q	n
Kamber and Millard (2012)	km	SVAR	1979q4-2007q4	q	n
Mumtaz and Theophilopoulou (2016)	mut	BSVAR	1976q2-2009q1	q	n
Vitek (2015)	vit	DSGE	1999q3-2008q4	q	y

Note: The table provides an overview of the studies from which we obtained monetary policy shock time series for the euro area. We construct monetary policy shocks for the US based on Consensus Forecast data as described in Appendix B. The model used in Ca'Zorzi et al. (2015) is adopted from Justiniano and Preston (2010).

Table 6: Overview of Non-US, Non-Euro Area and Non-UK Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database

Reference	**Acronym**	**Country**	**Type**	**Sample period**	**Frequency**	**Multi-country**
Kamber et al. (2015a)	ado	SWE	DSGE	1980q2-2007q3	q	n
Adolfson et al. (2013)	rams	SWE	DSGE	1995q2-2015q2	q	n
Argov et al. (2012)	moi	ISR	DSGE	1992q1-2011q4	q	n
Assenmacher-Wesche (2008)	asw	CHE	SVECM	1975q1-2006q4	q	n
Bong et al. (2016)	dpb	AUS, NZL	DSGE	1989q2-2006q4	q	n
Bong et al. (2016)	dpb	CAN	DSGE	1989q2-2006q4	q	n
Melecky and Buncic (2008)	bud	AUS	DSGE	1984q1-2005q4	q	n
Melecky and Buncic (2008)	buv	AUS	SVAR	1984q1-2005q4	q	n
Caputo et al. (2008)	mas	CHL	DSGE	2001q2-2016q1	q	n
Carabenciov et al. (2013)	gpm	JPN	DSGE	1994q1-2008q1	q	y
Ca'Zorzi et al. (2015)	jp	AUS	DSGE	1975q1-2013q3	q	n
Ca'Zorzi et al. (2015)	jp	CAN	DSGE	1975q1-2013q3	q	n
Cuche-Curti et al. (2009)	cdn	CHE	DSGE	1995q2-2015q4	q	n
Dorich et al. (2013)	tot	CAN	DSGE	1990q1-2014q4	q	n
Gervais and Gosselin (2014)	lens	CAN	DSGE	1993q1-2014q4	q	n
Gupta and Steinbach (2013)	gs	ZAF	DSGE	1981q2-2010q4	q	n
Hirose (2014)	hir	JPN	DSGE	1983q2-2013q1	q	n
Jiang and Kim (2013)	jkc	CHN	SVAR	1993q1-2009q3	q	n
Kamber et al. (2015a)	nzsim	NZL	DSGE	1993q2-2013q1	q	n
Kim (2014)	tbk	KOR	DSGE	2000q2-2012q4	q	n
Milani and Park (2015)	mil	KOR	DSGE	1991q2-2012q4	q	n
Ncube and Ndou (2011)	nd1	ZAF	SVAR	1976q1-2009q4	q	n
Ncube and Ndou (2013)	nd2	ZAF	SVAR	1983q3-2010q1	q	n
Raghavan et al. (2016)	ras1	CAN	VARMA	1974m3-2007m12	m	n
Raghavan et al. (2016)	ras2	CAN	SVAR	1975m1-2007m12	m	n
Rees et al. (2015)	rsh	AUS	DSGE	1992q1-2013q4	q	n
Rudolf and Zurlinden (2014)	ruz	CHE	DSGE	1983q2-2015q4	q	n
Steinbach et al. (2009)	sms	ZAF	DSGE	1990q1-2007q4	q	y
Sveriges Riksbank	bvar	SWE	BVAR	1995q4-2014q4	q	n
Vitek (2015)	vit	NZL, AUS, SWE, CAN, ZAF, KOR, CHN, JPN, CHE, ISR, CHL	DSGE	1999q3-2008q4	q	y
Voss and Willard (2009)	vow	AUS	SVAR	1985q2-2007q4	q	n

Note: The table provides an overview of the studies from which we obtained monetary policy shock time series for the euro area. The model used in Ca'Zorzi et al. (2015) is adopted from Justiniano and Preston (2010).

Table 7: Results for the Regression of Shock Correlation on Model Characteristics—Baseline

	(1) US, EA, UK	(2) US, EA, UK	(3) US, EA, UK	(4) All	(5) All	(6) All
Same economy	0.16^{***}			0.21^{***}		
	(0.00)			(0.00)		
Both shocks for USA		0.17^{***}	0.17^{***}		0.20^{***}	0.20^{***}
		(0.00)	(0.00)		(0.00)	(0.00)
Both shocks for EAR		0.14^{***}	0.15^{***}		0.18^{***}	0.19^{***}
		(0.00)	(0.00)		(0.00)	(0.00)
Both shocks for GBR		-0.01	-0.02		0.02	0.01
		(0.71)	(0.42)		(0.46)	(0.71)
Both shocks for JPN					0.13	0.15
					(0.34)	(0.28)
Both shocks for SWE					-0.01	-0.01
					(0.95)	(0.96)
Both shocks for AUS					0.07	0.06
					(0.23)	(0.28)
Both shocks for CAN					0.32^{***}	0.31^{***}
					(0.00)	(0.00)
Both shocks for ZAF					0.11	0.13
					(0.27)	(0.20)
Both shocks for CHE					-0.02	-0.02
					(0.78)	(0.79)
Both shocks for NZL					0.52^{***}	0.53^{***}
					(0.00)	(0.00)
Both shocks for KOR					0.11	0.11
					(0.66)	(0.66)
Both shocks for CHL					0.31^{***}	0.33^{***}
					(0.00)	(0.00)
Both shocks for ISR					0.39^{***}	0.41^{***}
					(0.00)	(0.00)
Same model type	0.06^{***}			0.04^{***}		
	(0.00)			(0.00)		
Both DSGE		0.09^{***}	0.11^{***}		0.04^{***}	0.06^{***}
		(0.00)	(0.00)		(0.00)	(0.00)
Same economy x Both DSGE		0.02	0.02		0.09^{***}	0.09^{***}
		(0.54)	(0.46)		(0.00)	(0.00)
Both financial market expectation		-0.09^{***}	-0.11^{***}		-0.03	-0.04^{**}
		(0.00)	(0.00)		(0.15)	(0.03)
Same economy x Both financial market expectations		0.27^{***}	0.27^{***}		0.24^{***}	0.24^{***}
		(0.00)	(0.00)		(0.00)	(0.00)
Both narrative		-0.12^{***}	-0.14^{***}		-0.06^{***}	-0.07^{***}
		(0.00)	(0.00)		(0.00)	(0.00)
Both reduced-form models		-0.04^{**}	-0.06^{***}		-0.03^{***}	-0.05^{***}
		(0.01)	(0.00)		(0.00)	(0.00)
Same economy x Both reduced-form models		0.06^{**}	0.06^{**}		0.07^{***}	0.07^{***}
		(0.03)	(0.04)		(0.01)	(0.01)
Same frequency	0.09^{***}	0.08^{***}	0.08^{***}	0.03^{***}	0.02^{***}	0.03^{***}
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
At least one shock from multi-country DSGE model			-0.08^{***}			-0.04^{***}
			(0.00)			(0.00)
Constant	0.03^{***}	0.04^{***}	0.06^{***}	0.03^{***}	0.04^{***}	0.05^{***}
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Adj. R-squared	0.16	0.19	0.21	0.15	0.17	0.18
Observations	2346	2346	2346	6105	6105	6105

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Results for the Regression of Shock Correlations on Model Characteristics—Country-pair Indicator Variables for New Keynesian DSGE Model Shocks

	(1)	(2)	(3)	(4)	(5)	(6)
	US, EA, UK	US, EA, UK	US, EA, UK	All	All	All
One shock is for USA	0.06**			0.08***		
	(0.01)			(0.00)		
USA-EA		0.12***	0.14***		0.21***	0.21***
		(0.00)	(0.00)		(0.00)	(0.00)
USA-GBR		-0.06**	-0.07**		0.03*	0.02
		(0.02)	(0.02)		(0.05)	(0.15)
USA-SWE					0.01	0.01
					(0.64)	(0.71)
USA-CAN					0.16***	0.15***
					(0.00)	(0.00)
USA-AUS					0.07***	0.06***
					(0.00)	(0.01)
USA-NZL					0.07***	0.06***
					(0.01)	(0.01)
USA-ZAF					-0.09***	-0.07***
					(0.00)	(0.00)
USA-KOR					0.09***	0.09***
					(0.00)	(0.00)
USA-CHN					-0.10***	-0.08***
					(0.00)	(0.00)
USA-JPN					-0.08***	-0.07***
					(0.00)	(0.00)
USA-ISR					-0.07***	-0.07***
					(0.00)	(0.00)
USA-CHE					0.04	0.04
					(0.13)	(0.14)
USA-CHL					-0.04	-0.04
					(0.12)	(0.14)
Constant	0.16***	0.16***	0.22***	0.07***	0.07***	0.10***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Adj. R-squared	0.11	0.16	0.21	0.17	0.24	0.25
Observations	666	666	666	2346	2346	2346

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: The Relationship between the Correlation between Monetary Policy Shock Time Series Estimates and Economies' International Financial Integration in the Monetary Policy Shocks Database

	(1)	(2)	(3)
Overall fin. integration country 1 x country 2 (CPIS)	0.70***		0.61***
	(0.00)		(0.00)
Share of US in country 1 fin. integration x country 2		1.44***	1.23***
		(0.00)	(0.01)
Country 1 dummies	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes
Adj. R-squared	0.12	0.11	0.12
Observations	1228	1176	1176

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: The Relationship between the Correlation between Monetary Policy Shock Time Series Estimates and Economies' International Financial in the Monetary Policy Shocks Database—Including Trade Integration

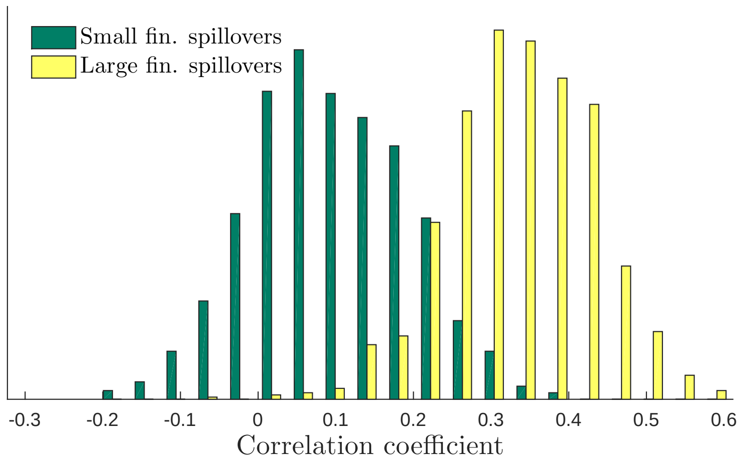
	(1)	(2)	(3)
Overall fin. integration country 1 x country 2 (CPIS)	0.70***		0.62***
	(0.00)		(0.00)
Share of US in country 1 fin. integration x country 2		2.13***	1.92***
		(0.00)	(0.00)
Trade integration country 1 x country 2	0.43		0.15
	(0.33)		(0.75)
Share of US in country 1 trade integration x country 2		-1.17**	-1.16*
		(0.05)	(0.07)
Country 1 dummies	Yes	Yes	Yes
Country 2 dummies	Yes	Yes	Yes
Adj. R-squared	0.12	0.11	0.12
Observations	1228	1176	1176

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

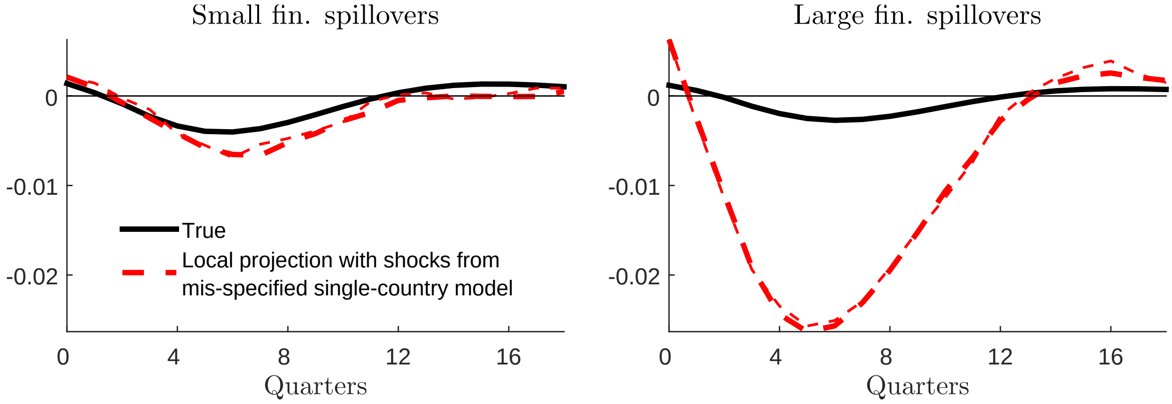
D Figures

Figure 1: Distribution of Correlation between US and Euro Area Smoothed Monetary Policy Shocks across Replications in the Counterfactual Monte Carlo Experiment



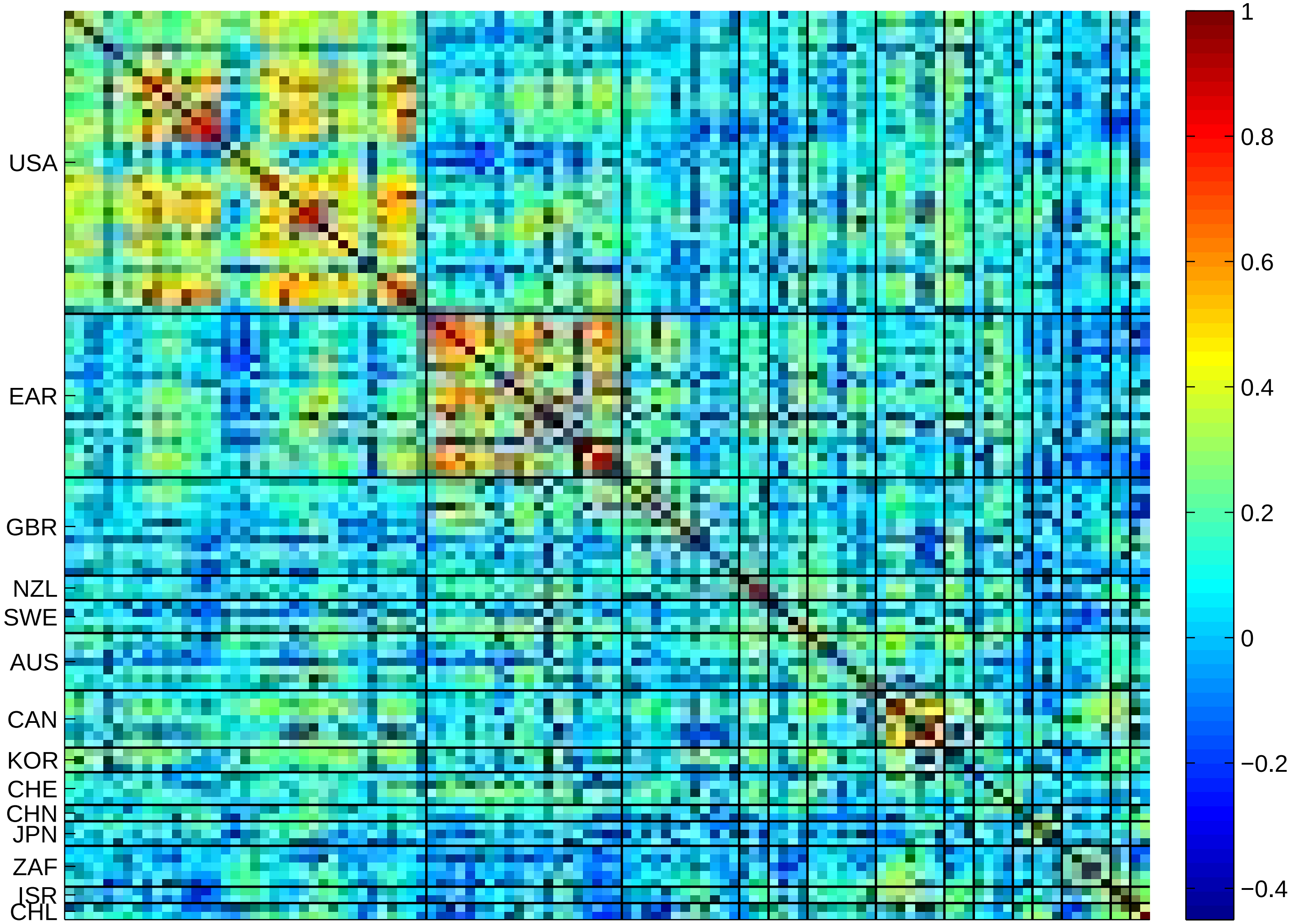
Note: .

Figure 2: True and Local Projection Spillovers Estimates for Euro Area Monetary Policy Shocks to the US based on Smoothed Shocks from Single-country Model in the Counterfactual Monte Carlo Experiment



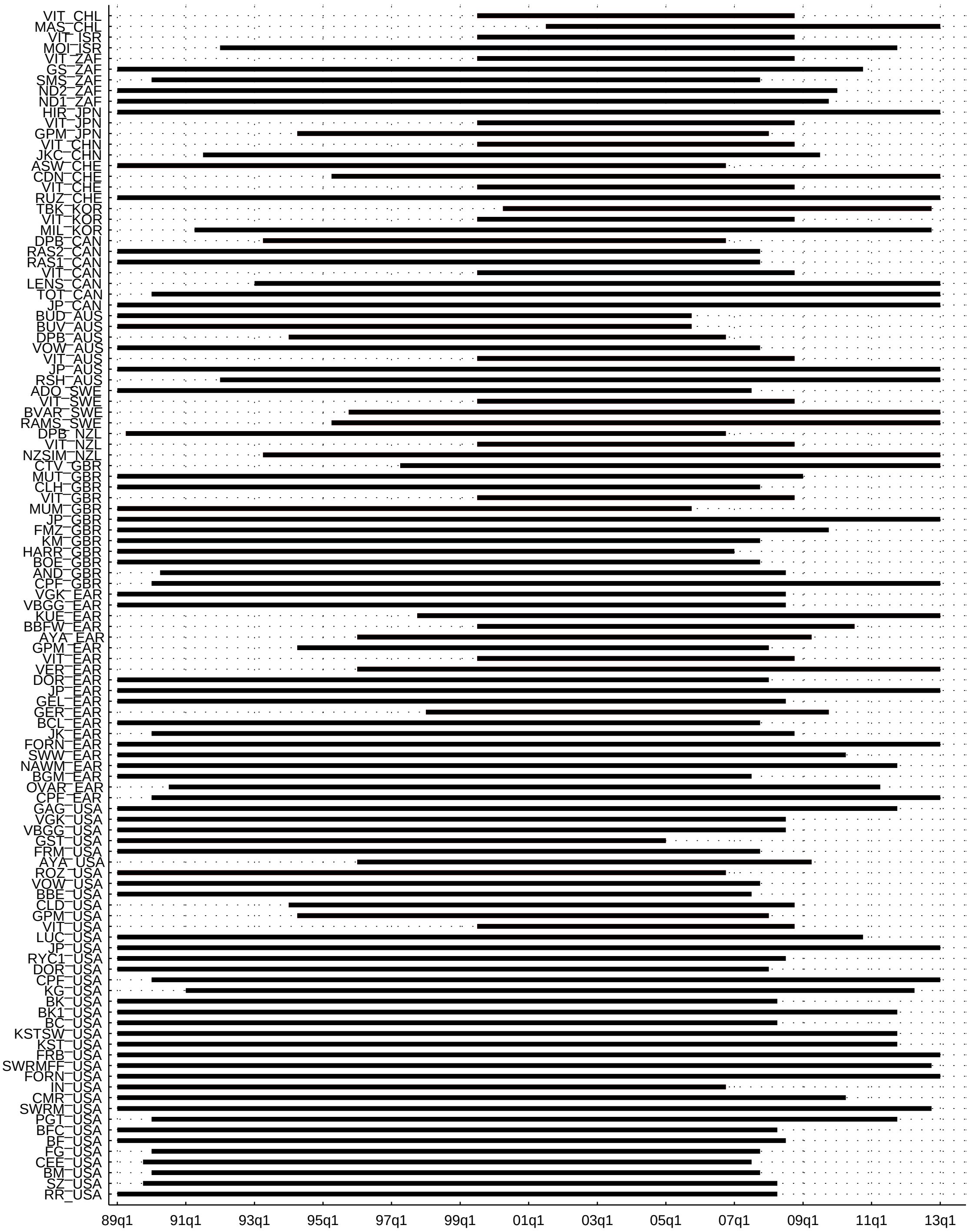
Note: .

Figure 3: Correlation of Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database



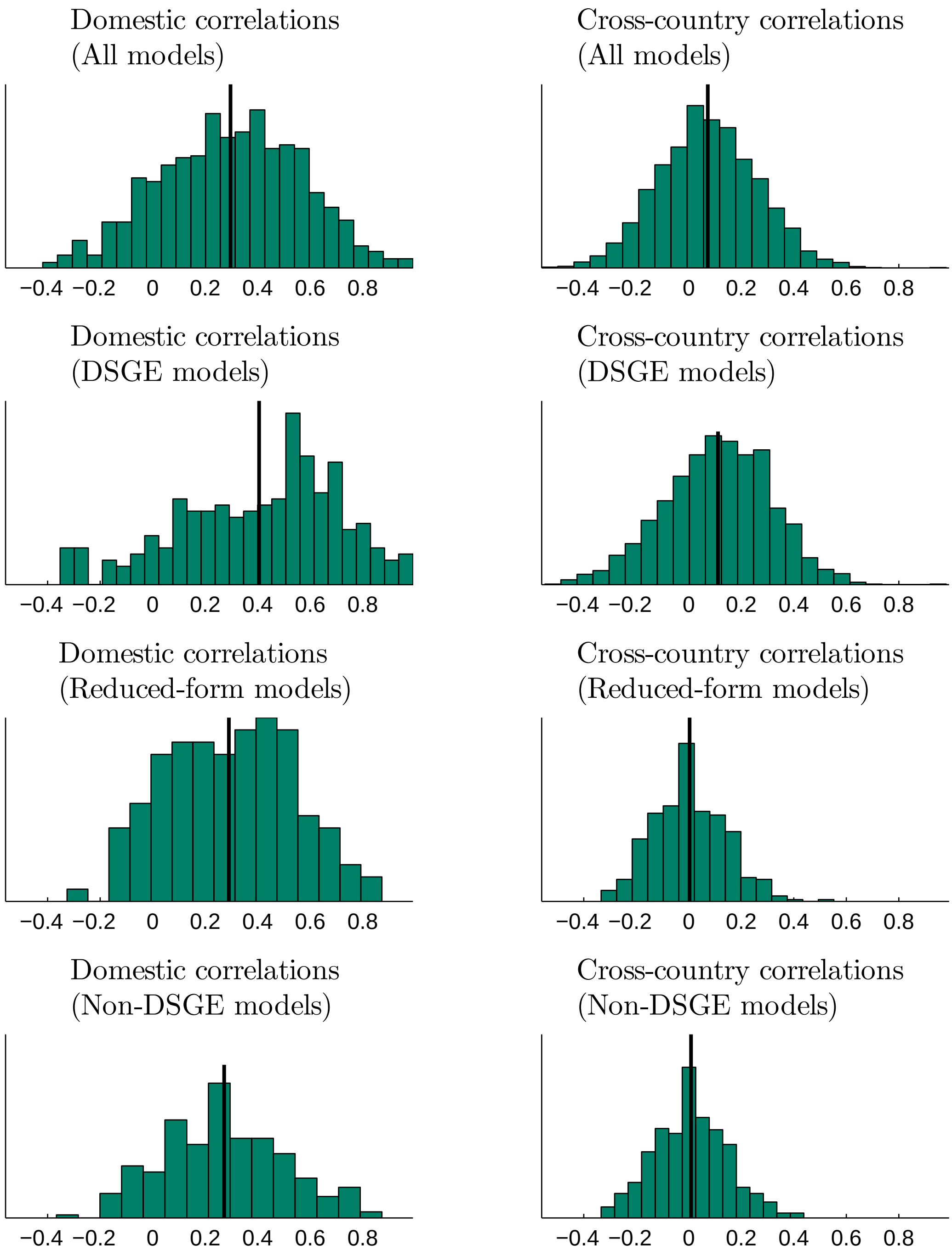
Note: .

Figure 4: Time-series Coverage of Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database



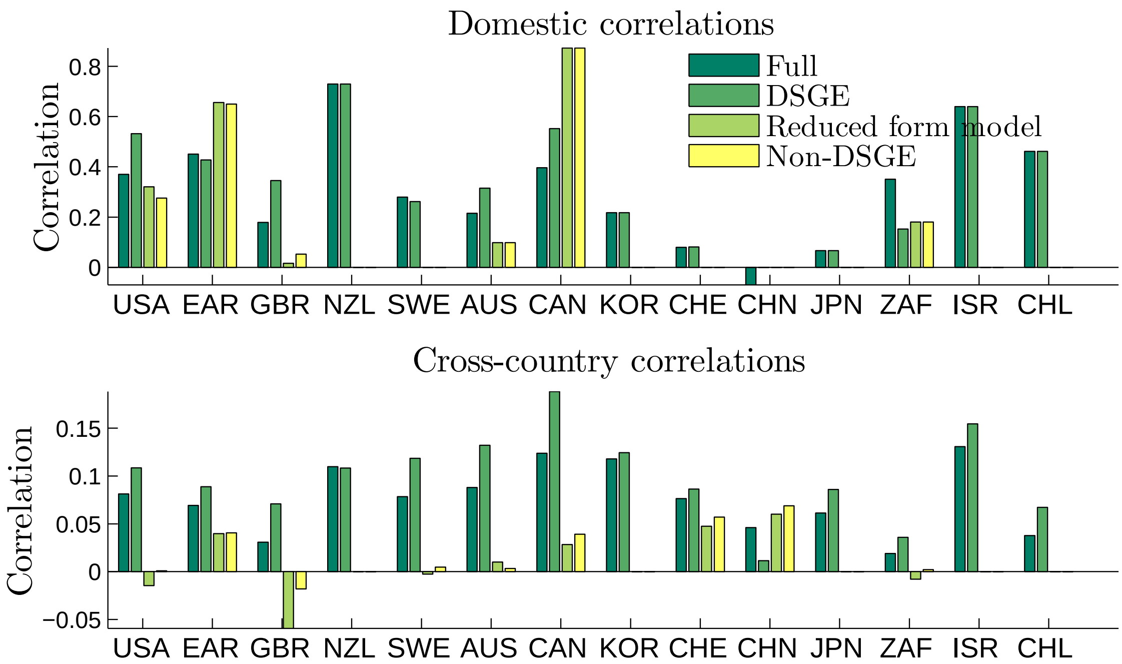
Note: .

Figure 5: Distribution of Correlations of Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database



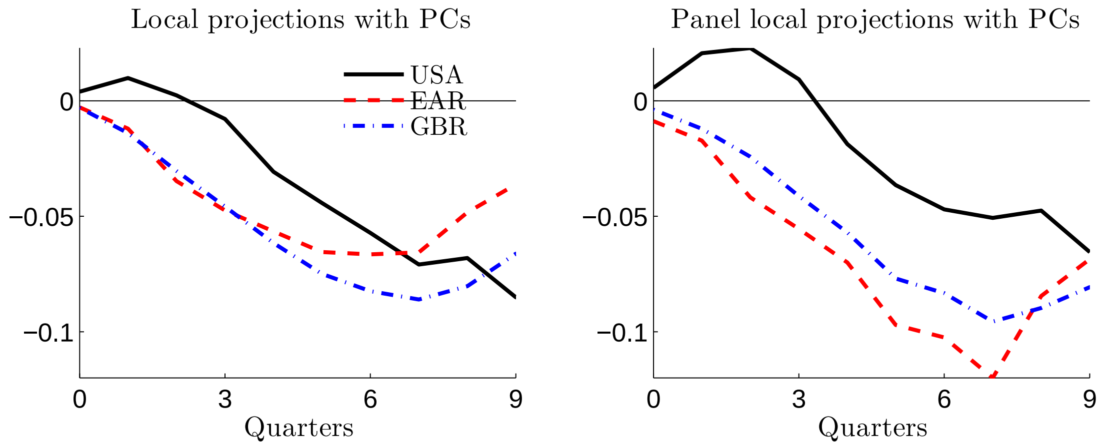
Note: .

Figure 6: Domestic and Cross-country Correlation of Monetary Policy Shock Time Series Estimates in the Monetary Policy Shocks Database for DSGE and Non-DSGE Models



Note: .

Figure 7: Global Output Spillovers from Monetary Policy Shocks based on Monetary Policy Shock Time Series Estimates from New Keynesian DSGE Models



Note: .

E The Model of Coenen and Wieland (2002)

E.1 Model description

For $i \in \{u, ea, ja\}$, the IS-curve for the domestic output gap q_{it} is given by

$$q_{it} = \sum_{j=1}^{3} \delta_{ij}^{q} q_{i,t-j} + \delta_{i}^{z} z_{it} + \delta_{i}^{rl} (rl_{i,t-1} - \overline{rl}_i) + \sigma^{e^d} e_{it}^{d}, \tag{E.1}$$

where $z_{it} = \sum_{j=1, j \neq i}^{N} w_{ij} \cdot \omega_{ij,t}$ is an economy's real effective exchange rate with w_{ij} representing bilateral trade shares and $\omega_{ij,t}$ bilateral exchange rates; $r_{it}^{(l)}$ is the real long-term interest rate; and e_{it}^{d} is a demand shock. Quarter-on-quarter inflation is determined in a backward-looking Phillips-curve

$$\pi_{it} = \left(\sum_{j=1}^{3} \phi_{ji} \right)^{-1} \left(\sum_{j=0}^{3} \phi_{ji} cwp_{i,t-j} - (\phi_{2i} + \phi_{3i})\, \pi_{i,t-1} - \phi_{3i} \pi_{i,t-2} \right), \tag{E.2}$$

where cwp_{it} is the contract wage. Based on specification tests Coenen and Wieland (2002) consider fixed-duration Taylor-style wage contracts for the euro area and Japan

$$\begin{aligned} cwp_{it} = {} & (\phi_{1i} + \phi_{2i} + \phi_{3i})\, E_t \pi_{i,t+1} + (\phi_{2i} + \phi_{3i})\, E_t \pi_{i,t+2} + \phi_{3i} E_t \pi_{i,t+3} \\ & + \gamma_i \sum_{j=0}^{3} \phi_{ji} E_t q_{i,t+j} + \sigma_i^{cw} e_{it}^{cw}, \qquad i \in \{ea, ja\}, \end{aligned} \tag{E.3}$$

and relative real wage contracts for the US

$$\begin{aligned} cwp_{us,t} &= \sum_{j=0}^{3} \phi_{j,us} E_t \varpi_{us,t+j} + \gamma_{us} \sum_{j=0}^{3} \phi_{j,us} E_t q_{us,t+j} + \sigma_{us}^{cw} e_{us,t}^{cw}, \\ \varpi_{us,t} &= \sum_{j=0}^{3} \phi_{j,us} cwp_{us,t-j}. \end{aligned} \tag{E.4}$$

The model is closed by monetary policy rules which determine the nominal short-term interest rate $i_{it}^{(s)}$ according to

$$i_{it}^{(s)} = \rho_{i^s} i_{i,t-1}^{(s)} + \alpha_i \left(\pi_{it}^{(4)} - \pi_i^T \right) + \beta_i q_{it} + (1 - \rho_i) \left(\overline{r}_i^{(l)} + \pi_{it}^{(4)} \right) + \sigma_i^{i^s} e_{it}^{mp}, \tag{E.5}$$

where π_i^T represents the inflation target, and e_{it}^{mp} is a monetary policy shock. Year-on-year inflation $\pi_{it}^{(4)}$ is given by

$$\pi_{it}^{(4)} = \sum_{j=0}^{3} \pi_{i,t-j}. \tag{E.6}$$

The real long-term interest rate is defined as

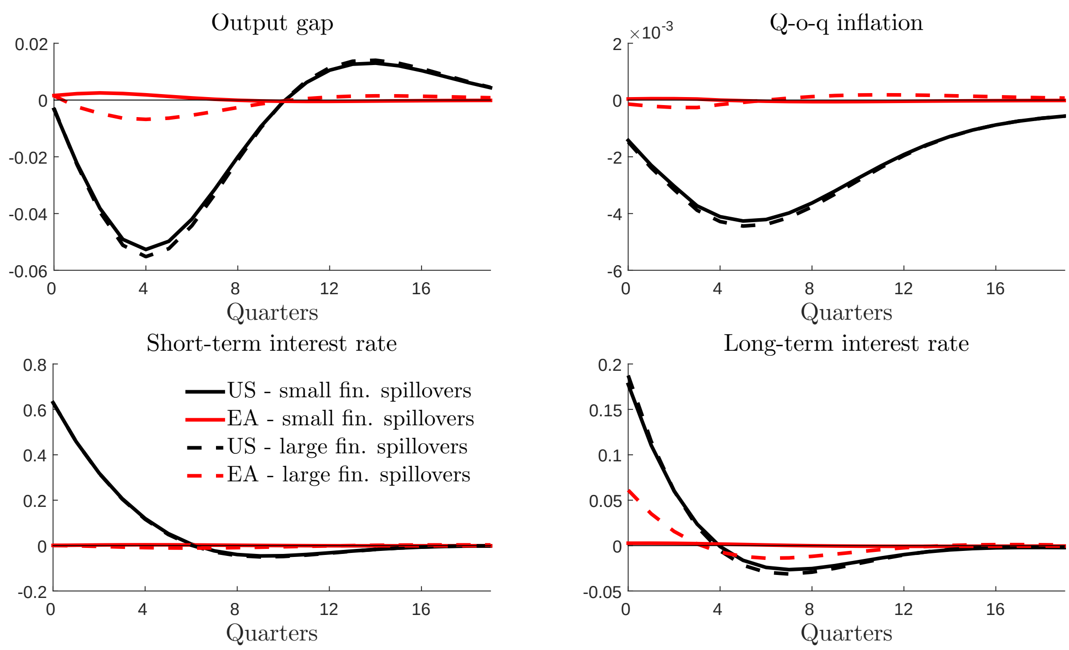
$$r_{it}^{(l)} = i_{it}^{(l)} - 0.5 \sum_{j=1}^{8} E_t \pi_{i,t+j}. \qquad \text{(E.7)}$$

E.2 Responses of domestic and foreign variables to monetary policy shocks

Figure 8 displays the responses of the US and the euro area to a contractionary monetary policy shock in the US. The impulse responses under the "small financial spillovers" scenario are depicted by the solid lines, and those under the "large financial spillovers" scenario by the dashed lines. While the domestic responses in the US economy are rather similar under the two scenarios, the spillovers to output and inflation in the euro area from a monetary policy shock abroad are substantially larger in the "large financial spillovers" scenario. In particular, under the "small financial spillovers" scenario the spillovers are small and expansionary as those arsing through trade dominate: The euro depreciates in response to a monetary policy tightening in the US, stimulating the euro area's net exports through expenditure switching. In contrast, under the "large financial spillovers" scenario the expansionary effects from a US monetary policy tightening in the euro area are dominated by the contractionary spillovers through financial markets: Euro area long-term interest rates rise in tandem with those in the US, dampening domestic demand in the euro area. Quantitatively, under the "large financial spillovers" scenario the magnitude of spillovers is at the lower end of the estimates in the empirical literature (see Georgiadis, forthcoming; Dedola et al., 2015; Banerjee et al., 2015; Feldkircher and Huber, 2015).

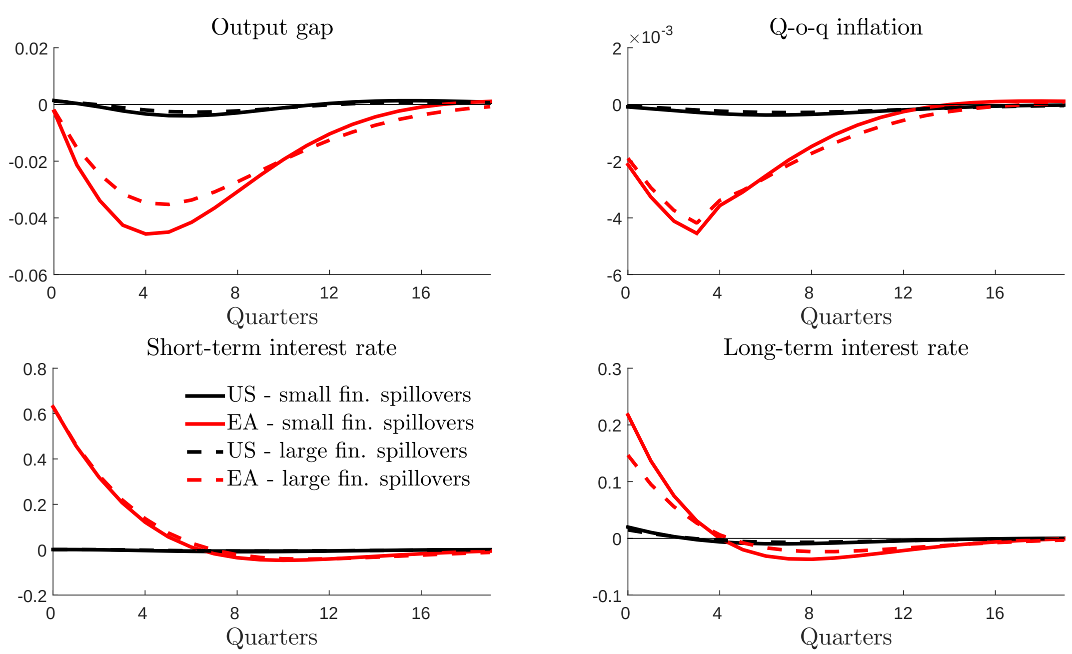
Figure 9 displays the responses of the US and the euro area to a contractionary monetary policy shock in the euro area. In contrast to the spillovers from US monetary policy, those emitted from the euro area are contractionary both under the "small financial spillovers" and the "large financial spillovers" scenarios. This is due to the relatively large susceptibility of US long-term interest rates to foreign shocks in our calibration compared to the polar case of the "small financial spillovers" scenario calibration for the euro area. However, the spillovers from euro area monetary policy shocks to the US are smaller for both scenarios compared to the spillovers to the euro area from US monetary policy shocks. For the euro area, the domestic impact of a euro area monetary policy shock is smaller under the "large financial spillovers" scenario as the transmission from short to long-term interest rates is weaker. This is consistent with the recent "dilemma hypothesis" according to which financial globalisation reduces monetary policy autonomy and effectiveness, partly due to a dampened transmission of short term to long-term interest rates (Ito, 2014; Miyajima et al., 2014; Obstfeld, 2015; Rey, 2015).

Figure 8: True Model Impulse Responses to a US Monetary Policy Shock for Small and Large Financial Spillovers



Note: .

Figure 9: True Model Impulse Responses to a Euro Area Monetary Policy Shock for Small and Large Financial Spillovers



Note: .