Mind the gap: Heterogeneous monetary policies and international euro debt securities

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Abstract

This paper analyses the effects of diverging monetary policy on the euro denominated international debt security issuance by 32 non-euro area economies, distinguishing between non-financial corporate and bank borrowers. A wider gap between the monetary policy of non-euro area issuers and the euro is positively associated with greater issuance of international debt securities denominated in euro. The regression analysis indicates heterogeneity in the influence of wider monetary policy gaps on international euro debt securities across issuing sector, advanced versus emerging countries, and the global financial cycle. Moreover, the results highlight the importance of divergences in unconventional monetary policy between the two largest currencies, the US dollar and the euro, as determinants of international debt security issuance in euro.

Keywords: Euro, debt securities, monetary policy, unconventional monetary policy, interest rate differentials
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1 Introduction

This paper investigates the effects of diverging monetary policy on the euro denominated debt security issuance of borrowers outside of the euro area. Since its launch in 1999 the euro has gained ground in becoming a major currency in the international financial system, second only to the US dollar (Chinn and Frankel 2008, ECB 2016, Shin 2016). During the period preceding the global financial crisis, international issuers of debt securities denominated in euro were primarily those in advanced economies and banks. The global financial crisis, followed by the escalation of the European sovereign debt crisis, led international investors to reallocate their portfolios away from euro denominated assets, manifesting in a sharp decline in the international use of the single currency outside the euro area, particularly by banks. A period of unconventional monetary policy and low long-term interest rates for the euro have witnessed increased use of the currency outside of the euro area, particularly by the non-financial corporate sector in advanced economies. This is against a background of diverging monetary policy stances across the economies and currencies of global systemic importance.

While a number of studies have previously examined the factors affecting usage of the US dollar outside of the US, the research on the determinants of the international use of the euro remains scant. The objective of this paper is to fill that gap by analysing the drivers of international issuance of euro denominated debt securities by non-euro area borrowers. Controlling for global economic and financial conditions, the macroeconomic environment in the home countries of issuers, and unobservable home country characteristics, this paper analyses the influence of diverging monetary policies between those of the issuer relative to that of the euro area. Exploiting a country-level quarterly dataset of 32 non-euro area countries, distinguishing between non-financial corporate (NFC) and bank borrowers, the empirical analysis shows that differences in monetary policy between the home market and the euro area are indeed significant determinants of international debt security issuance denominated in euro by non-euro area borrowers. Specifically, the empirical analysis indicates that relatively cheaper funding in euro matters for both NFCs and banks outside of the euro area.

This paper builds on the empirical literature that examines the determinants of international capital flows including issuance of international debt securities. The determinants of international capital flows can be decomposed into push and pull factors (Calvo et al. 1996). In a global environment of financial integration, the recent international macroeconomic literature has increasingly emphasised the role of push factors.[1] Push factors, exogenous to the economy in receipt of capital inflows, include the international activities of global banks, innovation in financial instruments and global risk appetite, are significant in driving cross-border banking flows. Specifically, fluctuations in global risk influence the leverage capacity of both global and domestic banks, and contribute to both cross-border and domestic credit dynamics.

[1]Forbes and Warnock 2011, Committee on the Global Financial System 2011, Forbes and Warnock 2012, McCauley 2012, Shin, 2012, Cetorelli and Goldberg 2012, Rey 2013, Bruno and Shin 2015.

The empirical analysis in this paper examines the determinants of a global funding currency. The dominance of the US dollar as a global funding currency is well recognised (Goldberg 2013, McCauley et al. 2015, Ivashina et al. 2015). There has been shift in the pattern of the sectors intermediating US dollar credit. Prior to the global financial crisis European banks were active in channelling US funding internationally (Shin 2012, Bruno and Shin 2015, Ivashina and Scharfstein 2015). The advent of the European sovereign debt crisis restrained euro area banks from intermediating US dollar funding internationally (Fender and McGuire 2010, Correa et al. 2012). Ex-post the global financial crisis, NFCs in emerging economies have increased their international issuance of US dollar credit in order to take advantage of relatively lower US dollar funding rates, the (McCauley et al. 2015, Shin 2013).

Greater financial globalisation, combined with the importance of the monetary policy of advanced economies in the global financial cycle, facilitates international spillovers of monetary policy (Rey 2013, Fratzscher et al. 2016). In particular, the empirical literature on international finance concludes that US monetary policy influences global financing conditions and is transmitted internationally through international capital flows (Cetorelli and Goldberg 2012, Rey 2013, Bruno and Shin 2015, Cerutti et al. 2014). Furthermore, diverging monetary policies among major global currencies affects the supply of assets denominated in major funding currencies (ECB 2016, He et al. 2016, McCauley et al. 2015).

Unconventional monetary policy in the form of asset purchase programmes can also affect international financial markets. Lo Duca et al. (2016) find that purchases of assets by the Federal Reserve were associated with increased issuance of bonds in both advanced and emerging markets. The non-standard monetary policy measures of the ECB also have international implications by raising asset prices in international financial markets and lowering global risk (Fratzscher et al. 2016). In the wake of the expanded unconventional monetary policy of the euro area, it is also NFCs, particularly those in advanced economies that have been taking advantage of comparatively lower costs of issuing euro debt relative to that of the US dollar, giving rise to increasing "reverse yankees" (Shin 2016).

The findings in this paper are relevant for the related literature and inform the policy debate concerning the international monetary system. First, consistent with the empirical findings of McCauley et al. (2015), the paper highlights the role of wider gaps in interest rates between the issuer country and the euro in driving the international issuance of euro denominated debt securities. Second, the results in this paper indicate empirical support for unconventional monetary policy as a determinant of the use of the euro in international bond markets. Furthermore, euro debt security issuance outside the euro area is not solely influenced by unconventional monetary policy in the euro area but also that of the US.

The remainder of the paper is as follows. Section 2 provides a brief overview of the dynamics in international debt securities followed by a description of the data sources drawn upon. Section 3 presents the econometric specification and the empirical results. Finally, Section 4 concludes.

2 Stylised facts and data

2.1 Stylised facts

This section details the characteristics and dynamics of international debt securities. Since the inception of the euro issuance of debt securities denominated in the single currency has steadily increased and it has become an important currency in the global financial system, second only to the US dollar.

The outstanding stock of euro denominated debt securities increased from 26 per cent of total international debt securities at the launch of the currency, to a share of 51 per cent on the eve of the global financial crisis in mid-2008, thereby surpassing the share of the US dollar in international debt markets (Figure 1). The period subsequent to the global financial crisis witnessed a return to greater usage of US dollar denominated debt security issuance relative to the euro (Figure 2). The US dollar regained dominance of use over the euro in the first quarter of 2015, the period associated with the implementation of the public sector purchase programme (PSPP) by the ECB as it engaged in an expansion of its unconventional monetary policy tools (Figure 1). Despite the return of the US dollar as the dominant currency in international debt security issuance, the international use of the euro continues to retain its status as the second largest currency in international bond markets.

Looking to the currency denomination of net issuance of international debt securities across country categories, the surge in net issuance in euro by borrowers in advanced economies seen during the pre-crisis period diminished sharply during the period associated with the sovereign debt crisis in Europe (Figure 3a). More recently there has been a return to positive net issuance of debt securities denominated in euro, with gross issuance exceeding redemptions, by borrowers in advanced economies. The return to usage of the euro by borrowers in advanced economies is most likely motivated by the comparatively lower funding costs in euro international debt markets driven by the negative interest rate policy in the eurozone, coupled with the ECB's asset purchase programme.

In contrast to borrowers in advanced economies, the US dollar retains its status as the most important currency for the issuance of debt securities by emerging markets in international bond markets (Figure 3b). This is consistent with Shin (2013, 2015) in that an appreciation of exchange rates in emerging economies relative to the US dollar increases emerging economies' borrowers' demand for international leverage denominated in US dollar driven by improvements in their net worth. Similar to the trend in advanced economies, the period associated with greater central bank liquidity in the euro area has seen marginal increased use of euro denominated debt security issuance by emerging markets.

What types of borrowers use the euro? In the wake of the launch of the euro and during the mid-2000s issuers of euro denominated debt securities were predominantly banks (Figure 4a), primarily those of advanced economies (Figure 4b). Redemptions have exceeded gross issuances of euro denominated securities by banks since the escalation of the sovereign debt crisis in Europe reflecting the contraction in banks' international leverage. In contrast since 2011 the share of NFCs accessing

euro denominated debt has increased significantly, driven by corporates in advanced economies. A different pattern in euro denominated issuance across sectors by emerging market borrowers is evident (Figure 4c) with the government sector having the largest share of net issuance between 1999 and 2008, and the role of banks in net issuance is comparatively smaller than those in advanced economies. Similar to NFCs in advanced economies, net issuance of securities denominated in euro has increased (Figure 4c).

2.2 Data

This section describes the data sources employed in the empirical analysis.

2.2.1 International Debt Securities

The gross issuance, net issuance (gross issuance minus redemptions) and outstanding amounts of debt securities are taken from the International Debt Securities (IDS) database of the Bank for International Settlements. Country-level data are available at a quarterly frequency for borrowers across four key sectors, namely banks, other financial corporations, non-financial corporations and governments, and are denominated by currency of issuance. The debt securities dataset includes issuance in both money market and bond instruments in debt markets other than that of the borrower thereby capturing the international aspect of debt security issuance.

Data are available on both a nationality and residency basis, the latter refers to the principle consistent with the residency principle of the balance of payments statistics. An advantage of the availability of nationality data is this concept of data collation is on a consolidated basis is closer to an accounting/supervisory principles. These data refer to the ultimate borrower rather than a subsidiary whose immediate borrowings are captured within the residency concept. For example, if a US borrower issues euro denominated bonds through its Hong Kong subsidiary purchased by an external investor say a UK bank, the residency definition would consider this to be an external liability of the Hong Kong subsidiary. The corporate is likely to base its finances on a consolidated group level. In order to explain the activities of the US borrow, therefore, it is important to consider the consolidated balance sheet and take account of euro denominated securities issued offshore.

Quarterly data on gross issuance, net issuance and outstanding amounts are employed for 32 non-euro area countries, 10 of which are advanced and 22 are emerging (see Appendix Table A for a list of countries in the sample). Euro area data are excluded from the dataset motivated by the focus on euro denominated debt issuance by borrowers outside of the euro area. The annual quarterly growth rate of net issuance scaled by the outstanding stock of debt securities from the previous period are calculated for non-financial corporates and banks over the period 1999 to mid-2016.

2.2.2 Monetary policy variables

To capture the differences in monetary policy across countries two interest rate variables are examined. The short-term interest rate is the money market interest rate and the yields on 10-year government bonds are taken to represent long-term interest rates, both of which are sourced from the IMF's IFS.

A number of measures of central bank unconventional monetary policy are considered. The balance sheets of the ECB and the Federal Reserve are sourced from their respective websites. The Wu Xia (2016) and Krippner (2016) shadow rates of the US and euro area are taken from the website of Cynthia Wu (https://sites.google.com/site/jingcynthiawu/) and the Reserve Bank of New Zealand (http://www.rbnz.govt.nz/research-and-publications/research-programme/research-staff-profiles /leo-krippner).

2.2.3 Country and global control variables

A range of country specific factors identified in the empirical literature as drivers of international capital flows is employed. Four country specific variables are considered. To capture the sentiment of investors and financial markets in the home country of borrowers the return on equity is taken from Thomson Reuters Datastream. Credit as a percentage of GDP is included to capture credit conditions in the domestic market of the borrower and are both sourced from the International Financial Statistics of the IMF (IMF's IFS). The macroeconomic conditions of the borrower country are represented by GDP growth taken from the IMF's IFS. The effect of exchange rates is captured by the change in the Nominal Effective Exchange Rate of the euro sourced from the IMF's IFS.

The risk appetite of investors in international bond markets is proxied by Bank of America Merrill Lynch Option Volatility Estimate (MOVE) Index downloaded from Thomson Reuters Datastream. Global GDP growth, sourced from the World Bank, is included to control for the global macroeconomic environment. The summary statistics of the variables used in the empirical analysis is reported in Table 1.

3 Empirical specification and results

3.1 Empirical specification

The econometric model considers that the issuance of euro denominated debt securities by non-euro area borrowers i resident in country j are influenced by diverging monetary policies, controlling for domestic conditions, global macroeconomic and financial conditions, and unobservable characteristics of country j. The baseline specification is given as follows:

$$\begin{aligned}\Delta D_{ijt} &= \beta \Delta Policy\ Rate\ Gap_{t-1} + \rho \Delta LT\ Rate\ Gap_{t-1} + \alpha Country_{jt-1} \\ &\quad + \psi Global_{t-1} + \theta Crisis^{GF}_{t} + \eta Crisis^{SD}_{t} + \delta C_j + \epsilon_{ijt} \end{aligned} \tag{1}$$

where ΔD is the net issuance of international debt securities denominated in euro by sector i in country j at time t, scaled by the outstanding amount of its euro debt securities at time $t-1$.

The divergence in the monetary policy stance between the issuers' home country j and the euro has consequences for the issuance of euro denominated securities by non-euro area borrowers. Wider gaps between short-term interest rates ($PolicyRateGap_{t-1}$) and long-term sovereign yields $LTRateGap_{t-1}$, indicating a tighter monetary policy environment in the issuers home country relative to that of the euro, is expected to be associated with greater issuance of euro denominated debt securities.

$Country$ represents a range of determinants of international debt issuance including the return on equity in the home country, ROE, where higher returns are associated with improved balance sheet worth for NFCs and higher equity growth leads to greater international leverage by banks (Bruno and Shin, 2015). GDP growth, GDP, in the home economy is also included given improvements in the macroeconomic environment increase demand for credit and investment. Greater availability of credit in the home market ought reduce demand by NFCs for leveraging internationally in foreign currency debt issuance and motivates the inclusion of the variable $Credit/GDPratio$.

$Global\ GDP$ is included to capture global macroeconomic factors that potentially determine international debt security issuance, including aggregate demand and the business cycle. Also included is $\Delta NEER$ to capture exchange rates effects, where a depreciation of the euro relative to the home country currency provides greater incentives for non-euro area borrowers to issue international debt securities denominated in euro. The risk appetite of bond investors, $MOVE$, has consequences for the supply of international debt securities given increased risk and uncertainty in bond markets is associated with reduced issuance and contractions in international capital flows.

To analyse the effect of the global financial crisis and European sovereign debt crisis on the determinants of international debt security issuance denominated in euro, two crisis dummies are created. To capture the global financial crisis the dummy variable, $Crisis^{GF}_{t}$, takes a value of 1 for the periods 2008Q4 to 2009Q2, and 0 otherwise. To account for the European sovereign debt crisis a second dummy variable is created, $Crisis^{SD}_{t}$, and is assigned a value of 1 between 2011Q3 and 2012Q1, and 0 otherwise, representing the most intense period of this crisis. Furthermore, the model is also estimated excluding these crisis periods to analyse their impact on the international issuance of euro denominated debt securities.

All control variables are included with a lag to account for potential simultaneity of the explanatory variables. The dependent variables are winsorized at the 5th and 95th percentile to mitigate the effects

of potential outliers.[2] To account for the possibility that international debt security issuance in euro by non-euro area residents is driven by time-invariant country-specific unobservable factors, country fixed effects, C_j, are included. Finally, ϵ is the error term.

3.2 Results

3.2.1 Baseline

The regressions are estimated over the period 1999 to mid-2016 on a quarterly unbalanced panel dataset of 32 non-euro area countries, distinguishing between their NFC and banking sectors. Included in the regression estimations are robust standard errors. Controls for global financial and macroeconomic conditions, exchange rates, and country specific time-varying characteristics are included in each regression.

The results of the baseline regressions based on specification (1) are reported in Table 2, where the dependent variable is the growth in the issuance of euro denominated debt securities of sector *i* scaled by the outstanding stock of debt security issuance from the previous period. Eight regressions are estimated across the two sub-samples of issuer type, with factors accounting for the global financial crisis and the euro area sovereign debt crisis entering each set of regressions sequentially.

Overall, the empirical results indicate that greater divergence in monetary policy between the country of the issuing sector and the euro area are statistically significant determinants of euro denominated debt security issuance by non-euro area borrowers. For the sample of NFCs, the positive and significant sign on the coefficient $ST\,interest\,rate$ in columns (1) to (4) suggests a greater gap between the issuer country's policy rate and that of the euro is related to higher issuance of euro denominated debt securities. The empirical analysis in column (1) is conducted over the sample period 1999 to 2016. In column (2) the global financial crisis period, 2008q4 to 2009q2 inclusively, is excluded. The global financial crisis dummy is included in columns (3) and (4), and the latter also includes the dummy variables for the European sovereign debt crisis period. Neither dummy variable is significant and $ST\,interest\,rate$ retains its explanatory power.

In terms of the global macroeconomic control variables, a greater return on equity in the home country of NFC issuers is associated with greater euro debt security issuance. The negative and significant coefficient on $Credit/GDPratio$ indicates that lower credit availability in the home market is related to higher reliance on euro debt security issuance, suggesting when faced with tighter credit conditions in the home market, NFCs turn to international funding outside of their local banking system. Lower growth in the home country of non-euro area issuers and the global economy are both associated with lower euro debt security issuance by non-euro area resident NFCs. $\Delta NEER$ enters columns (1) to (4) with negative and significant signs, indicating an appreciation of issuers' home

[2]Findings are consistent when the dependent variables are winsorized at the 1st and 99th percentile.

currency relative to the euro is associated with greater issuance of euro denominated debt securities. A higher perception of risk in global bond markets is positively associated with debt issuance by non-euro area NFCs denominated in euro.

Columns (5) to (8) in Table 2 report the results where the euro issuance of debt securities by non-euro area resident banks enters the regressions as the dependent variable, and the factors controlling for the two crisis periods entering the same regression sequence as columns (1) to (4). In contrast to the results for NFCs, euro debt issuance by banks corresponds positively to a wider gap in the longer-term interest rate between the home country and the euro area, and with greater divergence in policy rates negatively related to issuance for the full sample and when the global financial crisis period is excluded. A higher return on equity is inversely related to euro debt issuance by banks when dummy variables representing the two crises are included. Consistent with the results for NFCs, GDP growth in the home economy enters the regressions with a significant and negative sign. The effects of global macroeconomic and financial variables affect bank issuance differently to that of NFCs. Greater bank issuance of euro debt securities is consistent with higher global GDP growth and a depreciation of their home currency against the euro. The negative and significant coefficient on $MOVE$ indicates that a decline in risk in global bond markets is associated with greater euro issuance of debt securities by banks outside of the euro area. Consistent with the stylised facts, international debt security issuance by banks is negatively affected by both of the crisis periods examined in the empirical analysis.

To test the robustness of these results, the determinants of gross issuance of euro denominated debt securities by NFCs and banks are considered, the results of which are presented in Table 3. The positive and significant signs on the coefficient $ST\ interest\ rate$ for NFCs and $LT\ Rate\ Gap_{t-1}$ for banks confirm the importance of the relation between diverging monetary policy in the home country relative to that of the euro for the issuance of euro denominated debt securities outside of the euro area.

3.2.2 Advanced and emerging economies

Next explored is whether there is heterogeneity in the response of issuance of euro debt securities by banks and NFCs across advanced and emerging economies. In Table 4 the sample of countries is split into advanced and emerging economies continuing with the distinction between non-euro area resident NFC and bank issuers of international euro debt securities.[3] A greater gap between policy rates in issuers' home countries relative to the euro continues to be significant in determining issuance of euro denominated securities by NFCs across both advanced and emerging economies. A higher differential between longer-term rates as a driver of issuance by banks of euro debt securities retains its explanatory power for banks in emerging markets but not those in advanced economies.

For advanced economies, higher returns on equity are positively associated with international

[3]Table A1 in the Appendix details the countries included in the categories of advanced and emerging economies.

leverage by banks through euro bond markets, indicating higher equity returns at home are positively received by international investors. These findings are consistent for NFCs in emerging markets. In contrast higher equity returns in the issuer's home country are associated with less euro denominated international leverage by their banks. Borrowers in advanced economies are more sensitive to credit availability in the home market, whereby tighter credit in the home market incentivises international euro debt issuance. Improved macroeconomic conditions in the home market are positively associated with international euro leverage by borrowers in advanced economies but is significantly negative in relation to euro denominated debt security issuance by NFCs and banks in emerging markets.

Turning to the global factors that are determinants of international debt flows, growth in global GDP is negatively related to euro issuance by NFCs in advanced economies and positively associated with issuance by banks in advanced and emerging markets. The positive coefficient on $\Delta NEER$ in columns (2) and (4) suggests a depreciation of the home currency of non-euro area borrowers against the euro is associated with greater issuance by banks in advanced and emerging economies of euro denominated debt securities. A decline in volatility in international bond markets is associated with decline in the international issuance of euro debt securities by banks in advanced economies and NFCs in emerging markets but increased issuance by banks in emerging markets. For banks in both advanced and emerging markets both the global financial crisis and the European sovereign debt crisis negatively influence the issuance of euro denominated securities for banks but not NFCs.

3.2.3 Pre and post crisis

In the next step of the empirical analysis, it is examined whether the gap in the monetary policy stance has evolved in its role as a determinant of international debt security issuance in euro since the introduction of the currency. In Tables 5 and 6 the period under review is split between pre-crisis period, 1999q1-2008q3, and the post-crisis period, 2009q3-2016q2, and issuers are decomposed by sector and country category.

Prior to the global financial crisis, a wider gap between policy rates in the issuer country and the euro is negatively related to international debt issuance in euro by banks in all countries, and both advanced and emerging economies, implying comparatively higher funding costs for euro financing relative to other currencies did not dissuade non-euro area resident banks from issuing euro denominated debt securities. A similar pattern emerges for the gap in yields between the issuer country and the euro, where a narrower gap is negatively related to international debt security issuance in euro by NFCs in the full country sample and in emerging markets and banks in advanced economies. A positive relation between monetary policy gaps reflected by higher differentials in yields and euro credit in the form of debt securities to NFCs in advanced economies and banks in emerging markets is evident for the period prior to the global financial crisis.

Ex-post the global financial crisis, monetary policy divergence, as measured by $LT\ Rate\ Gap_{t-1}$,

between the home country of non-euro area resident issuers and the euro is positively related to euro debt security issuance for both NFCs and banks in the full country sample. The regression results in column (4) in Table 6 indicate the sensitivities of euro issuance of debt securities by banks in advanced economies outside of the euro area to both wider gaps in the policy rate and longer-term yields. The results for the post-crisis sample also reveal the evolving role of risk and uncertainty in bond markets as a driver of international debt issuance. Pre-crisis only international debt security issuance in euro by NFC borrowers in advanced economies was positive and statistically significantly related to $MOVE$. In contrast post-crisis the international leverage denominated in euro is sensitive to declines risk and uncertainty for banks in the full country and emerging markets samples, and NFCs in advanced economies.

3.2.4 Unconventional monetary policy

The next phase of the analysis is motivated by the findings that greater differentials between the monetary policy stance in issuers' home country and the euro area incentivise issuance in euro ex-post the global financial crisis. The expansion in the use of unconventional monetary policy tools by the Federal Reserve and the ECB as determinants of international issuance of euro denominated debt securities is therefore the focus of the next step in the empirical analysis.

The empirical analysis on the role of unconventional monetary policy as a determinant of international debt security issuance in euro is over the period 2011 to 2016, which witnessed significant enhancement of the ECB's balance sheet reflecting unconventional monetary policy in the form of asset purchases from public and private sector investors, combined with credit easing packages in the form of the Very Long-Term Refinancing Operations (VLTROs) and Targeted Long-Term Refinancing Operations (TLTROs). This period is also associated with the announcement and implementation by the Federal Reserve's tapering operations coupled with a return towards the normalisation of monetary policy in the form of interest rate hikes. The divergence between the monetary policies of the two major central banks has been more pronounced since end-2011 as evidenced in the divergence in the scale of the balance sheet of each central bank scaled by its respective GDP (Figure 5). The asynchronous developments in the monetary policy stance across the most important currencies in the global financial system is also reflected in the increasing gaps between the shadow rates (Figure 6).

The empirical results reported in Table 7 replicate the baseline regression but the policy rate and yield gap measures of monetary policy are replaced with indicators of unconventional monetary policy. A number of measures of the unconventional monetary policy stance are considered, including: (i) the change in the gap between policy rates in the US and the euro area; (ii) the growth in the balance sheet of the ECB to capture "flow effects" representing asset purchases by the ECB; (iii) the growth in the gap between the shadow rates of the US and the euro area from Wu Xia (2016); (iv) the growth in the gap between the shadow rates of US and the euro area estimated in Krippner (2016); (v) the

change in the gap between the balance sheets of the Federal Reserve and the ECB; (vi) the growth in the US shadow rate, and (vii) the growth in the euro area shadow rate. Table 7 presents the summary results of the regression analysis (details of the individual regressions with the control variables are reported in Tables A2-A7 in the Appendix), where the indicators of unconventional monetary policy enter the regressions individually and included in throughout the regressions are controls for domestic and global conditions consistent with the results in Tables 2 to 6.

A greater gap in the monetary policy stance between the US and the euro area is positively associated with greater international issuance of euro debt securities by banks in the full country sample, and by those of advanced and emerging markets, indicating that non-euro area owned banks take advantage of comparatively lower funding costs of the euro relative to US dollar funding. The coefficient on $\Delta logECB\ BS$, enters columns (2), (3), (4) and (6) with a significant and negative sign, implying asset purchases by the ECB are negatively associated with international euro debt security issuance by banks of advanced and emerging economies and NFCs of advanced economies.

Across the two measures of the gaps in the shadow rates significant effects are found of a greater gap in unconventional monetary policy influencing international euro debt issuance for NFCs and banks in the full country sample and banks in the emerging market sub-sample. The growth in the gap between the balance sheets of the Federal Reserve and the ECB negatively affects the international euro debt issuance by banks in advanced economies. Throughout the regressions growth in the unconventional monetary policy in the US positively influences international euro debt security issuance by all categories of sectors and country sub-samples under consideration. International euro debt security debt issuance by banks is negatively related to expansions in the ECB's unconventional monetary policy as estimated by the shadow rate for banks in the full country sample, driven by banks in advanced economies.

3.3 Discussion of results

Larger interest rate differentials, reflecting heterogeneity in the monetary policy stance across countries are expected to increase the international leverage of borrowers in the relatively cheaper currency. Overall, the formal analysis confirms that diverging monetary policy between the home currency of the issuer and that of the euro area matters for the euro denominated international debt security issuance by non-euro area borrowers. The empirical analysis shows that issuance of euro denominated debt securities by non-euro area borrowers is determined by greater differentials in the monetary policy between the domestic market of the issuer and the euro area. In addition, the results highlight that there is heterogeneity in the effect of the gaps between the short term policy rate and long term interest rate across sectors. These findings are consistent with the related research on the determinants of international borrowing in the currencies of major economies (McCauley et al. 2015).

Credit conditions and the macroeconomic environment in the home economy of the issuer emerge

as highly significant indicators of both international euro denominated debt security issuance by both NFCs and banks. Less credit in the home market and a weak economic performance are associated with higher debt issuance in euro, indicating borrowers go beyond their domestic bond market when domestic macroeconomic conditions deteriorate. Global factors have contrasting effects on NFCs compared with banks, suggesting across the international financial and business cycles, international investors have contrasting demand for bond assets. A decline in the perception of risk in bond markets induces a net expansion of credit to NFCs but has contractionary effects for banks, suggesting international bond markets perceive a safe haven effect of NFC debt.

Heterogeneity in the determinants of debt security issuance in euro by non-euro area borrowers not only exists across sector and geography but also over time. Pre-crisis, when non-euro area banks were the most active sector issuing euro denominated debt securities, a wider gap negatively influenced debt security issuance. In the wake of the global financial crisis issuers appear to be more price sensitive where higher gaps in monetary policy matter for both NFCs and banks (Avdjiev et al. 2016).

Furthermore, evidence of spillovers of unconventional monetary policy from the euro area and US is found. Regarding the non-standard monetary policy measures of the ECB, greater purchases and holdings of assets by the central bank is negatively related to debt security issuance in euro by non-euro area bank borrowers and NFCs in advanced economies. These findings are in contrast to the idea that asset purchases by central banks induce global bond issuance and portfolio rebalancing (D'Amico and King 2013, Lo Duca et al. 2016). Divergent effects of unconventional monetary policy on euro denominated debt issuance is evident, where the unconventional monetary policy of the Federal Reserve positively influences euro debt issuance outside of the euro area, and is negatively related to the unconventional monetary policy of the ECB, suggesting not only is the difference between the policy of importance to global bond markets but also the policies themselves. These findings are in line with those in the related literature, that the monetary policy of major economies affects international capital flows (Rey 2013, Fratzscher et al. 2014, Bruno and Shin 2015). Overall these findings suggest that international bond markets react differently to the monetary policy regimes of major currencies.

4 Conclusions

The rising importance of the euro in global financial markets has increased the impetus to understand the factors influencing the issuance of debt securities denominated in euro by borrowers outside the monetary union. Employing a country-level quarterly dataset of 32 non-euro area advanced and emerging economies, this paper investigates the influence of differences in monetary policy in the euro area relative to the borrower's home country on the use of the euro in international bond markets. Controlling for country-specific characteristics, global factors, the global financial crisis and the European sovereign debt crisis, the empirical analysis finds that diverging monetary policy in the

borrower's home economy relative to that in the euro area determines the international issuance of debt securities denominated in euro by non-euro area borrowers.

These findings have direct implications for policy makers. First, increased use of the euro by non-euro area borrowers in an environment of asynchronous monetary policies for the dominant currencies in the international monetary system facilitates borrowers the ability to by-pass their domestic monetary policy stance. Second, the use of euro by non-euro area borrowers may "crowd out" euro area borrowers thereby decreasing their access to low cost funding, thereby creating leakages of euro area unconventional monetary policy. Furthermore, increased availability of euro denominated assets has positive effects for the portfolio rebalancing channel of unconventional monetary policy transmission.

In terms of international capital flows research the increased role of the euro in global financial system combined with diverging monetary policies not just between emerging and advanced economies but also between advanced economies highlights the need for these factors to be considered. Overall, these results warrant investigation of deeper inter-linkages between monetary policy spillovers, international funding currencies and financial market developments.

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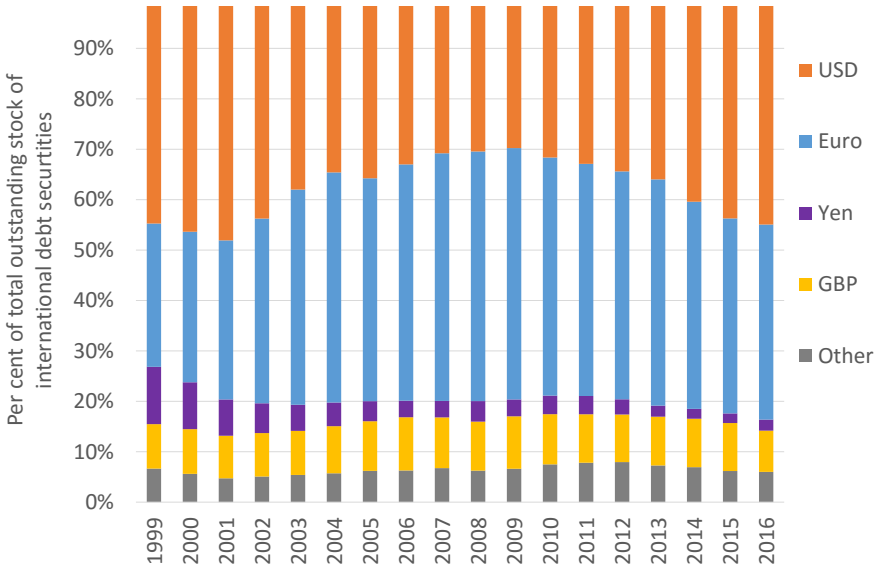
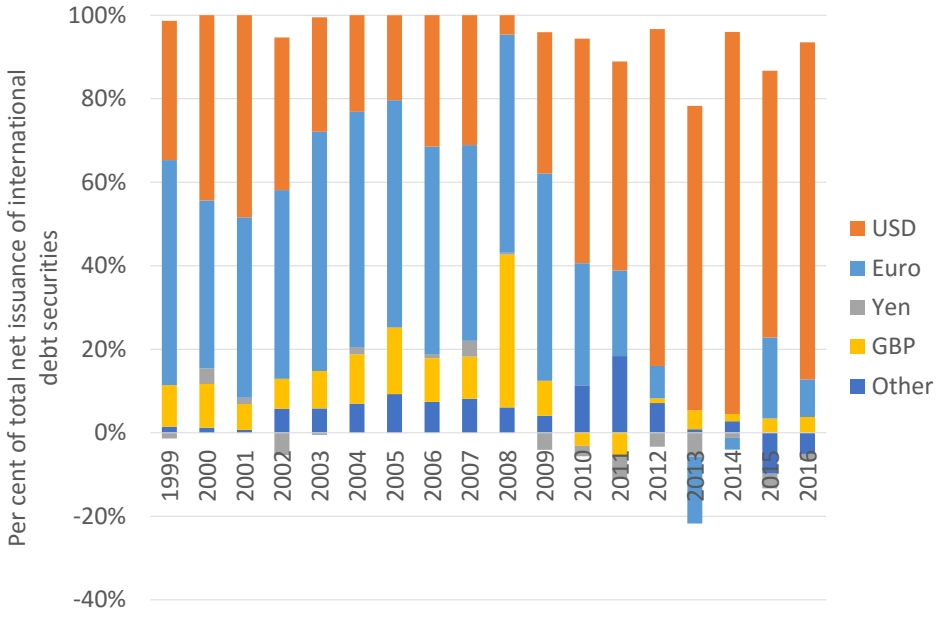
Figures and tables

Figure 1: Outstanding stocks of international debt securities by currency, 1999 to 2016



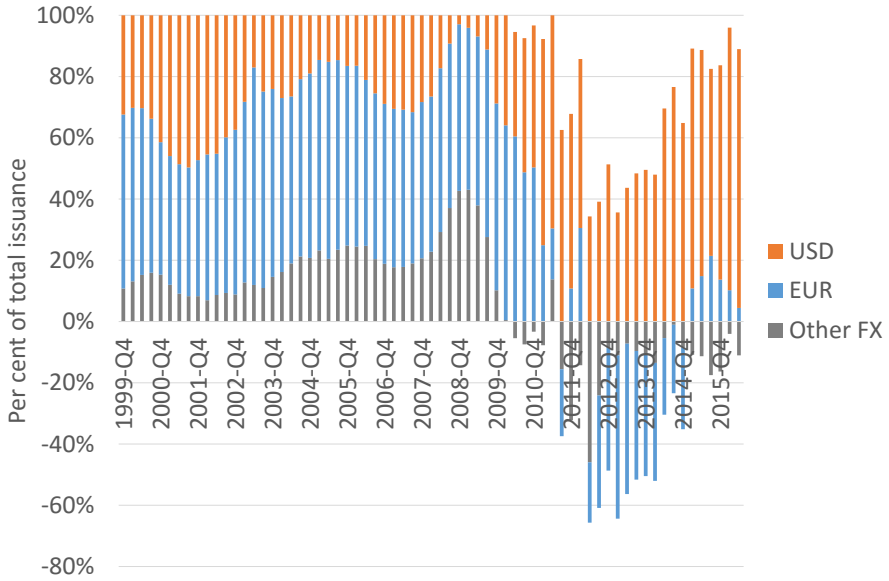
Data source: BIS International Debt Securities Statistics

Figure 2: Net issuance of international debt securities by currency, 1999 to 2016



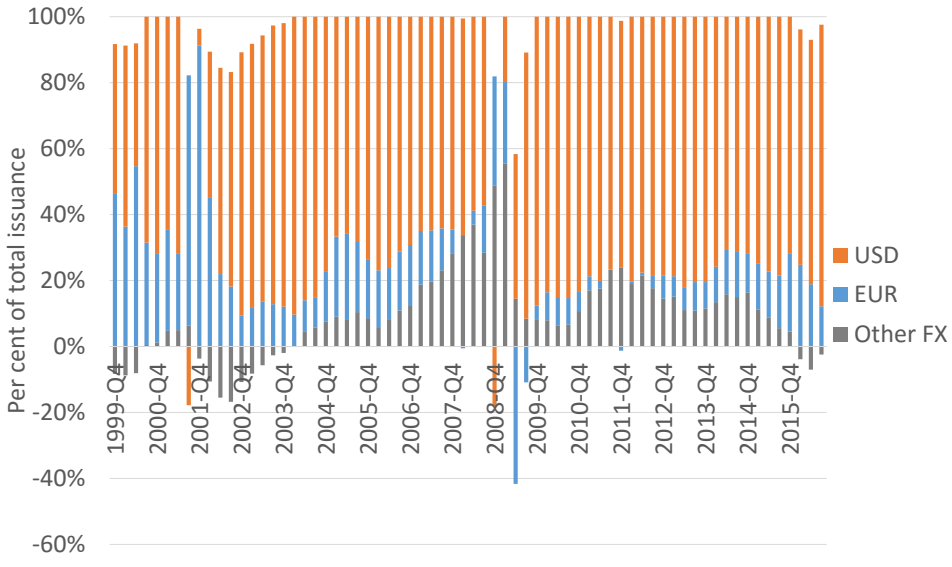
Data source: BIS International Debt Securities Statistics

Figure 3a: Net issuance of international debt securities by advanced economies, 1999 to 2016



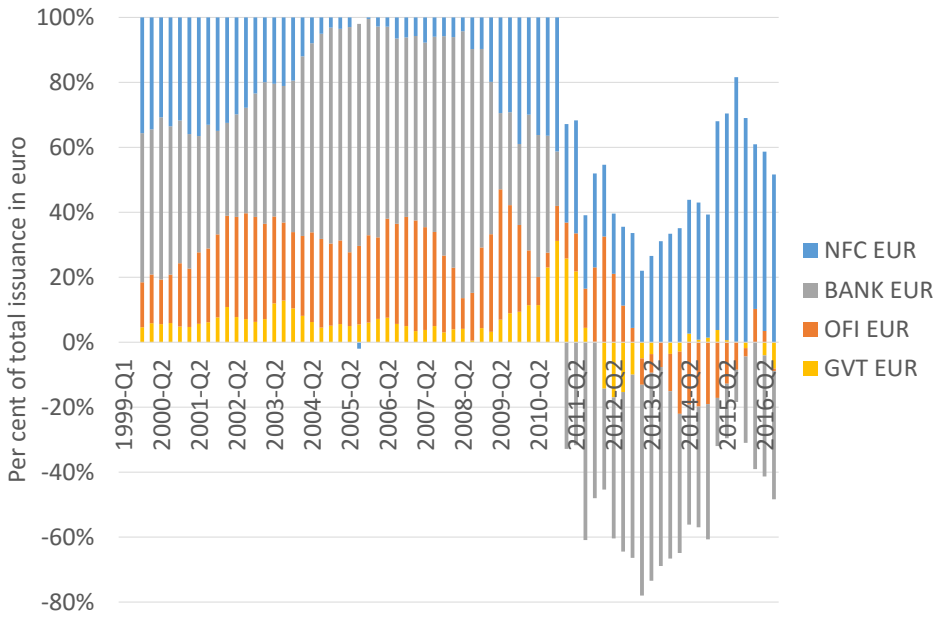
Data source: BIS International Debt Securities Statistics

Figure 3b: Net issuance of international debt securities by emerging economies, 1999 to 2016



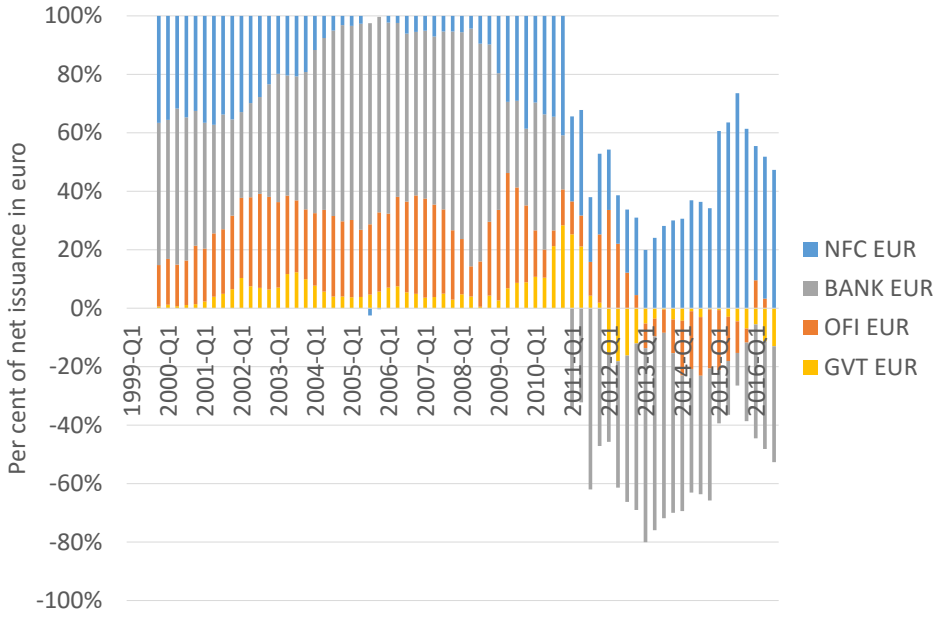
Data source: BIS International Debt Securities Statistics

Figure 4a: Net issuance of EUR international debt securities, by sector, 1999 to 2016



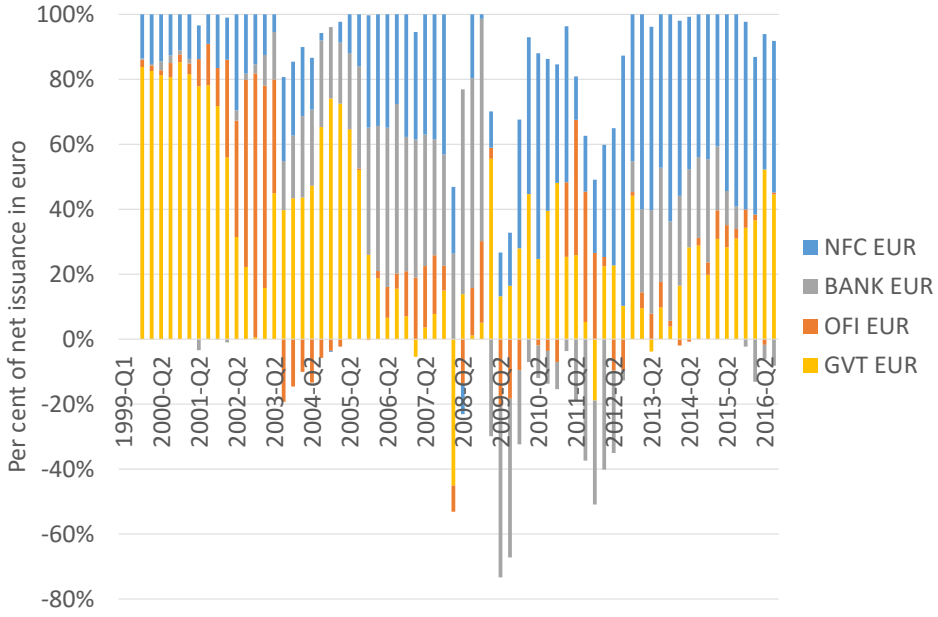
Data source: BIS International Debt Securities Statistics

Figure 4b: Net issuance of EUR international debt securities in advanced economies by sector, 1999 to 2016



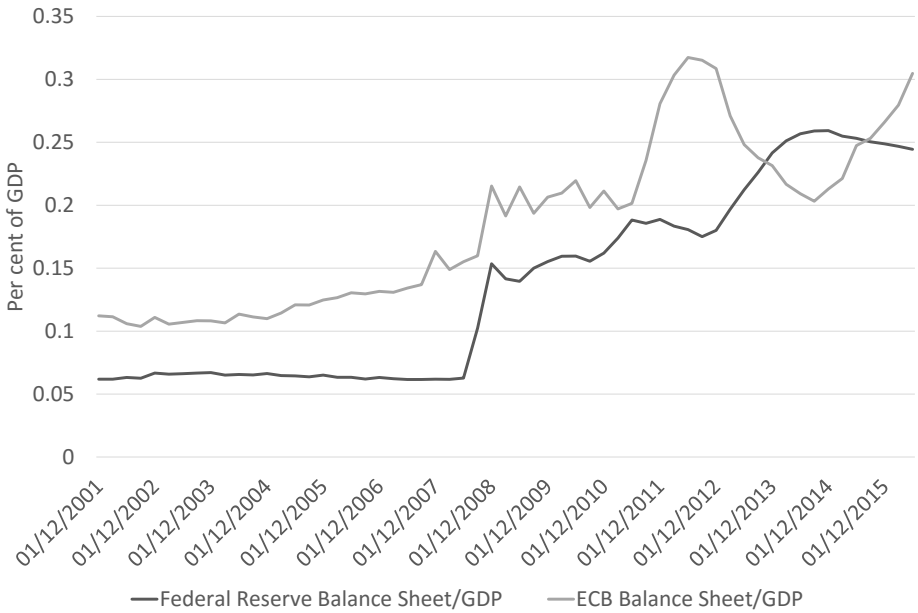
Data source: BIS International Debt Securities Statistics

Figure 4c: Net issuance of EUR international debt securities in emerging economies by sector, 1999 to 2016



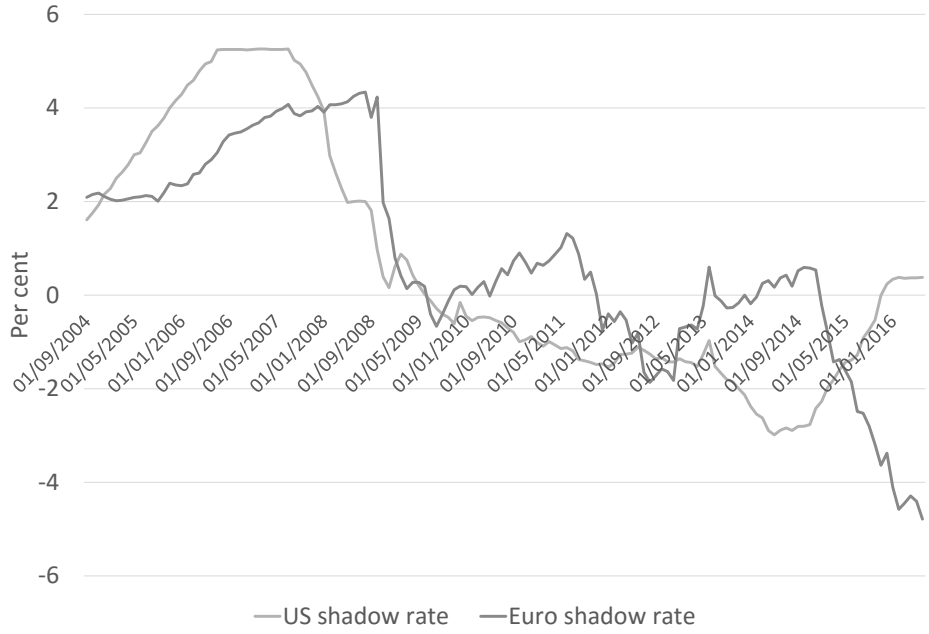
Data source: BIS International Debt Securities Statistics

Figure 5: Federal reserve and ECB balance sheets, 2001 to mid-2016



Data sources: Central bank balance sheet data is sourced from the websites of the Federal Reserve and ECB. GDP data are sourced from the International Financial Statistics of the International Monetary Fund.

Figure 6: US and ECB shadow rates, 2004 to mid-2016



Data source: Wu Xia (20XX) shadow rates

Table 1: Summary Statistics

Variable	Mean	Std.Dev.	Min.	Max.
		No. of observations = 2310		
Dependent variables				
Net EUR issuance of NFCs	0.01	0.45	-1.00	1.01
Net EUR issuance of banks	0.02	0.58	-0.98	1.46
Gross EUR issuance of NFCs	0.25	0.39	0.00	1.45
Gross EUR issuance of banks	0.47	0.74	0.00	2.67
Monetary policy variables				
Policy rate gap	-0.04	0.78	-5.07	4.89
LT rate gap	-0.00	0.18	-0.97	1.30
US EA Policy Rate Gap	0.10	1.31	-2.15	3.39
Change in ECB BS	0.10	0.18	-0.28	0.45
US EA Shadow Rate Gap (Wu Xia)	0.23	5.48	-9.50	33.38
US EA Shadow Rate Gap (Krippner)	-1.01	9.43	-45.77	46.20
US EA BS Gap	-0.14	2.10	-11.60	9.30
Change in US Shadow Rate	-0.01	0.86	-3.28	1.91
Change in EA Shadow Rate	-2.24	14.75	-93.62	19.58
Country control variables				
ROE	0.06	0.28	-2.35	1.62
Credit/GDP ratio	2.29	2.32	0.00	12.51
GDP growth issuer	0.07	0.08	-0.23	0.73
Global control variables				
NEER	0.01	0.06	-0.11	0.15
GDP growth world	0.05	0.05	-0.09	0.14
MOVE index	4.54	0.25	4.05	5.20

Table 2: Baseline results: Net issuance of NFCs & banks

	(1) NFCs	(2) NFCs	(3) NFCs	(4) NFCs	(5) Banks	(6) Banks	(7) Banks	(8) Banks
Monetary policy gaps								
Δ log Policy Rate Gap	0.026**	0.021**	0.026**	0.026**	-0.020*	-0.019	-0.020*	-0.016
	(0.008)	(0.008)	(0.008)	(0.008)	(0.012)	(0.013)	(0.012)	(0.012)
Δ log LT Rate Gap	0.017	0.018	0.016	0.025	0.082*	0.087*	0.076	0.127**
	(0.040)	(0.041)	(0.040)	(0.041)	(0.047)	(0.049)	(0.048)	(0.048)
Country factors								
ROE	0.114***	0.128***	0.106***	0.099***	-0.000	-0.050	-0.030	-0.064*
	(0.027)	(0.032)	(0.029)	(0.029)	(0.036)	(0.043)	(0.038)	(0.039)
Credit/GDP ratio	-0.047***	-0.047***	-0.046***	-0.045***	-0.051***	-0.047***	-0.048***	-0.041***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
GDP growth issuer	-0.628***	-0.647***	-0.632***	-0.630***	-0.385**	-0.357**	-0.400**	-0.390**
	(0.138)	(0.142)	(0.138)	(0.138)	(0.147)	(0.155)	(0.148)	(0.148)
Global factors								
GDP growth world	-0.709***	-0.698***	-0.677***	-0.624***	0.812***	0.915***	0.925***	1.212***
	(0.152)	(0.163)	(0.159)	(0.163)	(0.194)	(0.210)	(0.204)	(0.209)
Δlog NEER	-0.267**	-0.270**	-0.281**	-0.281**	0.771***	0.718***	0.722***	0.725***
	(0.129)	(0.132)	(0.131)	(0.131)	(0.162)	(0.165)	(0.164)	(0.164)
MOVE index	0.057*	0.068*	0.068*	0.068*	-0.162***	-0.126**	-0.124**	-0.120**
	(0.034)	(0.038)	(0.037)	(0.037)	(0.046)	(0.051)	(0.050)	(0.050)
Crisis dummies								
Crisis^{GF}			-0.037	-0.046			-0.130**	-0.179***
			(0.038)	(0.038)			(0.048)	(0.049)
Crisis^{SD}				-0.059				-0.321***
				(0.038)				(0.045)
N	2310	2211	2310	2310	2310	2211	2310	2310
R^2	0.356	0.350	0.356	0.357	0.354	0.355	0.355	0.367
adj. R^2	0.344	0.338	0.344	0.345	0.342	0.343	0.343	0.355

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table 3: Gross issuance of NFCs & banks

	(1) NFCs	(2) NFCs	(3) NFCs	(4) NFCs	(5) Banks	(6) Banks	(7) Banks	(8) Banks
Monetary policy gaps								
Δ log Policy Rate Gap	0.016*	0.011	0.016*	0.017*	-0.034**	-0.031*	-0.034**	-0.031*
	(0.009)	(0.008)	(0.009)	(0.009)	(0.017)	(0.018)	(0.017)	(0.017)
Δ log LT Rate Gap	0.051	0.050	0.053	0.059	0.121*	0.151**	0.126*	0.168**
	(0.040)	(0.040)	(0.040)	(0.040)	(0.066)	(0.067)	(0.066)	(0.067)
Country factors								
ROE	0.143***	0.172***	0.155***	0.151***	-0.030	-0.031	-0.004	-0.032
	(0.026)	(0.030)	(0.028)	(0.028)	(0.050)	(0.060)	(0.054)	(0.055)
Credit/GDP ratio	-0.063***	-0.066***	-0.064***	-0.063***	-0.045***	-0.047***	-0.048***	-0.042**
	(0.011)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)
GDP growth issuer	-0.313**	-0.312**	-0.308**	-0.306**	-0.419**	-0.390**	-0.406**	-0.398**
	(0.109)	(0.114)	(0.109)	(0.109)	(0.182)	(0.191)	(0.181)	(0.181)
Global factors								
GDP growth world	-0.489***	-0.524***	-0.533***	-0.497***	1.010***	0.897**	0.911**	1.148***
	(0.137)	(0.146)	(0.143)	(0.145)	(0.287)	(0.305)	(0.296)	(0.307)
Δlog NEER	-0.112	-0.071	-0.093	-0.092	1.093***	1.141***	1.135***	1.138***
	(0.128)	(0.131)	(0.130)	(0.130)	(0.219)	(0.222)	(0.220)	(0.221)
MOVE index	-0.058*	-0.080**	-0.072**	-0.072**	-0.420***	-0.463***	-0.453***	-0.450***
	(0.031)	(0.034)	(0.034)	(0.034)	(0.066)	(0.073)	(0.072)	(0.072)
Crisis dummies								
Crisis^{GF}			0.050*	0.044			0.113	0.073
			(0.029)	(0.030)			(0.079)	(0.080)
Crisis^{SD}				-0.040				-0.266***
				(0.034)				(0.055)
N	2310	2211	2310	2310	2310	2211	2310	2310
R^2	0.269	0.265	0.270	0.270	0.221	0.225	0.222	0.227
adj. R^2	0.256	0.251	0.256	0.257	0.208	0.210	0.208	0.213

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table 4: Advanced and emerging economies

	(1) Advanced: NFCs	(2) Advanced: Banks	(3) Emerging: NFCs	(4) Emerging: Banks
Monetary policy gaps				
Δ log Policy Rate Gap	0.035**	-0.030	0.019*	-0.014
	(0.011)	(0.020)	(0.011)	(0.015)
Δ log LT Rate Gap	0.080	0.088	0.027	0.210***
	(0.062)	(0.085)	(0.062)	(0.054)
Country factors				
ROE	0.056	0.161**	0.120**	-0.097**
	(0.044)	(0.057)	(0.038)	(0.047)
Credit/GDP ratio	-0.051***	-0.058***	0.003	0.047**
	(0.012)	(0.012)	(0.019)	(0.022)
GDP growth issuer	1.082**	0.977**	-0.744***	-0.346**
	(0.422)	(0.460)	(0.146)	(0.157)
Global factors				
GDP growth world	-1.755***	0.860**	-0.199	1.214***
	(0.281)	(0.373)	(0.214)	(0.268)
Δlog NEER	-0.243	1.300***	-0.205	0.580**
	(0.196)	(0.259)	(0.170)	(0.210)
MOVE index	0.039	0.168**	0.105**	-0.184**
	(0.061)	(0.080)	(0.047)	(0.063)
Crisis dummies				
Crisis^{GF}	-0.002	-0.183***	-0.078	-0.168**
	(0.061)	(0.054)	(0.050)	(0.070)
Crisis^{SD}	-0.027	-0.331***	-0.083	-0.328***
	(0.049)	(0.047)	(0.052)	(0.064)
N	770	770	1540	1540
R^2	0.334	0.187	0.354	0.368
adj. R^2	0.316	0.165	0.340	0.355

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table 5: Pre crisis

	(1) All: NFCs	(2) All: Banks	(3) Advanced: NFCs	(4) Advanced: Banks	(5) Emerging: NFCs	(6) Emerging: Banks
Monetary policy gaps						
Δ log Policy Rate Gap	0.015	-0.107***	0.022*	-0.142***	-0.001	-0.085**
	(0.011)	(0.024)	(0.012)	(0.040)	(0.018)	(0.027)
Δ log LT Rate Gap	-0.133**	0.078	0.152*	-0.311*	-0.212**	0.317***
	(0.064)	(0.095)	(0.092)	(0.176)	(0.094)	(0.095)
Country factors						
ROE	0.119***	-0.057	0.259**	0.231	0.096**	-0.110*
	(0.035)	(0.060)	(0.089)	(0.145)	(0.038)	(0.066)
Credit/GDP ratio	-0.033**	-0.016	-0.021	-0.046**	0.010	0.139***
	(0.013)	(0.013)	(0.015)	(0.015)	(0.030)	(0.035)
GDP growth issuer	-1.058***	-0.461**	0.895	-1.159*	-1.179***	-0.355
	(0.176)	(0.226)	(0.752)	(0.685)	(0.181)	(0.23)
Global factors						
GDP growth world	-1.286***	0.887**	-3.333***	0.779	-0.621**	0.847**
	(0.246)	(0.340)	(0.391)	(0.550)	(0.311)	(0.420)
Δlog NEER	-0.594***	0.048	-0.399	0.618*	-0.550**	-0.17
	(0.170)	(0.204)	(0.307)	(0.374)	(0.205)	(0.244)
MOVE index	0.066	-0.061	0.178**	0.054	0.045	-0.038
	(0.052)	(0.070)	(0.081)	(0.099)	(0.067)	(0.09)
N	1287	1287	429	429	858	858
R^2	0.429	0.463	0.521	0.243	0.394	0.448
adj. R^2	0.410	0.446	0.500	0.210	0.372	0.429

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table 6: Post crisis

	(1) All: NFCs	(2) All: Banks	(3) Advanced: NFCs	(4) Advanced: Banks	(5) Emerging: NFCs	(6) Emerging: Banks
Monetary policy gaps						
Δ log Policy Rate Gap	0.014	0.016	0.011	0.062***	0.016	-0.011
	(0.009)	(0.014)	(0.014)	(0.018)	(0.012)	(0.019)
Δ log LT Rate Gap	0.106**	0.165**	0.077	0.294**	0.148	0.062
	(0.051)	(0.059)	(0.058)	(0.089)	(0.095)	(0.083)
Country factors						
ROE	0.167**	-0.118**	-0.047	0.023	0.274**	-0.146*
	(0.066)	(0.059)	(0.046)	(0.041)	(0.083)	(0.087)
Credit/GDP ratio	-0.062**	0.051	-0.031	0.023	-0.098*	0.102
	(0.027)	(0.000)	(0.019)	(0.022)	(0.053)	(0.062)
GDP growth issuer	-0.727**	-0.665**	-0.757	1.402**	-0.918**	-0.889**
	(0.289)	(0.336)	(0.554)	(0.639)	(0.328)	(0.381)
Global factors						
GDP growth world	-0.712**	-0.125	-0.865**	-1.787***	-0.549*	0.574
	(0.222)	(0.304)	(0.354)	(0.423)	(0.295)	(0.412)
Δlog NEER	-0.14	0.601**	-0.111	0.595*	-0.213	0.774**
	(0.201)	(0.264)	(0.227)	(0.348)	(0.293)	(0.380)
MOVE index	-0.064	-0.359***	-0.281**	-0.127	0.008	-0.436***
	(0.055)	(0.074)	(0.094)	(0.115)	(0.068)	(0.094)
N	924	924	308	308	616	616
R^2	0.506	0.451	0.176	0.230	0.540	0.486
adj. R^2	0.484	0.426	0.124	0.182	0.517	0.460

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table 7: Unconventional monetary policy (UMP)

	(1) All: NFCs	(2) All: Banks	(3) Advanced: NFCs	(4) Advanced: Banks	(5) Emerging: NFCs	(6) Emerging: Banks
US EA Policy Rate Gap	0.002	0.211**	0.083	0.218**	-0.028	0.188*
	(0.056)	(0.075)	(0.053)	(0.098)	(0.079)	(0.104)
R^2	0.531	0.592	0.235	0.221	0.534	0.650
Δlog ECB BS	0.063	-0.654***	-0.203**	-0.424**	0.153	-0.717***
	(0.093)	(0.116)	(0.085)	(0.199)	(0.129)	(0.153)
R^2	0.532	0.607	0.244	0.225	0.536	0.666
US EA Shadow Rate Gap (Wu Xia)	0.013*	0.001	0.006	0.017	0.016	-0.007
	(0.008)	(0.008)	(0.006)	(0.012)	(0.011)	(0.011)
R^2	0.534	0.587	0.231	0.214	0.537	0.647
US EA Shadow Rate Gap (Krippner)	-0.000	0.003**	0.000	0.000	-0.000	0.005**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
R^2	0.531	0.589	0.228	0.206	0.534	0.650
US EA BS Gap	-0.001	-0.005	0.000	-0.019*	-0.001	0.002
	(0.005)	(0.007)	(0.006)	(0.011)	(0.007)	(0.008)
R^2	0.531	0.587	0.227	0.220	0.534	0.647
Δlog US Shadow Rate	0.102**	0.196***	0.096**	0.303***	0.114*	0.129**
	(0.042)	(0.050)	(0.045)	(0.081)	(0.060)	(0.065)
R^2	0.536	0.596	0.250	0.266	0.538	0.650
Δlog EA Shadow Rate	-0.000	-0.002**	-0.001	-0.004**	0.000	-0.001
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
R^2	0.531	0.591	0.234	0.242	0.534	0.647
N	627	627	209	209	418	418

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Appendix

Table A1: Sample countries

Advanced economies	Emerging economies
Australia	United Arab Emirates
Canada	Argentina
Switzerland	Bulgaria
Denmark	Brazil
United Kingdom	Chile
Iceland	China
Japan	Czech Republic
Norway	Croatia
Sweden	Hungary
United States	India
	South Korea
	Kuwait
	Kazakhstan
	Mexico
	Malaysia
	Poland
	Qatar
	Russia
	Thailand
	Turkey
	Uruguay
	South Africa

Table A2: UMP and NFCs in full sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
US EA Policy Rate Gap	0.002						
	(0.056)						
Δlog ECB BS		0.063					
		(0.093)					
US EA Shadow Rate Gap (Wu Xia)			0.013*				
			(0.008)				
US EA Shadow Rate Gap (Krippner)				-0.000			
				(0.001)			
US EA BS Gap					-0.001		
					(0.005)		
Δlog US Shadow Rate						0.102**	
						(0.042)	
Δlog EA Shadow Rate							-0.000
							(0.001)
ROE	0.475**	0.504**	0.477***	0.478**	0.473**	0.424**	0.472**
	(0.151)	(0.154)	(0.142)	(0.145)	(0.146)	(0.145)	(0.144)
Credit/GDP ratio	-0.046	-0.043	-0.053	-0.046	-0.046	-0.055	-0.047
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.050)	(0.048)
GDP growth issuer	-0.993**	-0.997**	-1.041**	-0.992**	-0.994**	-1.034**	-0.989**
	(0.354)	(0.356)	(0.359)	(0.354)	(0.354)	(0.358)	(0.351)
Δlog NEER	-0.055	0.121	0.112	-0.057	-0.070	-0.325	-0.018
	(0.309)	(0.336)	(0.269)	(0.273)	(0.296)	(0.277)	(0.285)
GDP growth world	-0.713**	-0.746**	-1.030**	-0.718**	-0.690*	-1.787***	-0.713**
	(0.318)	(0.320)	(0.364)	(0.320)	(0.359)	(0.533)	(0.314)
MOVE index	0.145	0.117	0.230**	0.147	0.147	0.233**	0.144
	(0.090)	(0.099)	(0.101)	(0.094)	(0.089)	(0.094)	(0.090)
N	627	627	627	627	627	627	627
R^2	0.531	0.532	0.534	0.531	0.531	0.536	0.531
adj. R^2	0.500	0.500	0.503	0.500	0.500	0.505	0.500

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table A3: UMP and Banks in full sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
US EA Policy Rate Gap	0.211**						
	(0.075)						
Δlog ECB BS		-0.654***					
		(0.116)					
US EA Shadow Rate Gap (Wu Xia)			0.001				
			(0.008)				
US EA Shadow Rate Gap (Krippner)				0.003**			
				(0.001)			
US EA BS Gap					-0.005		
					(0.007)		
Δlog US Shadow Rate						0.196***	
						(0.050)	
Δlog EA Shadow Rate							-0.002**
							(0.001)
ROE	-0.526***	-0.691***	-0.403**	-0.442***	-0.420**	-0.504***	-0.446***
	(0.134)	(0.133)	(0.128)	(0.132)	(0.131)	(0.126)	(0.127)
Credit/GDP ratio	0.003	-0.017	0.009	0.008	0.009	-0.008	0.000
	(0.054)	(0.052)	(0.056)	(0.055)	(0.055)	(0.053)	(0.055)
GDP growth issuer	-0.772	-0.662	-0.708	-0.713	-0.714	-0.782	-0.665
	(0.488)	(0.460)	(0.490)	(0.482)	(0.491)	(0.478)	(0.499)
Δlog NEER	0.381	-0.773*	1.005**	1.221***	0.867**	0.461	1.332***
	(0.366)	(0.416)	(0.323)	(0.344)	(0.348)	(0.329)	(0.334)
GDP growth world	0.282	0.505	0.151	0.303	0.327	-1.873**	0.190
	(0.377)	(0.367)	(0.413)	(0.377)	(0.432)	(0.638)	(0.373)
MOVE index	-0.389***	-0.075	-0.353**	-0.412***	-0.353***	-0.192*	-0.370***
	(0.103)	(0.111)	(0.119)	(0.107)	(0.104)	(0.112)	(0.102)
N	627	627	627	627	627	627	627
R^2	0.592	0.607	0.587	0.589	0.587	0.596	0.591
adj. R^2	0.565	0.581	0.559	0.562	0.559	0.570	0.564

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table A4: UMP and NFCs in advanced economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
US EA Policy Rate Gap	0.083						
	(0.053)						
Δlog ECB BS		-0.203**					
		(0.085)					
US EA Shadow Rate Gap (Wu Xia)			0.006				
			(0.006)				
US EA Shadow Rate Gap (Krippner)				0.000			
				(0.001)			
US EA BS Gap					0.000		
					(0.006)		
Δlog US Shadow Rate						0.096**	
						(0.045)	
Δlog EA Shadow Rate							-0.001
							(0.000)
ROE	0.207	0.105	0.291**	0.279**	0.288**	0.188	0.264*
	(0.146)	(0.164)	(0.132)	(0.130)	(0.134)	(0.151)	(0.134)
Credit/GDP ratio	-0.023	-0.019	-0.026	-0.026	-0.026	-0.020	-0.026
	(0.030)	(0.028)	(0.030)	(0.030)	(0.030)	(0.029)	(0.030)
GDP growth issuer	-0.303	-0.224	-0.296	-0.299	-0.290	-0.325	-0.342
	(0.611)	(0.593)	(0.596)	(0.600)	(0.599)	(0.589)	(0.603)
Δlog NEER	-0.568**	-0.852**	-0.268	-0.305	-0.338	-0.580**	-0.203
	(0.253)	(0.293)	(0.256)	(0.233)	(0.256)	(0.216)	(0.251)
GDP growth world	-0.726**	-0.711**	-0.874**	-0.711**	-0.729**	-1.788**	-0.723**
	(0.287)	(0.286)	(0.356)	(0.296)	(0.339)	(0.591)	(0.286)
MOVE index	-0.046	0.047	0.006	-0.040	-0.033	0.046	-0.036
	(0.083)	(0.082)	(0.093)	(0.085)	(0.081)	(0.076)	(0.082)
N	209	209	209	209	209	209	209
R^2	0.235	0.244	0.231	0.228	0.227	0.250	0.234
adj. R^2	0.167	0.176	0.162	0.159	0.159	0.183	0.166

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table A5: UMP and banks in advanced economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
US EA Policy Rate Gap	0.218**						
	(0.098)						
Δlog ECB BS		-0.424**					
		(0.199)					
US EA Shadow Rate Gap (Wu Xia)			0.017				
			(0.012)				
US EA Shadow Rate Gap (Krippner)				0.000			
				(0.002)			
US EA BS Gap					-0.019*		
					(0.011)		
Δlog US Shadow Rate						0.303***	
						(0.081)	
Δlog EA Shadow Rate							-0.004**
							(0.001)
ROE	-0.117	-0.284	0.106	0.097	0.025	-0.220	-0.011
	(0.180)	(0.249)	(0.153)	(0.163)	(0.158)	(0.179)	(0.157)
Credit/GDP ratio	-0.030	-0.024	-0.037	-0.038	-0.038	-0.020	-0.038
	(0.036)	(0.040)	(0.031)	(0.032)	(0.032)	(0.039)	(0.035)
GDP growth issuer	-0.028	0.145	-0.012	0.004	-0.105	-0.102	-0.222
	(0.876)	(0.870)	(0.833)	(0.825)	(0.846)	(0.865)	(0.900)
Δlog NEER	-0.177	-0.645	0.645	0.430	-0.038	-0.331	1.039**
	(0.477)	(0.637)	(0.482)	(0.514)	(0.486)	(0.434)	(0.458)
GDP growth world	-0.502	-0.470	-0.954**	-0.501	0.029	-3.858***	-0.490
	(0.371)	(0.361)	(0.472)	(0.363)	(0.475)	(0.974)	(0.362)
MOVE index	-0.029	0.173	0.123	0.005	0.040	0.253*	-0.008
	(0.159)	(0.172)	(0.167)	(0.160)	(0.152)	(0.137)	(0.154)
N	209	209	209	209	209	209	209
R^2	0.221	0.225	0.214	0.206	0.220	0.266	0.242
adj. R^2	0.151	0.156	0.144	0.135	0.151	0.201	0.175

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table A6: UMP and NFCs in emerging economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
US EA Policy Rate Gap	-0.028						
	(0.079)						
Δlog ECB BS		0.153					
		(0.129)					
US EA Shadow Rate Gap (Wu Xia)			0.016				
			(0.011)				
US EA Shadow Rate Gap (Krippner)				-0.000			
				(0.002)			
US EA BS Gap					-0.001		
					(0.007)		
Δlog US Shadow Rate						0.114*	
						(0.060)	
Δlog EA Shadow Rate							0.000
							(0.001)
ROE	0.529**	0.568**	0.515**	0.519**	0.511**	0.469**	0.517**
	(0.177)	(0.176)	(0.168)	(0.172)	(0.174)	(0.170)	(0.170)
Credit/GDP ratio	-0.044	-0.032	-0.060	-0.046	-0.046	-0.067	-0.045
	(0.074)	(0.074)	(0.074)	(0.074)	(0.074)	(0.076)	(0.075)
GDP growth issuer	-1.058**	-1.082**	-1.127**	-1.066**	-1.068**	-1.099**	-1.070**
	(0.390)	(0.393)	(0.396)	(0.387)	(0.387)	(0.394)	(0.386)
Δlog NEER	0.201	0.536	0.327	0.095	0.086	-0.197	0.099
	(0.445)	(0.475)	(0.381)	(0.390)	(0.425)	(0.400)	(0.409)
GDP growth world	-0.783*	-0.851*	-1.167**	-0.779*	-0.727	-1.954**	-0.766*
	(0.460)	(0.464)	(0.515)	(0.461)	(0.518)	(0.733)	(0.450)
MOVE index	0.231*	0.161	0.334**	0.232*	0.229*	0.324**	0.228*
	(0.129)	(0.144)	(0.143)	(0.134)	(0.128)	(0.136)	(0.129)
N	418	418	418	418	418	418	418
R^2	0.534	0.536	0.537	0.534	0.534	0.538	0.534
adj. R^2	0.501	0.502	0.504	0.501	0.501	0.505	0.501

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.

Table A7: UMP and banks in emerging economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
US EA Policy Rate Gap	0.188*						
	(0.104)						
Δlog ECB BS		-0.717***					
		(0.153)					
US EA Shadow Rate Gap (Wu Xia)			-0.007				
			(0.011)				
US EA Shadow Rate Gap (Krippner)				0.005**			
				(0.002)			
US EA BS Gap					0.002		
					(0.008)		
Δlog US Shadow Rate						0.129**	
						(0.065)	
Δlog EA Shadow Rate							-0.001
							(0.001)
ROE	-0.632***	-0.788***	-0.539***	-0.586***	-0.531***	-0.590***	-0.558***
	(0.148)	(0.143)	(0.141)	(0.146)	(0.145)	(0.140)	(0.141)
Credit/GDP ratio	0.041	-0.009	0.061	0.050	0.055	0.031	0.045
	(0.084)	(0.079)	(0.085)	(0.083)	(0.084)	(0.083)	(0.084)
GDP growth issuer	-1.030**	-0.900*	-0.947*	-0.980*	-0.971*	-1.011**	-0.940*
	(0.522)	(0.492)	(0.521)	(0.511)	(0.521)	(0.514)	(0.529)
Δlog NEER	0.707	-0.710	1.162**	1.577***	1.306**	0.899**	1.431**
	(0.503)	(0.554)	(0.416)	(0.440)	(0.459)	(0.450)	(0.439)
GDP growth world	0.811	1.100**	0.877	0.877	0.636	-0.637	0.702
	(0.543)	(0.525)	(0.569)	(0.537)	(0.609)	(0.836)	(0.531)
MOVE index	-0.557***	-0.218	-0.578***	-0.602***	-0.534***	-0.421**	-0.536***
	(0.131)	(0.143)	(0.153)	(0.137)	(0.133)	(0.149)	(0.131)
N	418	418	418	418	418	418	418
R^2	0.650	0.666	0.647	0.650	0.647	0.650	0.647
adj. R^2	0.625	0.642	0.622	0.625	0.621	0.625	0.622

Robust standard errors in parentheses.
***, **, * denote significance at 1, 5 and 10 percent.