Global Liquidity and Drivers of Cross-Border Bank Flows

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Abstract

This paper studies the determinants of global liquidity using data on cross-border bank flows, with a longer time series and broader country sample than previous studies. We define global liquidity as non-price determinants of cross-border credit supply, consistent with its meaning as the "ease of financing" in international financial markets. We find that global liquidity is driven primarily by uncertainty (VIX), US monetary policy (term premia), and UK and Euro Area bank conditions (proxied by leverage and TED spreads). This expands on previous studies by highlighting non-US drivers of global liquidity, and is consistent with the dominant role of European banks in cross-border lending. We also show that borrowing countries can limit their exposures to global liquidity fluctuations through better macro frameworks, capital flows management tools, and more stringent bank regulation.

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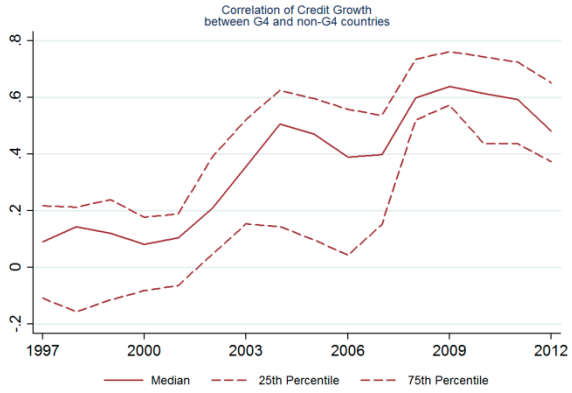
I. INTRODUCTION

The financial cycle is becoming increasingly global, as highlighted in recent academic work (Rey, 2013; Bruno and Shin; 2014; Obstfeld, 2014) and reflected in policy discussions (e.g., on the impact of low US and European interest rates on the rest of the world). The phenomenon is evident from the correlation of credit growth across countries, which has increased markedly since the mid 90s (Figure 1). This reflects in part deeper real economic integration as illustrated by the expansion of international trade (red line in Figure 2), and in part increased integration of countries into the global financial system, as illustrated by the expansion of cross-border banking claims before the financial crisis (blue line in Figure 2).

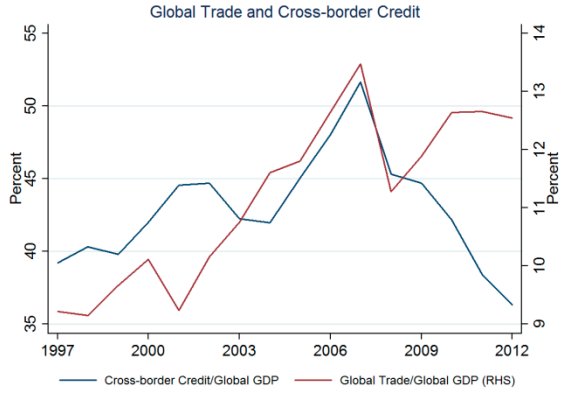
An important feature of financial integration is that a large amount of funds flows from 'financial center' economies (G4: US, Euro Area, UK, Japan) to the rest of the world. For example, in June 2013, cross-border bank claims by the G4 on the rest of the world exceeded claims by the rest of the world on G4 banks by 20%. And this number understates the role of the G4 as financial centers, because international banks in the G4 also intermediate much of cross-border credit between countries in the rest of the world. Since G4 financial systems intermediate much of global credit, funding conditions – ease of credit – within the G4 affects funding conditions globally. This is precisely what the concept of global liquidity aims to capture. One can understand global liquidity as credit supply factors in 'financial center' economies that affect the provision of cross-border credit. [2]

Figure 1: Financial cycle more correlated



Rolling 5-year average correlations between total credit growth in the US, UK, Eurozone and Japan and the rest of the world. Source: BIS and authors' calculations.

Figure 2: Deeper financial integration



The share of trade and cross-border claims relative to GDP. Source: BIS, IMF, and authors' calculations.

[2] The focus on these four countries as 'financial center' economies can in principle be refined. For example, China may also be considered as an economy that funds the rest of the world. But the analysis of the China's role in global liquidity is restricted by data availability.

The fact that funding conditions in the G4 affect funding conditions globally implies that the ability of borrower (non-G4) countries to attract funds is determined not only by their domestic conditions and policies, but also by economic and financial conditions and policies within the G4. As such, knowing what drives the cross-border supply of funds becomes an important surveillance question for policy makers globally. Such knowledge can matter for formulating effective policy response.

While there is much recent research on global liquidity and cross-border financing conditions, there remain many conceptual and empirical gaps in our understanding (see Landau, 2013, and IMF, 2014a, for recent reviews). This paper attempts to fill some gaps that are most critical for formulating effective economic policy. It focuses on cross-border bank flows, given their importance in total capital flows (IMF, 2011). It builds on the literature on the role of global factors in cross-border bank flows, which has identified the importance of uncertainty and risk aversion, monetary policy stance in 'financial center' economies, and funding conditions and risk attitudes of global banks in affecting flows (Rey, 2013; Bruno and Shin, 2014).

Using a comprehensive dataset covering 77 countries over the period 1990-2012 and adjusting for exchange rate changes, our analysis confirms most of the earlier results, also showing that most of the relations appear in the 2000s' financial globalization period. It then adds to existing knowledge by exploring the following three questions:

- *What measures of G4 financial conditions are most relevant for capturing global liquidity?* We find that short-term interest rates and growth in money aggregates are not robust across specifications in explaining cross-border bank flows. The term premia in the US, UK and Euro Area, in contrast, have a robust negative association with flows, consistent with its theoretical impact on banks' incentives to engage in a "search for yield." (Banks borrow short-term and lend long-term, so their domestic investment opportunities are less profitable when the yield curve is flatter.) We also propose two new proxy measures for global liquidity drivers – bank leverage in non-US G4 countries (complementing US dealer bank leverage, as used in Bruno and Shin, 2014) and real domestic credit growth in the G4 – and find them to be positively associated with cross-border bank flows (except for Japan). The credit growth measure is often used in the literature on financial cycles (Borio et al 1994; Claessens et al. 2012a), and can be seen as an alternative for the bank leverage variable, for which long time series are only available for the US.

- *Is global liquidity primarily US-driven, or do other G4 countries play a role too, and if so, how much?* The presumption in the literature, and the evidence documented to date, has been that factors driving global liquidity originate predominantly in the US. The question arises, however, whether financial conditions in other G4 economies also play a role. We find that UK and Euro Area supply factors are indeed important globally, i.e.,

going beyond influencing regional flows (e.g., Western Europe to Eastern Europe). This is especially so for banking sector conditions (bank leverage and TED spreads), where their importance often exceeds that of US banking sector conditions. This evidence is consistent with the major global financial intermediation role of European banks (cf. Shin, 2012; Rey, 2013). For monetary policy variables, the US continues to play a dominant role.

- *How can borrower countries limit their exposure to variations in global liquidity?* In light of the large cross-border effects of G4 financial conditions and the de facto limited international coordination, borrower countries face the question of how best to adapt their own policies. We find that better macroeconomic framework (flexible exchange rate regime), use of capital flow management tools, and more stringent bank supervision and regulation reduce the borrower country's exposures to variations in global liquidity. Economic effects are substantial: an increase from the 25th to 75th percentile in the policy indexes for any of these dimensions reduces the exposures at least by half. The impact is higher for cross-border flows to banks (as opposed to non-bank borrowers), consistent with banks being more regulated and public policy having limitations in controlling activities of non-bank borrowers. These policies may be especially important for borrower countries with better institutions or wider presence of foreign banks, which are otherwise more exposed to variations in global liquidity.

The paper proceeds as follows. Section 2 defines global liquidity and puts our analysis in the context of the existing theoretical and empirical literature. Section 3 describes the data and the empirical methodology and presents the results. Section 4 concludes with broader lessons and outstanding issues for policy and research.

II. Definition and Literature Review

A. What is global liquidity?

Global liquidity has been explored in recent academic and applied work (see inter alia IMF, 2010, 2013, 2014a; CGFS, 2011), and the BIS has started monitoring a selection of indicators – including price, flow, and stock measures – in semi-annual updates (BIS, 2013). Much of the literature on global liquidity, however, has been data-driven. So it is useful to take a step back by more formally defining the concept.

The starting point is that the expression "global liquidity" is commonly used to refer to the "ease of funding" in global financial markets, thus referring to supply factors. One can therefore think in terms of the supply of funds from 'financial center' economies (here, G4) to other advanced economies and emerging markets. And then to define "global liquidity" as a vector of factors, *GL*, which shift the G4 supply function for cross-border credit out or in.

Formally, $Q^S = Q(P, GL)$, where Q^S is the quantity of cross-border financing provided, P is the "price" (say, expected return differentials); and *GL* are a vector of "non-price" supply factors. Note that under this definition global liquidity is a specific case of funding liquidity (ease of financing, cf. Brunnermeier and Pedersen, 2009). And that this definition is quite different from the notion of asset market liquidity, that is, the ability to trade rapidly with small price impacts.

B. What are the determinants of global liquidity?

Non-price supply factors *GL* reflect a variety of financial and economic conditions faced by the providers of funds to cross-border markets. In our case, these providers are mainly major international banks. There are a number of indicators which the empirical literature has found relevant for describing their conditions and attitudes, and the resulting impact on cross-border flows. For some of the indicators, there are clear economic and financial channels. For others, channels are less clear. And some *GL* factors originate in the private sector, while others are derivatives of monetary policy, micro- and macroprudential policy stances (e.g., risk-taking induced by the interest rate structure). The indicators notably identified in the existing theoretical and empirical literature are:

- *Uncertainty and risk aversion*. Uncertainty and risk aversion are determined by multiple factors – macroeconomic fundamentals, lenders' and investors' risk attitudes (which can give rise to risk-on / risk-off episodes), and possibly the policy stance (accommodative monetary policy reduces uncertainty and risk aversion, Bekaert et al., 2013). In the empirical literature, uncertainty and risk aversion are commonly captured through the US VIX, the stock option prices-based measure of implied volatility (Rey, 2013).

- *The funding conditions for global banks*. Funding conditions also reflect risk perceptions, and affect the banks' ability and willingness to take on risks in (cross-border) lending. There are here a number of measures used in the literature. One is the TED spread (the difference between short-term interbank lending and government bond rates). Another is bank leverage, often taken as that of major US dealer banks; with the idea that high leverage indicates lower perceived risk and higher willingness and capacity of banks to lend (Adrian and Shin, 2010; Bruno and Shin, 2014).

- *Monetary policy in the G4*. This includes the general level of interest rates (rather than relative, as in spreads) and the slope of the yield curve. Although the effect of low interest rates on bank risk taking is supported by some empirical literature (Altunbas et al., 2014; Borio and Zhu, 2012; Jimenez et al., 2014; Bruno and Shin, 2013, 2014), its economic significance and precise causal channels remain the subject of much debate. In contrast, the effect of the term premium on bank risk taking has a clearer economic intuition. Banks borrow short-term and lend long-term, so their domestic investment

opportunities are less profitable when the yield curve is flat; this may trigger banks' search for yield, including in the form of cross-border bank loans.

- *Money aggregates*. The empirical literature also points out that changes in narrow money aggregates, such as M2, may affect the buoyancy of banks' cross-border lending, although the exact channel for this is unclear. One argument may be that the growth in some components of broad money measures, such as wholesale or non-financial enterprises' deposits, can complement leverage measures in explaining bank risk as they indicate the relative ease of funding conditions (Hahm et al., 2013; Chung et al., 2014).

Note that, in principle, all of the above channels could affect both domestic and cross-border lending of banks. But cross-border lending can be expected to be the more volatile of the two, i.e., expand and contract more at the margin as financial conditions change. This is because of higher asymmetric information (which may affect lending especially during downturns), more reliance on hard information (which makes cross-border lending scalable up or down), and sovereign risk factors (which may also vary over the cycle).

It is also useful to place our paper in the context of recent notable contributions to the global liquidity literature. Bruno and Shin (2014) focus on the role of US dealer bank leverage in determining global liquidity. We complement their work by using additional measures – bank leverage and real credit growth in the G4 – which are similar in economic effects but more widely available. We also offer evidence based on a longer time series, distinguish among G4 countries (which helps clarify some results, e.g. on the role of money growth), and study in more detail the role of recipient country characteristics. Rey (2013) focuses on VIX as a driver of global liquidity and suggests that capital controls may be essential to ensure independence of domestic monetary policy, even for countries with flexible exchange rate regimes. We empirically confirm the results on the effectiveness of capital controls, but also identify other tools, such as stricter bank regulation and supervision, which can mitigate the borrower country exposures to global liquidity. Finally, our analysis of borrower country characteristics draws on the earlier, broader literature on "push" and "pull" factors, which has attempted to explain cross-border capital flows using global factors such as global interest rates, and countries' growth rates, inflation and institutional characteristics (e.g., Calvo et al., 1996; and more recently Fratzscher, 2011, and Brandao et al., 2013).[3]

[3] Among other relevant papers, Eickmeier et al. (2013) use principal components analysis to identify common factors in a broad range of country-specific series of various financial variables. As a few factors can statistically account for much of the variability in the data, global factors are then thought to drive in large part the cross-border flows. Controlling for demand at the recipient country level, Cerutti and Claessens (2014) identify shocks to major banking systems' balance sheets to be important global supply factors. See also IMF (2014b).

III. DATA AND EMPIRICAL ANALYSIS

Following the definition provided in the previous section, the objectives of this section are to document which drivers of global liquidity, for the US and other G4 countries, help explain the evolution of cross-border bank claims on banks and non-banks over the period 1990-2012. In addition, we investigate which borrower countries' policies and characteristics (e.g., exchange rate regime, capital flows management, bank regulation, etc.) play a role in dampening or amplifying the impact of global liquidity on cross-border bank flows.

A. Data

We use data on cross-border bank exposures from the BIS International Banking Statistics (IBS), which provides a comprehensive picture of cross-border banking linkages across countries. The BIS IBS comprises two datasets – the Locational and the Consolidated banking statistics.[4] These datasets capture the exposures (i.e., loans, securities, and other claims) of the most important banking systems to their foreign borrowers. Our analysis is based on the BIS Locational data (BIS IBS Table 6) since those data conform closer to the notion that conditions in specific 'financial center' countries affect flows. Furthermore, there are two data-related reasons: (i) the BIS Locational data provide a long time span, while BIS Consolidated data is often only consistently available from the mid-2000s); and (ii) it provides exchange rate adjusted series and the sectoral breakdown of lending to banks vs. non-banks.[5] Our data covers 77 countries over the period 1990-2012.

We capture the drivers of global liquidity through the measures suggested by theoretical and empirical studies. Specifically, we use the stock option market implied volatility (CBOE VIX), US dealer bank leverage, TED spread (3 month Libor minus 3 month government bond yield), slope of yield curve (10 year government bond yield minus 3 month government bond yield), real policy rate (deflated with CPI), and money aggregates. These measures are compiled separately for each of the G4, that is, for the US, UK, Euro Area, and Japan (see Figures in the Appendix). In addition to these widely-used measures, we explore two new measures of credit conditions – bank leverage and credit growth in G4 countries, which complement the US dealer bank leverage measure of Bruno and Shin (2014).

We control for credit demand using lagged GDP growth rate and inflation in borrower countries, and for the price determinants of cross-border credit using the differential between

[4] BIS Locational statistics are residence-based data (i.e. they follow balance-of-payments accounting) that track the cross-border positions of banks located in a particular country. Both domestically-owned and foreign-owned banking offices in the reporting countries record their positions on a gross (unconsolidated) basis, including positions vis-à-vis own affiliates in other countries. BIS Consolidated statistics track banks' worldwide consolidated gross claims and other exposures to individual countries and sectors. Banks net out intergroup positions and consolidate positions across offices worldwide.

[5] Since BIS banking statistics are reported in US dollars, a time series analysis of cross-border bank flows is better performed using exchange rate adjusted data in order to capture changes in the actual underlying positions of bank claims rather than also variations in bank claims due to exchange rate movements.

the local and international interest rates. We also study a number of additional borrower country characteristics, specifically indexes of exchange rate flexibility, capital controls, overall institutional environment, and various indexes of bank regulation (the strength of capital adequacy requirements, supervisory powers, and limits on foreign bank presence).

Table 1 provides definitions and sources of the variables; Tables 2 and 3 provide summary statistics and correlation matrixes for the whole period and by sub-periods. Table 3 Panel B describes correlations of global liquidity factors across G4, showing high correlations in most cases, but relatively low or negative for some series (e.g., Japan M2 with other G4 M2).

B. Empirical specification

The base estimation consists of a panel regression with country fixed effects and standard errors clustered at the borrower country level:

$$\Delta L_{jt} = \beta_0 + \beta_1 DomesticFactor_{jt} + \beta_2 \Delta InterestSpread_{jt} + \beta_3 GlobalLiquidity_t + \gamma_j + \varepsilon_{jt}$$

where the dependent variable ΔL_{jt} is the quarterly difference in the log of the exchange rate adjusted stock of bank claims in borrower country j at time t; $DomesticFactor_{jt}$ are the proxies for country j demand at t; $\Delta InterestSpread_{jt}$ is the change (current quarter minus 4 quarter lag) in the spread between local lending rates and US Fed Funds Rate for country j at time t; $Global\ Liquidity_t$ is the set of G4 global liquidity drivers at time t; γ_j are country fixed effects and $\varepsilon_{j,t}$ is the error term. Two different dependent variables are used: (i) the change in the (log of the) stock of BIS Locational cross-border claims on the banking sector of borrower country j, and (ii) the change in the (log of the) stock of BIS Locational cross-border claims on the non-bank sector of borrower country j. We sometimes use the terms "flows" and "lending" as a short hand for change in stocks.

We then introduce country characteristics and interaction variables to analyze the borrower country exposures to the level and cyclical variation of global liquidity, as follows:

$$\Delta L_{jt} = \beta_0 + \beta_1 DomesticFactor_{jt} + \beta_2 \Delta InterestSpread_{jt} + \beta_3 GlobalLiquidity_t + \beta_4 BorrowerCharacteristics_{jt} + \beta_5 GlobalLiquidity_t * BorrowerCharacteristics_{jt} + \gamma_j + \varepsilon_{jt}$$

where $BorrowerCharacteristics_{jt}$ includes: (i) type of exchange rate regime, (ii) use of capital controls; (iii) general institutional development (rule of law, investment risks, etc.); and (iv) bank regulatory variables.

C. Base results: Drivers of global liquidity

The base regression results indicate that country characteristics proxying demand – lagged GDP growth and inflation – are statistically significant in explaining cross-border flows to banks (Table 4, Panel A). This holds for the whole period, 1990-2012 (columns 1 to 11), and several sub-periods (columns 12 to 14). Lagged inflation is somewhat less significant in explaining flows to non-bank borrowers (Panel B). The coefficients of the changes in interest rate differentials are not statistically different from zero in the full sample. This may be in part due to the sample coverage which includes some developing countries where interest rates are not market-based.[6]

As the existing literature has highlighted (e.g., McGuire and Tarashev, 2008; Avdjiev et al., 2012; Bruno and Shin, 2014; Cerutti, 2013; Turner 2014), US global liquidity factors (VIX, TED spread, dealer bank leverage, credit growth, real interest rate, slope of the yield curve, and M2 growth in the G4) are statistically significant drivers of cross-border bank flows when considered individually (columns 2 to 8 in Panels A and B). VIX and TED spreads have the expected negative signs, indicating that cross-border flows decrease during times of uncertainty. US dealer bank leverage has the expected positive sign, showing that banks expand more cross-border when bank funding conditions are accommodative. Also real credit growth has a positive sign, possibly as it captures the leverage and financial cycle.

US real interest rate has a positive sign, indicating that during less favorable economic conditions – when interest rates are lower – global banks lend less cross-border. This contrasts with the view that low rates increase bank risk-taking, which has been highlighted in some recent papers, but does not seem to hold over this longer period. The US term premium has a negative coefficient, suggesting the presence of 'search for yield' incentives in global banks: when US investment opportunities are more attractive, cross-border flows decline. G4 M2 growth is positively associated with cross-border flows.

Since the correlations across individual US factors are moderate in our sample (except for the correlation between dealer bank leverage and real credit growth, and between the policy rate and the term premium, see Table 2), we can run regressions that include most drivers simultaneously. The results (columns 12-13 in Table 4, Panels A and B) show that VIX, US dealer bank leverage, and the term premium remain statistically significant determinants of changes in cross-border claims on banks and non-banks. M2 growth affects claims on banks, but not on non-banks. Changes in VIX and dealer bank leverage affect cross-border claims on banks (Panel A) more than those on non-banks (Panel B), suggesting that cross-border flows to banks are more sensitive to financial conditions compared to flows to the real sector.

[6] When the sample is reduced to advanced and large emerging markets, these coefficients become statistically significant, with the signs mostly negative, indicating that larger differentials deter rather than encourage cross-border bank flows (suggesting higher local rates lead to perceptions of more risk).

A comparison between columns 11 and 12 shows that the results for the full 1990-2012 sample (column 9) are largely driven by the second sub-period (2001-2012). This is consistent with a greater degree of financial integration and globalization since the late 1990s. Interestingly, column 13 shows that the results for the pre-global financial crisis period (2001-2006) are similar to those for 2001-2012 (column 12). This suggests that the crisis and its aftermath do not drive the main results.

The economic effects implied by the marginal effects highlight the role of VIX and US dealer bank leverage in driving cross-border bank flows. A change in the VIX from the 25th to the 75th percentile reduces cross-border claims on banks by 5¾ percent (3½ percent for non-banks). A similar change in the US dealer bank leverage increases cross-border claims on banks by 5½ percent (4½ percent for non-banks). The economic effects of the other variables are smaller. For example, an increase in the term premium from its 25th to 75th percentile decreases cross-border claims banks by 1¾ percent (¼% for non-banks). This suggests that monetary policy stance is a less important driver of global liquidity than market uncertainly or the funding conditions of global banks. And, more qualitatively, that market conditions seem more important in driving global liquidity than direct government actions.

D. The role of US versus other G4 drivers

Following the existing literature, the base specification used mostly US variables to capture the drivers of global liquidity. An interesting and so far not explored question is whether US variables are the most relevant, or whether other G4 countries also play a role. Indeed, in recent decades, US banks have had a smaller share of cross-border lending than UK and Euro Area banks. To answer this question, we compiled series similar to the US series used in Table 4 for the UK, Euro Area, and Japan. Instead of dealer bank leverage we use commercial bank leverage for the non-US G4. Many of the non-US G4 series are highly correlated with the US series and among each other within each driver category (Table 3, panel B). Thus they cannot be included in the estimations simultaneously. For this reason, we compare the explanatory power of various global liquidity factors individually. We also use a reduced sample of borrower countries, which excludes the US, UK, Japan and the Euro Area countries themselves, to capture cross-border impacts and not to bias the results in favor of Euro Area drivers (Euro Area represents 16 borrower countries in the dataset).

Table 5 displays the regression results for the individual G4 country drivers, introduced separately in panel regressions that again include (not reported) lagged recipient country GDP growth, inflation, and the change in the interest rate differential. The estimations are performed for the period 2001-2012, as the results in Table 4 were mostly driven by that period and because the data on most Euro Area liquidity drivers are consistently available for that period only. The table reports, besides the coefficients on the factors, only the R2s.

The results for risk aversion (VIX) are similar across G4 countries, with the US VIX having slightly higher explanatory power, as captured by R2. But for bank conditions, UK and Euro Area variables often have the same or higher explanatory power than the US variables. For TED spreads, not only is the US TED spread not significant, but it also has the lowest R2; UK TED spread has twice as much explanatory power. UK bank leverage has a higher explanatory power than US bank leverage, and Euro Area credit growth has a higher explanatory power than US credit growth. For monetary policy, US and UK real policy rates, and US, UK and Euro Area term premia have the same explanatory power. Japan is an exception in several ways: the policy rate is not significant, while the slope of the yield curve is significant but with a positive sign. The fact that the interest rate in Japan has been stable and low over the period (Table 2) may be behind this.

The results for the G4 M2 measures in Table 5 are also insightful, particularly since the analytical basis for the impact of M2 on cross-border credit is less obvious. Recall that in Table 4 cross border claims increased in aggregate G4 M2 growth. Table 5 shows that this relationship also holds for UK and Euro Area M2 growth. But the sign flips to negative for US and Japan M2 growth. We interpret this as reflecting the greater importance of banks in financial intermediation for the UK and Euro Area, where an increase in bank deposits (part of M2) translates into larger bank balance sheets and more cross-border lending. An increase in US and Japan M2 might not have the same effect, perhaps because growth in M2 there reflects in part flight to safety (i.e., occurs during periods of deleveraging and reduction in cross-border lending). Nevertheless, since European banks represent the largest share of overall cross-border bank flows over this period, and the evolution of UK and Euro Area M2 drives a large part of the G4 M2 aggregate, the coefficient on aggregate G4 M2 growth in Table 4 was still positive.

In principle, the differences in the explanatory power of different G4 global liquidity drivers could reflect regional effects, where individual G4 lenders have dominant market shares for (groups of) borrower countries. For example, Euro Area global liquidity drivers could be particularly relevant for European borrower countries. The regional effects of G4 conditions could be further amplified by regional macroeconomic feedback effects (e.g., through the trade channel). Since bilateral cross-border banking exposures are not available due to confidentiality, we conduct a preliminary exploration of whether our results on non-US global liquidity factors hold beyond the regional effects. We do that by estimating cross-border bank flows regressions for different geographical regions of borrower countries.

This analysis is reported in Table 6. We focus on cross-border bank claims on Asian and Western Hemisphere countries, to identify the importance of UK and Euro Area global liquidity drivers beyond their own region. We do not report data on country-specific VIX (because of high correlations of uncertainty measures across G4 countries) or for the Japan factors (for which results are often insignificant or not robust). Results confirm that UK and Euro Area global liquidity drivers have explanatory power beyond their own region and

above their correlation with US factors. A notable example is that UK and Euro Area TED spreads have a higher explanatory power for cross-border bank lending to Asia and Western Hemisphere countries than the US TED spread does. Also, UK bank leverage has a similar or higher explanatory power than US bank leverage.

Interestingly, US monetary policy factors remain dominant. For example, the US term premium is the only variable that has explanatory power in cross-border lending to both banks and non-banks in Asia. US and UK and Euro Area term premia have similar significance in explain cross-border lending to the Western Hemisphere. One may therefore suggest that the global financial cycle is driven in large part by US monetary policy, and UK and Euro Area bank conditions. This would be consistent with the dominant role of European banks in intermediating funds from US to the rest of the world (cf. Shin, 2012).

E. Borrower country characteristics

We finally study how borrower country policies and characteristics affect the level or volatility of cross-border bank inflows. Table 7 present the coefficients for the impact of country characteristics and of the interactions of country characteristics with key global liquidity drivers on cross-border bank flows. The selection of the global liquidity factors used for this analysis is based on their explanatory power in Table 5.

We find that a flexible exchange rate regime reduces the borrower country exposures to variation in some key global liquidity drivers (dealer bank leverage, term premium, M2 growth), making inflows less cyclical. So do capital controls and more stringent bank supervision. More stringent capital requirements also make cross-border flows less cyclical, and in addition reduce the level of cross-border inflows to banks. At the same time, better institutional quality increases the level and, for some global liquidity factors, the cyclicality of inflows to banks. Fewer limits on foreign bank presence also increase the cyclicality of inflows to banks. This suggests that better macroeconomic framework (captured here as flexible foreign exchange regime), capital flows management tools, and more stringent bank regulation and supervision, reduce country exposures to variations in global liquidity. These tools may be most relevant for more open countries with better institutions, which are otherwise more exposed to such variations.

Even though recipient country characteristics and regulations do not fully insulate the country from variations in global liquidity, their estimated economic effects are substantial. For example, when US dealer bank leverage increases from its 25th to the 75th percentile, a country with a level of capital controls at the 25th percentile would experience a growth in cross-border claims of about 19%, while a country with capital controls at the 75th percentile would experience only about a 10% pick-up (7% and 5% for flows to non-banks). Effects of similar magnitude are present for exchange rate flexibility, and the stringency of bank capital regulation and supervision; and for other global liquidity drivers. Overall, results suggest that

improvement along any of these dimensions reduces borrower country banks' exposures to cyclical variations in global liquidity roughly by half.[7]

IV. Conclusions and Policy Implications

Using a long times series and a broad set of countries, this paper confirms that a number of 'global liquidity' factors drive cross-border bank flows alongside country-specific factors. Cross-border bank flows decrease in volatility (VIX) and with the slope of the US yield curve, but increase with US dealer bank leverage, real interest rates, and G4 money growth. An important new finding is that bank conditions in other 'financial center' countries, notably the UK and Euro Area, captured by bank leverage and TED spreads, also drive cross-border bank flows, and are sometimes more important than equivalent US conditions. That is, the global financial cycle is to a large extent driven by US monetary policy and UK and Euro Area bank conditions. Furthermore, we find that level and cyclicality of cross-border inflows depend on borrower country policies and characteristics. For example, a flexible exchange rate, capital flow management tools, and stricter bank regulation and supervision can serve as buffers against the cyclicality of cross-border bank inflows. This is consistent with the earlier literature on push and pull factors, cf. Calvo et al. (1996) and Claessens et al. (1998).

Our results have important bearing on the policy debate on the global financial cycle and global liquidity. They suggest that domestic financial conditions in all 'financial center' economies, not just the US, could affect the rest of the world through changes in cross-border bank flows. In light of the current asynchronous (conduct of and exit from) unconventional monetary policies in the G4 and other major economies, this finding alone is of major policy interest. Major economies may want to consider some of the effects their policies have on other countries as these can feed back on their own economies and financial systems. Whether mechanisms can be designed for major source economies to internalize the externalities on other countries is doubtful, but since some of the same factors that affect cross-border flows also drive volatility in domestic credit, it might be in their own interests to consider these factors anyhow. And, even with the limited scope in practice for international policy coordination, results suggest that recipient countries have some policy options to reduce their exposure to global liquidity. Notably, by strengthening their macroeconomic management and regulatory environments, recipient countries can reduce the cyclical impact of global liquidity on cross-border bank flows.

The broader lesson from the global liquidity literature is that cross-border flows can give rise to both benefits and risks. Global cyclical swings can add a welcome impetus and support

[7] The fact that multiple recipient country characteristics can affect the exposure to variations in global liquidity expands the suggestions of Rey (2013) who focuses predominantly on the role of capital controls. See also IMF (2013b).

local activity during times of stress. But they can also have undesirable procyclical effects. In the face of volatile global conditions, domestic monetary and fiscal policies can become less effective. Favorable global financial conditions can add to the build-up of vulnerabilities (e.g., asset price booms and related financial fragility, possibly leading to busts and instability), especially in case of weaker macroeconomic and prudential policies in borrower countries. Overall, there may be a need to adapt policy responses, both domestically and globally. The global liquidity cycle is importantly driven by global systemic financial institutions, whose distress can propagate widely in the global economy. Monitoring liquidity, funding, and credit conditions in these institutions is therefore critically important.

The state of the art in understanding global liquidity is still limited, however, both regarding the channels through which financial conditions affect global investors' risk-taking, capital flows and ensuing vulnerabilities, and in determining how global liquidity is consequently best measured. A better understanding of the drivers of liquidity conditions in advanced economies, and the mechanisms of international propagation and related amplification of financial shocks is therefore sorely needed. In the meantime, the challenge for countries and others engaged in surveillance is to find empirically useful indicators that have sound conceptual underpinnings. Multiple indicators corresponding to various aspects of liquidity have been proposed over time and found to be useful in detecting vulnerabilities. Yet continuously changing institutional environments, evolving micro- and macro-prudential policies, financial innovations and shifting market structures, all keep reshaping the mechanics of liquidity creation and propagation. This reinforces a key lesson from earlier crisis episodes that a continuous review of indicators is warranted.

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Table 1 – Variable Definitions and Sources

Variables	Definition	Sources
Dependent variables		
Log cross-border claims on banks	Log Changes in BIS Locational Cross-Border Claims on Banks (exchange rate adjusted)	BIS Locational statistics (Table 6)
Log cross-border claims on non-banks	Log Changes in BIS Locational Cross-Border Claims on Banks (exchange rate adjusted)	BIS Locational statistics (Table 6)
Global drivers		
Real GDP Growth	Growth rate of real GDP	WEO
Inflation	Inflation	IFTSTSUB and GDS
Interest rate Differential	Difference between domestic rate and Fed funds rate	IFTSTSUB
Exchange rate flexibility	Ranges from 1-4, with higher values indicating more flexibility.	Ilzetzki, Reinhart and Rogoff (2008)
Capital controls	Higher values of the index represent more restrictions.	Quinn (2011)
Institution quality	The average of the following four indices: bureaucracy quality; law and order; corruption; investment profile. Higher values indicate lower quality	International Country Risk Guide
Capital stringency	Whether capital requirement reflects certain risk elements and deducts certain market value losses from capital before minimum capital adequacy is determined. Higher values indicate greater stringency.	World Bank surveys on bank regulation
Supervisory power	Whether the supervisory authorities have the authority to take specific actions to prevent and correct problems. Higher values indicate greater power.	World Bank surveys on bank regulation
Limits on foreign banks	Whether foreign banks may own domestic banks and whether foreign banks may enter a country's banking industry. Higher values indicate great restriction.	World Bank surveys on bank regulation
US VIX	CBOE S&P500 Volatility VIX	Datastream
UK VIX	FTSE 100 Volatility Index	Datastream
EA VIX	VDAX Volatility Index (new)	Datastream
JP VIX	NIKKEI Stock Average Volatility Index	Datastream
US TED spread	3-month TED spread (LIBOR - Treasury bill)	Datastream
UK TED spread	3-month GBP LIBOR spread (LIBOR - Gilt)	Datastream
EA TED spread	3-month Euro LIBOR spread (LIBOR - Govt. AAA bill) [1/]	Datastream
JP TED spread	3-month JPN LIBOR spread (LIBOR - Treasury bill)	Datastream and Haver
US real policy rate	Federal Funds Target Rate	Haver
UK real policy rate	UK Base Rate (Repo rate)	Haver
EA real policy rate	Euro Area Deposit facility rate	Haver
JP real policy rate	Japan deposit facility rate	Haver
US slope of yield curve	10 year/3 month US Treasury yield spread	Datastream
UK slope of yield curve	10 year/3 month UK government securities yield spread	Datastream
EA slope of yield curve	10 year/3 month EA AAA Sovereign yield spread [1/]	Datastream
JP slope of yield curve	10 year/3 month Japan Treasury yield spread	Datastream and Haver
US growth rate of M2	Growth rate of M2 in national currency	IFTSTSUB
UK growth rate of M2	Growth rate of M2 in national currency	IFTSTSUB
EA growth rate of M2	Growth rate of M2 in national currency	IFTSTSUB
JP growth rate of M2	Growth rate of M2 in national currency	IFTSTSUB
US bank leverage	(Equity+Total Liabilities)/Equity	US Flow of Funds
UK bank leverage	Total Assets/Equity	Bank of England
EA bank leverage	Total Assets/Equity	European Central Bank
JP bank leverage	Total Assets/Equity	Bank of Japan
US credit-to-GDP ratio	Private credit/GDP	IFTSTSUB and MBRF2
UK credit-to-GDP ratio	Private credit/GDP	IFTSTSUB
EA credit-to-GDP ratio	Private credit/GDP	IFTSTSUB
JP credit-to-GDP ratio	Private credit/GDP	IFTSTSUB and MBRF2
US growth rate of real credit	Real private credit	IFTSTSUB and MBRF2
UK growth rate of real credit	Real private credit	IFTSTSUB
EA growth rate of real credit	Real private credit	IFTSTSUB
JP growth rate of real credit	Real private credit	IFTSTSUB and MBRF2

Note: 1/ Data on Euro Government AAA 3-month bill is available since 2007, so the period 2001-2006 is based on the 3 month French treasury bill rate.

Table2- Summary Statistics, Correlations over Full Sample (1990Q1–2012Q4) and Regional Distribution

Panel A - Summary Statistics

Variable	Obs	Mean	Median	Std. Dev.	P25	P75	Min	Max
Log cross-border claims on banks	5448	1.61	1.30	10.43	-3.08	6.20	-42.62	43.83
Log cross-border claims on non-banks	5420	1.44	1.12	6.88	-1.96	4.55	-22.21	27.15
GDP Growth (lag)	5446	3.87	3.79	4.78	1.58	6.28	-20.34	24.50
Inflation (lag)	5447	5.06	3.29	6.18	1.83	6.32	-2.80	70.59
Change in Interest Rate Differential	5448	-0.26	-0.04	4.74	-1.40	1.11	-31.65	40.13
CBOE VIX	5448	21.21	20.18	9.00	14.91	24.97	11.11	68.51
US TED Spread	5448	0.53	0.45	0.41	0.23	0.62	0.12	2.15
US Bank Leverage	5448	19.11	19.80	4.91	14.60	22.14	8.91	30.62
Growth of Real US Credit	5448	2.31	3.58	4.29	0.31	5.45	-8.52	7.74
Real US Federal Fund Rate	5448	0.62	0.50	2.05	-1.05	2.58	-3.67	4.04
US Slope of Yield Curve	5448	1.84	1.91	1.15	0.88	2.79	-0.48	3.63
G4 Countries M2	5448	6.06	5.96	5.80	1.62	10.83	-7.02	18.63

Panel B - Correlation Matrix

	GDP Growth (lag)	Inflation (lag)	Change in Interest Rate	CBOE VIX	US TED Spread	US Bank Leverage	Growth of Real US Credit	Real US Federal Fund Rate	US Slope of Yield Curve	G4 Countries M2
GDP Growth (lag)	1.00									
Inflation (lag)	0.01	1.00								
Change in Interest Rate	0.02	-0.15	1.00							
CBOE VIX	-0.08	0.04	0.16	1.00						
US TED Spread	0.11	0.09	0.12	0.40	1.00					
US Bank Leverage	0.17	-0.05	0.01	-0.23	0.21	1.00				
Growth of Real US Credit	0.09	-0.06	-0.12	-0.17	0.13	0.68	1.00			
Real US Federal Fund Rate	0.08	0.07	-0.05	-0.09	0.25	0.25	0.38	1.00		
US Slope of Yield Curve	-0.17	-0.02	0.05	0.18	-0.30	-0.45	-0.52	-0.63	1.00	
G4 Countries M2	0.00	0.01	0.05	-0.05	0.14	0.17	-0.04	-0.24	0.20	1.00

Panel C - Regional distribution of countries included in the Sample (1/ if G4 country member)

Asia	**Europe**	**Western Hemisphere**	**Other regions**
Australia	Austria 1/	Argentina	Algeria
China	Belgium 1/	Bolivia	Bahrain, Kingdom of
Hong Kong	Bulgaria	Brazil	Côte d'Ivoire
India	Croatia	Canada	Ghana
Indonesia	Cyprus 1/	Chile	Israel
Japan 1/	Czech Republic	Colombia	Jordan
Malaysia	Denmark	Guatemala	Kuwait
New Zealand	Estonia 1/	Jamaica	Libya
Pakistan	Finland 1/	Mexico	Mauritius
Philippines	France 1/	Panama	Morocco
Singapore	Germany 1/	Paraguay	Oman
South Korea	Greece 1/	Peru	Qatar
Sri Lanka	Hungary	United States 1/	Saudi Arabia
Thailand	Iceland	Venezuela, Rep. Bol.	Senegal
	Ireland 1/		South Africa
	Italy 1/		Tunisia
	Latvia		
	Lithuania		
	Luxembourg 1/		
	Norway		
	Poland		
	Portugal 1/		
	Romania		
	Russia		
	Slovak Republic 1/		
	Slovenia 1/		
	Sweden		
	Switzerland		
	Turkey		
	Ukraine		
	United Kingdom 1/		

Table3 - Summary Statistics and Correlations over the Period 2001Q1-2012Q4 for Individual G4 Variables

Panel A - Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
US VIX	2503	22.22	10.38	11.24	68.51
UK VIX	2503	21.13	8.40	10.12	49.57
EA VIX	2503	25.36	9.75	12.70	57.94
JP VIX	2503	26.26	9.07	15.48	65.49
US TED spread	2503	0.48	0.48	0.12	2.15
UK TED spread	2503	0.37	0.36	0.03	1.73
EA TED spread	2503	0.35	0.38	-0.02	1.80
JP TED spread	2503	0.13	0.13	-0.03	0.59
US real policy rate	2503	-0.47	1.71	-3.63	3.32
UK real policy rate	2503	0.75	2.72	-4.28	4.90
EA real policy rate	2503	-0.71	1.05	-2.54	1.59
JP real policy rate	2503	0.53	0.68	-1.40	2.53
US slope of yield curve	2503	2.08	1.14	-0.32	3.59
UK slope of yield curve	2503	1.07	1.31	-0.63	3.56
EA slope of yield curve	2503	2.00	1.15	0.25	4.06
JP slope of yield curve	2503	1.16	0.26	0.46	1.56
US growth rate of M2	2503	6.35	2.26	1.27	10.54
UK growth rate of M2	2503	7.86	5.48	-3.66	17.04
EA growth rate of M2	2503	6.41	2.80	1.43	10.51
JP growth rate of M2	2503	2.19	0.73	0.47	3.56
US bank leverage	2503	20.00	5.50	12.43	30.62
UK bank leverage	2503	15.39	2.00	11.81	19.52
EA bank leverage	2503	16.99	1.15	13.95	18.08
JP bank leverage	2503	23.96	2.19	20.97	28.79
US growth rate of real credit	2503	2.47	4.10	-8.52	7.71
UK growth rate of real credit	2503	4.40	7.16	-10.86	13.32
EA growth rate of real credit	2503	3.59	3.92	-4.05	9.81
JP growth rate of real credit	2503	-0.96	2.77	-8.34	4.27

Panel B - Correlation Matrix (selected cases)

US VIX	1.00			
UK VIX	0.94	1.00		
EA VIX	0.87	0.93	1.00	
JP VIX	0.89	0.86	0.78	1.00
US TED spread	1.00			
UK TED spread	0.84	1.00		
EA TED spread	0.72	0.89	1.00	
JP TED spread	0.83	0.87	0.75	1.00
US real policy rate	1.00			
UK real policy rate	0.58	1.00		
EA real policy rate	0.78	0.58	1.00	
JP real policy rate	0.27	-0.16	0.22	1.00
US slope of yield curve	1.00			
UK slope of yield curve	0.71	1.00		
EA slope of yield curve	0.65	0.92	1.00	
JP slope of yield curve	-0.06	-0.20	-0.17	1.00
US growth rate of M2	1.00			
UK growth rate of M2	-0.26	1.00		
EA growth rate of M2	0.17	0.63	1.00	
JP growth rate of M2	0.19	-0.43	-0.56	1.00
US Dealer bank leverage	1.00			
UK bank leverage	0.82	1.00		
EA bank leverage	0.72	0.75	1.00	
JP bank leverage	0.33	0.32	0.56	1.00
US growth rate of real credit	1.00			
UK growth rate of real credit	0.79	1.00		
EA growth rate of real credit	0.64	0.87	1.00	
JP growth rate of real credit	-0.08	-0.18	0.12	1.00

Table4 - Regression Results for Cross-Border Claims to Banks and Non-Banks, for period 1990Q1-2012Q4

Panel A - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Banks (in %)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
					1990-2012						1990-2000	2001-2012	2001-2006
GDP Growth (lag)	0.227***	0.191***	0.236***	0.180***	0.213***	0.197***	0.215***	0.227***	0.160***	0.175***	0.170**	0.138*	0.0417
	(0.0537)	(0.0521)	(0.0547)	(0.0546)	(0.0530)	(0.0541)	(0.0536)	(0.0533)	(0.0530)	(0.0523)	(0.0771)	(0.0706)	(0.0775)
Inflation (lag)	-0.0981***	-0.0836***	-0.0888***	-0.0791***	-0.0826***	-0.104***	-0.110***	-0.0996***	-0.0747***	-0.0859***	-0.0142	-0.0587	-0.108
	(0.0227)	(0.0222)	(0.0229)	(0.0256)	(0.0236)	(0.0221)	(0.0229)	(0.0227)	(0.0237)	(0.0212)	(0.0350)	(0.0552)	(0.0736)
Change in Interest Rate Differential	-0.0223	0.0384	-0.0129	-0.0246	0.000106	-0.0149	-0.0188	-0.0288	0.0259	0.0413	0.0369	0.00422	0.0433
(Domestic rate - Fed Fund Rate)	(0.0308)	(0.0327)	(0.0321)	(0.0298)	(0.0312)	(0.0307)	(0.0306)	(0.0317)	(0.0334)	(0.0349)	(0.0443)	(0.0449)	(0.0637)
CBOE VIX		-0.184***							-0.149***	-0.175***	0.0311	-0.166***	-0.138***
		(0.0235)							(0.0289)	(0.0272)	(0.0516)	(0.0323)	(0.0427)
TED Spread			-0.784*						-0.222	0.296	-1.366	0.0178	-3.181
			(0.435)						(0.529)	(0.532)	(0.885)	(0.691)	(3.851)
US Bank Leverage				0.279***					0.179***		-0.0437	0.105*	-0.133
				(0.0505)					(0.0496)		(0.0876)	(0.0619)	(0.132)
Growth of Real US Credit					0.191***					0.115**			
					(0.0453)					(0.0463)			
US Slope of Yield Curve						-0.645***			-0.220		0.0541	-0.515**	-1.061***
						(0.155)			(0.151)		(0.255)	(0.209)	(0.345)
Real Federal Fund Rate							0.196**			0.100			
							(0.0823)			(0.0946)			
G4 Countries M2 (Annual growth rate)								0.105***	0.0767***	0.0976***	-0.0612*	0.168***	0.133**
								(0.0250)	(0.0240)	(0.0273)	(0.0317)	(0.0404)	(0.0525)
Country Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	5,448	5,448	5,448	5,448	5,448	5,448	5,448	5,448	5,448	5,448	2,079	3,369	1,670
R-squared	0.013	0.037	0.014	0.029	0.019	0.018	0.014	0.016	0.048	0.043	0.014	0.065	0.021
Number of countries	77	77	77	77	77	77	77	77	77	77	65	77	74

Notes: The table reports the estimates of panel regressions with country fixed effects and clustered standard errors at the borrower country level. The dependent variables are the change in cross-border claims on banks (Panel A) and non-banks (Panel B). *** indicate significance at 1 percent, ** at 5 percent, and * at 10 percent, respectively.

Table 4 Cont. - Regression Results for Cross-Border Claims to Banks and Non-Banks, for period 1990Q1-2012Q4

Panel B - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Non-Banks (in %)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
					1990-2012						1990-2000	2001-2012	2001-2006
GDP Growth (lag)	0.182***	0.159***	0.185***	0.145***	0.169***	0.152***	0.170***	0.182***	0.126***	0.141***	0.137***	0.126***	-0.0454
	(0.0298)	(0.0284)	(0.0302)	(0.0249)	(0.0272)	(0.0283)	(0.0295)	(0.0295)	(0.0250)	(0.0267)	(0.0296)	(0.0387)	(0.0536)
Inflation (lag)	-0.0223	-0.0123	-0.0193	-0.00745	-0.00609	-0.0288	-0.0353*	-0.0228	-0.00680	-0.0102	0.00804	0.0245	-0.0401
	(0.0197)	(0.0187)	(0.0195)	(0.0210)	(0.0206)	(0.0199)	(0.0198)	(0.0196)	(0.0197)	(0.0192)	(0.0179)	(0.0365)	(0.0364)
Change in Interest Rate Differential	-0.0143	0.0241	-0.0113	-0.0160	0.00823	-0.00675	-0.0107	-0.0166	0.0171	0.0330	0.0258	-0.00775	-0.00873
(Domestic rate - Fed Fund Rate)	(0.0281)	(0.0270)	(0.0284)	(0.0270)	(0.0273)	(0.0272)	(0.0276)	(0.0285)	(0.0268)	(0.0272)	(0.0353)	(0.0344)	(0.0289)
CBOE VIX		-0.118***							-0.0897***	-0.113***	-0.0246	-0.115***	-0.151***
		(0.0142)							(0.0160)	(0.0156)	(0.0296)	(0.0210)	(0.0295)
TED Spread			-0.248						-0.0969	0.403	-0.198	0.377	-3.269
			(0.279)						(0.329)	(0.328)	(0.610)	(0.413)	(2.623)
US Bank Leverage				0.223***					0.150***		0.0789	0.103**	0.0417
				(0.0310)					(0.0316)		(0.0564)	(0.0453)	(0.0594)
Growth of Real US Credit					0.195***					0.141***			
					(0.0292)					(0.0292)			
US Slope of Yield Curve						-0.669***			-0.303***		-0.185	-0.402**	-0.919***
						(0.0918)			(0.0986)		(0.128)	(0.198)	(0.334)
Real Federal Fund Rate							0.219***			0.0660			
							(0.0547)			(0.0630)			
G4 Countries M2 (Annual growth rate)								0.0382**	0.0211	0.0331*	-0.00169	0.0137	0.00497
								(0.0169)	(0.0153)	(0.0172)	(0.0259)	(0.0295)	(0.0388)
Country Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	5,420	2,055	3,365	1,666
R-squared	0.015	0.039	0.015	0.040	0.029	0.027	0.019	0.016	0.056	0.050	0.019	0.070	0.041
Number of countries	77	77	77	77	77	77	77	77	77	77	65	77	74

Notes: The table reports the estimates of panel regressions with country fixed effects and clustered standard errors at the borrower country level. The dependent variables are the change in cross-border claims on banks (Panel A) and non-banks (Panel B). *** indicate significance at 1 percent, ** at 5 percent, and * at 10 percent, respectively.

Table5 - Regression Results for Cross-Border Claims to Banks and Non-Banks, Individual G4 variables

Panel A - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Banks (in %)

G4 Economy		VIX	TED	Bank Leverage	Real Credit Growth	Real Policy Rate	Slope of yield curve	M2 growth (national currency)
US	Coefficient	-0.251***	-0.433	0.364***	0.284***	0.446***	-1.309***	-0.879***
	Standard error	(0.0294)	(0.668)	(0.0652)	(0.0791)	(0.138)	(0.242)	(0.139)
	R2	0.051	0.010	0.035	0.019	0.014	0.024	0.032
UK	Coefficient	-0.258***	-4.455***	0.930***	0.127**	0.454***	-1.214***	0.110**
	Standard error	(0.0337)	(0.861)	(0.159)	(0.0481)	(0.129)	(0.294)	(0.0458)
	R2	0.039	0.025	0.031	0.015	0.019	0.025	0.012
EA	Coefficient	-0.243***	-3.213***	0.624**	0.393***	0.0815	-1.338***	0.401***
	Standard error	(0.0291)	(0.764)	(0.285)	(0.0864)	(0.224)	(0.303)	(0.130)
	R2	0.046	0.019	0.013	0.025	0.010	0.025	0.017
JP	Coefficient	-0.271***	-8.463***	0.0617	0.0548	-0.250	1.941**	-1.580***
	Standard error	(0.0315)	(2.021)	(0.123)	(0.0916)	(0.435)	(0.878)	(0.348)
	R2	0.045	0.017	0.010	0.010	0.010	0.012	0.018

Panel B - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Non-Banks (in %)

G4 Economy		VIX	TED	Bank Leverage	Real Credit Growth	Real Policy Rate	Slope of yield curve	M2 growth (national currency)
US	Coefficient	-0.163***	0.113	0.264***	0.288***	0.636***	-1.234***	-0.523***
	Standard error	(0.0184)	(0.377)	(0.0438)	(0.0580)	(0.108)	(0.170)	(0.0832)
	R2	0.052	0.013	0.043	0.033	0.031	0.041	0.031
UK	Coefficient	-0.163***	-2.617***	0.734***	0.119***	0.382***	-0.935***	0.146***
	Standard error	(0.0203)	(0.526)	(0.109)	(0.0330)	(0.0889)	(0.183)	(0.0350)
	R2	0.039	0.025	0.043	0.024	0.029	0.034	0.023
EA	Coefficient	-0.162***	-2.392***	0.623***	0.337***	0.381**	-1.049***	0.361***
	Standard error	(0.0174)	(0.498)	(0.200)	(0.0569)	(0.157)	(0.197)	(0.0859)
	R2	0.049	0.024	0.021	0.037	0.016	0.034	0.027
JP	Coefficient	-0.157***	-3.677***	0.0957	0.253***	0.114	2.172***	-1.358***
	Standard error	(0.0198)	(1.199)	(0.0878)	(0.0580)	(0.270)	(0.791)	(0.250)
	R2	0.040	0.017	0.014	0.021	0.014	0.018	0.027

Notes: The table reports the estimates of panel regressions with country fixed effects and clustered standard errors at the borrower country level. Only non-G4 countries are included in the estimations, which reduces the sample to 58 countries (2,503 observations). The dependent variables are the change in cross-border claims on banks and non banks. The variables reported in the table were introduced individually (not all simultaneously). All regressions also include lag GDP growth, lag CPI inflation, and change in interest rate differentials, but they are not reported. *** indicate significance at 1 percent, ** at 5 percent, and * at 10 percent, respectively.

Table 6. Regression results for cross-border claims on banks and non-banks, individual G4 country factors, by region.

G4 Variables	Claims on Banks		Claims on Non-banks	
	Asia	West Hemisphere	Asia	West Hemisphere
US TED spreads	-2.817**	-0.908	-1.031	-0.299
	(0.973)	(1.070)	(0.641)	(0.332)
UK TED spreads	-5.640***	-5.006***	-3.845***	-2.142**
	(1.618)	(1.372)	(1.061)	(0.832)
EA TED spreads	-5.091***	-1.698**	-3.384***	-0.692
	(1.403)	(0.779)	(0.864)	(0.804)
US bank leverage	0.0827	0.251**	0.114	0.116***
	(0.0878)	(0.101)	(0.0767)	(0.0368)
UK bank leverage	0.409*	0.667**	0.412*	0.489***
	(0.207)	(0.290)	(0.191)	(0.0984)
EA bank leverage	-0.569	-0.803	-0.251	-0.0645
	(0.391)	(0.453)	(0.312)	(0.144)
US real credit growth	0.0641	-0.0733	0.166*	0.0264
	(0.0832)	(0.0888)	(0.0911)	(0.0415)
UK real credit growth	-0.0755	-0.0470	-0.0195	0.00488
	(0.0677)	(0.0646)	(0.0481)	(0.0250)
EA real credit growth	0.0566	0.199	0.139	0.190***
	(0.104)	(0.126)	(0.0955)	(0.0434)
US real policy rate	-0.00835	0.339	0.505*	0.284*
	(0.202)	(0.257)	(0.232)	(0.141)
UK real policy rate	-0.0204	0.00279	0.0589	0.0319
	(0.163)	(0.146)	(0.145)	(0.0886)
EA real policy rate	-0.986**	-0.154	-0.218	0.0247
	(0.384)	(0.568)	(0.301)	(0.156)
US slope of yield curve	-0.712*	-1.234**	-1.161***	-1.027**
	(0.389)	(0.426)	(0.314)	(0.361)
UK slope of yield curve	-0.126	-0.493	-0.241	-0.407**
	(0.385)	(0.360)	(0.286)	(0.145)
EA slope of yield curve	-0.0889	-0.739**	-0.273	-0.556***
	(0.416)	(0.330)	(0.305)	(0.122)
US growth of M2	-0.841**	-0.744*	-0.794***	-0.198
	(0.278)	(0.370)	(0.118)	(0.127)
UK growth of M2	-0.0672	-0.0575	0.0545	0.0217
	(0.0638)	(0.0691)	(0.0608)	(0.0322)
EA growth of M2	-0.135	-0.0424	-0.0663	0.144**
	(0.191)	(0.251)	(0.120)	(0.0612)

Notes: The table reports the estimates of panel regressions with country fixed effects and clustered standard errors at the borrower country level. Each region is estimated separately, with only non-G4 countries being included. The dependent variables are the change in cross-border claims on banks and non-banks. The variables reported in each row of the table were introduced individually (not all simultaneously). All regressions also include lag GDP growth, lag CPI inflation, and change in interest rate differentials, but they are not reported. *** indicate significance at 1 percent, ** at 5 percent, and * at 10 percent, respectively.

Table7 - Interaction Effects of Country Characteristics with Global Liquidity Variables

Panel A - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Banks (in %)

	X Variables						
		US VIX	UK TED	US Dealer Bank Leverage	UK real policy rate	UK slope of yield curve	G4 Countries M2 (Annual growth rate)
Exchange rate flexibility	1.237	1.634	1.382	4.180***	1.969**	0.915	1.610
	(1.032)	(1.007)	(0.841)	(1.130)	(0.765)	(0.769)	(0.998)
Exchange rate flexibility * X		-0.0134	-0.541	-0.132***	-0.270***	0.802***	-0.0689***
		(0.0113)	(0.475)	(0.0400)	(0.0915)	(0.176)	(0.0164)
Capital controls	0.0108	-0.00284	-0.0270	0.0840	-0.00390	-0.0324	0.0274
	(0.0284)	(0.0307)	(0.0320)	(0.0563)	(0.0316)	(0.0251)	(0.0294)
Capital controls * X		-0.000415	-0.0158	-0.00518**	-0.0139***	0.0301***	-0.00346**
		(0.000802)	(0.0228)	(0.00232)	(0.00457)	(0.00971)	(0.00138)
Capital stringency	-0.805**	-0.403	-0.392	1.233**	-0.427	-0.967***	-0.411
	(0.369)	(0.285)	(0.288)	(0.561)	(0.296)	(0.269)	(0.366)
Capital stringency * X		-0.00629	-0.263	-0.0809***	-0.0785	0.423***	-0.0442***
		(0.00434)	(0.178)	(0.0254)	(0.0590)	(0.0946)	(0.0123)
Supervisory power	-0.108	-0.0620	-0.0212	0.420	0.0155	-0.316	0.0230
	(0.345)	(0.305)	(0.322)	(0.366)	(0.312)	(0.311)	(0.336)
Supervisory power * X		-0.00364*	-0.176*	-0.0250**	-0.0599**	0.258***	-0.0160***
		(0.00215)	(0.0896)	(0.0110)	(0.0281)	(0.0511)	(0.00424)
Institution quality 1/	-3.834***	-3.130***	-3.545***	-1.064	-2.761***	-3.734***	-2.956***
	(1.043)	(1.026)	(1.071)	(1.231)	(1.002)	(0.967)	(1.075)
Institution quality * X		-0.0155	-0.645	-0.0735**	-0.237***	0.606***	-0.0484**
		(0.0109)	(0.390)	(0.0367)	(0.0778)	(0.159)	(0.0197)
Limits on foreign banks	-0.406	1.213	1.533	5.303**	0.207	-1.187**	0.0106
	(0.638)	(1.014)	(1.047)	(2.107)	(0.602)	(0.483)	(1.230)
Limits on foreign banks * X		-0.0561	-3.488**	-0.257***	-0.404**	1.091***	-0.0336
		(0.0351)	(1.440)	(0.0858)	(0.158)	(0.385)	(0.105)

Panel B - Dependent Variable: Log Changes in BIS Locational Cross-Border Claims on Non-Banks (in %)

	X Variables						
		US VIX	UK TED	US Dealer Bank Leverage	UK real policy rate	UK slope of yield curve	G4 Countries M2 (Annual growth rate)
Exchange rate flexibility	-0.890	-0.710	-0.854	1.297	-0.398	-1.050	-0.649
	(0.612)	(0.537)	(0.857)	(0.948)	(0.995)	(0.768)	(0.671)
Exchange rate flexibility * X		-0.00676	-0.0649	-0.0988***	-0.171***	0.450***	-0.0517***
		(0.00623)	(0.190)	(0.0268)	(0.0602)	(0.110)	(0.0135)
Capital controls	-0.0243	-0.0369	-0.0507*	0.0331	-0.0358	-0.0573**	-0.0152
	(0.0269)	(0.0267)	(0.0277)	(0.0357)	(0.0272)	(0.0244)	(0.0269)
Capital controls * X		-0.000143	0.00216	-0.00395***	-0.0107***	0.0218***	-0.00166*
		(0.000496)	(0.0144)	(0.00131)	(0.00278)	(0.00569)	(0.000892)
Capital stringency	-0.504	-0.377	-0.416	1.020**	-0.183	-0.535**	-0.324
	(0.319)	(0.283)	(0.293)	(0.490)	(0.261)	(0.258)	(0.333)
Capital stringency * X		0.000804	0.101	-0.0612***	-0.0624	0.207***	-0.0229**
		(0.00294)	(0.111)	(0.0206)	(0.0441)	(0.0697)	(0.00941)
Supervisory power	0.101	0.135	0.125	0.492**	0.151	0.0432	0.162
	(0.166)	(0.145)	(0.157)	(0.243)	(0.151)	(0.143)	(0.171)
Supervisory power * X		-0.00250	-0.0146	-0.0185**	-0.0182	0.0695*	-0.00769*
		(0.00156)	(0.0578)	(0.00888)	(0.0204)	(0.0355)	(0.00411)
Institution quality 1/	-3.197***	-2.901***	-3.233***	-1.330*	-2.555***	-3.010***	-2.981***
	(0.542)	(0.472)	(0.536)	(0.723)	(0.531)	(0.485)	(0.549)
Institution quality * X		-0.00392	0.151	-0.0491**	-0.110**	0.249**	-0.0182
		(0.00621)	(0.199)	(0.0220)	(0.0442)	(0.0962)	(0.0136)
Limits on foreign banks	-0.950	-0.664*	-0.723	1.783	-0.540	-1.099**	-0.731
	(0.590)	(0.371)	(0.462)	(1.415)	(0.586)	(0.427)	(0.845)
Limits on foreign banks * X		-0.00263	-0.174	-0.114**	-0.241**	0.451**	-0.0264
		(0.0197)	(0.518)	(0.0496)	(0.116)	(0.194)	(0.0445)

Notes: The table reports the estimates of panel regressions with country fixed effects and clustered standard errors at the borrower country level. The dependent variables are the change in cross-border claims on banks and non banks. The variables reported in the table were introduced individually (not all simultaneously). All regressions also include lag GDP growth, lag CPI inflation, change in interest rate differentials, and, in the respected interacted variable.
*** indicate significance at 1 percent, ** at 5 percent, and * at 10 percent, respectively. 1/High values indicate lower institutional quality.

Annex A. Time series charts of the drivers of global liquidity