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BANKING GLOBALIZATION, TRANSMISSION, AND MONETARY POLICY AUTONOMY

Linda S. Goldberg

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ABSTRACT

International financial linkages, particularly through global bank flows, generate important questions about the consequences for economic and financial stability, including the ability of countries to conduct autonomous monetary policy. I address the monetary autonomy issue in the context of the international policy trilemma: countries seek three typically desirable but jointly unattainable objectives: stable exchange rates, free international capital mobility, and monetary policy autonomy oriented toward and effective at achieving domestic goals. I argue that global banking entails some features that are distinct from broad issues of capital market openness captured in existing studies. In principal, if global banks with affiliates established in foreign markets can reduce frictions in international capital flows then the macroeconomic policy trilemma could bind tighter and interest rates will exhibit more co-movement across countries. However, if the information content and stickiness of the claims and services provided are enhanced relative to a benchmark alternative, then global banks can weaken the trilemma rather than enhance it. The result is a prediction of heterogeneous effects on monetary autonomy, tied to the business models of the global banks and whether countries are investment or funding locations for those banks. Empirical tests of the trilemma support this view that global bank effects are heterogeneous, and also that the primary drivers of monetary autonomy are exchange rate regimes.

Linda S. Goldberg
Federal Reserve Bank-New York
33 Liberty Street
New York, NY 10045
and NBER
linda.goldberg@ny.frb.org

I. Introduction

Financial globalization is frequently criticized, with concerns voiced about consequent increases in economic volatility and disruptions to monetary policy autonomy. Questions about the structure of the system for international capital flows and funding intermediation are of first order importance, and actively debated.[2] One concern is that such globalization amplifies the vulnerability of economies to shocks, while limiting the tools that central banks and policy authorities have for addressing the shocks generated at home and abroad. In the aftermath of the Great Recession and global financial crisis, particular attention has been focused on the activities of global banks and their contribution to economic vulnerability. Do these banks play a role in stabilizing or destabilizing host markets? Do global banks make it more difficult for countries to use local interest rates to address domestic cyclical needs, thereby reducing monetary autonomy?

In this paper, I focus on the relationship between global banks, international shock transmission, and monetary policy autonomy. Throughout, I consider banks as global when they have international activity achieved at least in part through networks of physical branches and subsidiaries in foreign countries. This type of global activity has increased dramatically in recent decades, whether measured in terms of cross-border funding flows, local lending by bank branches and subsidiaries in host markets, counts of foreign banks operating in local markets, or the share of local intermediation activity accounted for by global banks. The composition of international funds provided has also changed tremendously, with more emphasis on longer-term funding, greater use of internal capital markets as compared to cross-border transactions, and more off-balance sheet activity in the form of derivatives, credit guarantees, and commitments. Additionally, global banks use offshore financial centers to a greater degree, and have become more complex organizations in terms of their structures, geographical reach, and service provision.

The consequence of openness to international capital flows for monetary policy autonomy is not a new question. This theme is directly confronted in literature on the macroeconomic policy trilemma, wherein countries seek three typically desirable but jointly unattainable objectives: stable exchange rates, free international capital mobility, and monetary policy autonomy oriented toward and effective at achieving domestic goals (for example, see Obstfeld, Shambaugh, and Taylor (2005, 2010)). Monetary autonomy, proxied by low interest rate co-movement, is most obtainable under flexible exchange rate regimes and some forms of capital flow restrictions (Klein and Shambaugh 2013).

[2] For example, at the 2013 Jackson Hole conference, both Rey (2013) and Landau (2013) addressed issues regarding the behavior of global liquidity and dynamics of the global financial cycle.

Does the presence of global banks per se require some distinct considerations relative to other forms of international capital movements? I argue that this distinction matters. In principal, if global banks enter markets by establishing affiliates, this can lead to reduced frictions in international capital flows. In turn, the macroeconomic policy trilemma could bind tighter and interest rates will exhibit more co-movement across countries. Research already shows that international capital flows through global banks adjust rapidly to shocks through cross-border and internal capital markets, so local monetary policy effects through the bank lending channel can be weakened (Cetorelli and Goldberg 2012a). However, it also could be the case that, if the global banks are engaged in local lending activity, the information content and stickiness of the claims and services provided in the host market are enhanced relative to a benchmark alternative This higher information intensity may enable more stability of flows to individual non-bank counterparties in host markets, even in the face of larger macroeconomic disturbances and diminishing financial frictions. Such an argument is consistent with the observation that the presence of global banks is tied to the reduced incidence of crises across countries. . In this case, the global banks can weaken the trilemma rather than enhance it. Overall, heterogeneity in shock transmission and autonomy effects across countries and types of counterparties should be expected, and could depend on the form of foreign bank entry, the information content of loans, and the role of affiliate markets in the overall parent organizations as funding sources or investment locations (Cetorelli and Goldberg 2012c).

I conduct empirical tests of the trilemma, closely following the analyses of Obstfeld, Taylor and Shambaugh (2005, 2010) and Klein and Shambaugh (2013), but also adding variables that introduce the extent of global bank penetration of local economies. The share of global banks in domestic credit creation, not the relative counts of banks with operations in a country, is correlated with interest rate co-movements in countries with pegged or floating exchange rate regimes. In particular, global bank presence is associated with stronger interest rate co-movements in the pegged rate countries that have the most open capital accounts. Global bank penetration matters, while standard measures of capital account openness do not, for floating exchange rate countries, and is associated with higher interest rate co-movements. That said, exchange rate regimes matter most and are the primary reason for differences in interest rate co-movements across countries.

Does this mean that global banking does exacerbate a policy trilemma? In some cases the answer may be yes, but not conclusively so. Global banks follow customers into many markets, and should be correlated with international trade activity, which is not a separate control in the regressions. At the same time, the transmission of shocks between economies through banks is quite

heterogeneous, as are the expected effects for the macro-economy. Some host countries are investment locations for banks, where information-intensity of transactions plays a larger role, while other locations are funding locations. Indeed, recent work also suggests that the complexity of the overall global bank parent organization may influence transmission (Cetorelli and Goldberg 2013b), alongside the health and vulnerabilities of banks (Cetorelli and Goldberg 2011), and the structure of finance beyond these banks should matter for transmission and macroeconomic consequences. Clearly, more work is needed before a "negative" assessment of the effects of global banks on monetary policy autonomy is levied.

Finally, it is worth noting that my arguments go in a different direction from those of Rey (2013), who considers the large gross capital flows in international banking and elsewhere as destabilizing economies and making more difficult the conduct of monetary policy. These gross flows certainly could contribute to the incidence of crises, and the severity of crises as also argued by Obstfeld (2012). However, net flows and the specific counterparties for these flows might matter more for the regular conduct of monetary policy. Moreover, research generally shows that the entry of global banks into economies, especially emerging market ones, has reduced crisis vulnerabilities rather than enhanced these.

Section II proceeds by presenting trends in global banking across recent decades. Section III presents key lessons from the literature that examines the roles of global banks in international shock transmission and business cycle co-movement. Section IV turns to evidence on the international macroeconomic policy trilemma, and Section V concludes with a discussion of some outstanding challenges.

II. Trends in banking globalization and international flows

To provide perspective for understanding the macroeconomic consequences of global banks, this section presents facts on the scale and composition of international banking activity. Consider first the international banking flows by approximately thirty countries that report consolidated, national data at a quarterly frequency to the Bank for International Settlements (BIS). These data reflect banks' "on-balance sheet" financial claims vis-à-vis the rest of the world, aggregated across all banks within each reporting country. They cover contractual lending by the head office, its branches, and subsidiaries on a worldwide consolidated basis, i.e. net of inter-office accounts. Intermediation activity includes the extension of credit by a bank headquartered in a particular country to residents of another country, and can occur via: (i) cross-border lending; (ii) local lending by affiliates established in the foreign country, or

(iii) lending booked by an affiliate established in a third country (e.g. an international financial center). The underlying financial instruments could be loans, deposits, or securities, as well as derivatives contracts and contingent facilities.[3]

Figure 1 shows an informative trajectory in international banking growth (as a share of GDP). While growth during the mid-1980s and 1990s was gradual, the early 2000s saw a significant acceleration until the start of the financial crisis of 2007. This was followed by a significant retrenchment during the crisis, with international capital flows through banks dropping nearly 25 percent through 2012. Cross-border flows drive much of the dynamics (in red). These patterns can be compared with the growth in international trade activity (Figure 2). The early rise in international banking tightly mirrored the growth of international trade, in accord with the view that early internationalization of banking was associated with financial multinationals following the production conglomerates and real resource firms abroad. The sharper liftoff in global banking flows through the 2000s occurred as the activities and customer bases of global banks broadened.

Insert Figure 1 here

Insert Figure 2 here

As globalization of banks and opportunities for claims through affiliates increased, cross-border and interbank flows could have tilted toward transactions that are more risky and volatile.[4] For example, international capital flows to unaffiliated banks in emerging markets are more volatile than lending flows to the non-bank sector (Figure 3). The claims extended through affiliates could be the more information intensive ones, and expanded activity in local markets could be with counterparties that have harder information available. The volatility of flows is not purely a story of shortened maturity of funding extended by global banks. Between the 1990s and the 2000s, the share of short-term flows in international claims (Figure 4), which includes both cross-border and foreign currency denominated local claims, declined.

Insert Figure 3 here

[3] The types of claims reported to the BIS are described as international claims and foreign claims. International claims encompass the cross-border lending and local claims extended by foreign affiliates of the parent bank that are denominated in foreign currency. Foreign claims are broader than international claims, in that they also capture local claims denominated in local currency terms. The data do not cover asset management services. Parts of section update evidence provided in BIS CGFS No. 41 (2010) on long term trends in international banking.

[4] Some of these flows may respond more to stress events, leading to greater volatility in bank financing than in foreign direct investment, portfolio equity, and net international debt securities.

Insert Figure 4 here

The opportunity to shift activities from being cross-border to locally-based arose with the establishment of branches and affiliates of global banks in host markets. As carefully documented by Claessens and van Horen (2013), the numbers and shares of banks operating internationally with local affiliates exhibit their strongest growth in the late 1990s and early 2000s, and again in 2006 to 2007 (Figure 5).[5] In some countries, particularly in emerging markets, the foreign-owned bank shares in local activity grew to dominate shares by domestically-owned banks. The volume of credit issuance originating from foreign-owned banks within local markets also grew rapidly, although not homogeneously, across countries.

Insert Figure 5 here

As part of the growing number of global banks with centralized decision-making and liquidity management practices, flows between affiliated banks through internal capital markets also reached significant levels. These intra-affiliate flows, in gross terms, are almost as large as interbank transactions (Figure 6).[6]

Insert Figure 6 here

The 2000s also were a period of expanded off-balance sheet exposures, flows to offshore financial centers, and enhanced organizational complexity. Off-balance sheet transactions, which include derivatives positions, credit commitments, and guarantees[7], had growth (Figure 7) that outpaced that of local claims and cross-border claims. US banks were responsible for the largest growth in guarantees extended and credit commitments, while UK banks accounted for the growth in derivatives contracts (BIS CGFS No. 41 2010). At the same time, global bank flows channeled through offshore financial centers increased three-fold over this period (Figure 8). The economic rationale behind use of OFCs and

[5] Various studies explore the entry decisions by these banks, including Buch (2003, 2005), Focarelli and Pozzolo (2006) and Lehner (2009). Niepmann (2013) provides a model where more efficient banks are able to absorb fixed costs of entry into foreign markets, and therefore access these markets through local affiliates instead of cross-border flows, monitoring customers and absorbing higher costs then domestic banks. Empirical evidence by Buch, Koch, and Koetter (2012) provide support for size and efficiency arguments. Cerutti, Dell'Ariccia and Peria 2007 explore the decision over form of entry through branches or subsidiaries.

[6] Examples of studies providing direct evidence are Cetorelli and Goldberg 2012 a,b,c, and Duwell 2013.

[7] These positions of international banks are captured by BIS banking statistics for the period since 2005 and fall under "other exposures". The derivative positions are the "net value of derivatives", including derivatives used to hedge balance sheet positions, but not derivatives used for proprietary trading.

the economic consequences of this activity are the subject of ongoing analyses (For example, Rose and Spiegel (2007)).

Insert Figure 7 here

Insert Figure 8 here

The growth in global banking activity is accompanied by a large increase in the complexity of these organizations, as measured by the number and industrial classifications of their affiliates (Cetorelli and Goldberg 2013a). There is a widespread perception that the size of organizations is closely mapped to the complexity of organizations. While higher value organizations do tend to have greater numbers of affiliates, especially when considering the largest of financial institutions, this tight link is absent when geographic and business line complexity are considered. Still to be determined are reasons for such complexity: whether due to a search for production efficiency, tax avoidance, information obfuscation, or other explanations. Many global bank affiliates are found within the parent organization's borders, but other affiliates are scattered worldwide). Complexity may be intertwined with the role of global banks in international shock transmission. Cetorelli and Goldberg (2013b) posit that the US branches of foreign banks may play a larger role in liquidity provision and insurance when they are part of more complex global organizations.

III. Global Banks and International Shock Transmission

Ultimately I ask the question of whether banking globalization, distinct from other forms of international financial integration, undermines the ability of countries to conduct autonomous monetary policy. Before turning to empirical tests related to that proposition, in this section I review evidence on global banks and international shock transmission. I begin with evidence that financial integration strengthens international co-movement of business cycles and the transmission of shocks across markets, and then turn to global bank roles.

III.1 Financial Globalization and business cycle co-movements.

Alternative theoretical frameworks use two-country models to understand the role of financial globalization in the international propagation of shocks originating in one country and leading to more synchronized business cycles. Calibrated models introduce financial frictions and international business

cycles[8]. Specific mechanisms differ across studies, for example when leverage-constrained investors with internationally diversified portfolios are responsible for reallocating capital in response to shocks. Alternatively, investors equalizing returns across internationally traded assets transmit shocks that hit their respective net worth, leading to enhanced co-movements of business cycles. [9]

VAR studies have explored the responses of shocks to GDP across the United States, Euro Area, Japan, and an aggregate of small industrialized countries - with the goal of identifying the major international channels through which shocks are propagated (Bayoumi and Swiston 2009). The largest contributions to spillovers almost universally come from financial variables, as opposed to from trade flows or through commodity prices. World interest rates are also found to be important for emerging market business cycles (Neumeyer and Perri 2005), and U.S. shocks are clearly transmitted to Latin American countries (Canova (2005)). Financial integration raises business cycle synchronization among a sample of industrialized countries, even though these countries also tend to be more specialized (Imbs 2004).

The financial integration that is viewed as enhancing business cycle co-movement is not purely a story about international risk sharing. Empirical evaluations of risk sharing patterns among countries exhibiting differing degrees of international financial integration finds it is at best modest, and certainly nowhere near the levels predicted by theory (Terrones et al. 2007). In addition, only industrial countries have attained better risk sharing outcomes during the recent period of globalization. This evidence concludes that developing countries have been partly shut out of this benefit because portfolio debt, which has dominated the external liability stocks of most emerging markets until recently, is not conducive to risk sharing.

III.2 Direct Evidence on Global banks and International Shock Transmission

What is the specific role of global banks in business cycle co-movements? The diversification benefits of risk-sharing in banking are illustrated in basic macro-banking models where integration tends

[8] For example, see Devereux and Yetman (2010), Kollman, Enders and Muller, 2011, Dedola and Lombardo (2012), and Meier (2013).

[9] Adrian and Shin (2010) argue that financial intermediaries – and more generally the suppliers of credit -- drive the business cycle through their role in driving the price of risk, and argue (in a one country setting) that balance sheet aggregates such as total assets and leverage are the relevant financial intermediary aggregates to consider in macroeconomic analysis. In their context, with data on the United States, the quantitative discussion considers both the banking and shadow banking system or more market-based intermediaries such as broker-dealers (and which are dependent on more volatile external finance). The institutional structure of intermediation is stressed. In principle, these arguments should extend to the international environment and the location of sensitivities to changes in risk and leverage.

to dampen the effect of bank capital shocks within borders, but amplifies the effect of bank-specific shocks across borders (Morgan, Strahan, and Rime (2004)). In the international setting, the dampening of local shocks starts with a basic observation that the availability of loanable funds via the home deposit base contributes to the pro-cyclicality of lending and the real economy. If foreign-owned bank entrants are less reliant on host-country funding sources and more dependent on foreign sources than their domestically-owned counterparts are, the pro-cyclicality in their supply of loanable funds may be lower.

By now it is well-established that global banks are agents for international shock transmission and generate more integrated international lending activity. Japanese banks transmitted the shocks from Japanese stock price movements that hit their own capital bases into the U.S. real estate market through Japanese bank branches operating in the United States (Peek and Rosengren 1997, 2000).[10] Liquidity shocks transmitted through individual U.S. global banks weakened the bank lending channel within the United States and increasing transmission into markets where U.S. banks have overseas affiliates (Cetorelli and Goldberg 2012a). Internal capital markets within global banks work alongside cross-border flows as paths for this transmission, with intra-bank borrowing and lending less volatile but still adjusting to liquidity shocks in crisis and non-crisis times (Cetorelli and Goldberg 2012b,c). Cross border funds and traditional interbank transactions are more volatile than local claims (Cetorelli and Goldberg (2006, 2011), Schnabl (2012), Correa, Sapriza, and Zlate (2012)). Syndicated lending activity is a form of cross-border flows shown to be highly responsive to balance sheet conditions and responsible for international transmission (de Haas and van Horen 2012, Giannetti and Laeven 2012).

These observations also point to the importance of being very clear about the form of international banking flows in studies of the effects of banking globalization. Global bank intermediation, along with related internal capital market flows to international affiliated banks or branches, may reduce the financial frictions in international capital markets, and potentially lead to more rapid adjustments of positions. At the same time, there can instead be reduced volatility in international capital flows as counter-party risk declines with the shift away from long distance relationships between borrowers and lenders; the transition from cross-border connections to those through local claims of banks can both ease the potential for international capital movements while reducing the flightiness of those flows; and the incidence of crises in local markets has declined. Such observations can be consistent with the message of Kalemli-Ozcan, Papaioannou, and Peydro (2012).

[10] In the Malaysian case, banks with sufficient international diversification played a stabilizing role in host credit markets during the Asian crisis, while foreign banks that had a narrower focus on Asia behaved similarly to domestic banks (Detragiache and Gupta (2004)).

Moreover, business model differences across and within banks should drive their consequences for international shock transmission and business cycle co-movements, implying heterogeneity in international transmission. While shocks to both the parent organization and local markets are smoothed through capital reallocations, not all affiliate markets are similarly treated by parents. In US bank external flows, a pecking order approach to the affiliates applies, instead of the alternative where there is an organizational hierarchy supporting the parent at the uniform expense of the affiliates (Cetorelli and Goldberg 2012c). The real effects and form of shock transmission is not expected to be uniform across locations. Duwel (2013) shows the German parent banks likewise used internal markets to reallocate funding within their organizations, with different dynamics of protections to branches and subsidiaries as the funding pressures evolved.

Nonetheless, from a macroeconomic perspective, the role of global banks in enhanced business cycle co-movements may be exaggerated. Kalemli-Ozcan, Papaioannou, and Peydro (2012) explore business cycle co-movement within more than 150 bilateral pairs of advanced economies between 1970 and 2006. The cross-section of country pairs confirms the significant positive correlation between banking integration and output synchronization, but the panel estimates show that within country pairs, increases in cross-border banking and more legislative/ regulatory harmonization in financial services inside the EU has been followed by less synchronized, more divergent output fluctuations. Moreover, aggregate credit effects depend on the potential for local borrowers to substitute credit through bond markets and shadow banking (Adrian, Colla, and Shin 2012), which can differ widely across countries.

III.3 Financial Globalization and Crises

Oddly, another reason for enhanced business cycle co-movements across countries could be because banking globalization is associated with a reduced incidence of (idiosyncratic) financial crises in emerging market economies, and thereby with fewer sharp output contractions that accompany such crises (Calvo and Reinhart 2000). In a wide sample of countries, the share of bank assets held by foreign owners is negatively correlated with the probability of a crisis (Beck, Demirguc-Kunt, Levine 2003). Foreign bank presence was found to have a negative and statistically significant coefficient in cross-country regressions on crisis probability (Demirguc-Kunt, Levine, and Min 1998). More recent work using data from a sample of 20 developed countries between 1978 and 2009 compared the bilateral linkages and crisis probabilities in periods with and without financial crises (Kalemli-Ozcan, Papaioannou, and Perri 2012). In periods without financial crises, increases in bilateral banking linkages are associated with more divergent output cycles. This relation is significantly weaker and turned positive during

financial turmoil periods, suggesting that financial crises induce co-movement among more financially integrated countries and more generally that the type of shock matters for the direction of business cycle co-movement.

IV. Interest rate co-movements and the macroeconomic policy trilemma

The consequences of financial globalization generally, and banking globalization specifically, for the monetary autonomy of countries has been explored in many studies through the lens of interest rate co-movements.[11] Bilateral studies of the economic news effect provide one set of perspectives, though without explicitly considering magnitudes of the financial or banking integration of countries. Consistent with increasing globalization, impacts of U.S. shocks on euro area interest rates have grown larger over time (Ehrmann and Fratzscher 2005), although other studies find more mixed results depending on the particular period studied.[12] These long term structural changes are not the only factors behind changing interest rate co-movements. Similarities in perceived central bank policy reaction functions matter (Goldberg and Klein 2011). Risk conditions also matter: uncertainty alters the information content of news announcements, the interaction of monetary policy and financial stability objectives of central banks, and the effect of economic news announcements on risk premia (Goldberg and Grisse 2013).

In a cross-country setting, exchange rate regimes, controls on financial flows, and economic inter-linkages are tied to interest rate co-movements. Countries with *de jure* or *de facto* currency pegs with respect to the U.S. dollar have their interest rates and monetary stances move largely in step with U.S. interest rates, tying the broader business cycles more closely together (di Giovanni and Shambaugh 2008, and Frankel, Schmukler and Serven 2004). Forbes and Chinn (2004) find that the response of bond yields in smaller economies to those of the world's largest economies depends more on trade than financial linkages, whereas Hausman and Wongswan (2011) find both types of linkages are important to the response of bond yields to U.S. monetary shocks.

The macroeconomic policy trilemma facing countries is that only two of the following three options might be achieved: exchange rate fixity, monetary autonomy, and international financial openness. Extensive cross-country and time series tests by Obstfeld, Taylor and Shambaugh (2005,

[11] Kamin (2010) provides a comprehensive review of a number of distinct literatures on asset price co-movements and international shock transmission.

[12] Faust, Rogers, Wang, and Wright (2007) find that surprises in U.S. macro announcements affect both short- and longer term interest rates in Europe, but find little evidence that these effects grew stronger over the 1987-2002 period. Contrary to that finding, Ehrmann and Fratzscher (2005) find that the effect of U.S. macro announcements on euro area interest rates rose from before to after 1998.

2010) provide evidence that is broadly supportive of the trilemma, particular with respect to less monetary autonomy observed for countries with fixed exchange rates, and more interest rate independence for countries under flexible exchange rate systems. Klein and Shambaugh (2013) demonstrate that countries with extensive capital controls or floating exchange rates retain more monetary autonomy. However, partial capital controls and limited exchange rate flexibility did not lead countries to have more monetary autonomy than in situations with open capital accounts and fixed exchange rates. The trilemma policy mix of countries also feeds back into their output volatility and inflation performance, as Aizenman, Chinn, and Ito (2010) document for developing countries.

IV.1 Underpinnings for Global Bank Effects on the Macroeconomic Policy Trilemma

Within this context, why might banking globalization per se matter for monetary autonomy? Banking globalization, especially through the establishment of branches and affiliates in host countries, can be viewed from the lens of reducing financial frictions in international capital markets.[13] These frictions are largely informational, and can be captured under a broad heading of counterparty risk. The increased global bank entry into many economies is accompanied by an expansion of local lending through these banks. This lending is presumably more information intensive than the previous arms-length cross border flows that would have occurred through these same banks. At the same time, there has been an increased use of internal capital markets by these global banks. The presumption here is that the reduced "distance" between the lending source (the global bank) and the client - when this global bank operates through its local branch or subsidiary - increases information intensity. While the costs of moving credit across countries may be reduced when operating within an organization, the information content of the flows associated with lending may be higher, enhancing rather than reducing the stability of loans relative to a cross-border relationship.[14] Indeed, in a systemic crisis or stress situation, such flows may continue to a greater degree than other flows with more counterparty risk. While relevant for the branches and subsidiaries that operate lending operations in countries, information as a stabilizing factor to net lending flows may be less important in economies that some global banks use mainly as locations for raising local funds and offering other portfolio services.

[13] For thinking about financial frictions, a broad macroeconomic literature considers a type of financial frictions and effects on lending activity. The early literature takes a closed economy view and models frictions as related to credit constraints related to borrower collateral. Gertler and Kiyotaki (2010) instead places borrowing constraints on the lender (the bank), still within a closed economy framework. Other frictions arise from access to external finance when liquidity conditions adjust, a phenomenon argued by Kashyap and Stein (2000) to explain differential bank lending channel effects of monetary policy on loan supply by large versus small banks in the United States, or Cornett, McNutt, Strahan, and Tehranian (forthcoming) on their responses to liquidity risk.

[14] For example, see Degryse and Ongena (2005) and Buch (2005).

Thus, in addition to the looser restrictions on international capital markets access that can enhance the policy trilemma for countries (particularly those without fully flexible exchange rates), I consider whether the presence of global banks also alters the strength of the trilemma.[15] The empirical exercise below examines whether measures of global bank participation within countries and over time add explanatory power to existing studies of interest rate co-movements across countries and the policy trilemma.

The main empirical specification from Obstfeld, Shambaugh and Taylor (2005, 2010) is

$$\Delta r_{it} = \alpha + \beta \Delta r_{bit} + \mu_{it} \qquad (1)$$

where changes Δ at time *t* in the nominal local interest rate *r* of country *i* move in step with changes in the interest rate *r* of a dominant or base currency *b*, which is the currency of the nation to which country *i* has some degree of *de facto* or *de jure* exchange rate pegs. Most tests use short-term rates for both country *i* and the base country. Many variants on this basic test have been derived and tested in prior studies. I follow the trilemma literature, in which tests introduce non-structural functional forms for $\boldsymbol{\beta}$, capturing the intuition that co-movements of interest rates should be higher for countries with currency peg relationships and with more open capital accounts, captured in variable vector *X*. Specifically,

$$\beta = \beta_0 + \beta_1 X_{it} \qquad (2)$$

High values of β are interpreted as indicating less monetary autonomy for country *i*. This interpretation is certainly subject to objections, as tight interest rate co-movements can arise for other reasons, including tight inter-linkages of economies through trade, production integration, or similar industry structures (eg. Stockman and Tesar 1995, and Burstein, Kurz, and Tesar 2008). Interestingly, specification results of (1) with broader controls introduced for these other country linkages still generate robust conclusions about the roles of exchange rate regimes and capital controls (Shambaugh 2004). My contribution to this literature is to explore whether interest rates co-move more tightly across countries when we introduce controls for the presence of global banks,. This result might

[15] As discussed further below, the metric for foreign bank penetration – relative counts of banks – used in our first tests is one indicator, but certainly is unlikely to capture the extent of integration. It also does not reflect the relationships between the operations in the host markets and the entire parent operations, factors that Cetorelli and Goldberg (2012c) identify as important for the use of internal capital markets and transmission into lending supply in the host markets.

especially arise under fixed exchange rate regimes, but also might be present under flexible exchange rate regimes. If I find indication of a significant role of global bank participation, more analysis would be needed to parse if this role exists independently or exists because these banks are in markets that otherwise have more correlated trade and business cycles. [16]

IV.2 Data.

I adopt the exchange rate regime metrics of Shambaugh (2004), where a currency is treated as in a "peg" if its exchange rate is within a 2 percent band over the course of a year against a base currency. For example, pegs against the U.S. dollar would have the base interest rate be that of the United States. In addition, I use the "soft pegs" definition of Obstfeld et al. (2010), where the exchange rate bands are between +/-2 percent and +/- 5 percent per year.

I capture restrictions on international capital flows by adopting the Chinn and Ito (2006) capital account openness measure. This metric allows for a variety of capital controls, including covering current account transactions, capital account transactions, and multiple exchange rates. The measure is highest when these restrictions are few, and takes a low or negative value when extensive restrictions on international capital movements are in place.[17] These capital control metrics are intended to reflect de jure impediments or frictions in international movements of capital. My regression specifications introduce the Chinn-Ito metrics, which are continuous variables that range between -1.86 and 2.45 in our sample, or introduce discrete categories of capital account openness (high, medium or low) based on the continuous Chinn-Ito metric.[18]

Global bank presence in each country (denoted by variable *GlobalBank*) is introduced using two measures of foreign penetration. First, I draw on the Claessens and van Horen (2013) database on foreign bank penetration into local financial systems. One measure, denoted as *count* in the regression tables, is the relative count of foreign banks out of total banks in each economy in each year from 1995

[16] Spiegel (2009) considers whether financial globalization disciplines local monetary policy implementation in the sense of reducing the returns from using monetary policy to stabilize output. Using a financial remoteness variable, he finds a negative relationship between median inflation and financial globalization, but not a robust relationship.

[17] Klein (2013) also constructs useful measures distinguish between long-standing capital controls that extend over a wide range of assets, described as "walls", and controls that are more narrowly targeted over a limited duration, which he describes as "gates". Klein and Shambaugh (2013) introduce both sets of measures into their benchmark set of tests of the policy trilemma for countries.

[18] These high, medium, and low categories follow the idea of Klein and Shambaugh (2013), who divide country-year observations into true open, mid-open, and other. While the high openness observations correspond to true open in that study, we broaden the definition of low openness to include some observations that Klein and Shambaugh included as mid-open. The cut-offs for each category are described in the data appendix.

to 2009.[19] These data are then merged with the dataset used in Klein and Shambaugh (2013, "KS"), resulting in a sample of 136 countries and spanning 15 years of data.[20] I construct a second measure of foreign bank penetration that is based on credit extension, instead of counts of banks. This measure, denoted as *GlobalinCredit* in the regression tables, is the share of foreign bank claims on local residents from the Bank for International Settlements Consolidated Banking Statistics Database, relative to Domestic Credit volumes reported in the International Financial Statistics (IFS) database. The latter are converted into USD using IFS bilateral exchange rates. The resulting variable for foreign local credit share is lagged in regression specifications to deal with simultaneity concerns. The global bank presence measures may be positively correlated with financial openness, but these are not identical concepts.

I use the Chinn-Ito measures to describe capital market openness as high, medium, or low, and using the peg, softpeg, and flexible exchange rate regime indicators. The data observations are well distributed over the alternative capital account openness and exchange rate regimes (Table 1).

Finally, the specifications use times series of nominal short-term interest rates for each country. The specific short-term interest rates and base countries used for each country at each date, along with all other data sources, are described in the data appendix. I use the KS assignment of base countries for each peg, as presented in Appendix Table A1. While all of the reported specifications use annual interest rates, I have also run specifications with quarterly interest rates and various lag structures. The qualitative and quantitative results are robust to this frequency choice, but more noise is added to interest rates and regression fits decline.[21]

IV.3 Results for Global Bank Effects on the Macroeconomic Policy Trilemma

Table 2 reports the results of interest-rate co-movement specifications (1) with various controls introduced. The specifications labeled as baseline replicate the KS specifications, although that study spanned a longer time frame, more countries, and included a broader exploration of capital control types. Specifications (1) do not include any capital controls distinctions, specifications (2) do not include any exchange rate regime distinctions, and specifications (3) introduce exchange rate regimes and a division of capital account regimes according to degree of openness (high, medium, or low). Under each of these are three columns, labeled a, b, and c. Columns b and c separately introduce the two global bank variables (*count* and *GlobalinCredit*), both non-interacted and interacted with the other regression

[19] An alternative variable, on foreign bank share in total banking system assets, is available only from 2004.
[20] I thank both sets of authors for providing the data. The Klein and Shambaugh (2013) study covers 209 countries and data for 1960 to 2011.
[21] I do not explicitly focus on the interesting issue of the speed through which the base rate feeds through to domestic rates.

variables. Table 3 follows a similar format, except that instead of using dummy variables for the capital account openness regime, the continuous Chinn-Ito series is used. Tables 4 and 5 parallel each other, but present separate regression analyses for sample observations divided according to exchange rate regime (peg, soft peg, or float).

The baseline specifications show that exchange rate regimes are associated with significant differences across countries in interest rate co-movements relative to base country rates (Table 2, specification 1a). The lack of significance on the base rate (non-interacted) shows that on average, pegged exchange rate countries have the tightest co-movement at 0.57, soft peg countries have a weaker co-movement at 0.49, and flexible exchange rate countries do not display statistically significant co-movements . Table 2, specification 2a demonstrates that those specifications that only distinguish by capital account openness, and not exchange rate regimes, do not measure significant distinctions in interest rate co-movements. When both capital account and exchange rate regimes are simultaneously introduced (Table 2, specification 3a), the coefficients associated with the exchange rate regimes become more pronounced as the coefficient on pegs rises, and the distinction between low and medium capital accounts openness appears to be more prominent. Table 3 results use the continuous Chinn-Ito measures, again showing that both pegged exchange rates and capital account openness are associated with stronger interest rate co-movements. For robustness, we have run regressions without the constant term in addition to other specifications using quarterly interest rates (and various lag structures). The study's findings are robust to these alternative specifications.

These results have a lot in common with the central message from prior studies: pegged exchange rate regimes are associated with higher interest rate co-movements. Specifically, while full pegs have the strongest co-movements, with higher point estimates than soft pegs, soft pegs do not seem to provide much added insulation or "monetary policy autonomy", a result that Klein and Shambaugh confirms in a range of other tests. I find weaker evidence for the role of capital controls in this baseline as compared to prior studies that used earlier sample periods in the empirical analysis. These earlier periods may have had more extreme capital account restrictions in place than those we associate with our low capital account openness regime.[22] During the period I examine, and for the country sample included, capital controls as captured by the Chinn-Ito measures do not appear to be effective for changing interest rate co-movements.

Results provided in Table 4 baseline specifications correspond to separate specifications for the observations within each exchange rate regime subsample. Only the specification applied to pegged

[22] Our "low" openness regime overlaps with the KS "mid-open" categorization.

exchange rate regimes (Table 4, specification 1) explains much of the interest rate variation with an adjusted R^2 of 0.18 and with significant roles for the base country interest rate, regardless of discrete capital account categories. Table 5 specifications using the continuous Chinn-Ito measure show that pegged exchange rate countries with greater capital account openness also have their short-term policy rates move more closely with the base currency interest rate.

The other specifications within these tables introduce additional measures to reflect global bank participation by country and date. Specifications (b) across the tables introduce the ratio of foreign banks to total number of banks in each country at each date (*count*). Specifications (c) introduce the share of global banks in the provision of domestic credit (*GlobalinCredit*), corresponding to the lending operations of local affiliates (branches and subsidiaries) of these global banks. In general, these variables add very little explanatory power to the specifications. These metrics of banking globalization do not change the basic message regarding key drivers of monetary autonomy for countries. The exchange rate regimes in place dominate the results. Across the two alternative global bank metrics, a consistent finding is that the number of foreign-owned banks relative to the total number of domestic banks is not correlated with patterns interest rate co-movements. However, global bank penetration in credit provision can be significant.

Among pegged exchange rate countries (Tables 4 and 5, specification c), high foreign bank shares in credit are associated with some increased co-movements of interest rates. This is especially the case for countries already with a high degree of capital account openness. It is interesting that a role for foreign bank penetration in credit provision also is associated with more interest-rate co-movement among floating exchange rate countries. In some specifications, this type of openness strengthens co-movement of interest rate, damping the effect of capital account openness per se.

Overall, the regression tables using data from 1995 to 2009 show that the primary distinction across countries in interest rate co-movements arise according to exchange rate regimes, and in particular, if a pegged exchange rate regime is in place. Soft pegs are associated with somewhat lower, but still high and significant interest rate co-movements. Countries that have "fear of floating" (Calvo and Reinhart 2002) and adopt soft pegs still forgo a lot of monetary independence. The broad capital account openness measures of Chinn and Ito (2006) play a distant secondary role in our data and country sample. Instead, there is some evidence that global bank presence in local economies influences co-movements. This evidence does not appear when controls capture the numbers of foreign entrants, but when the unit of observation is the share of the foreign banks in domestic credit provision. For pegged and flexible exchange rate countries, interest rate co-movements are greater as foreign bank

credit share rise, pointing to a specific channel which may offset some of the direct differences across countries that would come from the capital account openness measures.

Despite this statistical significance, it is important to emphasis the low incremental explanatory power that resulted from the inclusion of the global bank variables. I already have stressed that, ex ante, it might be difficult to have a single generalized effect of global banking on interest rate co-movement or "monetary autonomy" across countries and time. Global banks enter markets for different reasons, and perform very different functions within specific localities. The health of the foreign bank is an important consideration for transmission (Dages, Goldberg, and Kinney 2000), as is the pattern of foreign bank vulnerabilities (Cetorelli and Goldberg 2011, 2012b) and organizational complexity (Cetorelli and Goldberg 2013a). For any global bank, the type of shock transmission to any economy should depend on the importance of that economy to the overall business of the parent organization - both as a funding source and an investment location (Cetorelli and Goldberg 2012c). Additionally, the corresponding aggregate credit effects depend on the potential for local borrowers to substitute credit through bond markets and shadow banking. Other data on measures of financial and foreign exchange market development could be usefully added in future studies.

V. Conclusions

Global banks serve to reduce frictions to international capital flows, especially as they enter local markets through branches and subsidiaries and increase flows with related parties. At the same time, more information intensity of transactions with unrelated parties can support more stable funding, compared with cross-border flows. Such developments are consistent with research on the relative cyclicality of alternative flows and the reduced incidence of crises in host markets.

Does this mean that global banking exacerbates a policy trilemma? In some cases the answer may be yes, but not conclusively so. Global banks follow customers into many markets, and should be correlated with international trade activity, which is not a separate control in the regressions.[23] At the same time, studies do clearly show transmission of shocks between economies through banks, although with heterogeneous on the direct effects through banks, and also on the transmission into the macro-economy. Some host countries are investment locations for banks, where information-intensity of transactions plays a larger role, while other locations are funding locations. Indeed, recent work also suggests that the complexity of the overall global bank parent organization may influence transmission

[23] As the careful work of Kalemli-Ozcan, Papaioannou, and Peydro (2012) cautions, there is a danger of ascribing too much of a role to global banks in studies of business cycle co-movement.

(Cetorelli and Goldberg 2013b), alongside the health and vulnerabilities of banks (Cetorelli and Goldberg 2011), and the structure of finance beyond these banks should matter for transmission and macroeconomic consequences. Clearly, more work is needed before a negative assessment of the effects of global banks on monetary policy autonomy is levied.

References

Adrian, T.,Shin, H., 2010. "Financial Intermediaries and Monetary Economics," *Handbook of Monetary Economics* 3A Ch. 12, edited by Benjamin Friedman and Michael Woodford, pp. 601-650.

Adrian, T., Colla, P., and Shin, H., 2012. "Which Financial Frictions? Parsing the Evidence from the Financial Crisis of 2007-09," *NBER Macroeconomics Annual 2012*, edited by Daron Acemoglu, Jonathan Parker, and Michael Woodford.

Aizenman, J., Chinn, M., and Ito, H. 2010. "The emerging global financial architecture: Tracing and evaluating new patterns of the trilemma configuration" *Journal of International Money and Finance* vol. 29, pp. 615-641.

Bank for International Settlement, 2010. "Long-term issues in International Banking," *Committee on Global Financial Stability Publications* CGFS No. 41 .

Beck, T., Demirguc-Kunt, A., Levine, R., 2003. "Bank Concentration and Crises," NBER working paper No. 9921.

Bayoumi, T., Swiston, A., 2009. "Foreign Entanglements: Estimating the Source and Size of Spillovers Across Industrial Countries," *IMF Staff Papers*, Vol. 56(2), pp. 353-383 .

Buch, C., 2003. "Information or regulation: What Drives the International Activities of Commercial Banks," *Journal of Money, Credit and Banking* Volume 35 No. 6 pp. 851–69.

Buch, C., 2005. "Distance and International Banking," *Review of International Economics* Vol. 13 No. 4 pp. 787-804.

Buch, C., Koch, C., Koetter, M., 2012. "Do Banks Benefit from Internationalization? Revisiting the market Power-Risk Nexus," *Review of Finance.*

Burstein, A., Kurz, C., Tesar, L., 2008. "Trade, Production Sharing, and the International Transmission of Business Cycles," *Journal of Monetary Economics Vol.* 55 pp. 775-795.

Calvo, G., Reinhart, C., 2000. "When Capital Inflows Come to a Sudden Stop: Consequences and Policy Options," *Reforming the International Monetary and Financial System*, edited by Peter B. Kenen and Alexander Swoboda, IMF pp. 175-201.

Calvo, G., Reinhart, C. 2002. "Fear Of Floating," *The Quarterly Journal of Economics*, MIT Press, vol. 117(2), pages 379-408, May.

Canova, F., 2005. "The Transmission of US shocks to Latin America," *Journal of Applied Econometrics* Vol. 20 Issue 2 pp. 229-251.

Cetorelli, N., Goldberg, L., 2013a. "Measures of Complexity of Global Banks," manuscript, Federal Reserve Bank of New York.

Cetorelli, N., Goldberg, L., 2013b. "Size, Complexity, and Liquidity Management: Evidence from Foreign Banks in the United States," manuscript, Federal Reserve Bank of New York.

Cetorelli, N., Goldberg, L., 2012a. “Banking Globalization and Monetary Transmission,” *Journal of Finance* Vol. 67 No. 5, pp. 1811-1843.

Cetorelli, N., Goldberg, L., 2012b. "Follow the Money: Quantifying Domestic Effects of Foreign Bank Shocks in the Great Recession," *American Economic Review* Vol. 102 No. 3, pp. 213-18.

Cetorelli, N., Goldberg, L., 2012c. “Liquidity management of U.S. Global Banks: Internal Capital Markets in the Great Recession,” *Journal of International Economics* Vol. 88 Issue 2 pp. 299-311.

Cetorelli, N., Goldberg, L., 2011. “Global Banks and International Shock Transmission: Evidence from the Crisis,” *International Monetary Fund Economic Review* Vol. 59 No. 1 pp. 41-76.

Cetorelli, N., Goldberg, L., 2006. “Risks in U.S. Bank International Exposures,” *Cross Border Banking: Regulatory Challenges* in ed. Jerry Caprio, Douglas Evanoff and George Kaufman (Singapore: World Scientific Publishing Company, Federal Reserve Bank of Chicago and World Bank).

Cerutti, E., Dell’Ariccia, G., Martínez Peria, M., 2007. “How Banks Go Abroad: Branches or Subsidiaries?” *Journal of Banking and Finance* Vol. 31 pp. 1669–92.

Chinn, M., Ito, H., 2006. “What Matters for Financial Development? Capital Controls, Institutions, and Interactions,” *Journal of Development Economics* Vol. 18 Issue 1 pp. 163-192.

Claessens, S., van Horen, N., 2013. "Foreign Banks: Trends and Impact," *Journal of Money, Credit and Banking*, forthcoming.

Cornett, M., McNutt, J., Tehranian, H., and Strahan, P.,2011. “Liquidity Risk Management and Credit Supply in the Financial Crisis” *Journal of Financial Economics* Vol. 101 Issue 2 pp. 297-312

Correa, R., Sapriza, H., Zlate, A., 2012. “Liquidity Shocks, Dollar Funding Costs, and the Bank Lending Channel During the European Sovereign Crisis,” Federal Reserve Board *International Finance Discussion Papers* 1059.

Dages, B.G., Goldberg, L., Kinney, D., 2000. “Foreign and Domestic Bank Participation in Emerging Markets: Lessons from Mexico and Argentina,” *Federal Reserve Bank of New York Economic Policy Review* Vol. 6 No. 3 pp. 17-36.

De Haas, R., van Horen, N., 2012. “International Shock Transmission after the Lehman Brothers Collapse: Evidence from Syndicated Lending,” *American Economic Review* Vol. 102 No. 3.

Dedola, L., Lombardo, G., 2012. “Financial Frictions, Financial Integration, and the International Propagation of Shocks,” *Economic Policy*, Vol. 27 Issue 70 pp. 319-359.

Degryse, H., Ongena, S., 2005. “Distance, Lending Relationships, and Competition," *Journal of Finance*, Vol. 60 Issue 1 pp. 231-266.

Demirguc-Kunt, A., Levine, R., Min, H., 1998. “Opening to Foreign Banks: Issues of Stability, Efficiency, and Growth,” *Proceedings of the Bank of Korea Conference on The Implications of Globalization of World Financial Markets*.

Detragiache, E., Gupta, P., 2004. “Foreign Banks in Emerging Market Crises: Evidence from Malaysia,” International Monetary Fund Working Paper WP/04/129.

Devereux, M., Yetman, J. 2010. “Leverage Constraints and the International Transmission of Shocks,” *Journal of Money, Credit and Banking* Vol. 42 pp. 71-105.

di Giovanni, J., Shambaugh, J., 2008. “The Impact of Foreign Interest Rates on the Economy: The Role of the Exchange Rate Regime,” *Journal of International Economics* Vol. 74 pp. 341-61.

Duwel, C., 2013. “Repo funding and internal capital markets in the financial crisis,” *Deutsche Bundesbank* No. 16 Discussion Paper.

Ehrmann, M., Fratzscher, M., 2005. "Equal Size, Equal Role? Interest Rate Interdependence Between the Euro Area and the United States," *The Economic Journal* No. 115 pp. 928-948.

Faust, J., Rogers, J., Wang, S.B., Wright, J.H., 2007. "The High-Frequency Response of Exchange Rates and Interests Rates to Macroeconomic Announcements," *Journal of Monetary Economics* Vol. 54 Issue 4 pp. 1051-1068.

Focarelli, D., Pozzolo, A., 2006. "Where do Banks Expand Abroad? An Empirical Analysis," *Journal of Business* Vol. 79 No. 1 pp 2435–63.

Forbes, K., Chinn, M., 2004. "A Decomposition of Global Linkages in Financial Markets over Time," *Review of Economics and Statistics* Vol. 86 Issue 3 pp. 705-722.

Frankel, J., Schmukler, S., Serven, L., 2004. "Global Transmission of Interest Rates: Monetary Independence and the Currency Regime," *Journal of International Money and Finance* Vol. 23 No. 5 pp.701-734.

Gertler, M., Kiyotaki, N., 2010. "Financial Intermediation and Credit Policy in Business Cycle Analysis," *Handbook of Monetary Economics.*

Giannetti, M., Laeven, L., 2012. "Flight Home, Flight Abroad, and International Credit Cycles", *American Economic Review* Vol. 102 No. 3 pp. 219-24.

Goldberg, L., Grisse, C., 2013. "Time Variation in Asset Price Responses to Macro Announcements: The Role of Risk," *manuscript, Federal Reserve Bank of New York.*

Goldberg, L., Klein, M. 2011. "Evolving Perceptions of Central Bank Credibility: The European Central Bank Experience," *NBER International Seminar on Macroeconomics, University of Chicago Press, vol. 7, pages 153 - 182*.

Hausman, J., Wongswan, J., 2011. "Global asset prices and FOMC announcements," *Journal of International Money and Finance*, Vol. 30 No.3 pp. 547-571.

Imbs, J., 2004. "Trade, Finance, Specialization, and Synchronization," *Review of Economics and Statistics* Vol. 86 No. 3 pp. 723-734.

Kalemli-Ozcan, S., Papaioannou, E., Peydró, J., 2013. "Financial Regulation, Financial Globalization, and the Synchronization of Economic Activity," *Journal of Finance*,Vol. 68 Issue 3 pp.1179-1228.

Kalemli-Ozcan, S., Papaioannou, E., Perri., F., 2012. "Global Banks and Crisis Transmission," Journal of International Economics Vol. 89 pp.495-510

Kamin, S., "Financial Globalization and Monetary Policy," *Encyclopedia of Financial Globalization ed.* Caprio, G., forthcoming.

Kashyap, A., Stein, J., 2000. "What Do a Million Observations on Banks Say about the Transmission of Monetary Policy?" *American Economic Review* Vol. 90 No.3 pp. 407-428.

Klein, M., 2013. "Capital Controls: Gates versus Walls" *Brookings Papers on Economic Activity* Vol. 1.

Klein, M., Shambaugh, J., 2013. "Rounding the Corners of the Policy Trilemma" *Manuscript presented at the 2013 Bank of Japan IMES Conference.*

Kollman, R., Enders, Z., Muller, G., 2011. "Global Banking and International Business Cycles," *European Economic Review*, Vol. 55, pp. 407-426.

Landau, J.P., 2013. "Global Liquidity: Public and Private," *manuscript* for 2013 Jackson Hole Meeting.

Lehner, M., 2009. "Entry Mode Choice of Multinational Banks," *Journal of Banking and Finance* Vol.33 pp. 1781-1792.

Meier, S., 2013. “Financial Globalization and Monetary Transmission,” *Working Papers* 2013-03, Swiss National Bank.

Morgan, D., Strahan, P., Rime, B., 2004. “Bank Integration and Business Volatility,” *Quarterly Journal of Economics Vol. 119 No. 4 pp.1555-1584*

Neumeyer, P., Perri, F., 2005. “Business Cycles in Emerging Economies: the Role of Interest Rates,” *Journal of Monetary Economics* Vol. 52 pp.345-380.

Niepmann, F., 2013. “Banking across Borders with Heterogeneous Banks,” Federal Reserve Bank of New York Staff Report No. 609.

Obstfeld, M. 2012. "Does the Current Account Still Matter?" *American Economic Review*, 102(3): 1-23.

Obstfeld, M., Shambaugh, J., Taylor, A., 2005. “The Trilemma in History: Tradeoffs among Exchange Rates, Monetary Policies, and Capital Mobility,” *Review of Economics and Statistics* Vol. 87 No. 3 pp. 423-438.

Obstfeld, M., Shambaugh, J., Taylor, A., 2010. “Financial Stability, the Trilemma, and International Reserves,” *American Economic Association Journal: Macroeconomics* Vol. 2 No.2 pp. 57-94.

Peek, J., Rosengren, E., 1997. “The International Transmission of Financial Shocks: The Case of Japan,” *American Economic Review* Vol. 87 No.4 pp. 495-505.

Peek, J., Rosengren, E., 2000. “Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States,” *American Economic Review* Vol. 90 No. 1 pp. 30-45.

Rey, H., 2013. “Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence” *manuscript* for 2013 Jackson Hole Meeting.

Rose, A., Spiegel, M., 2007. “Offshore Financial Centers: Parasites or Symbionts?” *Economic Journal* Vol. 117 pp. 1310-1335.

Schnabl, P., 2012. “The International Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market,” *Journal of Finance*, Vol. 67 Issue 3 pp.897-932.

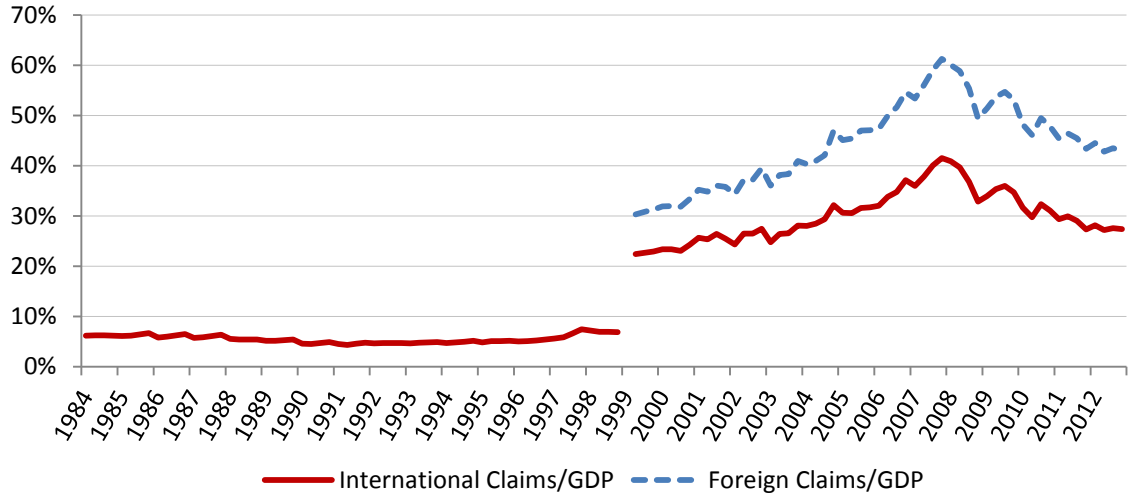
Shambaugh, J., 2004. “The Effect of Fixed Exchange Rates on Monetary Policy," *The Quarterly Journal of Economics*, Vol. 119, pp. 300-351.

Spiegel, M., 2009. “Financial Globalization and Monetary Policy Discipline: A Survey with New Evidence from Financial Remoteness,” *IMF Staff Papers* Vol. 56 No. 1 pp. 198-221.

Stockman, A. Tesar., L., 1995. “Tastes and Technology in a Two-Country Model of the Business Cycle: Explaining International Comovements,” *American Economic Review* Vol. 85 pp. 168-85.

Terrones, M., Kose, M., Prasad, E., 2007. "How Does Financial Globalization Affect Risk Sharing? Patterns and Channels," *IMF Working Papers* WP/07/238.

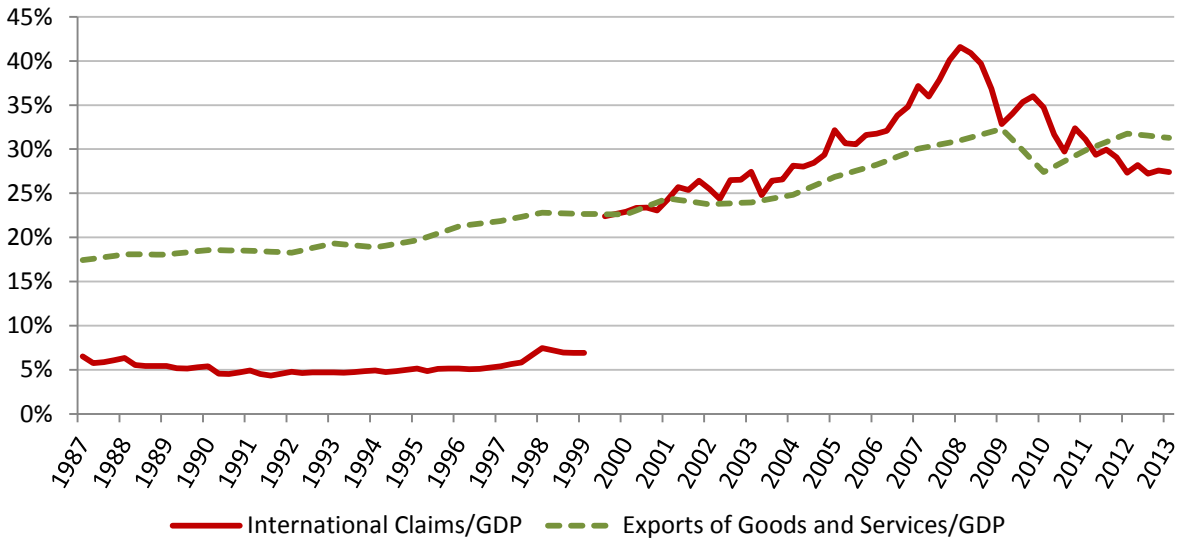
Figure 1 Ratio of Bank International and Foreign Claims to Global GDP[1]



[1] The series are based on current exchange rates vis-à-vis the US dollar. International claims comprise cross-border claims and local claims in foreign currencies. Foreign claims comprise cross-border claims and local claims in all currencies. Interoffice accounts are excluded. BIS International Claims show a 4 Trillion USD increase in 1999 due to the inclusion of reporting countries as vis-a-vis countries (see http://www.bis.org/statistics/breakstablescons.pdf)

Sources: IMF World Economic Outlook Database for Global GDP; BIS Consolidated Banking Statistics. Reproduced from CGFS No. 41 (2010).

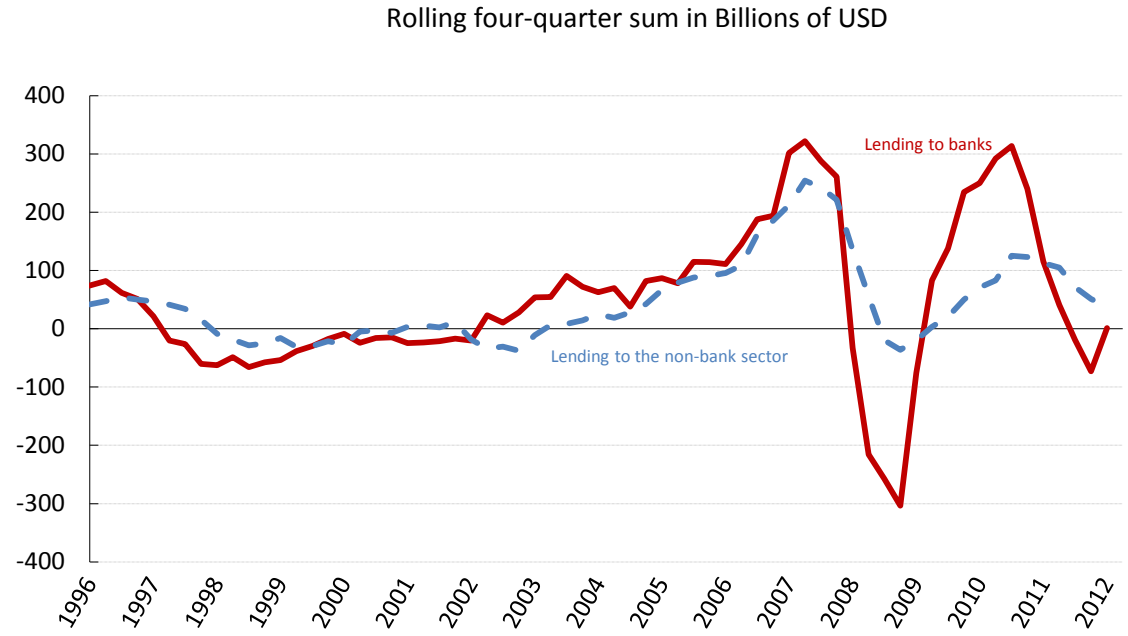
Figure 2 Ratio of International Trade and Bank International Claims to Global GDP[1]



[1] The series are based on current exchange rates vis-à-vis the US dollar. Foreign claims comprise cross-border claims and local claims in all currencies. Interoffice accounts are excluded. BIS International Claims show a 4 Trillion USD increase in 1999 due to the inclusion of BIS reporting countries as vis-a-vis countries (see http://www.bis.org/statistics/breakstablescons.pdf)

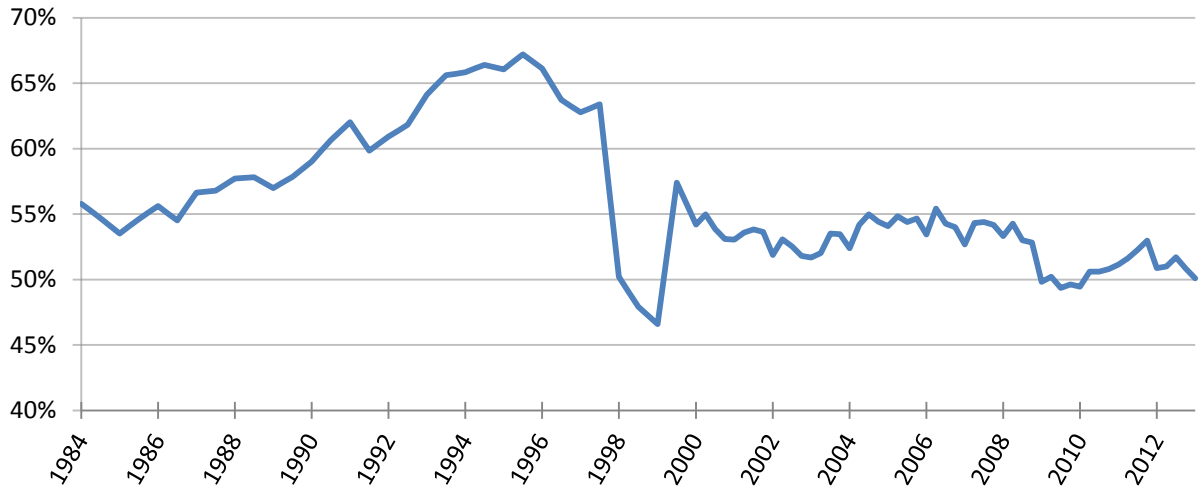
Sources: IMF World Economic Outlook Database for World GDP; BIS Consolidated Banking statistics. Reproduced from CGFS No. 41 (2010).

Figure 3 Cross-border lending to banks and non-banks in emerging markets, 1996-2012



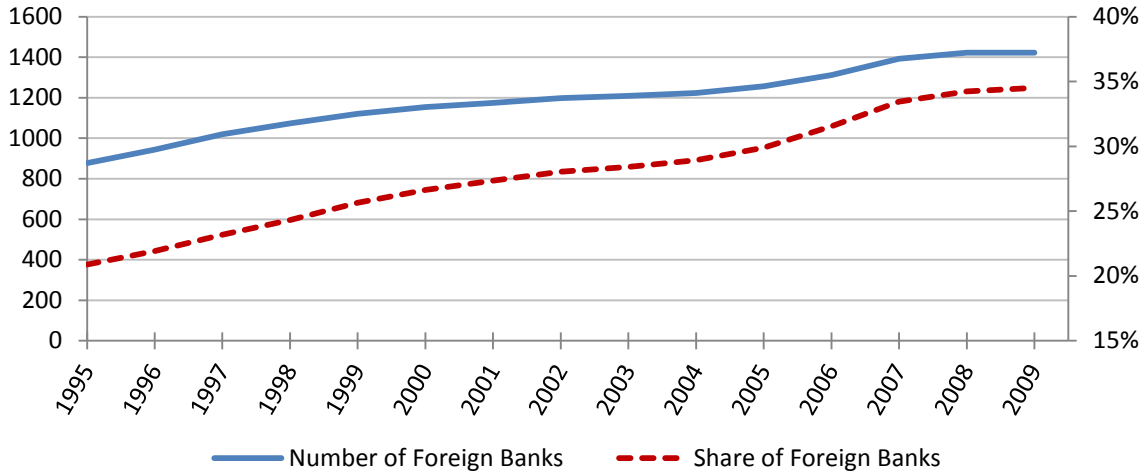
Source: BIS Locational Statistics. Figures are adjusted for exchange rate effects.

Figure4 Short Term Flows (Up to 1 Year Maturity) as Share of Total International Claims



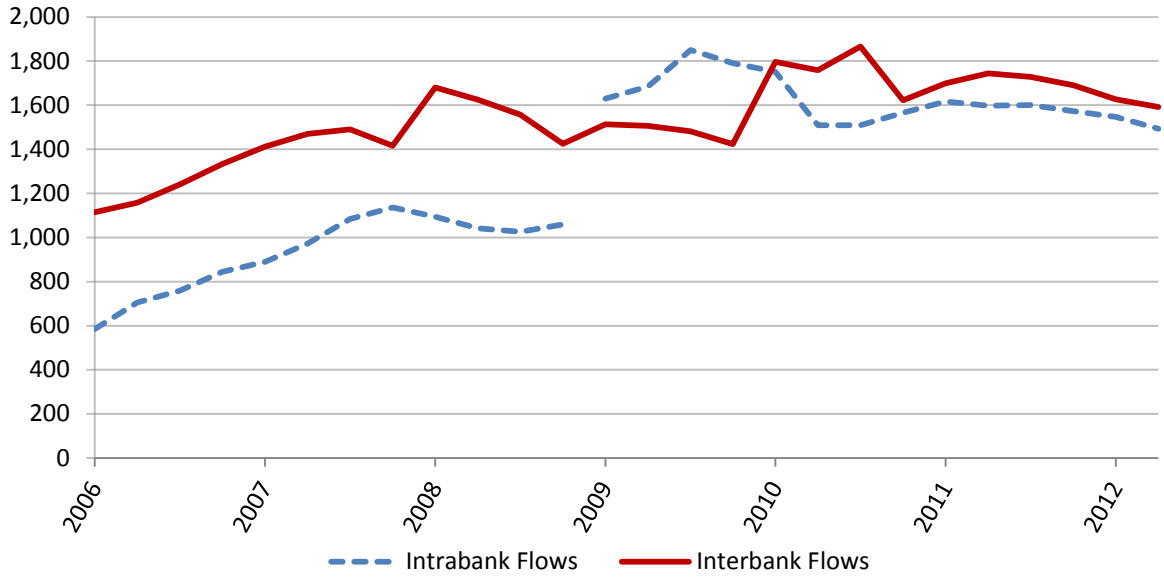
Source: BIS Consolidated Banking Statistics, immediate borrower basis

Figure 5 Foreign Banks in Host Markets Worldwide



Source: Claessens and van Horen (2013), Figure 1.

Figure 6 Intra-bank and Interbank flows of US banks[1]

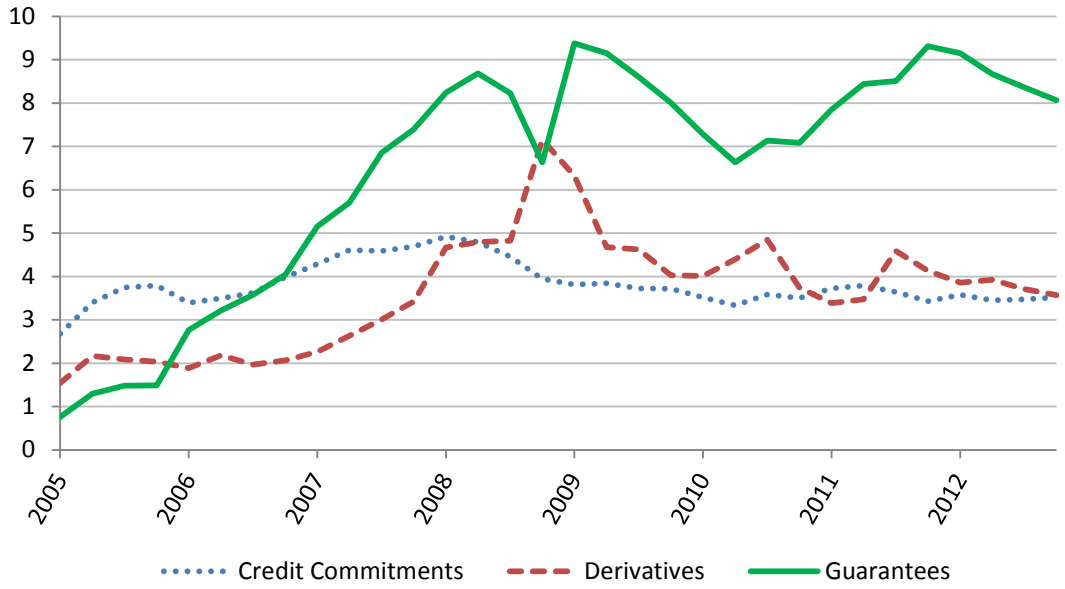


Source: FFIEC 009 and BIS Consolidated Banking Statistics

[1] Intra-bank flows are computed as the sum of net due to (from) of affiliates (in absolute value), from FFIEC 009. Interbank flows are computed as the sum of foreign claims of the U.S. vis-a-vis rest of world and of rest of world vis-a-vis the U.S., from BIS. A break appears in the Intrabank Flows in 2009 due to the new inclusion of the Goldman Sachs Group, Morgan Stanley, Barclays Group US, CIT Group, American Express, and Ally

Figure 7 International Banking: Derivatives, Credit Commitments, and Guarantees

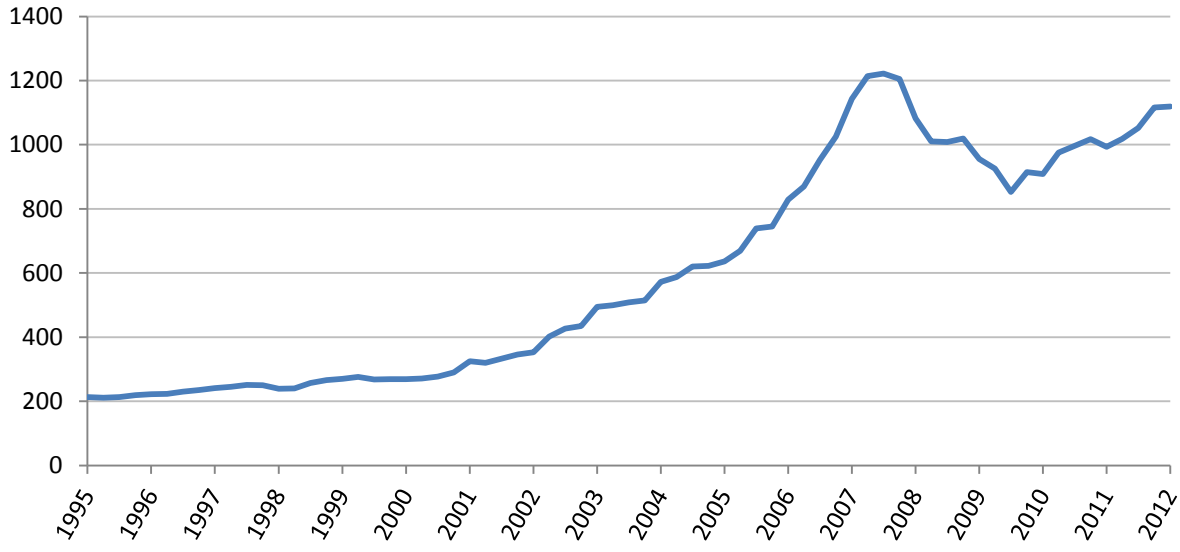
In Trillions of USD



Source: BIS Consolidated Banking Statistics, ultimate risk basis.

Figure 8 Global Bank Deposits in Offshore Financial Centers[1]

In Billions of USD



[1] Based on current exchange rates vis-à-vis the US dollar. Vis-à-vis countries are Aruba, Bahrain, the Bahamas, Belize, Barbados, Costa Rica, Cyprus, Dominica, Grenada, Hong Kong SAR, Ireland, the Isle of Man, Lebanon, Luxembourg, Macao SAR, Malta, Mauritius, Panama, St Vincent and the Grenadines, Samoa, the Seychelles, Singapore, Switzerland and Vanuatu.

Source: BIS Locational Banking Statistics

Table 1: Regression Observations across Exchange Rate Regimes (Shambaugh) and Categories of Capital Account Openness (Chinn-Ito)

Annual Frequency	peg	softpeg	float	*total*
high open	274	176	162	*612*
medium open	66	133	123	*322*
low open	211	93	132	*436*
total	*556*	*406*	*419*	*1381*

Table 2 – Interest Rate Co-Movement Across Countries, using Discrete Capital Openness Categories (Chinn-Ito), Annual Data 1995-2009

	(1)			(2)			(3)		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
		GlobalBank			GlobalBank			GlobalBank	
	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit
Δr_{bit}	-0.089	-0.132	-0.350***	0.147	0.012	0.081	-0.267	-0.298	-0.472***
	(0.117)	(0.177)	(0.132)	(0.119)	(0.199)	(0.125)	(0.163)	(0.256)	(0.158)
peg * Δr_{bit}	0.572***	0.685***	0.778***				0.641***	0.631***	0.829***
	(0.131)	(0.204)	(0.158)				(0.139)	(0.201)	(0.166)
softpeg * Δr_{bit}	0.467***	0.551*	0.666***				0.466***	0.460	0.637***
	(0.168)	(0.290)	(0.228)				(0.163)	(0.282)	(0.219)
high open * Δr_{bit}				0.152	0.421*	0.025	0.181	0.304	0.106
				(0.146)	(0.235)	(0.177)	(0.139)	(0.232)	(0.159)
medium open * Δr_{bit}				0.140	0.351	0.193	0.258*	0.298	0.293*
				(0.154)	(0.275)	(0.197)	(0.149)	(0.247)	(0.175)
Δr_{bit}* **GlobalBank**		0.001	1.069***		0.003	0.591**		0.001	1.130***
		(0.005)	(0.211)		(0.004)	(0.270)		(0.006)	(0.198)
peg * Δr_{bit}* **GlobalBank**		-0.003	-0.942**					-0.000	-1.109***
		(0.005)	(0.365)					(0.005)	(0.371)
softpeg * Δr_{bit}* **GlobalBank**		-0.002	-1.026*					0.000	-1.088*
		(0.007)	(0.568)					(0.007)	(0.597)
high open * Δr_{bit}* **GlobalBank**					-0.006	0.058		-0.003	0.188
					(0.005)	(0.380)		(0.005)	(0.396)
medium open * Δr_{bit}* **GlobalBank**					-0.006	-0.913*		-0.001	-0.625
					(0.006)	(0.524)		(0.006)	(0.473)
Constant	-0.370***	-0.370***	-0.433***	-0.343***	-0.343***	-0.403***	-0.373***	-0.373***	-0.437***
	(0.061)	(0.060)	(0.064)	(0.058)	(0.058)	(0.061)	(0.061)	(0.060)	(0.064)
Observations	1,381	1,381	1,195	1,370	1,370	1,193	1,370	1,370	1,193
Adj R-squared	0.032	0.031	0.034	0.015	0.015	0.013	0.034	0.031	0.034

Robust standard errors in parentheses, clustered by country

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

Table 3 - Interest Rate Co-Movement Across Countries, using Continuous Capital Openness (Chinn-Ito), Annual Data 1995-2009

	(1)			(2)			(3)			(4)		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
		GlobalBank			GlobalBank			GlobalBank			GlobalBank	
	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit
Δr_{bit}	-0.089	-0.132	-0.350***	0.210***	0.205	0.116	-0.153	-0.132	-0.389***	-0.153	-0.231	-0.373***
	(0.117)	(0.177)	(0.132)	(0.071)	(0.126)	(0.083)	(0.120)	(0.181)	(0.130)	(0.132)	(0.204)	(0.132)
peg * Δr_{bit}	0.572***	0.685***	0.778***				0.605***	0.580***	0.809***	0.584***	0.658***	0.798***
	(0.131)	(0.204)	(0.158)				(0.128)	(0.195)	(0.156)	(0.150)	(0.249)	(0.163)
softpeg * Δr_{bit}	0.467***	0.551*	0.666***				0.476***	0.506*	0.678***	0.550***	0.729**	0.768***
	(0.168)	(0.290)	(0.228)				(0.171)	(0.299)	(0.233)	(0.207)	(0.324)	(0.252)
Chinn-Ito * Δr_{bit}				0.058	0.135**	0.045	0.061*	0.107*	0.061	0.060	0.251***	0.092
				(0.038)	(0.062)	(0.046)	(0.036)	(0.060)	(0.041)	(0.077)	(0.093)	(0.084)
peg * Chinn-Ito * Δr_{bit}										0.043	-0.131	-0.016
										(0.085)	(0.115)	(0.098)
softpeg * Chinn-Ito * Δr_{bit}										-0.088	-0.424**	-0.176
										(0.117)	(0.174)	(0.153)
Δr_{bit}* **GlobalBank**		0.001	1.069***		0.000	0.425*		-0.000	1.057***		0.003	1.117***
		(0.005)	(0.211)		(0.003)	(0.234)		(0.005)	(0.218)		(0.005)	(0.217)
peg * Δr_{bit}* **GlobalBank**		-0.003	-0.942**					0.000	-1.052***		-0.003	-1.451***
		(0.005)	(0.365)					(0.005)	(0.372)		(0.006)	(0.358)
softpeg * Δr_{bit}* **GlobalBank**		-0.002	-1.026*					-0.001	-1.152*		-0.007	-2.032*
		(0.007)	(0.568)					(0.007)	(0.645)		(0.009)	(1.174)
Chinn-Ito * Δr_{bit}* **GlobalBank**					-0.002	-0.035		-0.001	-0.008		-0.005*	-0.318**
					(0.001)	(0.115)		(0.001)	(0.109)		(0.002)	(0.135)
peg * Chinn-Ito * Δr_{bit}* **GlobalBank**											0.004*	0.571***
											(0.003)	(0.184)
softpeg * Chinn-Ito * Δr_{bit}* **GlobalBank**											0.009**	0.872
											(0.004)	(0.575)
Constant	-0.370***	-0.370***	-0.433***	-0.342***	-0.342***	-0.406***	-0.370***	-0.369***	-0.440***	-0.371***	-0.369***	-0.437***
	(0.061)	(0.060)	(0.064)	(0.058)	(0.058)	(0.061)	(0.060)	(0.060)	(0.064)	(0.061)	(0.060)	(0.064)
Observations	1,381	1,381	1,195	1,370	1,370	1,193	1,370	1,370	1,193	1,370	1,370	1,193
Adj R-squared	0.032	0.031	0.034	0.017	0.017	0.014	0.035	0.033	0.034	0.035	0.036	0.037

Robust standard errors in parentheses, clustered by country

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

Table 4 - Exchange Rate Regime Subsamples, Interest Rate Co-Movement Across Countries, Discrete Capital Openness, 1995-2009

	(1)			(2)			(3)		
	peg			softpeg			float		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
		GlobalBank			GlobalBank			GlobalBank	
	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit
Δr_{bit}	0.327**	0.299	0.375**	0.363	0.443	0.245	-0.232	-0.437	-0.433*
	(0.129)	(0.249)	(0.151)	(0.279)	(0.433)	(0.352)	(0.244)	(0.365)	(0.239)
high open * Δr_{bit}	0.334**	0.386	0.220	-0.159	-0.604	-0.307	0.196	0.825**	0.217
	(0.147)	(0.277)	(0.175)	(0.312)	(0.502)	(0.397)	(0.298)	(0.398)	(0.345)
medium open * Δr_{bit}	0.176	0.313	0.098	0.104	0.152	0.304	0.314	0.150	0.255
	(0.244)	(0.486)	(0.281)	(0.344)	(0.494)	(0.431)	(0.262)	(0.392)	(0.299)
Δr_{bit}* **GlobalBank**		0.001	-0.504		-0.003	0.678		0.006	1.368***
		(0.004)	(0.394)		(0.011)	(2.064)		(0.009)	(0.217)
high open * Δr_{bit}* **GlobalBank**		-0.001	0.883**		0.011	0.127		-0.015	-0.788
		(0.005)	(0.436)		(0.012)	(2.114)		(0.010)	(0.545)
medium open * Δr_{bit}* **GlobalBank**		-0.004	-0.754		-0.004	-1.817		0.005	-0.421
		(0.009)	(1.090)		(0.014)	(2.251)		(0.011)	(0.587)
Constant	-0.287***	-0.286***	-0.265***	-0.743***	-0.729***	-0.853***	-0.102	-0.091	-0.216
	(0.068)	(0.068)	(0.072)	(0.126)	(0.127)	(0.133)	(0.160)	(0.161)	(0.158)
Observations	551	551	470	402	402	356	417	417	367
Adj R-squared	0.179	0.175	0.178	0.020	0.018	0.011	-0.004	-0.002	0.004

Robust standard errors in parentheses, clustered by country

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

Table 5 - Exchange Rate Regime Subsamples, Interest Rate Co-Movement Across Countries, Continuous Capital Openness, 1995-2009

	(1)			(2)			(3)		
	peg			softpeg			float		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
		GlobalBank			GlobalBank			GlobalBank	
	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit	baseline	count	GlobalinCredit
Δr_{bit}	0.442***	0.437**	0.444***	0.360**	0.456*	0.327	-0.096	-0.173	-0.318**
	(0.086)	(0.169)	(0.100)	(0.151)	(0.247)	(0.204)	(0.137)	(0.212)	(0.133)
Chinn-Ito * Δr_{bit}	0.102**	0.121	0.072	-0.029	-0.165	-0.069	0.062	0.254***	0.090
	(0.040)	(0.076)	(0.049)	(0.085)	(0.154)	(0.117)	(0.077)	(0.096)	(0.085)
Δr_{bit}* **GlobalBank**		0.000	-0.319		-0.004	-0.597		0.003	1.108***
		(0.003)	(0.285)		(0.007)	(1.238)		(0.005)	(0.222)
Chinn-Ito * Δr_{bit}* **GlobalBank**		-0.000	0.258**		0.004	0.401		-0.005*	-0.315**
		(0.001)	(0.124)		(0.003)	(0.576)		(0.002)	(0.138)
Constant	-0.285***	-0.284***	-0.274***	-0.737***	-0.732***	-0.851***	-0.108	-0.105	-0.221
	(0.067)	(0.067)	(0.072)	(0.123)	(0.123)	(0.131)	(0.160)	(0.160)	(0.158)
Observations	551	551	470	402	402	356	417	417	367
Adj R-squared	0.184	0.181	0.181	0.020	0.018	0.007	-0.003	0.000	0.011

Robust standard errors in parentheses, clustered by country

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

DATA APPENDIX

Data Sources:

- Claessens - van Horen Bank Ownership Database

  (http://www.dnb.nl/en/onderzoek-2/databases/bank.jsp)
- BIS Consolidated Banking Statistics Database

  (http://www.bis.org/statistics/consstats.htm)
- IMF International Financial Statistics

  (http://elibrary-data.imf.org/finddatareports.aspx?d=33061&e=169393)

  (http://fweb.rsma.frb.gov/php/if/data/fame/#/intl/index/)
- Chinn-Ito Index

  (http://web.pdx.edu/~ito/Chinn-Ito_website.htm)
- *IMF Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER)

  (http://www.elibrary.imf.org/page/AREAER/www.imfareaer.org)

Dataset Dimensions:

The dataset used in Klein and Shambaugh (2013) covers a panel of 209 countries from 1960 to 2011. After merging foreign bank proxies from the Claessens and van Horen (2013) datasets, this paper's analysis covers 136 countries from 1995 to 2009. Additional data are introduced from the IMF International Financial Statistics (IFS) and BIS Consolidated Banking Statistics Database. The Claessens – van Horen Bank Ownership Database provides country-year data on the counts of foreign bank (as a share of total banks) and foreign bank assets as a share of total banking assets in each country. These yield the first set of proxies for foreign bank penetration used in the annual and quarterly regression analyses.

IFS Series for quarterly domestic credit (local currencies) are obtained for all countries from 1995-2009 using DLX Haver, and are converted to USD using IFS exchange rates. Country-quarter BIS series on total cross-border, interbank, and local claims from the rest of the world vis-à-vis each country are then merged in order to BIS Claims on Local Residents / IFS Domestic Credit.

Variable	Definition	Data Source	Variable Code Name (s)	Frequencies
Country	Panel variable	Klein-Shambaugh	country_combined	Annual / Quarterly
Own Rate	The interest rate of the local currency	IMF IFS	ownr	Annual / Quarterly
Own Rate Type	The type of interest rate (central bank discount, money market, t-bill, etc) used for the local currency	IMF IFS	ownrate	Annual / Quarterly
Base Country	The country corresponding to the base currency	Klein-Shambaugh / IMF AREAER	base_country	Annual
Base Rate	The interest rate corresponding to the base currency	IMF IFS	baser	Annual / Quarterly
Base Rate Type	The type of interest rate (central bank discount, money market, t-bill, etc) used for the local currency	IMF IFS	baserate	Annual / Quarterly
Exchange Rate Controls	The type of exchange rate regime	IMF AREAER	peg, softpeg, float	
Domestic Credit (in USD)	Exchange rate converted to USD from IFS Series 32 (local currency) This series consists of all claims of the central bank and depository institutions vis-a-vis all the following: (32an) Central government, and treasury (32b) State and local governments, and public financial institutions (32c) Nonfinancial public enterprises (32d) Private sector (32f) Other Banking Institutions (32g) Nonbank Financial Institutions Excludes the domestic claims of Nonbank Financial Institutions vis-à-vis all counterparty sectors	IMF IFS Series 32	domcred_USD	Annual / Quarterly
USD Exchange Rate	Inverted calculation of IFS series AE (provided as Local per USD)	IMF IFS Series AE	exchrate	Annual / Quarterly
Central Bank Discount Rate	The rate at which the central banks lend or discount eligible paper for deposit money banks	IMF IFS Series 60	cbintrate	Annual / Quarterly
Money Market Rate	The rate on short-term lending between financial institutions	IMF IFS Series 60b	mmr	Annual / Quarterly
Treasury Bill Rate	The rate at which short-term securities are issued or traded in the market	IMF IFS Series 60c	tbill	Annual / Quarterly
Chinn-Ito Index	An index measuring a country's degree of capital account openness. It is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). This index was first introduced in Chinn, Menzie D. and Hiro Ito (2006). *"What Matters for Financial Development? Capital Controls,Institutions, and Interactions,"* Journal of Development Economics, Volume 81, Issue 1, Pages 163-192 (October).	Chinn-Ito Index	kaopen	Annual
Open	Binary Discretized version of Chinn-Ito Index: Equals 1 if Chinn-Ito > 0.15	Chinn-Ito Index	open	Annual
Trueopen	Trinary Discretized version of Chinn-Ito Index: Equals 1 if Chinn-Ito > 1.2	Chinn-Ito Index	trueopen	Annual
Midopen	Trinary Discretized version of Chinn-Ito Index: Equals 1 if 1.2 > Chinn-Ito > -1.15	Chinn-Ito Index	midopen	Annual
Closed	Trinary Discretized version of Chinn-Ito Index: Equals 1 if Chinn-Ito < -1.15	Chinn-Ito Index	closed	Annual
Interbank Claims	The asset claims of: 1) All domestic banks in BIS reporting countries 2) All branches and subsidiaries located in BIS reporting countries whose activities are consolidated in a parent bank institution that is located in another BIS reporting country 3) All banking offices located in BIS reporting countries whose controlling parent bank institution resides in a non-BIS reporting country 4) All branches or subsidiaries located in BIS reporting countries whose activities are not consolidated by a controlling parent bank institution in another BIS reporting country (e.g. banking subsidiary with a nonbank controlling parent) vis-a-vis: All banks in the panel variable country. This excludes central banks and multilateral development banks	BIS Consolidated Banking Statistics	banks	Annual / Quarterly
Claims on Local Residents	The asset claims of all banking offices (that reside in the panel variable country and are owned by a BIS reporting parent) vis-à-vis the residents of the panel variable country.	BIS Consolidated Banking Statistics	locclaims	Annual / Quarterly
Cross Border Claims	The asset claims of all BIS reporting banks (not located in the panel variable country) vis-à-vis the panel variable country.	BIS Consolidated Banking Statistics	intclaims	Annual / Quarterly
Number of Foreign Banks	The number of active foreign banks in the country	Claessens - van Horen Bank Ownership Database	fgnbankct	Annual
Share of Foreign Banks	The share of foreign banks out of total banks in the country	Claessens - van Horen Bank Ownership Database	shnum_	Annual
Asset Share of Foreign Banks	The share of foreign bank assets out of total bank assets in the country	Claessens - van Horen Bank Ownership Database	shta_	Annual

Table A1: Country list

Presents base country pairings, interest rate types used, and period coverage for the country sample (1995-2009)

Country	Own Rate Type	Own Rate Coverage	Base Country	Base Country Period	Base Rate Type	Base Rate Coverage
Albania	tbill	all	Germany	all	tbill	1995Q1-2007Q2
Algeria	tbill	1995Q1-1995Q3,1998Q2-2009Q4	France	all	tbill	all
Angola	N/A	missing	United States	all	N/A	missing
Antigua and Barbuda	tbill	all	United States	all	tbill	all
Argentina	mmkt	all	United States	all	fedfunds	all
Armenia, Republic of	tbill	1995Q3-2009Q4	United States	all	tbill	all
Australia	mmkt	all	United States	all	fedfunds	all
Austria	mmkt	all	Germany	all	mmkt	all
Azerbaijan, Republic of	tbill	1997Q2,1997Q3,1998Q1,1998Q3-2009Q4	United States	all	tbill	all
Bahrain, Kingdom of	mmkt	all	United States	all	fedfunds	all
Bangladesh	N/A	missing	United States	all	N/A	missing
Barbados	tbill	all	United States	all	tbill	all
Belarus	N/A	missing	United States	all	N/A	missing
Belgium	tbill	all	Germany	all	tbill	1995Q1-2007Q2
Benin	mmkt	all	France	all	mmkt	all
Bolivia	tbill	all	United States	all	tbill	all
Bosnia and Herzegovina	N/A	missing		1995-1996	N/A	missing
Bosnia and Herzegovina	N/A	missing	Germany	1997-2009	tbill	1997Q1-2007Q2
Botswana	N/A	missing	South Africa	all	N/A	missing
Brazil	mmkt	all	United States	all	fedfunds	all
Bulgaria	mmkt	all	United States	1995	fedfunds	all
Bulgaria	mmkt	all	Germany	1996-2009	mmkt	all
Burkina Faso	mmkt	all	France	all	mmkt	all
Burundi	tbill	missing	United States	all	tbill	all
Cambodia	N/A	missing			N/A	missing
Cameroon	N/A	missing	France	all	N/A	missing
Canada	tbill	all	United States	all	tbill	all
Chile	mmkt	1999Q4-2009Q4	United States	all	fedfunds	all
China	N/A	missing	United States	all	tbill	all
China, P.R.: Hong Kong	mmkt	all	United States	all	fedfunds	all
Colombia	mmkt	all	United States	all	fedfunds	all
Congo, Democratic Republic of	N/A	missing	United States	all	fedfunds	all
Costa Rica	N/A	missing	United States	all	tbill	all
Cote d'Ivoire	mmkt	all	France	all	mmkt	all
Croatia	mmkt	all	Germany	all	mmkt	all
Cuba	N/A	missing			N/A	missing
Cyprus	tbill	1995Q1-1996Q1,1996Q3-2000Q1,2000Q3-2001Q2,2002Q1,2002Q3,2003Q3,2004Q1-2005Q2,2006Q1-2006Q3,2007Q1	France	all	tbill	all
Czech Republic	N/A	missing	Germany	all	mmkt	all
Denmark	mmkt	1995Q1-2000Q4,2001Q2-2009Q4	Germany	all	mmkt	all
Dominican Republic	mmkt	1996Q1-2009Q4	United States	all	fedfunds	all
Ecuador	N/A	missing			N/A	missing
Egypt	tbill	1997Q1-2009Q4	United States	all	tbill	all
El Salvador	mmkt	1997Q1-2004Q3,2005Q2-2005Q4,2006Q2,2007Q4,20089Q2,2008Q3	United States	all	fedfunds	all
Estonia	mmkt	1995Q1-1999Q3,2000Q1-2009Q4	Germany	all	mmkt	all
Ethiopia	tbill	1995Q1-2008Q4	United States	all	tbill	all
Finland	mmkt	all	Germany	all	mmkt	all
France	tbill	all	Germany	all	tbill	1995Q1-2007Q2
Georgia	mmkt	1995Q2-2009Q4	United States	all	fedfunds	all
Germany	mmkt	all	United States	all	fedfunds	all
Ghana	tbill	all	United States	all	tbill	all
Greece	tbill	all	Germany	all	tbill	1995Q1-2007Q2
Guatemala	mmkt	1997Q1-2006Q1	United States	all	fedfunds	all
Haiti	N/A	missing	United States	all	N/A	missing
Honduras	N/A	missing	United States	all	N/A	missing
Hungary	tbill	all	Germany	all	tbill	1995Q1-2007Q2
Iceland	mmkt	all	Germany	all	mmkt	all
India	mmkt	1995Q1-1998Q2,2006Q2-2009Q4	United States	all	fedfunds	all
Indonesia	mmkt	all	United States	all	fedfunds	all
Iran, Islamic Rep.	N/A	missing	United States	all	N/A	missing
Ireland	mmkt	all	Germany	all	mmkt	all
Israel	tbill	all	United States	all	tbill	all
Italy	mmkt	all	Germany	all	mmkt	all
Jamaica	tbill	all	United States	all	tbill	all
Japan	mmkt	all	United States	all	fedfunds	all
Jordan	mmkt	1999Q1-2009Q4	United States	all	fedfunds	all
Kazakhstan	tbill	1995Q1-1998Q2,1998Q4-2009Q4	United States	all	tbill	all
Kenya	tbill	all	United States	all	tbill	all
Korea, Republic of	mmkt	all	United States	all	fedfunds	all
Kuwait	mmkt	all	United States	all	fedfunds	all
Kyrgyz Republic	tbill	all	United States	all	tbill	all
Latvia	mmkt	all	United States	1995-2003	fedfunds	all
Latvia	mmkt	all	Germany	2004-2009	mmkt	all
Lebanon	tbill	all	United States	all	tbill	all
Libya	mmkt	1998Q1-2005Q3	United States	all	fedfunds	all
Lithuania	mmkt	all	United States	1995-2001	fedfunds	all
Lithuania	mmkt	all	Germany	2002-2009	mmkt	all
Luxembourg	mmkt	1995Q1-1999Q1	Belgium	all	mmkt	all
Macedonia, FYR	N/A	missing	Germany	all	N/A	missing
Madagascar	tbill	2000Q3-2002Q1,2002Q4-2009Q4	France	all	tbill	all

Country	Own Rate Type	Own Rate Coverage	Base Country	Base Country Period	Base Rate Type	Base Rate Coverage
Malawi	tbill	all	United States	all	tbill	all
Malaysia	mmkt	all	United States	all	fedfunds	all
Mali	mmkt	all	France	all	mmkt	all
Mauritania	tbill	all	United States	all	tbill	all
Mauritius	mmkt	all	United Kingdom	all	mmkt	all
Mexico	tbill	all	United States	all	tbill	all
Moldova	N/A	missing	United States	all	tbill	all
Mongolia	N/A	missing	United States	all	tbill	all
Morocco	mmkt	all	France	all	mmkt	all
Mozambique	mmkt	1998Q1-2009Q4	United States	all	fedfunds	all
Namibia	tbill	all	South Africa	all	tbill	all
Nepal	tbill	1995Q2-2009Q4	India	all	N/A	missing
Netherlands	mmkt	all	Germany	all	mmkt	all
New Zealand	mmkt	all	Australia	all	mmkt	all
Nicaragua	N/A	missing	United States	all	N/A	missing
Niger	mmkt	all	France	all	mmkt	all
Nigeria	tbill	all	United States	all	tbill	all
Norway	N/A	missing	Germany	all	mmkt	all
Oman	mmkt	2004Q1-2009Q4	United States	all	fedfunds	all
Pakistan	mmkt	all	United States	all	fedfunds	all
Panama	mmkt	2002Q1-2009Q4	United States	all	fedfunds	all
Paraguay	mmkt	all	United States	all	fedfunds	all
Peru	mmkt	1995Q4-2009Q4	United States	all	fedfunds	all
Philippines	mmkt	all	United States	all	fedfunds	all
Poland	mmkt	all	Germany	all	mmkt	all
Portugal	mmkt	all	Germany	all	mmkt	all
Qatar	mmkt	2004Q3-2009Q4	United States	all	fedfunds	all
Romania	mmkt	all	United States	1995-2002	fedfunds	all
Romania	mmkt	all	Germany	2003-2009	mmkt	all
Russian Federation	mmkt	all	United States	all	fedfunds	all
Rwanda	mmkt	1996Q3-2009Q1, 2009Q4	United States	all	fedfunds	all
Saudi Arabia	N/A	missing	United States	all	fedfunds	all
Senegal	mmkt	all	France	all	mmkt	all
Serbia	N/A	missing			N/A	missing
Seychelles	tbill	all	United States	all	tbill	all
Singapore	mmkt	all	Malaysia	all	mmkt	all
Slovak Republic	mmkt	2000Q1-2008Q3	Germany	all	mmkt	all
Slovenia	mmkt	all	Germany	all	mmkt	all
South Africa	mmkt	all	United States	all	fedfunds	all
Spain	mmkt	all	Germany	all	mmkt	all
Sri Lanka	mmkt	all	India	all	mmkt	1995Q1-1998Q2, 2006Q2-2009Q4
Sudan	N/A	missing			N/A	missing
Swaziland	tbill	all	South Africa	all	tbill	all
Sweden	mmkt	all	Germany	all	mmkt	all
Switzerland	N/A	missing	Germany	all	mmkt	all
Tanzania	tbill	all	United States	all	tbill	all
Thailand	mmkt	all	United States	all	fedfunds	all
Togo	mmkt	all	France	all	mmkt	all
Tunisia	mmkt	all	France	all	mmkt	all
Turkey	mmkt	all	United States	all	fedfunds	all
Uganda	tbill	all	United States	all	tbill	all
Ukraine	mmkt	1996Q4-2009Q4	United States	all	fedfunds	all
United Arab Emirates	N/A	missing			N/A	missing
United Kingdom	mmkt	all	Germany	all	mmkt	all
United States	fedfunds	all			N/A	missing
Uruguay	mmkt	all	United States	all	fedfunds	all
Uzbekistan	N/A	missing			N/A	missing
Venezuela, Republica Bolivariana de	mmkt	1996Q1-2009Q4	United States	all	fedfunds	all
Vietnam	tbill	1997Q1-2007Q3, 2008Q1, 2008Q3-2009Q4	United States	all	tbill	all
Yemen, Republic of	tbill	1995Q4-2009Q4	United States	all	tbill	all
Zambia	tbill	all	United States	all	tbill	all
Zimbabwe	mmkt	missing	United States	1995-2008	fedfunds	all
Zimbabwe	mmkt	1995Q1-2005Q3		2009	N/A	missing