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What is the Major Determinant of Credit Flows through Cross-border Banking?

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Abstract

This paper examines the major determinant of the cross-border credit flows from global banks toward 70 vis-á-vis countries in seven regions of the world. Employing a Bayesian dynamic latent factor model, we decompose the volatilities of banking flows into the contribution of the global-common factor, the regional-common factor, and the national-specific factor. The results indicate that the global-common factor explains 36.4 percent of volatilities in overall cross-border banking flow, suggesting that the international propagations of shocks through global banks are quantitatively important. Especially, the contribution of the global-common factor is increasing in the 2000s. At the same time, main determinants are largely heterogeneous across countries. This heterogeneity implies that the desirable policy response to credit inflows could be different for each host country.

JEL classification: C11, F3
Keywords: International Capital Flows, Dynamic Latent Factor, Bayesian Estimation

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1 Introduction

Following the financial crisis in the late 2000s, international capital flows have received substantial attention. The surges and retrenchments of the capital flows before and after the financial crisis are sometimes referred to as "Liquidity Tsunami," suggesting that the low interest rate environment in the advanced economies induces the liquidity overflows around the world.

The active capital inflows are a dual-edged sword for the recipient countries. On the bright side, capital flows support economic growth and welfare gains by financing the productive investment opportunities and smoothing consumption. However, on the negative side, capital surges tend to bring inflationary pressures and capital account deficits, which make the economy more vulnerable to external shocks. Further, once capital retrenchment starts, the economy would experience acute deterioration of the economic activities and welfare losses by consumption volatility.

Among several forms of capital flows, credit flows through globally active banks (hereafter global banks) are becoming a topic of debate. This is partly because international transactions of global banks have expanded enormously since the 2000s.[1] In addition, ongoing reforms of financial regulations also facilitate discussions on global banking activities against the backdrop of the recent financial turmoils that spread all over the world rapidly.[2]

This paper aims to provide a quantitative assessment on the major determinant of the cross-border credit flows from global banks toward 70 vis-á-vis countries in seven regions of the world, using International Banking Statistics of the Bank for International Settlements (BIS). To be more specific, we decompose the volatilities of banking flows into the contribution of the global-common factor, the regional-common factor, and the country-specific factor.

The global-common factor captures the worldwide co-movements in the credit flows. It is related to conditions in headquarters of home countries or global funding markets that include the investors' risk appetite and the worldwide low interest rate environment. The regional-common factor resembles the global-common factor but it captures regional co-movements in credit flows, including regional contagion of capital surges and retrenchments.[3] On the contrary, the national-specific factor is related to the domestic conditions of recipient countries such as government debts, country risks, and macroeconomic fundamentals. In the literature, the global- and regional-common factors are sometimes referred to as "push factors" and the national-specific factor and other idiosyncratic factors are referred to "pull factors."[4]

[1] According to the consolidated banking statistics of the BIS, the balance of the external assets of global banks at end-June 2012 expands 2.9 times from 2000.

[2] The country-level aggregate statistics of Lane and Milesi-Ferretti (2008) indicate that the stock of cross-border banking is more than 50 percent of the overall amount of international holdings.

[3] As is suggested in Aizenman, Pinto and Radziwill (2007) and Prasad, Rajan and Subramanian (2007), empirical relations between economic growth and capital flows are ambiguous. So, we do not try to establish the direct relationships between movements in credit flows and international- or regional-business cycles.

[4] It is not evident that regional-common factor should be categorized into "push factors" or "pull factors." For descriptive purposes, this paper categorizes the regional-common factor as "push factors" with

Quantitative assessment of drivers behind the cross-border credit flows through global banks is important for inferring the sustainability of credit inflows to recipient countries and drawing policy implications. If push factors are the dominant sources of fluctuations, the global banking flows are more driven by the centralized decisions and needs of home countries, suggesting that global banks play an important part in the international shock propagation from home countries to recipient countries. In this case, the cross-border credit flows through global banks would turn around easily at the time of the turmoil in home countries. And they are the potential sources of local market volatilities for recipient countries. Hence, it might be rationalized that regulators in recipient countries adopt a liquidity "ring-fence" regulation that restricts global banks to reallocate their funds globally. Adversely, if local pull factors are the primary sources of fluctuations, the global banking flows are more driven by the total-optimization decisions that are based on the risk-adjusted relative profitability for each host location. Then, they are more stabilizing and minor in the transmission of global shocks to recipient countries.

The results indicate that the global-common factor explain 36.4 percent of volatilities in overall cross-border banking flow, suggesting that the international propagations of shocks through global banks are quantitatively important. Further, there exists large heterogeneity in the main determinant of credit inflows: some countries are mainly affected by global- and regional-common factors but others are mainly affected by local pull factors such as national-specific and idiosyncratic factors.[5] Credit flows toward European countries tend to be affected by the global-common factor, while credit flows toward emerging countries such as Asia Pacific countries and Latin American countries tend to be affected by the regional-common factor. The observed heterogeneity implies that the desirable policy response to credit inflows could be different for each host country.

This paper is related to the literature on the determinant of international capital flows, which was studied intensively since the 1990s. A number of the previous works study the capital flows toward developing countries, using the data of bond and equity flows,[6] the

regionally contagious flows in mind.

[5] A recent work of Cetorelli and Goldberg (2012) shows that some of foreign affiliates of banks are used as liquidity buffers of headquarters while others are protected from liquidity shortage in headquarters, using U.S. confidential data of individual banks.

[6] Some works insist the important role of the global push factors but others claim that both push and pull factors are significant as determinants of capital flows. Calvo, Leiderman and Reinhart (1996), Fernandez-Arias (1996), and Kim (2000) point out that the substantial part of the capital inflows to Latin American countries in the late 1980s and early 1990s are induced by the low interest rate environment in the United States. For the empirical exercises, Fernandez-Arias (1996) and Kim (2000) study the bond and equity flows. Whereas, Calvo et al. (1996) examine the real exchange rate and reserves as proxies of capital flows. Different from these works, Taylor and Sarno (1997), Chuhan, Claessens and Mamingi (1998), and Hernandez, Mellado and Valdes (2001) insist that not only the global push factors but also the local pull factors such as inflation rates, price per earnings ratios, or credit ratings in the recipient countries are also important determinants for the capital inflows to the Latin American and Asian countries, using the bond and equity data in the late 1980s and early 1990s.

international investment positions,[7] or current accounts.[8]

In the meanwhile, the capital flows by type of agents have recently attracted attention because the materiality of the international capital flows has began to be recognized from the financial regulatory perspective. For example, Fratzscher (2012) focuses on the capital flows through investment funds and finds that both global push and local pull factors are significant determinants.[9] Our paper focuses on the cross-border credit flows through "global banks" across the globe and assesses the relative contribution of global, regional, and national factors within an econometrically consistent framework.[10] [11]

Finally, we will briefly refer to the technical aspect of the analysis in this paper. For the purpose of identifying the relative contribution of each factor to the cross-border credit flows, it is necessary to identify these factors. In this regard, two approaches could be potential candidates. First, a researcher could select variables that he or she thinks appropriate for proxies of each factor, and then perform variance decompositions using the selected variables. This approach faces a concern that the selected variables may not be good proxies of factors in question.

Second, as an alternative approach, a latent factor model could be a straightforward candidate to estimate unobservable factors. However, if observable variables have large cross-sectional dimensions as in our case, the classical likelihood maximization encounters a serious problem to find a unique solution on a complex likelihood surface.

To overcome problems in the above approaches, we employ the Bayesian technique that Kose, Otrok and Whiteman (2003) and Kose, Otrok and Whiteman (2008) developed in the international business cycles literature. To be more specific, Kose et al. (2003)

[7]For example, Forbes and Warnock (2012) identify the extreme events in the private capital flows of international investment positions since 1980 and find that global-common factors such as investors' sentiment are related to the outbreak of "capital waves" around the world.

[8]The current accounts have been studied as a representation of net capital inflows. Reinhart and Reinhart (2009) analyze the current account data and find that the global factors have a systematic effect on the global capital flows. Reinhart and Reinhart (2009) provide the extensive summary of studies that use the current account data.

[9]According to Fratzscher (2012), the global push factor was the key determinant of funds' flows during the financial crisis in 2008 but other local pull factors became the main drivers in the aftermath of the crisis. Investment fund flows under the crisis are studied by other authors such as Clavel, Campbell and Sodini (2009) and Jotikasthira, Lundblad and Ramadorai (2012).

[10]Global banks have been the focus as an international shock transmission mechanism at least from the late 1990s. Peek and Rosengren (1997) and Peek and Rosengren (2000) are the pioneering empirical works in this area. Recent works such as Cetorelli and Goldberg (2012), Bruno and Shin (2011), and Shin (2012) provide better understandings of the specific mechanism behind the international shock transmission through global banks. These researches suggest that global banks are becoming carriers of liquidity across borders through the centralized portfolio allocation decisions among branches and subsidiaries that are located in foreign countries. Kalemli-Ozcan, Papaioannou and Perri (2012) study the shock transmission role of global banks and show that shocks to global banks played an important role in triggering the financial crisis in the late 2000s. Theoretical macroeconomic research on the international shock propagation mechanism through global banks has also been accumulated; see for example, Kollmann, Enders and Muller (2011) and Ueda (2012).

[11]BIS and central bank economists have been studied the cross-border banking flows to emerging economies using BIS International Banking Statistics (e.g., Jeanneau and Micu (2002) and Herrmann and Mihaljek (2010)).

develop a multi-factor version of the dynamic factor model, with an explicit distinction of the global-common factor, the regional-common factor, the nation-specific factor, and the idiosyncratic factor. This approach could complement the first approach with overcoming the weak point in the second approach.

The rest of the paper is organized as follows. In Section 2, the model and the estimation procedure are described. Section 3 presents the estimation results. In Section 4, we will interpret the results, showing some connections with previous literature. Section 5 is the conclusion.

2 The model and estimation procedure

This section introduces the model and the estimation procedure used in identifying global-common, regional-common, and national-specific factors. In particular, we employ a dynamic multi-factor model of the seminal works by Kose et al. (2003). The brief description of the model and procedure is presented, basically following Kose et al. (2003).

There are M observable variables of length T per country and N countries. Denoting observable variables as $y_{i,t}$ for $i \in [1, \cdots, M \times N]$ and $t \in [1, \cdots, T]$, $y_{i,t}$ consists of a multi-layered structure of driving forces. Specifically, each set of country variables has a common dynamic factor (f_n^{nation} for $n \in [1, \cdots, N]$), which represents the nation-specific factor. Countries are grouped into R regions and all countries in a region share a common factor specific to that region (f_r^{region} for $r \in [1, \cdots, R]$), which reflects the regional-common factor. Finally, a single global-common factor (f^{global}) accounts for the co-movement common to all $M \times N$ of the observable variables, representing the global-common factor. The remaining idiosyncratic component (ϵ_i) is serially correlated with order p. The evolution of each factor is governed by an autoregression of order q. The system of equations for an observation i is expressed as follows.

$$y_{i,t} = \beta_i^{global} f_t^{global} + \beta_i^{region} f_{r,t}^{region} + \beta_i^{nation} f_{n,t}^{nation} + \epsilon_{i,t}, \tag{1}$$

$$f_{l,t}^m = \Phi(q) f_{l,t}^m + u_{f_l^m,t}; \quad E u_{f_l^m,t} u_{f_l^m,t} = \sigma_{f_l^m}^2; \tag{2}$$

$$\epsilon_{i,t} = \Phi(p) \epsilon_{i,t} + u_{i,t}; \quad E u_{i,t} u_{i,t} = \sigma_i^2; \tag{3}$$

where $\Phi(\cdot)$ is a lag operator. $u_{f_l^m,t}$ and $u_{i,t}$ are assumed to be zero mean, contemporaneously uncorrelated normal random variables.

The model is a set of linear equations with Gaussian autoregressive errors. Since the structure of the model is simple, it is possible to generate random samples from a joint posterior distribution for unknown parameters and unobservable factors using Markov Chain Monte Carlo (MCMC) procedures. To be specific, taking initial values of parameters and factors as given, we first sample from the posterior distribution of the parameters conditional on the factors. Then, we sample from the posterior distribution of the factors conditional on the parameters.[12] This sequence is executed repeatedly. Since the

[12] Sampling factors from a joint normal distribution, it is necessary to handle the inverse of $T \times T$ covariance matrix. When T is large, the covariance matrix happens to be non-positive definite. In such a case, we use Moore-Penrose pseudo inverse matrix.

regularity condition of Tanner and Wong (1987) is satisfied here, the MCMC procedures will converge and a sample from the joint posterior distribution of the parameters and the unobserved factors is obtained after the convergence.

In the implementation, the length of dynamic factors' polynomials and the serial correlation of observation equations are both four ($p = q = 4$). The prior distributions on all factor loadings are all $N(0, 1)$. Following Kose et al. (2003), the priors on the autoregression parameters of dynamic factors are set as $N(0, \Sigma)$, where Σ is a matrix with $[1, 0.5, 0.25, 0.125]$ for the diagonal elements and zero for the off-diagonal elements. As is stated in Otrok and Whiteman (1998), this prior is chosen to ensure stationarity. Finally, a prior distribution on innovation variance is Inverted Gamma ($6,10^{-3}$) which is fairly diffuse.[13] The results in this paper are based on a chain of length 50,000 and the half of the sample is discarded as "burn-in."[14]

The time-series data of international capital flows are provided from the BIS International Banking Statistics (hereafter IBS).[15] In the IBS, reporting banks are asked to report the external claims and liabilities vis-á-vis the banking sector and the non-banking sector in each country. Aggregating external claims of reporting banks, the BIS provides the international credit flows through global banks.

Since our interest is to shed light on the intermediary role of global banks, it is necessary to differentiate capital movements that are initiated by foreigners and those by domestic investors. For this purpose, the gross credit flows are adopted, instead of the net flows.[16]

Specifically, the quarterly data on international financial assets of reporting banks in 70 vis-á-vis countries for 1991:QIII-2012:QI are used. We pick only those countries that have no missing-values in the entire sample period.[17] In addition, the data from countries with smaller share (less than 1 percent share in the latest five years) are discarded. Each series is transformed into a year-on-year growth rate and demeaned. Each country is grouped into seven regions, following the BIS regional segmentation.[18] Thus, we use $M = 2$ series (banking and non-banking sectors) per country for $N = 70$ countries, with $T = 83$ time-series observation for each. The descriptive statistics are shown in Table 1.

[13]Since autoregressive parameters cannot be sampled directly, we combine the random walk Metropolis Hastings procedure within the Gibbs procedure as is described in Kose et al. (2003).

[14]To check the convergence, we run the three cases of 5,000, 10,000, and 50,000 chains. The results from 10,000 chain and 50,000 chain are mostly the same. In addition, we check the convergence to the same results from a different set of initial values.

[15]The locational banking statistics of the immediate borrower basis in the IBS family are used. See BIS (2012) for details of data.

[16]Forbes and Warnock (2012) stress the importance of viewing capital flows in gross terms, suggesting that the major events in capital movements, e.g., capital surges, bonanzas, sudden stops, and flights, are all expressed in gross terms. Borio and Disyatat (2011) point out that the net capital flows do not carry the information on the underlying patterns of global intermediation that contributed to the credit booms and the transmission of the financial turmoil.

[17]Prior to December 1993, the data of Russia, Ukraine, and Czech Republic are backcasted using the data of the Soviet Union and Czechoslovakia and respective weight at in September 1993.

[18]The seven regions are as follows: Advanced Europe, Other Advanced, Offshore Centers, Middle East and Africa, Asia and Pacific, Developing Europe, and Latin America. The list of the countries used are presented in Appendix 1.

Table 1: Descriptive statistics

	Mean	Median	S.D.	Skewness	Kurtosis
Overall	0.0899	0.0821	0.261	0.241	8.896
Advanced Europe	0.1045	0.1059	0.2017	-0.1131	7.5704
Other Advanced	0.0664	0.0764	0.1672	-0.3686	5.3695
Offshore	0.0851	0.0774	0.2682	-0.5873	15.8229
Middle East & Africa	0.0785	0.0501	0.3055	0.3102	6.1982
Asia & Pacific	0.0865	0.0862	0.2436	-0.0236	4.623
Developing Europe	0.131	0.1047	0.36	0.3397	7.1882
Latin America	0.0679	0.0508	0.275	0.6726	8.2263

3 Estimation results

3.1 Estimated factors

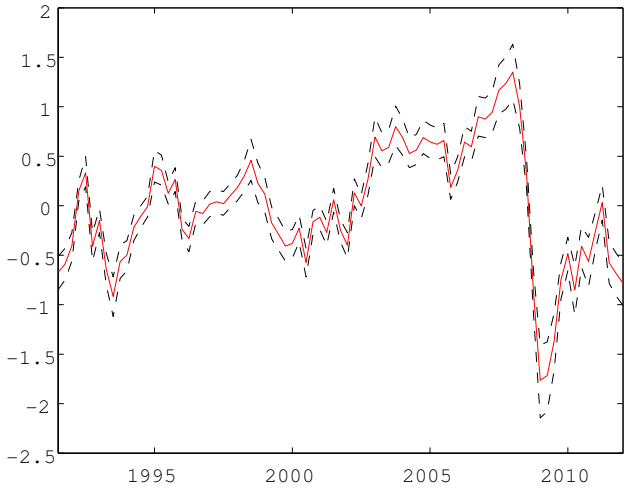
Figure 1 shows the estimated global-common factor in the last 20 years. Judging from the tightness of the 10-90 percentile intervals, the factor is sharply estimated. The factor succeeds in capturing major episodes during the sample period. For instance, the trough around 1992-93 reflects the financial turmoil of the EMS crisis and its worldwide propagation.[19] In the latter half of the sample, the global-common factor depicts the large swings, reflecting the surge and consecutive retrenchment of the external credit flows before and after the financial crisis in 2008. It should be noted that the estimated global-common factor may be influenced by activities of global banks in advanced European countries to a greater degree because the ratio of European reporting countries to all reporting countries is relatively high (19 countries out of 45 countries).

Figure 2 shows the estimated regional-common factors in respective regions. In "Other Advanced" countries and "Middle East and Africa" countries, 10-90 percentile intervals are wide and the estimated regional-common factors are insignificant because of the grouping of countries in these regions. "Other Advanced" is the rest of the advanced countries and includes countries such as Australia, Canada, and Japan, where regional common elements may not exist. "Middle East and Africa" is also the grouping of countries that are at different stages of economic development. The results suggest that regional common movements in the cross-border banking activities are obscure and hard to pin down clearly in these areas. Except for the above two areas, the regional-common factors are sharply estimated.

Figure 2 suggests that the regional-common factors develop independently in each region. For example, credit inflows into the "Asia Pacific" countries had gradually accelerated in the 2000s after the sharp drop of the Asian currency crisis and until the outbreak of the financial crisis. Whereas the credit inflows into the "Latin America" countries were stable in the first half of the 2000s but skyrocketed after 2005. After the financial crisis in

[19] In the autumn of 1992, the United Kingdom and Italy were forced to withdraw from the Exchange Rate Mechanism of the European Monetary System (EMS) by currency attacks.

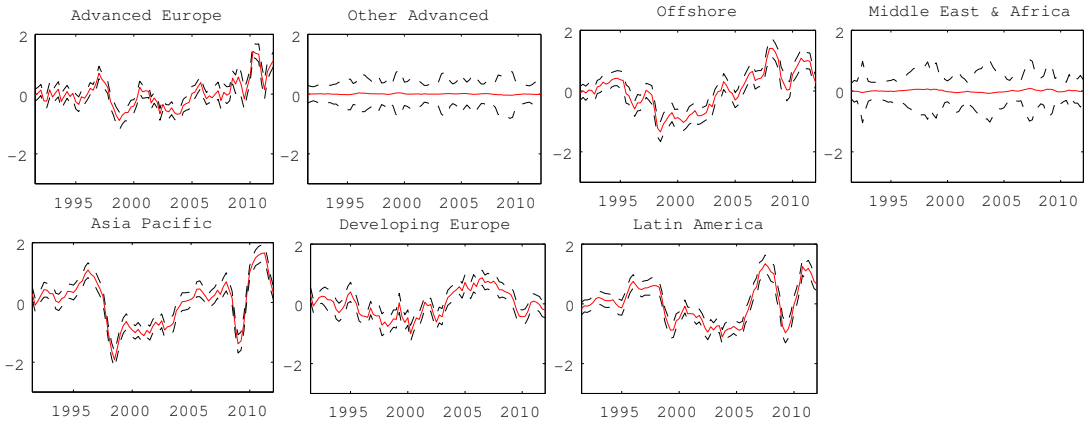
Figure 1: Global-common factor



Note: The solid line and dotted lines are the average and the 10-90 percentile intervals of the global-common factor, respectively.

the late 2000s, credit surges came back again in both "Asia Pacific" and "Latin America" countries.

Figure 2: Regional-common factors



Note: The solid line and dotted lines are the average and the 10-90 percentile intervals of factors, respectively.

For the purpose of acquiring some insight into what each factor is capturing, we study the historical data of external credit growth by region, decomposed into the relative contribution of each factor.[20] Figure 3 suggests that the driver of the international credit is different from region to region. As for "Advanced Europe," a large part of the credit growth is explained by the global-common factor, implying that "Advanced Europe" countries

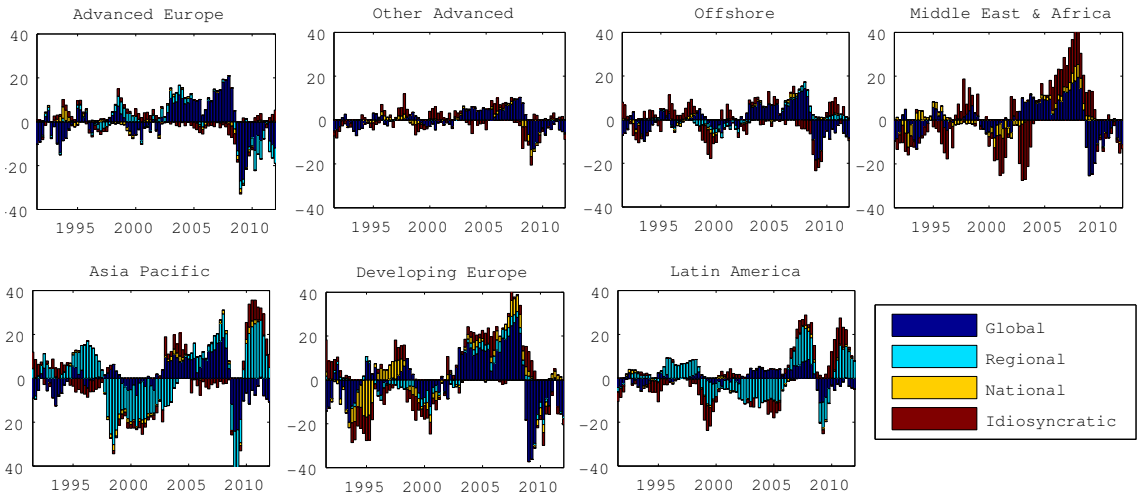
[20]The historical decomposition for each country is the asset-weighted average.

are systematically related to the global banking activities and fulfill intermediary roles in the international shock propagation. The global-common factor is also significant for the credit inflows into "Developing Europe" countries.

As for "Asia Pacific" and "Latin America" countries, the regional common factors are the important determinants of the credit flows. Specifically, in the "Asia Pacific" countries, sudden stops of credit inflows in 1997 were contagious and had left a long-lasting effect on the credit inflows in this area in the first half of the 2000s. Capital surges after the collapse of the Lehman Brothers could be interpreted as area-wide phenomena.

In the "Latin America" countries, the credit flows were also affected largely by the regional common factors. Before the outbreak of the financial crisis in 2007, massive credit flooded into this region as a result of the "search for the yield" activities of global investors (e.g., BIS (2006)). After the "Lehman shock" in 2008, contagious capital flows came back again though they started to slowdown in the aftermath of the European sovereign crisis in 2011.

Figure 3: Historical decomposition by region



Note: The growth rates per annum of external credit flows are the weighted average by region.

3.2 Variance decomposition

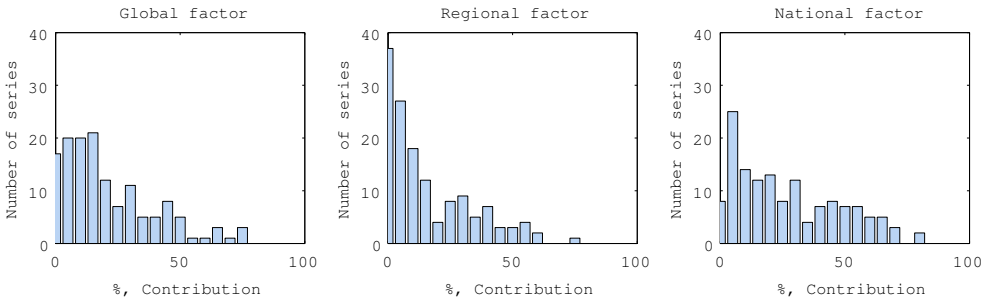
To measure the relative contributions of each factor to variations of external credit growth, we estimate the share of the variance of each observable due to each factor. Assuming factors are orthogonal, the variance of any variable y_i is decomposed based on the following expression.[21]

$$var\left(y_i\right) = \sum_m \left(\beta_i^m\right)^2 var\left(f_l^m\right) + var\left(\epsilon_i\right). \tag{4}$$

[21] Since the orthogonality condition is not necessarily sufficed, factors are orthogonalized in the order of global, regional, and national factors, as in Kose et al. (2003).

Table 2 and 3 present the variance decomposition of each series of data. These tables show that large heterogeneity exists. For instance, the global-common factor explains 72.3 percent of credit growth in the U.K. banking sector, but it explains only 1.9 percent in the Brazilian non-banking sector. Figure 4 illustrates that the main determinant of a capital flow is different for each series of data, by showing the widely-spanned frequency distribution of contributions due to each factor in the variance decomposition.

Figure 4: Variance decomposition of each series



To explore which types of countries are more influenced by local pull factors, we run the following cross-country regression.

$$PullCont = \gamma_1 \cdot MktS + \gamma_2 \cdot FLtoY + \gamma_3 \cdot FinOpen + \gamma_4 \cdot VGDP, \tag{5}$$

where $PullCont$, $MktS$, $FLtoY$, $FinOpen$, and $VGDP$ represent the contribution of local pull factors in a variance decomposition, a market share of a country to total foreign claims, a ratio of loans from non-resident banks to GDP, the financial openness index of Chinn and Ito (2008) that measures a country's degree of capital account openness, and volatilities of GDP growth, respectively. γ_j is a parameter. Following Cetorelli and Goldberg (2012), we use a market share of each country to total foreign claims as one of explanatory variables.[22] The volatilities of GDP growth represent country risks.

According to the empirical analysis in Table 4, a country with a larger market size and a higher penetration of foreign banks tends to be less affected by local pull factors. And a country with higher volatilities in macroeconomic fundamentals is likely to be more affected by local pull factors. The current account openness is not systematically related to whether credit inflows of a country are push-driven or pull-driven.

It should be pointed out that the market share is positively significant. "Core countries" that have higher market shares are more exposed to global- and regional-common factors and "peripheral countries" that have lower market shares are more depending on local pull factors. This result is opposite to the one of Cetorelli and Goldberg (2012) who focus on the net flows between headquarters and foreign affiliates of U.S. banks though ours are gross flows.[23]

[22]Since assets are long-tailed distributions, a market share is transformed into logarithm.

[23]The difference between Cetorelli and Goldberg (2012) and ours may suggest that gross flows and net flows have different natures as in the previous works such as Forbes and Warnock (2012) and Borio and

Table 2: Variance decompositions for advanced countries and offshore centers

		Global			Regional			National			Idiosyncratic		
		1/3	Median	2/3	1/3	Median	2/3	1/3	Median	2/3	1/3	Median	2/3
AT	B	74.5	75.5	76.5	0.2	0.5	1	3.9	7.4	11.7	12.3	16.3	19.3
	N	10.6	12.3	14.1	29.2	33.3	37.1	10.4	20.6	30.2	25.2	33.7	42.4
BE	B	71.9	73.2	74.4	2.1	3.1	4.4	0.2	0.3	0.7	22	22.8	23.5
	N	2.5	3	3.5	15.3	17.1	19	49.6	56.4	61.3	18.8	23.4	29.8
CY	B	0.6	0.8	1	0.3	0.6	1.2	69.5	76.3	80.5	17.6	21.6	28.4
	N	56.1	57.8	59.4	1.5	2.2	3	1.6	2.9	5	33.5	35.7	37.7
FI	B	8.2	8.9	9.6	2.3	3.3	4.6	32.9	48.5	58.5	29	38.7	54.1
	N	14.6	15.2	15.9	0.6	1.1	1.8	9.2	16.3	28.9	54.6	67.1	74.1
FR	B	72.5	73.8	74.9	1.7	2.7	3.9	5.4	7.5	10.1	13.4	15.8	17.9
	N	23.7	25.7	27.6	15.9	18.4	21	20.6	27.2	33.1	23.1	28.8	35.1
DE	B	29.6	31.7	33.7	4.5	6.9	9.6	7.6	11.5	17.2	43.8	49.5	53.2
	N	10.8	11.6	12.5	10.4	12.4	14.4	41.9	50.4	56.4	19.9	25.2	33
GR	B	18.6	19.3	20.1	0.1	0.2	0.4	59.3	63.5	66.6	13.9	16.9	21
	N	11.8	13.7	15.7	28.9	32.9	36.8	2.6	4.3	6.7	44.3	47.9	51.3
IE	B	27.2	29.7	32.2	19.4	23.3	27.2	26.5	32.3	36.3	10.9	13.8	19
	N	64.7	66.8	68.6	12.8	14.7	16.8	1.7	2.9	4.6	13.7	15.4	16.7
IT	B	62.9	64.2	65.4	2	3	4.2	1.7	3.9	7.5	25	28.3	30.4
	N	14.3	16.7	19.1	44.7	49.1	53.3	6.8	13.8	20.1	14.7	19.4	24.8
LU	B	49.8	51	52.1	2.7	3.7	4.8	0.7	2.1	5.8	39.3	42.6	44.2
	N	43.3	45.3	47	7.7	9.5	11.7	16.5	24.1	29	16.5	21.2	28.3
NL	B	64.5	66.6	68.5	2.3	3.7	5.5	1.7	4.9	10.6	18.9	24.1	27
	N	43.5	45.8	48	14.4	17	19.7	3.4	9	16.8	20.6	27.8	32.8
PT	B	12	14	16	31.6	35.8	40	3.2	6.5	11.2	38.7	42.6	45.9
	N	26.7	29.5	32.2	41.8	45.3	48.7	5.3	9	12.7	13.5	16.4	19.2
ES	B	54	56.3	58.3	11.5	13.5	15.6	11.6	15.4	18.6	11.8	14.8	18.3
	N	43.7	46.5	49.1	20.5	23.6	26.9	6.7	9.9	13.6	16.3	19.8	22.9
DK	B	45	46.4	47.7	0.9	1.6	2.5	5.6	19.9	31.5	20.7	32	45.3
	N	17.5	18.5	19.6	0.5	1.2	2	2.9	11.6	32.7	47	67.9	76.3
IS	B	50.7	52.4	54	1	1.9	3.2	30.1	32.7	34.9	10.7	12.8	15.1
	N	46.2	48.2	50	6.4	8.3	10.4	20.3	22.8	25.4	18.3	20.8	23.2
NO	B	30.3	31.4	32.6	0.2	0.4	0.9	2.5	6.3	16.5	51.5	61.1	65
	N	15.3	15.9	16.6	0.2	0.4	0.7	27.5	44.1	53.6	30	39.3	55.9
SE	B	41.7	43	44.3	0.6	1.2	2.2	2.7	4.2	7.5	47.5	50.7	52.5
	N	7.5	8.1	8.8	6.4	7.7	9.2	56.4	64.1	68.4	16.1	20.2	27.5
CH	B	27.7	29.6	31.2	2.4	3.9	5.8	6	11.7	24	42.2	54.5	60
	N	42.4	43.6	44.7	0.8	1.4	2.2	12.7	24.9	32.8	22.2	30	42.1
GB	B	69.6	71	72.3	0.4	1	1.8	8.2	9.3	10.7	17	18.4	19.6
	N	28.6	29.5	30.5	1.3	1.9	2.8	51.4	54.1	56.3	12.1	14.3	16.9
AU	B	35.6	36.3	37	0.5	1.1	2.1	10.2	13.5	17.6	44.1	48.3	51.5
	N	30.2	31.5	32.8	1.2	2.6	4.7	40.3	45.8	50.3	14.8	18.2	22.6
CA	B	24.7	25.6	26.5	5.2	11.7	21.3	11.6	26.1	39.6	21.9	27.4	34.7
	N	8.3	9	9.7	5.9	12.4	19.5	5.6	16.7	34	39.9	51	63.4
JP	B	0.1	0.1	0.2	4.9	9.9	15.8	10	16.3	24.1	61.8	69.3	76
	N	12	12.9	13.9	3.6	7.5	12.6	33.5	42.8	50.6	27.5	32.8	40.1
NZ	B	0.1	0.1	0.1	0.6	1.4	2.6	36.4	48.1	58.4	39	48.9	60.4
	N	6.8	7.3	7.7	1.7	3.6	6.2	21.2	30.3	40.4	46.1	55.4	64.5
US	B	15.5	16.1	16.7	4.6	9.3	15.1	1.9	4.1	8.1	57.8	64.9	71.4
	N	36.1	37.3	38.5	3.2	7.4	14	32.7	41.3	46.9	9.7	11.9	14.7
BS	B	0.2	0.3	0.4	2.3	3	3.7	11.9	15	19.1	77.5	81.6	84.6
	N	6.8	7.3	7.8	0.1	0.2	0.4	62.3	67.9	72.5	19.8	24.5	29.9
KY	B	25.1	26.3	27.4	4.7	6.1	7.6	19	32.2	41.5	26	34.7	47.2
	N	28	29.1	30.2	10.6	13.1	16	3.2	7.5	16	38.7	46.3	52.1
HK	B	3.4	4.6	6	72.2	76.1	79.5	0.6	1.4	3.6	12.2	14.6	17.3
	N	8.3	9.4	10.6	8.9	10.8	13.3	39.4	52.1	59.3	21	27	37.3
MO	B	3.5	4.3	5.3	14.5	16.4	18.5	61.2	64.8	67.9	11.3	13.6	16.6
	N	12.1	13.3	14.6	23	25.6	28.4	10.7	13.5	16.8	44	46.9	49.5
PA	B	7.4	8.1	8.8	3.7	4.8	6.1	30.1	51.5	61.4	25.3	34.5	54.9
	N	9.9	11.6	13.5	52.8	56	59.2	0.8	2.3	7.2	20.2	25	29.2
SG	B	23	25.1	27.3	39.7	43.3	46.5	1.2	3.6	10.8	20	24.3	27.5
	N	14.6	15.7	16.8	5	6.1	7.2	8.3	25.1	40.3	38	52.9	69.5

Note: The number in the table is the variance share in percent. 1/3, Median, and 2/3 correspond to the respective quantiles of posterior distribution. B and N represent the banking and non-banking sector, respectively. Two-letter country codes are presented in Appendix 1.

Table 3: Variance decompositions for developing countries

		Global			Regional			National			Idiosyncratic		
		1/3	Median	2/3	1/3	Median	2/3	1/3	Median	2/3	1/3	Median	2/3
EG	B	12.8	13.9	15.2	34.6	40.8	45.7	0.7	1.8	4.5	34.3	39	44.1
	N	17.5	18.9	20.2	0.8	1.7	3.4	46	54.7	60.4	18.6	23.3	30.4
IR	B	9.3	10.3	11.2	15.8	20.7	25.7	15.3	21.9	28.8	39.9	45.2	50.8
	N	13.9	14.9	16	4	6.5	9.6	25.2	36.3	45.7	32.7	41	50.5
KW	B	38	39	40.2	0.7	1.3	2.1	1.4	3	5.8	52.8	55.5	57.6
	N	14.6	15.2	15.9	0.7	1.5	3	6.8	13.9	22.5	59.1	67.5	74.5
NG	B	20.7	21.5	22.3	3.9	6	8.5	18.6	25.7	33.4	36.9	44.4	52
	N	29	29.9	30.9	10.2	14	17.9	23.5	30	36.3	19.5	23.9	29.1
OM	B	7.3	7.9	8.6	19.6	25.3	30.3	12.7	17.8	24	40.9	46.3	52.1
	N	21.3	22.1	22.9	5.6	8.4	11.8	36.1	43.1	48.7	20.3	24.6	29.9
QA	B	13	13.9	14.9	0.6	1.2	2.1	32.9	41.4	49.3	35	42.7	51.1
	N	3.2	3.7	4.3	18.6	23.9	28.6	25.2	33.4	42	30.9	37.4	44.5
SA	B	7.3	7.7	8.2	1	2.3	4.4	20.1	25	30.3	56.7	62.2	67.6
	N	6.2	6.7	7.2	10.5	14	17.7	48	53.4	58.5	21.9	25	28.5
ZA	B	25.2	26.5	27.8	5.2	7.4	9.7	1.1	3.2	11	52.2	59.3	63.4
	N	21	22.3	23.5	3.2	5.1	7.1	24.5	41.6	50.3	22.4	30.4	46.2
TN	B	19.4	20.1	20.9	5.1	6.9	8.7	29.8	37	44.6	28.3	35.7	43
	N	21.1	22.3	23.5	1.2	2.1	3.4	27.9	36.3	44.3	30.9	38.7	46.8
AE	B	34.2	35.3	36.4	3.1	5	7.4	1.7	5.8	17.9	39.1	49.3	55.5
	N	12.9	13.8	14.8	3.6	5.7	7.9	13.1	31.7	47.1	32.2	47.1	65.4
CN	B	7.2	8.5	10.1	56.4	58.9	61.2	4.5	9.8	14.9	17.7	22.1	26.4
	N	17.4	19.4	21.7	39.3	41.7	44	2.3	5.4	10.8	28.1	32.6	35.4
TW	B	12.4	13.3	14.1	10.3	11.7	13.2	4.9	35.4	54.2	21.3	39.1	67.3
	N	3.2	3.5	3.9	7.7	8.6	9.6	1.9	10.8	51.4	36.5	76.1	84.7
IN	B	41.5	43.7	45.9	11.9	13.6	15.5	19.8	25.9	29.7	13.1	16.7	22.5
	N	29.6	31.8	34	14.6	16.5	18.5	1.6	3.9	8.3	43.2	46.8	49
ID	B	3.8	4.8	6.1	52.4	54.4	56.3	3.5	5.7	8.8	30.8	34	36.9
	N	1.2	1.8	2.6	55.9	58.1	60.2	22	25.7	29	11.5	13.6	16.5
MY	B	5.4	6.3	7.3	37.6	39.5	41.4	0.7	2.2	6.7	45.3	49.8	52.4
	N	11.9	12.8	13.7	17.5	19.1	20.7	33.7	44.3	50.1	18.3	23.8	33.8
PK	B	6.9	7.4	7.9	10.9	11.8	12.8	3.8	7.1	20.3	60.7	73.4	76.5
	N	2.8	3.3	3.8	10.2	11.5	12.8	13.2	39	54.2	31	46.2	71.9
PH	B	1.7	2.3	2.9	35.6	37.5	39.6	19.2	26	34.8	25.4	33.3	39.5
	N	5.7	6.2	6.8	0.3	0.6	0.9	49.9	60.6	67.5	25.6	32.4	43.1
KR	B	19.8	21	22.3	27.4	29.2	31.1	15.4	21.7	27.9	22.4	28.2	34.1
	N	16.2	17.7	19.5	33.7	35.8	37.9	15.3	21.1	26.6	20.1	25.5	31
LK	B	3.4	4	4.7	19.4	20.7	22.2	41.8	49.9	55.2	20.2	25.5	33.1
	N	10.6	11.1	11.7	1.1	1.5	2	10.8	16.2	24.5	62.9	71.2	76.6
TH	B	0.9	1.3	1.8	52	54.3	56.6	21.4	28.9	33.6	11.2	14.5	20.8
	N	0.1	0.3	0.5	44.6	46.5	48.4	1.5	3.4	7	44.4	47.9	50.8
VN	B	24.6	27	29.6	28.2	30.6	33	17.5	25.6	30.5	12.4	16.6	24
	N	9.1	9.8	10.6	0.1	0.2	0.3	11	17.6	30.7	59.4	72.4	79
BG	B	7.3	8.1	9	5.8	8	10.3	62.1	66.2	69.7	14.1	16.9	20.2
	N	19.6	20.4	21.2	13.8	16.1	18.6	16.9	20.1	23.6	39	42.4	45.7
CZ	B	32.3	33.3	34.2	0.2	0.4	0.8	42.1	46.2	49.6	16.6	19.9	23.8
	N	50	50.9	51.7	0.7	1.4	2.4	16.1	18.6	21.3	26	28.5	31
HU	B	50.2	51.6	53	0.5	1.1	2	5.8	15.1	27.7	19.2	31.6	40
	N	43	45.7	48.2	0.5	0.9	1.5	7.5	20.2	32.7	20.9	33.1	43.4
PL	B	5.6	6.1	6.7	1.6	2.6	3.9	64.3	69.5	73.7	17.2	20.9	25.8
	N	40.7	42	43.2	0.4	0.8	1.3	6.4	8.5	11.2	45.4	48.1	50.5
RO	B	39.8	41.5	43.3	26	29.4	32.6	3.1	6.3	10.5	18.2	21.2	24.2
	N	2.2	2.6	2.9	9.2	11.9	14.9	9.9	21.1	34.3	50.3	62.9	72.9
RU	B	35.8	38	40.3	27.4	30.8	34.2	1.9	3.5	5.9	23	25.5	28.1
	N	27.9	29.1	30.4	0.9	2.1	4	49.1	54.2	57.9	10.5	12.8	16.1
UA	B	45	46.7	48.5	34.9	37.9	40.7	0.5	1.2	2.3	12	13.4	14.9
	N	23.2	24.3	25.4	0.5	1.1	2.3	53.8	57.7	61.1	12.7	15.5	18.6
AR	B	8.1	8.8	9.5	41.6	43.8	45.9	29.8	32.9	35.9	12.3	14.6	17.1
	N	7.1	7.8	8.7	52.5	55.1	57.6	15.3	18.4	21.5	16.7	18.8	20.7
BR	B	5.9	7.1	8.4	49.7	52.6	55.7	6.7	12.1	18.9	20	25.5	30.9
	N	1.3	1.9	2.7	28.7	31.4	34	20.4	29.8	38.3	28	35	43.9
CL	B	14.5	15.8	17.1	1.5	2.2	3.1	49.1	57.9	63	18.7	23.6	32.3
	N	2.1	2.5	2.9	23	25.9	28.9	6.4	10.6	17.4	52	58.9	64.4
CO	B	5.2	6.3	7.4	29	31.5	34.2	22.9	37	44.2	18.2	24.5	36.7
	N	8.1	9.1	10.2	49.5	52.2	54.9	1	2.9	8.6	27.1	32.2	35.7
CR	B	4.3	4.6	5	8.4	9.4	10.5	9.1	13.4	21.8	63.8	72	76.4
	N	0.4	0.5	0.7	2.3	2.8	3.4	62.3	74.2	79.8	16.9	22.5	34
DO	B	2.1	2.4	2.7	34.2	36.2	38.5	39.7	43.4	46.7	14.9	17.5	20.6
	N	12.5	13.6	14.6	0.1	0.2	0.3	36.1	40.4	44.7	41.5	45.8	50.2
GT	B	1.9	2.4	2.9	29.6	31.4	33.3	12.6	16.8	22.6	43.5	48.9	53
	N	0.1	0.1	0.1	6.2	7.1	8.1	54.5	62.6	68.8	24.2	30.1	38.3
MX	B	3.4	4	4.8	29.6	31.2	32.6	9.8	23.7	34.2	31	41.1	54.3
	N	12.6	13.4	14.3	7.6	8.8	10	5.5	11.9	25.3	52.7	65.5	71.4
PE	B	12.2	13.8	15.5	28	30.4	32.8	18.4	30.2	37.4	18.5	24.6	35.2
	N	19.7	21.7	23.6	42.3	44.7	47.1	0.8	2.2	5.9	26.1	29.4	31.7
TT	B	16.4	17	17.7	1.1	1.6	2.2	22.5	36.8	47.7	33.7	44.5	58.7
	N	1.9	2.3	2.7	3	3.7	4.5	4.5	11.4	23.4	70.5	82.4	89
UY	B	0.1	0.2	0.3	24.9	26.4	27.8	8.7	20.3	33.5	40.3	52.9	63.6
	N	0.8	1	1.2	12.4	13.4	14.4	3.7	9.8	24.1	61.4	75.2	81.2
VE	B	0.2	0.3	0.5	15.5	16.9	18.3	29.5	46.7	56.8	25.8	35.5	52.8
	N	2.1	2.5	3	0.8	1.4	2.2	2.2	6.8	20.6	75.2	88.4	92.8

Note: The number in the table is the variance share in percent. 1/3, Median, and 2/3 correspond to the respective quantiles of posterior distribution. B and N represent the banking and non-banking sector, respectively. Two-letter country codes are presented in Appendix 1.

Table 4: Determinants of local pull factors' contribution

	Coeff.	*t-stats.*	
Const.	27.94	2.54	***
MktS	-6.02	-4.04	***
FLtoY	-2.14	-2.20	**
FinOpen	1.51	0.60	
VGDP	0.02	1.90	*
$Adj\ R^2$	0.23		
S.E.	16.62		

Note: $***$, $**$, and $*$ indicate the 1, 5, and 10 percent significant level, respectively.
Sources: BIS, "International Banking Statistics"; IMF, "World Economic Outlook"; World Bank, "Global Financial Database."

To draw implications for aggregates, variance decompositions of individual series in Table 2 and 3 are summarized by regions, as asset-weighted averages. The followings are the key points in Table 5.

First, the estimated global-common factor account for 36.4 percent of the variations in the world credit growth. It is suggested that the international propagations of shocks through global banks are quantitatively important.

Second, regional heterogeneity is large. In European countries, the global-common factor is the dominant source of fluctuations in the credit growth. The contribution of the global-common factor reaches 48.8 percent in the "Advanced Europe" countries and 32.1 percent in the "Developing Europe" countries. Financial institutions in Europe have complex linkages inside and outside of the region.[24] A shock in Europe may propagate through these linkages and result in the global co-movement of credit growths. In contrast, in developing countries especially in "Asia and Pacific" and "Latin American" regions, the contributions of the regional-common factor exceed those of the global-common factor. Credit inflows in these developing countries co-move but the co-movements are regional-specific and not directly related to the global trends.

For the purpose of studying the evolution of contributions of each factor, we perform the sequential regressions by extending the end of the sample period on a year-by-year basis. Figure 5 presents the contributions of the global-common factor, the regional-common factor, and the national-specific factor at each point in time. It clarifies that the relative contribution of the global-common factor started to rise in 2004 and it has still continued to rise even after the financial crisis. In exchange, the contribution of regional-common factor is falling in the 2000s. And the pace of the decline accelerated

Disyatat (2011). However, for the interpretation, we should bear in mind that the focus of Cetorelli and Goldberg (2012) is different from ours in several important aspects of the following: Cetorelli and Goldberg (2012) focus on the net flows using data of the financial crisis period as a natural experiment whereas we focus on the gross flows using the last 20-year historical sample.

[24]For example, see Minoiu and Reyes (2011).

Table 5: Variance decompositions by region

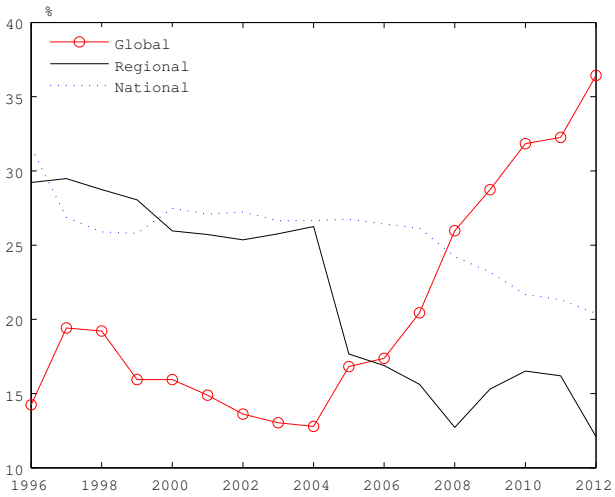
	Global factor	Regional factor	National factor	Idiosync. factor
Overall	36.4	12.3	19.7	31.6
Advanced countries	38.4	10.6	19.5	31.5
Advanced Europe	48.8	7.6	17.7	25.9
Other Advanced	23.3	11.6	23.7	41.4
Developing countries	17.2	28.4	21.8	32.7
Offshore	20.8	23.7	18.6	37.0
Middle East & Africa	16.0	9.5	30.2	44.3
Asia & Pacific	16.5	38.4	16.3	28.8
Developing Europe	32.1	10.7	29.1	28.1
Latin America	7.2	30.5	23.2	39.0

Note: The figures are asset-weighted averages.

after 2004.[25] In the meantime, the contribution of the nation-specific factor is gradually declining but relatively stable.

The recent work by Fratzscher (2012) empirically studies the determinant of international capital flows through individual investment funds, making explicit distinction between the global factor and the local factors and finds that the global factor and local factors are both important determinants in the 2000s. Our results are in line with his research while ours is focusing on the credit flows through the banking sector.

Figure 5: Evolution of the common factors' contributions



Note: The contribution of common factors to the variances of aggregated credit flows are presented.

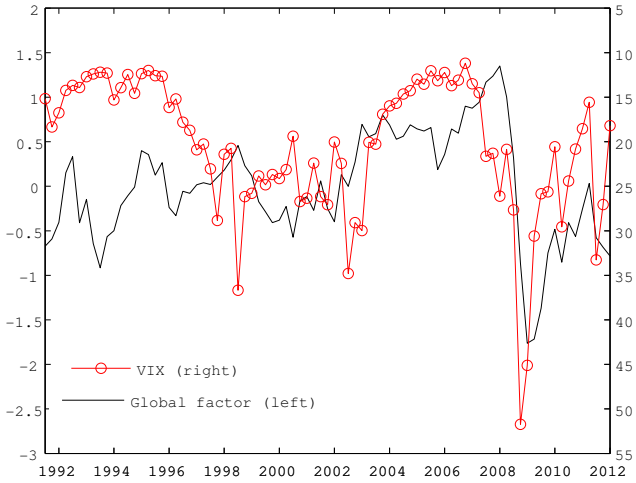
[25]It is known that "Bear Sterns exemption," which gave the five largest U.S. investment banks a full exemptions from leverage restrictions, was introduced in 2004.

4 Discussion

Recent literature such as Cetorelli and Goldberg (2012) and Bruno and Shin (2011) clarifies the shock transmission channel through the cross-border credit flows of global banks. Bruno and Shin (2011) claim that the global banks raise wholesale funding from financial centers around the world and reallocate their funds globally through centralized decision making from headquarters.[26]

Based on their idea, we can consider the relationship between the centralized portfolio reallocation decision and our factors. The global-common factor could be interpreted as the relaxation of risk tolerance of global banks. Bruno and Shin (2011) express it as the relaxation of Value-at-Risk constraint in their model. The other local factors could be interpreted as the portfolio reallocation that occurs when the relative yields and the risk of the assets change.

Figure 6: VIX and the global-common factor



Note: The right-hand side axis is inverted. VIX is the Chicago Board Options Exchange (CBOE) Volatility Index of implied volatility in S&P 500 stock index option prices.

In order to confirm the above interpretation, Figure 6 depicts the global-common factor and VIX index that is generally considered as a barometer of investors' sentiment (Adrian and Shin (2010)). The figure exhibits the relationship between the global-common factor and VIX index as a whole. Table 6 shows that the VIX index is statistically significant across the cases. It suggests that when the risk sentiment worsens, the global-common factor responds negatively and depresses the cross-border credit growth. Further, case 2 in Table 6 indicates that the U.S. term spread is also statistically significant. The negative coefficient of the term spread implies that the expected monetary easing in the

[26]Baba, McCauley and Ramaswamy (2009) show that on the eve of the financial crisis in 2008, over 40 percent of assets under management of U.S. prime MMFs were short-term obligations of the foreign banks, among which European banks held a dominant share.

Table 6: Regression on the global-common factor

	Case 1		Case 2		Case 3		Case 4	
	Coeff.	*t-stats.*	*Coeff.*	*t-stats.*	*Coeff.*	*t-stats.*	*Coeff.*	*t-stats.*
VIX	-0.02^{**}	−2.29	-0.02^{**}	-2.53	-0.01^{**}	-2.29	-0.01^{**}	-2.26
$USSPR$			-0.55^{**}	-2.53	-0.43^{*}	-1.83	-0.40^{*}	-1.71
$USFF$					0.09	1.34	0.08	1.42
$WGDP$							0.04^{*}	1.93
$Adj\,R^2$	0.76		0.77		0.77		0.78	
$S.E.$	0.31		0.30		0.29		0.29	

Note: Sample period is from 1991QIII to 2012QI. $**$ and $*$ indicate the 5 percent and 10 percent significant level. $USSPR$, $USFF$, and $WGDP$ represent the spread between the 3-month U.S. Treasury bill rate and the federal funds rate, the federal funds rate, and the annual growth rate of the world GDP, respectively. The world GDP is taken from World Economic Outlook database released by the IMF and is converted into the quarterly data from the annual data, using the cubic spline. The autoregressive process of order one is assumed for the residual terms. Constant terms are abbreviated from the Table.

United States will boost the global-common factor of the cross-border credit flows.[27] Case 3 suggests that the level of the policy rate is insignificant. Hence, the low interest rate is not the cause of the global push factor but the expectations for the prolonged low interest environment is. These results are robust even if the effect of the world GDP is controlled as in case 4.[28] The empirical results in Table 6 are basically consistent with the earlier findings of Forbes and Warnock (2012) and Bruno and Shin (2011). Both works stress the importance of the global risk as a determinant of capital flows.

5 Conclusion

This paper quantitatively analyzes the determinant of the cross-border credit flows through global banks. The relative contributions of the global-common factor, the regional-common factor, and the national-specific factor are examined within a consistent framework, employing a Bayesian approach of Kose et al. (2003).

The empirical exercises in this paper reveal that the global-common factor explains 36.4 percent of volatilities in overall cross-border banking flow, suggesting that the international propagations of shocks through global banks are quantitatively important. The explanatory power of the global-common factor was increasing during the 2000s. Empirical results also show that the main drivers of the cross-border credit flows are largely

[27] When the economy faces the zero boundary of nominal interest rates, the term spread may not reflect the expected monetary easing. However, in the most of the sample period, the zero boundary of nominal interest rates is not binding. Thus, it may well to interpret that the global-common factor is affected by the expectation of the future monetary policy.

[28] In addition, we confirm the robustness of the results, using the global equity prices (MSCI global index).

heterogeneous across countries and sectors, suggesting that the importance of each investment destination to global banks may not be uniform.

These results are consistent with the views of the recently growing literature, such as Cetorelli and Goldberg (2012) and Bruno and Shin (2011) that focus on global banks that manage their portfolio size and rebalance the portfolio from the global perspective. We confirm this view showing the statistically significant relationship between the estimated global-common factor and the investors' risk sentiment.

As a final remark, it is worth mentioning a few policy implications drawn from this research. First, BIS IBS will provide a useful information for the purpose of monitoring activities of global banks and the developments in the global co-movements of credit growth. In this regard, the efforts to collect better data should also be supported. International financial forums such as the Committee on Global Financial Systems have started to work on the this issue (CGFS (2011)). Second, the local factors have non-negligible explanatory powers on variations of external credit growths. Further, the importance of each investment destination could be different for global banks. Taking the above results into account, the desirable policy response to credit inflows could be different for each host country.

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Appendix 1: Country code

Region	Code	Country	Region	Code	Country
Advanced	AT	Austria	Middle East	EG	Egypt
European	BE	Belgium	and	IR	Iran
Countries	CY	Cyprus	African Countries	KW	Kuwait
	FI	Finland		NG	Nigeria
	FR	France		OM	Oman
	DE	Germany		QA	Qatar
	GR	Greece		SA	Saudi Arabia
	IE	Ireland		ZA	South Africa
	IT	Italy		TN	Tunisia
	LU	Luxembourg		AE	United Arab Emirates
	NL	Netherlands	Asia and Pacific	CN	China
	PT	Portugal	Countries	TW	Chinese Taipei
	ES	Spain		IN	India
	DK	Denmark		ID	Indonesia
	IS	Iceland		MY	Malaysia
	NO	Norway		PK	Pakistan
	SE	Sweden		PH	Philippines
	CH	Switzerland		KR	South Korea
	GB	United Kingdom		LK	Sri Lanka
Other	AU	Australia		TH	Thailand
Advanced	CA	Canada		VN	Vietnam
Countries	JP	Japan	Developing	BG	Bulgaria
	NZ	New Zealand	European	CZ	Czech Republic
	US	United States	Countries	HU	Hungary
Offshore	BS	Bahamas		PL	Poland
Centers	KY	Cayman Islands		RO	Romania
	HK	Hong Kong SAR		RU	Russia
	MO	Macao SAR		UA	Ukraine
	PA	Panama	Latin	AR	Argentina
	SG	Singapore	American	BR	Brazil
			Countries	CL	Chile
				CO	Colombia
				CR	Costa Rica
				DO	Dominican Republic
				GT	Guatemala
				MX	Mexico
				PE	Peru
				TT	Trinidad and Tobago
				UY	Uruguay
				VE	Venezuela