



Push vs. Pull Factors of Capital Flows Revisited: A Cross-country Analysis

Tae Soo Kang and Kyunghun Kim



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Executive Summary

Capital market integration contributes to economic growth and it can be more beneficial for emerging market economies (EMEs, hereafter) at their early stages of development where the capital is relatively insufficient. An open capital market also enables investor to share the country-specific risks by holding foreign assets. However, there are also some negative side effects of capital market integration. Financial shocks originating in the center country can be quickly propagated through the integrated financial market. The Global Financial Crisis (GFC, hereafter) is a good example of the contagion of the financial crisis. Volatile cross-border capital inflows and outflows negatively affect financial stability, which eventually lowers economic growth by causing financial crises.

Despite of these negative side effects, capital market integration has been an inevitable long-term trend for many EMEs over the past few decades (Aizenman *et al.* 2010). There have been continuous capital flows to EMEs, which started even before GFC and this trend has been more pronounced during the U.S. zero-interest rate period (Ahmed and Zlate 2014). Though some monetary authorities in EMEs tried to moderate the procyclicality of credit flows by implementing policy instruments such as capital controls or macro-prudential policy measures after GFC (Kim and Mehrotra 2018), the common factors in the global financial market still play a crucial role in determining capital inflows to EMEs.

The relationship between the global financial condition and its impact on capital inflows to EMEs, has been a long-debated issue. This issue concerns whether push or pull factors are the major determinant of capital flows. The push factor represents the common factor that exists in the global financial market or center countries, which influences capital inflows to peripheral countries. These factors are interest rates and GDP growth rates of advanced economies (AEs, hereafter), global risk factors such as VIX (S&P 500 Volatility Index), and the commodity price index. The pull factor denotes domestic factors that attract funds from the global financial market to domestic financial markets. These factors are domestic interest rates, domestic GDP growth rates, and other country-specific characteristics such as exchange rate regime, degree of the capital account openness, institutional quality, and stages of economic development.

In previous literature, many scholars have found strong evidence for push factors

being the major determinant of capital movement. The interest rates of mature economies and VIX are significant determinants of capital inflows to EMEs. However, there is only some evidence that higher domestic interest rates and higher domestic GDP growth rates pull capital from the center countries to individual EMEs (Koepke 2015).

Related to this long-debated issue in academia, the Chairman of the Federal Reserve, Jerome H. Powell recently stated, "... I will argue that, while global factors play an important role in influencing domestic financial conditions, the role of U.S. monetary policy is often exaggerated." With this statement, he also pointed out that the slow-down in capital inflows to EMEs which has been happening ever since 2011 has been mainly due to the narrowing of GDP gaps between AEs and EMEs, i.e., the recent decrease in capital inflows to EMEs can be attributed to the decline in EMEs' GDP growth rates given the fact that the U.S. GDP growth rate has picked up.

In this paper, we revisit this issue of push and pull factors of capital inflows. To this end, we consider the heterogeneity that exists in EMEs by dividing them into four subgroups. We investigate which is the main driver of capital inflows between push and pull factors across country groups. Categorizing subgroups is important for two reasons. First, EMEs are so heterogeneous that we make subgroups which share similar economic fundamentals by regions. Second, making subgroups across EMEs is an effective way to indirectly consider the regional contagion effect. With this cross-country analysis, we can figure out the differing effects of push and pull factors across country groups, and this can eventually lead to the development and implementation of appropriate policy instruments.

Our empirical finding shows that the push and pull factors play a different role in determining capital inflows to AEs and EMEs. The major drivers of capital inflows to AEs are both push and pull factors, but push factors turn out to be the main determinant of capital inflows to EMEs. When EMEs are divided into four subgroups, we find sizable heterogeneity across subgroups. In Asian countries, both push and pull factors are significant, which is similar to AEs, but only U.S. interest rate plays a major role in Eastern Europe. Some pull factors are important in Latin American countries and other EMEs, but these are not robust to alternative empirical models and measures.

Keywords: capital flows, push factor, pull factor

JEL Classification: F3, E5

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Push vs. Pull Factors of Capital Flows Revisited: A Cross-country Analysis*

Tae Soo Kang[†] and Kyunghun Kim^{††}

1. Introduction

Capital market integration contributes to economic growth and it can be more beneficial for emerging market economies (EMEs, hereafter) at their early stages of development where the capital is relatively insufficient. An open capital market also enables investor to share the country-specific risks by holding foreign assets. However, there are also some negative side effects of capital market integration. Financial shocks originating in the center country can be quickly propagated through the integrated financial market. The Global Financial Crisis (GFC, hereafter) is a good example of the contagion of the financial crisis. Volatile cross-border capital inflows

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and outflows negatively affect financial stability, which eventually lowers economic growth by causing financial crises.

Despite of these negative side effects, capital market integration has been an inevitable long-term trend for many EMEs over the past few decades (Aizenman *et al.*, 2010). There have been continuous capital flows to EMEs, which started even before GFC and this trend has been more pronounced during the U.S. zero-interest rate period (Ahmed and Zlate 2014). Though some monetary authorities in EMEs tried to moderate the procyclicality of credit flows by implementing policy instruments such as capital controls or macro-prudential policy measures after GFC (Kim and Mehrotra 2018), the common factors in the global financial market still play a crucial role in determining capital inflows to EMEs.

The relationship between the global financial condition and its impact on capital inflows to EMEs, has been a long-debated issue. This issue concerns whether push or pull factors are the major determinant of capital flows. The push factor represents the common factor that exists in the global financial market or center countries, which influences capital inflows to peripheral countries. These factors are interest rates and GDP growth rates of advanced economies (AEs, hereafter), global risk factors such as VIX (S&P 500 Volatility Index), and the commodity price index. The pull factor denotes domestic factors that attract funds from the global financial market to domestic financial markets. These factors are domestic interest rates, domestic GDP growth rates, and other country-specific characteristics such as exchange rate regime, degree of the capital account openness, institutional quality, and stages of economic development.

In previous literature, many scholars have found strong evidence for push factors being the major determinant of capital movement. The interest rates of mature economies and VIX are significant determinants of capital inflows to EMEs. However, there is only some evidence that higher domestic interest rates and higher domestic GDP growth rates pull capital from the center countries to individual EMEs (Koepeke 2015).

Related to this long-debated issue in academia, the Chairman of the Federal Reserve, Jerome H. Powell recently stated, "... I will argue that, while global factors play an important role in influencing domestic financial conditions, the role of U.S.

monetary policy is often exaggerated.”¹ With this statement, he also pointed out that the slowdown in capital inflows to EMEs which has been happening ever since 2011 has been mainly due to the narrowing of GDP gaps between AEs and EMEs, i.e., the recent decrease in capital inflows to EMEs can be attributed to the decline in EMEs’ GDP growth rates given the fact that the U.S. GDP growth rate has picked up.

In this paper, we revisit this issue of push and pull factors of capital inflows. To this end, we consider the heterogeneity that exists in EMEs by dividing them into four subgroups. We investigate which is the main driver of capital inflows between push and pull factors across country groups. Categorizing subgroups is important for two reasons. First, EMEs are so heterogeneous that we make subgroups which share similar economic fundamentals by regions. Second, making subgroups across EMEs is an effective way to indirectly consider the regional contagion effect. With this cross-country analysis, we can figure out the differing effects of push and pull factors across country groups, and this can eventually lead to the development and implementation of appropriate policy instruments.

Our empirical finding shows that the push and pull factors play a different role in determining capital inflows to AEs and EMEs. The major drivers of capital inflows to AEs are both push and pull factors, but push factors turn out to be the main determinant of capital inflows to EMEs. When EMEs are divided into four subgroups, we find sizable heterogeneity across subgroups. In Asian countries, both push and pull factors are significant, which is similar to AEs, but only U.S. interest rate plays a major role in Eastern Europe. Some pull factors are important in Latin American countries and other EMEs, but these are not robust to alternative empirical models and measures.

The rest of this paper is organized as follows. The related literature on push and pull factors of capital flows are discussed in Section 2. An empirical analysis is presented in Section 3 and various robustness tests follow in Section 4. Lastly, we conclude with a summary in Section 5.

¹ Eighth High-Level Conference on the International Monetary System, Zurich, Switzerland, May 8, 2018.

2. Literature review

In the related literature on the determinants of capital flows, Fratzscher (2012) emphasizes the different role of push and pull factors in tranquil times and crisis periods. During the crisis, push factors were the main drivers of capital flows, however, pull factors such as the quality of domestic institutions, country risk, and the macro fundamentals were dominant in accounting for the dynamics of capital flows of EMEs in 2009 and 2010.

There is a series of papers that identify the episodes of extreme capital flows and then find the significant determinants of the episodes. Forbes and Warnock (2012) identify episodes of surges (sharp increases of capital inflows), stops (sharp decreases of capital inflows), flight (sharp increases in capital outflows), and retrenchment (sharp decreases in capital outflows) and then find that push factors, especially global risk, are significantly associated with extreme capital flow episodes, but domestic macroeconomic characteristics are generally less important.

Ghosh *et al.* (2014) identify the surge episode for 56 EMEs over 1980-2011. The empirical results of this paper show that U.S. interest rates and investor risk aversion determine when surges of capital to EMEs will occur. However, the magnitude of that surge is highly associated with the domestic factors. Friedrich and Guérin (2016) also identify episodes of strong capital flows using a high-frequency weekly fund flows data for a large set of countries based on a regime-switching model. Their empirical result shows that VIX and U.S. monetary policy shock had substantial time-varying effects on the episodes.

Ahmed and Zlate (2014) introduce the growth and interest rate differentials between AEs and EMEs instead of push and pull factors separately, and they focus only on net private capital inflows to EMEs. They find that the growth and interest rate differentials and VIX are important determinants of net private capital inflows. In particular, the interest rate differentials became a major determinant after the GFC. IMF (2016) also uses the growth and interest rate differentials to show that the slow-down in net capital inflows to EMEs since 2010 can be explained by the narrowing differential in growth between AEs and EMEs.

The regional property or country-specific characteristics are taken into consideration in Shu *et al.* (2018). This paper investigates the cross-border spillover effect from the U.S. and China to markets in Asia and the Pacific. They found that the

influence of Chinese equities and currency movements have risen to a level close to that of the U.S. in normal times, but the relative influence of the U.S. still remains strong in crisis periods.

Eichengreen *et al.* (2018) examine the determinants of FDI, bank-intermediated flows, debt, and equity separately. Debt and equity are mainly driven by push factors and are the most volatile along with bank-intermediated flows, but FDI is more stable than non-FDI flows and driven mainly by pull factors.

Lee and Kim (2018) argue that solely a flexible exchange rate regime cannot solve the global imbalance which is more likely to be the result of excessive capital flows in the global financial market, rather than exchange rate gaps, Lee and Kim (2018) then show the negative impact of excessive exchange rate flexibility on medium- and long-term economic growth in EMEs.

Rarely have studies shed light on the differing effect of push and pull factors on capital inflows across country groups and subgroups in EMEs. Thus, the contribution of this paper is that we find a heterogeneous role of push and pull factors by focusing on subgroups in EMEs, and show that these differences are statistically significant and robust.

3. Empirical analysis

In Section 3, we introduce the empirical model and explain the main variables included in the model. We also present the basic statistics of the main variables along with a time-series graph of capital inflows and a table which shows cross-country comparisons.

3-1. Empirical model

We use a pooled OLS regression and the baseline empirical model is given by Equation (1).

$$IF_{i,t} = \alpha + \underbrace{\beta_1 VIX_{t-1} + \beta_2 CP_{t-1} + \beta_3 R_{t-1}^{US} + \beta_4 GDP_{t-1}^{AE}}_{\text{Push factors}} + \underbrace{\beta_5 R_{i,t-1} + \beta_6 GDP_{i,t-1} + Y \cdot \Gamma_{t-1}}_{\text{Pull factors}} + \delta t + \varepsilon_{i,t} \quad (1)$$

where

$$\Gamma_{t-1} = [ERS_{i,t-1}, KA_{i,t-1}, INS_{i,t-1}, GDPPC_{i,t-1}]$$

IF_i represents country i 's net capital inflows normalized by its GDP. The net capital inflows are defined by the difference between gross capital outflows and gross capital inflows. The gross capital outflows are the balance of payment (BOP, hereafter) assets, which consist of residents' purchase of foreign portfolio investment (equity and bond)² net of sales. The gross capital inflows are BOP liabilities, which consist of non-residents' purchase of domestic equity and bond net of sales. VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rate (Wu and Xia 2016), which effectively reflects the monetary policy stance of the Fed during the zero-interest rate period. GDP^{AE} is an average of GDP growth rates of AEs (classified by IMF). R_i is country i 's money market rate and GDP_i is country i 's GDP growth rate. The subscript t means time t . δt

² In this paper, we focus on the equity and debt assets and liabilities since the international transmission through the portfolio investment, debt in particular, has been more pronounced rather than the banking channel after the GFC as Shin (2014) pointed out.

denotes the time trend. Quarterly dummy variables are also included to control for seasonality. $\varepsilon_{i,t}$ is the error term.

Table 1. Variables and Data Source

Variable	Data Source	Definition
IF_i	IMF BOP	Net capital inflows representing the difference between gross inflows and outflows. Gross inflows are BOP debt and equity liabilities, and consist of the non-residents' purchase of domestic assets net of sales. Gross outflows are BOP debt and equity assets, and consist of the residents' purchase of foreign assets net of sales.
VIX	CBOE	Market expectation of near term volatility conveyed by stock index option prices, the S&P 500 index volatility
CP	Fed	Global price index of all commodities. Percentage Change in Growth Rate
R^{US}	Wu and Xia (2016)	U.S. Shadow Rates, Percent per annum.
GDP^{AE}	IMF IFS	Real Gross Domestic Product growth rate averages for Advanced Economies(AE, classified by the IMF) at time t (%)
R_i	IMF IFS	Money Market Interest Rates, Percent per annum.
GDP_i	IMF IFS	Real Gross Domestic Product growth rate for Country i at time t (%)
ERS_i	Obstfeld, Shambaugh and Taylor (2010)	Exchange rate stability index of country i
KA_i	Fernández <i>et al.</i> (2016)	Capital control measure
INS_i	WB WGI	Institutional quality index
$GDPPC_i$	WB WDI	Natural logarithm of GDP per capita of country i

The push factors are VIX , CP , R^{US} , and GDP^{AE} and the pull factors are R_i and GDP_i . In the extended empirical model, we include additional country-specific characteristics along with a large set of pull factors. The vector of variables reflecting country-specific characteristics is denoted as Γ . This vector includes exchange rate stability index (ERS_i), financial market restriction (KA_i)³, institutional quality (INS_i),

³ This is closely related to the degree of capital account openness, which is negatively associated

and GDP per capita ($GDPPC_i$). In the baseline model, we run a simple OLS regression where all explanatory variables are lagged by one period except for CP , which is the percentage growth in the commodity price index between time $t-1$ and t .⁴ The definitions of the variables used in the empirical model are presented in Table 1.

3-2. Data and basic statistics

We used data from 47 countries with a sample period of 1997 to 2015. All variables are measured at the quarterly level except for the country-specific characteristics included in the extended empirical model which are measured at the yearly level due to lack of data available at the quarterly level for these variables. Countries are divided into AEs and EMEs. AEs are composed of advanced economies in the European Union (EU, 9 countries) and advanced economies excluding EU countries (AEs excl. EU, 7 countries). EU member countries which do not use the Euro as their official currency, for example Denmark, Sweden, and the U.K. in our dataset, are divided into AEs excl. EU because these countries are closer to advanced economies located outside the EU in that they have their own monetary policy independent from the European Central Bank (ECB). EMEs consist of four subgroups, which include Asia (7 countries), Eastern Europe (9 countries), Latin America (7 countries), and Other EMEs (8 countries). The country list is presented in Table 2.

The summary statistics of variables used for the empirical analysis are reported in Table 3. This is unbalanced panel data. The push factors are common to all sample countries, so there are only 76 observations (19 years long). There are some outliers in R_i and $GDPP_i$. However, the empirical result estimated without outliers is not very different from our main empirical result.

with the financial market restriction.

⁴ For the yearly data, we use the values of the previous year.

Table 2. Country List

Advanced Economies in EU (9)		
Cyprus	Germany	Netherlands
Finland	Ireland	Portugal
France	Italy	Spain
Advanced Economies excluding EU (7)		
Denmark	New Zealand	United Kingdom
Iceland	Sweden	
Japan	Switzerland	
Asian Countries (7)		
India	Malaysia	Thailand
Indonesia	Philippines	
Korea, Republic of	Sri Lanka	
Eastern Europe (9)		
Bulgaria	Estonia	Romania
Croatia	Lithuania	Slovak Republic
Czech Republic	Poland	Slovenia
Latin America (7)		
Argentina	Guatemala	Uruguay
Brazil	Mexico	
Colombia	Paraguay	
Other Emerging Market Economies (8)		
Armenia, Republic of	Moldova	South Africa
Georgia	Russian Federation	Ukraine
Kyrgyz Republic	Saudi Arabia	

Note: Countries are divided into six groups based on the IMF classification. The EU countries are defined by the European Union member countries that use the Euro as their official currency.

Table 3. Basic Statistics of Main Variables

	N	Mean	SD	Min	Max	p1	p5	p25	p50	p75	p95	p99
(Net) Capital IF_i Flows	2,503	0.20	2.94	-27.92	57.71	-6.58	-2.80	-0.54	0.02	0.80	3.27	9.39
VIX	76	21.21	7.78	11.03	58.60	11.03	12.56	15.14	20.09	25.23	33.02	58.60
Push CP	76	0.56	9.94	-51.94	16.63	-51.94	-15.86	-4.43	1.30	6.91	11.91	16.63
factors R^{US}	76	1.92	2.88	-2.92	6.52	-2.92	-2.51	-0.96	1.74	4.99	5.68	6.52
GDP^{AE}	76	1.97	1.75	-4.82	4.72	-4.82	-2.61	1.49	2.26	3.03	3.96	4.72
Pull R_i	2,503	6.31	9.58	-2	196.15	-0.05	0.16	2.25	4.16	7.32	18.46	45.33
factors GDP_i	2,503	3.37	4.72	-22.30	30.81	-11.27	-4.08	1.27	3.55	5.64	9.75	18.67
Other ERS_i	2,376	0.38	0.38	0	1	0	0	0	0.25	0.875	1	1
coun- KA_i	2,221	0.36	0.33	0	1	0	0	0.05	0.275	0.7	0.875	1
try- INS_i	2,168	0.51	0.97	-1.37	2.10	-1.19	-0.91	-0.34	0.48	1.40	1.95	2.01
specific $GDPPC_i$	2,503	9.81	0.74	7.67	11.03	7.86	8.44	9.30	9.92	10.44	10.73	10.94
factors												

Note: IF_i is the net capital inflow of country i . VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rates. GDP^{AE} is the average of the real GDP growth rates of advanced economies(AE, classified by the IMF). R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i . ERS_i is the exchange rate stability index of country i . KA_i is the capital control measure of country i from Fernández *et al.*(2016). INS_i is the institutional quality index of country i . $GDPPC_i$ is the natural logarithm of GDP per capita of country i .

Table 4 shows averages and standard deviations of the main variables of each country group. The averages of IF_i , ERS_i , INS_i , and $GDPPC_i$ are greater in AEs than EMEs. Additionally, the averages of R_i and GDP_i are greater in EMEs than AEs.⁵ KA_i , which reflects the degree of restrictions in the financial market, is also much greater in EMEs, meaning that there is a lower degree of capital account openness compared to that of AEs. Standard deviations of subgroups in EMEs are smaller in general compared to those of full set of EMEs. This implies that EMEs are divided into more homogeneous subgroups than would be the case if they were pooled into one large group.

⁵ The graphs of push and pull factors are available from the authors upon request.

Table 4. Average of Main Variables across Country Groups

		AEs	EU	AEs excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
(Net)									
Capital	IF_i	0.34 (4.83)	0.32 (5.05)	0.35 (4.64)	0.13 (1.18)	0.14 (1.05)	0.12 (1.51)	0.12 (0.85)	0.12 (0.95)
flows									
Pull	R_i	3.19 (2.83)	2.60 (1.61)	3.72 (3.50)	7.86 (11.22)	6.16 (7.25)	6.99 (15.59)	11.00 (8.41)	8.30 (7.30)
	GDP_i	2.26 (3.32)	2.22 (3.84)	2.30 (2.78)	3.91 (5.19)	4.49 (3.72)	3.28 (4.63)	3.21 (4.63)	4.96 (7.30)
Other country- specific factors	ERS_i	0.53 (0.40)	0.77 (0.34)	0.31 (0.32)	0.31 (0.35)	0.20 (0.29)	0.48 (0.36)	0.15 (0.29)	0.28 (0.34)
	KA_i	0.12 (0.19)	0.10 (0.16)	0.14 (0.21)	0.51 (0.30)	0.69 (0.23)	0.35 (0.27)	0.45 (0.31)	0.53 (0.27)
	INS_i	1.62 (0.44)	1.36 (0.53)	1.85 (0.12)	-0.02 (0.66)	0.05 (0.58)	0.51 (0.45)	-0.39 (0.51)	-0.58 (0.41)
	$GDPPC_i$	10.55 (0.17)	10.49 (0.15)	10.60 (0.17)	9.45 (0.63)	9.33 (0.62)	9.85 (0.31)	9.40 (0.37)	8.97 (0.80)

Note: Standard deviation are in parenthesis. IF_i is the net capital inflow of country i . R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i . ERS_i is the exchange rate stability index of country i . KA_i is the capital control measure of country i from Fernández *et al.*(2016). INS_i is the institutional quality index of country i . $GDPPC_i$ is the natural logarithm of GDP per capita of country i .

Figure 1 shows the capital inflows of six country groups. The solid line denotes the gross capital inflows and the shaded area represents net capital inflows defined by the difference between gross capital inflows and gross capital outflows. Since gross capital outflows are much smaller in EMEs, the solid line and the shaded area overlap in a large area. This pattern cannot be seen in AEs in which the amount and fluctuations of gross capital outflows in are much larger than those of EMEs.

Figure 1. Net and Gross Capital Inflows by Country Group



Note: Net capital inflows represent the difference between gross inflows and outflows. Gross inflows are BOP debt and equity liabilities, and consist of the non-residents' purchase of domestic assets net of sales. Gross outflows are BOP debt and equity assets, and consist of the residents' purchase of foreign assets net of sales.

3-3. Empirical results

The main empirical result based on Equation (1) is presented in Table 5. Before we go over the effect of push and pull factors on capital inflows separately, the effect of the interest rate and GDP growth rate differentials are presented in the first column of Table 5. It turns out that the interest rate differential plays an important role, which is consistent with Ahmed and Zlate (2014). As interest rate differentials, which are defined by $R_i - R^{US}$, increase, the capital inflows also rise. But, the GDP growth rate differential, which is defined by $GDP_i - GDP^{AE}$, is not statistically significant. This result is different from IMF (2016) and the recent statement by the Chairman of the Federal Reserve, Jerome H. Powell.

The interest rate and GDP growth rate differentials are divided into push and pull factors, respectively, and the result is presented in Table 5 (2). The push factors, U.S. interest rate and the GDP growth rates of AEs, are statistically significant. An increase in those push factors are associated with a decline in capital inflows. The commodity price index is also associated with the capital inflows, but VIX remains statistically insignificant. Country i 's interest rate, a pull factor, is an important determinant of capital inflows, but country i 's GDP growth rate is not.

Both push and pull factors are the main determinants of capital inflows to AEs, however, push factors are relatively more important than pull factors in EMEs (see Table 5 (3) and (6)). The significant pull factors in EU and AEs excl. EU are GDP_i and R_i , respectively. This is because countries in the European Union do not have monetary autonomy, but AEs excl. EU have monetary policy independence more or less so they actively implement their monetary policy as a tool for smoothing out the business cycle.

In Table 5 (7) ~ (10), we can see that there is sizable heterogeneity across subgroups in EMEs. The effect of pull factors is limited in the full set of EMEs, but some pull factors in Asia, Latin America, and other EMEs are significant determinants of capital inflows. For Asian countries, both push and pull factors remain significant, and this is similar to those in AEs. The push factor is the main driver of capital inflows to Eastern Europe. Interestingly, the pull factors of GDP_i and R_i significantly affect capital inflows into Latin America and other EMEs, respectively.

Table 5. OLS Regression Results across Country Groups

Independent variable: $IF_{i,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	All	AEs	EU	excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
$Differences$										
$R_{i,t-1} - R_{t-1}^{US}$	0.0137** (0.006)									
$GDP_{i,t-1} - GDP_{t-1}^{AE}$	0.0295 (0.020)									
VIX_{t-1}	-0.0031 (0.006)	-0.0083 (0.006)	-0.0230 (0.015)	-0.0287 (0.016)	-0.0111 (0.025)	-0.0039 (0.005)	-0.0111 (0.011)	0.0059 (0.012)	-0.0135 (0.011)	-0.0044 (0.008)
CP_{t-1}	0.0155** (0.008)	0.0156** (0.008)	0.0378 (0.024)	0.0306 (0.037)	0.0330 (0.026)	0.0079** (0.004)	0.0205 (0.011)	0.0029 (0.006)	0.0014 (0.005)	0.0078* (0.003)
R_{t-1}^{US}		-0.0547* (0.029)	-0.2360* (0.123)	-0.1128 (0.101)	-0.2590 (0.206)	-0.0476** (0.019)	-0.0840** (0.026)	-0.0811** (0.035)	0.0339 (0.039)	-0.0169 (0.029)
GDP_{t-1}^{AE}		-0.0578* (0.030)	-0.2914** (0.078)	-0.1947*** (0.046)	-0.3788** (0.151)	-0.0172 (0.029)	-0.0801** (0.024)	0.0098 (0.074)	-0.0210 (0.036)	0.0174 (0.041)
$R_{i,t-1}$		0.0125** (0.006)	0.2563*** (0.069)	-0.1318 (0.257)	0.3089*** (0.066)	0.0038 (0.003)	0.0174** (0.006)	0.0040 (0.004)	0.0017 (0.008)	0.0117* (0.006)
$GDP_{i,t-1}$		0.0307 (0.020)	0.2554*** (0.086)	0.2066*** (0.056)	0.3199 (0.187)	0.0026 (0.010)	0.0385* (0.018)	-0.0208 (0.030)	0.0261* (0.012)	0.0020 (0.004)
Observations	2,555	2,555	854	410	444	1,701	405	599	334	363
R-squared	0.007	0.008	0.050	0.037	0.084	0.011	0.088	0.025	0.060	0.029

Note: Time trend and quarterly dummy variables are included in all columns. Clustered standard errors are reported in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. IF_i is the net capital inflow of country i . VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rate. GDP^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i .

Based on the empirical results in Table 5, we test whether the differences in the estimated coefficients across country groups are statistically significant. Table 6 (1) shows the differences between AEs and EMEs. The pull factors have greater impact on capital inflows to AEs than EMEs. However, there is no statistically meaningful difference in the effect of push factors except for GDP growth rates of AEs, meaning that VIX , CP , and R^{US} are important push factors affecting capital flows in both AEs and EMEs. Among AEs, there is a statistically significant difference in the role of domestic interest rates. An increase in domestic interest rates leads to greater capital inflows to AEs, but this cannot be seen in the EU. Among subgroups in EMEs, the effect of push factors on capital flows to Asia and Eastern Europe is relatively greater than other subgroups in EMEs. The pull factors play a relatively

bigger role in Asia and Latin America compared to the other subgroups in EMEs. The difference in the main determinants of capital flows across EMEs can be partly explained by country characteristics summarized in Table 4. The variances of all pull factors of EMEs are greater than those of AEs (except for ERS_i), and this might be able to lead to larger room for pull factors to play quite different role in pulling global liquidity among EMEs. Since interest rates of Asian and Eastern Europe EMEs are relatively lower on average than other countries in EMEs (i.e., interest rate gap between these countries and the U.S. is relatively smaller), the net capital flows tend to be more sensitive to the change in the global interest rate. It is quite obvious that commodity price is the main determinant of capital flows in other EMEs when we consider the fact that the other EMEs consist of countries with abundant natural resources (e.g., South Africa, Russia, Ukraine, Saudi Arabia).

Table 6. Differences in Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AEs vs. EMEs	EU vs. AEs excl. EU	Asia vs. E. Europe	Asia vs. Latin America	Asia vs. Other EMEs	E. Europe vs. Latin America	E. Europe vs. Other EMEs	Latin America vs. Other EMEs
VIX_{t-1}	-0.0191 (0.223)	-0.0176 (0.536)	-0.0170 (0.267)	0.0024 (0.868)	-0.0067 (0.602)	0.0194 (0.211)	0.0103 (0.466)	-0.0091 (0.487)
CP_{t-1}	0.0299 (0.199)	-0.0024 (0.956)	0.0176 (0.142)	0.0191 (0.103)	0.0127 (0.245)	0.0015 (0.853)	-0.0049 (0.461)	-0.0064 (0.291)
R_{t-1}^{US}	-0.1884 (0.121)	0.1462 (0.502)	-0.0029 (0.945)	-0.1179*** (0.008)	-0.0671* (0.073)	-0.115** (0.021)	-0.0642 (0.142)	0.0508 (0.274)
GDP_{t-1}^{AE}	-0.2742*** (0.001)	0.1841 (0.218)	-0.0899 (0.232)	-0.0591 (0.151)	-0.0975** (0.032)	0.0308 (0.698)	-0.0076 (0.927)	-0.0384 (0.463)
$R_{i,t-1}$	0.2525*** (0.0002)	-0.4407* (0.084)	0.0134** (0.040)	0.0157* (0.088)	0.0057 (0.481)	0.0023 (0.781)	-0.0077 (0.257)	-0.01 (0.287)
$GDP_{i,t-1}$	0.2528*** (0.003)	-0.1133 (0.539)	0.0593* (0.074)	0.0124 (0.542)	0.0365* (0.033)	-0.0469 (0.128)	-0.0228 (0.430)	0.0241** (0.044)

Note: The differences between the estimated coefficients (Table 5) are reported and p-values are in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rate. GDP^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i .

4. Robustness tests

In Section 4, we test whether our main result, Table 5, is robust to an alternative model specification, extended model including a large set of control variables, using yearly data, alternative capital flow measures, alternative measures of interest rates, and excluding crisis periods in the sample period.

4-1. Alternative model: Panel regression with the country-fixed effect

We use the panel regression with country-fixed effects to find the effect of push and pull factors of capital inflows. As Table 7 shows, the empirical result from the panel regression is consistent with our main result based on the pooled OLS. The push and pull factors significantly affect capital inflows to AEs, but the push factors are a major determinant in EMEs.

Table 7. Panel Regression Results across Country Groups

Independent variable: $IF_{i,t}$	(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	
	All	AEs	AEs		EU	excl. EU	EMEs	Asia	Eastern	Latin	Other
			EU	excl. EU					Europe	America	EMEs
<i>Push factors</i>	VIX_{t-1}	-0.0094 (0.007)	-0.0206 (0.015)	-0.0283 (0.016)	-0.0078 (0.023)	-0.0042 (0.006)	-0.0116 (0.011)	0.0068 (0.012)	-0.0141 (0.011)	-0.0056 (0.007)	
	CP_{t-1}	0.0148* (0.008)	0.0307 (0.022)	0.0259 (0.036)	0.0283 (0.025)	0.0078** (0.003)	0.0201 (0.011)	0.0036 (0.006)	0.0013 (0.005)	0.0071** (0.003)	
	R_{t-1}^{US}	-0.0613* (0.035)	-0.1179 (0.096)	-0.1081 (0.125)	-0.0858 (0.134)	-0.0406** (0.018)	-0.0770** (0.026)	-0.0737* (0.032)	0.0460 (0.034)	-0.0160 (0.028)	
	GDP_{t-1}^{AE}	-0.0547* (0.032)	-0.2918** (0.109)	-0.1204 (0.069)	-0.4416** (0.169)	-0.0159 (0.028)	-0.0750** (0.026)	0.0055 (0.070)	-0.0136 (0.036)	0.0259 (0.041)	
	<i>Pull factors</i>	$R_{i,t-1}$	0.0082** (0.004)	-0.0120 (0.062)	-0.1986 (0.297)	0.0195 (0.090)	0.0017 (0.003)	0.0071* (0.004)	0.0035 (0.004)	-0.0026 (0.005)	0.0106 (0.006)
$GDP_{i,t-1}$		0.0280 (0.020)	0.2248** (0.082)	0.1512*** (0.041)	0.3198* (0.164)	-0.0002 (0.010)	0.0240 (0.019)	-0.0198 (0.033)	0.0165 (0.013)	0.0013 (0.006)	
Observations		2,555	854	410	444	1,701	405	599	334	363	
R-squared	0.005	0.020	0.024	0.028	0.010	0.081	0.023	0.055	0.030		

Note: Country-fixed effect, time trend and quarterly dummy variables are included in all columns. Clustered standard errors are reported in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. IF_i is the net capital inflow of country i . VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rate. GDP^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i .

4-2. Extended model including country-specific factors

The additional country-specific characteristics which we consider as a broad set of pull factors are the exchange rate regime, financial market restriction, institutional quality, and GDP per capita. The empirical result with the extended set of controls is consistent with our main result, though the U.S. shadow rate becomes insignificant. Among the added country-specific characteristics, institutional quality significantly affects capital inflows, i.e., the greater institutional quality, the more capital inflows. Greater financial market restriction is associated with less capital inflows to AEs, but this effect on capital inflows to EMEs is in the opposite direction.

Table 8. OLS Regression with Country-specific Factors

Independent variable: $IF_{i,t}$		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		All	AEs	EU	AEs excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
Push factors	VIX_{t-1}	-0.0095 (0.008)	-0.0204 (0.021)	-0.0123 (0.027)	-0.0199 (0.030)	-0.0079 (0.005)	-0.0074 (0.009)	-0.0156 (0.011)	-0.0135 (0.011)	0.0007 (0.008)
	CP_{t-1}	0.0195* (0.010)	0.0409 (0.026)	0.0274 (0.039)	0.0312 (0.027)	0.0119*** (0.004)	0.0222 (0.012)	0.0015 (0.008)	0.0055 (0.005)	0.0140** (0.004)
	R_{t-1}^{US}	-0.0758 (0.050)	-0.3530 (0.214)	-0.1499 (0.167)	-0.3928 (0.292)	-0.0408 (0.025)	-0.0897** (0.033)	-0.0846 (0.066)	0.0376 (0.042)	-0.0129 (0.038)
	GDP_{t-1}^{AE}	-0.1016** (0.046)	-0.3418*** (0.102)	-0.1521 (0.125)	-0.4082* (0.168)	-0.0505* (0.028)	-0.0749* (0.031)	-0.1172 (0.071)	-0.0172 (0.041)	0.0514 (0.045)
Pull factors	$R_{i,t-1}$	0.0192 (0.012)	0.3411*** (0.081)	-0.1968 (0.343)	0.3637*** (0.086)	0.0030 (0.003)	0.0079 (0.016)	0.0013 (0.005)	0.0002 (0.015)	0.0245 (0.019)
	$GDP_{i,t-1}$	0.0636 (0.044)	0.2874*** (0.085)	0.2080*** (0.018)	0.3378 (0.186)	0.0002 (0.013)	0.0378** (0.013)	-0.0609 (0.040)	0.0127 (0.014)	0.0020 (0.010)
Other country-specific factors	$ERS_{i,t-1}$	-0.2015 (0.294)	-0.2235 (0.380)	0.0913 (0.486)	-1.1881 (1.390)	-0.0417 (0.149)	-0.0863 (0.107)	-0.0598 (0.344)	0.0025 (0.271)	0.2147 (0.166)
	$KA_{i,t-1}$	-0.1774 (0.272)	-2.5349** (0.984)	-0.4128 (0.724)	-2.7410* (1.151)	0.2368* (0.127)	0.1419 (0.195)	0.9468 (0.748)	0.1914 (0.362)	-0.1873 (0.558)
	$INS_{i,t-1}$	0.3288* (0.192)	-0.1651 (0.335)	-0.3648 (0.535)	3.1052 (5.950)	0.1963** (0.078)	0.1571 (0.084)	-0.1833 (0.792)	0.2395 (0.357)	0.0312 (0.164)
	$GDPPC_{i,t-1}$	-0.1353 (0.121)	-0.5307 (1.604)	1.9222 (1.436)	-0.5264 (2.570)	-0.1279 (0.082)	-0.1431 (0.096)	0.5406 (1.112)	-0.2040 (0.629)	-0.0284 (0.094)
Observations		1,882	687	320	367	1,195	338	311	279	267
R-squared		0.014	0.058	0.037	0.110	0.029	0.092	0.113	0.073	0.086

Note: Time trend and quarterly dummy variables are included in all columns. Clustered standard errors are reported in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. IF_i is the net capital inflow of country i . VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rate. GDP^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i . ERS_i is the exchange rate stability index of country i . KA_i is the capital control measure of country i . INS_i is the institutional quality index of country i . $GDPPC_i$ is the natural logarithm of GDP per capita of country i .

4-3. Alternative data frequency: Yearly variables

We use purely yearly data⁶ and conduct the empirical analysis to test whether our main result from quarterly data is robust to different data frequencies. As Table 9 shows, the empirical result from the yearly data is also consistent with our main result. Push and pull factors significantly affect capital inflows to AEs, but push factors play a major role in determining capital flows to EMEs.

Table 9. OLS Regression using Yearly Data

Independent variable: $IF_{i,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	AEs	EU	AEs excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
VIX_t	-0.0284 (0.074)	-0.0967 (0.238)	-0.0636 (0.212)	-0.1686 (0.497)	-0.0121 (0.030)	-0.0818 (0.051)	0.0726 (0.071)	-0.0640 (0.040)	-0.0311 (0.041)
$Push\ CP_t$	0.0987** (0.038)	0.3310** (0.149)	0.2969 (0.258)	0.2956** (0.118)	0.0300 (0.031)	0.1377 (0.077)	-0.0200 (0.053)	-0.0328 (0.045)	0.0637 (0.058)
$fac-tors\ R_t^{US}$	-0.1900 (0.120)	-0.9477* (0.502)	-0.5314 (0.394)	-1.0656 (0.729)	-0.2164** (0.103)	-0.3331** (0.132)	-0.4850** (0.195)	0.2125 (0.201)	-0.0083 (0.082)
GDP_t^{AE}	-0.2222 (0.223)	-1.5870** (0.566)	-1.5500*** (0.300)	-1.0397 (1.194)	0.0249 (0.124)	-0.2876* (0.128)	0.2638 (0.352)	-0.0744 (0.165)	0.0460 (0.159)
$Pull\ R_{i,t}$	0.0627* (0.033)	1.1413*** (0.359)	-0.3383 (0.853)	1.5561*** (0.274)	0.0110 (0.013)	0.0596 (0.044)	0.0080 (0.012)	-0.0030 (0.039)	0.0817** (0.033)
$fac-tors\ GDP_{i,t}$	0.1428 (0.111)	1.2603** (0.510)	1.4552*** (0.420)	0.3590 (0.269)	0.0026 (0.036)	0.1496 (0.082)	-0.0718 (0.072)	0.1050* (0.050)	0.0005 (0.012)
Observations	664	220	107	113	444	103	152	94	95
R-squared	0.018	0.151	0.253	0.146	0.017	0.193	0.090	0.123	0.084

Note: Time trend and quarterly dummy variables are included in all columns. Clustered standard errors are reported in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. IF_i is the net capital inflow of country i . VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rate. GDP^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i .

⁶ In the empirical analysis using the yearly data, lagged variables are not used for the explanatory variables.

4-4. Alternative capital flow measure: Gross capital inflows

In Table 10, gross capital inflows are used for the dependent variable instead of net capital inflows which is used in the baseline empirical model. It turns out that our main result is robust to this alternative capital flow measure. The push factors are major determinants in EMEs, and this effect is more pronounced in Asia and Eastern Europe. An especially interesting finding is that *VIX* becomes statistically significant which was not the case in the main result.⁷

Table 10. OLS Regression with Gross Capital Inflows

Independent variable: $GIF_{i,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	AEs	EU	AEs excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
<i>VIX</i> _{<i>t</i>-1}	-0.0396** (0.020)	-0.0994* (0.052)	-0.1322* (0.068)	-0.0784 (0.087)	-0.0108** (0.005)	-0.0153** (0.006)	-0.0119 (0.013)	-0.0152 (0.009)	-0.0005 (0.009)
<i>CP</i> _{<i>t</i>-1}	0.0268*** (0.009)	0.0741** (0.029)	0.0692 (0.048)	0.0615* (0.027)	0.0130*** (0.004)	0.0284** (0.011)	0.0140** (0.005)	0.0033 (0.005)	0.0031 (0.004)
<i>R</i> ^{US} _{<i>t</i>-1}	0.0738 (0.070)	0.1326 (0.256)	0.4219 (0.529)	-0.0693 (0.190)	-0.0266 (0.017)	-0.0646* (0.028)	-0.0394 (0.041)	0.0326 (0.041)	-0.0198 (0.026)
<i>GDP</i> ^{AE} _{<i>t</i>-1}	-0.0866* (0.051)	-0.8233** (0.312)	-1.1135*** (0.304)	-0.4720* (0.219)	-0.0265 (0.025)	-0.0806*** (0.015)	-0.0242 (0.062)	-0.0386 (0.027)	0.0566 (0.052)
<i>R</i> _{<i>i,t</i>-1}	-0.0154* (0.008)	0.0084 (0.193)	-0.7654 (0.467)	0.2258*** (0.044)	-0.0007 (0.003)	0.0063 (0.005)	0.0003 (0.004)	-0.0018 (0.007)	0.0046 (0.006)
<i>GDP</i> _{<i>i,t</i>-1}	0.0208 (0.037)	0.6394** (0.248)	0.8436*** (0.184)	0.2987 (0.166)	-0.0031 (0.011)	0.0112 (0.013)	-0.0195 (0.036)	0.0222 (0.015)	-0.0077 (0.007)
Observations	2,561	854	410	444	1,707	405	599	340	363
R-squared	0.019	0.114	0.198	0.090	0.023	0.110	0.032	0.074	0.048

Note: Time trend and quarterly dummy variables are included in all columns. Clustered standard errors are reported in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. *GIF*_{*t*} is the gross capital inflow. *VIX* is the S&P 500 index volatility. *CP* is the global price index of all commodities. *R*^{US} is the U.S. shadow rate. *GDP*^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). *R*_{*i*} is the money market rate of country *i*. *GDP*_{*i*} is the real GDP growth rate of country *i*.

⁷ In the baseline empirical model, *VIX* is not statistically significant. This can also be seen in Ghosh *et al.* (2014). In Ghosh *et al.* (2014), *VIX* plays a more important role as a determinant when the dependent variable is episodes rather than the magnitude of net capital inflows.

4-5. Alternative interest rate variable: Real interest rates

When the real interest rate is used instead of the shadow rates, we obtain an empirical result that is consistent with our main result. The real interest rate is constructed based on Ghosh *et al.* (2014), which is defined by the money market rate deflated by CPI. The push and pull factors are all statistically significant in AEs, but only the push factor is likely to be the main determinant in EMEs.

Table 11. OLS Regression with Real Interest Rates

Independent variable: $IF_{i,t}$	(1)	(2)	(3) (4)		(5)	(6)	(7)	(8)	(9)
	All	AEs	EU	AEs excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
VIX_{t-1}	-0.0072 (0.007)	-0.0171 (0.017)	-0.0251 (0.017)	-0.0060 (0.031)	-0.0014 (0.006)	-0.0105 (0.011)	0.0070 (0.012)	-0.0075 (0.012)	-0.0009 (0.008)
CP_{t-1}	0.0158* (0.008)	0.0389 (0.026)	0.0333 (0.041)	0.0401 (0.034)	0.0082** (0.004)	0.0211* (0.011)	0.0022 (0.007)	0.0042 (0.006)	0.0063 (0.004)
$(Real)R_{t-1}^{US}$	-0.0460 (0.076)	-0.3002 (0.280)	-0.0021 (0.075)	-0.5578 (0.463)	-0.0100 (0.016)	-0.0595* (0.027)	-0.0162 (0.032)	0.0385 (0.032)	0.0159 (0.018)
GDP_{t-1}^{AE}	-0.0570* (0.031)	-0.3435** (0.123)	-0.1501 (0.111)	-0.4738* (0.225)	-0.0135 (0.030)	-0.0748** (0.029)	0.0093 (0.075)	0.0146 (0.025)	0.0346 (0.040)
$(Real)R_{i,t-1}$	-0.0001 (0.000)	0.2831** (0.106)	0.1754 (0.325)	0.3906** (0.125)	-0.0000 (0.000)	0.0309 (0.019)	-0.0001 (0.000)	0.0063 (0.007)	0.0091*** (0.002)
$GDP_{i,t-1}$	0.0208 (0.018)	0.2627*** (0.085)	0.1874*** (0.043)	0.3046 (0.179)	-0.0060 (0.009)	0.0155 (0.017)	-0.0317 (0.027)	0.0117 (0.010)	-0.0023 (0.004)
Observations	2,476	854	410	444	1,622	405	599	255	363
R-squared	0.006	0.046	0.036	0.084	0.007	0.077	0.017	0.049	0.034

Note: Time trend and quarterly dummy variables are included in all columns. Clustered standard errors are reported in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. IF_i is the net capital inflow of country i . VIX is the S&P 500 index volatility. CP is the global price index of all commodities. $(Real)R^{US}$ is the U.S. money market rate deflated by US CPI. GDP^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). $(Real)R_i$ is the country i 's money market rate deflated by CPI. GDP_i is the real GDP growth rate of country i .

4-6. Sample period excluding period of crisis

We test whether our main result is robust to different sample data excluding crisis periods. The effect of pull factors in EMEs becomes more important in normal time, and this is consistent with Fratzscher (2012). Overall the result is consistent with the main result.

Table 12. OLS Regression without Crisis Period

Independent variable: $IF_{i,t}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	AEs	EU	AEs excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
VIX_{t-1}	-0.0105 (0.011)	-0.0455 (0.030)	-0.0483* (0.021)	-0.0339 (0.057)	0.0035 (0.007)	-0.0008 (0.011)	0.0178 (0.017)	-0.0097 (0.011)	-0.0030 (0.010)
CP_{t-1}	0.0175* (0.010)	0.0492 (0.030)	0.0276 (0.025)	0.0587 (0.050)	0.0045 (0.004)	0.0173* (0.007)	-0.0014 (0.008)	-0.0094* (0.004)	0.0088 (0.006)
R_{t-1}^{US}	-0.0470* (0.028)	-0.2498* (0.139)	-0.0669 (0.094)	-0.3110 (0.248)	-0.0326 (0.021)	-0.0524** (0.015)	-0.0723 (0.042)	0.0517 (0.041)	-0.0075 (0.029)
GDP_{t-1}^{AE}	-0.0869*** (0.029)	-0.3308*** (0.078)	-0.2647*** (0.095)	-0.3891*** (0.118)	-0.0417 (0.027)	-0.1144*** (0.017)	-0.0127 (0.062)	-0.0589 (0.045)	0.0059 (0.056)
$R_{i,t-1}$	0.0127** (0.006)	0.2738*** (0.078)	-0.1959 (0.229)	0.3411*** (0.065)	0.0048* (0.003)	0.0172** (0.006)	0.0056 (0.004)	0.0031 (0.008)	0.0128* (0.006)
$GDP_{i,t-1}$	0.0339* (0.020)	0.2569*** (0.085)	0.1935*** (0.045)	0.3435* (0.174)	0.0071 (0.010)	0.0475*** (0.015)	-0.0159 (0.033)	0.0369*** (0.010)	0.0035 (0.004)
Observations	2,312	768	366	402	1,544	369	539	304	332
R-squared	0.008	0.054	0.037	0.099	0.011	0.085	0.035	0.081	0.020

Note: Time trend and quarterly dummy variables are included in all columns. Clustered standard errors are reported in the parentheses. *, **, and *** indicate significance at the 10, 5, and 1-percent levels, respectively. IF_i is the net capital inflow of country i . VIX is the S&P 500 index volatility. CP is the global price index of all commodities. R^{US} is the U.S. shadow rate. GDP^{AE} is the average of the real GDP growth rates of advanced economies (classified by IMF). R_i is the money market rate of country i . GDP_i is the real GDP growth rate of country i .

Table 13 shows the summary of our main result and results from the robustness tests. The shaded area represents a significant relationship between the corresponding factor and net capital inflows. Darker shading indicates that this relationship is supported by most of our empirical analysis, and (+) and (-) denote a positive or negative relationship, respectively.⁸

⁸ The differences in the estimated coefficients across country groups from robustness tests are consistent with Table 6. These results are available from the authors upon request.

Table 13. Summary of Empirical Result

Independent variable: capital inflows	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	AEs	EU	AEs excl. EU	EMEs	Asia	Eastern Europe	Latin America	Other EMEs
<i>Push factors</i>									
VIX_{t-1}			(-)						
CP_{t-1}	(+)				(+)	(+)			(+)
R_{t-1}^{US}	(-)	(-)			(-)	(-)	(-)		
GDP_{t-1}^{AE}	(-)	(-)	(-)	(-)		(-)			
<i>Pull factors</i>									
$R_{i,t-1}$	(+)	(+)		(+)		(+)			(+)
$GDP_{i,t-1}$		(+)	(+)			(+)		(+)	

Note: This is a summary table based on the main empirical result (Table 5) and robustness tests (Table 7 ~ 12). The shaded area represents a significant relationship between the corresponding factor and net capital inflows. Darker shading indicates that this relationship is supported by most of our empirical analysis, and (+) and (-) denote a positive or negative relationship, respectively.

5. Conclusion

Capital market integration has been an inevitable long-term trend for many EMEs over the past few decades. Regarding capital market integration and its impact on capital inflows to EMEs, there has been a long-debated issue. This issue is regarding the major determinant of capital flows between push and pull factors. We revisit this issue of the push and pull factors of capital inflows by considering the heterogeneity that exists in EMEs. We divide EMEs into four subgroups and investigate which is the main driver of capital inflows between push and pull factors across country groups.

Our empirical finding shows that the push and pull factors play a different role in determining capital inflows to AEs and EMEs. The major drivers of capital inflows to AEs are both push and pull factors, but push factors turn out to be the main determinant of capital inflows to EMEs. When EMEs are divided into four subgroups, we find sizable heterogeneity across subgroups. In Asian countries, both push and pull factors are significant, which is similar to AEs, but only the U.S. interest rate plays a major role in Eastern Europe. Some pull factors are important in Latin American countries and other EMEs, but these are not robust.

According to our empirical result, it might lead to unexpected results if EMEs simply follow uniform policy recommendations suggested by international organizations because there is sizable heterogeneity in determinants of capital flows to EMEs. Therefore, individual countries need to find effective policy instruments which are appropriate to the financial market environment in their own country.

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국문요약

본 연구자료에서는 47개 국가패널자료를 활용하여 순자본유입의 결정요인을 분석하였다. 자본유출입에 영향을 미칠 수 있는 여러 국가특성을 고려하여, 패널 데이터를 선진국과 신흥국으로 구분하였다. 신흥국은 다시 지역을 기준으로 4개 하위그룹으로 구분하였다. 실증분석결과 선진국 및 신흥국 사이의 자본유출입 결정요인에 대한 이질성이 존재할 뿐 아니라, 신흥국 국가그룹 내에서도 이러한 이질성이 상당한 것으로 확인되었다. 선진국의 경우 대내외요인이 모두 자본유출입을 결정하는 주요 요인인 것으로 나타났다. 일부 신흥국 국가그룹에서 대내요인이 자본유출입에 통계적으로 유의한 영향을 미치는 것으로 나타났으나, 대체적으로 대외요인이 신흥국으로의 순자본유입에 더 중요한 역할을 하는 것으로 확인되었다. 이러한 실증분석 결과는 확장된 계량모형, 고정효과를 포함한 패널분석, 이자율 변수, 분석기간 등에 대해 강건한 것으로 나타났다.

핵심용어: 자본흐름, 대외요인, 대내요인

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Push vs. Pull Factors of Capital Flows Revisited: A Cross-country Analysis

Tae Soo Kang and Kyunghun Kim

This paper examines the major determinants of net capital inflows. The forty-seven countries used for the empirical analysis are divided into advanced economies (AEs) and emerging market economies (EMEs). These countries are further divided into subgroups in order to consider the heterogeneity that exists in AEs and EMEs. Our empirical result shows that sizable heterogeneity exists across country groups. Both push and pull factors are statistically significant in AEs, but push factors play a larger role in EMEs, though some pull factors partly affect capital flows to a few EME subgroups. Our empirical result is robust to alternative model specifications, alternative capital flow and interest rate measures, and an alternative sample period.

