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Push and Pull Factors of Capital Flows in Emerging Market Economies: Mitigating the Impact of External Shocks

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Push and Pull Factors of Capital Flows in Emerging Market Economies: Mitigating the Impact of External Shocks

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Abstract

Unlike developed countries, emerging market economies (EMEs) are not mature in economic size or fundamentals. While large capital inflows boost their economic growth, large and volatile capital flows possibly also create economic distortions and policy challenges. From the 1990s onwards, EMEs have experienced large capital inflows and outflows in tandem with global financial cycles, which has caused instability in their economic development. By analyzing the causes of capital flows into EMEs, we seek policies to mitigate the negative impact of external shocks on EMEs, thereby improving their economic stability and promoting their economic development.

Research on the factors of capital flows in EMEs is usually divided into pull and push factors; however, despite the extensive research on these factors, it remains unclear which factors are significant. Moreover, few papers have examined which types of EMEs could mitigate the impact of external shocks through financial policies. Accordingly, we first deploy a panel regression model to analyze the pull and push factors for the capital inflows of EMEs and then examine how to mitigate the impact of external shocks. By analyzing 17 emerging market economies between 2000 and 2019, we find that push factors more strongly impact EMEs' capital inflows. Countries with high foreign reserves, a float exchange regime, and low foreign debt show significantly reduced volatility of gross capital inflows.

Keyword

Capital Flows, Emerging Market, Pull and Push Factors

新興市場国への資本フローの要因分析：外的ショックの影響をいかに軽減するか？

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要旨

新興市場国への資本流入は経済成長を促進させる可能性がある一方で，新興市場国は，先進国とは異なり経済規模やファンダメンタルズが成熟していないために，大量かつ不安定な資本流入は経済の歪みや政策課題を生み出す可能性もある。1990年代以降，新興国経済は世界的な金融サイクルと整合的に大規模な資本流出入を経験し，その経済発展に不安定さをもたらしてきた。本論文の目的は，新興国における資本フローの原因を分析することにより，その原因を特定し，外

部からのショックが新興市場国経済に与える負の影響を軽減するための適切な政策を見出すことである。これにより，新興市場国経済の安定性が向上し，経済発展が促されることを期待する。

新興市場国への資本フローの要因に関する先行研究では，プル要因とプッシュ要因に分けて分析するものが多いが，どの要因が重要であるかはまだ不明である。また，新興市場国がどのような政策によって外的ショックの影響を緩和し得るかを検証した論文は少ない。本論文は，パネル回帰モデルを推定することにより，新興国の資本流入のプル要因とプッシュの要因を分析し，さらに，外的ショックが新興国に与える影響を緩和する政策を分析する。分析対象は2000年から2019年までの新興市場国17カ国であり，アジア，欧州，そして中南米地域の新興市場国を含んでいる。主要な発見は以下のとおりである。第１は，新興市場国の資本流入にはプッシュ要因がより大きな影響を与えることである。第２は，多い外貨準備，管理フロートを含む変動為替制度，そして少ない対外債務は，外的ショックが資本流入に与える影響を有意に緩和させることである。

キーワード

資本移動，新興市場国，プル要因とプッシュ要因

1. Introduction

With economic globalisation, emerging market economies (EMEs) continue to develop. Simultaneously, they host large-scale cross-border capital inflows from developed countries, which has enabled them to solve the problem of domestic capital scarcity. Becoming an important driving force for their economic growth, large-scale inflows of cross-border capital have brought these EMEs high-end resources such as high-tech and human resources. Although international capital inflows promote economic development, large and volatile capital flows could create economic distortions and policy challenges. The 2008–09 Global Financial Crisis (GFC) and Taper Tantrum of 2013 are excellent examples of how vulnerable EMEs are to external shocks. Therefore, stabilising international capital flows is an urgent issue for EMEs in an uncertain world. The purpose of this study is to first identify factors affecting capital inflows in EMEs from 2000 to 2019, and then to determine effective policies that help mitigate the impact of external shocks.

Although it is not uncommon to research the factors impacting capital flows in EMEs, some unsolved issues in this area remain. First, do pull and push factors have a greater impact on capital inflows to EMEs? Alfaro (2008) determined that a host country's domestic economic fundamentals are more important in attracting cross-border capital inflows into emerging markets. Kang and Kim (2019) noted that push factors play a prominent role in EMEs. Second, what are the differences in the impact of external shocks on capital inflows across geographies? Massaporn and Chaiyuth (2019) argued that Europe and Latin America are significantly affected by external shocks, but their study included both developed countries and EMEs. Few studies have examined the impact of external shocks on capital inflows to EMEs across geographies. Third, research has been conducted on how to mitigate the sensitivity of external shocks to capital inflows to EMEs. Although one studies the role of exchange rate regimes, foreign reserves, and external debt in mitigating the impact of external shocks (Rudolfs, 2016), it does not

clarify how the dummy variables of foreign reserves and foreign debt were calculated. Moreover, while a large body of literature exists on whether exchange rate regimes could help a country resist the impact of external shocks, it represents various views. For instance, Joshua et al. (2015) believe that if EMEs apply more fixed exchange rates and free capital movements, they would be more strongly affected by external shocks. However, Passari and Rey (2015) estimate that countries would be substantially affected by external shocks regardless of the adopted exchange regime.

The contributions of this study are as follows. It divides the sample of EMEs into Latin America, East Asia, and Europe according to their geographical locations to examine how the extent of external shocks affects these three regions separately, which is rare in the literature. Moreover, this study empirically analyses how to mitigate the impact of external shocks. The empirical results show that a floating exchange rate regime can significantly mitigate the impact of external shocks on portfolio bond inflows in EMEs. This is interesting because this conclusion contrasts that of Rey. In addition, this study innovatively categorises foreign exchange reserves and external debt according to the quartiles of 17 countries in each period. This enables avoiding the pseudo-regression problem caused by time series and better reflects the mitigation role of foreign exchange reserves and external debt on the impact of external shocks among 17 EMEs.

Based on the theoretical and empirical analyses, the main findings of this study are as follows.

First, although both pull and push factors influence capital inflows to EMEs, push factors have a greater impact than pull factors. This is because with global financial integration after 2000, EMEs opened their capital markets to a greater extent, becoming more sensitive to external shocks.

Second, portfolio equity inflows and bank inflows in East Asian EMEs are more vulnerable to external shocks than those in European EMEs and Latin American countries. This is attributed to rapid financial market development, a higher dependence on foreign capital, and relatively high ratio of peg exchange rate regimes in East Asian EMEs. Therefore, short-term capital inflows to these countries are more vulnerable to external shocks. The sample of European EMEs, excepting Turkey, is EU countries and thus, more heavily influenced by EU economic policies. In contrast, Latin America's international financial markets are smaller than those of East Asian EMEs, and thus, they are less affected by external shocks.

Third, EMEs with a floating exchange rate regime can significantly mitigate the impact of external shocks on bond inflows. High foreign exchange reserves can significantly mitigate the impact of external shocks on all types of capital inflows to EMEs, except for foreign direct investment (FDI) inflows. When capital inflows are subjected to quadratic dummy calculations for each period, foreign reserves located in quartiles 3 and 4 significantly mitigate the impact of external shocks on capital inflows.

The remainder of this paper is organised as follows. Section 2 provides the literature review. Section 3 is a theoretical analysis of the factors of capital flows in EMEs and their heterogeneity. Section 4 presents the empirical methodology used to analyse the determinants of capital flows in EMEs and how to mitigate the impact of external shocks on them. Conclusions are highlighted in section 5.

2. Literature Review

With the development of financial integration, the liquidity of global capital has significantly increased. In general, international capital tends to flow from developed to developing countries with higher economic growth rates in pursuit of higher rates of return (Alfaro et al., 2008). While contributing to the economic growth of these countries, large international capital inflows increase external dependence. Suppose there is a sudden withdrawal of international capital inflows due to changes in the financial situation. This situation could trigger a substantial negative impact on the economies of these countries through credit and risk transmission channels (Rey, 2016). Therefore, channelling and using capital flows to mitigate their negative impacts has become a common challenge for governments, especially for EMEs with fast economic growth rates. Here, we review research on the factors affecting capital flows and ways to mitigate the impact of external shocks.

2.1 Push and Pull Factors

There is much research on the factors influencing cross-border capital flows. International scholars divide cross-border capital flows into push and pull factors. Push factors are external factors, and pull factors are the domestic factors of host countries. However, factors that significantly affect capital inflows in emerging countries have not been well determined. Some researchers argue that pull factors play a crucial role in cross-border capital inflows in emerging markets. For instance, by performing a cross-country ordinary least squares (OLS) regression with annual data from 1970–2000 in 98 countries (23 developed and 75 developing countries), Alfaro (2008)[1] analysed both push and pull factors of gross cross-border capital inflows. He determined that the host country's domestic structural elements such as capital market openness, human capital, and institution quality are more important in attracting cross-border capital inflows into emerging markets. However, the data he applied were from before 2000, when the capital markets in developing countries were not as open as those today.

Some researchers assert that push factors are more critical. Among the more recent studies, Byrne (2016) utilised a panel regression model with country-specific fixed effects to analyse a dataset of emerging and developing countries from 1993 to 2009, finding US interest rates crucial for international capital flows to EMEs. Cerutti (2017) performed a panel regression with country-fixed effects covering 77 countries from 1990–2012. He contended that push factors (uncertainty (vix), US monetary policy (term premia), and the UK and Euro Area bank conditions) have a more significant impact on their capital inflows. These push factors expand previous studies by highlighting the non-US drivers of global liquidity. Moreover, Kang and Kim (2019) claimed that the determinants of these factors differ between advanced countries and EMEs. He used a pooled OLS regression with a sample of 47 countries from 1997–2015 to analyse the significant determinants of net capital inflows. He revealed that push and pull factors are statistically significant in developed countries, but push factors play a more prominent role in EMEs. The data applied in these papers are newer in the context of more open capital markets in developing countries (especially EMEs). Therefore, this study considers push factors more prominent than

pull factors.

Other researchers maintain that the factors that more strongly affect capital flows are changing in response to financial conditions; that is, during the financial crisis period, push factors matter more. In non-crisis periods, pull factors more strongly affect capital flows. Duca (2012) conducted an empirical analysis based on quarterly data of international portfolio flows in EMEs from 2007–2012 using a static regression model with a time-varying parameter model. The results show that domestic economic conditions (liquidity, credit, and confidence) strongly impact capital inflows. In contrast, during a crisis, capital inflows are strongly influenced by international risk preferences. Fratzscher (2011) analysed the role of push and pull factors in driving portfolio flows, differentiating between non-crisis and crisis periods. He constructed a model with two types of factors: global factors (push) and country-specific factors (pull) using 266 weekly observations for equity and bond flows to a broad set of 50 advanced and emerging economies. He concluded that push factors such as vix, the condition of US equity markets, were overall the main drivers of capital flows to EMEs during the crisis in 2007 and 2008. However, country-specific determinants (pull factors) were dominant in accounting for the dynamics of global capital flows in 2009 and 2010 for emerging markets.

Although research abounds on the factors affecting cross-border capital flows in EMEs, there is no clear conclusion regarding which factors significantly impact EMEs. Therefore, based on international financial theory, we analyse pull and push factors to determine the reason for capital flows.

2.2 Effectiveness of Foreign Reserves and Choice of Exchange Rate Regime in Reducing External Shocks

2.2.1 Foreign Reserves

Foreign exchange reserves are one central bank instrument for foreign exchange market intervention. In recent years, studies have gradually focused on the important role of foreign exchange reserves in stabilising the volatility of capital flows. According to the World Economic Outlook: Too Slow for Too Long (Rudolfs Bems, 2016), foreign exchange reserves have a buffering role. High foreign exchange reserves can reduce the volatility of capital flows. Alberola (2016) empirically demonstrated the role of foreign exchange reserves as stabilisers in capital flows, especially during financial crises. However, his analysis focuses on the buffering role of foreign exchange reserves during financial crises. Some scholars argue that high foreign exchange reserves increase fluctuations in capital flows. Using a panel regression model, Yu (2020) conducted an empirical test based on annual data of 22 EMEs from 1994–2017. The results demonstrated that foreign exchange reserves could affect the size of a country's capital flows through the interest rate channel and that higher foreign exchange reserves lead to higher domestic interest rates, which attracts more capital inflows. However, she only considered the results of foreign exchange reserves acting on domestic factors, ignoring the role of external factors. External shocks are a better reflection of global financial conditions, with the capital markets of EMEs becoming increasingly open. Therefore, examining the role of foreign exchange reserves in external shocks is critical to illustrate the effectiveness of measures to reduce economic volatility.

2.2.2 Choice of Exchange Rate Regime

There is consensus that EMEs are vulnerable to external shocks in the context of global financial turmoil. Therefore, mitigating the impact of external shocks on EMEs is a significant challenge for governments. As a tool for balancing a country's monetary policy and foreign exchange market, countries have focused on the effectiveness of the choice of exchange rate regime[2] in mitigating the impact of external shocks. According to Mundell's (1963) trilemma model, when making fundamental decisions about managing international monetary policy, a country must choose between free capital mobility, exchange rate management, and monetary autonomy. Only two of these three can possibly be realized. With free capital mobility, independent monetary policies are feasible only if exchange rates are floating. Specifically, if free capital flows exist, countries with a peg exchange rate regime cannot implement independent monetary policies and thus cannot be isolated from external shocks. It is possible to have independent monetary policies only by having an exchange rate float. The literature is unclear about whether the choice of exchange rate regime could help a country mitigate the impact of external shocks.

Joshua et al. (2015) confirmed the trilemma theory by building a panel regression from 1986–2012 with a sample of 100 countries. They determined that if EMEs apply more fixed exchange rates and free capital movements, they would be more strongly affected by external shocks through policy interest rates and the real effective exchange rate.

However, more recently, attention has focused on the issue that the choice of exchange rate regime does not significantly impact cross-border capital movements in EMEs. Passari and Rey (2015) used risk aversion as the main channel in a structural vector autoregressive (SVAR) model. They concluded that countries would be substantially affected by external shocks regardless of the adopted exchange regime. Nevertheless, capital mobility was overlooked in the analysis.

Briefly, there is no consensus on whether the choice of an exchange rate system could help a country mitigate the impact of external shocks. Since the choice of exchange rate regime affects the effectiveness of domestic macroeconomic policies, this study also examines whether the choice of exchange rate regime can help a country resist external shocks.

3. Theoretical Analysis

3.1 Theories on Factors Influencing Cross-Border Capital Flows

The theoretical system of factors influencing cross-border capital flows includes the following: classical economic theory of drivers (W., G. R., & Ohlin, B, 1935; Ricardo, David, 1817), interest rate determinism (Meade, 1951; Mundell, 1963), modern portfolio theory (Markowitz, 1952), and more recent theoretical research on internal and external factors (Fratzscher, 2012). These theories evolved from a single-factor analysis of international capital flows to multiple factors. In this study, we categorise the theories applied in previous studies into three broad groups: global push factors, domestic pull factors, and contagion effects.

3.1.1 Analysis of the Theoretical Mechanisms of Global Push Factors

The theory of the global push factors of capital flows focuses on the external economic factors of the host country that receives/retrieves capital flows. This theory considers

the availability of host countries global capital liquidity and financial risk, and emphasises two important factors.

The first is the impact of interest rate differentials and exchange rates among countries. With a constant expected exchange rate, short-term cross-border capital flows are positively correlated with the interest rate differential between developed and host countries. When the market interest rate in the host country is significantly larger than that in developed countries, international capital flows heavily into the host country and vice versa. According to the Mundell Fleming model, domestic and foreign investors purchase various assets denominated in the local currency when the local currency appreciates externally. This trend triggers international capital inflows to the host country and vice versa.

The second is the impact of perceived international risk expectations caused by the risk sentiment of international short-term investors and financial institutions. For example, international investors and financial institutions invest cautiously during and after a financial crisis. To reduce possible investment risks that might cause losses, they reduce the amount of investment in developing countries and withdraw their capital to more secure developed countries. As developed countries have more mature financial markets, better-developed legal mechanisms, more rational industrial structures, and various sound financial instruments, they have a significant institutional advantage against uncertain risks. Therefore, they are often considered safe havens for capital (flight to safety). Global uncertainty decreases when the world economy is in a boom phase with abundant international capital. International investors and financial institutions are more likely to invest in developing countries or emerging markets where high economic growth and returns on investment can be expected. They are also more likely to invest their capital in these countries on a large scale to seek excess profits from their investments.

3.1.2 Analysis of the Theoretical Mechanisms of the Domestic Pull Factor

The theory of domestic pull factors of capital inflow focuses on the domestic economic conditions of developing EMEs. When a developing or emerging market country improves its economic condition, it attracts significant capital inflows. Conversely, the opposite could happen, that is, international capital could be withdrawn to seek favourable investment opportunities in other countries. This causes heterogeneity in international capital inflows across countries.

3.1.3 Analysis of Theoretical Mechanisms of Contagion Effects

The contagion effect refers to a phenomenon in which financial volatility spreads from one country to another. For example, when a financial crisis occurs in a capital-exporting country owing to a particular shock, the capital inflows of a country that has imported capital from that country will be reduced. If these negative impacts are prolonged, the capital-importing country will also have its own financial crisis. If the country has strong economic ties with that capital-exporting country, it is more likely that the capital-importing country will suffer from the economic crisis of the capital-exporting country. This phenomenon is highly likely to occur when the economic situation is weak. This contagion effect has multiple transmission channels between economies and is broadly classified into three transmission channels: trade, financial relations,

and psychological expectations.

3.2 Heterogeneous Analysis of Push and Pull Factors of Capital Flows in EMEs

Most studies analyse the push and pull factors of capital flows for EMEs as a whole and do not provide a detailed analysis of the impact of country-level heterogeneity. In addition to analysing the pull and push factors affecting capital flows in EMEs, this study also investigates ways to mitigate the impact of external shocks. By analysing the heterogeneity of national policies, we investigate how to mitigate the impact of external shocks. At the country level, the heterogeneity of EMEs depends on foreign trade dependence, foreign reserves, exchange rate regimes, and the external debt of receiving countries. This study innovatively proposes hypotheses for heterogeneity, targeting the effectiveness of foreign exchange reserves and choice of exchange rate regime in reducing gross capital inflows.

First, differences in foreign trade dependence lead to heterogeneity in capital flows. The higher the foreign trade dependence of EMEs, the more vulnerable their exports and imports are to global financial fluctuations. According to the balance of payments equilibrium theory, current and capital accounts usually move in opposite directions. Therefore, the higher is foreign trade dependence, the more volatile are the capital flows of EMEs.

Second, the choice of exchange rate regime affects sensitivity to external shocks. The exchange rate regime is broadly divided into a fixed and floating exchange rate system. A peg-exchange rate system uses a fixed exchange rate between countries. In a float exchange rate system, the exchange rate of a country's currency to another country's currency fluctuates in the foreign exchange market according to supply and demand. By analysing the impact of different exchange rate regimes on capital inflows by applying economic theory, we presume that a floating exchange rate regime smoothens capital inflows, while a fixed exchange rate regime amplifies capital inflows.

Figure 1 clarifies the impact of the choice of different exchange rate regimes on capital inflows.

In Figure 1, panels (a) and (b) show that when the global economy is booming, EMEs attract large international capital inflows because of their fast economic growth and higher investment demands. For countries with floating exchange rate regimes, global capital inflows lead to an appreciation of the local currency. Local currency appreciation increases imports and reduces exports, resulting in a current account deficit. The current account deficit leads to an increase in foreign exchange demand, depreciating the local currency. The relative depreciation of the local currency reduces international capital inflows. In countries with fixed exchange rate regimes, international capital inflows contribute to higher exchange rate expectations. To stabilise the exchange rate, the monetary authority buys foreign currency and sells local currency in the foreign exchange market, leading to more accumulation in foreign exchange reserves. An increase in foreign exchange reserves increases the domestic supply of base money, and the domestic money supply increases under the money multiplier effect. Under such conditions, according to equilibrium theory, investments outweigh savings in an open economy. Excess

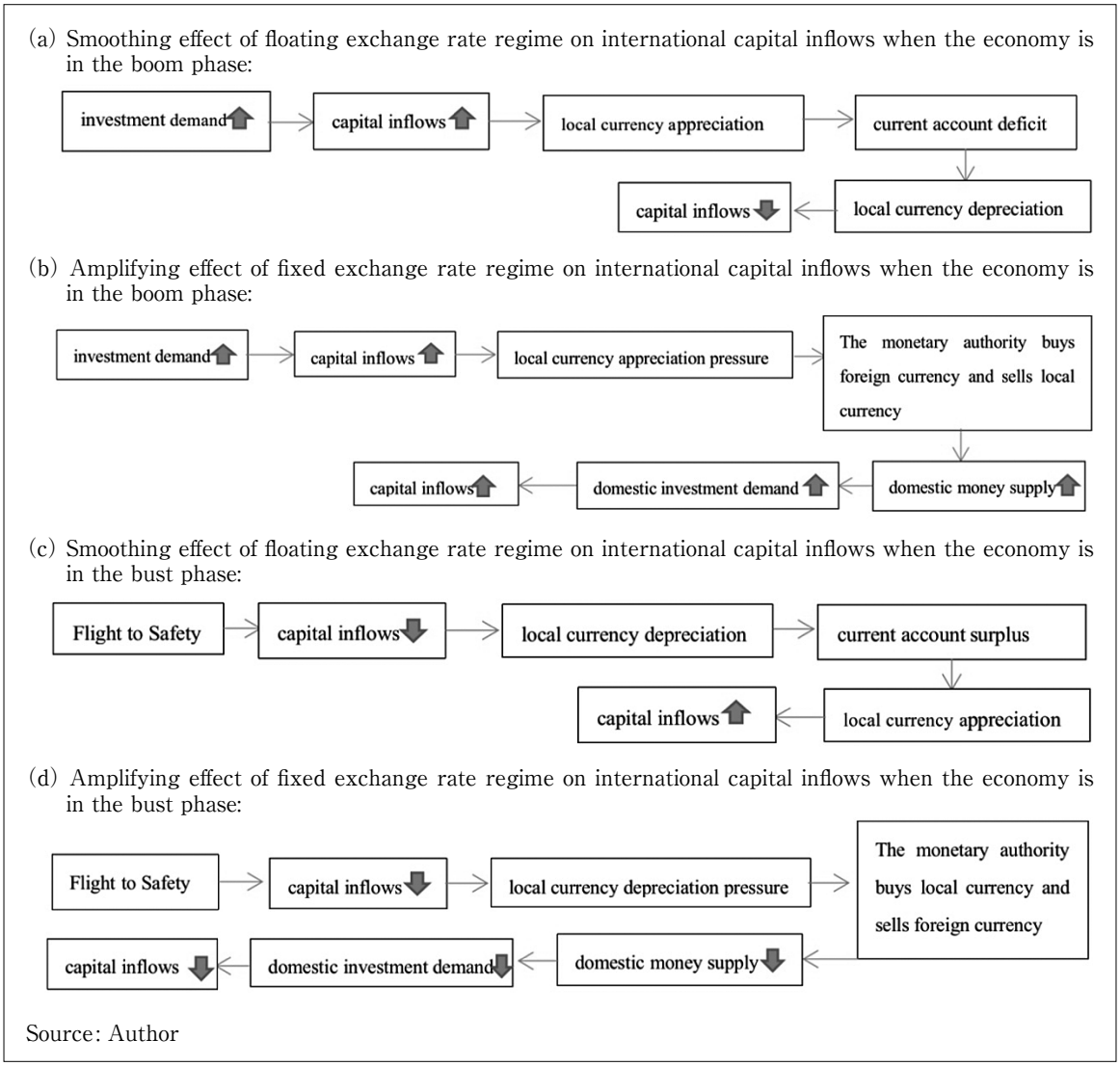

Figure 1. Exchange rate regimes and international capital inflows

investment demand attracts more capital inflows.

Furthermore, panels (c) and (d) in Figure 1 show that when the global economy is in recession, capital flows from EMEs to developed countries for safe-haven needs. For countries with floating exchange rate regimes, international capital outflows lead to a decline in the exchange rate. Local currency depreciation increases exports and reduces imports, causing a surplus in the current account. A current account surplus reduces demand for foreign exchange, leading to an appreciation of the local currency. The relative preference for the local currency increases international capital inflows, generating smoothing effects in capital inflows. When global capital inflows decrease, countries with peg exchange rate regimes are pressured to depreciate their local currencies. Under such conditions, the monetary authority

buys local currency and sells foreign currency in the foreign exchange market to stabilise the exchange rate. A reduction in foreign exchange reserves is accompanied by a decrease in domestic money supply, resulting in tightening domestic liquidity and a decline in investment demand. A decrease in investment demand further reduces international capital inflows.

Third, we focus on the effects of foreign reserves. Foreign exchange reserves are foreign exchange assets held centrally by central banks and other government agencies and are readily convertible to foreign currencies. Reserve accumulation, the main tool for foreign exchange intervention, is a response to a self-insurance motivation. When external shocks occur, the central bank of a country with high foreign exchange reserves is more likely to use appropriate foreign exchange interventions to stabilise the foreign exchange market and thus mitigate the volatility of capital inflows. In contrast, the central bank of a country with low foreign exchange reserves has a weak ability to regulate the foreign exchange market. There is also a risk of depleting foreign exchange reserves if that country is attacked by international lenders (as in the 1998 Asian financial crisis[3]), leading to a sustained devaluation of the national currency.

Finally, external debt refers to a country's liability to foreign countries. High foreign debt can increase the risk of debt default. Therefore, when assessing risk, investors may choose to invest less if a country has high foreign debt. Thus, the higher the external debt, the lower the capital inflow.

4. Empirical Analysis

4.1 Analysis method

First, this section analyses the push and pull factors influencing gross capital inflows and their components, and second, it studies how to mitigate the impact of external shocks on them. Because we applied long panel data, we performed unit root tests for each variable to check for a time trend. This is because if there are time series problems, we would not obtain the exact result owing to pseudo-regressions (Table 5). As the results show no unit roots, we deployed a fixed-effects model with cluster robust standard errors[4] to analyse the main drivers of cross-border capital flows in the 17 EMEs[5] in East Asia (EA), Emerging Europe (EE), and Latin America (LA). Specifically, the sample countries (based on region, GDP scale, and data availability) include the following:

EA: China, Korea, India, Indonesia, Malaysia, Philippines, Thailand

EE: The Czech Republic, Hungary, Poland, Slovak, Turkey

LA: Argentina, Brazil, Chile, Colombia, Mexico

This sample spans quarterly panel data from 2000–2019, a period that effectively avoids the impact of the 1998 Southeast Asian financial crisis, and documents the economic reconstruction of EA countries after the Asian financial crisis. Since gross capital inflows to EMEs are larger than gross capital outflows, and the volatility of gross capital inflows could cause shocks to their domestic capital markets, this study focuses on gross capital inflows.

Regarding the components including in this section, we first analyse the pull and push factors on gross capital inflows in EMEs and then study a method to mitigate the impact of external shocks by deploying the interaction

term of the CBOE index (vix) and foreign reserves, exchange rate regime, and external debt. Note that foreign reserves and external debt are dummy variables generated by using quartiles of the 17 countries in each period and then cross-multiplying these dummy variables with vix.

4.1.1 Main Independent Variables

First, considering the role of pull and push factors, which might influence capital inflows in EMEs, we developed the following equation:

$$Capital\ inflows_{i,t} = \beta_1 \times pull\ factors_{i,t} + \beta_2 \times push\ factors_t + \beta_3 \times control\ variables_{i,t} + \alpha_i + u_{i,t} \quad (1)$$

Regarding the dependent variables, we use capital inflows/GDP data because output-based capital inflows better capture the size of a country's capital inflows. The change in external liability flows is the gross inflows by foreign agents, which can be positive or negative. Positive inflows mean inflows by foreign agents. Negative inflows mean outflows by foreign agents. However, we do not include outflows by domestic agents, but do include outflows by foreign agents. In addition, we divided the independent variables into pull and push factors, and control variables (see equation 1). The pull factor variables include $r\_i_{i,t}$ (monetary policy in EME i in quarter t) and $g\_i_{i,t}$ (real GDP growth in EME i in quarter t). The push factor variables include g_AE_t (AE real GDP growth in quarter t) and vix_t (uncertainty and risk aversion in quarter t). Note that here, vix_t represents external shocks as vix stands for global risk aversion, which is sensitive and rapidly spreading. Control variables include $tradeopenness_{i,t}$, and α_i is the country fixed effects. Assuming each individual has a different intercept term, we deployed this fixed effects model to capture the differences between individuals where $u_{i,t}$ are the error terms.

The independent variables are as follows:

1) Monetary policy[6] in EMEs (pull factor)

The real interest rate ($r\_i_{i,t}$) is the rate at which savers or investors receive interest returns after excluding the inflation rate. Real interest rates tend to be representative of a country's economic condition. Under less favourable economic conditions when interest rates are lower, global banks lend less cross-border (Cerutti, 2014). Therefore, the expected sign of the real interest rate is positive.

2) Investment attractiveness (pull factor for EME real GDP growth ($g\_i_{i,t}$) and push factor for AE real GDP growth (g_AE_t))

This is a dynamic indicator reflecting the degree of change in the level of a country's economic development in a certain period, and an important indicator of whether a country's economy is attractive for investment. The investment attractiveness index in this study includes a push factor (real economic growth rate of developed countries) and pull factor (real economic growth rate of EMEs). The expected sign of the real economic growth rate in developed countries is negative, and that of the real economic growth rate in EMEs is positive.

3) Uncertainty and risk aversion (push factor)

In the empirical literature, uncertainty and risk aversion are commonly captured through the US vix (vix_t), the stock option price-based measure of implied volatility (Rey, 2013). This study uses this indicator to represent external shocks because vix has the characteristic of rapid spread. The expected sign of vix is negative.

4) Trade openness

Trade openness ($tradeopenness_{i,t}$) is used as a control variable. It is calculated

as (export+import)/GDP, which shows the openness of a country's trade. We include it in the equation as a control variable, and the expected sign is positive.

4.1.2 Indicators of Economic Policy

This study analyses how to mitigate the impact of external shocks on EMEs based on the heterogeneity of economic policies among countries. It also analyses pull and push factors. After the analysis, vix had the most significant impact on capital inflows in EMEs. Because vix represents external shocks, this study uses the interaction terms of vix and economic policy to study the effectiveness of economic policies in mitigating the impacts of external shocks on emerging market countries.

$$Capital\ inflows_{i,t} = \beta_1 \times pull\ factors_{i,t} + \beta_2 \times g\_AE_t + \beta_3 \times vix_t + \beta_4 \times vix_t \times policies_{i,t} + \beta_5 \times control\ variables_{i,t} + \alpha_i + u_{i,t} \quad (2)$$

In equation 2, $policies_{i,t}$ includes foreign exchange reserves, exchange rate regime, and foreign debt.

The economic policy indicators from equation 2 are as follows:

1) Exchange rate regime ($exchange\_regime_{i,t}$):

In this study, we apply Ilzetzki's (2019) classification of exchange rate regimes. According to Ilzetzki (2019), exchange rate regimes can be classified as fine or coarse. Fine regimes are divided into groups 1–15, and coarse regimes into groups 1–6. In this study, both managed and free-floating regimes are considered float variables[7] and treated as the same (the value of the float_regime dummy variable is 1). Others, including crawling pegs, are considered peg regimes and treated as the same (the value of the float_regime dummy variable is 0). We take the exchange rate regime dummy as 1 when it falls in 3 and 4 in the coarse category, as per Ilzetzki, and 0 when it falls in the 1 and 2 category[8]. Since only Argentina's exchange rate regime in 2016 is categorised as 5, no dummy variable is generated for free falling.

2) Foreign exchange reserves ($foreign\_reserve_{i,t}$):

This study quadrates foreign exchange reserves for each period. If the foreign exchange reserves belong to this sub-range, it takes a value of 1. If they did not fall within this range, it takes 0. For example, if the foreign exchange reserves in 2005Q1 are higher than the median of the foreign exchange reserves of the 17 countries in this period, then we take it as 1. If they are lower than the median of the foreign exchange reserves of the 17 countries in this period, we take it as 0.

3) External debt ($external\_debt_{i,t}$):

External debt is calculated by external debt/GDP. When external debt is higher than this country's average debt level, it is taken as 1; otherwise, it is taken as 0.

4.2 Results

4.2.1 Descriptive Statistics

Table 1 presents the variables and their sources. Table 2 provides the descriptive statistics for the data, including observations, means, and standard deviations, and calculates their quartile values. This facilitates better understanding the data distribution. Through a descriptive statistical analysis, we found that among the components of capital inflows, FDI inflows are the largest and equity inflows the smallest. Table 3 presents the correlation coefficients of the studied variables. The table shows a significant positive correlation between FDI inflows and gross capital inflows, with a correlation coefficient of 0.872.

Table 1 : Country list

East Asia	Emerging Europe	Latin America
China Mainland	Czech	Argentina
India	Hungary	Brazil
Indonesia	Poland	Chile
Korea	Slovak	Colombia
Malaysia	Turkey	Mexico
Philippines		
Thailand		

Table 2 : The main independent variables

Data	Definition	Source
gross,it	Gross Total Inflows in the ratio to GDP（quarterly GDP,converted to USD based on average exchange rate）	IFS,IMF
equity,it	Gross Equity Investment Inflows in the ratio to GDP（quarterly GDP, converted to USD based on average exchange rate）	IFS,IMF
bond,it	Gross Bond Investment Inflows in the ratio to GDP（quarterly GDP, converted to USD based on average exchange rate）	IFS,IMF
FDI,it	Gross Direct Investment Inflows in the ratio to GDP（quarterly GDP, converted to USD based on average exchange rate）	IFS,IMF
Other,it	Other Investment Inflows in the ratio to GDP（quarterly GDP, converted to USD based on average exchange rate）	IFS,IMF
r_i,t	real interest rate in country i（policy rate, deflated by forecast inflation（one-year ahead）, semiannual）	IFS,IMF
g_i,t	real GDP growth rate forecast in country i（one-year ahead）（spring→Q1, Q2, fall→Q3,Q4, semiannual）	IFS,IMF
g_us,t	real GDP growth rate forecast in US（one-year ahead）（spring→Q1, Q2, fall→Q3,Q4）, semiannual）	IFS,IMF
r_us,t	The shadow rate of the U.S under the macroeconomic effects of unconventional monetary policy.	Wu and Xia（2016）
tradeopenness,it	It is calculated by（export+import）/GDP,（quarterly GDP, converted to USD based on average exchange rate）	IFS,IMF
foreign_reserve,it	International reserves and liquidity,（Liquidity, Total Reserves excluding Gold, Foreign Exchange,converted to US Dollar）	IFS,IMF
vix,t	The Chicago Board Options Exchange's Volatility Index（VIX）	Chicago Board Options Exchange
Corporate_bond_spreads,t	Moody's Seasoned Baa Corporate Bond Yield Relative to Yield on 10-Year Treasury Constant Maturity, rate, Monthly, not Seasonally Adjusted	Federal Reserve Economic Data
foreign_reserve（>50%）	The foreign_reserve（>50%）is the dummy variable, which takes the value 1 if it is higher than the median of foreign reserve over GDP of sample economies for each period and 0 otherwise.	
foregin_reserve（0-25%）	A quartile calculation of foreign reserves/GDP for 17 emerging market countries for each period, it takes 1 for those belonging to the first quartile interval and 0 for the other quartile intervals.	

foregin_reserve（25-50%	A quartile calculation of foreign reserves/GDP for 17 emerging market countries for each period, it takes 1 for those belonging to the second quartile interval and 0 for the other quartile intervals.	
foregin_reserve（50-75%	A quartile calculation of foreign reserves/GDP for 17 emerging market countries for each period, it takes 1 for those belonging to the third quartile interval and 0 for the other quartile intervals.	
foregin_reserve（75%-100）	A quartile calculation of foreign reserves/GDP for 17 emerging market countries for each period, it takes 1 for those belonging to the fourth quartile interval and 0 for the other quartile intervals.	
float_regime	Float exchange rate regimes include free float and managed float exchange rate regime categoried by Ilzetzki et al.	Ilzetzki et al.（2016）
external_debt	The external_debt is the dummy variable, which takes the value one if it is higher than the mean of external debt / GDP of sample economies for each period and 0 otherwise.	

Table 3: The description of the data set

Variable	Obs	Mean	Std. Dev.	Min	25%	50%	75%	Max
gross,it	1,016	6.870	13.879	-175.218	2.708	5.876	9.365	213.694
FDI,it	1,004	3.457	11.428	-177.036	1.425	2.547	4.221	215.054
equity,it	997	0.255	1.346	-9.862	-0.183	0.169	0.701	10.493
bond,it	977	1.227	3.463	-20.085	-0.264	0.784	2.511	29.069
other,it	1,004	1.256	4.771	-21.157	-0.525	0.977	2.881	55.033
r_i,it	930	1.526	3.938	-10.006	-0.417	0.750	2.314	44.945
g_EM,it	1,020	4.046	3.201	-19.036	3.038	4.000	5.250	20.868
g_AE,it	1,020	2.453	0.920	-0.049	2.199	2.569	2.953	3.874
tradeopenness,it	1,004	82.510	49.068	18.886	43.072	64.386	127.904	206.815
vix,t	1,020	18.453	7.845	9.510	13.395	16.235	21.253	44.140

Source : Author's calculation

Table 4 : Matrix of correlations

gross,it	1									
FDI,it	0.872	1								
equity,it	0.089	-0.039	1							
bond,it	0.288	0.03	0.191	1						
other,it	0.422	0.155	-0.090	0.053	1					
r_i,it	0.033	0.034	0.042	-0.012	0.074	1				
g_EM,it	0.018	0.003	0.018	-0.031	0.045	-0.080	1			
g_AE,it	0.054	0.068	-0.061	-0.017	0.043	0.100	0.085	1		
tradeopenness,it	0.075	0.090	-0.081	0.018	0.022	-0.295	-0.022	0.065	1	
vix,t	-0.057	-0.009	-0.172	-0.146	-0.017	0.001	0.029	-0.505	-0.015	1

Source : Author's calculation

4.2.2 Unit Root Test

Because the dataset in this study is long panel data, there may be a time-series correlation. Because the existence of a time series correlation may cause spurious regression, this study performed a unit root test using the IPS, ADF fisher, and LLC method. The results show that none of the variables have a unit root, indicating that all variables are stationary; thus, we could directly construct a panel regression with those variables.

4.2.3 Empirical Analysis for Pull and Push Factors (based on equation 1)

As Table 6 shows, both pull and push factors have a significant impact on the volatility of capital inflows[9]. However, push factors (especially external shocks) have a more significant impact on capital inflows than pull factors. Specifically, vix has a significant negative impact on gross capital inflows, portfolio equity, and bond flows[10]. Both types of capital are highly liquid and susceptible to liquidity risk and investor appetite. However, vix does not significantly impact FDI inflows and bank inflows. Real interest rates (pull factor) in country i have a significant positive impact on cross-border bank capital inflows[11], which is consistent with the findings of Cerutti (2014). The real interest rate is the interest rate paid by the bank after inflation is excluded. An increase in the real interest rate in EMEs has been beneficial in attracting non-residents to depositing in banks. The domestic real economic growth rate in AEs is significantly sensitive to portfolio equity and bond inflows. An increase in the real growth rate in developed countries will promote demand for financing, which could lead to international capital flows out of EMEs and into developed countries. The real economic growth rate in the home country has a significant positive impact on portfolio equity inflows. This represents a country's economic cycle. A booming economy helps increase the expectation of market returns, allowing for more portfolio equity inflows. The more open it is to trade in country i, the more output is

Table 5 : Unit root test

level	IPS	Fisher	LLC	
gross,it	-17.437***	-37.481***	-7.714***	stationary
FDI,it	-12.717***	-40.277***	-6.354***	stationary
equity,it	-16.908***	-37.832***	-14.393***	stationary
bond,it	-12.952***	-35.964***	-13.046***	stationary
other,it	-17.139***	-41.984***	-14.173***	stationary
r_i,it	-4.134***	-9.065***	-6.727***	stationary
g_EM,it	-2.607***	-13.910***	-2.448***	stationary
g_AE,it	-3.496***	-8.945***	-4.670***	stationary
tradeopenness,it	-4.588***	-11.447***	-1.580***	stationary
vix,t	-10.678***	-19.4601***	-3.877***	stationary
corporate_bond_spreads,t	-6.887***	107.818***	-3.006***	stationary

Note : (1) Im, Pesaran, and Shin W-statistic (null hypothesis: non-stationary).
(2) ADF test-Fisher Chi-square statistic (null hypothesis: non-stationary).
(3) Levin, Lin, and Chu t-statistic (null hypothesis: non-stationary).

Source : Author's calculation

Table 6 : Drivers of capital inflows to EMEs

	(1) gross	(2) equity	(3) bond	(4) FDI	(5) other
r_i	0.181	0.020	0.003	0.078	0.087**
	(0.177)	(0.020)	(0.043)	(0.096)	(0.041)
g_AE	0.002	-0.278***	-0.434**	0.777	-0.013
	(0.769)	(0.095)	(0.175)	(0.572)	(0.148)
g_EME	0.217	0.031**	0.042	0.105	0.044
	(0.130)	(0.014)	(0.029)	(0.083)	(0.032)
tradeopenness	-1.861	0.579*	-0.310	-2.415	-0.805
	(5.268)	(0.318)	(1.258)	(3.832)	(1.313)
vix	-0.144***	-0.035***	-0.071***	-0.013	-0.016
	(0.044)	(0.010)	(0.021)	(0.018)	(0.027)
q2	2.487**	0.280*	1.473***	0.271	0.802
	(0.929)	(0.149)	(0.380)	(0.262)	(0.479)
q3	-0.140	0.049	0.497*	-1.204	1.047**
	(1.156)	(0.078)	(0.253)	(0.966)	(0.484)
q4	0.854*	0.039	0.536*	-0.189	0.592*
	(0.436)	(0.119)	(0.281)	(0.219)	(0.330)
GFC	3.292	-0.724**	-0.833**	3.045	0.886
	(3.763)	(0.319)	(0.310)	(2.814)	(0.807)
constant	15.137	-1.059	4.110	11.583	3.861
	(19.976)	(1.317)	(4.949)	(14.719)	(5.057)
Observations	920	920	903	920	920
R-squared	0.015	0.083	0.058	0.012	0.019

Note : Standard errors in parentheses. ***, ** and * denote the 1%, 5% and 10% significance level, respectively.
All the results are obtained by the fixed effect model.

Source : Author's calculation

expected. Note that FDI inflow[12] is less sensitive to external shocks. FDI is a type of investment with long-term returns in a business operating in a country, which is more stable among the four types of capital flows. Compared to short-term external shocks, domestic factors such as market size, infrastructure, and labour costs are the main determinants of FDI inflows to developing countries (Khachoo, 2012). Thus, they are less influenced by short-term external shocks.

Table 7 indicates a difference in the sensitivity of capital inflows to external shocks across geographic regions. We found that EMEs in East Asia are most affected by external shocks[13]. Gross capital inflows, portfolio investment inflows, and bank capital flows in Latin America are least sensitive to risk. Europe's portfolio equity inflows, which are significantly less sensitive to external shocks than those in Asia, are also higher than those of Latin America. The relatively small scale of the international

Table 7 : Drivers of capital inflows to EMEs: results with regional dummies

	(1) gross	(2) equity	(3) bond	(4) FDI	(5) other
r_i	0.178	0.017	0.005	0.081	0.080**
	(0.175)	(0.018)	(0.045)	(0.101)	(0.032)
g_AE	0.013	-0.275**	-0.433**	0.779	-0.006
	(0.769)	(0.094)	(0.173)	(0.571)	(0.149)
g_EME	0.213	0.030**	0.041	0.105	0.042
	(0.127)	(0.013)	(0.029)	(0.081)	(0.030)
tradeopenness	-1.912	0.633*	-0.392	-2.575	-0.644
	(5.196)	(.334)	(1.285)	(3.83)	(1.255)
vix	-0.208**	-0.058***	-0.072*	-0.017	-0.066**
	(0.079)	(0.019)	(0.037)	(0.017)	(0.023)
vix × EE	0.046	0.036*	-0.020	-0.040	0.091
	(0.093)	(0.019)	(0.049)	(0.033)	(0.084)
vix × LA	0.159*	0.041**	0.020	0.045	0.079***
	(0.089)	(0.019)	(0.037)	(0.038)	(0.024)
q2	2.472**	0.274*	1.473***	0.270	0.791
	(0.924)	(0.148)	(0.380)	(0.260)	(0.477)
q3	-0.148	0.046	0.497*	-1.203	1.04**
	(1.155)	(0.078)	(0.253)	(0.966)	(0.483)
q4	0.853*	0.037	0.538*	-0.185	0.586*
	(0.433)	(0.119)	(0.282)	(0.22)	(0.329)
GFC	3.343	-0.709**	-0.831**	3.055	0.918
	(3.763)	(0.316)	(0.320)	(2.81)	(0.815)
constant	15.360	-1.279	4.451	12.255	3.196
	(19.695)	(1.375)	(5.035)	(14.65)	(4.92)
Observations	920	920	903	920	920
R-squared	0.017	0.095	0.059	0.012	0.024

Note: Standard errors in parentheses. ***, ** and * denote the 1%, 5% and 10% significance level, respectively.

All the results are obtained by the fixed effect model. EE and LA means the reginal dummy variables: EE takes the value one if the economy is in Emerging Europe and 0 otherwise, and LA takes the value one if the economy is in Latin America and 0 otherwise. GFC is the 2008 global financial crisis dummy, which takes the value 1 if it is in 2008, and 0 otherwise.

Source: Author's calculation

financial market in Latin America and four out of five European EMEs in the sample belonging to the EU, whose economic condition and policy influence European EMEs, might be reasons for the smaller influence of external shocks. Therefore, based on the table, we can simply conclude that geographical factors are also important in the volatility of capital flows.

4.2.4 Analysis of How to Mitigate the Impact of External Shocks (based on equation 2)

Regarding the analysis of how to mitigate sensitivity to external shocks[14], we investigated

Table 8 : Drivers of capital inflows to EMEs: results with country heterogeneity dummies (foreign_reserve, float_regime, external_debt)

	(1) gross	(2) equity	(3) bond	(4) FDI	(5) other
r_i	0.277	0.058*	0.089	-0.017	0.165*
	(0.187)	(0.03)	(0.084)	(0.097)	(0.081)
g_AE	-0.114	-0.373***	-0.641**	0.958	-0.05
	(0.833)	(0.103)	(0.229)	(0.681)	(0.2)
g_EM	0.53	0.038	0.055	0.313	0.172**
	(0.376)	(0.034)	(0.07)	(0.276)	(0.08)
tradeopenness	-0.039	0.008*	0.005	-0.034	-0.049**
	(0.053)	(0.004)	(0.009)	(0.033)	(0.021)
vix	-0.784*	-0.056***	-0.229**	-0.336	-0.138
	(0.386)	(0.017)	(0.08)	(0.242)	(0.091)
vix × foreign_reserve (>50%)	0.165**	0.019**	0.055***	0.038	0.064**
	(0.066)	(0.009)	(0.013)	(0.037)	(0.025)
vix × float_regime	0.687	-0.001	0.123*	0.428	0.1
	(0.447)	(0.009)	(0.061)	(0.312)	(0.101)
vix × external_debt	0.062	0.004	0.012	0.021	0.016
	(0.083)	(0.011)	(0.02)	(0.045)	(0.035)
q2	0.613	0.299*	1.464**	-1.176	0.801
	(1.206)	(0.152)	(0.542)	(1.344)	(0.532)
q3	-0.863	0.131**	0.757**	-2.454	1.289**
	(2.305)	(0.06)	(0.328)	(2.272)	(0.505)
q4	-0.162	0.129	0.805**	-1.744	0.851*
	(1.566)	(0.14)	(0.311)	(1.669)	(0.415)
GFC	2.348	-0.806**	-1.014**	2.016	1.11*
	(1.959)	(0.359)	(0.385)	(1.217)	(0.623)
_cons	11.062***	1.083	3.39***	3.908**	3.965***
	(2.694)	(0.69)	(0.992)	(1.559)	(1.036)
Observations	684	684	677	684	684
R-squared	0.093	0.12	0.127	0.059	0.089

Note: Standard errors in parentheses. ***, ** and * denote the 1%, 5% and 10% significance level, respectively.
All the results are obtained by the country fixed effect model. The foreign_reserve (>50%) is the dummy variable, which takes the value 1 if it is higher than the median of foreign reserve over GDP of sample economies for each period and 0 otherwise. The float_regime is float regime (including managed float regime and free float regime) dummy variable. The external_debt is the dummy variable, which takes the value one if it is higher than the mean of external debt / GDP of sample economies for each period and 0 otherwise.

Source: Author's calculation

the policies of foreign exchange reserves, exchange rate regimes, and foreign debt. We used an interaction term between risk and policies to investigate whether these policies are effective in mitigating the impact of external shocks on capital inflows.

Regarding the effectiveness of foreign exchange reserves and choice of exchange rate regime in mitigating the impact of external shocks, Table 8 indicates that foreign reserves and choice of exchange rate regime affect risk-aversion elasticity.

In Table 8, when a country's foreign exchange reserves are above the median of the foreign exchange reserves of the 17 countries over each period, the sensitivity of EMEs to external risks is significantly reduced. Specifically, foreign reserves over the median in each period would reduce the elasticity by 1.65 bias points in gross capital inflows, 0.19 bias points in portfolio equity inflows, and 0.55 bias points in portfolio bond inflows. Thus, higher foreign exchange reserves could help a country use foreign exchange interventions more flexibly to reduce the volatility of capital inflows, especially portfolio investment inflows.

Table 8 also shows that the choice of exchange rate regime affects the risk-aversion elasticity to bond inflows. A floating exchange rate regime, including a managed floating exchange rate regime[15], would significantly reduce the elasticity by 1.23 bias points in portfolio bond inflows. This may be because the self-regulating capacity of a floating exchange rate regime enhances the creditworthiness of the country, and thus reduces expectations of liquidity risk.

Finally, as Table 8 further shows, for all floating exchange rate regimes, we found no buffering role of external debt in reducing the volatility of capital inflows. This suggests that the size of external debt does not reduce the impact of external shocks on domestic capital flows in the short term, but whether it could mitigate the impact of external shocks in the medium or long term requires further research.

Therefore, what is the difference in the impact of foreign reserves at different quantile intervals on mitigating the impact of external shocks? As Table 9 shows, when foreign reserves fall in the first quartile range, they amplify the impact of external shocks on the volatility of portfolio equity inflows, portfolio bond inflows, and bank inflows to the country. When foreign reserves fall in the fourth quartile range, they significantly mitigate the impact of external shocks on the volatility of all types of capital inflows, except for FDI inflows. The impact of external shocks on the volatility of gross capital inflows and bank inflows is also significantly mitigated when foreign reserves are in the third quartile range. In sum, high foreign exchange reserves mitigate the impact of external shocks and vice versa.

Table 10-a shows the share of foreign exchange reserves in each quartile range in each geographic region. For example, in East Asia, foreign exchange reserves belonging to the first quartile range account for 33% of the sum of these 3 geographic regions. The table also indicates that East Asia's share of foreign exchange reserves above the median is almost 0.5, although this is related to the relatively large number of East Asian countries. Comparing it with the share of foreign exchange reserves below the median demonstrated that East Asia's foreign exchange reserves are more concentrated above the median. This indicates that East Asia has higher foreign exchange reserves than other regions in the period. Table

Table 9 : Drivers of capital inflows to EMEs: results with country heterogeneity dummies (4 quartiles of foreign_reserve)

	(1) gross	(2) equity	(3) bond	(4) FDI	(5) other
r_i	0.194	0.021	0.007	0.077	0.093**
	(0.177)	(0.02)	(0.043)	(0.095)	(0.041)
g_AE	0.047	-0.274***	-0.415**	0.780	0.004
	(0.774)	(0.09)	(0.183)	(0.572)	(0.151)
g_EME	0.232	0.032**	0.043	0.107	0.049
	(0.134)	(0.014)	(0.026)	(0.084)	(0.033)
tradeopenness	-3.482	0.493*	-0.734	-2.594	-1.330
	(4.971)	(0.271)	(1.329)	(3.915)	(1.089)
vix	-0.136***	-0.030***	-0.062***	-0.023	-0.007
	(0.042)	(0.008)	(0.018)	(0.029)	(0.027)
vix × foreign_reserve (0-25%)	-0.036	-0.018**	-0.036**	0.035	-0.035*
	(0.049)	(0.008)	(0.016)	(0.049)	(0.019)
vix × foreign_reserve (50-25%)	1.471*	0.067	0.243	0.591	0.584*
	(0.782)	(0.137)	(0.168)	(0.692)	(0.308)
vix × foreign_reserve (75-100%)	4.264***	0.314***	1.332***	0.537	1.592***
	(0.906)	(0.105)	(0.337)	(0.495)	(0.539)
q2	2.567***	0.279**	1.495***	0.289	0.820*
	(0.817)	(0.127)	(0.344)	(0.265)	(0.408)
q3	-0.135	0.047	0.484**	-1.197	1.046**
	(1.081)	(0.077)	(0.218)	(0.959)	(0.453)
q4	0.964**	0.056	0.575**	-0.204	0.643*
	(0.407)	(0.109)	(0.259)	(0.231)	(0.34)
GFC	3.438	-0.718**	-0.771**	3.073	0.935
	(3.854)	(0.318)	(0.332)	(2.846)	(0.805)
constant	20.367	-0.798	5.464	12.048	5.482
	(18.511)	(1.163)	(5.201)	(14.83)	(4.211)
Observations	920	920	903	920	920
R-squared	0.032	0.114	0.104	0.012	0.055

Note: Standard errors in parentheses. ***, ** and * denote the 1%, 5% and 10% significance level, respectively.
All the results are obtained by the country fixed effect model. Foreign_reserve (0-25%) denotes a quartile calculation of foreign reserves/GDP for 17 emerging market countries in each period, with 1 for those belonging to the first quartile interval and 0 for the other quartile intervals. Foreign_reserve (25%-50%) means 1 for those belonging to the second quartile interval and 0 for the others. It is the same with foreign_reserve (50%-75%) foreign_reserve (75%-100%).

Source: Author's calculation

10-b shows the share of different exchange rate regimes in each geographic region. The table indicates that the managed floating exchange rate regime has the highest share of all three geographic regions. Interestingly, there is no free-floating exchange rate regime among the seven East Asian countries, and the share of fixed exchange rate regimes in this region is much higher than in the other two regions. As shown in Table 7, East Asia is the most affected by external shocks. In addition to geographical factors, the exchange rate regime might also be an important factor influencing the volatility of capital inflows in East Asia.

In sum, higher foreign exchange reserves and a floating exchange rate regime could significantly reduce the volatility of capital inflows (especially portfolio investment inflows).

4.2.5 Robustness Check

Corporate bond spreads tend to reflect the level of financial cycle and risk. Specifically, higher corporate bond spreads indicate higher corporate short-term bond yields and lower 10-year treasury rates. This reflects a financial downturn and an increased investment risk. Therefore, higher corporate bond spreads are associated with higher degrees of risk aversion (Manganelli, Simone, & Guido Wolswijk, 2009).

Tables 1–3 in the appendix show the results of the robustness check. In Appendix Table 1, corporate bond spreads have a significant negative impact on gross capital inflows, portfolio investment inflows, and bank capital inflows. This is because corporate bond spreads reflect the risk of short-term investments and risk expectations of long-term economic development. Elevated corporate bond spreads indicate an increase in short-term investment risk and a pessimistic attitude toward future economic development, which leads global banks to lend less cross-border.

Appendix Tables 2–3 indicate that higher foreign reserves and a floating exchange rate regime effectively help reduce the sensitivity of gross capital inflows and portfolio investment inflows to external shocks. In addition, the sensitivity of bank capital inflows to external shocks is reduced in the short term and expectation in the long run. If financial turmoil occurs in emerging country A, foreign countries will reduce their lending to country A to prevent losses due to the expectation of the

Table 10 : Percentage of foreign reserves and regime by region (East Asia, East Europe and Latin America)

a	foreign_reserve (0-25%)	foreign_reserve (25%-50%)	foreign_reserve (50%-100%)	foreign_reserve (50%-75%)	foreign_reserve (75%-100%)
East Asia	0.33	0.35	0.47	0.45	0.50
East Europe	0.37	0.28	0.27	0.21	0.33
Latin America	0.30	0.38	0.26	0.35	0.17
b	peg	managed_float	free_float	free_falling	
East Asia	0.35	0.65	0.00	0	
East Europe	0.13	0.78	0.08	0	
Latin America	0.18	0.73	0.07	0	

Note : Foreign_reserve (0-25%) denotes a quartile calculation of foreign reserves/GDP for 17 emerging market countries in each period, with 1 for those belonging to the first quartile interval and 0 for the other quartile intervals. Foreign_reserve (25%-50%) means 1 for those belonging to the second quartile interval and 0 for the others. It is the same with foreign_reserve (50%-75%) foreign_reserve (75%-100%).

Source : Author's calculation

continued devaluation of country A's currency, which leads to a decrease in bank capital inflows to country A. However, if country A has relatively high foreign exchange reserves, foreign countries will expect a better economic condition for country A than if they have fewer foreign exchange reserves; thus, the impact on bank inflows to country A will be reduced.

5. Conclusion

This study presented a theoretical and empirical analysis of the pull and push factors of capital flows to emerging countries and how to mitigate the impact of external shocks. The analysis showed that both pull and push factors have a significant effect on gross capital inflows in EMEs, with risk appetite (push) having the most pronounced impact. This is because risk appetite, as represented by the panic index, is a good reflection of investors' market expectations and thus, could cause large swings in short-term capital flows. Therefore, when studying how to mitigate the impact of external shocks on capital inflows, this study used vix to represent external shocks. The cross-interaction of vix and foreign reserves, the exchange rate regime, and external debt was employed to study how to mitigate the impact of external shocks.

The results showed that the choice of exchange rate regime could significantly mitigate the impact of external shocks on equity capital inflows, since the imbalance in the balance of payments of a country with a floating exchange rate system could be reduced by the free fluctuation of the exchange rate and fewer imbalances mean fewer gaps in capital inflows. More foreign exchange reserves could significantly mitigate the impact of external shocks on gross capital inflows, portfolio investment inflows, and bank inflows. This is because adequate foreign exchange reserves help a country intervene better in the foreign exchange market. Finally, we performed a robustness check, replacing vix with corporate bond spreads, and similarly showed that a floating exchange rate regime could mitigate the impact of capital inflows.

The analysis also highlighted topics requiring further research. First, this study addressed ways to mitigate the impact of gross capital inflows; however, Rudolfs Bems (2016) argues that the size of gross capital outflows also increased after the financial crisis. Since fluctuations in capital outflows invested in by residents also impact a country's economic cycle, it is important to study how to reduce the volatility of capital outflows. In addition, this study examined 17 EMEs as a whole. However, the impact of external shocks on capital inflows in each country with individual characteristics and how to moderate this impact remain a topic of discussion. Moreover, besides these three policies, macroprudential policies, capital controls, and other policies of individual host countries are also important issues. Therefore, we continue our research to determine more comprehensive policy approaches to moderate capital flows.

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Notes

[1] However, Alfaro (2008) uses data prior to 2000, after which the capital market of developing countries including EMEs became more open as global integration deepened. In addition, his analysis is not specific to EMEs or developed countries.

[2] Williamson (2008) divides the current theory of a floating exchange rate into what determines the steady state and what determines the transition to a steady state. He assumes a limit to what governments can do, even in countries with non-floating exchange rate regimes, and that the price level may move in the opposite direction to the nominal exchange rate, making it difficult for the real exchange rate to reach the desired level. However, behavioural models are somewhat adaptive and systematic intervention policies can improve the returns of fundamental analysts, thereby increasing their share of the foreign exchange market and reducing the bias caused by chart analysts who follow the herd effect.

[3] During the 1998 Asian financial crisis, Thailand's ability to intervene in the market was limited by its low foreign exchange reserves. Thailand used foreign exchange to intervene in the market, which led to a rapid depletion of foreign exchange. Furthermore, it was attacked by international lobbyists, causing the Thai baht to fall into a vicious devaluation.

[4] Country fixed effects may capture time-invariant characteristics among the EMEs, such as distance, border, common language, common legal origin, and institutional quality, which influence transactions of real goods and financial assets.

[5] This study refers to the IMF Fiscal Monitor, which classifies 40 economies as "emerging market and middle-income" economies. Among the EMEs in East Asia, Europe, and Latin America, according to the size of national GDP, international influence and the data availability, we choose a sample of 17 countries.

[6] For interest rates, we analyse the impact of the real interest rate on capital inflows in the capital-receiving country. We do not analyse the interaction term between the vix and monetary policy variables such as interest rates, since we consider that the analysis of the interaction term between the vix and exchange rate regime variables include some effects of monetary policy. This is because, theoretically, a peg exchange rate regime makes it difficult to implement monetary policy, while a floating exchange rate regime allows for independent monetary policy implementation.

[7] Most of the 17 countries with peg exchange rates are crawling pegs, and a few apply hard pegs. Therefore, no further division of the peg exchange rate regime into hard pegs and crawling pegs is discussed in this paper. Moreover, this paper focuses on whether a floating exchange rate regime could mitigate the impact of external shocks more effectively than a peg exchange rate regime given trilemma. The exchange rate regime dummy variable is therefore broadly divided into a floating exchange rate regime and peg exchange rate regime.

[8] Ilzetzki refers to Rogoff (2004) and the IMF's method. His paper describes the calculations under each exchange rate regime in detail. The classification of exchange rate regimes in this paper is based on ilzetzki's coarse classification. Crawling pegs are classified as pegs in the coarse classification.

[9] This study also analysed gross capital outflows in the EMEs, finding that pull factors rather than push factors are the main factors influencing them, presumably because gross capital outflows are investments by residents into foreign countries and therefore, their ability to invest is more influenced by domestic economic conditions.

[10] Portfolio investment flows are delineated as portfolio equity and bond flows. Portfolio equity flows include equities and investment funds, which are highly liquid. Portfolio bond flows are

mainly accompanied by changes in a country's creditworthiness and liquidity risk. The definition is derived from the International Monetary Fund, Balance of Payments Manual, fifth edition (IMF, 1993).

[11] From the general definition by the International Monetary Fund, Balance of Payments Manual, fifth edition (IMF, 1993), other investment is a residual category that includes positions and transactions other than those included in direct investment, portfolio investment, financial derivatives and employee stock options, and reserve assets. According to the Balance of Payments Standard Presentation by country, the main composition is 'Deposit-taking corporations, except the central bank sector', which refers to the bank sector.

[12] From the general definition by the International Monetary Fund, Balance of Payments Manual, fifth edition (IMF, 1993), FDI is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise resident in another economy.

[13] This study found that a portion of EMEs in East Asia have adopted peg exchange rate regimes, such as India, Indonesia, and China. The analysis also indicated that peg exchange rate regimes increase the impact of external shocks. Therefore, this is one of the factors considered. In addition, geographic location, institutional quality, and national policies might contribute to the vulnerability of EMEs in East Asia. This assumption needs further research.

[14] This study classified capital openness as high and low (Kyunghun Kim, 2018) to examine the effectiveness of national policies. It found that for countries with high capital openness, a floating exchange rate regime is more effective in mitigating the impact of external shocks on gross capital inflows, portfolio investment inflows, FDI inflows, and bank capital inflows than foreign exchange reserves. In contrast, in countries with low capital openness, foreign exchange reserves could more significantly mitigate the impact of external shocks on gross capital inflows, portfolio investment inflows, and bank capital inflows.

[15] The data analysis indicated that most of the floating exchange rate regimes in the 17 EMEs are managed floating exchange rate regimes. Managed floating exchange rate regimes are based on supply and demand in the foreign exchange market. Central banks intervene directly or indirectly in the foreign exchange market to avoid large fluctuations in exchange rates. It enables both the effectiveness of domestic monetary policy (under a managed floating exchange rate system) and a degree of self-adjustment of the balance of payments. This reduces the gap, which mitigates the impact of external shocks.

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Appendix

Appendix Table 1 : Drivers of capital inflows to EMEs（Robust check）

	(1) gross	(2) equity	(3) bond	(4) FDI	(5) other
r_i	0.157	0.017	-0.007	0.077	0.076*
	(0.17)	(0.017)	(0.040)	(0.095)	(0.043)
g_AE	-0.313	-0.175**	-0.446***	0.787	-0.512***
	(0.624)	(0.072)	(0.134)	(0.591)	(0.119)
g_EME	0.220	0.028**	0.039	0.105	0.053
	(0.136)	(0.013)	(0.028)	(0.082)	(0.042)
tradeopenness	-2.644	0.491	-0.595	-2.463	-1.154
	(5.233)	(0.312)	(1.251)	(3.864)	(1.282)
corporate_bond_spreads	-2.104***	-0.099	-0.719**	-0.099	-1.297***
	(0.481)	(0.074)	(0.290)	(0.187)	(0.19)
q2	2.672**	0.298*	1.547***	0.282	0.891*
	(0.959)	(0.153)	(0.400)	(0.258)	(0.474)
q3	-0.100	0.062	0.521*	-1.199	1.043**
	(1.166)	(0.077)	(0.256)	(0.962)	(0.485)
q4	0.436	-0.007	0.375	-0.215	0.405
	(0.415)	(0.119)	(0.271)	(0.240)	(0.305)
GFC	3.816	-1.094***	-0.958*	2.986	2.233**
	(4.106)	(0.369)	(0.54)	(2.732)	(0.98)
constant	22.078	-1.281	5.954	11.794	9.565*
	(20.971)	(1.424)	(5.282)	(14.806)	(5.206)
Observations	920	920	903	920	920
R-squared	0.020	0.064	0.061	0.012	0.054

Note : Standard errors in parentheses. ***, ** and * denote the 1%, 5% and 10% significance level, respectively. All the results are obtained by the fixed effect model.

Source : Author’s calculation

Appendix Table.2 : Drivers of capital inflows to EMEs: results with country heterogeneity dummies (foreign_reserve, float_regime, external_debt) (Robustness check)

	(1) gross	(2) equity	(3) bond	(4) FDI	(5) other
r_i	0.317	0.044*	0.041	0.046	0.164
	(0.252)	(0.024)	(0.077)	(0.126)	(0.103)
g_AE	-0.641	-0.23**	-0.499***	0.711	-0.564**
	(0.446)	(0.087)	(0.163)	(0.426)	(0.2)
g_EME	0.438	0.025	0.047	0.250	0.172*
	(0.338)	(0.031)	(0.063)	(0.248)	(0.086)
tradeopenness	2.908	1.241**	0.473	-0.667	-1.277
	(4.993)	(0.464)	(1.458)	(1.996)	(1.637)
corporate_bond_spreads	-8.381**	-0.188	-1.761**	-3.630	-2.426***
	(3.327)	(0.149)	(0.629)	(2.252)	(0.83)
corporate_bond_spreads × foregin_reserve (>50%)	1.428**	0.134*	0.390***	0.537	0.457**
	(0.647)	(0.07)	(0.08)	(0.465)	(0.167)
corporate_bond_spreads × float_regime	6.682*	0.020	1.011**	4.029	1.097
	(3.461)	(0.136)	(0.415)	(2.506)	(0.904)
corporate_bond_spreads × external_debt (>average)	-0.764	-0.062	-0.077	-0.612	-0.176
	(0.497)	(0.056)	(0.123)	(0.409)	(0.149)
q2	0.339	0.331*	1.323**	-1.175	0.693
	(1.114)	(0.169)	(0.517)	(1.395)	(0.541)
q3	-1.676	0.157**	0.487**	-2.621	0.93**
	(2.21)	(0.069)	(0.181)	(2.357)	(0.419)
q4	-1.322	0.063	0.503*	-1.834	0.203
	(1.542)	(0.131)	(0.281)	(1.674)	(0.292)
GFC	3.498	-1.084**	-1.09**	2.37	2.312***
	(2.482)	(0.389)	(0.435)	(1.717)	(0.779)
constant	3.011	-4.201*	1.983	6.655	10.37
	(19.876)	(2.094)	(5.797)	(8.181)	(6.577)
Observations	655	655	649	655	655
R-squared	0.150	0.098	0.135	0.078	0.139

Note : Standard errors in parentheses. ***, ** and * denote the 1%, 5% and 10% significance level, respectively.
All the results are obtained by the country fixed effect model. The foreign_reserve (>50%) is the dummy variable, which takes the value 1 if it is higher than the median of foreign reserve over GDP of sample economies for each period and 0 otherwise. The float_regime is the float_regime (including managed float regime and free float regime) dummy variable. dummy variable. The external_debt is the dummy variable, which takes the value one if it is higher than the mean of external debt / GDP of sample economies for each period and 0 otherwise.

Source : Author's calculation

Appendix Table 3 : Drivers of capital inflows to EMEs: results with country heterogeneity dummies (4 quartiles of foreign_reserve)(Robustness check)

	(1) gross	(2) equity	(3) bond	(4) FDI	(5) other
r_i	0.165	0.018	-0.005	0.077	0.079*
	(0.168)	(0.018)	(0.039)	(0.094)	(0.041)
g_AE	-0.291	-0.174**	-0.441***	0.793	-0.503***
	(0.667)	(0.070)	(0.140)	(0.603)	(0.122)
g_EME	0.236	0.029**	0.040	0.108	0.059
	(0.140)	(0.013)	(0.024)	(0.084)	(0.045)
tradeopenness	-3.661	0.463*	-0.766	-2.680	-1.553
	(5.037)	(0.262)	(1.339)	(3.957)	(1.123)
corporate_bond_spreads	-2.344***	-0.087	-0.711**	-0.190	-1.428***
	(0.548)	(0.059)	(0.256)	(0.255)	(0.246)
corporate_bond_spreads × foregin_reserve (0-25%)	-0.835***	-0.137*	-0.388**	-0.067	-0.32**
	(0.282)	(0.073)	(0.155)	(0.067)	(0.129)
corporate_bond_spreads × foregin_reserve (50-75%)	0.233	0.003	-0.003	0.097	0.169
	(0.170)	(0.063)	(0.079)	(0.131)	(0.115)
corporate_bond_spreads × foregin_reserve (75-100%)	0.568	-0.056	-0.046	0.225	0.286
	(0.449)	(0.093)	(0.212)	(0.271)	(0.200)
q2	2.695***	0.294**	1.544***	0.290	0.898**
	(0.821)	(0.132)	(0.360)	(0.259)	(0.399)
q3	-0.109	0.061	0.505**	-1.200	1.039**
	(1.092)	(0.076)	(0.215)	(0.956)	(0.46)
q4	0.556	0.004	0.405	-0.198	0.450
	(0.383)	(0.111)	(0.249)	(0.235)	(0.319)
GFC	3.937	-1.094***	-0.899	3.017	2.286**
	(4.075)	(0.349)	(0.540)	(2.752)	(0.968)
constant	26.385	-1.156	6.705	12.710	11.259**
	(20.101)	(1.212)	(5.531)	(15.191)	(4.640)
Observations	920	920	903	920	920
R-squared	0.044	0.089	0.105	0.013	0.099

Note : Standard errors in parentheses. ***, ** and * denote the 1%, 5% and 10% significance level, respectively.
All the results are obtained by the country fixed effect model. Foreign_reserve (0-25%) denotes a quartile calculation of foreign reserves/GDP for 17 emerging market countries in each period, with 1 for those belonging to the first quartile interval and 0 for the other quartile intervals. Foreign_reserve (25%-50%) means 1 for those belonging to the second quartile interval and 0 for the others. It is the same with foreign_reserve (50%-75%) foreign_reserve (75%-100%).

Source : Author's calculation

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新興市場国への資本フローの要因分析：外的ショックの影響をいかに軽減するか？

ソン　ゲイ

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