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The Effect of Simultaneous Flights and Stops on Growth and Investment: Evidence from Emerging Economies

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〈Abstract〉

This paper attempts to investigate if a significant increase in foreign asset purchases by domestic investors(i.e., a flight) is detrimental to emerging markets' growth and investment using a panel data set that covers 56 emerging markets between 1990 and 2014. Furthermore, it studies the effect of a flight when it occurs simultaneously with a significant decrease in domestic asset purchases by foreign investors(i.e., a stop) using an interaction model. A key difference of our study is that we estimate this interaction effect using three generalized method of moments estimators(difference GMM, system GMM, and orthogonal deviation GMM) to address the causal effects rather than the associations between them. The results suggest that a flight alone is not harmful whereas simultaneous flights and stops could depress growth and investment. Therefore, the results of this paper complement the empirical evidence of the existing literature.

*Keywords: Flights, Stops, Generalized Method of Moments, Interaction Models

Ⅰ. Introduction

Since many countries have experienced financial crises due to abrupt changes in capital flows, there have been many attempts to estimate the

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impact of such abrupt changes on our economies and their consequences. For example, in the 1990s, many foreign investors paid more attention to east Asian countries such as Thailand, the Philippines, and South Korea due to their rapid growth and promising economic forecasts. This led to massive capital inflows into those countries and, as a result, foreign investors could enjoy fruitful returns on their investments.

However, hot money began to increase asset bubbles and then busted collapsing asset prices and damaged financial markets. The situation panicked the market, and foreign investors soon withdrew their investments, further collapsing prices. Domestic currency depreciation and balance sheet effects severely increased foreign debt levels, which forced domestic governments and companies to continue selling assets. In the big picture, these asset fire sales had a spiral effect: when governments and companies sold assets, the asset prices collapsed, further depreciating the domestic currency and increasing foreign debts. Indeed, they had to sell more and more assets until this spiral effect ended. Needless to say, countries suffered from severe economic damage as a result of this process(Mendoza 2010).

Many researchers have been studying the causes of this so-called “sudden stop” phenomenon and focusing on emerging market economies’ past experiences. Calvo(1998) argued that sudden stops could drastically decrease the marginal and average productivity of physical and human capital and cause bankruptcies. He also argued that this phenomenon is unusual and that fixed exchange rate and dollar- denominated liabilities, which are prevalent in emerging market economies, enable sudden stops to impose detrimental effects. Schmidt & Zwick(2015) argued that country-specific risk factors are the main cause of sudden stops. They studied several countries in the Euro area and demonstrated that domestic factors such as domestic growth, the interest rate spread, and the debt level prompted foreigners to pull domestic investments. Conversely, Rey(2015) argued that global factors, which are represented by the volatility index(VIX), have driven global capital flows for a long time. According to her, U.S. monetary policy is the most important factor affecting foreigners’ investment decisions.

Many papers have demonstrated the impact of sudden stops on domestic economies. Hutchison & Noy(2006) studied sudden stop crises that occurred between 1975 and 1997 and showed that they reduced emerging market economies' gross domestic product(GDP) growth by about 13%–15% over 3 years. Calvo et al.(2006) examined sudden stops in 32 countries, including both emerging markets and developed economies. They showed results similar to Hutchison & Noy(2006); that is, regardless of the countries' development, their investment, private sector credit, and current account balances would become severely depressed if they experienced a sudden stop. They provided empirical evidence that sudden stops are especially detrimental to emerging market economies. Indeed, they suggested that governments should manage capital flows and financial markets more closely and implement appropriate policies when necessary.

Recent studies have focused on the flight phenomenon, which is driven by domestic investors. Net capital inflows are reduced not only when foreigners reduce their domestic investments(i.e., gross capital inflows) but also when domestic investors increase their foreign investments(i.e., gross capital outflows).[1] A flight indicates a significant increase in gross capital outflows, which intrigues many researchers because it may also reduce domestic investment as a stop does. Rothenberg & Warnock(2011) examined how macroeconomic variables evolved during flights and showed that they are similar to sudden stops in the sense that they also depress GDP growth, consumption, and investment. Cowan et al.(2008) called flights "sudden starts" and identified similarities between the two events. These similarities might exist because the opportunity cost of domestic investors' foreign investments equals their domestic investment. In this case, a flight, like a stop, may also severely damage the domestic economy.

Suh(2022) recently showed that flight is detrimental to a domestic economy only under certain circumstances. He determined that a flight

1) Net capital inflows = (Gross capital inflows) – (Gross capital outflows).

alone does not depress growth and investment in an emerging market and only does so when foreign investors simultaneously retrench their investments. If there is a large amount of capital inflow during a flight period, companies can simply borrow from foreigners, even if they cannot borrow from domestic investors. Conversely, if a flight and a stop occur simultaneously, domestic companies cannot borrow from foreigners or domestic investors, so they lose a significant amount of their working capital and face a high risk of bankruptcy. As a consequence, domestic investment and GDP growth may decrease.

It is noteworthy that Suh(2022) used a time trend model to provide empirical evidence of this fact. Although time trend models show the evolution of macroeconomic variables around certain events, they cannot address the endogeneity that is relevant in econometric analysis. Indeed, his results are vulnerable to endogeneity and might therefore be distorted by it. In this paper, the same question is revisited. This study instead uses an interaction model with several generalized method of moments(GMM) estimators(i.e., difference GMM, system GMM, and orthogonal deviation GMM estimators) to eliminate the bias in the coefficients and generate more reliable results.

The results from the interaction models are similar to those obtained from time trend models by Suh(2022). That is, a flight alone was harmless to a domestic economy, on average, whereas a simultaneous flight and a stop was damaging. Therefore, this paper's results complement those in Suh(2022) and support his arguments. This is one of the contributions of this paper.

This paper is organized as follows. Section 2 explains the data used and introduces detailed definitions of flights and stops. Section 3 describes three GMM estimators−difference GMM, system GMM, and orthogonal deviation GMM estimators−and summarizes Arellano & Bover(1995), Blundell & Bond(2000), and Roodman(2009). Section 4 briefly explains our estimation strategy and demonstrates and interprets the results of the interaction models. Lastly, Section 5 summarizes the paper and concludes.

Ⅱ. Data and the definition of flights and stops

1. Data

The data used for this study are the same as those used in Suh(2022) to generate comparable results. The data are drawn from 56 emerging market economies—excluding the major oil-exporting countries, bank havens, and low-income countries—between 1990 and 2014 according to the 2008 per capita gross national income(GNI) figures published by the World Bank, considering that there may exist strong outliers that could distort the estimates.[2)]

Gross capital outflows(i.e., inflows) are net foreign asset purchases by domestic agents(net domestic asset purchases by foreign agents) that include foreign direct investment(FDI), portfolio investments(i.e., equity and debt), and other investments(e.g., trade credits, loans, and deposits). Total investment(i.e., domestic investment) is equal to gross capital formation. Details regarding the data sources and variable definitions are presented in Table 1.

〈Table 1〉 Data sources

Variable	Definition	Source
Gross capital inflows (as a % of GDP)	Net domestic asset purchases by foreign agents. Domestic assets consist of foreign direct investment(FDI), portfolio investments, and other investments.	IMF, BoPs

2) The 56 emerging economies that comprise the dataset include Angola, Armenia, Belarus, Belize, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Chile, Colombia, the republic of Congo, Costa Rica, Cote d'Ivoire, Dominica, Dominican Republic, Egypt, El Salvador, Georgia, Grenada, Guatemala, Honduras, India, Indonesia, Jamaica, Jordan, Kazakhstan, Latvia, Lesotho, Lithuania, Malaysia, the Maldives, Mexico, Moldova, Mongolia, Morocco, Namibia, Nigeria, Pakistan, Paraguay, Peru, the Philippines, Poland, Romania, Russia, Saint Lucia, the Seychelles, South Africa, Sri Lanka, Syria, Thailand, Tunisia, Turkey, Ukraine, Uruguay, and Venezuela.

Variable	Definition	Source
Gross capital outflows (as a % of GDP)	Net foreign asset purchases by domestic agents. Foreign assets consist of FDI, portfolio investments, and other investments.	
GDP (in nominal and real U.S. dollars)		IMF, WEO
Real GDP growth(%)		
Total investment (as a % of GDP)	Gross capital formation.	
Capital market openness	This index ranges from 0 to 1. An index of 1 indicates the most liberalized market.	Chinn & Ito (2006)
Exchange rate regime	This index ranges from 1 to 16. An index of 16 indicates the most flexible regime.	Ilzetzki et al. (2019)
Private savings	Gross national savings − Gross public savings. Gross national savings = (Gross national disposable income) − (Consumption expenditures).	Alfaro et al. (2014)

2. The definition of capital flow episodes: Flights and stops

In this study, the term “flight” designates a large purchase of foreign assets by domestic agents, and the term “stop” denotes a large sale(or a large reduction in the purchase) of domestic assets by foreign agents. Technically, the two are defined by dummy variables, the thresholds of which are as follows:

Flights:

$$\begin{cases} 1 \ \text{if} \ KO_{jt} \in \left\{ top \ 30\% \ of \ (KO_{js})_{s=1}^{T} \right\} \cap \left\{ top \ 30\% \ of \ (KO_{js})_{j=1, s=1}^{N, T} \right\} \\ 0 \ \ otherwise \end{cases}$$

Stops:

$$\begin{cases} 1 \ \text{if} \ KI_{jt} \in \left\{ bottom \ 30\% \ of \ (KI_{js})_{s=1}^{T} \right\} \cap \left\{ bottom \ 30\% \ of \ (KI_{js})_{j=1, s=1}^{N, T} \right\} \\ 0 \ \ otherwise \end{cases}$$

where KO_{jt} represents gross capital outflows, and KI_{jt} represents gross capital inflows(as a percentage of GDP) in country *j* at time *t*. These thresholds indicate that for gross capital flows to be defined as a stop or a flight, the flows should be remarkably large, not only according to country *j*'s own experience but also according to cross-country experience. These two dummy variables are our main interest and will therefore be used in the main model.

Ⅲ. Generalized method of moments(GMM) estimator

This section briefly introduces three kinds of two-step GMM estimators(i.e., difference GMM, system GMM, and orthogonal deviation GMM estimators) that were used for this study. Section 3.1 describes the three GMM estimators, and Section 3.2 discusses the tests used to prove their validity.

1. Difference, system, and orthogonal deviation GMM estimators

We begin with the following panel data model in which *i* is for individuals and *t* is for time with the traditional assumptions.

$$y_{it} = X_{it}^{'}\beta + u_{it}$$
$$u_{it} = \eta_i + \epsilon_{it}$$
$$E(\eta_i) = E(\epsilon_{it}) = E(\eta_i \epsilon_{it}) = 0$$

We first take the difference of the expression to eliminate fixed effects, which generates the following expression:

$$\triangle y_{it} = \triangle X_{it}^{'}\beta + \triangle \epsilon_{it}$$

where $\triangle y_{it} = y_{it} - y_{it-1}$, for example. At this stage, $\triangle X_{it}^{'}\beta$ and $\triangle \epsilon_{it}$ are still correlated with each other under the assumption that X_{it}

and ϵ_{it} are also correlated with each other. In the difference GMM estimator, we construct an instrument set, Z, that contains twice and further lagged Xs(by adding the first lag if X is predetermined) to satisfy the moment condition, $E(\epsilon \mid Z) = 0$. The lags are suitable instruments for original variables as they are strongly correlated with the latter and therefore satisfy the exclusion restriction condition. However, two additional conditions should be satisfied for the instruments to be valid. First, they must be orthogonal to the error term. Second, differenced error terms should not be serially correlated. Specifically, these are as follows:

$$E[(X_{it-s}\epsilon^{*}_{it})] = 0 \text{ for } t \geq 3 \text{ and } s \geq 2 \qquad (1)$$

where ϵ^{*it} is the transformed error term, and

$$E[(\epsilon_{it} - \epsilon_{it-1})(\epsilon_{it-2} - \epsilon_{it-3})] = 0 \text{ for } t \geq 3. \quad (2)$$

When these conditions are satisfied, the lagged variable becomes an appropriate instrument.

Blundell & Bond(2000) argued that the first-differenced GMM estimator may work as a weak instrument if the original variables were highly persistent, since the lagged levels will be weakly correlated with the subsequent first differences. If so, this causes large finite-sample bias, which is what motivated them to extend the system by adding level equations. Accordingly, $\hat{\beta}$ is estimated using the following equation:

$$\begin{pmatrix} \triangle y_{it} \\ y_{it} \end{pmatrix} = \begin{pmatrix} \triangle X_{it} \\ X_{it} \end{pmatrix}' \hat{\beta} + \begin{pmatrix} \triangle u_{it} \\ u_{it} \end{pmatrix} \quad (3)$$

and $\triangle X_{it-1}$ is used as an instrument for level equations.[3)]

With Equations (1) and (2), an additional condition is required for $TRIANGLE X_{it-1}$ to be a valid instrument. Since fixed effects still remain in a

3) First differences can be replaced with orthogonal deviations, which are described in the following discussion.

level equation, the differenced lags themselves must be orthogonal to fixed effects, which means the following:

$$E[\triangle X_{it-1}(\eta_i)] = 0 \qquad (4)$$

This indicates that the samples are not too far from a steady state throughout the sample period and that the deviations are therefore not systematically correlated with the fixed effects. Assuming $X_{it} = \gamma X_{it-1} + (\delta\eta_i + v_{it})$, Blundell & Bond(1998) showed that the following condition should be satisfied for (4) with the first observation, x_{i1}:

$$E[(x_{i1} - \frac{\delta\eta_i}{1-\gamma})\delta\eta_i] = 0 \qquad (5)$$

The sufficient(but not necessary) condition for (5) is that x_{it} and y_{it} both have stationary processes ($|\gamma| < 1$).

Difference GMM might also not work well with unbalanced panel data because if some observations are missing, the available equations may decrease significantly. For example, if y_{it-1} is not observed, not only will the equation for y_{it-1} but also for y_{it} may be unavailable. This might cause small-sample bias and cause the GMM estimator to become inefficient. Bun & Windmeijer(2010) argued that the system GMM estimator for a dynamic panel data model might have a weak instrument problem like the difference GMM estimator. Under this circumstance, the system GMM estimator is no longer a consistent estimator. In this case, orthogonal deviation GMM(Arellano & Bover 1995) could present a solution. According to it, each equation is not subtracted from its previous value but subtracted from the average of future available samples. That is,

$$\triangle^* x_{it} = c_{it}(x_{it} - \frac{1}{T_{it}}\Sigma_{s>t} x_{is}) \qquad (6)$$

where $c_{it} = \sqrt{T_{it}/(T_{it}+1)}$ and T_{it} is the number of observations from time t for individual i. We can only see that one equation is unavailable for the missing x_{it} with unbalanced panel data. Hayakawa (2009) showed that the orthogonal deviation GMM estimator has less finite-sample bias than the difference GMM estimator under a dynamic panel data model using a Monte Carlo simulation.

2. Tests for validity

As previously stated, Equations (1) and (2) must be satisfied for GMM estimators to be valid. First, Sargan or Hansen tests can be performed to test Equation (1). The Sargan and Hansen tests each have their own benefits and drawback. If the error terms are heteroscedastic, the results of a Sargan test are not robust, unlike those of a Hansen test. Conversely, the Hansen test is vulnerable to the use of too many instruments, unlike the Sargan test. Considering that homoscedasticity is hardly satisfied, this paper performed Hansen tests and reported their results.[4] In addition, when we estimate the system GMM estimator, we must check whether newly added instruments(i.e., differenced lags) are also orthogonal to the error term without the original instrument set because the Hansen test only reports this statistic with the whole instrument set. We can verify this condition by performing a difference-in-Hansen test with only the newly added instruments. The null hypothesis of a Hansen test(and a difference-in-Hansen test) is that (additional) instruments are orthogonal to the error term.

Second, to prove Equation (2), we must test whether differenced error terms are second-order serially correlated. This is called an Arellano–Bond test after the researchers who first suggested it. The null hypothesis is that differenced error terms are not serially correlated on order 2.

GMM requires time span T to be short due to the possible problems that might be caused by the use of too many instruments(Roodman 2009). First, too many instruments can overfit the instrumented variables. In an

4) The methods used to reduce the number of instruments are discussed in a later section.

extreme case, an instrument might perfectly predict the instrumented variables and, as a result, the GMM estimator simply becomes an ordinary least squares(OLS) estimator.5) In this case, GMM fails to expunge the endogenous components of the estimates. Second, the Hansen and difference-in-Hansen tests become favorable to instruments by reporting a p-value that is almost 1. As a result, the Hansen test and GMM estimates lose their credibility.

Due to these problems, any researcher who uses GMM estimators must control the number of instruments used. Roodman(2009) suggested two ways to reduce this number. First, we should only use certain lags rather than all lags and, second, we should collapse the instrument matrix. It is also possible to use both methods simultaneously. For instance, if we collapse the original instrument set and use only three lags, the set becomes as follows:

$$\begin{bmatrix} x_{i1} & 0 & 0 & 0 & 0 & 0 & \cdots \\ 0 & x_{i2} & x_{i1} & 0 & 0 & 0 & \cdots \\ 0 & 0 & 0 & x_{i3} & x_{i2} & x_{i1} & \cdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \ddots \end{bmatrix} \Rightarrow \begin{bmatrix} x_{it-4} & 0 & 0 \\ x_{it-3} & x_{it-4} & 0 \\ x_{it-2} & x_{it-3} & x_{it-4} \end{bmatrix}$$

We can see that the number of instruments is significantly reduced from T(T - 1)/2 to 3 for one variable.

How many instruments are appropriate? Unfortunately, there is no clear answer to this question because using too few instruments may also impair the efficiency of the estimator. As a rule of thumb, Roodman(2009) suggested that the number of instruments should be less than the number of individuals in the data. This paper follows this suggestion, and the number of instruments used is reported in the results to prove it.

Ⅳ. Results

This section reports the impact of flights and stops using an interaction

5) Imagine a two-stage least squares(2SLS) estimator with $R^2 = 1$ in the first stage.

model to observe what happens to an economy when flights and stops occur simultaneously. For example, if domestic companies may simply borrow from foreign countries during flights, the loss of investment by domestic agents may quickly be recovered and the impact of flights minimized. Conversely, if domestic companies cannot borrow from abroad during flights, this indicates they cannot recover the loss of investment and, as a result, they would be severely damaged by the flight caused by domestic agents. This example therefore demonstrates that the impact of flight is dependent on the existence of a stop in the country.

The model is as follows:

$$y_{it} = \beta_1 flight_{it} + \beta_2 stop_{it} + \beta_3 flight_{it} * stop_{it} + X^{'}_{it}\gamma + u_{it} \quad (7)$$

where the dependent variable, y, is real GDP growth or total investment. Here, the coefficient of the interaction term, β_3, shows the additional impact of a flight when it occurs simultaneously with a stop.[6)]

Tables 2 and 3 show the results on real GDP growth and total investment. When the dependent variable is real GDP growth, the constitutive terms of flights($\hat{\beta}_1$s) in all estimators are positive. Moreover, a flight alone does not depress total investment. The estimators therefore confirm the results obtained by Suh(2022) that one flight alone is not harmful to the domestic economy. Nonetheless, when the dependent variable is GDP growth, the presence of a negative interaction term($\hat{\beta}_3$s) may suggest that a flight might depress domestic growth if there is “capital flight” from domestic financial markets by not only domestic but also foreign investors. Conversely, it is interesting to see that the interaction terms vary when the dependent variable is total investment. This might indicate that domestic investment does not decrease, even if flights and stops occur simultaneously, which is counterintuitive. Further study of this issue is therefore warranted.

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6) Note that the impact of a flight is β_1, whereas the impact of a simultaneous flight and stop is $\beta_1 + \beta_3$.

〈Table 2〉 The impact of stops and flights on real GDP growth

	FEOLS	DGMM	SGMM	OGMM
FLIGHT	0.5153	2.6334	0.9019	2.4037**
	(0.3497)	(2.1681)	(2.6025)	(1.2234)
STOP	−0.9235**	−1.1285	-1.1556	-0.296
	(0.3867)	(1.3031)	(1.8582)	(0.8371)
*FLIGHT * STOP*	−0.9507	−5.7214	-2.3539	-7.768*
	(1.4622)	(6.0759)	(6.0312)	(4.6568)
LZGDP	0.2226***	0.263*	0.3119**	0.2396***
	(0.0626)	(0.1363)	(0.123)	(0.0793)
EXREGIME	−0.1981***	−0.2344	-0.2407*	-0.2348*
	(0.0462)	(0.2031)	(0.1232)	(0.1322)
KAOPEN	−0.203	−2.1702	-0.081	1.3372
	(0.4359)	(2.5607)	(1.7547)	(1.8888)
Time Dummies	YES	YES	YES	YES
Wald test on flights	0.3152	0.4749	0.9165	0.1101
Wald test on stops	0.0476	0.0318	0.2662	0.0981
No. of Countries	56	56	56	56
No. of Observations	1,231	1,168	1,231	1,175
R^2	0.2339			
Hansen test		0.755	0.400	0.819
A-B AR(2) test		0.841	0.797	0.857
No. of Instruments		47	54	47
Diff-in-Hansen test			0.359	

Notes: FEOLS for fixed-effects estimators, DGMM for two-step difference GMM estimators, SGMM for two-step system GMM estimators, and OGMM for two-step orthogonal deviation GMM estimators. Robust standard errors appear in parentheses(clustered by country in FEOLS and Windmeigher-corrected in GMMs. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. P-values appear in each test.

〈Table 3〉 The impact of stops and flights on total investment

	FEOLS	DGMM	SGMM	OGMM
FLIGHT	−0.2111	3.1283	4.7341	6.5359
	(0.6255)	(3.3179)	(2.962)	(4.7965)
STOP	−2.1705***	−2.3183**	-1.577	-2.4326
	(0.442)	(1.0715)	(1.67)	(2.7902)
*FLIGHT * STOP*	−0.1653	5.4526	0.1679	-5.1394
	(1.6653)	(3.7109)	(3.4236)	(8.2399)
ZGDP	0.3553***	0.2976	0.253*	0.3302
	(0.1092)	(0.1492)	(0.1453)	(0.3962)
SAVE	0.0981**	−0.1152	-0.0325	-0.0877
	(0.0428)	(0.1309)	(0.1153)	(0.1723)
KAOPEN	3.7987**	10.2448**	3.1181	4.5159
	(1.8172)	(4.008)	(3.5842)	(5.7824)
Time Dummies	YES	YES	YES	YES
Wald test on flights	0.9	0.2579	0.1588	0.3858
Wald test on stops	0.0000	0.0697	0.4768	0.2905
No. of Countries	55	55	55	55
No. of Observations	1,018	929	1,018	963
R^2	0.1811			
Hansen test		0.372	0.245	0.150
A-B AR(2) test		0.644	0.645	0.792
No. of Instruments		54	49	54
Diff-in-Hansen test			0.126	

Notes: FEOLS for fixed-effects estimators, DGMM for two-step difference GMM estimators, SGMM for two-step system GMM estimators, and OGMM for two-step orthogonal deviation GMM estimators. Robust standard errors are in the parenthesis(clustered by country in FEOLS and Windmeigher-corrected in GMMs. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. P-values appear in each test.

The coefficients of lagged GDP growth(LZGDP) are all positive regardless of the estimators used. This implies the sticky nature of real GDP growth. That is, a country that is in a boom phase tends to keep growing. Meanwhile, the coefficients of an exchange regime(EXREGIME) are all negative. Since this variable has a greater value with a more flexible regime, this indicates that a country with a fixed regime grows more quickly than a country with a flexible regime. We surmise that this is so because fixed regimes provide a more favorable atmosphere to trade markets. A country with a more fixed regime tends to record a larger current account surplus. Lastly, capital market openness(KAOPEN) hardly affects real GDP growth. None of its coefficients are statistically significant, and their signs change depending on the estimator used.

It is not surprising to see that real GDP growth(ZGDP) positively affects total investment. There is no doubt that a fast-growing country may also be able to invest more than other countries. Conversely, it is uncertain whether savings(SAVE) promotes total investment. Although its coefficient is positive when a fixed-effects estimator(FEOLS) is used, it is negative and statistically insignificant when a GMM estimator is used. It might take over a year for savings to be intermediated to investment. Capital market openness, however, significantly increases total investment, which is not a surprise.

An alternative specification is also employed that replaces the flight dummies with gross capital outflows. The model is as follows:

$$y_{it} = \beta_1 outflow_{it} + \beta_2 stop_{it} + \beta_3 outflow_{it} * stop_{it} + X^{'}_{it}\gamma + u_{it} \quad (8)$$

and the estimates are reported in Table 4.

There is no significant difference from previous results. $\hat{\beta}_1$s are mostly positive and insignificant, which indicates that gross capital outflows hardly hurt the domestic economy. Conversely, $\hat{\beta}_2$s are negative with all the estimators, and the impact on domestic investment is especially significant. If we see the interaction term that sows the impact of gross capital outflows during a capital stop, although $\hat{\beta}_3$s are negative when

GDP growth is the dependent variable, its sign changes according to the estimator when total investment is the dependent variable. While this supports the previous result－that flights are harmful under the presence of stops－it also suggests that an even low level of gross capital outflows depresses the economy when there are not enough external loans. For example, the result from OGMM shows that a 1%(of GDP) increase in gross capital outflows may decrease about 0.44% of real GDP growth in the short run if there are not sufficient financial resources. In sum, the results from Tables 2, 3, 4, and 5 demonstrate that policymakers must manage both gross capital inflows and outflows to prevent the damage caused by domestic investors' flight from domestic markets.

Although the results from an interaction model ratify the hypothesis that flights are harmful conditional on the existence of stops, to some extent, an insignificant interaction term makes it suggestive rather than conclusive. To understand why, it is worth noting that a feature of an interaction model－multicollinearity between constitutive and interaction terms. For instance, the interaction terms of two constitutive terms(stops and flights in (7) and gross capital outflows and stops in (8)) are simply their intersection or product. As a result, the standard error of the coefficients becomes inflated and, in many cases, contributes to the coefficients becoming insignificant. Furthermore, a small number of interaction terms exacerbates this issue. Although a few papers have suggested solutions, no consensus has yet been reached to my knowledge. However, as Friedrich(1982) and Brambor et al.(2006) argued, it is desirable to use them if there is any chance that interaction is present because it provides additional information that cannot be discovered using a linear-additive model.

〈Table 4〉 The impact of gross capital outflows and stops on real GDP growth

	FEOLS	DGMM	SGMM	OGMM
OUTFLOW	0.0735*	0.084	0.0885	0.0889
	(0.0398)	(0.1195)	(0.1102)	(0.0879)
STOP	−0.8596**	−1.35	-0.4944	-0.43
	(0.4148)	(1.1434)	(1.2495)	(0.978)
OUTFLOW * *STOP*	−0.062	−0.3171	-0.3735	-0.4376*
	(0.0836)	(0.3033)	(0.3489)	(0.2267)
LGDP	0.2233***	0.2707***	0.28***	0.23***
	(0.0621)	(0.0786)	(0.0714)	(0.0724)
EXREGIME	−0.1998***	−0.2184	-0.3312***	-0.2638**
	(0.0468)	(0.1787)	(0.1158)	(0.1253)
KAOPEN	−0.2017	−2.3291	0.7745	1.0129
	(0.4527)	(2.8019)	(1.5427)	(1.9039)
Time Dummies	YES	YES	YES	YES
Wald test on outflow	0.1697	0.4666	0.3732	0.1852
No. of Countries	56	56	56	56
No. of Observations	1,231	1,168	1,231	1,175
R^2	0.2318			
Hansen test		0.743	0.388	0.753
A-B AR(2) test		0.858	0.840	1.000
No. of Instruments		47	54	47
Diff-in-Hansen test			0.399	

Notes: FEOLS for fixed-effects estimators, DGMM for two-step difference GMM estimators, SGMM for two-step system GMM estimators, and OGMM for two-step orthogonal deviation GMM estimators. Robust standard errors appear in parentheses(clustered with countries in FE estimators and Windmeijer-corrected in GMMs). *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. P-values appear in the tests.

〈Table 5〉 The impact of gross capital outflows and stops on total investment

	FEOLS	DGMM	SGMM	OGMM
OUTFLOW	-0.0158	-0.0687	-0.1675	0.1686
	(0.1014)	(0.2321)	(0.2747)	(0.2105)
STOP	-1.9469***	-2.297*	-3.2858*	-5.3684***
	(0.48)	(0.2686)	(1.7831)	(1.9249)
*OUTFLOW * STOP*	-0.1731	-0.1281	0.2126	0.0057
	(0.1141)	(0.2686)	(0.4575)	(0.2678)
LGDP	0.354***	0.3121*	0.3445***	0.2357
	(0.1084)	(0.1665)	(0.1133)	(0.3255)
EXREGIME	0.0971**	0.0023	0.0616	-0.0114
	(0.0428)	(0.0948)	(0.0888)	(0.1339)
KAOPEN	3.863**	4.4118	-0.3918	0.7016
	(1.8083)	(4.9106)	(3.0695)	(4.7536)
Time Dummies	YES	YES	YES	YES
Wald test on outflow	0.2422	0.5842	0.8264	0.7176
No. of Countries	55	55	55	55
No. of Observations	1,018	929	1,018	963
R^2	0.1797			
Hansen test		0.311	0.310	0.606
A-B AR(2) test		0.870	0.757	0.354
No. of Instruments		54	55	54
Diff-in-Hansen test			0.289	

Notes: FEOLS for fixed-effects estimators, DGMM for two-step difference GMM estimators, SGMM for two-step system GMM estimators, and OGMM for two-step orthogonal deviation GMM estimators. Robust standard errors appear in parentheses(clustered with countries in FE estimators and Windmeijer-corrected in GMMs). *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively. P-values appear in the tests.

Ⅴ. Conclusions

This paper uses an interaction model with three GMM estimators to generate unbiased estimates. The results are not different from those obtained by Suh(2022), who suggested that flights are only harmful if they occur simultaneously with stops according to empirical evidence from a time trend model. However, a time trend model with an OLS estimator cannot eliminate bias in the coefficients, making the results vulnerable to endogeneity and making the results doubtful. To overcome this shortcoming, this paper estimates the same effects using an interaction model with three GMM estimators that generate unbiased estimates. These results therefore support the arguments in Suh(2022) and complement his results.

Nonetheless, it is worth noting that the results also feature some limitations. Although they suggest that simultaneous flights and stops are very harmful, some of the coefficients for the interaction terms were statistically insignificant, which makes the results seem inconclusive. This is the main concern with using an interaction model－because interaction terms that multiply some constitutive terms are highly correlated to them. Especially, this paper defines flights and stops using dummy variables, which makes the interaction terms simply the subset of two variables. We surmise that this could be the main reason why some coefficients for the interaction terms become insignificant.

However, it is also worth noting that this limitation cannot vitiate this study’s results. This issue is an intrinsic feature of an interaction model rather than a problem caused by an incorrectly designed econometric model. Furthermore, an interaction model provides additional information that cannot be revealed by other models while enabling the generation of unbiased estimates. Therefore, we argue that the gains from its use are much greater, which justifies the use of the model and its results. Of course, I aim to suggest better empirical evidence in a future work.

To conclude, the paper confirms that flights unaccompanied by stop fail to depress domestic economies whereas simultaneous flights and stops do. Indeed, the damage from flights depends not only on gross capital outflows but also inflows. For this reason, the government should closely monitor the two flows caused by domestic agents and foreigners to prevent financial markets from collapsing due to abrupt changes in capital flows. Considering the fact that emerging market economies have experienced financial crises due to abrupt changes caused by investors for a long time, careful policy implementation is one of the most important tasks for maintaining a sound financial system and sustainable economic growth.

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국문요약

플라이트와 스톱의 동시 발생이 경제 성장과 투자에 미치는 영향: 신흥 시장의 증거를 중심으로

서재현 ▌ 계명대학교

본 연구는 국내 투자자들이 해외 자산 구매를 크게 늘리는 현상을 가리키는 플라이트가 개발도상국의 경제 성장과 투자에 해로운 효과를 미치는지를 1990년부터 2014년까지 사이의 56개 개도국을 대상으로 한 패널 자료를 통해 알아보고자 한다. 또한, 플라이트의 효과가 해외 투자자가 국내 자산 구매를 크게 줄이는 현상을 가리키는 스톱과 동시에 발생할 경우 어떻게 작용할 것인지를 교호작용 모형을 통해 알아본다. 세 종류의 일반화적률법(차분적률법, 시스템적률법, 직교차이적률법)을 사용하여 내생성을 제거한 교호작용 효과를 추정한다는 것이 본 논문과 기존 논문들과의 중요한 차이점이다. 추정 결과는 플라이트가 스톱과 동시에 발생할 때만 성장과 투자를 저해하는 효과를 일으키는 반면에 단독으로 발생하는 플라이트는 경제에 해로운 효과를 미치지 못할 수 있음을 제시하고 있다. 이 결과는 비슷한 주제를 연구한 과거 논문들의 경험적 증거를 보완하고 있다.

주제어: 플라이트, 스톱, 일반화적률법, 교호작용 모형

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