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Are there different linkages of foreign capital inflows and the current account between industrial countries and emerging markets?

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Abstract This article investigates the causal relationship between the current account and foreign capital inflows on two groups of countries, industrial countries (ICs) and emerging markets (EMs), during the time period of 1987–2006. Apart from including three sets of control variables (macroeconomic, financial, and institutional) in the regression to avoid omitted variable bias, we additionally examine whether there is a disparate interaction between gross capital inflows and the current account and between net foreign inflows and the current account. Our empirical results show that for EMs, it is mostly true that foreign capital inflow Granger causes the current account, while for ICs, it is the other way around for causality although when using gross foreign capital inflows, there is less evidence of causality detected. We also find that for EMs, after the 1997–1998 currency crises, capital inflows change the nature of their effects on the current account, particularly for Asian EMs.

Keywords Foreign capital inflows · Current account · Financial account · Intertemporal current account · Emerging markets · Granger causality

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1 Introduction

The resurgence of capital mobility since the end of the 1980s has led to increased discussion over whether it is a curse or a blessing, in particular for emerging markets (EMs) as many were affected by currency crises during the last decade of the twentieth century (e.g., Eichengreen 2001; Edison et al. 2004). Those who advocate free capital movement argue that foreign capital flow helps countries get access to the international financial markets to facilitate investment opportunities and offers a significant increase in economic efficiency. However, an opposing view, held by Rodrik (1998) and Stiglitz (2004), among others, argues that free capital mobility does not necessarily lead to an optimal allocation of resources, as evidenced in the currency crises of the 1990s which afflicted many EMs and were mainly initiated by massive capital inflows and the ensuing sudden outflows precipitated the crises.[1] The boom-bust foreign capital flows that accompanied a series of currency crises in the 1990s have been dubbed a "capital account crisis (IMF 2003).[2]

A persistent current account deficit is a warning indicator for impending currency crises, as indicated in Corsetti et al. (1999) and Edwards (2002). Foreign capital flows can either spur the exuberant investment, or release the liquidity constraint to bring about profligate consumption, therefore leading to a current account deficit, and in some extreme cases, even deviate away from the sustainable path and bring on a speculative currency attack. The perception of a current account deficit leading to a currency crisis has extended to the recent debate on whether the U.S. persistent current account deficit, ongoing since the beginning of the 1990s, is the culprit for the current U.S. economic debacle and the global economic meltdown (e.g., Roubini and Setser 2004; Obstfeld and Rogoff 2004; McKinnon 2001; Poole 2005; Bernanke 2005).[3] However, developed and developing countries are different and suggesting that the U.S. will suffer from capital account crisis that Asian countries experienced in the late 1990s is unfitted. As opined by Caballero et al. (2005), Australia, with its flexible

[1] Stiglitz (2004) argued that as there is considerable information asymmetry in international financial markets, free capital mobility does not necessarily lead to an optimal allocation of resources. Rodrik (1998) emphasized that openness to international capital flows can be especially dangerous if the appropriate controls, regulatory apparatus, and macroeconomic frameworks are not in place. During sudden stop episodes, as indicated in Calvo (1998), foreign financing quickly dries up and sudden capital outflows deplete the foreign reserves, which deprive the central bank of the ability to defend the pegged rate regime and results in a currency crisis.

[2] Note that since 1993, the balance of payment manual provided by the IMF has reclassified most items in the previous capital account into a newly coined account, "financial account." Currently, the capital account keeps meager items, but its name usually refers to the financial account. Here, the "capital account crises" in fact indicate "financial account crises."

[3] Roubini and Setser (2004) presented that once foreign investors (either private sector or central banks) stop financing the U.S., the "sudden stop" could spin a series of ugly adjustment, accompanied by a *GDP* slump. Obstfeld and Rogoff (2004) suggested that if the correction of the current account imbalance is resolved by deep currency depreciation, then turbulent consequences are inevitable. Bernanke (2005) argued that the unprecedented low savings rate of the U.S. is due to a "global savings glut," particularly appearing in the emerging market economies. Hence, the problem of the U.S. enduring a current account deficit does not come from the U.S. McKinnon (2001) and Poole (2005) nonetheless pointed out that with the privilege the U.S. has under the current international dollar standard, the U.S. will not suffer from the plight of financial crises that emerging market economies experienced in the 1990s.

exchange rate regime, domestic currency-denominated debt instruments, and sophisticated financial system, is rarely heard of suffering from an Asian-type financial crisis, even with an enduring current account deficit.[4] In addition, Rodrik and Subramanian (2009) argued that financial globalization and its accompanying free capital mobility may be beneficial to developed countries, but it disappoints developing countries.

There has recently been a surge of research attempting to address the relationship between foreign capital inflows and current account imbalances (Fry et al. 1995; Wong and Carranza 1999; Yan 2007). These studies, although using different time periods or different sample countries, mostly conform to a general conclusion that the current account Granger causes foreign capital inflows in industrial countries (ICs), while in EMs, foreign capital inflows usually cause or "push" the current account toward an imbalance. The policy implication is that EMs are susceptible to the whimsical movement of foreign capital inflows, and therefore such countries should be cautious when liberalizing the capital account.

Due to the important policy implication from different causal relationships of the current account and foreign capital inflows between ICs and EMs, this article attempts to further explore this issue by considering factors which were neglected from previous studies. Instead of investigating an individual country, we focus on using a panel data with two groups of countries: 23 EMs and 22 ICs. Adding three sets of control variables (macroeconomic, financial, and institutional) allow us to grapple with the issue of "omitted variables" bias from previous studies. In addition, ever since the 1997–1998 Asian currency crises, there is a salient change in EMs in dealing with foreign capital inflows and a current account imbalance, as noted in IMF (2007a), Ghosh et al. (2008), and Mihaljek (2008). We also investigate whether the second wave of capital mobility since 1997 will bring any difference in the causal relationship.

Our findings show that the current accounts of EMs are indeed susceptible to foreign capital inflows, while the current accounts of ICs are not, although there appear different implications when using net or gross foreign capital inflows. We also detect that after 1997, foreign capital inflows have a positive causal relationship on the current account for EMs instead of the negative effect for the periods prior to 1997. This reflects the fact that EMs accumulate enormous foreign reserves in order to self-insure themselves from currency crises. In the robustness check, we use samples of eight Asian EMs and ICs, excluding those financial centers, and achieve similar results when using the full sample of countries. When using components of the current account and foreign capital flows to examine which components serve as the driving forces of causality, we find that the testing results mostly remain the same, although it merits demonstrating which components are the driving forces for the causal relationship.

The rest of this article is organized as follows. Section 2 summarizes different theoretical perspectives about the channels of the causal relationship between the current account and financial account and reviews the relevant empirical literature. We then

[4] The Australian experience of smoothly sailing through a persistent current account deficit during the 1980s and the turbulent period of the Asian 1997–1998 crisis vindicates that it is groundless to worry about a current account imbalance in the U.S. The ongoing global financial crisis, although is also proceeded with the persistent current account deficit of the U.S. Unlike the emerging market financial crisis, it is mainly triggered by the over-leverage and poor risk management in the banking system.

present our motivation and explain the data used in the empirical study. Section 3 explains the method of panel Granger-causality estimation and the testing results, while Sect. 4 presents additional robustness tests by examining the causal relationship using different countries in the group and the components of the current account and foreign capital inflows. Concluding remarks are in Sect. 5.

2 Foreign capital inflows and the current account imbalance

An expedient way to show how the current account interacts with foreign capital inflows is from the balance of payment accounting, expressed as follows:

$$BOP = CA + FA, \tag{1}$$

where *BOP, CA*, and *FA* represent balance of payment, current account, and financial account, respectively.[5] *FA* records the net foreign capital inflows (outflows, when negative). With a flexible exchange rate and official intervention hardly existing, *BOP* is close to zero and negligible. On the other hand, under a fixed or managed floating exchange rate regime, *BOP* is like a residual which serves to balance the accounts of *CA* and *FA*.

Equation 1 can be rearranged for macroeconomic analysis. *CA* is expressed as the difference between national savings (S) and investment (I), and *FA* is composed of three main components: foreign direct investment (*FDI*), portfolio investment (*PI*), and other investment (*OI*, mostly bank loans). In addition, the BOP accounting indicates that *FA* is the balance of foreign assets (representing gross capital outflows) and foreign liabilities (representing gross capital inflows, or *FAG*, which we shall discuss more later). The decomposition of *CA* or *FA* helps to catch which components are the main driving forces for the change.

Note that Eq. 1 is an accounting identity, and it does not imply any causal relationship. In the following, we introduce the theoretical perspectives in the related literature to explain the possible channels of the causal relationship between the current account and foreign capital inflows.

2.1 Theoretical perspectives on the causal channels between the current account and foreign capital inflows

The resurgence of foreign capital flows into developing countries since the end of the 1980s has drawn much attention on their causes and possible consequences.[6] Two factors which operate to attract foreign capital inflows are proposed—namely, "pull" and "push" factors—as noted in Goldstein (1995) and Agènor and Montiel (1999).

[5] We ignore the capital account, omitted items, and statistical error here.

[6] The Latin America debt crisis erupted at the beginning of the 1980s and thereafter international capital flows were shunned from developing countries. After resolution was initiated by the Brady Plan, international capital resurged and began to flow into developing countries. See Agènor and Montiel (1999, pp. 545–574).

"Pull" factors (also called "internal" factors) relate to those that attract capital from abroad as a result of advantageous domestic conditions, such as a higher marginal productivity of capital, improved creditworthiness induced by better macroeconomic policy, and structural reform. "Push" factors (also called "external" factors) are those that originate outside of the countries. For instance, unfavorable conditions in ICs result in a low interest rate and recession, which invoke capital to flow out of ICs and into developing countries. Calvo et al. (1993) found that external factors, not internal factors, explain the foreign capital inflows into Latin America in the late 1980s.[7]

In an open economy, there is an apparent close tie between capital inflows and current account. If "pull" factors are in the making for foreign capital to flow in, then this represents that the domestic economic environment is favorable to attract foreign investors, and it is plausible that the current account would lead or cause foreign capital inflows. On the other hand, if it is "push" factors in the making, then this external factor could cause foreign capital to flow into domestic markets and cause the current account to change. In reality, both pull and push effects might be at work simultaneously and which factor dominates can only be determined empirically. Except for these two different driving forces of capital inflows which can bring about different causal relationships, there are various theoretical perspectives which could explain the rationale of the causal relationship between foreign capital inflows and the current account.

2.1.1 Intertemporal model of current account

The intertemporal current account balance model, as advocated by Sachs (1981, 1982) and Obstfeld and Rogoff (1996), among others, suggests that foreign capital inflows serve to finance the gap of national saving and investment. The current account functions as a "buffer stock" to smooth the intertemporal consumption. As a result, foreign capital inflows serve a purpose to finance the current account imbalance. Foreign capital inflows are attracted into the country to finance domestic investment, because of the host country's rosy investment opportunity, or to finance increasing consumption due to a promising future as a result of high economic growth and wealth creation from the "New Economy."[8] This view of foreign capital inflows, serving to fill the gap created from the difference between savings and investment, has permeated into most of the reasoning on the issues of a current account deficit. According to this approach, the current account leads, or causes foreign capital inflows.

[7] The conclusion of Calvo et al. (1993) is based on the finding that international reserve accumulation and real exchange rate appreciation in Latin American capital-receiving countries are highly correlated with various U.S. financial variables.

[8] Pakko (1999) argued that the U.S. current account deficit is attributable to its immense investment opportunities and strong economy. Engle and Rogers (2006) showed that expected higher future income growth will make up the gap of a current shortage on savings.

2.1.2 Country portfolio: international wealth diversification

With the ongoing global financial integration since the 1980s, countries' holdings of external assets have grown rapidly as shown by Lane and Milesi-Ferretti (2001, 2006), and investors are allowed to reap benefits by exercising portfolio diversification as Driessen and Laeven (2007) demonstrated. Ventura (2001) and Kraay et al. (2005) proposed that the determination of the "country portfolio" can affect the current account through two effects. One is the portfolio growth effect which could result from the change of a country's wealth, and the other is the portfolio rebalancing effect, which might result from the change in the distribution of asset returns. If the deployment of the country portfolio governs the balance of payment accounting, then the current account will passively respond to the change of the country wealth deployment. In other words, for the purpose of diversifying a country portfolio, foreign capital inflows can lead and drive the current account toward imbalance.

2.1.3 Summary

To summarize, with two opposing forces, whether the current account causes foreign capital inflows or vice versa depends upon which force dominates the causality direction. In general, there could be four outcomes between the current account and foreign capital inflows. First, the current account causes, or leads, foreign capital inflows, as the intertemporal current account model implies. Second, foreign capital inflows cause, or push, the current account imbalance, as the country portfolio model indicated . Third, there could be bi-directional causality. The principle of *BOP* accounting, which is an ex post concept, has a tendency to bind the current account and foreign capital inflows together. Fourth, if domestic and foreign investors are two independent parties who make their own investment or consumption decision, then there is no reason to expect that there will be any causal relationship between the current account and foreign capital inflows. This is particularly true when considering the causal relationship on the current account with gross capital inflows, instead of net foreign capital inflows.

2.2 Extant empirical studies and this article's motivation

To date, there are few empirical studies on the causal relationship between foreign capital flows and the current account. Fry et al. (1995) and Wong and Carranza (1999) focused on testing the causal relationship between *CA* and *FA* for developing countries.[9] Sarisoy-Guerin (2003) used different causality testing methods upon 20 developed countries and 19 developing countries and found that there are more developed

[9] Fry et al. (1995) applied an error correction model, which assumes that *CA* and *FA* have co-movements in the long run, and therefore the Granger non-causality can be tested. Using annual data from 1970 to 1992 for developing countries, Fry et al. (1995) found 17 countries with *FA* Granger causing *CA*, 12 countries with *CA* Granger causing *FA*, and 21 countries without a causal relationship. Wong and Carranza (1999) studied four developing countries (Argentina, Mexico, the Philippines, and Thailand) and showed that, prior to 1989 when capital mobility was restricted, there is evidence that *CA* Granger causes *FA*, while the direction of causality is the opposite from 1989Q1 to 1994Q4 when global capital mobility became prevalent.

countries (including the U.S.) with causality going from *CA* to *FA*, while developing countries have more cases with causality going the opposite way.[10] Yan (2007), using seven countries each for ICs and EMs, found that it is mostly true that the financial account serves to finance a current account imbalance for ICs, but for the EMs the financial account helps push the current account toward imbalance.[11] Yan argued that different causal relationships can result from disparate stages of financial development, and suggested that developing countries should be cautious while dismantling capital mobility.

Distinct from previous studies, there are four novelties in this empirical study. First, unlike the previous studies testing the causality within each individual country, we use a panel data with two groups of countries, namely 23 EMs and 22 ICs, to determine a more general causal relationship between the current account and foreign capital inflows. Second, previous studies, such as Wong and Carranza (1999) did not use control variables, while Yan (2007) only used the exchange rate and *GDP* as control variables. To avoid a possible omitted variable bias, we deliberately use three sets of control variables: macroeconomic variables, financial variables, and institutional variables. Within these three groups of control variables, financial variables, which emphasize the quality of financial system, has been argued as one of the main causes of global current account imbalance and international capital flows (e.g., Dorrucci et al. 2009). Third, previous studies are mostly based on net foreign capital inflows, which are tantamount to the financial account (*FA*) in the balance of payment accounting. In order to examine how foreign investors interact with a country's current account, it would be more sensible to use the gross foreign capital inflows (*FAG*), which only include the liabilities of the financial account.[12] In theory, foreign investors do not consider financing a country's current account imbalance as their purpose. Hence, it is plausible that *FAG* will not have any causal relationship with *CA*. Fourth, since the 1997–1998 Asian financial crises, there has been a significant change in the structure of capital flows, particularly for the EMs as noted in IMF (2007b). We also examine whether there are different causal relationships between prior to and after 1997.

[10] Sarisoy-Guerin (2003) investigated annual data, starting variously from the 1960s up to 2000, for 20 developing and 20 developed countries. Abiding by the rule of the same integrated order so as to run the causal relation regression between *CA* and *FA*, he applied either the standard Granger-causality test or the co-integration error correction causality test. However, pre-testing the unit root to identify the same integrated order reduces the number of qualified countries for the causality test to less than half.

[11] Using the sample period starting differently but all ending in 2003Q4, Yan (2007) also investigate the causal relationship between current account and three different components of foreign capital inflows—foreign direct investment (*FDI*), portfolio investment (*PI*), and other investments (*OI*, mainly bank loans)—and found similar results that there is different causal relationship between EMs and ICs.

[12] Net foreign capital inflows are defined as the difference between foreign investors investing in the domestic country and domestic investors investing in foreign countries. It is the result of the mixed decision-making of both domestic and foreign investors. However, gross foreign capital inflows principally represent only the decision-making of foreign investors.

2.3 Country samples and data

Our sample countries include 22 ICs and 23 EMs as selected in the Morgan Stanley Capital International (MSCI) Index.[13] Since global capital mobility has resurged from the end of the 1980s, our sample starts from 1987 and ends in 2006, prior to the global financial crisis underway since summer 2007. In Tables 1 and 2, we show the descriptive statistics for ICs and EMs' current account, financial account (net foreign capital inflows, *FA*), and gross foreign capital inflows (*FAG*), which are all in terms of *GDP*. At the bottom of the table, the last three rows show the country mean (non-GDP weighted) of these three variables for three different time periods: 1987–2006, 1987–1996, and 1997–2006.

Three features are worth noting. First, with few exceptions (Hong Kong, Singapore, and Switzerland), the temporal averages of *CA* and *FA* are moderate for most countries. Even for the U.S., which has been criticized recently for its high *CA* deficit, the average *CA* (−2.93%) is not high. Second, for the country mean of *FAG*, ICs are much higher than EMs, or about four times higher on average, and during the second period (1997–2006) it is about seven times (ICs' *FAG* reaches as high as 18.75%, while for EMs it is 2.74%).[14] This indicates that ICs have much more open financial markets and have actively diversified their assets internationally. Third, for the EMs the second period exhibits that both *CA* and *FA* are in a surplus, which is in contrast to the first period (1987–1996) when *CA* is in a deficit (−1.61%) and *FA* is relatively high (with 2.67%). This demonstrates that after the 1997–1998 currency crises, *CA* has reversed to a surplus in EMs. The double-thronged flow of foreign capital from *CA* and *FA* simply reflects dramatic increases of foreign reserves in EMs, as to self-insure from the devastating effects of sudden stop or currency crises (e.g., Edison 2003; Aizenman and Lee 2006; Jeanne 2007).

Figures 1 and 2 show the scatter diagram for two pairs of variables—*CA* and *FA*, and *CA* and *FAG*—for both ICs and EMs. In Fig. 1, it is apparent that *CA* and *FA* have a negative correlation in ICs, while for the EMs, there is also a negative correlation, but it is less acute. On the contrary, in Fig. 2, *CA* and *FAG* show no correlation in ICs, while for EMs it demonstrates a compellingly negative correlation. To be sure, a correlation does not imply causality.

3 Granger-causality estimation

Based on the spirit of Granger (1969), we test the causality by investigating whether the lagged *CA (FA)* has significantly explanatory power on *FA (CA)*. Our estimation methodology is similar to Aizenman and Noy (2006), in which an ordinary fixed-effect

[13] 22 ICs include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherland, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, UK, and U.S.; 23 EMs include: South Africa, Argentina, Brazil, Chile, Colombia, Egypt, Greece, India, Indonesia, Israel, Jordan, South Korea, Mexico, Morocco, Pakistan, Peru, Philippines, Sri Lanka, Taiwan, Thailand, and Turkey,

[14] ICs have a rather high *FAG* on average, even without considering those international financial centers such as Belgium, Hong Kong, Singapore, etc.

Table 1 *CA, FA*, and *FAG*: industrial countries

	CA (%)				*FA* (%)				*FAG* (%)			
Country	Mean	Max	Min	SD	Mean	Max	Min	SD	Mean	Max	Min	SD
Australia	−4.15	−1.86	−5.94	0.011	4.52	6.76	1.70	0.015	8.28	17.43	4.23	0.031
Austria	−0.77	2.88	−3.25	0.015	0.81	4.25	−3.15	0.017	11.64	28.78	2.16	0.089
Belgium	3.86	5.74	1.84	0.014	−3.85	−0.25	−6.26	0.019	56.48	156.29	4.45	0.464
Canada	−0.05	3.20	−3.09	0.022	0.28	3.82	−2.88	0.022	6.12	10.65	2.52	0.020
Denmark	1.38	3.88	−2.85	0.019	−0.73	6.39	−4.86	0.031	9.84	31.45	−8.10	0.087
Finland	2.70	10.37	−5.57	0.053	−2.39	7.95	−10.46	0.058	10.19	33.02	−0.59	0.071
France	0.64	3.24	−1.27	0.013	−0.62	2.02	−3.34	0.013	11.06	31.43	1.70	0.084
Germany	1.17	5.17	−1.51	0.085	−1.14	2.96	−5.75	0.026	8.57	19.57	2.00	0.049
Hong Kong	6.75	11.02	0.08	0.037	−4.98	2.72	−10.25	0.045	12.05	63.07	−83.95	0.456
Ireland	2.53	10.94	−6.33	0.051	−1.68	6.91	−19.25	0.063	71.96	190.85	3.61	0.653
Italy	−0.08	3.18	−2.43	0.017	0.16	2.67	−3.60	0.018	6.99	15.30	1.69	0.038
Japan	2.60	3.80	1.35	0.007	−1.68	1.30	−3.06	0.011	1.65	5.92	−2.88	0.022
Netherland	4.04	7.91	1.65	0.082	−3.95	−0.03	−7.79	0.024	21.47	45.78	2.95	0.147
New Zealand	−4.52	−1.80	−9.05	0.022	4.11	13.05	−2.26	0.036	6.27	15.56	−4.58	0.042
Norway	6.55	16.41	−4.44	0.065	−5.65	4.20	−17.51	0.064	9.47	36.80	−2.47	0.095
Portugal	−3.73	1.03	−8.97	0.035	4.67	9.70	−3.68	0.036	14.83	30.33	1.82	0.083
Singapore	14.59	27.32	−0.77	0.068	−6.45	6.32	−18.32	0.077	24.88	56.70	−1.94	0.131
Spain	−2.19	0.99	−8.01	0.023	2.38	8.05	−2.30	0.028	12.16	25.60	0.14	0.074
Sweden	1.92	7.50	−3.36	0.034	−1.58	6.01	−7.24	0.042	11.74	27.17	2.12	0.076
Switzerland	8.64	14.71	2.57	0.037	−8.09	−1.72	−18.45	0.045	16.83	55.45	1.33	0.143
UK	−1.99	0.01	−5.05	0.012	2.11	4.73	−0.31	0.014	26.39	61.08	4.50	0.160
U.S.	−2.93	−0.03	−6.18	0.018	2.94	6.16	−0.07	0.017	6.71	14.09	1.85	0.033
Country mean (unweighted)												
1987–2006	1.12				−0.37				12.72			
1987–1996	0.56				0.40				9.05			
1997–2006	2.03				−1.63				18.75			

Note: All the data are from IFS. *CA, FA*, and *FAG* represent the current account, net foreign capital inflows, and gross foreign capital inflows, respectively. All are in terms of *GDP*. Country mean is calculated by using non-*GDP* weight

Table 2 *CA, FA*, and *FAG*: emerging markets

	CA(%)				*FA*(%)				*FAG*(%)			
Country	Mean	Max	Min	SD	Mean	Max	Min	SD	Mean	Max	Min	SD
South Africa	−0.62	7.47	−11.80	0.036	0.49	12.08	−6.85	0.032	0.03	0.54	−0.62	0.002
Argentina	−0.59	8.94	−4.82	0.038	−0.63	8.89	−19.87	0.072	1.46	11.83	−12.63	0.070
Brazil	−0.95	1.82	−4.27	0.021	0.78	4.95	−3.58	0.024	1.87	5.67	−3.12	0.025
Chile	−1.60	3.61	−5.36	0.023	2.57	9.26	−4.28	0.043	7.05	16.39	−5.21	0.053
Colombia	−1.39	4.78	−5.39	0.027	2.27	6.56	−1.19	0.022	3.88	8.93	−0.47	0.029
Egypt	1.11	6.75	−3.03	0.029	−2.76	3.37	5.62	0.056	−0.21	9.57	−18.99	0.058
Greece	−3.81	−0.15	−9.59	0.023	4.42	9.69	0.25	0.024	6.99	19.85	−0.63	0.055
India	−0.94	1.48	−2.36	0.010	2.33	3.74	1.32	0.006	2.52	5.22	1.09	0.010
Indonesia	0.17	4.84	−3.37	0.030	0.39	5.35	−7.89	0.034	1.03	5.37	−10.05	0.041
Israel	−0.24	6.26	−4.28	0.026	−0.38	8.83	−13.02	0.048	3.94	14.29	−11.79	0.047
Jordan	−2.47	13.13	−17.60	0.082	7.11	55.67	−7.98	0.140	7.90	35.66	−17.38	0.120
South Korea	1.63	11.74	−4.27	0.039	0.72	4.52	−5.73	0.026	2.95	8.68	−6.15	0.035
Malaysia	4.04	17.11	−9.73	0.090	0.58	21.57	−12.51	0.093	4.75	17.55	−3.07	0.055
Mexico	−2.48	3.03	−7.05	0.023	2.94	7.60	−5.15	0.033	3.80	9.27	−1.50	0.027
Morocco	0.19	4.71	−3.94	0.024	0.27	7.35	−4.21	0.031	0.77	8.35	−3.62	0.032
Pakistan	−2.32	5.64	−7.55	0.035	2.35	7.02	−3.60	0.032	2.54	7.63	−3.75	0.036
Peru	−3.77	2.64	−8.57	0.028	2.69	9.60	−5.13	0.042	4.06	10.00	0.68	0.029
Philippines	−1.80	5.13	−6.08	0.030	3.17	10.01	−2.25	0.035	4.92	15.70	−0.65	0.041
Sri Lanka	−3.74	−0.17	−6.61	0.019	3.90	11.13	−1.82	0.037	3.52	8.49	−2.22	0.035
Taiwan	5.50	17.32	1.18	0.037	−1.33	9.71	−9.19	0.045	5.38	14.51	−0.91	0.042
Thailand	−0.84	12.73	−8.53	0.063	2.86	12.41	−15.14	0.084	4.09	15.20	−9.47	0.076
Turkey	−1.61	2.33	−8.12	0.028	2.45	12.62	−11.18	0.048	3.65	15.66	−8.70	0.053
Venezuela	4.04	17.04	−9.62	0.076	−3.25	5.11	−12.95	0.054	2.34	7.96	−7.22	0.038
Country mean (unweighted)												
1987–2006	−0.94				1.77				3.18			
1987–1996	−1.61				2.67				3.45			
1997–2006	0.17				0.28				2.74			

Note: All the data are from IFS. *CA, FA*, and *FAG* represent the current account, net foreign capital inflows, and gross foreign capital inflows, respectively. All are in terms of *GDP*. Country mean is calculated by using non-*GDP* weight

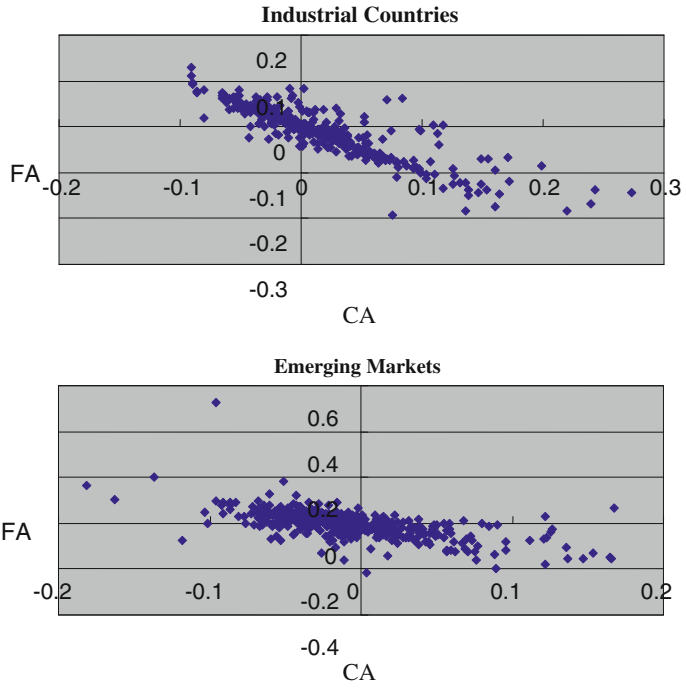

Fig. 1 Scatter diagram for *CA* and *FA*

model of panel estimation was implemented. While Aizenman and Noy (2006) focused on the causality between trade openness and financial openness, we are interested in the causality between a current account imbalance and foreign capital inflows.[15]

3.1 Panel causality estimation

The panel estimation equations are shown as follows.

$$CA_{it} = a_i^{CA} + b_1^{CA} FA_{it-1} + b_D^{CA}(D_{it-1} \times FA_{it-1}) + b_2^{CA} CA_{it-1} + b_3^{CA} M_{it} + b_4^{CA} F_{it} + b_5^{CA} I_{it} + e_{it} \quad (2a)$$

$$FA_{it} = a_i^{FA} + b_1^{FA} CA_{it-1} + b_D^{FA}(D_{it-1} \times CA_{it-1}) + b_2^{FA} FA_{it-1} + b_3^{FA} M_{it} + b_4^{FA} F_{it} + b_5^{FA} I_{it} + e_{it}, \quad (2b)$$

[15] Our testing methodology is similar to Aizenman and Noy (2006) with two main differences. The first is about the purpose. Aizenman and Noy (2006) emphasized on whether trade openness or financial openness leads, while we are interested in the relationship between the current account and foreign capital inflows. Aizenman and Noy (2006) focused on the causal relationship between *FDI* and current account imbalance (exports and imports), while we focus on the relationship between *CA* (*S* and *I*) and foreign capital inflows. Second, in the panel causality test we add a dummy interaction term to capture whether there is a disparity in the causal relationship between the current account and foreign capital inflows prior to and after the 1997–1998 Asian currency crises.

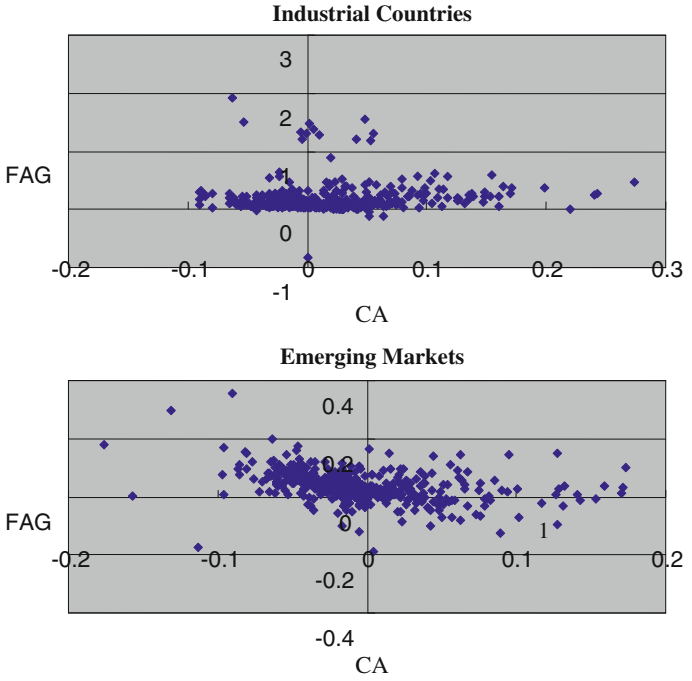

Fig. 2 Scatter diagram for *CA* and *FAG*

where *CA* and *FA* represent the current account and net capital inflows (or financial account). The estimated coefficients are denoted with a superscript align with the dependent variable. Term a_i is the country fixed effect, which is used to control for unobservable heterogeneity, and D_{it} is a dummy variable and it is 0 for the time period of 1987–1996, while it equals 1 for 1997–2006.

As suggested by IMF (2007a), after the 1997–1998 Asian financial crises there has been another wave of foreign capital inflows and a reversal of the current account toward a surplus in EMs, and this might influence the causal relationship. We therefore add a dummy interaction term to examine whether there is a different causal relationship. The null hypothesis of no-Granger-causality tests whether the estimated coefficients of the lagged variable, $CA_{it-1}(FA_{it-1})$, and the lagged dummy interaction term, $D_{it-1} \times CA_{it-1}$ $(D_{it-1} \times FA_{it-1})$, i.e., b_1^{CA} (b_1^{FA}) and b_D^{CA} (b_D^{FA}), are significantly different from zero. In order to have parsimonious estimated coefficients, the lag $(t-1)$ used here represents the one lag average over four periods, $t-1, \ldots, t-4$.[16]

[16] Using one lag average over four lagged periods allows us to capture the causal relationship by estimating a parsimonious regression and to save the degree of freedom. See the similar application in Aizenman and Noy (2006). We also consider two other ways to specify lags used in the regression for testing Granger causality. First, instead of using one lag average over four lags, we can directly use four different lags in the regression. Second, except using the one lag average over four lagged periods on the causal variables, we can extend the one lag average over four lagged periods to the control variables. We exercised these two different lag specifications and we found that the causal relationship mostly remain the same. The results are available from the authors upon request.

3.2 Control variables

In the spirit of the Granger-causality test, we include the lagged dependent variable as one of the regressors, and the other control variables included seek to capture those factors which could cause foreign capital inflows (e.g., Goldstein 1995; Agènor and Montiel 1999) and the current account (e.g., Chinn and Prasad 2003; Chinn and Ito 2007). We categorize control variables into three groups: macroeconomic variables (M), financial variables (F), and institutional variables (I). The description and sources of those control variables can be seen in the appendix.

Macroeconomic control variables include *GDP* (*YX*, growth rate of *GDP*), exchange rate (*EX*, growth rate of exchange rate), and economic openness (*OPEN*). Except for two control variables, *YX* and *EX* used in Yan (2007), we add the scale of an economy's openness, which could affect the current account and foreign capital inflows, as argued by Chinn and Prasad (2003) and Aizenman and Noy (2006). However, whether economic openness will bring a positive or negative influence on *CA* and *FA* (*FAG*) can only be determined empirically.[17]

Financial variables include financial deepness (the ratio of private credit by deposit money banks and other financial institutions over *GDP*; Beck et al. 2000), the financial development (ratio of the value of total shares traded to average real market capitalization, *SMTV*; Beck et al. 2000), and financial account openness (*KAOP*; Chinn and Ito 2008).[18] Financial deepness strengthens the capacity of a country to absorb large inflows or outflows of foreign capital and it could increase the saving rate and affect the current account, although its effect on *CA* and *FA* (*FAG*) is ambiguous. Financial development may lead to higher savings and therefore *CA* surplus (Chinn and Ito 2007), but it could be beneficial for investment. Therefore, whether it will cause a positive or negative effect on *CA* is uncertain. Likewise, there is no definite answer that financial development will bring more capital inflows or outflows, and therefore a negative or positive *FA*. Whether financial openness is beneficial or detrimental to an economy has been a hotly debated issue (Prasad et al. 2007). Financial openness influences *CA* and *FA*, but whether its effect on the current account and financial account is negative or positive remains an empirical question.

[17] We also add a dependence ratio (ratio of the number of people aged below 14 plus those aged above 64 over those aged between the ages of 15 and 65), and a government budget deficit. Both cannot change the fundamental casual relationship and for brevity we do not present the estimated results of including these two variables.

[18] We also tried the ratio of $M2$ over *GDP* as an indicator for financial deepness, and the estimations are mostly insignificant and irrelevant for the determination of causality. In Beck et al. (2000), there are other two measures of financial development including the stock market capitalization ratio and stock market total value traded (in terms of *GDP*), for brevity we do not present their estimation results. *KAOP* is based on IMF's Annual Report on Exchange Arrangements and Restrictions, in which four major categories of variables on the restrictions of external accounts are adopted: presence of multiple exchange rates, restrictions on current account transactions, restrictions on capital account restriction, and the requirements of the surrender of export proceeds. The index of *KAOP* is calculated from the first standardized principal component of these four variables. With duly adjustment, the index takes a higher value the more open the country is to cross-broader capital transaction.

Institutional variables include the index of corruption (*CU*), political stability (*ST*), and law and order (*LA*).[19] An economy with high corruption will be less attractive to foreign capitals, but its effect on the current account could be undetermined due to the negative effect on both savings and investment. A stable political system certainly attracts more foreign capital, but whether it will bring a positive or negative effect on the current account is indeterminate. A country following the law and order is apt to elicit more foreign investors, and in the meantime, it allows domestic investors to allocate their assets in foreign countries. Therefore, we are unable to ascertain whether it has positive or negative effects on foreign capital inflows and the current account.

The correlation coefficients show scant evidence of multi-collinearity among current account (and its components, *S* and *I*), foreign capital inflows (both net and gross, *FA* and *FAG*; and their components, *FDI* and *FDIG*, *PI* and *PIG*, and *OI*, and *OIG*) and all related control variables.[20] To assure that all the variables included in the regression follow the stationary process, those causal variables, macroeconomic variables and financial variables are either expressed in terms of *GDP* (such as *CA*, *FA*, *FAG*, and their components), or in the change rate (such as *YX*, *EX*). For institutional variables, since they change in a glacial pace, they are relatively stable. To be sure, we also implemented variant panel unit root tests for each variable to avoid the possible spurious regression.[21]

3.3 Causality between the current account and foreign capital inflows

In order to show whether there is biased from omitted variable, we present estimation results without and with control variables.[22] We use the ordinary OLS estimation of the fixed-effect model with panel corrected standard errors following the suggestion of Beck and Katz (1995). This estimator allows for cross-sectional heteroskedasticity and contemporaneous correlation of the residuals.[23] Table 3 are the estimation results for the cases of using *CA* and net foreign capital inflows (*FA*) as dependent variables, and Table 4 are the results for the cases of causal estimations between *CA* and gross

[19] These three indices are from International Country Risk Guide (ICRG). Corruption is an index with a range from 0 to 6, whereby the higher the index, the less corruption, and vice versa. Political stability is an index which has a range from 0 to 12, and the higher the index, the better the political stability. Law and order has an index ranging from 0 to 6, and the higher the index, the better is a country's law and order.

[20] For brevity, we do not present the correlation coefficients. They are available from the authors upon request.

[21] We use four different panel unit root tests and the regression model used includes individual constant term and the AIC is used to select the lags. Most variables can reject the null hypothesis of panel unit root, although some variables can be rejected only under other identifications of the model, such as with individual constant term and trend term. Results of panel unit root tests are available from the authors upon request.

[22] There are only 22 EMs included when control variables are added because Taiwan is excluded for lack of available data of three financial control variables.

[23] We use another method of White-type standard errors for the system of equations, which will produce the estimator robust to a cross-equation correlation as well as different error variance in cross-section (Wooldridge 2002; Arellano 1987). The causal results remain the same.

capital inflows (*FAG*). As shown in both tables, the adjusted R^2 is higher for ICs than for EMs and for *CA* than *FA* as a dependent variable. For instance, Table 3 shows that for the case with control variables, when using *CA* as the dependent variable, the adjusted R^2 is around 0.86 for ICs and around 0.44 for EMs. On the other hand, when using *FA* as the dependent variable, the adjusted R^2 is around 0.68 for ICs and 0.31 for EMs. In addition, adding control variables apparently brings higher adjusted R^2.

3.3.1 Using net capital inflows

Columns (1)–(4) of Table 3 present the estimated results of using *CA* as the dependent variable. Whether foreign capital inflows will affect *CA* depends upon the estimated coefficients of the first two rows: FA_{t-1} and $D_{t-1} \times FA_{t-1}$. For ICs, as shown in columns (1)–(2) the estimated coefficient of lagged *FA* (i.e., FA_{t-1}) and the dummy intersection term with lagged *FA* (i.e., $D_{t-1} \times FA_{t-1}$) are insignificant. This indicates that for ICs, *FA* does not Granger-cause *CA*. For the cases of EMs, as shown in columns (3)–(4), the estimated coefficients of FA_{t-1} are significant either without or with control variables (-0.44 and -0.51, respectively). The estimated coefficient of the dummy intersection term, $D_{t-1} \times FA_{t-1}$, is significant when control variables are not included, but it turns insignificant when adding control variables. It is interesting to note that the estimated coefficients of $D_{t-1} \times FA_{t-1}$ are all positive, and this is different from the negative estimated coefficient of FA_{t-1}. This result suggests that for EMs, after 1997 there is a change in the nature of capital inflows affecting *CA* although the marginal effect in the second period remains negatively signed as in the first period.

Columns (5)–(8) present the results of using *FA* as the dependent variable. For ICs, whether using control variables or not, the lagged variable CA_{t-1} is significant although only under the 10% significance level, and the estimated coefficients of the dummy intersection term, $D_{t-1} \times CA_{t-1}$, is also significant although under the 10% significance level (the model without using control variables is significant under the 5% significance level). There is evidence of Granger causality going from *CA* to *FA* for ICs although it is rather weak. For EMs, the estimated coefficients of CA_{t-1} are insignificant either adding control variables or not. However, the estimated coefficients of $D_{t-1} \times CA_{t-1}$ are significant (under the 10% significance level) without adding control variables, but when adding control variables it turns insignificant.

3.3.2 Using gross capital inflows

When implementing the estimation by using gross foreign capital inflows, we simply replace *FA* in Eqs. 2a and 2b with *FAG*. Columns (1)–(2) of Table 4 show that for ICs, no causality from *FAG* to *CA* is detected, whether control variables are included or not. On the contrary, for EMs, as shown in columns (3)–(4), the causality going from *FAG* to *CA* is rather conspicuous. It is worth noting that the estimated coefficient of FAG_{t-1} is negative, but the estimated coefficient of the dummy intersection term, $D_{t-1} \times FAG_{t-1}$, turns out to be a dominant positive. As shown in column (4), the estimated coefficient of FAG_{t-1} is -0.44, while the estimated coefficient of $D_{t-1} \times FAG_{t-1}$ is 0.45, which indicates that in the second period, *FAG* Granger

Table 3 Causality estimations: *CA* and *FA*

	CA as a dependent variable					*FA* as a dependent variable			
Explanatory variables	ICs (1)	ICs (2)	EMs (3)	EMs (4)	Explanatory variables	ICs (5)	ICs (6)	EMs(7) (7)	EMs(8) (8)
FA_{t-1}	−0.16	−0.19	−0.44	−0.51	CA_{t-1}	−0.32	−0.38	−0.11	0.16
	(0.26)	(0.21)	(0.00)***	(0.00)***		(0.11)	(0.07)*	(0.58)	(0.58)
$D_{t-1} \times FA_{t-1}$	−0.15	0.07	0.26	0.18	$D_{t-1}CA_{t-1}$	−0.25	−0.24	0.33	0.02
	(0.14)	(0.54)	(0.07)*	(0.16)		(0.04)**	(0.06)*	(0.08)*	(0.94)
CA_{t-1}	0.55	0.63	0.23	−0.05	FA_{t-1}	0.28	0.16	0.41	0.41
	(0.00)***	(0.00)***	(0.09)*	(0.71)		(0.18)	(0.49)	(0.01)***	(0.03)**
YX		0.01		−0.03	*YX*		0.00		0.06
		(0.44)		(0.00)***			(0.95)		(0.00)***
EX		−0.00		0.01	*EX*		0.03		−0.06
		(0.99)		(0.56)			(0.42)		(0.01)***
OPEN		0.06		0.04	*OPEN*		−0.00		−0.04
		(0.00)***		(0.06)*			(0.86)		(0.25)
PCDM		−0.01		0.04	*PCDM*		−0.00		−0.03
		(0.01)***		(0.12)			(0.69)		(0.24)
SMTV		−0.01		−0.03	*SMTV*		−0.00		0.05
		(0.14)		(0.00)***			(0.97)		(0.00)***
KAOP		0.00		0.00	*KAOP*		−0.01		0.00
		(0.15)		(0.46)			(0.00)***		(0.66)
CU		−0.00		−0.00	*CU*		−0.00		0.01
		(0.88)		(0.00)***			(0.38)		(0.18)

Table 3 continued

Explanatory variables	*CA* as a dependent variable				Explanatory variables	*FA* as a dependent variable			
	ICs (1)	ICs (2)	EMs (3)	EMs (4)		ICs (5)	ICs (6)	EMs(7) (7)	EMs(8) (8)
ST		−0.00		0.00	*ST*		0.00		−0.01
		(0.01)***		(0.01)***			(0.24)		(0.00)***
LA		0.00		−0.00	*LA*		−0.00		−0.00
		(0.23)		(0.44)			(0.55)		(0.70)
Observation	398	336	449	374	Observation	400	338	449	388
Adjusted R^2	0.84	0.86	0.37	0.44	Adjusted R^2	0.68	0.70	0.18	0.31

Note: *CA* current account, *FA* net foreign capital inflows, all are in terms of *GDP*. *YX* growth rate of *GDP*, *EX* change rate of real effective exchange rate (in terms of US dollar for EMs); *OPEN* (export + import) in terms of *GDP*, *PCDM* private credit by deposit money banks in terms of *GDP*, *SMTV* stock market turnover ratio, *KAOP* capital account openness, *CU* corruption, *ST* political stability, *LA* law and order. *D* denotes dummy variable (equals 0 prior to 1997 and equals 1 after 1997). The lag $(t-1)$ represents the average for $t-1, \ldots, t-4$. The estimated coefficients are shown inside the table and the number inside the parenthesis is the *p* value. ***, **, and * represent the significance level of 1, 5, and 10%, respectively

Table 4 Causality estimations: *CA* and *FAG*

	CA as a dependent variable					*FAG* as a dependent variable			
Explanatory variables	ICs (1)	ICs (2)	EMs (3)	EMs (4)	Explanatory variables	ICs (5)	ICs (6)	EMs (7)	EMs (8)
FAG_{t-1}	−0.03	−0.02	−0.46	−0.44	CA_{t-1}	0.95	0.00	−0.01	−0.01
	(0.18)	(0.77)	(0.00)***	(0.00)***		(0.02)**	(0.99)	(0.95)	(0.95)
$D_{t-1} \times FAG_{t-1}$	−0.01	−0.01	0.54	0.45	$D_{t-1} \times CA_{t-1}$	−0.10	−0.08	0.39	0.24
	(0.72)	(0.87)	(0.00)***	(0.00)***		(0.80)	(0.84)	(0.01)***	(0.21)
CA_{t-1}	0.83	0.73	0.33	0.19	FAG_{t-1}	1.01	0.77	0.52	0.42
	(0.00)***	(0.00)***	(0.01)***	(0.17)		(0.00)***	(0.00)***	(0.00)***	(0.00)***
YX		0.02		−0.05	*YX*		−0.28		0.05
		(0.26)		(0.00)***			(0.05)**		(0.02)**
EX		−0.01		−0.00	*EX*		0.12		−0.06
		(0.87)		(0.82)			(0.46)		(0.01)***
OPEN		0.06		0.05	*OPEN*		0.27		−0.03
		(0.00)***		(0.03)**			(0.02)**		(0.21)
PCDM		−0.01		0.03	*PCDM*		−0.00		−0.01
		(0.04)**		(0.20)			(0.93)		(0.64)
SMTV		−0.00		−0.03	*SMTV*		0.04		0.03
		(0.32)		(0.00)***			(0.09)*		(0.06)*
KAOP		0.00		−0.00	*KAOP*		−0.02		0.01
		(0.03)**		(0.93)			(0.10)*		(0.06)*
CU		−0.00		−0.01	*CU*		−0.03		0.00
		(0.58)		(0.02)**			(0.02)**		(0.45)

Table 4 continued

Explanatory variables	*CA* as a dependent variable				Explanatory variables	*FAG* as a dependent variable			
	ICs (1)	ICs (2)	EMs (3)	EMs (4)		ICs (5)	ICs (6)	EMs (7)	EMs (8)
ST		−0.00		0.00	*ST*		0.00		−0.02
		(0.07)*		(0.26)			(0.98)		(0.07)*
LA		0.01		−0.00	*LA*		−0.01		−0.00
		(0.07)*		(0.69)			(0.39)		(0.27)
Observation	398	326	434	375	Observation	400	328	433	374
Adjusted R^2	0.84	0.86	0.40	0.43	Adjusted R^2	0.75	0.81	0.21	0.31

Note: *CA* current account, *FAG* gross foreign capital inflows, all are in terms of *GDP*. *YX* growth rate of *GDP*, *EX* change rate of real effective exchange rate (in terms of US dollar for EMs); *OPEN* (export + import) in terms of *GDP*, *PCDM* private credit by deposit money banks in terms of *GDP*, *SMTV* stock market turnover ratio, *KAOP* capital account openness, *CU* corruption, *ST* political stability, *LA* law and order. *D* denotes dummy variable (equals 0 prior to 1997 and equals 1 after 1997). The lag $(t-1)$ represents the average for $t-1, \ldots, t-4$. The estimated coefficients are shown inside the table and the number inside the parenthesis is the *p* value. ***, **, and * represent the significance level of 1, 5, and 10%, respectively

causes *CA* with a positive marginal effect of 0.01. For EMs, as compared to column (4) of Table 3 when *FA* is used, the second period of *FAG* does play a disparate and stronger role to cause *CA*.

Columns (5)–(8) of Table 4 show the estimation results when *FAG* serves as the dependent variable. For ICs, while no control variables added, the estimated coefficient of FAG_{t-1} is significant, as shown in column (5). However, column (6) shows that when adding control variables, no causal relationship is detected for ICs under the 5% significance level. For EMs, the estimated coefficients of CA_{t-1} are all insignificant either adding control variables or not. Although the estimated coefficient of dummy intersection term $D_{t-1} \times CA_{t-1}$ is significant, as shown in column (7), it turns insignificant after adding control variables, as shown in column (8).

3.3.3 Summary

We find that adding control variables make a difference for the causal relationship. This difference is more acute for the cases between *CA* and *FAG*. For both ICs and EMs, without adding control variables, it is evident that there is Granger causality going from *CA* to *FAG*, while after adding control variables, the causal relationship disappears. Based on the evidence from models of using control variables, there is Granger causality going from *CA* to *FA* for ICs, while for EMs, it is the other way around that *FA* Granger causes *CA*. This is similar to what found in Sarisoy-Guerin (2003) and Yan (2007). However, we also found that there is almost no causal relationship detected between *CA* and *FAG* for ICs. It indicates that there exists a decoupled decision-making between foreign investors and domestic agents. Indeed, with a sophisticated financial system in ICs, there is no reason to expect that domestic investors and foreign investors will have any connection when making their investment decisions. For EMs, although there is evident that gross foreign capital inflows serve to push *CA* toward imbalances, we also found that in the second period *FA* and *FAG* change the nature of its influence on *CA*. This resonates what IMF (2007b) observed that two waves (prior to and after the 1997–1998 crises) of international capital movement to EMs exhibited different features.

4 Additional robustness check

Considering that the foregoing estimation results might be contaminated when using different country samples, we group eight Asian EMs (EMs-8) and exclude seven financial centers and Ireland from ICs (ICs-14) to test whether the causal relationship will be different.[24] In addition, there might be aggregation bias because *CA* and *FA* (*FAG*) are aggregated variables. Hence, the causal relationship might exist, but it

[24] Asian EMs include eight countries: India, Indonesia, South Korea, Malaysia, Pakistan, the Philippines, Sri Lanka, and Thailand. Taiwan is not included due to the available data of financial variables. ICs-14, after excluding seven financial centers (Belgium, Hong Kong, the Netherlands, Singapore, Switzerland, UK, and the U.S.) and Ireland, contain 14 countries: Australia, Austria, Canada, Denmark, Finland, France, Germany, Italy, Japan, New Zealand, Norway, Portugal, Spain, and Sweden. Ireland is not included because of its high and unusual capital inflows ratio, particularly the gross capital inflows as shown in Table 1.

might be canceled out due to an opposite causal relationship in their components. For instance, *CA* is the difference between national saving (S) and investment (I), and foreign capital inflows might affect S or I, but their effect might be obscure when using *CA* instead. On the other hand, *FA(FAG)* is composed of three components: foreign direct investment, *FDI (FDIG)*, portfolio investment, *PI (PIG)*, and other investment, *OI (OIG)*. With different natures of these three components, each could have a disparate relationship with*CA*. As noted, *FDI* is usually for the long-term purpose and is relatively more stable, while *OI* (consisting mainly of short-term bank loans) and *PI* are rather whimsical, as witnessed during the Asian currency crises (Sarno and Taylor 1999a; Baily et al. 2000; Sula and Willet 2009).[25]

4.1 Using different country groups

In Table 5, columns (1) and (2) are the estimated results for testing whether *FA* Granger causes *CA*, and columns (3) and (4) show estimated results of the other way around, i.e., whether *CA* Granger causes *FA*. For ICs-14, the causal relationships are mostly similar to those shown in Table 3, except that there is evidence of the dummy intersection term, $D_{t-1} \times FA_{t-1}$, Granger causing *CA*. For Asian EMs-8, *FA* Granger causing *CA* remains mostly the same with those testing results in Table 3 with two differences. One is that the estimated coefficient of dummy intersection term of *FA* has a significant effect on *CA* as shown in column (2). The other is that the estimated coefficient of dummy intersection term of *CA*, $D_{t-1} \times CA_{t-1}$, has a significant effect on *FA* as shown in column (4).

Table 6 is the estimated results for causal relationship between *CA* and *FAG*. Columns (1) and (3) show that, similar to Table 4, there is no causal relationship detected between *CA* and *FAG* for ICs-14. For EMs-8, column (2) shows that the estimated coefficients of FAG_{t-1} and $D_{t-1} \times FAG_{t-1}$ are -0.78 and 0.72, respectively, and both are significant. This is similar to the results of Table 4 although with different estimated coefficients and the estimated coefficient of the dummy intersection term is not high enough to bring a positive marginal effect from the second period of *FAG*. Asian EMs-8 also show an interesting evidence of Granger causality going from *CA* to *FAG*, with the estimated coefficient of $D_{t-1} \times FAG_{t-1}$ 0.64, which is significant and higher than the estimated coefficient of FAG_{t-1}, -0.27 (insignificant) as shown in

[25] Sarno and Taylor (1999b) investigated the relative importance of permanent and temporary components of capital flows to Latin American and Asian developing countries over the period 1988–1997, for the broad categories of flows in the capital account: equity flows (*EF*), bond flows (*BF*), official flows (*OF*), commercial bank credit (*BC*), and foreign direct investment (*FDI*). They found relatively low permanent components in *EF, BF* and *OF*, while commercial *BC* flows appear to contain quite large permanent components and *FDI* flows are almost entirely permanent. Baily et al. (2000) found that during the 1997–1998 Asian financial crises *FDI* is relatively stable, while other investments (bank loans mostly) are not. Sula and Willet (2009) studied whether some types of capital flows are more likely to reverse than others during currency crises by using data for 35 emerging economies for 1990–2003. Their results confirm that direct investment is the most stable category. However, they find that contrary to much popular analysis, private loans on average are as reversible as portfolio flows.

Table 5 Causality estimations for ICs-14 and EMs-8: *CA* and *FA*

	CA as a dependent variable			*FA* as a dependent variable	
Explanatory variables	ICs-14 (1)	EMs-8 (2)	Explanatory variables	ICs-14 (3)	EMs-8 (4)
FA_{t-1}	−0.12	−1.04	CA_{t-1}	−0.05	−0.39
	(0.38)	(0.00)***		(0.81)	(0.34)
$D_{t-1} \times FA_{t-1}$	−0.26	0.53	$D_{t-1} \times CA_{t-1}$	−0.50	0.67
	(0.04)**	(0.00)***		(0.00)***	(0.01)***
CA_{t-1}	0.42	−0.42	FA_{t-1}	0.13	0.35
	(0.00)***	(0.13)		(0.56)	(0.22)
YX	−0.00	0.01	*YX*	0.01	0.02
	(0.88)	(0.85)		(0.84)	(0.83)
EX	0.04	0.01	*EX*	−0.00	−0.03
	(0.25)	(0.83)		(0.93)	(0.60)
OPEN	0.17	0.01	*OPEN*	−0.15	0.01
	(0.00)***	(0.72)		(0.00)***	(0.75)
PCDM	−0.02	0.06	*PCDM*	0.01	−0.09
	(0.00) ***	(0.02)**		(0.17)	(0.00)***
SMTV	−0.01	−0.02	*SMTV*	0.00	0.04
	(0.05)**	(0.13)		(0.94)	(0.00)***
KAOP	0.00	−0.01	*KAOP*	−0.01	0.02
	(0.37)	(0.01)***		(0.02)**	(0.01)***
CU	−0.00	−0.01	*CU*	−0.00	0.02
	(0.23)	(0.00)***		(0.76)	(0.00)***
ST	−0.00	0.00	*ST*	0.00	−0.00
	(0.03)**	(0.38)		(0.08)*	(0.23)
LA	0.00	0.01	*LA*	−0.00	−0.01
	(0.08)*	(0.01)***		(0.32)	(0.02)**
Observation	238	152	Observation	239	152
Adjusted R^2	0.81	0.64	Adjusted R^2	0.67	0.49

Note: ICs-14 contains 14 industrial countries except the financial centers and Ireland and EMs-8 includes eight Asian emerging market countries. *CA* current account, *FA* net foreign capital inflows, all are in terms of *GDP*. *YX* growth rate of *GDP*, *EX* change rate of real effective exchange rate (in terms of US dollar for EMs); *OPEN* (export + import) in terms of *GDP*, *PCDM* private credit by deposit money banks in terms of *GDP*, *SMTV* stock market turnover ratio, *KAOP* capital account openness, *CU* corruption, *ST* political stability, *LA* law and order. *D* denotes dummy variable (equals 0 prior to 1997 and equals 1 after 1997). The lag $(t-1)$ represents the average for $t-1, \ldots, t-4$. The estimated coefficients are shown inside the table and the number inside the parenthesis is the p value. ***, **, and * represent the significance level of 1, 5, and 10%, respectively

column (4). Although this result seems different from the case using the whole sample countries of 23 EMs (where there is no evidence of Granger causality from *CA* to *FA* and *FAG*), it reflects the phenomenal current account reversal and foreign reserve

Table 6 Causality estimations for ICs-14 and EMs-8: *CA* and *FAG*

	CA as a dependent variable			*FAG* as a dependent variable	
Explanatory variables	ICs-14 (1)	EMs-8 (2)	Explanatory variables	ICs-14 (3)	EMs-8 (4)
FAG_{t-1}	0.00	−0.78	CA_{t-1}	−0.22	−0.27
	(0.99)	(0.00)***		(0.35)	(0.40)
$D_{t-1} \times FAG_{t-1}$	0.02	0.72	$D_{t-1} \times CA_{t-1}$	0.14	0.64
	(0.77)	(0.00)***		(0.58)	(0.01)***
CA_{t-1}	0.70	−0.02	FAG_{t-1}	0.26	0.52
	(0.00)***	(0.94)*		(0.12)	(0.02)**
YX	−0.00	0.01	*YX*	−0.13	0.03
	(0.87)	(0.88)		(0.12)	(0.73)
EX	0.03	0.01	*EX*	0.15	−0.06
	(0.28)	(0.89)		(0.16)	(0.23)
OPEN	0.16	0.00	*OPEN*	0.12	0.03
	(0.00)***	(0.88)		(0.13)	(0.36)
PCDM	−0.02	0.08	*PCDM*	0.02	−0.05
	(0.00)***	(0.00)***		(0.31)	(0.07)*
SMTV	−0.01	−0.03	*SMTV*	0.04	0.02
	(0.07)*	(0.00)***		(0.05)**	(0.07)*
KAOP	0.00	−0.02	*KAOP*	0.01	0.01
	(0.26)	(0.01)**		(0.06)*	(0.20)
CU	−0.00	−0.01	*CU*	0.00	0.01
	(0.14)	(0.00)***		(0.54)	(0.00)***
ST	−0.00	0.00	*ST*	0.00	−0.00
	(0.00)***	(0.40)		(0.14)	(0.13)
LA	0.01	0.01	*LA*	−0.00	−0.00
	(0.01)***	(0.08)*		(0.34)	(0.12)
Observation	238	152	Observation	239	152
Adjusted R^2	0.80	0.63	Adjusted R^2	0.47	0.42

Note: ICs-14 contains 14 industrial countries except for the financial centers and Ireland, and EMs-8 includes eight Asian emerging market countries. *CA* current account, *FA* net foreign capital inflows, all are in terms of *GDP*. *YX* growth rate of *GDP*, *EX* change rate of real effective exchange rate (in terms of US dollar for EMs), *OPEN* (export + import) in terms of *GDP*, *PCDM* private credit by deposit money banks in terms of *GDP*, *SMTV* stock market turnover ratio, *KAOP* capital account openness, *CU* corruption, *ST* political stability, *LA* law and order. *D* denotes dummy variable (equals 0 prior to 1997 and equals 1 after 1997). The lag $(t-1)$ represents the average for $t-1, \ldots, t-4$. The estimated coefficients are shown inside the table and the number inside the parenthesis is the *p* value. ***, **, and * represent the significance level of 1, 5, and 10%, respectively

accumulation occurred in Asian EMs after the 1997–1998 Asian financial crises (IMF 2007a).[26]

[26] We also implement the estimation of using two different lag specifications by using four individual lags on the regressors of *CA* and *FA (FAG)*, and one lag average over four lagged periods extending to control

In sum, we found that the causal relationship remains mostly the same even we single out the country groups of ICs-14 and EMs-8. It bears to note that although we purpose to examine whether there is different causal relationship between two groups of countries, ICs and EMs, there might be different causal relationship within EMs and ICs. The fixed-effect model we used here, although captures some country difference, yet it might neglect the problems of other estimated coefficients containing cross-section heterogeneous estimates. In addition, there might be disparate property between short-run and long-run causal relationship. These will be an interesting extension for the future researches.[27]

4.2 Using components of *CA* and *FA* (*FAG*)

Table 7 shows estimation results of the causal relationship between the three components of *FA* (*FDI*, *PI*, and *OI*) and *CA*, and two components of *CA* (S and I) and *FA*, Column (1) of Table 7 is the estimation results of ICs, and there is no evidence of *FDI, PI*, or *OIG* Granger causing *CA*. For EMs, as shown in column (2), the estimated results show that two components—*FDI* and *OI*—Granger-cause *CA* and both have significant and negative estimated coefficients, -1.18 and -0.33, under the 5% significance level. Note that the estimated coefficient of *FDI* during the second period turns to a positive 1.36 and makes the marginal effect during the second period to 0.18 $(-1.18 + 1.36)$. Apparently, *FDI* plays an important role in the causal relationship between *CA* and *FA* for EMs. As of the causal regression between components of *CA* and *FA* for ICs, as shown in column (3), there is a negative estimated coefficient of S_{t-1} and a positive estimated coefficient of I_{t-1}, this indicates increasing I attracts more foreign capitals to flow in, while increasing S causes more capital to flow out (negative estimated coefficient) as the theory of intertemporal current account would predict (Obstfeld and Rogoff 1996). In addition, with the significant estimated coefficient of I_{t-1}, this indicates that the driving forces to attract foreign capital inflows are from the domestic investment. Note that the estimated coefficient of the dummy intersection term, $D_{t-1} \times S_{t-1}$, and $D_{t-1} \times I_{t-1}$ are both significant. For EMs, there is no evidence of causal relationship going from S or I to *FA* under the 5% significance level as column (4) indicated.

Table 8 shows the estimation results of causal relationship between the components of *FAG* and *CA*, and between the components of *CA* and *FAG*. The causal results are mostly similar to Table 7 except two differences. One is that *OIG* Granger causes *CA* for ICs as shown in column (1). The other is that, for ICs, there is no causal relation going from S or I detected as shown in column (3). However, the causal relationship in ICs and EMs in general remain the same when using the components of *CA* and *FA (FAG)*.

Foonote 26 continued
variables for both ICs and EMs, and the results of causal relationship are mostly the same. The estimated results are available on request.

[27] See Pesaran and Smith (1995), Pesaran et al. (2000) to address the possible bias from neglecting consideration of other estimated coefficients containing cross-section heterogeneous estimates and short-term and long-term disparity.

Table 7 Causal relationship between components of *CA* and *FA*

	CA as a dependent variable			*FA* as a dependent variable	
Explanatory variables	ICs (1)	EMs (2)	Explanatory variables	ICs (3)	EMs (4)
FDI_{t-1}	0.21	−1.18	S_{t-1}	−0.25	0.41
	(0.20)	(0.00)***		(0.26)	(0.13)
PI_{t-1}	0.15	−0.51	I_{t-1}	0.63	−0.49
	(0.27)	(0.07)*		(0.00)***	(0.11)
OI_{t-1}	−0.11	−0.33	$D_{t-1} \times S_{t-1}$	−0.37	−0.45
	(0.20)	(0.00)***		(0.01)***	(0.09)*
$D_{t-1} \times FDI_{t-1}$	−0.09	1.36	$D_{t-1} \times I_{t-1}$	0.37	0.26
	(0.55)	(0.00)***		(0.00)***	(0.27)
$D_{t-1} \times PI_{t-1}$	−0.19	−0.20	FA_{t-1}	0.02	0.34
	(0.18)	(0.50)		(0.93)	(0.08)*
$D_{t-1} \times OI_{t-1}$	0.02	0.35	*YX*	0.01	0.06
	(0.81)	(0.07)*		(0.63)	(0.00)***
CA_{t-1}	0.74	0.06	*EX*	0.01	−0.05
	(0.00)***	(0.66)		(0.85)	(0.02)**
YX	0.02	−0.05	*OPEN*	0.02	−0.02
	(0.19)	(0.00)***		(0.52)	(0.55)
EX	−0.02	−0.01	*PCDM*	−0.01	0.01
	(0.54)	(0.54)		(0.33)	(0.79)
OPEN	0.06	0.04	*SMTV*	−0.00	0.05
	(0.00)***	(0.13)		(0.74)	(0.00)***
PCDM	−0.01	0.03	*KAOP*	−0.01	0.00
	(0.06)*	(0.24)		(0.02)**	(0.53)
SMTV	−0.00	−0.02	*CU*	−0.00	−0.00
	(0.56)	(0.03)**		(0.29)	(0.80)
KAOP	0.00	−0.00	*ST*	0.00	−0.00
	(0.05)**	(0.88)		(0.26)	(0.41)
CU	−0.00	−0.01	*LA*	−0.00	−0.00
	(0.45)	(0.00)***		(0.44)	(0.41)
ST	−0.00	0.00			
	(0.14)	(0.33)			
LA	0.01	0.00			
	(0.02)**	(0.98)			
Observation	336	375	Observation	338	388
Adjusted R^2	0.87	0.46	Adjusted R^2	0.71	0.36

Note: *CA* current account, *FDI* (*G*) foreign direct investment (gross), *PI* (*G*) portfolio investment (gross), *OI* (*G*) other investment (gross), all are in terms of *GDP*. *YX* growth rate of *GDP*, *EX* change rate of real effective exchange rate (in terms of US dollar for EMs), *OPEN* (export + import) in terms of *GDP*, *PCDM* private credit by deposit money banks in terms of *GDP*, *SMTV* stock market turnover ratio, *KAOP* capital account openness, *CU* corruption, *ST* political stability, *LA* law and order. *D* denotes dummy variable (equals 0 prior to 1997 and equals 1 after 1997). The lag $(t-1)$ represents the average for $t-1, \ldots, t-4$. The estimated coefficients are shown inside the table and the number inside the parenthesis is the *p* value. ***, **, and * represent the significance level of 1, 5, and 10%, respectively

Table 8 Causal relationship between components of *CA* and *FAG*

	CA as a dependent variable			*FAG* as a dependent variable	
Explanatory variables	ICs (1)	EMs (2)	Explanatory variables	ICs (3)	EMs (4)
$FDIG_{t-1}$	0.00	−1.30	S_{t-1}	0.47	0.25
	(0.99)	(0.00)***		(0.22)	(0.26)
PIG_{t-1}	−0.21	−0.62	I_{t-1}	−0.02	−0.18
	(0.20)	(0.06)*		(0.97)	(0.45)
OIG_{t-1}	−0.44	−0.31	$D_{t-1} \times S_{t-1}$	−0.35	0.06
	(0.00)***	(0.02)**		(0.29)	(0.79)
$D_{t-1} \times FDIG_{t-1}$	−0.09	1.30	$D_{t-1} \times I_{t-1}$	0.18	−0.05
	(0.63)	(0.00)***		(0.59)	(0.80)
$D_{t-1} \times PIG_{t-1}$	0.08	−0.10	FAG_{t-1}	0.79	0.39
	(0.61)	(0.78)		(0.00)***	(0.00)***
$D_{t-1\times} \times OIG_{t-1}$	0.27	0.07	YX	−0.24	0.05
	(0.08)*	(0.68)		(0.07)*	(0.01)***
CA_{t-1}	0.66	−0.10	EX	0.03	−0.06
	(0.00)***	(0.58)		(0.83)	(0.01)***
YX	0.01	−0.05	$OPEN$	0.33	−0.02
	(0.55)	(0.00)***		(0.01)***	(0.39)
EX	−0.01	−0.01	$PCDM$	0.01	0.03
	(0.66)	(0.69)		(0.78)	(0.24)
$OPEN$	0.05	0.03	$SMTV$	0.05	0.03
	(0.02)**	(0.28)		(0.03)**	(0.04)**
$PCDM$	−0.01	0.04	$KAOP$	−0.01	0.01
	(0.09)*	(0.15)		(0.32)	(0.04)**
$SMTV$	−0.01	−0.03	CU	−0.04	−0.00
	(0.11)	(0.03)**		(0.01)***	(0.52)
$KAOP$	0.00	−0.00	ST	0.00	−0.00
	(0.20)	(0.83)		(0.42)	(0.67)
CU	−0.00	−0.00	LA	−0.01	−0.00
	(0.68)	(0.02)**		(0.34)	(0.16)
ST	−0.00	0.00			
	(0.03)**	(0.21)			
LA	0.00	−0.00			
	(0.29)	(0.60)			
Observation	336	326	Observation	338	374
Adjusted R^2	0.87	0.48	Adjusted R^2	0.82	0.34

Note: *S* national saving, *I* investment, *FA* net foreign capital inflows, *FAG* gross capital inflows, all are in terms of *GDP*. *YX* growth rate of *GDP*, *EX* change rate of real effective exchange rate (in terms of US dollar for EMs), *OPEN* (export + import) in terms of *GDP*, *PCDM* private credit by deposit money banks in terms of *GDP*, *SMTV* stock market turnover ratio, *KAOP* capital account openness, *CU* corruption, *ST* political stability, *LA* law and order. *D* denotes dummy variable (equals 0 prior to 1997 and equals 1 after 1997). The lag $(t-1)$ represents the average for $t-1, \ldots, t-4$. The estimated coefficients are shown inside the table and the number inside the parenthesis is the *p* value. ***, **, and * represent the significance level of 1, 5, and 10%, respectively

In sum, using the divided components of *CA* and *FA (FAG)* does help us to understand which components are the main driving forces to lead the Granger causality.[28] In addition, using aggregated variables may render the causal relationship obscure. For instance, there is only weak evidence of causality going from *CA* to *FA* for ICs as shown in Table 3 when *CA* is used instead. However, the estimation results shown in column (3) of Table 7 indicate that there is palpable causality going from both *I* and *S* to *FA* for ICs. Nevertheless, while both foreign direct investment and other investment are the driving force to cause the current account imbalance for EMs, it is mainly the *FDI* (and *FDIG*) which plays an influential role in dictating the causal relationship with *CA*. Although there are few cases with different results, such as ICs' *OIG* causes *CA*, we find that the causality direction mostly remains the same. EMs are more susceptible to the influence of foreign capital inflows.

5 Concluding remarks

There have been variant studies on the issue of how financial globalization brings different influences between EMs and ICs. This article proffers another disparity between these two groups of countries, namely the linkage between the current account and foreign capital inflows. Using a panel regression on 22 ICs and 23 EMs, this article investigates the causal relationship between current account and foreign capital inflows for the time period of 1987–2006. In order to prevent causal fallacy due to omitted variables, we add three sets of control variables in the regression: macroeconomic variables, financial variables, and institutional variables.

Our empirical results show that the current account imbalance is mostly caused by foreign capital inflows for EMs, while there is less evidence for ICs. We also demonstrate that the causal relationship can be different without considering the issue of omitted variables. After adding control variables, we find that causal relationships have changed, particularly when examining the cases of the causal relationship between gross foreign capital inflows and current account.

Using net or gross foreign capital inflows produces a significantly different result. Gross foreign capital inflows represent the decision made by foreign investors, who are not supposed to consider of financing current account imbalances of the capital-receiving countries. The evidence of a non-causal relationship between the current account and gross foreign capital inflows in ICs indicates a decoupling result between these two variables. However, for EMs it is even more pronounced that gross foreign capital inflows Granger-cause the current account, which sheds light on EMs' susceptibility to foreign capital inflows. In addition, it is foreign direct investment which plays the prominent role in the causal relationship between foreign capital inflows and the current account for EMs.

Emerging markets, prior to the 1997–1998 currency crises, were susceptible to global capital mobility, which usually pushes their current account toward deficits.

[28] We also implement the estimation of using two different lag specifications by using four individual lags on the causal variables in the regressors, and one lag average over four lags on causal variables and control variables. We found that the causal relationships are mostly the same. The results are available from the authors upon request.

Appendix Data descriptions and sources

Variables	Description	Sources
Variables for causality test		
CA	Current account (in terms of *GDP*)	IFS
FA	Net foreign capital inflows (in terms of *GDP*)	IFS
FAG	Gross capital inflows (in terms of *GDP*)	IFS
S	National savings (in terms of *GDP*)	IFS
I	Investment (in terms of *GDP*)	IFS
FDI	Foreign direct investment (in terms of *GDP*)	IFS
PI	Portfolio investment (in terms of *GDP*)	IFS
OI	Other investment (in terms of *GDP*)	IFS
FDIG	Liabilities of foreign direct investment (in terms of *GDP*)	IFS
PIG	Liabilities of portfolio investment (in terms of *GDP*)	IFS
OIG	Liabilities of other investment (in terms of *GDP*)	IFS
Control variables		
Macroeconomic variables		
YX	Growth rate of *GDP*	IFS
EX	Change rate of real effective exchange rate for ICs (in terms of US dollar for EMs, the real exchange rate is deflated with CPI)	IFS
OPEN	(Export + import) in terms of *GDP*	IFS
Financial variables		
PCDM	Private credit by deposit money banks and other financial institutions (in terms of *GDP*)	BDL
SMTV	Stock market turnover ratio	BDL
KAOP	Capital (or financial) account openness	C&I
Institutional variables		
CU	Corruption	ICRG
ST	Political stability	ICRG
LA	Law and order	ICRG

Note: *IFS* International Financial Statistics, *BDL* Beck et al. (2000, updated on Nov. 2008), *C&I* Chinn and Ito (2008), *ICRG* International Country Risk Guide

However, after taking the lesson from the crisis, EMs, particularly those in Asia, reverse the path of their current accounts toward the surplus path. The current account reversal has changed the nature of its causal relationship with foreign capital inflows. There is evidence that after the 1997–1998 currency crises the current account and foreign capital inflows move toward a positive relationship.

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