Assessing Currency Misalignments in Emerging Market Countries

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Abstract: Using 25 emerging market countries (EMCs) and 22 industrial countries (ICs) for the time period 1980-2007, this paper estimates the magnitude of exchange rate misalignments based on the theory of the purchasing power parity with the consideration of Balassa-Samuelson effect. We then use panel data regression analysis to examine how capital inflows and their components, financial variables, and policy variables, affect exchange rate misalignment. The empirical results show that for EMCs, foreign capital inflows contribute to exchange rate misalignment of currency appreciation. Within those capital inflows, portfolio investments and other investments show significant impacts on exchange rate misalignment of currency appreciation, while foreign direct investment has affected exchange rate misalignment of currency depreciation. We also found that although there were resurging capital inflows since 1997-98 Asian currency crises, exchange rate misalignment of currency appreciation in EMCs was contained. The unrelentingly undervalued currencies of EMCs since the 1997-98 currency crises indicate that there is aggressive intervention from central banks to stem currency appreciation. Given the unsophisticated financial systems in most EMCs, reaping benefits from capital inflows is still an illusion.

Key Words: exchange rate misalignment, capital inflows, currency appreciation, emerging market countries, foreign exchange intervention

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1. Introduction

The enduring global imbalance has been argued as one of the reasons for the Great Recession in 2008-09 (Bernanke, 2005, 2009; Krugman, 2009; Portes, 2009). Currency manipulation in emerging market countries (EMCs), referring particularly to China, has been alleged as one of the culprits for global imbalance (Bergson, 2007; Goldstein, 2007). In response to this mooted issue, there are variant studies using different methodologies to investigate exchange rate misalignments (either undervalued or overvalued) of EMCs (Ricci et al., 2008; Cline and Williamson, 2009; Rodik, 2008; Aizenman and Lee, 2007). Two approaches determining exchange rate misalignments are used most often. One is price-based, which refers to exchange rates being determined by the no-arbitrage condition in either traded goods or assets, such as purchasing power parity (PPP) (Froot and Rogoff, 1996; Rodrik, 2008), and the other is the model-based, which usually refers to defining equilibrium exchange rate to be determined by macroeconomic condition being in internal and external balance (Edwards, 1989; Clark and MacDonald, 1999; IMF, 2006). While the price-based approach of exchange rate determination is plainly clear, the model-based approach, with its flexibility of allowing adding variables to adapt to variant economic situations for each country, has gained popularity. Except the common fundamental determinants of exchange rates, such as productivity difference, terms of trade, net foreign assets, government expenditure, etc., there is a growing interest in considering driving factors from capital mobility, due to the intensive integration of global financial markets (IMF, 2007; Mohan and Kapur, 2010; Ostry et al., 2011).

Although transnational capital flow serves to fill the gap between national savings and investment and render efficiency usage of capital, given the immature financial system in most developing countries, it could be baneful inasmuch as the capital

inflows usually entail currency appreciation which undermines the external competitiveness of their tradable sectors and weaken growth (Corden, 1994; Bakardzhieva et al., 2010; Magud and Sosa, 2010).[1] This is particularly true considering that currency appreciation (or overvaluation) has been deemed as one of the warning indicators for the ensuing sudden stops and currency crises, which wrought havoc EMCs in the 1990s (Corsetti et al., 1998; IMF, 2003; Furceri et al., 2011).[2] Oddly, the onerous effect on the economy from large capital inflows and outflows rarely appears in industrial countries (ICs) (Kose et al., 2008). Nevertheless, not all types of capital inflows are trouble makers. Foreign direction investment (*FDI*), unlike portfolio investment (*PI*) or other investment (*OI*, mostly are bank loans), do not lead to currency appreciation as noted by Athukorala and Rajapatirana (2003), and Bakardzhieva et al. (2010). Sula (2010) also found that, within the three components of capital inflows, both *PI* and *OI* cause higher probability of a sudden stop for EMCs.

The 1997-98 Asian currency crises not only demonstrates the conspicuous impact of capital flows on the stability of exchange rates, but also signifies a watershed for the policy direction of EMCs. In response to a large capital flows into EMCs (IMF, 2007), many EMCs learned from the lesson that capital inflows and the ensuing currency overvaluation could be a precursor for currency crises. Many EMCs,

[1] In this paper, exchange rate is defined in real term. We shall use exchange rate overvaluation (undervaluation) and currency appreciation (depreciation) interchangeably.

[2] Starting from Mexico's peso crisis in 1994-95, Asian currency crises in 1997-98, and the ensuing crises in Brazil, Russia, Turkey and Argentina, there have been variant studies on the causes of these crises, including sudden stop, imprudent macroeconomic policies, and unsound financial system, etc. (Corsetti et al., 1998). Due to the devastating impact on economies from sudden stops of capital inflows in emerging market economies in the 1990s, a series of currency crises in the 1990s have been dubbed a "capital account crisis" (IMF, 2003). 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." Furceri et al. (2011) also found that currency crises causes by large capital inflows are mostly due to the other investment, not foreign development investment or portfolio investment. In addition, one of the overwhelming symptoms prior currency crises was that there is a phenomenal currency overvaluation.

particularly Asian countries, accordingly resorted to foreign exchange intervention to deliberately stem their currency from appreciation. Nevertheless, there are enormous evidence shown that preventing currency overvaluation helps promote export-led growth strategy, as argued by Dooley et al. (2003, 2004), Levy-Yeyati and Sturzenegger (2007), Rodrik (2008), Freund and Pierola (2008), and Korinek and Serven (2010).

Unlike extant studies focusing on how exchange rate misalignment affects macroeconomic variables (such as, trade, reserves, growth, etc.), this paper studies what causes exchange rate misalignment. The estimation method adopted in this paper mingles with price-based and model-based approaches of exchange rate determination. We first estimate the currency appreciation based on the purchasing power parity with the consideration of Balassa-Samuelson effect (or productivity biased purchasing power parity; Balassa, 1964; Samuelson, 1964; Lee and Tang, 2003). We then use panel data regression analysis by using 25 emerging market countries (EMCs) and 22 industrial countries (ICs) for the time period 1980-2007 by controlling fundamental macroeconomic variables, to examine how capital inflows and their components, financial variables, and policy variables, affect exchange rate misalignment.

Our approach helps directly address which factors affect currency misalignment (appreciation or depreciation). One of the immediate advantages of our two-stage setting of estimating factors driving currency misalignment is that current studies show that capital inflows do have a significant impact on currency appreciation (IMF, 2006, 2007; Saborowski, 2009; Bakardzhieva et al., 2010), yet unable to show the fact that undervalued currency could result from other factors, which could stem exchange rate from appreciation. To put in perspective, our estimation approach allows us to see the phenomenon that even there are large capital inflows, EMCs attempt to maintain their currencies undervalued. This indicates that except appreciating factors deriving

from capital inflows, other depreciation factors are at play, such as foreign exchange intervention.

The rest of the paper will be arranged as follows. Section 2 discusses factors which could affect exchange rate misalignment, including macroeconomic variables, capital inflows and their components, financial variables, and policy variables. We delineate empirical methodology and estimation results in section 3 and we conclude in section 4.

2. Factors Driving Exchange Rate Misalignment

Although our focus is on factors affecting exchange rate misalignment, a natural way to start is to seek for factors that affect the determinants of exchange rate. There have been studied on variant fundamental macroeconomic factors determining the medium-term equilibrium exchange rate, such as net foreign assets, terms of trade, productivity differential, government consumption, and openness to trade, which emphasized by the approach studying fundamental real equilibrium exchange rate (Faruqee, 1995; MacDonald, 1997, 2000; Clark and MacDonald, 1999, 2004; IMF, 2006). With a growing attention to serious economic consequences from financial globalization, how capital inflows affect currency appreciation and competitiveness of EMCs has been an issue instigating a vast study (Calvo et al., 1993; IMF, 2006, 2007; Saborowski, 2009; Bakardzhieva et al., 2010). Except capital inflows, financial development has dealt with a significant influence on the exchange rate during the age of large capital mobility (Saborowski, 2009). Government policies, such as foreign exchange intervention and the adoption of exchange rate regime, are all immediately relevant factors that could affect exchange rate (Goldfajn and Valdes, 1999; Coudert and Couharde, 2009; Combes et al., 2011).

2.1 Fundamental Macroeconomic Factors

The macroeconomic variables, which are often used for estimating fundamental equilibrium real exchange rate, consist of five variables including net foreign assets, productivity differential, government consumption, terms of trade, and trade openness (Faruqee, 1995; MacDonald, 1997; Clark and MacDonald, 1999; IMF, 2006).

Net foreign assets *(NFA)***:** Net foreign assets are defined as the difference between foreign assets held by domestic residents and foreign investors' holdings of domestic assets. For debtor countries, currency depreciation is one of the ways to decrease net external debts. On the contrary, creditor countries obtain the capability to appreciate their currency (IMF, 2006). However, for a net debtor country, it is possible that a short-term increase in capital inflows could lead to currency appreciation (Burges et al., 2003; AlShehabi and Ding, 2008). On the other hand, a country featured by export-led growth, such as emerging Asian countries, might follow an undervalued currency growth strategy, which could cause net foreign assets to have a positive relationship with currency depreciation.

Productivity differential **(***TNT***):** According to the Balassa-Samuelson effect (Balassa, 1964; Samuelson, 1964), when the productivity of tradable sectors is greater than that of non-tradable sectors, the average price level will be higher as the price level of non-tradable increases. This is because higher wages in tradable sectors spill over to non-tradable sectors and put upward pressure on wages, resulting in a higher relative price for non-tradables. Accordingly, the domestic currency appreciates in real terms (Farugee, 1995; MacDonald, 1997). The ratio of per capita *GDP* relative to the U.S. is usually used to proxy the productivity difference (Chudik and Mongardini, 2007; AlShehabi and Ding, 2008).

Government consumption **(***GC***):** Government expenditures are principally

biased to non-tradable goods. Increasing government consumption pushes the price of non-tradable goods to go up and renders real exchange rate appreciation (De Gregorio et al., 1994; Athurkorala and Rajapatirana, 2003; Ricci et al., 2008). Fiscal contraction is a powerful cushion against real exchange appreciation associated with capital inflows. However, if the sources of government consumption are from taxing the private sector, to some extent, it could cause the real exchange rate to depreciate (AlShehabi and Ding, 2008). We use government consumption in terms of *GDP* as a proxy to capture the effect of government expenditure on the real exchange rate.

***Terms of trade* (*TOT*):** The terms of trade is the ratio of export price index (*XPI*) and import price index (*MPI*). An improvement in terms of trade generates an income or wealth effect, which increases domestic demand and may cause currency appreciation (IMF, 2006). However, if the substitution effect dominates the income effect, then it is possible to cause real currency depreciation (AlShehabi and Ding, 2008).

***Trade openness* (*TOPEN*):** We use *exports* plus *imports* in terms of *GDP* to proxy for trade openness. Trade protection leads to higher domestic prices and a greater appreciated real exchange rate. A shift in a country's trade policy towards greater liberalization leads to an increase in demand for tradable goods. The real exchange rate will depreciate in order to shift the demand from non-tradable to tradable goods. Thus, there is a positive relationship between the real exchange rate and trade openness (Edwards, 1989; Jongwanich, 2010).

2.2 Capital Inflows and Their Components

The research of impacts from capital inflows on domestic economy are nothing new. 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 EMCs as many

were affected by currency crises during the last decade of the 20th century (Eichengreen, 2001; Edison et al., 2004; IMF, 2007). 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), Stiglitz (2004), and Rodrik and Subramanian (2009), 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 emerging markets and were mainly initiated by massive capital inflows and the ensuing sudden outflows precipitated the crises.[3]

Whether capital inflows will cause currency appreciation is associated with how those inflow capitals are used, what types of capital inflows, and other related factors, such as the sophistication of financial system and government policy responses. A line of literature argues that capital inflows could bring a side effect on the competitiveness of export-oriented sectors and import-competing sectors, namely "Dutch Disease," which refers to real exchange rate appreciation, factor reallocation, and de-industrialization (Economist, 1977; Corden and Neary, 1982; Magud and Sosa, 2010).[4] To be specific, if inflow capitals are tied to finance domestic consumptions, which are mostly non-tradable goods, it will cause real currency appreciation as an increase in the relative price of non-tradables; while if inflow capitals are used to finance imports, it has less effect on the exchange rate. The same applies to other investments flows, when they are used to build golf courses, instead of financing

[3] Stiglitz (2004) argued that there is considerable information asymmetry in international financial markets, as free capital mobility does not necessarily lead to an optimal allocation of resources. Rodirk (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.

[4] See the Economist (1977).

exports production (Bakardzhieva et al., 2010).

One of the adverse effects from capital inflows is the loss of competitiveness (Calvo et al., 1993; Bandara, 1995; Agénor, 1998; Lartey, 2008). Magud and Sosa (2010) empirically found that capital inflows resulted in currency appreciation and exchange rate volatility; both are inimical to the economic growth. However, not all types of capital inflows are deleterious. Combes et al. (2011) argued that *FDI*, which is tied to real investment in plant and equipment which result in transferring of technology, was mostly in export-oriented manufacturing and does not cause currency appreciation, and it might bring depreciation (Ito, 2000; Athurkorala and Rajapatirana, 2003). Yet it has been discovered that inflows of *PI* and *OI*, which may go into financing consumption, has the highest appreciation effect than *FDI* (Jongwanich, 2010; Bakardzhieva et al., 2010; Combes et al., 2011).

2.3 Financial Factors

Financial liberalization usually accompanies with devastating impact on EMCs since the weak absorptive capacity of financial sectors, due to the chronicle financial repression, are unable to channel suddenly flooded-in capitals, as documented in a classical paper by Diaz-Alejandro (1985). The gathering pace of financial globalization accelerates the financial liberalization and reignites the debate on how it will affect economic performance and exchange rate behavior (Henry, 2007; Bakardzhieva et al., 2010). With a sophisticated financial system, Saborowski (2009) predicated that capital inflows can be more efficiently allocated, risk can be aptly diversified and the adverse influence can be expediently reduced. Financial variables can be expressed chiefly by financial deepness, the financial development, and financial account openness.

Financial deepness **(***M2* or *PCR***):** The ratio of *M2* to *GDP* is usually used as the

proxy for financial depth (Chinn and Ito, 2007; Obstfeld et al., 2010).[5] Since many European countries in our sample are in the euro area and lack of individual *M2* data, we therefore use the private credit over *GDP* (*PCR*, Beck et al., 2000) as another proxy.[6] Financial deepness strengthens the capacity of a country to absorb large capital inflows and alleviate the impacts of outflows. In theory, financial deepness will alleviate the exchange rate misalignment.

***Financial development* (*STMK*):** To measure financial development, we use the ratio of stock market capitalization in terms of *GDP* (*STMK*; Beck et al., 2000) as the proxy. EMCs, although with rapid economic growth, usually suffer from immature financial development. With repressed credit markets, exchange rate usually cannot reflect the market value and remained misaligned. When financial development is higher, more efficient is the financial system and merits for efficient resources allocation, therefore capital inflows will bring less adverse effect and less exchange rate misalignment (Saborowski, 2009). In our cases, depending upon whether the misalignment is over or undervalued currency, the exchange rate can move up or down to align with the equilibrium exchange rate.

***Financial openness* (*KOPEN*):** Whether financial openness is beneficial or detrimental to an economy has been a hotly debated issue (Henry, 2007; Prasad et al., 2007b). Capital control could distort the exchange rate as well. Chinn and Ito (2008) compiled an index, *KOPEN*, to represent the degree of capital control from a large pool of countries by using Annual Report on External Arrangement Restrictions of

[5] We 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 capital 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.

[6] In Section 3.3, when we implement the additional estimation, sample countries will include Asian 7 EMCs (China, India, Indonesia, South Korea, Malaysia, the Philippines, and Thailand) and the regressor *PCR* is replaced with *M2*.

IMF.[7] The less intensive of capital control, the higher the index of financial openness. Although financial openness will exert influential effect on the exchange rate, whether it will lead to under or overvalued currency is an empirical question.

2.4 Policy Variables

Recent development of international economic environment has instigated many concerns about relevant factors which could contribute to exchange rate misalignment, such as the adoption of exchange rate regime and foreign exchange intervention.

Exchange rate regime (REG): Countries with fixed or managed floating exchange rate regime, which can be widely observed in many EMCs, is vulnerable to the sudden flows of foreign capitals. Calvo and Reinhart (2002) argued that because of "fear of floating" and due to the consideration of "original sin" (Eichengreen and Hausmann, 1999), EMCs are less willingness to tolerate sharp nominal exchange rate movements. Goldfajn and Valdes (1999) found that real exchange rates have a tendency to appreciate under fixed exchange rate regimes. Studying 128 countries from 1974-2004, Coudert and Couharde (2009) also found that pegged currencies are prone to be overvalued than floating ones. Combes et al. (2011) demonstrated that a flexible exchange rate regime helps dampen appreciation of the real exchange rate stemming from capital inflows. For the proxy of the exchange rate regime, we use the classification based on the method *de facto*, instead of *de jure*, prepared by Reinhart and Rogoff (2004) and Ilzetzki et al. (2008). Three regimes are reclassified into three categories, including fixed, managed floating, and flexible exchange rate regimes.

[7] Chinn and Ito (2007) compiled the *KOPEN* index based on 4 items of information provided by Annual Report on External Arrangement Restrictions of IMF, including presence of multiple exchange rates, restrictions on current account transactions, restrictions on capital account transaction, and the requirements of surrender of export proceeds. The index is obtained from the first standardized principal component of these four variables. With a duly adjustment, the index takes a higher value the more open the country is to cross-broader capital transaction.

***Foreign exchange intervention* (*FEI*):** The increased accumulations of foreign reserves, particularly in emerging Asian countries after the 1997-98 currency crises, demonstrate the intensiveness of foreign exchange intervention (IMF, 2007).[8] Extant studies mostly show that an undervalued currency merits economic growth (Levy-Yeyati and Sturzenegger, 2007; Freund and Pierola, 2008; Rodrik, 2008; Korinek and Serven, 2010). Due to the difficulty of obtaining the intervention data from the central bank, using change of foreign reserves is a common practice in empirical study (Dominguez, 1998; Sarno and Taylor, 2001).

3. Empirical Methodology and Results

Using a panel data, which includes 25 EMCs and 22 ICs, as selected in the Morgan Stanly Capital International (MSCI) Index (see the country list in Table 2), we first calculate the currency misalignment by using the Penn World Table 6.3 updated data set (Heston et al., 2006). We then investigate variant factors, including macroeconomic variables, financial variables, and policy variables, which could drive exchange rate misalignment.

3.1 Estimation Strategy

Based on PPP and with the consideration of Balassa and Samuelson effect, we estimate the equilibrium real exchange rate. Currency misalignments can be obtained by retrieving from the estimation residuals.

[8] The consequences of *FEI* could result from whether central banks conduct sterilization or not. Without sterilization, the increase of domestic money supply eventually ushers in domestic inflation and real exchange rate appreciation. In contrast, with sterilization in action, the domestic inflation can be tamed but will drive short-term interest rates higher, and perpetrate excess capital inflows and real appreciation. Often time, central banks practice partial sterilization. In general, in the long-term perspective, *FEI* is not an effective way to stem currency appreciation (Calvo, 1991).

3.1.1 Estimation of exchange rate misalignment

Assume that real exchange rate (*RER*) of each country can be expressed as $\ln RER_{it} = \ln(PPP_{it} / XRAT_{it})$, where *ln* denotes natural log, *i* (=*1,..,n*) denotes the country, and *t* denotes the time period. In the right hand side of the equation, *XRAT* represents nominal exchange rate (the price of per US dollar in terms of each domestic currency), and *PPP* represents the PPP transformation factor. The equation indicates that when *RER* increases (decreases), each domestic currency appreciates (depreciates) vis-à-vis the US dollar. Considering that *PPP* might be distorted by Balassa-Samuelson effect (Balassa, 1964; Samuelson, 1964), we follow Aizenman and Lee (2007) and Rodrik (2008) to run the following regression,

$$\ln RER_{it} = \alpha + \beta RGDP_{it} + f_t + u_{it} \quad (1)$$

Where *RGDP* denotes per capita income of each nation *i* at time *t*, f_t denotes the fixed time effect, u_{it} is the error terms. To obtain the exchange rate misalignment, *EE*, we can deduct the actual real exchange rate to the estimated one, as shown in the following.

$$EE_{it} = \ln RER_{it} - \overline{\ln RER_{it}} \quad (2)$$

Where $\overline{\ln RER_{it}}$ is the estimated fundamental equilibrium real exchange rate from equation (1). EE_{it} measures the magnitude of exchange rate misalignment of overvalued currencies. Specifically, if *EE* is 0, there is no exchange rate misalignment. When *EE* is positive, it represents that there is exchange rate misalignment of overvalued currency (or currency appreciation). In contrast, there is exchange rate

misalignment of undervalued currency (or currency depreciation) when *EE* is negative.

3.1.2 Regression analysis: factors affecting exchange rate misalignment

Our regression models can be presented as follows:

$$EE_{it} = c_i + \alpha X_{it} + \beta F_{it} + \gamma Z_{it} + \theta K_{it} + \gamma_D D \times Z_{it} + \theta_D D \times K_{it} + \varepsilon_{it} \quad (3)$$

where *EE* represents the exchange rate misalignment as shown in equation (2). *X*, *F*, *Z*, and *K* denote macroeconomic variables, financial variables, policy variables, and capital inflows variables. c_i denotes the fixed effect, which catches the country difference. α, β, γ, and θ denote coefficients to be estimated. *D* denote dummy variable, which equals 0 for the time period 1980-1997 and 1 otherwise. The estimated coefficients of intersection term of dummy variable with capital inflows (γ_D) and foreign exchange intervention (θ_D) intends to particularly examine whether there is augmented effect from capital inflows and foreign exchange intervention (*FEI*; IMF, 2007) after the 1997-98 Asian currency crises.

3.2 Empirical Results

We first report the estimated results of exchange rate misalignment of currency appreciation and then use it as a dependent variable to examine how financial variables, policy variables, and variables of capital inflows and their components affect its movement by using macroeconomic variables as control variables.

3.2.1 Exchange rate misalignment

The estimated coefficient $\hat{\beta} = 0.296$ of equation (1) indicates that when real per

capita *GDP* increases 1%, real exchange rate will go up 0.296%. The regression results are shown in Table 1. The time series of real exchange rate overvaluation (or misalignment) for each country can be readily obtained.[9] The results show that most of the exchange rate behaviors align with what many studies have argued that there is salient evidence of undervaluation in many emerging Asian countries after the 1997-98 currency crises. Table 2 shows the list of 25 EMCs and 22 ICs included in our study. We also present the descriptive statistics of exchange rate misalignment for each country. In general, the majority of EMCs have negative mean of exchange rate misalignment (undervalued currency), while ICs have more positive mean of exchange rate misalignment (overvalued currency). Unlike what has been usually argued, China's mean exchange rate misalignment is a meager overvaluation, 0.04, and its minimum undervaluation is -0.27, which occurred in 2007 and was not the lowest in EMCs.[10]

Taking 3 Asian EMCs (China, South Korea, and Taiwan) as examples, Figure 1 shows that although these 3 countries show variant evolutions of exchange rate misalignment, they share a common feature of exchange rate misalignment of undervalued currency after the 1997-98 Asian currency crises. China had exchange rate misalignment of overvalued currency before 1992, and since then it started to drop toward undervaluation although since the 1997-98 Asian currency crises up to 2002, China's exchange rate is less undervalued, yet afterward as the capital inflows

[9] This is a panel data estimation based on fixed time effect (Aizenman and Lee, 2006; Rodrik, 2008). Results from other estimation methods of fixed country model, pooled model, and fixed time and country model have similar estimation coefficients. The other estimation results are available from the authors upon request.

[10] The estimation of exchange rate misalignment of Chinese RMB has become a popular enterprise, given the argument of the accusation of currency manipulation. Unlike most estimations with currency undervaluation (Cline and Williamson, 2009), Cheung et al. (2007) used panel data of 1975-2004 covering 160 countries and used a framework built around the relationship between relative price and relative output levels, they find that, once sampling uncertainty and serial correlation are accounted for, there is little statistical evidence that the RMB is undervalued, even though the point estimates usually indicate economically significant misalignment with 70% undervaluation in 2004.

increase, currency misalignment entails and paradoxically further toward under-valuation. South Korean won was mostly undervalued but in a moderate manner, and its undervaluation became more apparent during the 1997-98 currency crises. Since then Korean won rebounded and remained its normal level with moderate undervaluation. Taiwan's exchange rate misalignment encountered mostly with overvalued currency prior to 1995, although with few years, 1980, 1985, and 1986, being undervalued. However, after 1995, Taiwan's NTD turned patently toward undervalued, in 1998 when NTD was under heavy speculative currency attack, it was undervalued for 14%. Thereafter, although NTD went up a bit but remained undervalued, and the magnitude of undervaluation expanded acutely after 2002 and in 2007 it was undervalued 34%.

With the resurge of foreign capital inflows toward EMCs after 2000, there is an enormous pressure for currency appreciation for EMCs, as argued by IMF (2007) and Ostry et al. (2011). However, the estimated exchange rate misalignment shows that most EMCs have undervalued currencies. Apparently, there are other forces serving to stem EMCs' currencies from appreciation. The well-noticed amassing of foreign reserves in EMCs, particularly Asian countries, have been argued as a signal of intensive foreign exchange intervention of their central banks either for precautionary motive or due to export-oriented growth strategy (Aizenman and Lee, 2007). While embracing financial globalization to allow large private capital inflows and simultaneously accumulating large foreign reserves through foreign exchange intervention to reverse the inflowing capitals through the central banks, EMCs show its uneasiness of financial openness. This reflects a complex syndrome of "fear of floating" mixed with "fear of sudden stop" (Aizenman and Sun, 2009).

3.2.2 Regression analysis

Using macroeconomic factors as control variables, we focus our analysis of the exchange rate misalignment of currency appreciation on interested variables, including capital inflows and their components, and foreign exchange intervention. As noted, exchange rate misalignment measures the deviation of exchange rates from fundamental equilibrium real exchange rate, as estimated by PPP with consideration of Balassa-Samuelson effect, and exchange rate misalignment variables can be assured to be stationary.[11] The data sources of all regressors are described in the Appendix. Most of the data of regressors are either in terms of *GDP*, or are indices, which can avoid from falling prey to nonstationary and resulting in the spurious regression. We use the ordinary OLS estimation of the fixed effect model with panel corrected standard errors following the suggestion of Beck and Katz (1995), which allows for cross-sectional heteroskedasticity and contemporaneous correlation of the residuals.[12]

A. Baseline estimation: controlling with macroeconomic and financial factors

Model 1-2 of Table 3 shows the results from the basic regression model.[13] Each model has estimated results in three columns from using all sample countries, EMCs, and ICs, respectively. The estimated coefficients from macroeconomic variables show that *NFA* significantly alleviates the exchange rate misalignment of currency appreciation for EMCs, but not significantly for ICs. *GC* serves to reinforce the exchange rate misalignment of currency appreciation for both EMCs and ICs, with the respective estimated coefficients of 2.04 and 1.80, both are significant under the 1%

[11] We employ variant panel unit root tests on the variable *EE* and found that the panel unit root can be consistently rejected under the 5% significance level. The testing results are available upon request.

[12] 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 estimated results remain similar.

[13] Note that *TNT* is excluded from the regression since it was used in the estimation of exchange rate misalignment.

significance level; so does the *TOT*, with the estimated coefficients of less influencing magnitude, 0.0005 and 0.004 for EMCs and ICs, respectively. *TOPEN* has the significant effect of reducing the exchange rate misalignment of currency appreciation for both EMCs and ICs with the respective estimated coefficients of -0.206 and -0.049 (under the significance level of 1% and 10%, respectively). These findings from macroeconomic variables are consistent with what elaborated in section 2.1.

Model 2 shows the estimated results by adding financial variables. Financial deepness (*PCR*) for EMCs shows that it decreases the exchange rate misalignment of currency appreciation, while for ICs, it increases its influence instead. As for financial development (*STMK*), it has positive effect on the exchange rate misalignment of currency appreciation for EMCs and ICs, yet both estimated coefficients are not significant. The estimated coefficient of *KOPEN* is negative but it is insignificant for EMCs.

B. Adding policy and capital inflow variables

Model 3 of Table 3 shows that countries with the exchange rate regime of both pegged and managed floating have augmented currency appreciation effect on exchange rate misalignment relative to floating exchange rate regime. This is similar to those findings in other studies, such as Goldfajn and Valdes (1999), and Combes et al. (2011). In Model 4 of Table 4, when including foreign exchange intervention (*FEI*) variable, there seems not to have any significant effect on *EE* for each 3-group of country sample. In model 5 when capital inflow variable (*FA*) is included, it shows a significant effect on exchange rate misalignment of currency appreciation either for EMCs and ICs, with estimated coefficients of 0.36 and 0.23, respectively. In addition, the estimated coefficient of foreign exchange intervention (*FEI*) is negative for all sample countries included (although not significant) and EMCs (under the 10%

significance level). It demonstrates that *FEI* cause exchange rate misalignment of undervalued currency for EMCs. For ICs, the estimated coefficient of *FEI* is positive yet not significant. Foreign exchange intervention indeed brings currency undervaluation, particularly for EMCs. This is consonant with the facts that ICs intervene less in the foreign exchange market since most of them adopted flexible exchange rate regimes and had rather sophisticated financial markets.

The estimation results when allowing the break-down of capital inflows into three components, *FDI*, *PI*, and *OI*, are shown at the Model 6 of Table 4. It is rather interesting to find that there is negative exchange rate misalignment of currency appreciation from *FDI* for EMCs (with an estimated coefficient of -0.225), similar to the studies by Athukorala and Rajapatirana (2003) and Combes et al. (2011), although it is not statistically significant. The prominent finding is that *OI* has positive exchange rate misalignment of currency appreciation for EMCs, with an estimated coefficient of 0.443. This resonates with those studies of EMCs' currency crises during the 1990s when *OI*, with its whimsical nature, was the main source of capital flight precipitating the crises (Sarno and Taylor, 1999; Baily et al., 2000; Sula and Willet, 2009). For ICs, the exchange rate misalignment of currency appreciation mainly results from *PI*, with the estimated coefficient of 0.273, significant under the 5% significance level.

To sum up, capital inflows indeed cause currency appreciation, and it is not because of *FDI*, but from *OI* (EMCs) or *PI* (ICs). However, the recent development also exhibits that many EMCs have been experiencing with undervalued currencies. This demonstrates that other factors are in the making to curtail the currency appreciation effect from capital inflows, such as the intensive and frequent intervention of foreign exchange market from the monetary authority of EMCs.

3.3 Additional Estimations

IMF (2007) and Mohan and Kapur (2010) documented that there were another wave of capital inflows to EMCs, and with changing volumes and types of capital inflows after the 1997-98 currency crises. disparate impact on exchange rate misalignment might occur. Nevertheless, the argument of the Bretton Woods II, which stipulated that periphery EMCs, after the 1997-98 currency crises, resorted to undervalue their currency vis-à-vis to central country, i.e. U.S., in order to promote their export-led growth strategy (Dooley et al., 2003, 2004). As a result, it is worth trying to examine whether key factors driving *EE* might be different after 1997-98. In addition, since the export-led growth strategy has mostly referred to Asian EMCs, we particularly group eight Asian countries (Asia-8) to estimation whether there is any disparity of effect driving *EE*.[14]

A. Different driving forces after 1997-98 Asian currency crisis

To examine whether prior to and after the 1997-98 Asian currency crises there are different features on capital inflows and foreign exchange intervention in EMCs, we use an interaction term of dummy variable with 0 prior to 1997 and 1 otherwise, to examine this effect. The estimated results are shown at the estimation Models 7 and 8 in Table 5. With adding the interaction term of dummy variable with foreign exchange intervention and capital inflows and their components, the estimated coefficients of macroeconomic variables and financial variables remain similar. For ICs, due to their relatively sophisticated financial system and flexible exchange rate regime, the estimated coefficients of foreign exchange intervention or capital inflows and their

[14] Eight Asian EMCs include Bangladesh, China, India, Indonesia, South Korea, Malaysia, the Philippines, and Thailand. Taiwan was excluded due to the unavailable data of financial variables, such as financial deepness and financial development, prepared by Beck et al. (2000).

components fairly remain insignificant. As for EMCs, the estimated coefficient of foreign exchange intervention (*FEI*) remains its negative influence on the exchange rate misalignment of currency appreciation, but turns to be insignificant (when regression estimation by breading down capital inflows into three components, the dummy interaction terms of estimated coefficient of *FEI* for EMCs turns to be significant). For the influence of capital inflows on EMCs, the currency appreciation all occurs in the period of post 1997-98 crises, with the augmented estimated coefficient, 1.004.

An interesting finding for EMCs shows when we break down the capital inflows into three components. Estimated coefficient of *FDI* remained negative (-2.18) and *OI* (0.17) remain positive; this is similar to the findings of Jongwanich (2010), Bakardzhieva et al. (2010), and Combes et al. (2011). However, the dummy interaction term shows that the augmented effect after 1997 has estimated coefficient of *D*FDI*, *D*PI*, and *D*OI* (2.70, 1.19, and 1.11, respectively), and all are significant under the 5% significance level. Even *FDI*, contribute positively to the exchange rate misalignment of currency appreciation after the 1997-98 currency crises of EMCs. However, *FEI* plays as a counteracting factor to stem currencies of EMCs from appreciation, with an estimated coefficient of -0.002 for the full sample period and -0.533 (under the 10% significance level) for the dummy interaction term of time period after 1997.

B. Considering Asian EMCs

The last 3 columns of Table 5 are the regression results for 8-Asian EMCs by considering 3 cases: including all currency misalignment driving factors (macroeconomic, financial, and policy variables) (Model 5a), adding 1997-98 time dummy variables (Model 7a), and considering different components of capital inflows

(Model 8a). Note that, without ICs, here we are able to use *M2* (instead of *PCR*) to represent financial deepness.[15] Model 5a shows that foreign exchange intervention has a significant negative impact (-0.406) on *EE*, while capital inflows (*FA*), although with positive impact (with estimated coefficient 0.160) on *EE*, is not significant. Considering the time dummy of 1997-98, Model 7a shows that the estimated coefficients of both *D*FEI* and *D*FA* are not significant. However, Dividing *FA* into three components helps capture the influence from capital inflows and *FEI* on *EE*. Model 8a shows that there are significant effects from *FDI* and *OI* on *EE*. *FDI* has negative influence on *EE*, with estimated coefficient, -1.27, and *OI* has positive influence on *EE*, with 0.337. Like using full sample of EMCs, 8-Asian EMCs also shows that there is positive *FDI* effect on EE after 1997, with augmented estimated coefficient of 1.660, and there is negative effect from foreign exchange intervention on *EE* with estimated coefficient, -0.495, although under the 10% significance level.

To sum up, for ICs, capital inflows do not have significant effect on EE, even for the periods after 1997-98. On the contrary, EMCs demonstrate that capital inflows could push exchange rate misalignment of currency appreciation. It bears noting that although many studies (Bakardzhieva et al., 2010; Combes et al., 2011) show that *FDI* can be a countering force to stem exchange rate from appreciation, our results show that *FDI* of the second wave of capital inflows to EMCs also enhances the currency appreciation. Finally, although capital inflows can cause currency misalignment of overvaluation, the overall proclivity of undervalued currency in the EMCs, particularly of 8-Asian EMCs, signify that other factors are in the play, such as foreign exchange intervention. The aggressive intervention from central banks to stem currency appreciation through recycling out of large capital inflows indicates that

[15] If using *PCR*, we will only have 6 countries for Asian EMCs (excluding two more countries, Bangladesh and China) due to the available data of financial variables.

reaping benefits from capital inflows is still an illusion for EMCs.

4 Conclusions

Current studies on exchange rate issues either focus on how pernicious large capital inflows can be for a country's international competitiveness due to currency appreciation, or how exchange rate misalignment (undervalued currency) can be beneficial for export-promoting growth strategy. However, it fails to demonstrate that although there are large capital inflows to EMCs, their currencies remained factually undervalued. This indicates that other opposite factors play a dominant role. What factors drive exchange rate is not yet under study. This paper contributes to investigate factors driving exchange rate misalignment by providing a two-stage estimation approach. The first stage is to estimate exchange rate misalignment and the second one is to estimate factors driving the misalignment. In this setting, we can estimate not only whether capital inflows cause currency appreciation, as most current studies focused, but also whether other factors, such as foreign exchange intervention and financial development can outstrip the influences of capital inflows and thus keep the exchange rate remained undervalued.

Except using macroeconomic and financial variables as our basic estimating factors driving exchange rate misalignment, we particularly focus on analyzing the influences from capital inflows and policy variables. We found that there are different impacts between EMCs and ICs. For EMCs, foreign capital inflows has significant effect on exchange rate misalignment of currency appreciation, while for ICs there is slim evidence of capital inflows affecting exchange rate misalignment. We also found

that since 1997-98 Asian currency crises, although there were enhancing forces from large capital inflows to push exchange rate misalignment toward overvaluation. However, the relentless undervalued currency in most EMCs shows that other forces are at play. Our empirical evidence shows the inexorably foreign exchange interventions of the monetary authority plays a key role in counteracting the currency appreciation and to some extent renders many EMCs' currencies stay undervalued, particularly after the 1997-98 Asian currency crises.

While embracing financial globalization to allow large private capital inflows and simultaneously accumulating large foreign reserves through foreign exchange intervention to reverse the inflowing capitals through the central banks, EMCs show its uneasiness of financial openness. With limited absorptive capacity in their financial markets and considering of promoting export-led growth strategy, the complex syndrome of "fear of floating" and "fear of sudden capital stop" signifies that reaping the benefits from capital inflows is still an illusion for emerging market countries.

Appendix

Data Sources and Descriptions

Variables	Unit	Definition	Data Sources
Dependent variable			
EE	Log	Exchange rate misalignment	Estimated by using PWT 6.3 (1980-2007)
Macroeconomic variables			
NFA	% of GDP	Net foreign assets / GDP	Lane and Milesi-Ferretti (2007, updated)
GC	% of GDP	General government final consumption exp. / GDP	WDI (1980-2007)
TOT	Index	Terms of trade index	WDI (1980-2007)
TNT	ratio	Per capita GDP in terms of U.S.	PWT 6.3
TOPEN	% of GDP	(Export + Import of goods and services) / GDP	WDI (1980-2007)
RGDP	US$	Per capita GDP (based on PPP)	PWT 6.3
Financial. Variables			
M2	% of GDP	Financial deepness (M2 / GDP)	WDI (1980-2007)
PCR	% of GDP	Financial deepness	Beck, Demirgüç-Kunt, and Levine, (2000,
STMK	% of GDP	Financial development	Beck, Demirgüç-Kunt, and Levine, (2000,
KOPEN	Index	Financial openness	Chinn and Ito (2008, updated)
Policy variables			
REG_F	Dummy	De facto flexible (0)	Ilzetzki, Reinhart, and Rogoff (2008)
REG_P	Dummy	De facto peg (1)	Ilzetzki, Reinhart, and Rogoff (2008)
REG_M	Dummy	Managed floating (2)	Ilzetzki, Reinhart, and Rogoff (2008)
FEI	% of GDP	Foreign exchange intervention	Lane and Milesi-Ferretti (2007, updated)
Capital inflows variables			
FA	% of GDP	Capital inflows	IFS (1980-2007)
FDI	% of GDP	Foreign direct investment	IFS, AREMOS
PI	% of GDP	Portfolio investment	IFS, AREMOS
OI	% of GDP	Other investments	IFS, AREMOS

Note: Data sources are shown as indicated except Taiwan's data, which are adapted from AREMOS, a data bank maintained by Ministry of Education of Taiwan.

Table 1: Country Sample and Descriptive Statistics of Exchange Rate Misalignment

EMCs (25)					ICs (22)				
Country	**Mean**	**Max.**	**Min.**	**S.D.**	**Country**	**Mean**	**Max.**	**Min.**	**S.D.**
Amman	-0.321	-0.190	-0.450	0.080	Austria	0.036	0.240	-0.191	0.122
Bahrain	-0.121	0.150	-0.349	0.110	Australia	0.079	0.272	-0.094	0.100
Bangladesh	0.074	0.213	-0.047	0.067	Belgium	0.077	0.234	-0.137	0.103
Chile	-0.213	0.045	-0.367	0.112	Canada	0.029	0.177	-0.096	0.081
China	0.004	0.370	-0.263	0.198	Denmark	0.392	0.581	0.069	0.150
Colombia	-0.111	0.057	-0.267	0.088	Finland	0.293	0.629	0.059	0.147
Egypt	0.013	0.450	-0.217	0.207	France	0.163	0.300	-0.057	0.106
Hungary	-0.254	-0.043	-0.406	0.107	Germany	0.134	0.347	-0.098	0.111
India	0.037	0.244	-0.122	0.115	Greece	-0.110	0.045	-0.300	0.109
Indonesia	-0.071	0.177	-0.254	0.118	Hong Kong	-0.238	-0.034	-0.434	0.113
Jordan	0.008	0.170	-0.203	0.093	Ireland	0.107	0.349	-0.054	0.107
Kenya	0.147	0.320	-0.004	0.094	Italy	0.023	0.212	-0.182	0.120
Korea	-0.108	-0.000	-0.270	0.062	Japan	0.300	0.733	-0.089	0.225
Kuwait	-0.243	-0.089	-0.456	0.096	Holland	0.070	0.255	-0.144	0.104
Malaysia	-0.215	0.045	-0.429	0.145	N. Zealand	0.072	0.226	-0.070	0.090
Mauritius	-0.422	-0.282	-0.569	0.078	Norway	0.231	0.439	0.008	0.118
Mexico	-0.090	0.158	-0.390	0.142	Portugal	-0.096	0.112	-0.256	0.107
Morocco	-0.078	-0.002	-0.154	0.046	Singapore	-0.177	0.081	-0.352	0.069
Nigeria	0.620	1.352	0.225	0.394	Spain	-0.076	0.089	-0.252	0.090
Philippines	-0.074	0.030	-0.186	0.054	Sweden	0.367	0.688	0.102	0.147
S. Africa	-0.126	-0.056	-0.197	0.040	Suitland	0.282	0.560	-0.057	0.164
Sri Lanka	-0.147	-0.006	-0.257	0.067	UK	0.116	0.323	-0.084	0.114
Thailand	-0.149	0.055	-0.271	0.101					
Turkey	-0.186	-0.068	-0.336	0.067					
Taiwan	-0.055	0.100	-0.342	0.116					

Note: Descriptive statistics of mean, max, min, and S.D. are for the estimated exchange rate misalignment (*EE*).

Table 2: Real Exchange Rate and Productivity

Dependent Variable: RER	
	All
C	-2.061***
	[0.067]
RGDP	0.296***
	[0.007]
adjusted R^2	0.577
Observations	1315

Note: The estimated coefficients are shown in the table and the number inside the bracket is the standard error. *** represent the significance level of 1%.

Table 3: Exchange rate misalignment regression: including macroeconomic and financial variables

Dependent Variable: EE

	[1]			[2]			[3]		
	All	Emerging	Advanced	All	Emerging	Advanced	All	Emerging	Advanced
NFA	-0.028	-0.073***	0.003	-0.022	-0.027	-0.014	-0.030	-0.044	-0.014
	[0.018]	[0.023]	[0.017]	[0.022]	[0.027]	[0.017]	[0.021]	[0.029]	[0.017]
GC	1.917***	2.038***	1.800***	2.095***	2.023***	2.381***	2.05***	1.964***	2.321***
	[0.204]	[0.272]	[0.363]	[0.308]	[0.338]	[0.413]	[0.311]	[0.340]	[0.409]
TOT	0.001***	0.0005**	0.004***	0.001**	0.0004	0.002**	0.001***	0.001*	0.002***
	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.001]
TOPEN	-0.116***	-0.206***	-0.049*	-0.222***	-0.191***	-0.227***	-0.222***	-0.199***	-0.224***
	[0.022]	[0.029]	[0.028]	[0.030]	[0.038]	[0.040]	[0.030]	[0.038]	[0.041]
KOPEN				-0.005	-0.005	-0.011*	-0.004	-0.004	-0.014**
				[0.005]	[0.007]	[0.006]	[0.005]	[0.007]	[0.007]
PCR				0.082***	-0.067	0.138***	0.086***	-0.048	0.136***
				[0.022]	[0.048]	[0.019]	[0.023]	[0.048]	[0.020]
STMK				-0.001	0.018	0.011	-0.001	0.016	0.008
				[0.015]	[0.024]	[0.017]	[0.015]	[0.024]	[0.017]
REG_P							0.056*	0.046	-0.021
							[0.031]	[0.036]	[0.039]
REG_M							0.059**	0.061**	-0.041
							[0.029]	[0.027]	[0.043]
adjusted R^2	0.759	0.736	0.747	0.824	0.760	0.859	0.823	0.759	0.859
Countries	46	25	21	44	23	21	43	22	21
Observations	1163	609	554	846	467	379	841	462	379

Note: The estimated coefficients are shown in the table and the number inside the bracket is the standard error. ***, **, and * represent the significance level of 1%, 5%, and 10%, respectively.

Table 4: Exchange rate misalignment regression: adding with policy variables

Dependent Variable: EE

	[4]			[5]			[6]		
	All	Emerging	Advanced	All	Emerging	Advanced	All	Emerging	Advanced
NFA	-0.030	-0.041	-0.011	-0.017	-0.034	0.004	-0.017	-0.037	0.008
	[0.022]	[0.029]	[0.017]	[0.022]	[0.030]	[0.019]	[0.022]	[0.029]	[0.020]
GC	2.020***	1.900***	2.399***	1.784***	1.646***	2.276***	1.810***	1.713***	2.282***
	[0.310]	[0.346]	[0.413]	[0.302]	[0.353]	[0.414]	[0.302]	[0.351]	[0.413]
TOT	0.001**	0.000*	0.002***	0.001***	0.001**	0.002***	0.001**	0.0004	0.002***
	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.001]
TOPEN	-0.219***	-0.192***	-0.236***	-0.194***	-0.162***	-0.239***	-0.197***	-0.174***	-0.234***
	[0.030]	[0.038]	[0.041]	[0.031]	[0.038]	[0.041]	[0.031]	[0.038]	[0.041]
KOPEN	-0.004	-0.004	-0.015**	-0.004	-0.003	-0.015**	-0.004	-0.001	-0.015**
	[0.005]	[0.007]	[0.007]	[0.005]	[0.007]	[0.007]	[0.005]	[0.007]	[0.007]
PCR	0.085***	-0.050	0.138***	0.087***	-0.026	0.135***	0.086***	-0.027	0.131***
	[0.023]	[0.048]	[0.020]	[0.023]	[0.047]	[0.020]	[0.023]	[0.047]	[0.020]
STMK	-0.002	0.018	0.013	-0.009	-0.006	0.017	-0.005	0.013	0.015
	[0.015]	[0.024]	[0.017]	[0.015]	[0.025]	[0.018]	[0.016]	[0.027]	[0.018]
REG P	0.056*	0.044	-0.019	0.050*	0.036	-0.011	0.046	0.035	-0.01
	[0.031]	[0.036]	[0.039]	[0.030]	[0.035]	[0.039]	[0.029]	[0.035]	[0.039]
REG M	0.059**	0.062**	-0.040	0.054*	0.057**	-0.034	0.054**	0.058**	-0.037
	[0.029]	[0.027]	[0.043]	[0.029]	[0.026]	[0.043]	[0.028]	[0.026]	[0.043]
FEI	-0.111	-0.233	0.246	-0.224	-0.302*	0.133	-0.182	-0.255	0.141
	[0.179]	[0.169]	[0.171]	[0.184]	[0.167]	[0.179]	[0.186]	[0.166]	[0.182]
FA				0.333***	0.356***	0.230*			
				[0.106]	[0.11]	[0.135]			
FDI							-0.018	-0.225	0.050
							[0.135]	[0.283]	[0.173]
PI							0.252**	-0.015	0.273**
							[0.113]	[0.235]	[0.142]
OI							0.381***	0.443***	0.192
							[0.120]	[0.118]	[0.139]
adjusted R^2	0.826	0.763	0.860	0.826	0.764	0.860	0.827	0.767	0.860
Countries	43	22	21	43	22	21	43	22	21
observation	841	462	379	841	462	379	841	462	379

Note: The estimated coefficients are shown inside the table and the number inside the bracket is the standard error. ***, **, and * represent the significance level of 1%, 5%, and 10%, respectively.

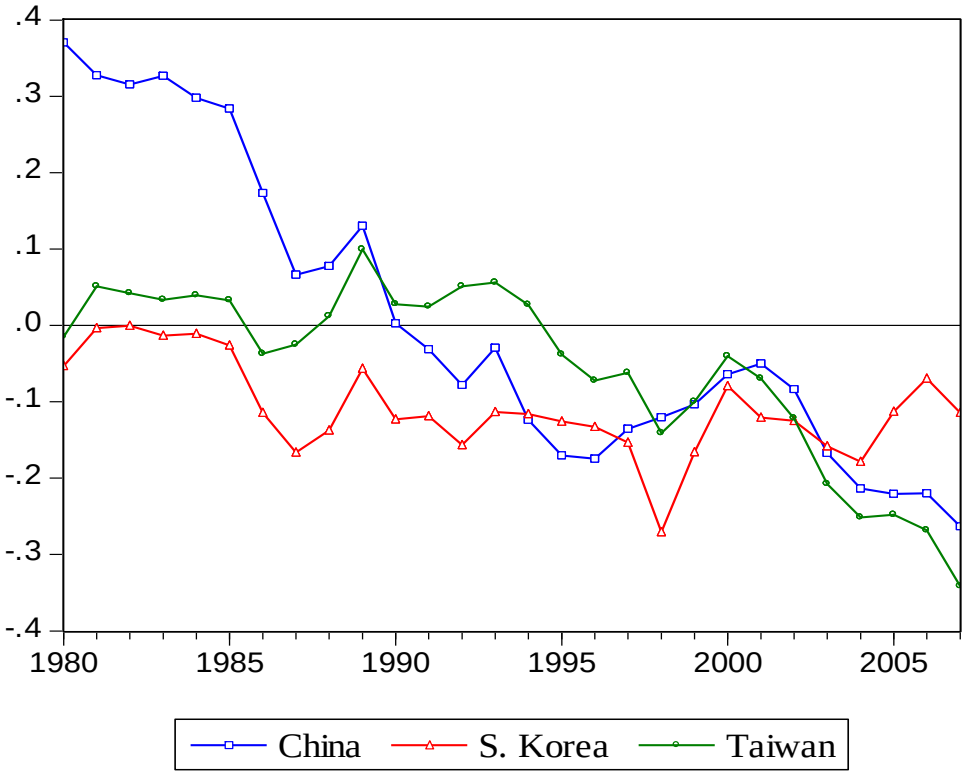
Table 5: Exchange rate misalignment regression - with time dummy variable

Dependent Variable: EE

	[7]			[8]			[5a]	[7a]	[8a]
	All	Emerging	Advanced	All	Emerging	Advanced	Asia-8	Asia-8	Asia-8
NFA	0.009	-0.014	0.015	0.004	-0.022	0.028	-0.089***	-0.089***	-0.095***
	[0.023]	[0.030]	[0.022]	[0.023]	[0.029]	[0.023]	{0.034}	[0.035]	[0.034]
GC	1.746***	1.471***	2.406***	1.772***	1.502***	2.361***	3.256***	3.255***	3.225***
	[0.296]	[0.351]	[0.430]	[0.300]	[0.339]	[0.433]	[0.361]	[0.368]	[0.361]
TOT	0.001***	0.001***	0.002***	0.001***	0.0001**	0.002***	0.001***	0.001***	0.001***
	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]
TOPEN	-0.185***	-0.149***	-0.243***	-0.194***	-0.196***	-0.246***	-0.110***	-0.103***	-0.116***
	[0.030]	[0.038]	[0.041]	[0.030]	[0.039]	[0.042]	[0.031]	[0.033]	[0.034]
KOPEN	-0.006	-0.010	-0.015**	-0.007**	-0.010	-0.015**	-0.009	-0.008	0.013
	[0.005]	[0.007]	[0.007]	[0.005]	[0.007]	[0.007]	[0.008]	[0.008]	[0.009]
PCR	0.087***	-0.001	0.138***	0.081***	-0.015	0.138***	0.010	0.006	-0.007
	[0.024]	[0.047]	[0.020]	[0.024]	[0.046]	[0.020]	[0.046]	[0.046]	[0.046]
STMK	-0.010	-0.027	0.022	-0.003	0.005	0.020	-0.044**	-0.044**	-0.030
	[0.015]	[0.025]	[0.018]	[0.016]	[0.026]	[0.018]	[0.018]	[0.018]	[0.019]
REG_P	0.051*	0.047	-0.013	0.044	0.029	-0.015	0.008	-0.004	-0.007
	[0.029]	[0.034]	[0.040]	[0.028]	[0.035]	[0.040]	[0.046]	[0.016]	[0.044]
REG_M	0.054*	0.062**	-0.034	0.052**	0.053**	-0.042	0.017	0.011	0.015
	[0.028]	[0.026]	[0.043]	[0.027]	[0.026]	[0.043]	[0.045]	[0.045]	[0.043]
FEI	-0.052	-0.151	0.351	0.036	-0.002	0.276	-0.406***	-0.289	-0.180
	[0.240]	[0.228]	[0.250]	[0.251]	[0.220]	[0.257]	[-0.142]	[0.213]	[0.204]
FA	0.060	0.039	0.188				0.160	0.091	
	[0.146]	[0.122]	[0.221]				[0.113]	[0.146]	
FDI				-0.978***	-2.180***	0.518			-1.227***
				[0.366]	[0.514]	[0.461]			[0.434]
PI				-0.003	-0.620	0.247			-0.053
				[0.246]	[0.472]	[0.253]			[0.445]
OI				0.122	0.172	0.123			0.337**
				[0.165]	[0.127]	[0.242]			[0.164]
D*FEI	-0.382	-0.351	-0.435	-0.436	-0.533*	-0.342		-0.215	-0.495*
	[0.315]	[0.320]	[0.316]	[0.322]	[0.324]	[0.333]		[0.286]	[0.297]
D*FA	0.600***	1.004***	0.011					0.156	
	[0.207]	[0.199]	[0.227]					[0.258]	
D*FDI				1.285***	2.695***	-0.489			1.660***
				[0.374]	[0.531]	[0.445]			[0.620]
D*PI				0.550**	1.191**	0.038			0.202
				[0.256]	[0.518]	[0.258]			[0.577]
D*OI				0.632**	1.112***	0.077			0.080
				[0.258]	[0.227]	[0.266]			[0.279]
adjusted R^2	0.830	0.776	0.860	0.832	0.789	0.860	0.778	0.776	0.788
Countries	43	22	21	43	22	21	8	8	8
Observations	841	462	379	841	462	379	186	186	186

Note: The estimated coefficients are shown inside the table and the number inside the bracket is the standard error. ***, **, and * represent the significance level of 1%, 5%, and 10%, respectively. For Models 5a, 7a, and 8a, countries included in the regression samples are 8 Asian EMCs (Bangladesh, China, India, Indonesia, South Korea, Malaysia, the Philippines, and Thailand) and the regressor *PCR* is replaced with *M2*.

Figure 1: Exchange Rate Misalignment (1980-2007)



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