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From a capital account surplus to a current account deficit

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Introduction

This paper is about external imbalances, in particular the causes of current account deficits in the run-up to a financial crisis. Financial crises have occurred in many countries following the collapse of the Bretton Woods system in 1971 and the move towards floating exchange rates. There have been several waves of financial crises during these almost five decades as discussed by Robert Aliber in another chapter of this book. In most cases there were both banking crises and currency crises. The first wave occurred in the early 1980s, affecting Mexico, Brazil and Argentina and ten other developing countries, the second wave affected Japan, Finland and Sweden in the early 1990s and a third wave occurred in 1997 when a crisis hit Thailand, Malaysia, Indonesia, the Philippines and South Korea. The recent Western crises in the US, the UK, Ireland, Spain, Portugal, Greece, the Baltic countries and Iceland constitute the fourth wave. The last wave is currently unfolding in Argentina, Turkey and probably soon in other emerging economies.

In each of these countries the crises were preceded by an economic boom that lasted several years that coincided with large current account deficits. The question posed in this paper is whether the boom and the accompanying current account deficits can be traced to domestic causes or have a common cause in global capital markets that creates capital inflows leading to a real exchange rate appreciation and a stock market boom. To this end we will explore data from Iceland, a country that became a symbol of the Western crisis that started in 2008.

A brief history of Iceland's boom and bust

Following the privatization of its banking system in 2003, Iceland experienced a credit boom from 2004 to 2008 fueled by a combination of excess liquidity in world capital markets and the willingness of the owners of the banks to use a good credit rating to borrow abroad to finance massive investment in other countries. There resulted a rapid expansion of its banking system (from 1.74 GDP in 2004 to 7.44 GDPs at the end of 2007), which soon became too big to save, and a deterioration of the country's net investment position. The assets of the three largest banks grew by between 50% and 60% annually during this period. The net investment position became negative amounting to one GDP but this statistic concealed vastly larger gross debt accumulation, gross debt being six times the country's GDP in 2008. The credit creation created a massive stock market bubble that raised stock prices by a factor of ten and an increase of house price from 2004 to 2008. Household and business debt increased rapidly – private business debt mostly in foreign currency denominated debt – and consumption boomed creating a current account deficit of around 20% of GDP.[1]

   Not all flows are potentially harmful and many economies have greatly benefited from capital inflows in the past. What matters is the origin and composition of inflows, and more importantly, the destination of these inflows within the recipient economy. Theoretically, if the foreign investment is sustainable and is used in generating resources which can potentially pay back the debt, then imbalances are eliminated without causing panic in the markets. Such properties are normally attributed to FDI investments in the tradeable sector. Portfolio investments (PFI) and bank borrowing, what we call "other investments" (OI), are, in contrast, relatively easier to pull out, which makes them potentially destabilising as described in the literature on sudden stops, see Calvo (1998). A point of concern with regards to free capital mobility is that the proportion of these volatile and other short-term flows has substantially increased over the last two decades. It has been argued that innovations in the financial markets have increased short-termism in the corporate sector, which has resulted in an increased volume of financial investments (see, e.g., Orhangazi (2008); Van Treeck (2009)).

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[1] See Benediktsdottir et al. (2011) on the crash in Iceland.

For Iceland, the openness to capital flows took place at a time of increased financialization in global markets.[2] Figure 1 shows that a large proportion of inflows into Iceland was in the form of portfolio investments (PFI) and bank borrowing (OI), while the proportion of FDI remained smaller in the initial years of liberalisation.[3] Iceland in the early 2000s borrowed by issuing fixed income securities in the international market and later in 2006-07 by offering higher interest rates on its deposits in foreign currencies. High interest rates in Iceland also resulted in a large volume of short-term inflows (the carry trade), which made the ISK appreciate (ISK). The overvaluation and expected appreciation of the domestic currency and high domestic interest rates encouraged domestic borrowers to borrow in foreign currencies. Tradable-sector firms (e.g. fishing) borrowed in foreign currencies because their revenues and partly also costs were in foreign currencies, but unhedged parties such as local communities, businesses serving the home market and households also borrowed in foreign currency while their earnings were mainly in ISK.

Figure 1. Capital inflows to GDP and share prices
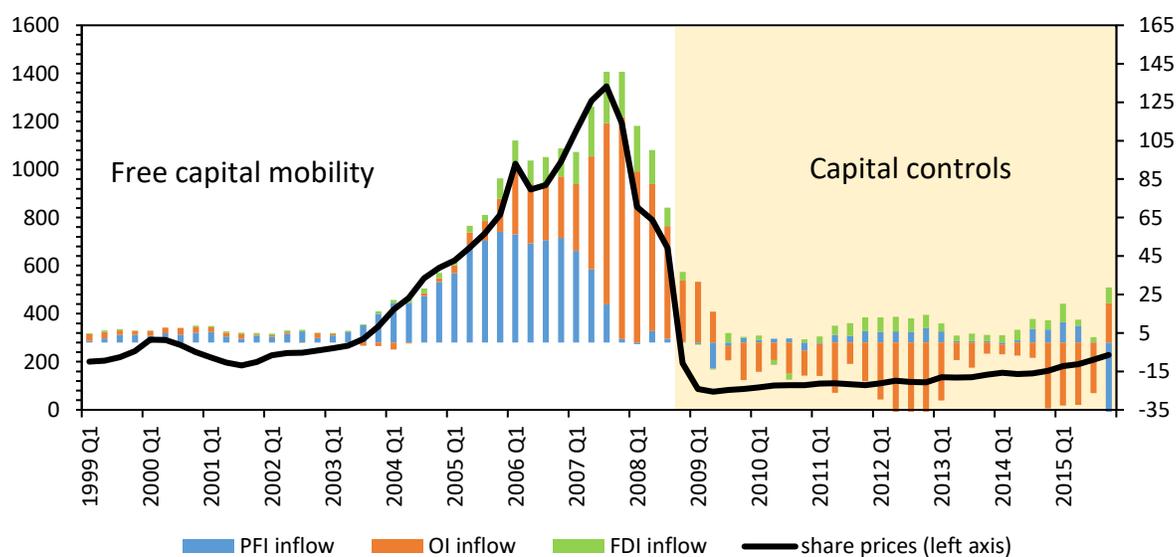
[2] Financialisation here is defined as an increase in financial investment compared to the volume of real investments.
[3] There is an increase in FDI in Iceland during 2006-08, where a large proportion of investment was in export projects (e.g. aluminum smelting). Baldursson and Porte (2013) have argued that the completion of export projects would have likely reduced the deficit, as Iceland has done so in the past after the completion of large investment projects.

Note: Gross inflows to annual GDP are calculated as four quarter moving averages

Figure 1 also shows that the episode of capital inflows coincided with the stock market boom. Apart from investors purchasing stocks, the banks also heavily relied on shares as collateral and regularly purchased their own shares in the market, which drove share prices above their true value. There is a close nexus between inflows, share prices and the exchange rate in Iceland.

The channels through which capital inflows interact with stock prices and real exchange rate are obvious, however, identifying the channels through which stock prices and real exchange rate are connected is complicated. From a theoretical perspective, the interaction between stock prices and exchange rate is usually analysed from two perspectives, "flow oriented" models as in Dornbusch and Fischer (1980), and "stock oriented" models, as proposed by Frankel (1983) and Branson (1983). The flow oriented models tend to associate exchange rate depreciations with stock market improvements. The argument is that exchange rate appreciations can deteriorate current account balance, which in turn can adversely stock performance of firms. In these models, stock prices respond to movements in exchange rate. Stock oriented models, in contrast, associate rising stock prices to exchange rate appreciation via wealth effects. In these models, real exchange rate responds to movements in the stock market. The relationship in the empirical literature is also ambiguous, as some studies find a positive relationship between the variables while some found a negative relationship.[4] Overall, it appears that the relationship differs across the countries and also has a tendency to change over time within the same economy. We now proceed to investigating the nexus between capital inflows, share prices, and real exchange rate.

Empirical analysis

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[4] For example, Aggarwal (1981) found a positive effect of US exchange rate on stock prices. Diamandis and Drakos (2011) concluded a positive effect of real exchange rate on stock prices for Latin countries. On the other hand, Goodwin, Farsio, and Willett (1992) and Soenen and Hennigar (1988) found a negative effect of US exchange rate on stock prices. Moreover, the results regarding direction of causality are also mixed (see, e.g., Granger et al., 2000; Pan, Fok and Liu, 2007, amongst others).

To explore the interaction between capital inflows, stock prices, and real exchange rate in Iceland, we use quarterly data from 1995Q1 – 2017Q4. First we use the full-sample and then split it for free capital mobility regime (1995Q1-2008Q3) and capital controls regime (2009Q1-2017Q3).

The variables used in the empirical section are the gross capital inflow to GDP *(F)*, stock prices *(S),* and real exchange rates *(R).* Figure 2 shows the evolution of gross capital inflows to GDP, stock prices, and real exchange rate. There is a clear positive co-movement between gross capital inflows and stock prices from 1995 up to the financial crash in 2008. In particular, the co-movement in the boom years leading to the crisis is very strong. This coincides with the period in which the banks increased their lending for stock purchasing and in some cases directly accepted each other's stocks as collateral. Gross capital inflows also seem to have a positive co-movement with real exchange rate in the period of free capital mobility (i.e., 1995 – 2008), however, in the post crisis period there is a divergence in the two series indicating a major shift in the dynamics of the relationship, marked by the implementation of strong capital controls.

Figure 2. Capital inflows, stock prices, and real exchange rate
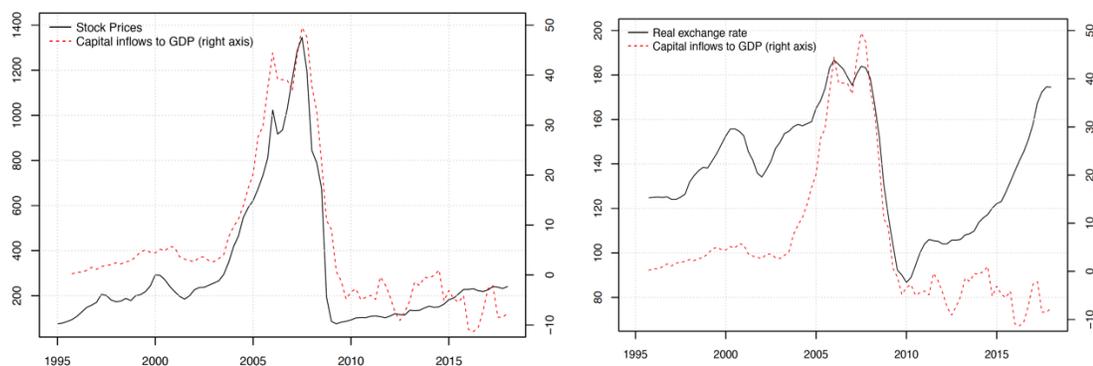
Model

We now formally investigate the interactions amongst variables using a Vector autoregression (VAR) model.[5] The model is represented as follows. The reduced form VAR model in levels can be represented as:

$$x_t = \mu_0 + A_1 x_{t-1} + A_2 x_{t-2} + \cdots + A_p x_{t-p} + e_t, \quad (t=1,2...T) \tag{1}$$

where μ_0 is a $n \times 1$ vector of constants, x_t is a $n \times 1$ vector of variables in the model, A_p is a $n \times n$ matrix (*with i =1,..p*) of parameters, e_t is a $n \times 1$ vector of error terms.

Since, we estimate our model in first differences, the vector of our endogenous variables takes the following form:

$$x_t = [\Delta F, \Delta lnS, \Delta lnR]'$$

F represents gross capital inflows to GDP.[6] *S* represents the stock prices. *R* represents the real exchange rate.

The structural-VAR (SVAR) model in its general form can be written as:

$$Bx_t = \mu_0 + B_1 x_{t-1} + B_2 x_{t-2} + \cdots + B_p x_{t-p} + \varepsilon_t, \quad (t=1,2...T) \tag{2}$$

where B is a contemporaneous matrix. Note that multiplying equation 2 with the inverse of B will result into reduced form VAR as represented in equation 1, i.e., $A_i = B^{-1}B_i$ (*for i =1,..p*).

We follow Cholesky decomposition to identify our shocks by imposing restrictions on the contemporaneous matrix B as follows:

$$B= \begin{matrix} \Delta F \\ \Delta S \\ \Delta R \end{matrix} \begin{bmatrix} 1 & 0 & 0 \\ * & 1 & 0 \\ * & * & 1 \end{bmatrix}$$

The ordering of the variables implies that capital inflows shocks contemporaneously affect stock prices and real exchange rates. But shocks to stock prices and real exchange rates affect gross capital inflows with a lagged effect. Our ordering regarding capital

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[5] Before estimating the model, we adjust all the variables for seasonal variations. We then test all the variables for
a unit root finding that they are non-stationary.
[6] We use trend of annual GDP in order to normalize our measure of capital inflows.

inflows preceding other variables is in line with the economic theory. The argument, as also discussed earlier, is that gross capital inflows make the real exchange rate appreciate and increase the demand for assets, which increases asset prices. Regarding the interaction between stock prices and real exchange rate, there is no general consensus on how should they be ordered. For example, the flow-approach would require placing real exchange rate before stock prices in a VAR model, however, stock oriented model would require placing stock prices before real exchange rate. Given, Iceland's experience, it is natural to assume that stock model approach is suitable to modelling this interaction as the episode of stock price boom coincides with real exchange rate appreciations. However, before explaining our main results we relax this assumption and change the ordering of stock prices and real exchange rate. We find that the ordering has some effect on the magnitude of the shock, i.e., the shock tends to be relatively stronger in magnitude when contemporaneous effects are incorporated but the impulse responses are robust in their shapes. Overall, the ordering assumption does not alter our results in any fundamental way.

Results and discussion

The results of our structural VAR model are presented in Figure 3, which shows the cumulated impulse responses. Focusing on the effects of capital inflows, the results indicate that capital inflows shocks increase stock prices as well as making the real exchange rate appreciate. The effect of the shock in both cases lasts for one year. There is also a significant feedback effect from stock prices to capital inflows, i.e., shocks to stock prices induce capital inflows. This effect lasts for 1-2 quarters. A shock to stock prices also appreciate real exchange rates, which is consistent with the wealth effects of equity market. A shock to real exchange rate increases stock prices but has no significant effect on capital inflows.

There are significant differences between the regimes of free capital mobility and capital controls. The cumulated impulse responses reported in Figure 4 shows major differences in the results. The results indicate a strong interaction between capital inflows, stock prices and real exchange rate in the period of free capital mobility but the interaction appears to have vanished in the capital controls regime. In particular, our results indicate that a shock to capital inflows increases stock prices and makes the real exchange rate
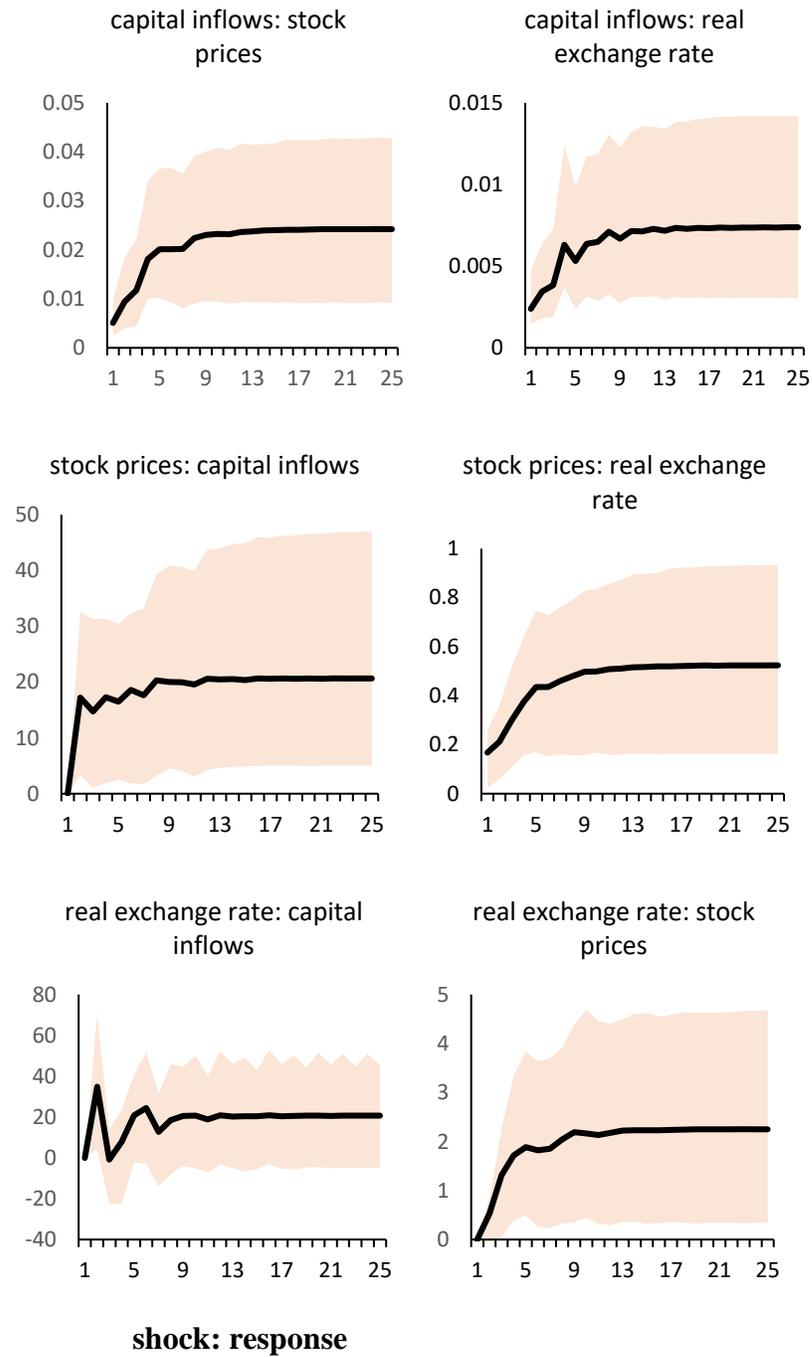
appreciate in the period of free capital mobility but the effect is zero in the period of capital controls. There is also a significant feedback effect from stock prices to capital inflows, indicating that a booming stock market encouraged capital inflows. Overall, we find that the effects of all shocks in the capital control regime are statistically zero.

Conclusions

The newly privatized bank's access to international capital flows may have made them choose more risky behavior as discussed the in chapter by Michael Dooley in this volume. In essence, the risky asset choice could be levered in international capital market may attracting capital from an unlimited pool of bond issuers and depositors. Our results show that the capital inflow may have caused the appreciation of the real exchange rate as well as the stock market boom, the latter consistent with the hypothesis that banks choice to finance riskier assets. Our empirical results are also consistent with the thesis of Robert Aliber in another chapter of the volume that current account surpluses in other countries may create capital flows that cause a small economy open to capital flows to boom and then bust in response to capital inflows and a sudden stop of these flows.
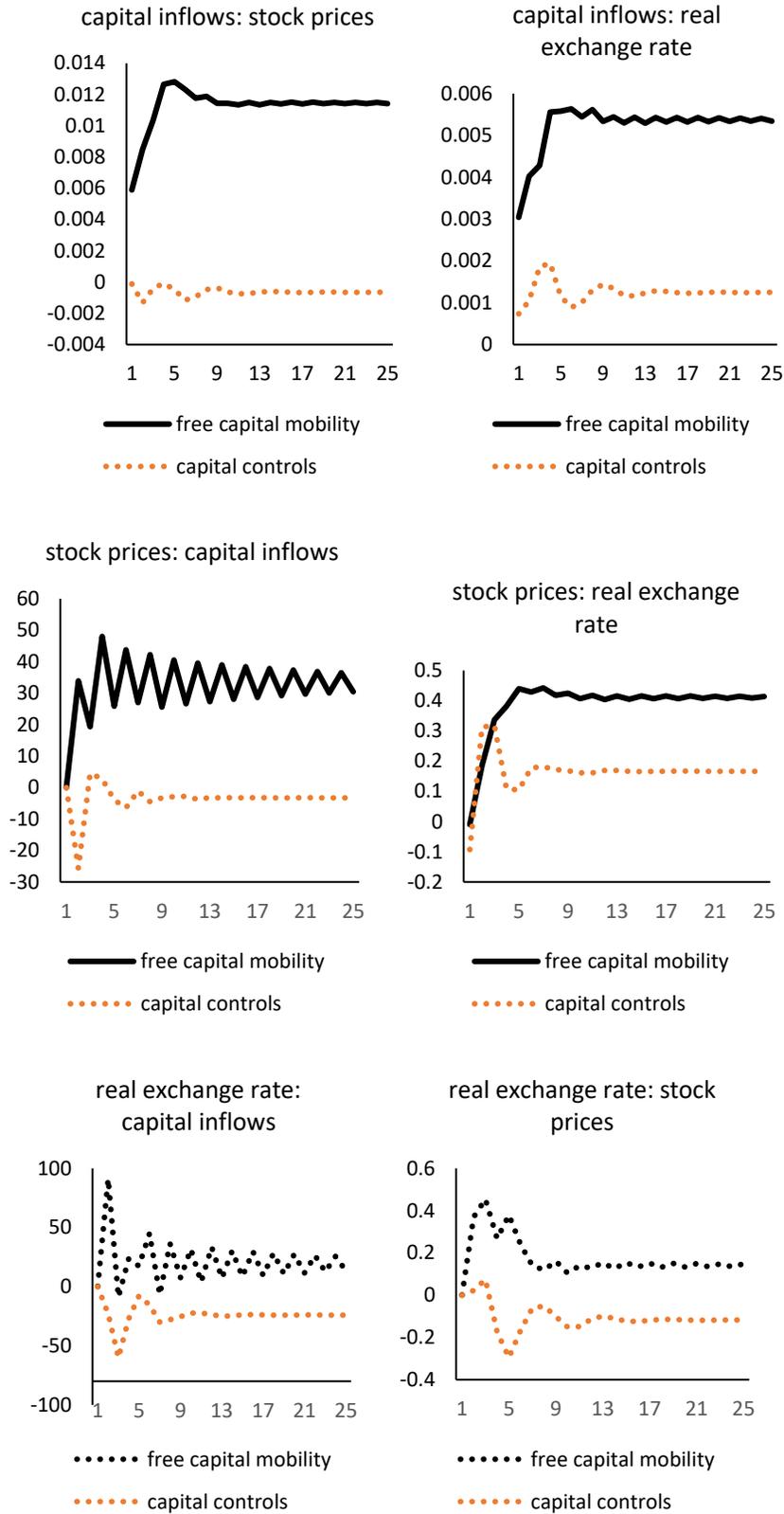
The policy implications of our results are clear. A country should try to limit the volume of portfolio investments by foreign investors, especially investments in the market for government bonds, corporate bonds and bank deposits. Such carry trade can, as we have shown, have large destabilizing effects on asset prices and economic activity of the recipient country.

Figure 3. Cumulated impulse responses for period 1995Q1-2017Q3

capital inflows: stock prices

capital inflows: real exchange rate

stock prices: capital inflows

stock prices: real exchange rate

real exchange rate: capital inflows

real exchange rate: stock prices

shock: response

Note: the structural shocks are plotted with 90% confidence bands.

Figure 4. Cumulative impulse responses for different regimes

capital inflows: stock prices

capital inflows: real exchange rate

stock prices: capital inflows

stock prices: real exchange rate

real exchange rate: capital inflows

real exchange rate: stock prices

free capital mobility

capital controls

Note: the solid indicates that the shock is significant where as dotted line indicates that the shock is insignficant using 90% confidence bands.

Appendix

Figure A1. Impulse responses from different ordering

stock prices: real exchange rate

real exchange rate: stock prices

———ΔF - ΔlnS - ΔlnR (benchmark model)

———ΔF - ΔlnR - ΔlnS

———ΔF - ΔlnS - ΔlnR (benchmark model)

———ΔF - ΔlnR - ΔlnS
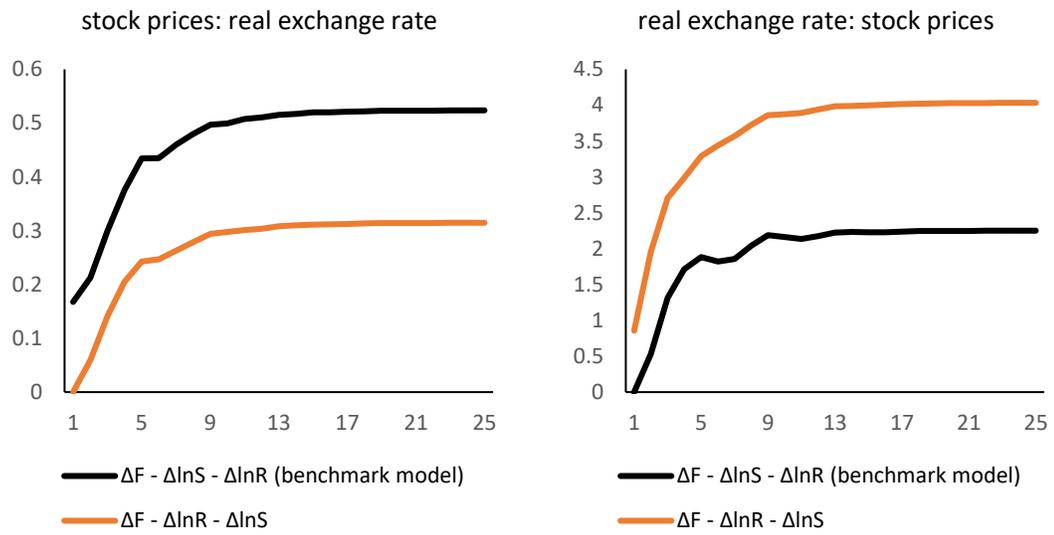
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