FDI, SECTORAL OUTPUT AND REAL EXCHANGE RATE DYNAMICS UNDER FINANCIAL OPENNESS

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ABSTRACT

This paper adopts an alternative approach to the study of the impact of capital inflow on the real exchange rate by foremost, analysing the effect of FDI inflow on the ratio of tradables to nontradables, and then estimating the relationship between the tradable-nontradable ratio and the real exchange rate, while accounting for the role of financial openness. Based on data for a group of developing countries, the findings show that an increase in FDI inflow is associated with a decrease in the tradable-nontradable ratio, and that an increase in the tradable-nontradable ratio leads to a depreciation of the real exchange rate; this effect being greater with an increase in financial openness. This suggests that an increase in FDI inflow could result in an expansion of the nontradable sector, which would be associated with a greater appreciation of the real exchange rate under a higher level of financial openness.

Keywords: Dutch disease, financial openness, FDI, real exchange rate

JEL classification numbers: F41, O11, O19

I. INTRODUCTION

Several studies have examined the link between financial openness and economic growth, and others have focused on the relationship between financial openness and productivity growth instead, all aimed at providing empirical evidence on the effect of financial liberalization on economic performance. Although the results on how financial liberalization impacts economic growth, in general, have been mixed (Bussiere and Fratzscher, 2008), those that focus on productivity growth have produced some consistent evidence. Kose et al. (2008), for instance, do find that economies with more open capital accounts have higher productivity growth. A related line of literature has explored the effects of capital inflows on resource reallocation and the real exchange rate in emerging market economies.1 Most of these studies have conducted empirical investigations on whether capital inflows cause symptoms of the Dutch disease, and have typically examined the relationship between some capital inflow variables and the real exchange rate.

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1These effects are referred to as the Dutch disease, a term used in reference to any situation in which a natural resource boom, large foreign aid or capital inflow causes a real exchange rate appreciation that hurts the prospect of manufacturing.
The results from such studies have also been variable. Athukorala and Rajapatirana (2003), for instance, find that an increase in foreign direct investment (FDI) leads to real exchange rate depreciation in Latin America and Asia whereas Larney (2007) reveals that FDI causes real exchange rate appreciation in sub-Saharan Africa.  

More recently, Saborowski (2009) examined the relationship between financial development and capital inflow-induced real exchange rate appreciation. The paper argues that the main benefits of a well-developed financial system would serve to weaken the link between capital inflows and real exchange rate appreciation. Specifically, the paper indicates that the efficiency of resource allocation and the broader range of investment opportunities in a more developed financial sector would channel foreign capital away from sectors where they increase domestic consumption and cause an increase in the relative price of nontradable goods. The results show that in a more developed financial sector, only FDI, among other types of capital inflow does not cause the real exchange rate to appreciate. Larney (2011), on the contrary, uses estimates from dynamic real exchange rate models to show that an increase in capital account openness leads to an appreciation of the real exchange rate, but more importantly, that an increase in FDI results in an appreciation of the real exchange rate only in more financially open countries.

In this study, I examine the effect of FDI on the ratio of tradable to nontradable output, and the implication of the interaction between financial openness and the ratio of tradable to nontradable output for real exchange rate dynamics. Adopting a new approach, I introduce the ratio of tradables to nontradables, instead of FDI inflow in an empirical real exchange rate model. The main idea is that the conventional way of studying real exchange rate effects of capital inflow and using that as evidence of the existence of the Dutch disease effects may not necessarily be capturing the resource movement effect and the spending effect that characterize the phenomenon. In fact, some results based on such studies may only reflect changes in the nominal exchange rate due to rising demand for domestic currency, particularly where the nominal exchange rate is not a control variable.

Thus this new approach is an attempt to capture foremost, how FDI affects the ratio of tradable to nontradable output, and secondly, see how the variation in the relative productivity of these sectors affects the real exchange rate, which would indicate whether the Dutch disease mechanism is in place, or if some other one such as the Balassa-Samuelson effect is at work. This representation of real exchange rate behavior, which is a departure from Larney (2011) and the standard way of empirically investigating the effects of capital inflows on the real exchange rate, is novel.

Studies have shown that, relative to other forms of capital inflow, FDI has greater impact on domestic capital accumulation. Mody and Murshid (2005) and Mileva (2008), for example, assert that FDI contributes more towards the provision of plant and equipment and technological spillovers, and consequently productivity growth. Thus, FDI tends to be channelled toward more productive investments. It could be argued then, that the degree of real appreciation from a given increase in FDI inflow should be smaller than that associated with increases in other forms of capital inflow, which have been associated with increases in the consumption of nontradable goods. Larney (2008), however, shows within a theoretical framework, that the greater is the financial openness of an economy, the greater is the real exchange rate appreciation following an increase in capital inflow, a result which is corroborated in Larney (2011). Arguably, a financially developed economy would channel capital inflows away from consumption and towards productive uses, enhancing productivity and thereby inducing a real exchange rate appreciation that is similar to the Balassa-Samuelson effect.

Given that the capital inflow-real exchange rate dynamics has been widely studied, I abstain from presenting a detailed review of the literature. Larney (2007) and Saborowski (2009), for example, provide in-depth literature reviews on the subject.
This paper, therefore, departs from earlier research and attempts to empirically examine the extent to which an increase in FDI inflow in particular, affects sectoral productivity and how that in turn impacts real exchange rate dynamics in developing countries.

II. EMPIRICAL ANALYSIS

The empirical approach involves two steps. Firstly, I analyse the effect of an increase in FDI inflow on the tradable-nontradable output ratio and secondly, estimate the relationship between the tradable-nontradable output ratio and the real exchange rate. I also investigate whether financial openness matters for sectoral productivity and real exchange rate dynamics.

II.1 Data and descriptive statistics

The dataset covers a group of 44 emerging market and developing countries, and over the period, 1990--2006. The ratio of tradable output to nontradable output and the real exchange rate represent the dependent variable in the first and second stage, respectively. The real exchange rate data comes from the International Financial Statistics database. The ratio of tradable to nontradable output is obtained using an approximate definition of tradable output as the sum of agriculture and manufacturing output, and nontradable output as services. Data on agriculture, manufacturing and services output as a share of GDP are from World Development Indicators.

The explanatory variable of interest at the first stage is foreign direct investment (FDI), and those for the second stage are the financial openness index and ratio of tradable to nontradable output. The other explanatory variables include non-FDI private inflows, growth rate of money supply, growth rate of government expenditure, openness to trade, terms of trade and gross domestic investment. All the explanatory variables, with the exception of investment as a share of GDP, are introduced in the real exchange rate equation, and represent the conventional set of control variables used in empirical real exchange rate models. Furthermore, given that the composition of the tradable-nontradable ratio essentially represents the main components of GDP, it could be argued that all the explanatory variables, being determinants of GDP theoretically, would be good control variables in that specification. In that case, the set of control variables could be categorized into primary determinants of GDP (investment), international transactions variables (financial openness, trade openness, terms of trade), capital inflow variables (FDI inflow, non-FD inflows) and policy variables (growth rate of money supply (M2/GDP(%) and Government expenditure).

Table 1 shows a negative association between FDI and the real exchange rate, and a negative association between FDI and the tradable-nontradable output ratio, which represent the two main relationships of interest. Another important correlation coefficient is the one describing the association between the tradable-nontradable ratio and real exchange rate, which is negative. The relationships between these pairs of variables are explored further using dynamic panel data estimation techniques.

II.2 Methodology and Results

I estimate dynamic models using the generalized method of moments (GMM) system estimator. This technique reduces omitted variable bias that is likely to affect cross-sectional estimates.

3 Gross domestic investment is used only in the first stage regression specifications.
4 See for instance, Athukorala and Rajapatirana (2003) and Lartey (2007) for the motivation behind the choice of these variables.
TABLE 1
Correlation matrix

| Variable                  | Real exchange rate | Financial openness | FDI inflows     | Non-FDI inflows | M2/GDP (%) | Govt. expenditure | Trade openness | Terms of trade | Tradable/Nontradable | Investment/GDP(%) |
|---------------------------|--------------------|--------------------|-----------------|-----------------|-------------|-------------------|----------------|----------------|---------------------|------------------|
| Real exchange rate        | 1.000              |                    |                 |                 |             |                   |                |                |                     |                  |
| Financial openness        | 0.208              | 1.000              |                 |                 |             |                   |                |                |                     |                  |
| FDI inflows               | -0.053             | 0.232              | 1.000           |                 |             |                   |                |                | -0.155–0.202–0.098 | -0.143–0.238–0.272–0.110–0.056 1.000 |
| Non-FDI inflows           | 0.053              | 0.105–0.055        | 1.000           |                 |             |                   |                |                |                     |                  |
| M2/GDP (%)                | -0.064             | 0.131              | 0.102           | 0.131           | 1.000       |                   |                |                |                     |                  |
| Govt. expenditure         | -0.044             | 0.040              | 0.227           | 0.129           | 0.418       | 1.000             |                |                |                     |                  |
| Trade openness            | 0.036              | 0.204              | 0.326           | 0.112           | 0.444       | 0.353             | 1.000          |                |                     |                  |
| Terms of trade            | -0.064–0.034       | 0.0904             | 0.067           | 0.083           | 0.189       | 0.110             | 1.000          |                |                     |                  |
| Tradable/Nontradable      | -0.155             | -0.202             | -0.098          | -0.143–0.238–0.272–0.110–0.056 | 1.000     |                   |                |                |                     |                  |
| Investment/GDP(%)         | -0.076             | 0.199              | 0.388           | 0.121           | 0.392       | 0.349             | 0.535          | 0.111–0.1841.000 |                     |                  |

and ameliorates inconsistencies from potential endogeneity issues in cross-section and static panel models.\(^5\) The estimated equations take the form,

\[
y_{i,t} = \gamma + \beta y_{i,t-1} + \theta(L)x_{it} + \alpha_i + \epsilon_{it}. \quad (1)
\]

This is a dynamic model for the level of \(y_{i,t}\), where \(y_{i,t-1}\) is the one period lag of \(y_{i,t}\), \(x_{it}\) is a vector of other explanatory variables, and \(\theta(L)\) is a vector of associated polynomials in the lag operator; \(\alpha_i\) is a country-specific effect which is unobservable, and \(\epsilon_{it}\) is an error term.

A transformation of equation (1) to eliminate the country-specific effect yields,

\[
y_{it} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \theta'(x_{it} - x_{i,t-1}) + (\epsilon_{it} - \epsilon_{i,t-1}). \quad (2)
\]

Equation (2) shows that the lagged difference of \(y\) is correlated with the error term, and instruments are required to deal with this problem and the potential endogeneity of the other explanatory variables. Under the assumptions that the error term is not serially correlated and the lagged levels of the explanatory variables are weakly exogenous, the lagged level of the explanatory variables serve as instruments in estimating equation (2). However, these instruments tend to be weak if the dependent variable (\(y\)) and other endogenous variables have near unit root properties. The GMM system estimator effectively combines an estimator in differences with another in levels into a system, where past changes of the variables serve as instruments for the equation in levels. This minimizes the potential biases associated with the estimator in differences under such circumstances. In addition, the inclusion of the equation in levels allows the use of information on cross-country differences, which is otherwise impossible to exploit using the estimator in differences. The validity of instruments underpins the consistency of the GMM estimator, and this is addressed by employing two specification tests; a test of over-identifying restrictions and a test for second-order serial correlation in the error term. The main regressions satisfy both the Sargan test of overidentifying restrictions and the serial correlation test.\(^6\)

II.2.1 FDI and tradable-nontradable output ratio. The first set of regressions examines the relationship between capital inflows and the ratio of tradables to nontradables, with a focus on FDI inflows. The results are presented in Table 2. The coefficient estimate on FDI is negative

\(^5\) An example of such an endogeneity issue will be the automatic feedback effect from the real exchange rate to tradable-nontradable ratio, and from the real exchange rate to FDI.

\(^6\) Details on these estimators are not provided here, as they have been widely applied in a number of studies. For more information, see Arellano and Bond (1991) and Blundell and Bond (1998). Also, see Roodman (2009) for details on issues related to instruments and overfitting bias for the estimators.
TABLE 2

FDI and tradable-nontradable ratio

| Regressors               | (1)        | (2)        | (3)        | (4)        | (5)        | (6)        |
|--------------------------|------------|------------|------------|------------|------------|------------|
| Tradable/Nontradable (−1) | 0.963***   | 0.970***   | 0.981***   | 0.964***   | 0.968***   | 0.979***   |
|                          | (.000)     | (.000)     | (.000)     | (.000)     | (.000)     | (.000)     |
| FDI inflows              | −0.034***  | −0.033***  | −0.031***  | −0.033***  | −0.033**   | −0.034**   |
|                          | (.000)     | (.000)     | (.000)     | (.028)     | (.022)     | (.028)     |
| Non-FDI inflows          | 0.018***   | 0.019***   | 0.020**    | 0.020**    | 0.020**    | 0.039**    |
|                          | (.000)     | (.000)     | (.040)     | (.039)     | (.039)     | (.039)     |
| Trade openness           | −0.040***  | −0.028***  | −0.033***  | −0.035     | −0.026     | −0.020     |
|                          | (.001)     | (.006)     | (.019)     | (.590)     | (.730)     | (.786)     |
| M2/GDP (%)               | −0.120***  | −0.112***  | −0.089***  | −0.109     | −0.106     | −0.103     |
|                          | (.000)     | (.000)     | (.000)     | (.169)     | (.182)     | (.202)     |
| Terms of Trade           | −0.001***  | −0.001***  | −0.001***  | −0.001***  | −0.001***  | −0.001***  |
|                          | (.000)     | (.000)     | (.000)     | (.007)     | (.006)     | (.007)     |
| Investment/GDP (%)       | 0.030**    | 0.038***   | 0.027      | 0.027      | 0.027      | 0.027      |
|                          | (.021)     | (.000)     | (.767)     | (.665)     | (.665)     | (.665)     |
| Govt. Expenditure        | 0.039***   | 0.040***   | 0.051***   | 0.033      | 0.029      | 0.045      |
|                          | (.001)     | (.002)     | (.000)     | (.553)     | (.604)     | (.471)     |
| Number of countries      | 44         | 44         | 44         | 44         | 44         | 44         |
| Number of Instruments    | 41         | 40         | 40         | 41         | 40         | 40         |
| Wald test                | (0.000)    | (0.108)    |            |            |            |            |
| Sargan test              | (0.210)    | (0.214)    | (0.222)    |            |            |            |
| Serial correlation test  | (0.503)    | (0.532)    | (0.472)    | (0.449)    | (0.516)    | (0.494)    |

Note: Dependent variable: tradable-nontradable ratio; p-values are in parenthesis.  
***Significant at 1% level, **5% level, *10% level.  
(1) - (3) : two-step GMM system with maximum 2 period lags of internal instruments.  
(4) - (6) : one-step GMM system (robust) with maximum 2 period lags of internal instruments.  
Wald test null hypothesis: investment/GDP=0, non-FDI inflows=0.  
No sargan test statistic for one-step GMM system (robust) in stata.

and statistically significant across the different model specifications. The results also show that non-FDI flows, on the other hand, has a positive and statistically significant coefficient in specifications where that variable is included, and indicates that an increase in FDI inflows by 1 percentage point leads to a decrease in tradable-nontradable ratio by approximately 3.3 percentage points. This suggests in general, that FDI inflow is associated with an expansion in the output of nontradables relative to tradables.

Studies have indicated that financial openness helps the development of the financial sector of an economy, and consequently directs capital inflow towards uses that enhance the productive capacity of the economy. Under a higher degree of openness, therefore, it is less likely for FDI inflow to be channelled into a sector (for instance, construction) where it increases demand without enhancing productive capacity (Saborowski, 2011). The second set of regressions, thus, explores the relationship between FDI and the tradable-nontradable ratio while accounting for the impact of financial openness. I focus solely on FDI as a result, and introduce into the baseline equation for the tradable-nontradable ratio, an interaction term of FDI and the measure of financial openness. The results, which are presented in Table 3, show that the coefficient on FDI remains negative and statistically significant across columns (1) to (3) whereas the non-FDI inflows variable is dropped in this set of regressions to focus on FDI inflows and how they are allocated under financial openness.

7The non-FDI inflows variable is dropped in this set of regressions to focus on FDI inflows and how they are allocated under financial openness.
### TABLE 3

FDI, financial openness and tradable-nontradable ratio

| Regressors | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Tradable/Nontrable(−1)| 1.080*** | 1.106*** | 1.073*** | 1.102*** | 0.822*** | 0.809*** |
|             | (.000)    | (.000)    | (.000)    | (.000)    | (.000)    | (.000)    |
| FDI × Financial openness | 0.001*** | 0.001     | 0.002     | 0.001     |           |           |
|             | (.000)    | (.353)    | (.210)    | (.329)    |           |           |
| FDI inflows | −0.013*** | −0.009*** | −0.013*   | −0.010    |           |           |
|             | (.001)    | (.000)    | (.095)    | (.195)    |           |           |
| FDI(−1) × Financial openness |           |           |           |           | 0.011*** | 0.011**  |
|             |           |           |           |           | (.000)   | (.023)   |
| FDI inflows(−1) |           |           |           |           | 0.003**  | 0.003    |
|             |           |           |           |           | (.035)   | (.621)   |
| Financial openness | 0.010*** | 0.011***  | 0.013*    | 0.012     | 0.008*   | 0.008    |
|             | (.000)    | (.000)    | (.104)    | (.148)    | (.083)   | (.404)   |
| Trade openness | 0.150*** | 0.124***  | 0.158***  | 0.128***  | 0.005    | 0.007    |
|             | (.000)    | (.000)    | (.000)    | (.000)    | (.653)   | (.757)   |
| M2/GDP (%) | −0.004*** | −0.004*** | −0.005*** | −0.004*** | −0.001** | −0.001** |
|             | (.000)    | (.000)    | (.000)    | (.000)    | (.000)   | (.029)   |
| Terms of Trade | −0.001*** | −0.001*** | −0.001    | −0.001    | −0.001   | −0.001   |
|             | (.000)    | (.000)    | (.196)    | (.137)    | (.139)   | (.796)   |
| Govt. Expenditure | −0.068*** | −0.119*** | −0.090*   | −0.132*** | −0.030** | −0.033   |
|             | (.005)    | (.000)    | (.081)    | (.009)    | (.039)   | (.445)   |
| Investment/GDP (%) | −0.004*** | −0.004*** | −0.004    | −0.001    |           |           |
|             | (.000)    | (.000)    | (.007)    | (.989)    |           |           |
| \[β_{fdi} + (β_{fdi×fopen} × fopen)]^a | −0.013*** | −0.009*** | −0.013*   | −0.010    | 0.003**  | 0.003    |
|             | (.000)    | (.000)    | (.095)    | (.195)    | (.043)   | (.653)   |

**Note:** Dependent variable: tradable-nontradable ratio; p-values are in parenthesis.
***Significant at 1% level, **5% level, *10% level.

*a*Estimate of the impact of FDI when interacted with financial openness; fopen represents the sample mean of the financial openness variable (−0.0135).

(1), (2) and (5): two-step GMM system with maximum 2 period lags of internal instuments.
(3), (4) and (6): one-step GMM system (robust) with maximum 2 period lags of internal instuments.
Wald test null hypothesis: investment/GDP = 0.
No sargan test statistic for one-step GMM system (robust) in stata.

interaction term is positive and statistically significant in column (1) only, suggesting that an increase in FDI inflow boosts the nontradable sector but this effect may be minimized as financial openness increases.

Further, I examine the hypothesis that the impact of FDI on sectoral output may operate with a lag by introducing the one-period lag of FDI in place of its contemporaneous counterpart. The coefficients on both FDI and the interaction of FDI and financial openness are positive and statistically significant in column (5). A percentage point increase in FDI is found to be
associated with about 1.3 percentage points decrease in the ratio of tradables to nontradables contemporaneously based on estimates in column (1) whereas when the one-period lag of FDI is considered, the estimated effect of an increase in FDI on the tradable-nontradable ratio is an increase of about 0.3 percentage point, based on estimates in column (5). Still and all, the results in general, seem to suggest that an increase in FDI would favour the tradable sector, even if slightly, as financial openness increases.

It is worth noting that the coefficient estimates for the effect of the lagged dependent variable suggest that the tradable-nontradable ratio potentially possesses some unit root properties, as the estimates do not seem to be significantly different from unity. Yet, given that the GMM system estimator is the technique employed, and which uses the more relevant and reliable lagged differences as instruments, the coefficient estimates can be considered to be reliable. Moreover, the observed values for the Sargan test statistic do provide some indication for the robustness of the results.\(^8\)

II.2.2 Tradable-nontradable output ratio and the real exchange rate. The second stage of the analysis entails an estimation of the relationship between the tradable-nontradable ratio and the real exchange rate, coupled with an examination of the effect of financial openness on this relationship. I interact the tradable-nontradable ratio with the measure of financial openness, and introduce the interaction term into the real exchange rate equation. I estimate specifications with the one-period lag of the tradable-nontradable ratio as well, in order to capture any such effects. Moreover, I introduce FDI in the baseline model even though the goal is to use the tradable-nontradable ratio in the real exchange rate model in lieu of FDI. This is done to control for any other effects of FDI on the real exchange rate apart from that which occurs through relative sectoral productivity and relative price movements.\(^9\) The coefficient estimates are presented in Tables 4 and 5.

The results show that the coefficient on the tradable-nontradable ratio is negative and statistically significant across all specifications, suggesting that an increase in tradable output relative to nontrables leads to a depreciation of the real exchange rate.\(^10\) This result is consistent for both the contemporaneous effect as well as the lagged effect of an increase in the tradable-nontradable ratio. The results further indicate that the contemporaneous effect of a relative expansion of the tradables sector is strengthened by an increase in financial openness, based on columns (1) and (2) of Table 4, as the coefficient estimate for the interaction term is negative and statistically significant in those specifications.\(^11\) The implication of these estimates is that an expansion of the nontradable sector relative to the tradable sector (a decrease in the tradable-nontradable ratio) would be associated with an appreciation of the real exchange rate, with the effect being stronger as financial openness increases.

II.2.3 Analysis of Results. FDI inflows to developing countries tend to have a greater impact on capital accumulation, and hence productivity growth. The argument can be advanced therefore, that the pressure on the real exchange rate to appreciate following FDI inflows would be
TABLE 4
Traded/nontraded ratio, financial openness and the real exchange rate

| Regressors                                      | (1)          | (2)          | (3)          | (4)          |
|------------------------------------------------|--------------|--------------|--------------|--------------|
| Real Exchange Rate (-1)                        | 0.648***     | 0.682***     | 0.649***     | 0.645***     |
|                                                | (.000)       | (.000)       | (.000)       | (.000)       |
| FDI inflows                                    | 0.004***     |              |              |              |
|                                                | (.000)       |              |              |              |
| Non-FDI inflows                                | 0.005***     | 0.003**      | 0.004        | 0.003        |
|                                                | (.000)       | (.16)        | (.402)       | (.516)       |
| Financial openness                             | 0.033***     | 0.035***     | 0.038***     | 0.039***     |
|                                                | (.000)       | (.000)       | (.000)       | (.008)       |
| Tradable/Nontradable                           | -0.202***    | -0.169***    | -0.196***    | -0.209***    |
|                                                | (.000)       | (.000)       | (.000)       | (.000)       |
| Tradable/Nontradable Financial Openness        | -0.020*      | -0.025***    | -0.033       | -0.031       |
| Trade Openness                                 | 0.069***     | 0.090***     | 0.083**      | 0.099**      |
|                                                | (.000)       | (.000)       | (.033)       | (.20)        |
| M2/GDP (%)                                     | -0.110***    | -0.118***    | -0.114***    | -0.124***    |
|                                                | (.000)       | (.000)       | (.000)       | (.000)       |
| Terms of Trade                                 | 0.001        | 0.001        | 0.001        | 0.001        |
|                                                | (.233)       | (.537)       | (.593)       | (.613)       |
| Govt. Expenditure                              | 0.166***     | 0.161***     | 0.175***     | 0.187***     |
|                                                | (.000)       | (.000)       | (.000)       | (.000)       |
| \[\beta_{tnt} + (\beta_{tnt, fopen} * fopen)]^a\ | -0.201***    | -0.168***    | -0.195***    | -0.209***    |
|                                                | (.000)       | (.000)       | (.000)       | (.000)       |
| Number of countries                            | 43           | 43           | 43           | 43           |
| Number of Instruments                          | 64           | 63           | 64           | 63           |
| Wald test                                      | (0.000)      |              |              | (0.121)      |
| Sargan test                                    | (0.974)      | (0.979)      |              |              |
| Serial correlation test                        | (0.354)      | (0.451)      | (0.681)      | (0.668)      |

Note: Dependent variable - real exchange rate; p-values are in parenthesis.
***Significant at 1% level, ** 5% level, *10% level.
*a Estimate of the impact of tradable-nontradable ratio when interacted with financial openness; fopen represents the sample mean of the financial openness variable (−0.0135).
(1), (2) and (5): two-step GMM system with maximum 2 period lags of internal instruments.
(3), (4) and (6) : one-step GMM system (robust) with maximum 2 period lags of internal instruments.
Wald test null hypothesis: FDI inflows=0.
No sargan test statistic for one-step GMM system (robust) in stata.

lower or potentially reversed where such inflows favour the output of tradables. On the contrary, it is also possible that even where FDI goes toward the tradables sector, a Balassa-Samuelson-type effect may exist, as the productivity increase in the tradables sector could spur an expansion of the nontradable sector and cause an appreciation of the real exchange rate.

The results revealed that in general, there is a negative relationship between FDI and the ratio of tradable to nontraded output contemporaneously, but that this effect weakens as financial openness increases. There is also weak evidence to suggest that the effect of an increase in FDI at one-period lag would lead to an expansion in output of tradables relative to nontrads as financial openness increases. To the extent that the results show that whether contemporaneously
TABLE 5

Tradable-nontradable ratio, financial openness and the real exchange rate

| Regressors                                      | (1)          | (2)          |
|------------------------------------------------|--------------|--------------|
| Real Exchange Rate (−1)                        | 0.790***     | 0.729***     |
|                                               | (.000)       | (.000)       |
| Non-FDI inflows                               | 0.007***     | 0.006        |
|                                               | (.000)       | (.204)       |
| Financial openness                            | 0.032***     | 0.032**      |
|                                               | (.000)       | (.040)       |
| Tradable/Nontradable (−1)                     | −0.142***    | −0.140***    |
|                                               | (.000)       | (.003)       |
| Tradable/Nontradable (−1) × Financial Openness| −0.017       | −0.018       |
|                                               | (.173)       | (.449)       |
| Trade Openness                                | 0.050***     | 0.058        |
|                                               | (.000)       | (.134)       |
| M2/GDP (%)                                    | −0.103***    | −0.094***    |
|                                               | (.000)       | (.003)       |
| Terms of Trade                                | 0.001        | 0.001***     |
|                                               | (.959)       | (.929)       |
| Govt. Expenditure                             | 0.094***     | 0.115***     |
|                                               | (.000)       | (.012)       |
| \[β_{nt} + (β_{nt} \times fopen \times fopen)\]^a | −0.142***    | −0.140***    |
|                                               | (.000)       | (.003)       |
| Number of countries                           | 43           | 43           |
| Number of Instruments                         | 63           | 63           |
| Sargan test                                    | (9.41)       |              |
| Serial correlation test                        | (6.68)       | (0.608)      |

Note: Dependent variable - real exchange rate; p-values are in parenthesis.

***Significant at 1% level, ** 5% level, *10% level.
^aEstimate of the impact of lagged tradable-nontradable ratio when interacted with financial openness; fopen represents the sample mean of the financial openness variable (−0.0135).

(1), (2) and (5): two-step GMM system with maximum 2 period lags of internal instuments.

(3), (4) and (6) : one-step GMM system (robust) with maximum 2 period lags of internal instuments.

No sargan test statistic for one-step GMM system (robust) in stata.

or with a lag, a decrease in the tradable-nontradable output ratio would be associated with a real exchange rate appreciation, the argument can be made that where an increase in FDI inflow is associated with an expansion in nontradable output relative to tradables, such an expansion would lead to an appreciation of the real exchange both contemporaneously and with a lag.

Still and all, it can be surmized that any expansion in the output of tradables relative to nontradables would be associated with a real exchange rate depreciation, even where this is generated by an increase in FDI inflow, as observed under the lagged effect of FDI with increasing financial openness. Thus, there is no evidence to indicate that FDI inflows generate dynamics similar to the Balassa-Samuelson effect. On the contrary, the results suggest that an increase in FDI inflows may be associated with an appreciation of the real exchange rate through an expansion of nontradable output, and which serves as evidence in support of the presence of the standard mechanism that is representative of the Dutch disease phenomenon.

Furthermore, a notable result is the positive association between financial openness and the real exchange rate, which is consistent with the notion that financial openness allows for an
increase in capital inflows, which in general tends to cause appreciation of the real exchange rate. Given that the model specification accounts for how relative sectoral productivity impact real exchange movements, this standalone effect of financial openness plausibly captures the impact of capital inflows on the real exchange through the nominal exchange rate.

II.2.4 Policy implications. The literature on the macroeconomic effects of capital inflows indicates that capital inflows to developing economies can potentially give rise to resource reallocation towards production of nontradables as well as real exchange rate appreciation, and thereby create policy challenges with respect to reconciling international capital mobility and international competitiveness, among other policy goals. On the other hand, policy measures that aim at increasing capital account openness generally allow for the relaxation of the financial constraints that developing countries are typically confronted with. The findings here, however, indicate that financial openness may exacerbate the problem of international non-competitiveness where FDI inflows favour an expansion of the nontradable sector, although there is weak evidence to suggest that FDI aids the tradable sector but with a lag.

Thus, as developing countries open up their capital accounts to take advantage of the productivity increases and other well documented benefits that come with financial openness, it is essential also that they find the right policy measures to mitigate the challenges of an expanding nontradable sector following FDI inflow. It is noteworthy that the productivity growth associated with financial openness is highly desirable, therefore policymakers should choose appropriate mechanisms to diminish the pressure that FDI inflows exert on the real exchange to appreciate through their effect on nontradable sector output, where the short-term objective is to enhance the country’s competitiveness in international markets.

III. CONCLUSION

Empirical studies on whether capital inflows generate macroeconomic effects that are symptomatic of the Dutch disease have typically estimated the relationship between some capital inflow variables and the real exchange rate. I adopt a different approach to examine the effect of FDI inflow on sectoral output and real exchange rate movements in developing countries using a two-step analysis. I examine the effect of FDI inflows on the ratio of tradable to nontradable output, and the relationship between tradable-nontradable output ratio and the real exchange rate, taking into account the impact of financial openness on the dynamics between these variables. The results reveal that, in general, an increase in FDI inflow leads to a decrease in the tradables-nontradable ratio. Moreover, an increase in the tradable-nontradable ratio is associated with depreciation of the real exchange rate, this effect being amplified with an increase in financial openness. This implies that an increase in FDI inflow may lead to an expansion of the nontradable sector relative to the tradable sector, and such an expansion would be associated with a greater appreciation of the real exchange rate under a higher degree of financial openness.

Arguably, an increase in financial openness aids the development of the financial sector of an economy, thereby providing a broader range of investment opportunities as well as directing capital inflow towards uses that enhance the productive capacity of the economy. However, where policies are directed towards enhancing financial openness in order to take advantage of such benefits, FDI inflow, when channelled into an industry like construction, may worsen the external competitiveness of an economy. In essence, the degree of financial openness is significant to relative sectoral productivity and real exchange rate variability following FDI inflow to developing economies.
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