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GOVERNMENT SPENDING AND THE REAL EXCHANGE RATE: A CROSS – COUNTRY PERSPECTIVE

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Abstract

In this paper we study, from an empirical point of view, the determinants of the real exchange rate (RER). Relative to the vast previous literature on this topic we aim to distinguish the impact of two important components of government expenditure—public investment and transfers—on the RER, which has usually been neglected. Using panel cointegration techniques, we assess the relevance of those variables in the determination of the RER for a wide set of countries from 1980 to 2009. Our results suggest that changes in either government transfers or public investment have an impact on the RER in emerging economies. On one hand, transfers tend to appreciate the RER because they induce an increase in the relative demand for nontraded goods. On the other, an increase in public investment generates an RER depreciation. This result can be explained by the fact that, in this case, there is an increase in the relative productivity in the nontraded sector of the economy. We also study the effect of countries' net external assets position on the RER and find that it differs markedly between developed and developing countries: this variable has a significant effect only in the case of developing economies.

Resumen

En este trabajo se estudian, desde un punto de vista empírico, los determinantes del tipo de cambio real (TCR). En relación con la vasta literatura sobre este tema, se pretende distinguir el impacto de dos componentes importantes del gasto público (inversión pública y transferencias al sector privado) en el TCR, el que ha sido generalmente ignorado. Se utilizan técnicas de cointegración en datos de panel para evaluar la pertinencia de esas variables en la determinación del TCR, para un amplio conjunto de países entre 1980 y 2009. Los resultados sugieren que los cambios tanto de las transferencias del gobierno como de la inversión pública tienen un impacto sobre el TCR en economías emergentes. Por un lado, las transferencias tienden a apreciar el TCR debido a que inducen un aumento en la demanda relativa de bienes no transables. En cambio, un aumento de la inversión pública genera una depreciación del TCR. Este resultado se explicaría por el hecho de que, en este caso, habría un aumento en la productividad relativa en el sector no transable de la economía. Para países desarrollados se encuentra que ni las transferencias ni la inversión de gobierno tienen un impacto estadísticamente distinto de cero. También se estudia el efecto de la posición neta de los países activos en el exterior en el TCR y se encuentra que difiere notablemente entre países desarrollados y en desarrollo: esta variable tiene un efecto significativo sólo en el caso de las economías en desarrollo.

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1 Introduction

There is no consensus about the economic implications of real exchange rate (RER) misalignments. One one hand, some (Edwards (1989)) argue that keeping the RER away from its equilibrium level creates distortions in the relative price of tradables to non tradables goods, generating misleading signals to economic agents. This, in turn, induces a suboptimal allocation of resources across sectors that has a negative impact on growth. It has also been argued (Krugman (1979); Frankel and Rose (1996); Kaminsky and Reinhart (1999)) that sustain RER overvaluations are an early warning indicator of possible currency crashes. Furthermore, there is evidence (Goldfajn and Valdes (1999)) that large and medium RER overvaluations end abruptly, with nominal devaluations that lead to a drastic adjustment of relative prices and to a decline in the aggregate growth rate of the economy (Aguirre and Calderón (2005)). On the other hand, Rodrik (2008) argues that in the presence of institutional and market failures, sustained RER depreciations increase the relative profitability of investing in tradables, and act in second-best fashion to alleviate the economic cost of these distortions. That is why episodes of undervaluation are strongly associated with higher economic growth.

Independently of the view about the consequences of RER misalignments, the concept itself requires the definition of equilibrium real exchange rate (ERER). Edwards (1989) argues that the ERER is the real rate that guarantees the internal and external balance of the economy. In this setup, the ERER depends, in the long run, on a set of fundamental variables that reflect the equilibrium in the domestic goods market and the sustainability of the current account. Edwards (1989), Obstfeld and Rogoff (1995), and Faruqee (1994) provide theoretical underpinnings that motivate the type of fundamentals to be considered. These include the relative productivity in the tradable to the nontradable sector (the Balassa-Samuelson effect), the effect of terms of trade, government consumption and the net foreign asset position of the economy.

The relationship between RER and its fundamentals has been estimated for single countries and for a set of countries using panel cointegration techniques (Aguirre and Calderón (2005); Galstyan and Lane (2009) and Lee et al. (2008), among others). Most of the studies find a correlation between the RER and its long run determinants. In particular, an increase in the relative productivity of the tradable sector, better terms of trade and an improvement in the net foreign asset position of the economy induce a RER appreciation. An increase in government consumption, on the other hand, has the same effect, with and semielasticity that goes from 0.3 to 2.9.

Now, empirical papers have assessed the impact of one particular component of fiscal spending: government consumption of goods and services. The impact of other two important com-

ponents, transfers and investment, has been neglected. Those components are an important fraction of total government expenses in most countries, accounting for 19% and 2% of overall fiscal expenditure in OECD countries in the last 30 years, respectively.

The purpose of this paper is to assess the impact of government investment and fiscal transfers on the RER determination. In a previous study, Galstyan and Lane (2009) develop a two-sector small open-economy model in which an increase in government consumption is associated with real appreciation, while an increase in government investment has an ambiguous effect on RER. This depends on the effect of government investment on the relative productivity of the tradable sector. Galstyan and Lane (2009) provide empirical evidence for 19 OECD countries, concluding that in some countries government investment tends to be associated with an increase in the relative productivity in the tradable sector, whereas for others the opposite is true. They do not find, however, a direct effect of government investment on the RER determination.

In this paper we estimate a relationship between the RER and its fundamentals for a set of countries from 1980 to 2009. Besides considering the impact of government consumption on the RER, we assess the impact of the other two components of fiscal expenses, government transfers and investment. Our results suggests that in developed countries, changes in both government transfers and public investment do not generate a significant change in the RER. For developing economies, however, we conclude that government transfers tend to appreciate the RER, whereas government investment tend to depreciate it. For both set of countries, government expenditures tend to appreciate the RER, although the impact is comparatively larger in developing economies. Finally, the effect of countries net external assets position on the RER is statistically significant only in the case of developing countries.

The rest of the paper is organized as follows. In Section 2, we discuss the concept of RER and present the behavioral equilibrium exchange rate model that links the behavior of the RER to a set of long-run determinants (or fundamental variables). In Section 3 we empirically implement this model and discuss the way in which the fundamental variables are constructed. Section 4 presents the empirical results and Section 5 concludes.

2 Real Exchange Rate and Economic Fundamentals

As in Bayoumi, Lee and Jayanthi (2005), for a given a set of weights for country i on partner countries (W_{ij} for $j \neq i$), the RER indices are calculated as a geometric weighted average of bilateral real exchange rates between the home country and its trade partners. Specifically, the RER index of country i is computed as

$$RER_t = \Pi_{j \neq i} \left(\frac{P_i E_i}{P_j E_j} \right)^{W_{ij}}$$

where j refers to trade partners, P refers to CPI, and E_i and E_j are bilateral nominal exchange rates of country i and j against the U.S. dollar (measured in U.S. dollar per local currency).

An increasingly dominant view is that over the business cycle, the real exchange rate tends to move toward an underlying equilibrium value determined by real factors, usually defined by some version of purchasing power parity. In particular, as noted by Lee et al. (2008), while the unpredictability of exchange rate at short is well documented, there is more consensus on the fact that the RER behavior at medium to long horizons can be explained, to some degree, by the evolution of a set of fundamentals (Engel et al. (2008)).

In practice, the RER like any other relative price is determined by a set of fundamental variables. There is an extensive literature on the determinants of the RER that includes, Edwards (1989), Froot and Rogoff (1995),Obstfeld and Rogoff (1995), and Faruqee (1994) among others. Based on this literature, we adopt the so-called single-equation approach, which relates the real exchange to a particular set of fundamentals in a reduced form. This specification has a long tradition in empirical international finance and has been extensively used in empirical applications. Under this specification, two types of fundamentals can be distinguish, those that affect the RER from a flow perspective an those that affect the RER from a stock perspective. Taking into account the stock and flow fundamental variables, an empirical equation for the RER can be expressed as:

$$LRER_t = \beta_0 + \beta_1 LTNT_t + \beta_2 LToT_t + \beta_3 \left(\frac{NFA}{GDP} \right)_t + \beta_4 \left(\frac{G}{GDP} \right)_t + \mu_t \tag{2.1}$$

We consider three flow variables. The first one is the relative productivity between the traded and non traded sector, denoted as TNT. This variable has a negative impact on the RER. In particular, with labor mobility and wage equalization across sectors, an increase in productivity in the traded goods sector raises the real wage in both sectors, leading to an increase in the relative cost and price of nontraded goods. As a result, the RER tends to appreciate. This is the Balassa- Samuelson hypothesis.

The second variable is the terms of trade, ToT. This variable has a negative impact on the RER. In particular, an increase in ToT raises the disposable income and hence increases the demand for both, traded and nontraded goods. Given the fact that tradable goods prices are given, an increase in ToT tends to increase the relative price of nontraded goods, and hence appreciates the RER.

The third variable is the share of fiscal spending on GDP. A larger participation of government spending will appreciate the real exchange rate through a composition effect (which is usually assumed to be relatively nontradables intensive) or just as an aggregate demand effect if there is not perfect capital mobility. The role of government consumption has previously been highlighted by Froot and Rogoff (1995), who postulate that increases in government consumption tend to increase the relative price of nontradables, since government consumption is concentrated on nontradables. Further empirical support is provided by De Gregorio et al. (1994) and Chinn (1997), who also find that increases in government consumption are associated with real appreciation. Usually, government consumption to output, $\left(\frac{G}{GDP}\right)_t$, is used as a proxy for this variable.

The stock variable we consider is the net foreign asset position of the economy as a percentage of the GDP, *NFA/GDP*. This stock variable should influence the real exchange rate because owning more assets has a counterpart in larger revenues earned (a surplus in factor payments), which in turn can finance a larger sustainable commercial deficit in steady state. This larger commercial deficit is coherent only with a more appreciated real exchange rate. Despite the fact that the net foreign assets is the only stock variable, its impact stems from its flow effect on the current account.

This approach has been applied to various countries: China (Wang (2004)), Brazil (Paiva (2006)), South Africa (Frankel (2007)), and Chile (Calderón (2004)). For a set of 22 developed economies, Bayoumi, Faruqee and Lee (2005). (2005) estimate RER equations, using panel cointegration techniques. Aguirre and Calderón (2005) used the same approach to estimate RER equations for a larger set of developed and developing countries, whereas Soto and Elbadawi. (2007) estimate RER equations only for developing economies. In general these studies find that the fundamental variables in (1) or a subset of them explain the behavior of the RER in the long run.

One criticism to the previous papers is related to the type of variables used. On one hand, given the lack of consistent data, the proxy for the relative productivity of the tradable to non tradable sector, the variable *TNT*, is constructed based on overall per capita relative output or based on GDP per worker. This measure does not necessary capture the Balassa-Samuelson effect: GDP per capita is likely to be correlated to either the tradable or non tradable productivity, but not to the ratio between them. To overcome this problem, Lee et al. (2008) estimate RER equations for set 45 countries, considering a more precise measure of the relative productivity. This is based on a detailed sectoral breakdown and considers a wider sample of countries than the previous literature. Lee et al. (2008) find that the estimated impact of productivity differentials between traded and nontraded goods, while statistically significant, is small. Also,

the conclude that there is positive relation between the CPI-based real exchange rate and commodity terms of trade. The Increases in net foreign assets and in government consumption tend to be associated with appreciating real exchange rates.

A second criticism is related to the role of government expenditure on the RER dynamics. In general, the literature focuses only on the role of government consumption. Government investment and transfers have been neglected, even though they represent and important fraction of total fiscal expenditure. In particular, as shown in Table 1, government transfers account, on average for OECD countries, for nearly 20% of GDP whereas investment is 2% of GDP. In some European countries, Germany, Greece, Finland, France and Italy those components represent a larger fraction of GDP than government consumption. Galstyan and Lane (2009) lay out a two-sector small open-economy model that incorporates both government consumption and government investment as potential influences on the real exchange rate. They conclude that in some countries government investment tends to be associated with an increase in the relative productivity in the tradable sector, whereas for others the opposite is true. The direct impact of government investment on the RER is not statistically different from zero.

Galstyan and Lane (2009), on the other hand, do not assess the impact of transfers on the RER. In particular, they assume that transfers only redistribute resources across private-sector entities without changing the relative demand of tradable to non tradable goods. As a consequence, they conjecture that the impact of transfers on the RER is zero.

Besides the traditional fiscal spending variable, $\frac{G}{GDP}$, we asses the relevance of public investment, $\frac{I}{GDP}$, and transfers, $\frac{TR}{GDP}$. Those are important components of government expenses and their role on the RER has usually being neglected. According to Galstyan and Lane (2009) government consumption and government investment are expected to have different effects on the evolution of relative price levels. While an increase in government consumption is typically associated to an increase in the relative demand for nontradables, thereby leading to real appreciation, a long-run increase in public investment has an ambiguous impact on the real exchange rate. While an increase in public investment that delivers a productivity gain in the tradables sector may generate real appreciation through the BalassaSamuelson mechanism, if public investment disproportionately raises productivity in the nontradables sector, it may actually lead to real depreciation. Moreover, if productivity is increased symmetrically in both sectors, there is no long-run impact on the relative price of nontradables and the real exchange rate.

Now, unlike Galstyan and Lane (2009), besides introducing goverment transfers and investment, we incorporate the ToT variable as well as the stock variable *NFA/GDP*. On the other hand, and as in Ricci et al. (2008), we incorporate measures of relative productivity based on sectoral productivities in both the tradable and nontradable sector.

3 Data and Econometric Methodology

We aim to construct a set of variables for the 65 countries listed in Table 2. The frequency is annual, from 1980 to 2009. The real effective exchange (RER) rate is based on the consumer price index (CPI) and new competitiveness weights constructed from 1999−2001 international trade data (Bayoumi, Faruqee and Lee (2005)). The nominal exchange rate and CPI were obtained from IFS and World Bank.

The productivity of tradables and nontradables relative to trading partners is constructed using several sources. For output in each sector we consider data on GDP (in constat 1990 US$ dollars for each country) provided by the the United Nation Statistic Divisions. The tradable sector includes agriculture, hunting, fishing, mining and industry. The nontradable sector includes construction, wholesale, retail trade, restaurants and hotels, transport, storage and communications, and other services. Labor in each sector is constructed based on information from the International Labor Organization (ILO) and the World Bank. As in Lee et al. (2008), a few missing observations were filled using the sectoral shares for adjacent years and aggregate data. Series for trading partners were constructed by applying the competitiveness weights (Bayoumi, Faruqee and Lee (2005)) to productivity series.

The net foreign assets to GDP ratio, at the end of the previous period, are from Lane and Milesi-Ferretti (2007) and updated by the IMF. We will also consider, as in Pistelli et al. (2007), the impact of gross assets and gross liabilities separately. Data on NFA and GDP are in current US$ dollars. Data on GDP are from the IMF and World Bank.

Government consumption to GDP ratio is defined as the ratio of government purchases of goods and services plus government wages to GDP. Government transfers to GDP, $\frac{TR}{GDP}$, include transfers to households (subsidies), social security transfers, government grants, public employee pensions, and transfers to non-profit institutions serving the household sector. Government investment to GDP, $\frac{I}{GDP}$, refers to the purchase of structures and equipment by the government sector. The source of the data is the OECD, WEO, local authorities and central banks. We were able to construct consistent data for 21 OECD countries and for a similar number of emerging economies (18 in total).

The variable terms of trade, TOT, is the ratio between the price of exports and price of imports. This is constructed with UN COMTRADE database.

Given the limited length of the sample (29 years), estimating separate RER equations for each country will result in very imprecise estimates. This shortcoming can be overcome by pooling the data.

In order to estimate (2.1) we implement a panel version of Dynamic Ordinary Least Squares

(DOLS) procedure, following Aguirre and Calderón (2005) and Lee et al. (2008).This methodology corrects the reverse causality due to the eventual correlation between the disturbances to the RER in (2.1) and the fundamentals. This problem is addressed by including leads and lags of the first differences of the fundamental variables as suggested by Phillips and Loretan (1991), Saikkonen (1991) and Stock and Watson (1993). In particular, if X_t is the vector containing the fundamental variables, the long run responses of the RER to its determinants, β, is estimated through the following expression:

$$LRER_{i,t} = f_i + \beta X_{i,t} + \sum_{k=-p1}^{p2} \gamma_k \Delta X_{i,t-k} + \varepsilon_{i,t} \tag{3.1}$$

where f_i is a country fixed effect. The p_1 leads and p_2 lags are chosen according to the Schwartz information criterion. In this particular case, we incorporate one lead and one lag [1].

Before proceeding to the estimation, we test the existence of unit root in the series. In doing so, we implement the Levin et al. (2002) and Im et al. (2003) tests. Those tests are implemented for the whole set of countries as well as for the group of developed and emerging economies. As show in Table (3), for some series it is not possible to reject the existence of a unit root. In particular, the net foreign asset series, the relative productivity variable, terms of trade and government expenditure are non stationary according to the Im, Pesaran and Shin test. In the face of this evidence, we use the Kao (1999) test to see if there is a long-run relationship (i.e. a stationary one) among the set of variables. Based on the results presented in Table 4, we can not reject the null hypothesis of no cointegration. This is valid for the complete set of countries as well as for the developed and developing groups. Also, as shown in Table 4 we find a long-run relationship for a small set of variables, as well as for a larger set that incorporates the components of the net foreign asset position, and the government transfers and investment series.

Overall, there appears to be a long-run relation between the real effective exchange rate and the set of fundamentals. As a consequence, we can estimate (2.1) using DOLS.

4 Results

We proceed in two steps. First, we estimate a RER equation without including public investment and transfers. Given that we have data on RER and the rest of the fundamentals for all the 65

[1] Results are robust to inclusion of additional leads and lags. As is noted by Choi et al. (2008) the lead and length selection issue has not been settled in the DOLS literature, hence the need of checking the robustness to alternative values of p_1 and p_2.

countries listed in Table 2, our first set of estimations include those countries. This is a larger set of countries than the one considered by Lee et al. (2008), including also more observations. Given our larger data set, we can split the sample between developed and emerging economies, which is an analysis not performed so far. Second, we estimate the model but introducing two additional components of government´s global expenses: government transfers and government investment. In this case, we were able to construct those series for a subset of countries: 39 in total, of which 21 are developed economies and 18 are emerging ones.

4.1 Long Run Dynamics: Full Sample of Countries

In Table 5, column (1) and (2), we present the estimation of (2.1) using DOLS, for the complete set of 65 countries. In the estimation we include a country fixed effect as well as a time fixed effect[2]. The impact of fundamentals have the expected sign and are statistically significant.

And increase of 1% in government consumption to GDP tends to appreciate the RER by 4.6%. This estimate is somehow higher than the one found by Lee et al. (2008) and by De Gregorio et al. (1994), who used and advanced economy sample. To see the extend to which this difference can be explained by the type of countries considered, we split the sample between developed and emerging economies. For advanced economies, columns (3) and (4), the response to government spending declines substantially. In particular, an increase of 1% in government consumption tends to appreciate the RER by nearly 1%. In the case of emerging economies, columns (5) and (6), the same increase tends to appreciate the RER by 4.4%. Hence, there is a substantial difference between the developed and emerging economies of an increase in government expenditure.

In terms of other fundamentals, an increase of 10% in terms of trade generates an equilibrium appreciation of 5.6%. In the case of emerging countries, this appreciation is slightly lower, 4.3%. On the other hand, a 10% increase in the relative productivity between the tradable and non tradable sector, tends to appreciate the equilibrium RER by 1.1%. The magnitude is in line with previous studies and suggests that the Balassa-Samuelson effect can explain, in part, the dynamics of the RER. In this case, however, for the set of emerging economies considered, the effect is not statistically different from zero.

Now the response of the RER to the net foreign asset position is such that a deterioration of the NFA to GDP of 10% would imply a depreciation of 2% in the equilibrium RER. This effect is not present in the case of developed economies, in which the effect is zero. Hence, this fundamental variable has a significant effect only in the case of emerging economies. On the

[2]The results do not change significantly if the time fixed effect is removed.

other hand, and as shown in column (2) and (6) the impact of foreign assets and liabilities are of similar magnitude, although with the opposite sign. As noted by Pistelli et al. (2007), if all components of net foreign assets have the same rate of return, they should have the same effect on the equilibrium real exchange rate, for they would produce the same income flow.

4.2 RER and the Composition of Government Expenditure

As mentioned before, we could construct series of government transfers and investment for a smaller, yet relatively large, set of countries. When all countries are considered, we found a negative and statistically significant effect of government consumption on the RER (see Table 6, column (3)). In this case, however, the response is substantially lower than the one we reported previously and closer to the value found by Lee et al. (2008).

Government investment, on the other hand, has a negative impact over the long-run RER. In particular, an increase of 1% in government investment generates a RER depreciation of 1.7%. This is in striking contrast with findings in Galstyan and Lane (2009), who performed this exercise for developed economies and did not find any significant impact of government investment. We show that, once differences between industrialized and emerging economies are considered, our result are similar to those obtained by Galstyan and Lane (2009).

Regarding government transfers, we do not find a significant effect of this variable on the long-run RER (Table 6, column (3)). This result suggest that an increase in transfers do not affect the relative demand between tradables and nontradables in industrialized economies.

The rest of fundamentals have the expected sign and the estimated effects are statistically significant. On the other hand, our results regarding the impact of government transfers and investment are robust to the sequential inclusion of the relevant variables (columns (1) to (4) in Table 6). Also, results are robust to considering, instead of the NFA/GDP, external assets and liabilities separately (columns (5) to (8) in Table 6).

4.2.1 Industrialized Economies

As before, we estimate the model for different group of countries. In the case of industrialized economies, column (3) in Table 7, we found that the impact of government consumption on RER is close to 1. This value is well below the impact found for the whole set of countries. This is perhaps an indication of the smaller relative size of government in this groups of countries or a different intensity of government consumption in domestically produced goods.

On the other hand, the response of the RER to government transfers is not different from zero. This tends to confirm Galstyan and Lane (2009) conjecture: transfers only redistribute

resources across private-sector entities without changing the relative demand of tradable to non tradable goods.

The response of the RER to public investment (specification (3) in Table 7) is positive but not statistically different from zero. This result is in line with findings in Galstyan and Lane (2009), who find that government investment does not have a significant impact on the RER for a set of OECD countries. This in turn is a indication that an increase in public investment has a symmetric impact on productivity in both sectors, the tradable and non tradable.

The impact of terms of trade and the realtime productivity is similar to the one found for the whole set of countries (Table 5). However, in sharp contrast with previous results, the NFA variable and its components (assets and liabilities) do not have a significant impact on the RER.

4.2.2 Emerging Economies

The results from the estimated model in the case of emerging economies shows some important differences with result for industrial countries (see column (3) in Table 8). First, the impact of government consumption is larger. For emerging countries an increase of 1% in government consumption to GDP tends to appreciate the RER by 3.0%. This is an indication that government consumption is more biased towards domestically produced goods in emerging economies.

Second, government transfers tend to appreciate the RER. This effect is smaller than the impact of government consumption, but is still important. A natural interpretation of this results is that transfers in emerging economies, besides redistributing resources across private-sector entities, change the relative demand between tradable and nontradable goods. In particular, if resources flow from high income households to low income households and if the latter group is financially constraint, then overall consumption will increase inducing a RER appreciation.

Third, government investment has an important effect on the RER. In particular, and increase of 1% on the ratio of government to GDP tends to depreciate the RER by 4% in the long run. In terms of Galstyan and Lane (2009) model, this result suggests that this type of expenditure increases relatively more the productivity in the nontradable sector, and hence reduces its relative price.

Fourth, the impact of the NFA variable is not statistically different from zero, however, when both components of the net foreign asset position are considered independently, the results change. In particular, external assets to GDP tend to appreciate the RER although its impact is, in absolute value, below the effect that liabilities have (see column (7) in Table 8). This latter result suggests that both components should be considered separately.

Finally, the terms of trade as well as the relative productivity have a significant effect on the

RER. The magnitude of the effect is similar to previous results

5 Conclusions

There are two important components of government expenditure whose impact on the RER has usually being neglected: public investment and transfers. Using panel cointegration techniques we assess the relevance of those variables in the determination of the RER for a wide set of countries. Following Lee et al. (2008), we incorporate measures of relative productivity based on sectoral mean productivity in both the tradable and nontradable sector, the impact the terms of trade and the effect of the net foreign asset position of the economy

Our main results suggest that the effect of fiscal variables on the RER differs markedly across group of countries. On one hand, an increase in government consumption has a larger impact on emerging economies than in industrialized ones. This is an indication that government consumption is more biased towards domestically produced goods in emerging economies.

Government transfers, on the other hand, tend to appreciate the RER in emerging economies. An explanation for this result is that an increase in government transfers change the relative demand between tradable and nontradable goods. In particular, in this case resources flow from high income households to low income households. This pushes up the relative price of nontraded goods, and therefore appreciates the RER . In the case of developed countries, however, transfers do not have a significant impact on the RER. The other component of goverment spending, goverment investment, tends to depreciate the RER in emerging economies. In this case an increase in government investment increases the productivity in the nontradable inducing a relative decline in the price of nontraded goods. Again, this effect is not significant in the case of industrialized countries. This result is in line with findings in Galstyan and Lane (2009), and suggests that an increase in public investment has a symmetric impact on productivity in both sectors, the tradable and non tradable in this group of countries.

Regarding the countries net external assets position, we find that the impact of those variables on the RER differ markedly among developed and developing countries. In the case of developing this variable has a long run impact on the RER, whereas in developed economies its impact is not different from zero.

Finally, terms of trade as well as the relative productivity between the tradables and nontradables sectors tend to appreciate the RER in both group of countries, with an effect which is quantitatively similar across countries.

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Table 1: Relative Contribution of Fiscal Expenses Components (average 1980-2008)

Country	G/GDP	I/GDP	TR/GDP
Australia	0.225	0.015	0.091
Austria	0.249	0.027	0.216
Bahrain, Kingdom of	0.203	0.070	0.041
Belgium	0.254	0.013	0.183
Brazil	0.166	0.022	0.074
Canada	0.243	0.011	0.122
Chile	0.116	0.025	0.127
Colombia	0.137	0.071	0.090
Denmark	0.309	0.001	0.191
Dominican Republic	0.066	0.072	0.087
Finland	0.279	0.013	0.186
France	0.283	0.015	0.190
Germany	0.229	0.016	0.188
Greece	0.179	0.021	0.147
Iceland	0.242	0.049	0.085
Iran, I.R. of	0.149	0.098	0.030
Ireland	0.208	0.025	0.128
Israel	0.286	0.027	0.224
Italy	0.215	0.022	0.176
Japan	0.176	0.037	0.099
Malaysia	0.133	0.124	0.153
Mexico	0.101	0.048	0.113
Netherlands	0.286	0.016	0.169
New Zealand	0.251	0.019	0.127
Norway	0.261	0.017	0.173
Pakistan	0.114	0.046	0.133
Paraguay	0.090	0.059	0.062
Peru	0.098	0.046	0.064
Portugal	0.211	0.021	0.132
Singapore	0.105	0.079	0.108
South Africa	0.186	0.038	0.083
Spain	0.196	0.036	0.134
Sweden	0.337	0.018	0.204
Thailand	0.113	0.077	0.058
Tunisia	0.158	0.040	0.132
United Kingdom	0.240	0.019	0.142
United States	0.198	0.011	0.116
Uruguay	0.125	0.052	0.139
Venezuela, Rep. Bol.	0.110	0.108	0.111

Table 2: Country List

Industrialized Economies		Developing Economies (1)		Developing Economies (2)	
IMF Code	Country	IMF Code	Country	IMF Code	Country
193	Australia	612	Algeria	548	Malaysia
122	Austria	311	Antigua and Barbuda	273	Mexico
124	Belgium	419	Bahrein	278	Nicaragua
156	Canada	339	Belize	564	Pakistan
128	Denmark	223	Brazil	288	Paraguay
172	Finland	228	Chile	293	Peru
132	France	924	China	566	Philippines
134	Germany	233	Colombia	456	Saudi Arabia
174	Greece	238	Costa Rica	724	Sierra Leone
176	Iceland	423	Cyprus	576	Singapore
178	Ireland	662	Cote d'Ivoire	199	South Africa
136	Italy	321	Dominica	361	St. Kitts and Nevis
158	Japan	248	Ecuador	364	St. Vincent and Grens.
138	Netherlands	646	Gabon	578	Thailand
196	New Zealand	648	Gambia, The	369	Trinidad and Tobago
142	Norway	652	Ghana	744	Tunisia
182	Portugal	328	Grenada	298	Uruguay
184	Spain	336	Guyana	299	Venezuela, RB
144	Sweden	532	Hong Kong	754	Zambia
186	Switzerland	536	Indonesia		
112	United Kingdom	436	Israel		
111	United States	666	Lesotho		

Table 3: **Unit Root Test (Prob.)**[(1)]

	Levin, Lin and Chu Test [(2)]			**Im, Pesaran and Shin Test** [(2)]		
Variables	**All Countries**	**Develop Countries**	**Developing Countries**	**All Countries**	**Develop Countries**	**Developing Countries**
$LRER$	0.000	0.000	0.000	0.000	0.000	0.000
$LToT$	0.000	0.002	0.016	0.015	0.227	0.014
$LTNT$	0.001	0.012	0.008	0.165	0.619	0.072
$\frac{NFA}{GDP}$	0.995	1.000	0.656	1.000	1.000	0.615
$\frac{FA}{GDP}$	1.000	1.000	0.998	1.000	1.000	1.000
$\frac{FL}{GDP}$	1.000	1.000	0.025	1.000	1.000	0.033
$\frac{G}{GDP}$	0.001	0.142	0.000	0.008	0.242	0.007
$\frac{TR}{GDP}$ [(3)]	0.137	0.207	0.145	0.034	0.112	0.085
$\frac{I}{GDP}$ [(3)]	0.000	0.000	0.000	0.000	0.000	0.000

[(1)] Ho: Unit Root

[(2)] With a constant in the test equation, and lag lenght 1

[(3)] Smaller set of countries

Table 4: **Kao Cointegration Test**

Variables					ADF Statistic (p-value) [1]		
Real Exchange Rate	**Terms of Trade**	**Productivity**	**Government Expenditure Measure**	**Foreign Assets**	**All Countries**	**Develop Countries**	**Developing Countries**
LRER	*LToT*	*LTNT*		$\frac{NFA}{GDP}$	0.000	0.000	0.000
			$\frac{G}{GDP}$	$\frac{FA}{GDP}$, $\frac{FL}{GDP}$	0.000	0.000	0.000
			$\frac{G}{GDP}$ [2] $\frac{TR}{GDP}$ [2] $\frac{I}{GDP}$ [2]	$\frac{NFA}{GDP}$	0.000	0.000	0.000
			$\frac{G}{GDP}$ [2] $\frac{TR}{GDP}$ [2] $\frac{I}{GDP}$ [2]	$\frac{FA}{GDP}$, $\frac{FL}{GDP}$	0.000	0.000	0.000
			$\frac{G+TR}{GDP}$ [2] $\frac{I}{GDP}$ [2]	$\frac{NFA}{GDP}$	0.000	0.000	0.000
			$\frac{G+I}{GDP}$ [2] $\frac{TR}{GDP}$ [2]	$\frac{NFA}{GDP}$	0.000	0.000	0.000
			$\frac{G+I+TR}{GDP}$ [2]	$\frac{NFA}{GDP}$	0.000	0.000	0.000

[1] Ho: No Cointegration

[2] Smaller set of countries

Table 5: Baseline Regressions (country and time fixed effect)

	All countries		Industrialized		Developing	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{G}{GDP}$	4.426***	4.421***	0.924***	1.012***	4.319***	4.345***
	[0.385]	[0.387]	[0.216]	[0.220]	[0.512]	[0.516]
LToT	0.564***	0.564***	0.547***	0.569***	0.434***	0.434***
	[0.0856]	[0.0857]	[0.0469]	[0.0472]	[0.115]	[0.115]
LTNT	0.115**	0.114**	0.170***	0.154***	0.0792	0.0778
	[0.0511]	[0.0512]	[0.0266]	[0.0271]	[0.0674]	[0.0675]
$\frac{NFA}{GDP}$	0.195***		0.00688		0.189***	
	[0.0342]		[0.0178]		[0.0456]	
$\frac{FA}{GDP}$		0.195***		0.00708		0.186***
		[0.0347]		[0.0178]		[0.0463]
$\frac{FL}{GDP}$		-0.194***		0.00388		-0.197***
		[0.0352]		[0.0184]		[0.0480]
Observations	1,746	1,746	620	620	1,126	1,126
R-squared	0.256	0.256	0.414	0.426	0.280	0.281
Number of ifscode	65	65	23	23	42	42

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Regressions with Government Transfers and Investment (all countries: country and time fixed effect)

	All countries							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES								
$\frac{G}{GDP}$	2.242***	2.172***	2.286***		2.224***	2.163***	2.253***	
	[0.295]	[0.304]	[0.308]		[0.299]	[0.308]	[0.313]	
$\frac{TR}{GDP}$		0.243	0.371	0.649**		0.224	0.445	0.704**
		[0.264]	[0.271]	[0.270]		[0.272]	[0.279]	[0.277]
$\frac{I}{GDP}$			-1.702***	-1.413***			-1.745***	-1.473***
			[0.532]	[0.530]			[0.535]	[0.532]
$LToT$	0.496***	0.486***	0.473***	0.504***	0.496***	0.486***	0.474***	0.506***
	[0.0512]	[0.0531]	[0.0531]	[0.0548]	[0.0514]	[0.0532]	[0.0532]	[0.0548]
$LTNT$	0.201***	0.200***	0.203***	0.160***	0.204***	0.202***	0.194***	0.155***
	[0.0381]	[0.0382]	[0.0380]	[0.0386]	[0.0388]	[0.0390]	[0.0388]	[0.0394]
$\frac{NFA}{GDP}$	0.0753***	0.0786***	0.0722**	0.0516*				
	[0.0286]	[0.0290]	[0.0293]	[0.0298]				
$\frac{FA}{GDP}$					0.0750***	0.0781***	0.0710**	0.0485
					[0.0288]	[0.0291]	[0.0295]	[0.0299]
$\frac{FL}{GDP}$					-0.0779***	-0.0796***	-0.0631**	-0.0426
					[0.0295]	[0.0297]	[0.0302]	[0.0306]
Observations	1,034	1,033	1,025	1,025	1,034	1,033	1,025	1,025
R-squared	0.267	0.268	0.277	0.222	0.267	0.268	0.278	0.226
Number of countries	39	39	39	39	39	39	39	39

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Regressions with Government Transfers and Investment (industrialized countries: country and time fixed effect)

	Industrialized Countries							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES								
$\frac{G}{GDP}$	0.988***	0.949***	1.062***		1.091***	0.984***	1.062***	
	[0.222]	[0.234]	[0.236]		[0.225]	[0.237]	[0.239]	
$\frac{TR}{GDP}$		-0.264	-0.0902	-0.0811		-0.0485	0.120	0.101
		[0.232]	[0.236]	[0.230]		[0.247]	[0.252]	[0.247]
$\frac{I}{GDP}$			0.433	0.326			0.270	0.180
			[0.467]	[0.474]			[0.472]	[0.482]
$LToT$	0.568***	0.555***	0.538***	0.536***	0.595***	0.579***	0.561***	0.556***
	[0.0492]	[0.0488]	[0.0485]	[0.0505]	[0.0495]	[0.0495]	[0.0493]	[0.0514]
$LTNT$	0.203***	0.203***	0.216***	0.169***	0.181***	0.185***	0.204***	0.157***
	[0.0357]	[0.0354]	[0.0356]	[0.0362]	[0.0364]	[0.0362]	[0.0363]	[0.0371]
$\frac{NFA}{GDP}$	0.00742	0.00462	0.0101	-0.00183				
	[0.0186]	[0.0186]	[0.0186]	[0.0189]				
$\frac{FA}{GDP}$					0.0105	0.00968	0.0142	0.00258
					[0.0186]	[0.0187]	[0.0187]	[0.0189]
$\frac{FL}{GDP}$					0.00407	0.00262	-0.00437	0.00796
					[0.0188]	[0.0188]	[0.0188]	[0.0193]
Observations	563	563	561	561	563	563	561	561
R-squared	0.414	0.430	0.448	0.397	0.428	0.440	0.458	0.406
Number of countries	21	21	21	21	21	21	21	21

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 8: Regressions with Government Transfers and Investment (emerging countries: country and time fixed effect)

	Developing							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES								
$\frac{G}{GDP}$	2.682***	2.400***	2.974***		2.660***	2.405***	2.938***	
	[0.535]	[0.548]	[0.547]		[0.536]	[0.549]	[0.550]	
$\frac{TR}{GDP}$		0.987**	1.667***	2.021***		0.905**	1.678***	2.056***
		[0.452]	[0.469]	[0.475]		[0.450]	[0.468]	[0.472]
$\frac{I}{GDP}$			-4.514***	-3.868***			-4.856***	-4.477***
			[0.928]	[0.917]			[0.937]	[0.932]
$LToT$	0.292***	0.222**	0.164*	0.192**	0.287***	0.221**	0.152*	0.181*
	[0.0865]	[0.0918]	[0.0907]	[0.0937]	[0.0861]	[0.0913]	[0.0905]	[0.0932]
$LTNT$	0.131**	0.122*	0.138**	0.0584	0.145**	0.136**	0.145**	0.0697
	[0.0639]	[0.0639]	[0.0621]	[0.0619]	[0.0638]	[0.0638]	[0.0620]	[0.0618]
$\frac{NFA}{GDP}$	0.165***	0.200***	0.0827	0.126*				
	[0.0608]	[0.0625]	[0.0645]	[0.0657]				
$\frac{FA}{GDP}$					0.204***	0.237***	0.120*	0.153**
					[0.0623]	[0.0637]	[0.0667]	[0.0675]
$\frac{FL}{GDP}$					-0.242***	-0.275***	-0.164**	-0.203***
					[0.0655]	[0.0669]	[0.0714]	[0.0718]
Observations	471	470	464	464	471	470	464	464
R-squared	0.334	0.345	0.389	0.338	0.350	0.360	0.402	0.355
Number of countries	18	18	18	18	18	18	18	18

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

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