Tesis de Maestría en Economía Internacional

El efecto del tipo de cambio real en la solvencia fiscal

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Real Exchange Rate and Fiscal Outcomes: A Flow Approach

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Real Exchange Rate and Fiscal Outcomes: A Flow Approach

Abstract

Against the usual idea based on the consequences of pubic debt dollarization, in this study we put forward the concept that real depreciation may also have a positive fiscal impact, provided that revenues are relatively more based on tradable goods and services while expenditures are relatively biased towards non-tradables. Analyzing the Uruguayan experience, we show that this *relative price* effect is far from negligible and has indeed provided a source of extra income in situations where sovereign financing is highly restricted.

During the 2002-2003 economic crises, public debt sustainability indicators deteriorated following an overshooting in the real exchange rate and the subsequent impact on the dollarized portion of the debt. However, the Uruguayan government was able to run a primary surplus, in part because it benefited from this favorable relative price evolution. In some cases, the amount of this transfer can be estimated as sufficient to cover most of the interest due on public debt.

KEYWORDS: Fiscal Sustainability, Real Exchange Rate, Fiscal Balance.

JEL Classification: E65, H62, H69.

I. Introduction.

In this study we explore the idea, in a standard tradable/non-tradable context, that a real depreciation may have a significant positive effect on the government's primary result. Even in a dollarized economy, where public debt is at least partially foreign currency denominated, this effect may compensate for the increased burden of debt service, and thus help to meet increased interest payments at times when external and domestic financing is restricted.

The channel whereby real depreciation may lead to an improvement in the primary fiscal balance is linked to the structure of the government's revenue and expenditure. To the extent that the government's revenue is relatively more biased towards tradable goods and services, a rise in the real exchange rate tends to improve the fiscal balance measured at constant prices, and this contributes to generating a breathing space. The government benefits from the different evolution of relative prices, making a gain which is conceptually close to a *terms of exchange* effect.

The traditional manner to estimate the fiscal impact of real exchange rate depreciation is usually based on a *stock* approach *à la* Blanchard. In this framework, there are three mechanisms to be taken into consideration when gauging the impact of real devaluation on the sustainability of public debt. First, real depreciation increases the burden of interest payable on foreign currency denominated debt, so a greater fiscal effort is needed to service this debt. Second, the impact of real depreciation will differ, depending on the relationship between the currency composition of public debt and the tradable/non-tradable composition of the country's GDP (see Calvo, Izquierdo and Talvi, 2003): at one extreme, if the whole debt is foreign currency denominated and domestic production is exclusively geared to the production of traded

goods, real depreciation would have no effect on fiscal sustainability. At the other extreme, if the whole debt is foreign currency denominated and the country only produces non-tradable goods, real depreciation would have a big impact on fiscal sustainability. Lastly, a rise in the debt-to-GDP ratio in an adverse context generates a perception of higher default risk, forcing capital outflows, which eventually might feed back greater currency depreciation.

In this paper we bring a *flow* perspective into consideration. However, our analysis differs from other previous approaches, like that of Anós and Seshan (2006) in their analysis of the Djibouti economy. These authors estimated the short term fiscal effects of devaluation on fiscal savings through simulating different nominal devaluation rates and estimating pass-through effects. They constructed different scenarios for the indexation of public sector wages. In the context of the economic structure of Djibouti, they found that nominal devaluation generates fiscal savings in the short term and has adverse effects on poverty levels and income distribution.

Our methodology also differs from Levy and Sturzenegger (2007), who used a partial equilibrium model to analyze fiscal sustainability with a balance sheet approach. They incorporate the correlation between different shocks by estimating their combined distribution and the dynamic responses to the relevant economic policy variables by estimating a VAR model. They estimate the effect of the real exchange rate on net wealth, bearing in mind that the sensitivity of government revenue to changes in the real exchange rate may not be the same as the sensitivity of government expenditure, and so their combined effect is uncertain. In Argentina, they estimate that a real permanent devaluation of 20% had almost no effect on net wealth, because the increase in the value of foreign currency denominated debt was offset by the beneficial effects of this devaluation on taxes and expenditure, particularly expenditure on wages and pensions. In Chile, on the other

hand, net wealth increased considerably, because copper exports account for a large proportion of fiscal revenue and the debt position is balanced.

In Uruguay, Cuitiño and Mailhos (2008) used a VECM model estimation to gauge the impact of changes in the real exchange rate on primary fiscal outcomes, but they did not obtain conclusive results. In an alternative approach, they included the effect of relative prices on debt interest and estimated a model that included GDP, the real exchange rate and the global balance in the public sector. They found that in the period 1997QI-2007QIII a real depreciation had an adverse effect on the global fiscal outcome through its effect on interest payments.

The methodology we have developed here is based on the decomposition of the primary fiscal result of the central government and the social security system, so as to isolate the magnitude of the above mentioned *relative prices* effect. The model benefits from the results of the Supply and Use Tables (SUT) of the System of National Accounts (SNA 93)[1], in order to derive a fine-tuned deflator of government revenues. Government expenditure, in turn, is concentrated in fewer categories. The price indices for revenues and expenditures were then classified as traded or non-traded, which made it possible to build a measure of the real internal exchange rate that affects central government accounts.

As a sub-product of this study, we constructed specific deflators for each of the main taxes collected by the Internal Revenues Service[2] (Dirección General Impositiva: DGI) in Uruguay. These deflators were conceived in such a way that they could be easily updated on a monthly basis and be used to monitor fiscal policy more closely and accurately.

[1] See Methodological Annex.
[2] DGI is the Spanish acronym for Dirección General Impositiva.

This study is organized in the following way: section II connects the concepts of solvency, liquidity and sustainability in terms of stocks, introducing the theoretical foundations of our *flow* approach; in section III we discuss empirical estimations and finally, section IV we provide a summary and our main conclusions.

II. The Model.

The traditional way to approach the impact of the real exchange rate on public sector accounts has mostly been through aspects of solvency. Public sector solvency is usually based on the government's intertemporal budget constraint. The public sector may be considered solvent when the present value of its assets plus future revenues is equal to or greater than the present value of its liabilities plus current and future expenditures. In other words, the government is considered solvent when the current value of its primary surplus is greater than or equal to its initial net debt. Therefore, the condition of being solvent is time-compatible with different fiscal surpluses or deficit situations and with different debt-to-GDP ratios.

The concepts of solvency and liquidity are interconnected. While solvency focuses on the balance sheet, liquidity has more to do with the capacity to meet obligations as they fall due. Sovereign solvency is always established *ex-post*, as the government implements fiscal adjustments, sells assets, reschedules obligations by extending payment deadlines or obtains deductions, and this also includes defaulting. The concept of debt sustainability is related to satisfying both of these conditions.

Following Dinh (1999), the role of the real exchange rate in the traditional *stock* approach becomes apparent from the law of evolution of the debt-to-GDP (D/Y) ratio:

$$1. \quad d\frac{D}{Y} = \frac{PFD}{Y} - \frac{D_d}{Y}(g - r) - \frac{D^*}{Y}\left(g - \left(r^* + \dot{q}^{\omega}\right)\right) - \frac{M}{Y}\left(\dot{P} + g - \dot{v}\right) + \frac{\dot{F}}{Y}$$

This equation involves the primary deficit (*PFD*) and its financing alternatives, namely: a) the excess of real GDP growth (*g*) relative to the real rate of interest (*r*) applicable to the initial stock of domestic currency denominated debt (D_d); b) in the case of foreign currency denominated debt (D^*), the excess of GDP growth with respect to the applicable interest rate (r^*) plus the real depreciation ($\dot{q}$) weighted by the share of non-tradables in the expenditure basket; c) the monetary (*M*) financing consistent with seigniorage (where $\dot{P}$ is the inflation rate and $\dot{v}$ is the rate of change of monetary velocity of circulation) and finally, d) the net use of reserve assets (*F*). Because this equation is connected to a one period budget constraint, it also shows how public sector liquidity constraints operate. The role of the real exchange rate stems from the impact on the stock of foreign currency denominated debt. However, up to now little has been said about the role of the real exchange rate on the primary fiscal result itself.

Following a concept put forward by Della Mea (2005), our point of departure is the definition of the nominal primary fiscal deficit (*PFD*) as the difference between the primary expenditure (*E*) and the primary revenue (*R*) of the government, in nominal terms:

$$2. \quad PFD = E - R$$

From here, the primary fiscal deficit at constant prices ($\overline{PFD}$) is obtained by dividing by the general price level (*P*, normally the Consumer Price Index or the implicit deflator of the *GDP*):

3. $$\overline{PFD} = \frac{E-R}{P} = \frac{E-R}{P_E}\frac{P_E}{P}$$

Fiscal revenue and expenditure in real terms are defined as follows:

4. $$\overline{E} = \frac{E}{P_E}$$

5. $$\overline{R} = \frac{R}{P_R}$$

where P_E is the specific deflator of government expenditure and P_R is the specific deflator of public revenue. By comparing the revenue and expenditure deflators we define the variable φ, which is associated with the government's *relative prices*[3].

6. $$\varphi = \frac{P_R}{P_E}$$

We can now define the real primary fiscal deficit (*pfd*) as the difference between real revenue and expenditure:

7. $$pfd = \overline{E} - \overline{R}$$

We also define the purchasing power of the government's revenue as:

8. $$\overline{RPP} = \frac{R}{P_E} = \overline{R}\varphi$$

[3] By analogy with the country level, we will refer to this variable φ as the government's *terms of exchange*.

The purchasing power of the primary fiscal deficit (*ppd*) can be defined as the nominal fiscal deficit, deflated by the price index of government expenditure:

$$9. \quad ppd = \frac{E}{P_E} - \frac{R}{P_R}\frac{P_R}{P_E} = \overline{E} - \overline{R}\varphi = \left(\overline{E} - \overline{R}\right) - \overline{R}(\varphi - 1)$$

Therefore, the fiscal deficit at constant prices can be expressed as follows:

$$10. \quad \overline{PFD} = \frac{P_E}{P}\, ppd = \left[\left(\overline{E} - \overline{R}\right) - \overline{R}(\varphi - 1)\right]\frac{P_E}{P} = \left[pfd - \overline{R}(\varphi - 1)\right]\frac{P_E}{P}$$

from which:

$$11. \quad \frac{\overline{PFD}}{\overline{Y}} = \frac{PFD}{Y} = \frac{E - R}{Y} = \frac{\overline{E}P_E - \overline{R}P_R}{\overline{Y}P} = \frac{P_E}{P}\left[\left(\frac{\overline{E} - \overline{R}}{\overline{Y}}\right) - \frac{\overline{R}}{\overline{Y}}(\varphi - 1)\right]$$

The primary deficit captures the relationship between the prices of government expenditure and the general level, applied to the effect of the real fiscal deficit (a *real* or *quantum* term) adjusted by a *relative price* term.

From here, the variation in the fiscal deficit at constant prices can be approached as the sum of three different factors, which in turn can be conceptually grouped in two different effects: a *quantum* effect and a *relative prices* effect.

12. $$\frac{d\overline{PFD}}{dt} = \underbrace{\frac{P_E}{P}\frac{d\left(\overline{E}-\overline{R}\right)}{dt}}_{I} - \underbrace{\frac{P_E}{P}\overbrace{\left[\frac{(\varphi-1)d\overline{R}}{dt}+\frac{\overline{R}d\varphi}{dt}\right]}^{\frac{d\left(\overline{RPP}-\overline{R}\right)}{dt}}}_{II} + \underbrace{\left[\left(\overline{E}-\overline{R}\right)-\overline{R}(\varphi-1)\right]\frac{d\frac{P_E}{P}}{dt}}_{III}$$

$$= \underbrace{\underbrace{\frac{P_E}{P}\frac{dpfd}{dt}}_{I}}_{\substack{QUANTUM \\ EFFECT}} \underbrace{\underbrace{\frac{P_E}{P}\overbrace{\left[\frac{(\varphi-1)d\overline{R}}{dt}+\frac{\overline{R}d\varphi}{dt}\right]}^{\frac{d\left(\overline{RPP}-\overline{R}\right)}{dt}}}_{II} + \underbrace{\left[pfd-\overline{R}(\varphi-1)\right]\frac{d\frac{P_E}{P}}{dt}}_{III}}_{\substack{RELATIVE\ PRICES \\ EFFECT}}$$

These three factors can be interpreted as follows:

I) A *Quantum* factor is given by the variation in the real fiscal deficit. This variable is affected by policy definitions (level of discretionary expenditure, tax rates, etc.) as well as by other exogenous factors (increases in the levels of activity and spending, etc.) beyond the direct control of the policymaker.

II) A "*Terms of Exchange*" factor, given by the different evolution of prices in the tax base and in the structure of expenditure. Thus, insofar as the prices of the activities or goods and services to which the government applies its aliquots outperform the prices of the goods and services (including factorials) that the government acquires, the government will be making a gain. This gain is similar to an intersectorial transfer of funds between society as a whole and the public sector, caused by the evolution of relative prices.

III) An *Expenditure Deflator* factor, which is analogous to the *terms of exchange* effect. In this case, it is determined by the different evolution of the prices of government expenditure on the one hand and the global price index on the other. Combined factors *II*

and *III* make up the effect of relative prices on the evolution of the fiscal result, while factor *I* reflects the role of quantities.

The deflators of the general price level, taxation and government expenditure are weighted baskets of traded (P_T) and non-traded (P_N) goods. If the weighting of these two elements were the same, then a variation in the real exchange rate (q) -measured as the relation between traded and non-traded goods- would not cause any variation in the relative structure of the two types of goods. However, to the extent that these weights are different, a change in q will induce changes in these relative prices and consequently will affect factors *II* and *III* described above. As a result, it will affect the evolution of the fiscal deficit at constant prices.

Let us focus for a moment on the evolution of the government's *terms of exchange*, though the analysis can be extrapolated to the relation between the expenditure deflator and the general price level. This variable can be expressed as a function of the real exchange rate:

$$13. \quad \varphi = \frac{IP_R}{IP_E} = \frac{P_T^{\alpha} P_N^{1-\alpha}}{P_T^{\beta} P_N^{1-\beta}} = \frac{P_T^{\alpha-\beta}}{P_N^{\alpha-\beta}} = q^{\alpha-\beta}; \quad q = \frac{P_T}{P_N}$$

where α is the weight of tradable items in government revenue and β is the weight of tradable goods in government expenditure.

$$14. \quad \frac{d\varphi}{dq} = (\alpha - \beta) q^{\alpha-\beta-1} + q^{\alpha-\beta} L(q) \frac{d(\alpha - \beta)}{dq}$$

If the weight of traded goods in the revenue deflator and the expenditure deflator were constant and equal, then a change in q would not have any effect on φ. But this is not normally the case, and it is estimated that an increase in q would bring about an increase in φ if:

15. $$\frac{d\varphi}{dq} \geq 0 \quad \leftrightarrow \quad (\alpha - \beta) + qL(q)\frac{d(\alpha - \beta)}{dq} \geq 0$$

This relationship is likely to be strictly positive if there is a greater relative bias towards traded goods in government revenue and the more inflexible their share in the baskets is.

III. Analyzing the Uruguayan Evidence

III.1 Exchange Rate and Public Debt Evolution

Uruguayan non-financial public debt at the beginning of the decade amounted to 35.9% of GDP. However, after adjusting for some transitory factors like currency overvaluation and the cyclical component of the product, the level of structural indebtedness was estimated by Roselli (2003) in 60% of GDP.

Since the 1982 debt crisis in Uruguay, this ratio had been steadily increasing. Some 91% of the debt was foreign currency denominated, while 65% was estimated to be held by non-residents. The non-financial public sector accounted for 74% of total public obligations, while some 85% of this total was owed by the central government.

The Uruguayan Peso depreciated after the floatation in June 2002 and this increased interest payments, while the debt itself soared in terms of GDP, causing sustainability indicators to deteriorate and arousing fears as to whether public financial obligations could be serviced on time. To make matters worse, the maturity profile was highly concentrated in the short term: 12% of total public debt matured within one year and 50% of total public debt matured in the five subsequent years. Half of total debt was contracted at variable rates.

The level of activity in Uruguay's economy started to decrease in 1999, in the wake of devaluation in Brazil. The country entered a recession that peaked in 2002-2003. A higher fiscal deficit increased to meet the government's financing needs. A higher amount of debt, mostly foreign currency denominated in the middle of a deep recession, made the debt-to-GDP ratio[4] rise to 106%.

The role of these different factors in the evolution of the debt ratio can be approached in discrete time by equation 16 (Della Mea, 2005), as follows:

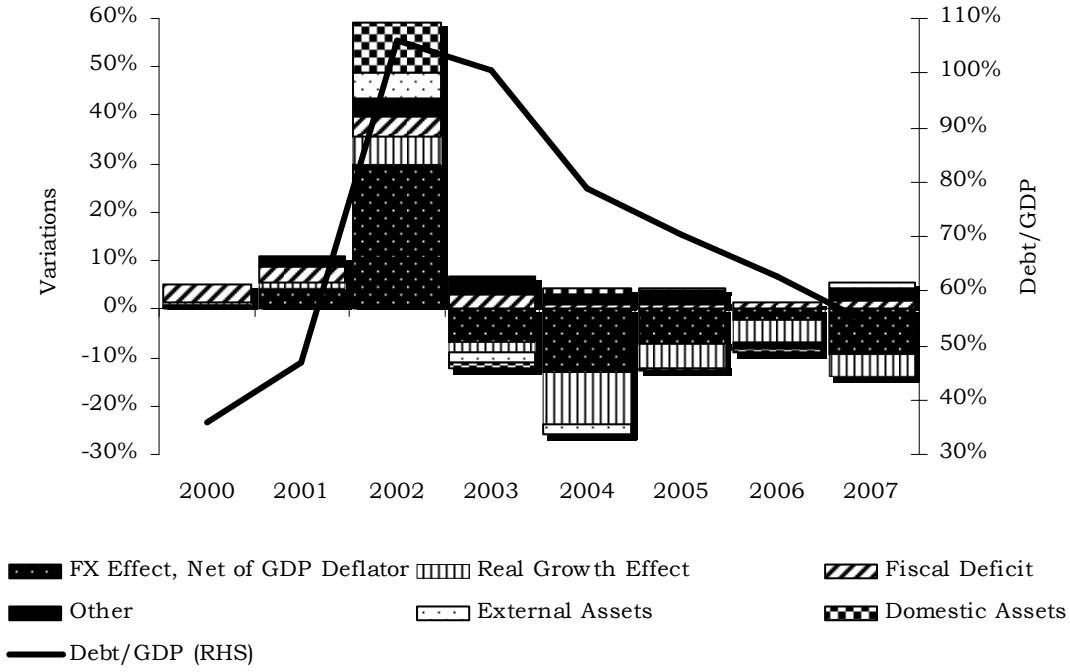
$$16. \quad \dot{D} = \frac{G}{Y_1} + \left[\frac{\Delta S}{S_0}(1-\omega_D) - \frac{\Delta P}{P_0} \right] \frac{D_0}{Y_1} - \frac{\Delta \overline{Y}}{\overline{Y}_0} \left(\frac{P_1}{P_0} \frac{D_0}{Y_1} \right) + \frac{O}{Y_1}$$

The first term (G/Y_1) corresponds to the overall fiscal deficit; the second term captures the foreign exchange rate effect on the share of foreign currency debt, net of the GDP deflator; the third term captures the effect of the evolution in real GDP (real growth effect) and lastly, O/Y_1 incorporates other factors like the accumulation of external and domestic assets of the non-financial public sector and other residual items.

Figure 1 shows the evolution of the debt-to-GDP ratio and an estimation of the underlying determinants. From this, the key role played by the exchange rate effect as a source of short term variability can be easily understood. In spite of the fact that these contributions are positive or negative over the years and that they tend to cancel out over time, they alone explained a 30% increase in the ratio during 2002. Given that this effect tends to be highly correlated with GDP evolution, they also tend to reinforce each other in either direction.

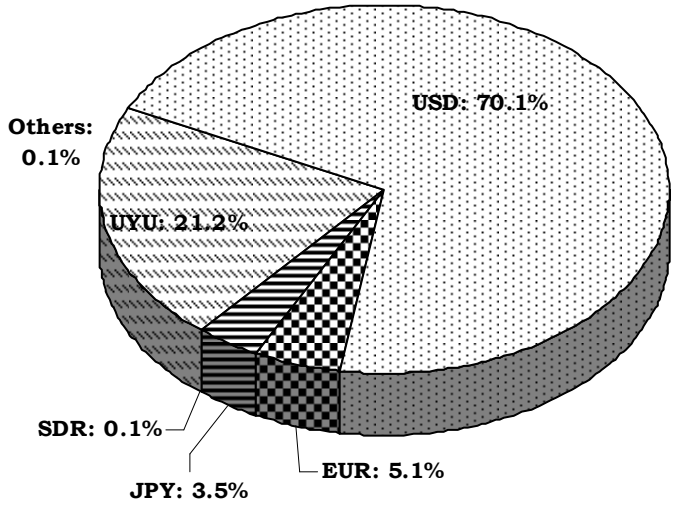
[4] As measured in domestic currency, valuing foreign currency denominated debt at end-of-period exchange rates.

Fig 1: Non- Financial Public Sector Debt
Factors of variation



Clearly, in a context of public debt dollarization, the debt-to-GDP ratio tends to be positively correlated to the evolution of the real exchange rate, which affects not only the debt stock but also the debt service due in any particular year. This is the fundamental reason why, after 2003, public debt management focused on the reduction of these sources of vulnerability, with the issue of nominal Uruguayan Peso and CPI-indexed debt, to stretch the maturity profile as much as possible. This policy has been steadily followed and, as can be seen in Figure 2, at the present time the share of domestic currency denominated debt has increased from just above zero to over 21% of the total.

Fig 2: Non Financial Public Sector Debt
Currency Composition as of Dec. 31, 2007



III.2 Exchange Rate and the Fiscal Primary Result

When Uruguay floated its currency in June 2002, the central government was running a modest primary deficit. Consistency between monetary and exchange rate policy set a limit to the extent to which the government could have recourse to inflationary taxation, so its overall needs for funding were mostly financed through the issue of foreign currency denominated debt.

In June 2001, the government had already doubled the width of the floatation band to 6% and accelerated the path of devaluation to 1.2% per month. These measures were again revised in January 2002 after the economic crisis in Argentina struck. The band was widened to 12% and the slide in the exchange rate also doubled. In order to ensure consistency, two successive fiscal adjustments were implemented.

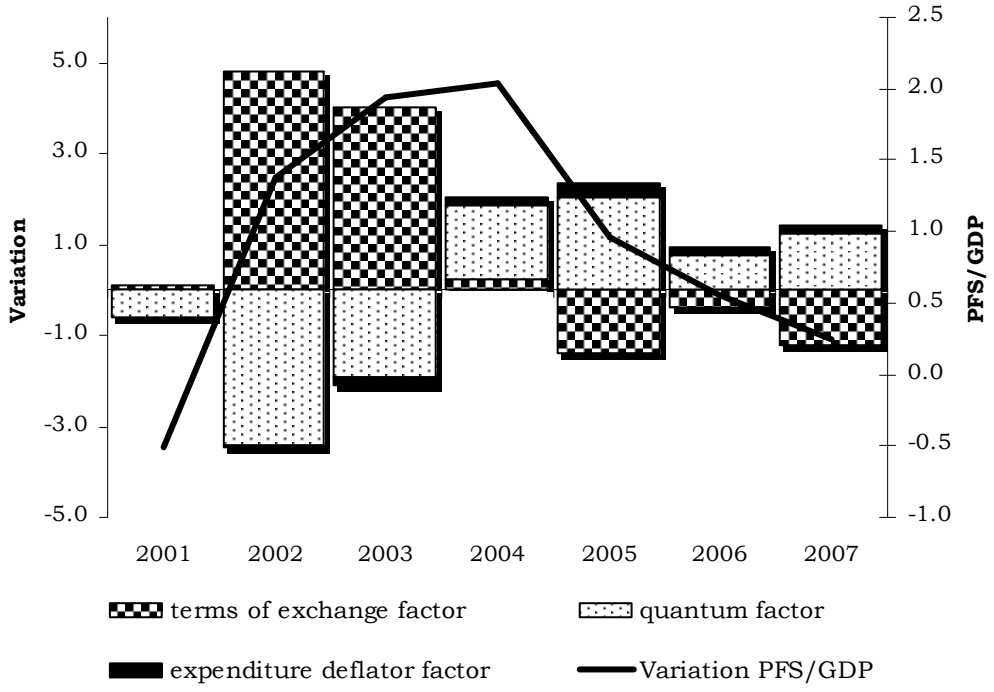
To make matters worse, the Uruguayan banking system was severely affected by this crisis. Government intervention in a bank with liquidity problems and doubts about the solvency of other banks

triggered heavy deposit withdrawals and strong capital outflows. The sovereign credit rating was downgraded and the Republic lost most of its access to capital markets. The impact was immediately felt in the level of external reserve assets. At the end of 2001, the Central Bank of Uruguay (BCU) had over USD 3,000m in reserve assets. By July 2002, this amount had fallen to approximately one fifth. Faced with this situation, the government -sponsored by the US Treasury- reached an agreement with the IMF, declared a banking holiday, suspended the activities of four domestic banks and one public bank, and created a fund sufficient to provide a full guarantee for sight deposits in order to stop the run on the banks and to preserve the chain of payments.

Between January and July 2002 the nominal exchange rate jumped by 58%. The recession, combined with deflationary pressure from other countries in the region, made for a low pass-through coefficient at devaluation prices. Retail price inflation increased by an annual average of 13.9% over the previous year's prices.

As part of the IMF agreement and in order to preserve fiscal sustainability, it became necessary to generate a primary fiscal surplus to meet interest payments on the debt. Figure 3 shows the evolution of the primary fiscal surplus (*PFS*) in terms of the factors resulting from the decomposition set out in equations 11 and 12:

Fig 3: Primary Fiscal Surplus.Sources of Variation, expressed as % of GDP of current year



These factors are summarized in Table 1:

Table 1: Decomposition of the change in the fiscal surplus
(million of constant pesos 2000)

	PFS/GDP	Surplus pps	Variation surplus	Factor I	Factor II	Factor III	Total factors
2000	-0.44	-1069					
2001	-0.96	-2253	-1184	-1403	209	11	-1184
2002	0.30	630	2883	-7114	10083	-87	2883
2003	2.23	4759	4129	-4087	8559	-343	4129
2004	4.02	9636	4877	3978	531	368	4877
2005	4.75	12091	2455	5162	-3550	842	2455
2006	4.99	13594	1503	2101	-1050	452	1503
2007	4.89	14296	702	3660	-3504	546	702

From this table, the contribution of the relative price effect in the improvement in the primary fiscal result during the crisis can be seen.

The increase in the real exchange rate in 2002-2003 had a positive effect on the level of primary revenues, comparable to the terms *of exchange* effect, due to the fact that the tax base of revenues is indeed more biased to tradable goods and services than expenditures, which are mostly focused on wages and pensions. In particular, in 2002 the real global effective exchange rate depreciated by 6.4% and the extra-regional rate rose 43.9%. The following year the upward trend in the nominal exchange rate continued and so did the real effective multilateral exchange rate, increasing on average by 29.3% from the previous year.

From that time on, in a context of currency appreciation, the government's relative prices tended to reduce the increase in the fiscal surplus while the main factor driving the increase in the primary fiscal surplus was the *quantum* or *real effect*. In 2005, the real multilateral exchange rate decreased by an average of 9.6% from the previous year. In subsequent years the real effective exchange rate continued to appreciate but to a lesser extent (average variations of -1.1% and -1.2% in 2006 and 2007, respectively). Because of this evolution of the real exchange rate, which in turn favored a reduction in the debt-product ratio, variations in the *terms of exchange* factor again had the opposite effect, tending to reduce the primary surplus. The *expenditure deflator* factor contributed, albeit to a lesser extent, to increasing the fiscal surplus from 2004 onwards.

To sum up, from a flow standpoint it seems possible to make a case for the idea that currency depreciation can have a positive fiscal impact, as opposed to the usually recognized negative impact derived from the increased burden of currency denominated debt. Given that these two effects tend to be negatively correlated, a real depreciation tends to improve fiscal revenues relative to expenditures and generates a compensating breathing space to cover increased debt service costs.

Let us analyze the factors involved here in greater depth.

The Quantum Factor

The *quantum* factor is not necessarily discretional. Some of the real components may be under the control of the policymaker but others are not. This exercise does not discriminate between discretionary and non discretionary determinants.

At the beginning of the period under consideration, the revenues of the central government –including social security- amounted to 28.6% of GDP, and expenditures stood at 29.1%. The main revenue sources are based on the tax system –mainly value-added taxes, excise taxes, income taxes and foreign exchange tariffs- and also on social security contributions.

Non-traded goods predominate in the revenue structure of the consolidated central government-social security system, making up 60% of this total. These sources are basically retirement contributions (42.4%), value-added taxes on non-traded goods and services (20.8%) and other central government income (26.2%), mainly payroll taxes, contributions from public enterprises and other income and property taxes. The revenue derived from traded goods, on the other hand, is based on value-added taxes (40.3%) and excise taxes (27.2%), and on other taxes collected by the internal revenues service not included in the Supply and Uses framework of the National Accounts.

Fig 4: Structure of the revenue of CG and SSB (%) :year 2000

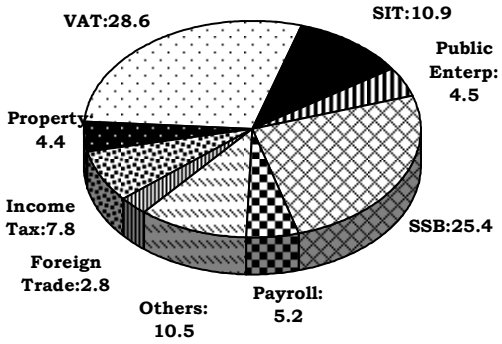
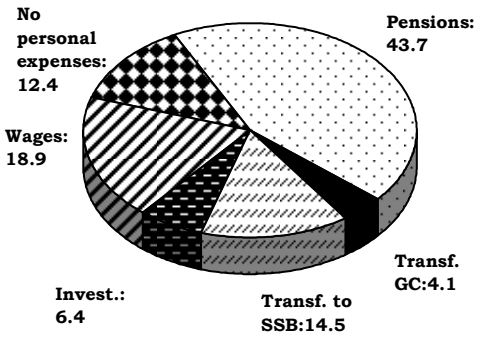


Fig 5: Structure of the expenditure of CG and SSB (%): year 2000



The figure above shows the structure of central government and social security combined expenditure. All this expenditure is considered to be non-traded, except expenditures on goods and services. Non-traded expenditure amounts to 87.6% of total expenditure. As can be seen, both revenue and expenditure are more based on non-traded goods, but expenditure is more biased than revenue.

Both real revenue and real expenditure behaved procyclically, but this behavior is more marked for real revenue. Ganon and Tiscordio found that the correlation between the cyclical components of fiscal revenue and GDP was 0.7, while for expenditure it was 0.5 in the period from 1989.I to 2006.IV.

At the beginning of the decade, real revenue was falling along with GDP. However, expenditure remained relatively steady, which worsened the real primary result and generated a negative *quantum* effect. In 2002 the government implemented two different fiscal packages in order to address the need to put fiscal accounts on a more solid foundation. These packages involved the introduction of new taxes by widening the tax base or changing the rates. These measures were aimed at reaching specific targets in terms of global and primary fiscal results. On the expenditure side, discretionary expenditure and investment was cut and public sector payroll policy was changed. As a result, the average

wage public sector index increased that year by 1.3%, leading to a real wage reduction of 11.4%. However, the fiscal adjustment failed to make a positive impact on market expectations and it did not reverse the negative risk associated with the public debt, so in fact the package further exacerbated a deepening recession.[5]

Real revenue in 2002 was 15.3% less than in 2001 whereas expenditure only decreased by 4.5%. The biggest impact of the 2002 crisis was felt in traded revenue, which fell by 18.8%, and in reductions in the real yield of excise taxes (29.8%), value-added taxes (16.9%) and foreign trade taxes (20.2%). This last effect was due to a considerable decrease in exports and imports of goods and services. Non-traded revenue fell by 11.1%, with a decrease of 22% in income from social security contributions and a 13.1% reduction in the yield of VAT.

On the expenditure side, in the crisis year the adjustment led to a reduction of 29% in non-personnel expenditure (assumed as tradable) and 28% in central government investment. Wage levels and pensions were kept on a tight rein. Because these reductions in expenditure were small compared to the fall in revenue, the *quantum* effect tended to worsen the fiscal result.

Real revenue started to recover in 2004 with the growth in income in the traded sector of the economy, and this continued until 2006. There was a rise of 17.6% in 2004, 21.4% in 2005 and 6.3% in 2006. Real expenditure also increased, by 2.2% in 2004, which was due to an increase of 6.3% in non-personnel expenditure and a recovery (23.9%)

[5] The non-Keynesian positive effects of a procyclical fiscal adjustment (see Giavazzi [1990], Pagano [1995] and Perotti [1995]), involving increases in aggregated demand in the face of fiscal contraction, did not occur in this case. In situations in which the government has a very high debt-product ratio and a weak fiscal position, a far-reaching fiscal adjustment can increase the value of non-human wealth and also perceptions about permanent income. The wealth effect is brought about by a lessening of the risk of default and/or the crowding-out effect which reduces the interest rate. Permanent revenue is affected through people's expectations that taxes will be reduced in the future.

in public investment. Expenditure increased less than revenue, and as a consequence the *quantum* effect began to operate in the direction of raising the primary fiscal surplus. However, in terms of levels, real expenditure still exceeded real revenues.

On the other hand, in the election year of 2005, expenditure increased by only 0.7%, due to a 16% rise in non-personnel expenditure and a 1.5% increase in transfers. All other expenditure categories decreased in real terms. In 2006 and 2007, as a consequence of wage increases (2.2% and 2%, respectively), the recovery of investment (9.8% and 18.7%, respectively) and transfers (3.8% and 19.8%)[6], real expenditure grew by 2.4% and 4.3%. Nevertheless, the variation in the *quantum* effect continued to operate, albeit less strongly, in the direction of increasing the fiscal surplus.

[6] Central government transfers, including transfers to municipal governments, increased by 80% during 2007.

Fig 6:Variation of the revenue, expenditure and GDP (millons pesos 2000)

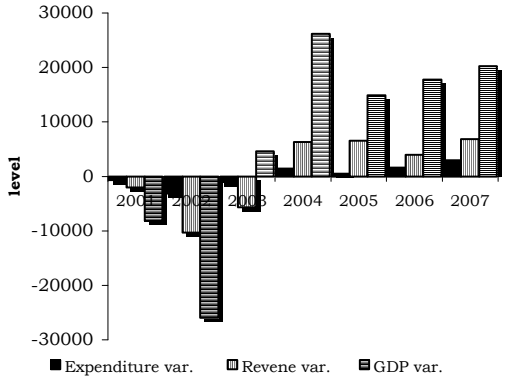


Fig 7:Variations in revenues tradables and nontrdables

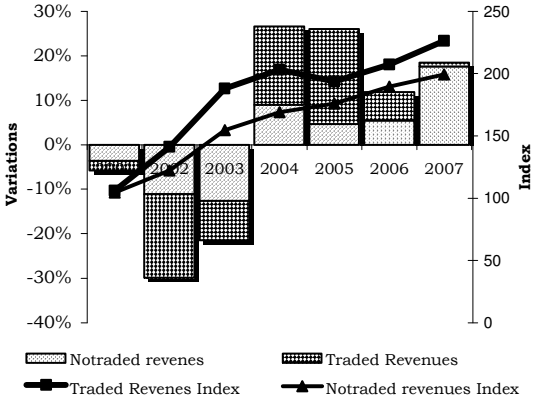


Fig 8:Variations in expenditures traded and non traded and their indexes

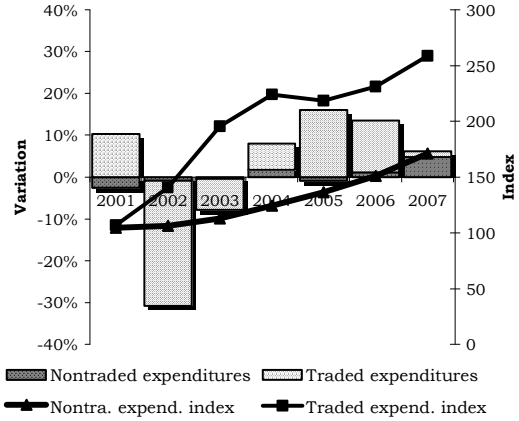
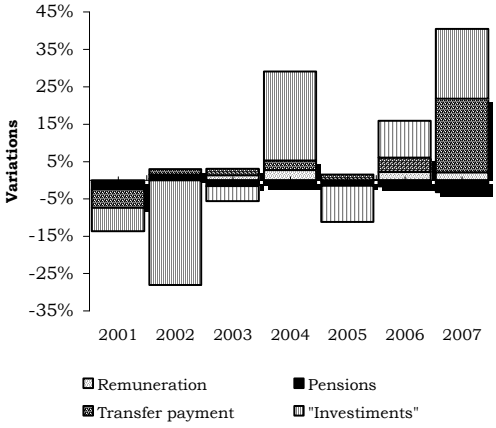


Fig 9:Variations of the main nontradables expenditures



The Terms of exchange Factor

In the empirical approach to calculating the index (φ) of relative prices, given that the basket of traded and non-traded goods is not the same on the revenue as on the expenditure side, we have:

$$17. \qquad \varphi = \frac{IP^R}{IP^E} = \frac{\left(IP_T^R\right)^{\beta}}{\left(IP_T^E\right)^{\alpha}} \frac{\left(IP_{NT}^R\right)^{1-\beta}}{\left(IP_{NT}^E\right)^{1-\alpha}} = \frac{IP^{P}{}_{T}}{IP^{P}{}_{NT}} = q^{\rho}$$

where

18. $$IP^{P}{}_{T} = \frac{\left(IP_T^R\right)^{\beta}}{\left(IP_T^E\right)^{\alpha}}$$

19. $$IP^{P}{}_{NT} = \frac{\left(IP_{NT}^E\right)^{1-\alpha}}{\left(IP_{NT}^R\right)^{1-\beta}}$$;

20. $$IP_T = \frac{IP_T^R}{IP_T^E}$$

21. $$IP_{NT} = \frac{IP_{NT}^E}{IP_{NT}^R}$$

22. $$q = \frac{IP_T}{IP_{NT}}$$

β is the weight of traded goods in revenues and α is the weight of traded goods in expenditures, IP_T^P is the weighted index of traded goods and IP_{NT}^P is the weighted index of non-traded goods.

The weighted index of prices for traded goods is the quotient between the weighted index of revenue and the weighted index of expenditure for traded goods. The weighted index of revenue for traded goods is a measure of different prices in the economy, whose more important elements are the consumer price index and the wholesale price index, approached by the index of producer prices for national products (PPINP).

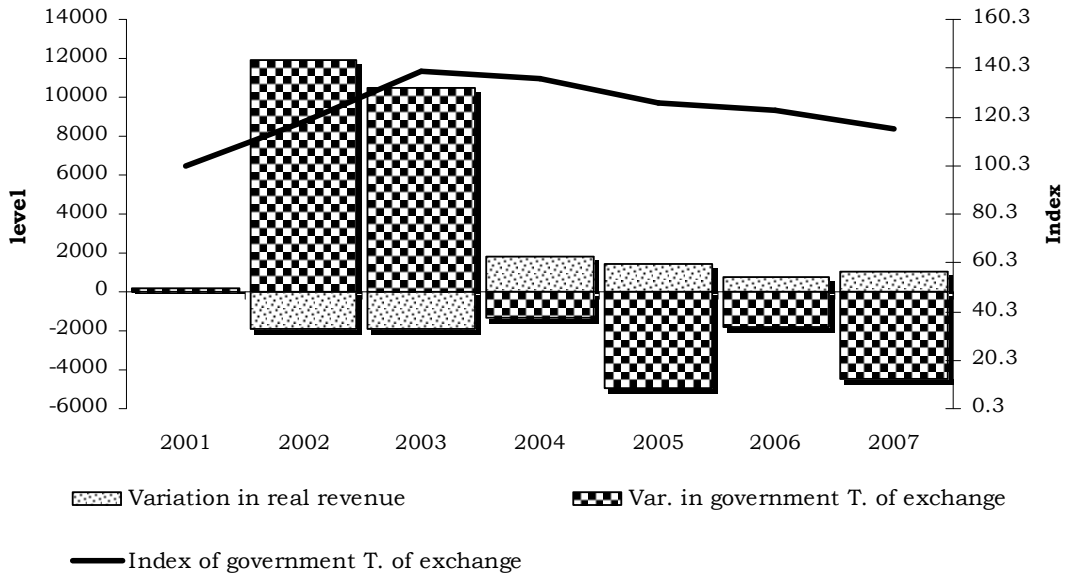
The weighted index of prices for non-traded goods and services is the ratio between the weighted index of expenditure and the weighted index of revenue from non-traded goods. The weighted index of expenditure mainly captures the evolution of total wages and of public sector wages. The construction of the weighted index of revenue included wages as well as the consumer price index for products most similar to BCU products. Therefore, variations in prices of non-traded goods closely track variations in real wages.

Factors influencing the evolution of the index of *terms of exchange* can be summarized as follows: a) changes in relative prices of revenues and expenditures of traded goods (IP_T) and of non-traded goods (IP_{NT}), and b) variations in current weights of traded and non-traded goods in the structure of revenues and expenditures (α and β). In other words, the evolution of the weighted real exchange index has an influence.

For our purposes, the *terms of exchange* factor can be decomposed into the effect of variations in real revenue and the effect of variations in relative prices themselves. The former captures the impact on the variation in real revenue of the relative price of expenditures, as compared to the GDP deflator, given the level of the index of relative prices minus one. The latter captures the variations in the index of the relative prices applied to real revenue and to the quotient of the index of prices for expenditures and of the GDP deflator. It follows that both terms are affected by the index of *terms of exchange* (*TTE*).

$$23. \qquad TTE = -\underbrace{\frac{P_E}{P}\overbrace{\left[\frac{(\varphi-1)d\overline{R}}{dt}+\frac{\overline{R}d\varphi}{dt}\right]}^{\frac{d\left(\overline{RPP}-\overline{R}\right)}{dt}}}_{II} = \frac{P_E}{P}\left((\varphi-1)\frac{d\overline{R}}{dt}+\frac{P_E}{P}\overline{R}\frac{d\varphi}{dt}\right.$$

Fig 10:Decomposition of the *terms of exchange* factor
(million pesos 2000)



The relative price effect that contributed to first achieving and then maintaining the fiscal surplus in 2002 and 2003 was mainly due to the effect of variations in the government's *terms of exchange*. The *real revenue variation* factor attenuated the growth of the surplus, and this was mainly due to the fall in real revenues.

It is true that, in 2004, the contribution of the global effect of the government's terms of exchange to the increase in the fiscal surplus was still positive, albeit only slightly, but the main factor behind the surplus was the variation in real revenue. This was the year when real revenue started to grow. From then on, the dominant factor in the global relative prices effect was the fall in the index of the terms of exchange, which was not counteracted by increases in real revenue, and this meant that this effect reduced the fiscal surplus.

As discussed above, in the evolution of the index of the government's terms of exchange (φ), the real internal exchange rate (q) has an influence, depending on how sensitive the terms of exchange index is to variations in the real exchange rate.

Table 2: Indexes of relevant prices, variations and the sensitivity of the terms of trade effect to the real exchange index

	Weighted Price of traded	Weighted Price of Nontrad.	φ	q	Δφ/φ %	Δq/q %	dφ/dq	Δq/q effective %	$\overline{R}$
2000	100	100	100	100					69591
2001	97.2	96.8	100.3	99.5	0.3	-0.5	-0.6	0.6	67514
2002	112.3	95.7	118.1	115.3	17.7	15.9	1.1	6.4	57185
2003	130.1	93.3	139.1	132.1	17.8	14.5	1.3	29.3	51482
2004	136.1	100.1	135.9	122.9	-2.3	-7.0	0.4	1.0	57790
2005	145.0	116.1	125.8	114.6	-7.5	-6.8	1.2	-9.6	64359
2006	142.1	115.9	122.6	112.6	-2.5	-1.7	1.6	-1.1	68271
2007	125.5	108.0	115.6	102.2	-5.7	-9.2	0.7	-1.2	75109

Note: dφ/dq was calculated in accordance with equation 14

The big increase in the terms of exchange index in 2002 and 2003 reflected its sensitivity to rises in the real exchange rate. In other words, while in 2002 the weighted index of prices for non-traded goods decreased (1.2%), the weighted index of prices for traded goods increased, absorbing almost the whole impact of the real devaluation that took place (15.6%).

In 2003, the *terms of exchange* index was more sensitive to the real exchange rate. The weighted price index for traded goods increased by 15.8%, while the weighted price index for non-traded goods continued to decline, dropping by 2.4%. Nevertheless, the variation in the *relative price* effect was less that that of the previous year because it was applied to a lower level of real revenue.

In 2004, the Uruguayan peso started to appreciate. In that year, the *terms of exchange* index was not very sensitive to the real exchange rate, and this meant that it did not fall so far. The weighted price index for traded goods increased by 4.6% and non-traded services rose by 7.2%, which is why the government's terms of exchange index went

down. The negative effect of the variation in the *terms of exchange* was not higher only because real revenue ($\overline{R}$) increased by 12.2% over the previous year.

In subsequent years, Uruguay's currency continued to appreciate. This had an influence, with varying degrees of sensitivity, on the index of the government's *terms of exchange*. From this time on, the effect of variations in the index of the government's terms of exchange was no longer negative, and this was due to the fact that real revenue was increasing systematically. If this had not been the case, the terms of exchange effect would have reduced the increase in the fiscal surplus even more, and would therefore have contributed to the government's obtaining smaller primary surpluses.

Lastly, starting in 2004, the variation in the real revenue effect increased. However, its effect was limited because the real exchange index was steadily decreasing.

To sum up, in the development of the government's relative effect over time, the main determining factor was the evolution of the terms of exchange index, which responds to its sensitivity to changes in the real exchange rate.

The Expenditure Deflator Factor

24. $$\left[\left(\overline{E}-\overline{R}\right)-\overline{R}*\left(\varphi-1\right)\right]\frac{d\left(\frac{P_E}{P}\right)}{dt}=ppd*d\frac{P_e}{P}=ppd*\frac{P_E}{P}\left(\frac{P_{E1}}{P_{E0}}-\frac{P_1}{P_0}\right)=$$
$$\overline{PFD}*\left(\frac{P_{E1}}{P_{E0}}-\frac{P_1}{P_0}\right)=\overline{PFS}\left(\frac{P_1}{P_0}-\frac{P_{E1}}{P_{E0}}\right)$$

First of all, we can note that the first term in this equation is the same as the first term in equation 10, where the fiscal deficit at

constant prices $\overline{PFD}$ is defined, except that in this case the factor by which it is multiplied is the variation in the quotient of relative prices. We have already analyzed the slight impact of the relative price effect in determining the fiscal surplus. In terms of flows we capture this situation, and it means the expenditure deflator effect is comparatively slight.

Table 3: Decomposition of the expenditure deflator factor (million pesos 2000)

	$\overline{R} - \overline{E}$	$\overline{R} * (\varphi - 1)$	pps	∂(Pe/P)/∂t	Factor III
2001	-2473	209	-2264	-0.005	11
2002	-9621	10340	720	-0.120	-87
2003	-14292	20122	5830	-0.059	-343
2004	-9419	20772	11354	0.032	368
2005	-3336	16590	13254	0.064	842
2006	-1033	15439	14406	0.031	452
2007	2846	11726	14572	0.037	546

The impact of the *expenditure deflator* factor on the variation in the fiscal result will depend on the repercussions that the evolution of the prices for goods that the government buys in relation to the GDP deflator has on the fiscal result at constant prices.

The extent to which expenditure prices -mainly reflecting wage increases- is below the rate of inflation (and hence there is a fall in real wages), the total impact of this factor will be captured by the sign of the fiscal surplus. Throughout the period, except in 2002 and 2003 when real wages went down, the evolution of the price of government expenditures was above inflation. This fact, along with the surpluses at constant prices ($\overline{PFS}$), meant that the expenditure deflator factor contributed to increasing the fiscal surplus at constant prices.

Throughout the period, the *terms of exchange* index applied to real revenue favored an increase in the fiscal surplus, except in 2002

and 2003, when -because of the impact of the *expenditure deflator*- it decreased. In subsequent years, when the increase in the index for government expenditure was above the increase in the GDP deflator, the fiscal surplus grew.

III.3 Exchange Rate, Debt Interest and Relative Prices

From the previous analysis it can be asserted that the *relative price* effect enabled the central government to obtain resources to meet increased interest payments in times of severe illiquidity.

Consolidating the years 2002 and 2003, the gains that accrued to the government through this effect covered 91% of total debt interest payments.

Table 4: Central government interest and the terms of exchange factor
(million pesos 2000)

	Total Interest	Cent.Gov. Interest a	Terms of Exchange (TTE) b	b/a %	Interest C.G/GDP %	TTE/GDP %
2001	6938	5832	209	3.6	2.5	0.1
2002	9669	8479	10083	118.9	4.0	4.8
2003	13837	12040	8559	71.1	5.6	4.0
2004	14572	11780	531	4.5	4.9	0.2
2005	11890	11230	-3550	-31.6	4.4	-1.4
2006	11794	11646	-1050	-9.0	4.3	-0.4
2007	10828	11192	-3504	-31.3	3.8	-1.2

These combined effects underpinned the development of a significant primary surplus, allowing the Republic to comply with its interest payments schedule and improve its fiscal sustainability indicators.

In May 2003, the government carried out a voluntary debt exchange operation whereby debt amortization payment deadlines were

rolled over until after 2010. This measure took pressure off the debt service schedule in the short term by postponing maturities (see Dominioni [2005]), at the price of increasing interest payments afterwards. It was a successful reprofiling, as measured by a bondholder participation of 90% in international debt and 98% in domestic debt. In 2006, the government carried out another liability management operation, which involved a debt exchange and buyback. This operation involved rescheduling bonds that would fall due in 2011 and in 2015, exchanging them for bonds that would fall due in 2022 and 2036. These operations contributed to smoothing out the debt amortizations schedule, lowering refinancing risks. The other component of debt service, interest payments –in particular on foreign currency denominated debt-, might benefit again from the counterbalancing effect of the overall *relative price* effect if there is an increase in the real exchange rate.

IV. Conclusions

At this stage, we can summarize the main conclusions of this study as follows:

In Uruguay, central government and social security revenues are based on a basket in which non-tradable goods and services slightly outweigh tradables. Still, government revenue is relatively more biased towards tradables, when compared to public expenditure.

The effect of the real currency depreciation in 2002-2003 was that large income gains were generated by the government *relative prices* effect. These gains alleviated the liquidity restrictions that prevailed during the crisis when foreign financing was unavailable in a context of massive capital flight. This relative price effect was key in the government being able to run a primary fiscal surplus throughout the period under consideration. As a consequence, resources were

transferred from the rest of society to the public sector to the extent that they covered 91% of interest payments due in 2002 and 2003.

This *relative price* effect was gradually diluted as the real exchange rate decreased, contributing to a reduction in the primary fiscal surplus at constant prices. In compensation, the *quantum effect* became an important factor behind variations in the primary fiscal surplus. The more the exchange rate appreciated, the greater the fiscal effort required to maintain the primary surplus.

On the other hand, the debt-to-GDP ratio for the non-financial public sector has been decreasing, largely as a consequence of currency appreciation. Once more, the flow approach and the stock approach to the impact of the real exchange rate on the fiscal accounts tend to move in opposite directions.

Bibliography

Anós Caseo, P., Seshan G., 2006, *Fiscal and Social Impact of a Nominal Exchange Rate Devaluation in Djibouti*, NBER WP 4028.

Banco Central del Uruguay, 2002-2007, *Monetary Policy Reports*.

Banco Central del Uruguay, Área de Estadísticas Económicas, 2005, *Cuadros de Oferta y Utilización*.

Blanchard O., 1990, *Suggestions for a New Set of Fiscal Indicators*, Chapter 14 in *The Political Economy of Government Debt*, 1993, H. Verbon and F. Van Winden, eds.

Borchardt M., Rial I., Sarmiento Adolfo, 1998, *Sostenibilidad de la Política Fiscal en el Uruguay*, CERES, Serie Estudios.

Calvo G., Izquierdo A., Talvi E., 2003, *Sudden-Stops, the Real Exchange Rate and Fiscal Sustainability: Argentina's Lessons*, NBER WP 9828.

Corsetti G., Máckowiak , 2006, *Fiscal Imbalances and the Dynamics of Currency Crises*, European Economic Review 50,1317-1338.

Cuitiño M., Mailhos M., 2008, *Efectos de la Inflación y el Tipo de Cambio Real sobre las Finanzas Públicas*, presented to the XXIII Annual Meeting of the Central Bank of Uruguay.

Della Mea U., 2005, *Technical Notes* (unpublished), Central Bank of Uruguay.

Dinh H., 1999, *Fiscal Solvency and Sustainability in Economic Management*, World Bank WP 2213.

Dominioni D., 2005, *Sovereign Debt: Evolution and Strategies in Uruguay*, BCU and IADB.

Ganón E., Tiscordio I., 2007, *Un Análisis de las Variables Fiscales del Gobierno Central del Uruguay para el Período 1989-2006*, presented at the XXII Annual Meeting of the Central Bank of Uruguay.

Giavazzi, F., Pagano M., 1990, *Non-Keynesian Effects of Fiscal Policy Changes, International Evidence and the Swedish Experience,* NBER WP 5332.

Giavazzi, F., Favero C., 2007, *Debt and the Effects of Fiscal Policy*, NBER, WP 12822.

Henn C., 2002, *About the Existence of Common Internal Causes of Recent Latin American Currency Crisis*.

Jajah S., Montiel P., 2007, *Devaluation, Debt and Default in Emerging Countries*, Open Economic Review 8:77-93.

Levy-Yeyati E., Sturzenegger F., 2007, *A Balance Sheet Approach to Fiscal Sustainability*, CIF/Universidad Torcuato di Tella, Documento de Trabajo 01/2007.

Mailhos J., Sosa S., 1999, *El Comportamiento Cíclico de la Política Fiscal en el Uruguay*, Facultad de Ciencias Económicas y Administración, UDELAR.

Mendoza E., Oviedo P., 2004, *Fiscal Solvency and Macroeconomic Uncertainty in Emerging Markets: The Tale of the Tormented Insurer*, University of Maryland/NBER/Iowa State University.

Papa G., 2006, *Los Resultados del Canje Progresista*, Semanario Brecha.

Pernalver A., Thwaites G., 2006, *Fiscal Rules for Debt Sustainability in Emerging Markets: the Impact of Volatility and Default Risk*, Bank of England WP No. 307.

Perotti R., 1998, *Fiscal Policy in Good Times and Bad*, The Quarterly Journal of Economics vol 114 (4), 1399-436.

Reinhart C., 2004, Comments on Mendoza E., Oviedo P., *Fiscal Solvency and Macroeconomic Uncertainty in Emerging Markets: The Tale of the Tormented Insurer*.

Reinhart C., Rogoff K., Savastano M., 2003, *Debt Intolerance*, NBER WP 9908

Rial I., Vicente L., 2003, *Sostenibilidad y Vulnerabilidad de la Deuda Pública Uruguaya 1988-2015*, Central Bank of Uruguay.

Rial I., Vicente L., 2008, *Política Fiscal y Vulnerabilidad Fiscal en el Uruguay 1976-2006*, presented at the XXIII Annual Meeting of the Central Bank of Uruguay.

Romer, D., *Advanced Macroeconomics, 3rd. ed.*

Roselli, P., 2003, *Perspectivas de la Deuda Pública Uruguaya tras el Canje 2003*, Revista de Economía vol X, No. 2, Central Bank of Uruguay.

Sconerwald Silva C., Vernengo M., 2007, *Foreign Exchange, Interest Rates and the Dynamics of Public Debt in Latin America*, University of Utah WP 2007-02

Talvi E., 2007, *Los Diez Temas Candentes de la Economía Uruguaya: Diagnóstico de una Realidad Inquietante*, CERES.

Methodological Annex

Central government revenue deflators were constructed at the highest possible degree of disaggregation, given the information obtained from the matrices of net taxation included in the Supply and Use Tables (SUT) of the Uruguayan economy for 1997. Taxes are sub-divided into Value Added Tax (VAT), Excise Taxes (Specific Internal Taxes, SIT) and other (Foreign Trade, etc.). Six matrices were obtained, drawing on 120 activities and 205 products.

The SUT, and in particular net taxation data, was obtained from the National Accounting Office (Contaduría General de la Nación, CGN). The information for the period 2000-2007 was provided by the Internal Revenue Service (Dirección General Impositiva, DGI) of the Ministry of Economy and Finance (MEF).

In accordance with recommendations in the Manual of National Accounts (SCN 93), every product in the matrix is assigned a non-deductible VAT rating -the difference between what is invoiced and deductible VAT- which coincides with the VAT the government receives[7]. The SIT and other taxes are also calculated in accordance with matrices and the amount charged coincides with the final balance.

Every good and service in the matrix was classified as traded or non-traded depending on the nature and origin of the product (home-produced or imported). The price index that was applied also took account of whether it was intermediate or final. The price index for Uruguayan products was mainly obtained at the highest available disaggregation from the Consumer Price Index (CPI) and the Producer

[7] The criterion for what is collected approximates to the box criterion with some small adjustments made by the CGN to assign the taxes to the correct month.

Price Index for National Products (PPINP), up to 4 digits in the International Standard Industrial Classification (ISIC).

The index of monthly prices for imported goods was constructed from two quarterly price indexes for imported goods, disaggregated up to 2 digits in the ISIC classification. The Boot, Feibes and Lisman smoothing method was used to disaggregate the quarterly series into monthly series, respecting the aggregation condition of the quarterly index[8] . In this way, we obtained the specific SUT indices for types of taxes (VAT, SIT and Others) by domestic or imported origin, traded and non-traded[9].

Taxes collected by the DGI were established more recently[10] and have therefore not been included into the SUT. For that reason, we adopted the following criteria:

a) To assimilate taxes into some other category (for example, the supplementary contribution to the social security system - COFIS- has been assimilated into VAT) and proceed to deflate them with the corresponding SUT index.

b) To classify them in accordance with their tradability and use the most suitable general price index for this categorization. We considered the CPI most appropriate for taxes that fall on non-traded services because it covers public as well as private services and because it captures internal commercialization

[8] Smoothing methods assume there is an unknown monthly tendency that is approximated by a time function. In particular, these authors find that the estimated monthly series is the solution to a restricted problem of quadratic minimization.
[9] The SUT also includes some municipal taxes and subsidies. All those detected were eliminated.
[10] The taxes created in the fiscal adjustment of 2002 as well as those created in the 2007 Tax Reform.

and transportation margins. Taxes defined as traded were deflated with the PPINP.

Finally, criterion b) is applied to all central government revenue not collected by the DGI.

Real total revenue was obtained as the sum of all the groups of revenue deflators. We calculated the price index for central government revenue as an implicit index between the quotient of nominal and real revenue based on the year 2000=100. In the same way, we calculated the implicit price index for central government and social security traded revenues and the implicit price index for non-traded revenues. With these three indexes we were able to calculate the variable monthly weights of traded and non-traded taxes and the total index for government revenues.

Although the price indices used generally have a fixed base (Laspeyres) or were modified to have a fixed base -as in the case of the PPINP, which is calculated as a Paasche type index- and the SUT weighting is fixed, the fact that implicit revenue and expenditure indices were constructed makes them variable weighting indices.

We followed a similar procedure for central government and social security expenditure. Each category was deflated, using the appropriate index, adding up total real expenditures. The price index for central government and social security expenditures is a monthly implicit index which results from the quotient between nominal and real expenditures.

Annex No.1: CENTRAL GOVERNMENT AND SOCIAL SEGURITY BANK REVENUES
Classification by tradable and non-tradables and their deflators

		Deflactors	
	SUT	**Non tradables**	**Tradables**
a) REVENUE FROM GENERAL TAX OFFICE (DGI)			
I TAX OF INCOME AND PROFITS			
Tax on trade and industry income (IRIC)			PPINP
IRIC of public enterprises		Tariffs	
IRIC of public enterprises: Ancap			price of gasoline
Tax on agriculture income (IRA)			PPINP
Tax on small enterprises		CPI	
Tax on non-residents income			PPINP
Tax on inome of physical persons			
category I		CPI	
category II		AWI	
Tax on agricultural activities (IMAGRO)			PPINP
Payroll tax		AWI	
II PROPERTY TAXES			
Tax on financial enterprises		CPI	
Tax on property of legal persons			PPINP
Tax on control and constitution of limited companies		CPI	
Tax on assets of banking enterprises (IMABA)			PPINP
Tax on control of financial system		CPI	
Wealth tax of physial persons			PPINP
III GENERAL SALES AND/OR VALUE ADDED TAXES			
Value added tax (VAT)	SUT		
Cofis (assimilated to VAT)	SUT		
Specific internal tax (SIT)	SUT		
IV OTHER TAXES			
Tax on the buying and selling foreign currency (ICOME)	SUT		
Sanitary Inspection Fund (FIS)	SUT		
Lottery tax	SUT		
Addittional IMEBA	SUT		
Tax on insurance companies income	SUT		
Tax on Commissions	SUT		
Tax on forced sales	SUT		
Specific tax on health services		CPI health	
Tax on credit cards		CPI	
Tax on telecommunications		CPI telephone	
Buying and selling of movable goods at public auction	SUT		
Tax on transfers or exchanges of athletes			PPINP
Tax on property transmissions	SUT		
Tax on the sale of agricultural goods (IMEBA)	SUT		
Tax on exports	SUT		
Taxed and non taxed revenues abolished		CPI	
b) REVENUE FROM CENTRAL GOVERNMENT AND SOCIAL SECURITY BANK			
Lotteries	SUT		
General Treasury of the Nation(TGN)	SUT		
Foreign Trade	SUT		
Sales of electrical power		Electricity Tariff	
Investment fund of the Ministry of Transport		CCI	
Public enterprises contribution		Index of tariffs (Antel and Ute)	
Free availability resources		CPI	
Payroll tax		AWI	
SSB		AWI	

PPINP:Producer Price Index for National Products
CPI:Consumer Price Index
AWI:Average Wage Index

Annex No.2: CLASSIFICATION OF EXPENDITURES AS TRADED OR NON-TRADED AND INDEXES USED

	Index	Classification
Wages	AWI public sector	no traded
Non- personnel expenditure	PPINP	traded
Pensions	AWI	no traded
		no traded
Transfers CG	AWI public sector	no traded
		no traded
Transfers SSB	AWI	no traded
		no traded
Investment	CPI	no traded

CCI: Construction Price Index

Annex No.3: Variations in main prices in the economy and GDP

(Variation average annual)

	CPI	PPINP	AWI	AWI public sector	Exchange rate	Deflator GDP	GDP
2001	4.4	6.6	4.1	5.3	1.3	5.3	-3.4
2002	14.0	31.9	1.0	1.3	56.8	18.7	-11.1
2003	19.4	38.9	5.2	6.2	32.7	18.4	2.2
2004	9.2	14.7	9.1	12.0	1.8	7.0	12.3
2005	4.7	-2.6	9.5	10.6	-14.7	1.0	6.2
2006	6.4	5.9	11.0	9.8	-1.7	6.8	7.0
2007	8.1	11.8	13.3	13.7	-2.5	8.5	7.4