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Abstract

A basic theoretical model of a small open economy within the framework of intertemporal maximization is used to analyze the effects of nominal export shocks. The model helps in explaining the close relationship that is found between export shocks and short run fluctuations of domestic savings in the major Latin-American economies. The savings/GDP ratio moves fairly closely with exports/GDP, indicating that individuals perceive almost all major changes in exports as transitory. An explanation is proposed for Colombia's fall in the savings rate during the 1990s, and the puzzling cases of Mexico and Peru during the 1980s. Exports volatility and prolonged overvaluation of the exchange rate are associated with savings rate volatility.

1. MOTIVATION

Why is the savings rate important? Two broad arguments have been advanced for justifying the concern over the level of the savings rate in developing economies. One emerges from the close relationship identified in the theoretical and empirical literature between the savings rate and growth. The other one has to do with the specific characteristics of developing economies, which make them more vulnerable

to exogenous phenomena, and hence strengthens the emphasis on savings as a precautionary buffer against uncertain future events.

Regarding the first argument, recent research has strengthened the view that the rates of saving and investment are particularly important in terms of their impact on growth, as well as the share of exports and trade to GDP. These variables exhibit a positive and robust correlation with average growth (see Collins, 1991; Levine and Renelt, 1992; Carrol and Weil, 1993; Edwards, 1995; Sala-i-Martin, 1995). The other stream of thought emphasizes the consumption-smoothing role of saving in addition to the accumulation motive; this is particularly relevant for developing economies whose income is vulnerable to commodity price volatility. According to this view the savings rate matters because it indicates the country's ability to lessen the impact of strong and frequent exogenous income shocks (see Deaton, 1989, and Ghosh and Ostry, 1994).

In a similar vein we find the Buffer-Stock theory of saving. This theory maintains that expectations regarding future income fluctuations lead to precautionary saving, and to a "target wealth stock ". The behavior of consumers, especially those within a wealth and income range that makes them vulnerable to income fluctuations, will be to save or dissave in order to maintain wealth close to a given target. Impatience (when wealth is above target) and prudence (when it is below)

are the two motives behind the tendency to return to the target wealth. When uncertainty about future income increases, the target buffer-stock increases in order to lessen the impact of shocks; therefore individuals will save more to build up wealth toward the new target (Carroll, 1992).

What determines the savings rate? in a recent article Edwards (1995) surveyed the plausible explanations for savings behavior:

i. The level of real interest rates, although theoretically these have an ambiguous effect on private savings, empirical evidence favors a low sensitivity of private savings to interest rates (see Giovannini, 1983; Gonzalez, 1988; Ogaki et al., 1995; and Ostry and Reinhart, 1995).

ii. The time profile of income flows, according to which demographics play an important role in explaining different countries' savings behavior.

iii. The already mentioned link between growth and savings; in this regard there are arguments justifying a bidirectional causality, but the results of Carroll and Weil (1993) indicate a positive impact of growth on private savings.

iv. The low ability to borrow displayed by an important share of the population (especially young or low-income agents; see Mankiw et al., 1985; and Lopez, 1994), and which, in an international context, may also affect low income countries, inhibiting them from following the optimal consumption path prescribed by

the consumption smoothing motive. Ogaki et al. (1995) provide evidence on the validity of this effect.

v. The presence of taxes and government consumption, analyzed empirically by Corbo and Schmidt-Hebbel (1991), which leads to only a partial offsetting of public savings by private savings, invalidating the Ricardian equivalence doctrine (see also Carrasquilla and Rincón, 1990).

Other issues affecting savings behavior include: the presence of heterogeneous agents, the political economy involved in government savings, and the particularities that emerge from considering the open economy where foreign savings act as a substitute of domestic ones (see Edwards, 1995; and Cárdenas, 1992).

As can be noted, foreign trade fluctuations do not appear in the menu of savings determinants addressed by many prominent surveys (see for instance Kotlikoff, 1989; Collins, 1991; Modigliani, 1993; Owens, 1993). Where they are mentioned it is mainly in terms of the substitutability between domestic and foreign savings (Feldstein and Horioka, 1980; Cárdenas, 1992; Owens, 1993 and Edwards, 1995).

Are export shocks relevant in explaining macroeconomic savings behavior? Along the line of reasoning advanced by Deaton (1989) the consumption smoothing motive is seen as an important determinant of savings behavior, particularly for low

and middle income countries subject to export revenues volatility. The evidence presented to support this view has relied mainly on cross sections of different sets of countries, in which the saving rate is regressed against some measure of trade balance or export volatility (see in particular Giovannini, 1983 and Ghosh and Ostry, 1994).

In what follows we will provide time series evidence supporting the consumption smoothing explanation for the major fluctuations of the savings rate, for a group of middle income Latin-American countries. The contribution of our analysis lies in our emphasis on time series, short run fluctuations of the saving rate. Our claim is that a major share of this variability is due to export shocks, which are, in almost all cases, perceived by agents as transitory. Thus, our interest is in the determinants of savings rate **fluctuations over time** rather than in the **level** of savings across countries.

Figures 1.1 and 1.2 provide evidence of a close relationship between export shocks and domestic savings for several Latin-American countries. Indeed, large fluctuations in exports, measured as a percentage of GDP, are closely associated with major changes in the rates of saving for Argentina, Brazil Chile, Colombia and Venezuela; interestingly, this pattern is difficult to identify for Mexico and

Peru during the 1980s[1].

In what follows we will present a model of a small open economy to analyze the effects of nominal export shocks. The model will follow an approach already developed in the literature, within the framework of a representative consumer who demands two goods, one that is imported and one that is non-tradeable, and maximizes utility intertemporally subject to a lifetime budget constraint (see Gavin, 1990; and the series of papers by Calvo and Végh, CV henceforth). The economy faces an infinitely elastic supply of the import good, whose price is exogenously given, as is the world interest rate. It consumes its endowments of the non-tradeable good and receives income from selling the export good, whose international price is also exogenous and subject to shocks[2]. The model exhibits the positive relationship between the savings rate and export shocks documented

[1]The data used for these figures was taken from the Interamerican Development Bank (IDB). "Savings " here results from subtracting total consumption from GDP. A similar computation was made using the Summers and Heston (1995) Database. The fluctuations reported in Tables 1.1 and 1.2 are confirmed with the Penn World Tables (PWT) for Argentina, Brazil, Chile (in the last two countries there were discrepancies for the period 1979-84), Mexico and Venezuela. For Colombia the two databases differed greatly, but the IDB data were similar to saving figures obtained from the Central Bank of Colombia, which are reported later. Finally there are discrepancies also for Perú, in particular for the period 1982-92; according to the IDB, savings grew from less than 20% to 27%, but according to the PWT they fell from 40% to less than 20%, an issue to be discussed later. A criterion for choosing the IDB instead of the PWT was the magnitude of the "Saving " figures which was too large in the PWT, fluctuating in several cases between 25% and 50% (Chile and Peru), and reaching 70% for Venezuela in 1970.

[2]We differ from CV (1994) in the mentioned disaggregation of the tradeables sector, which permits us to study the effects of export shocks, and in the simplified supply structure we utilize. A related topic has also been analyzed by Ostry (1988) in a discrete time framework.

Figure 1.1: EXPORT SHOCKS AND SAVINGS IN LATINAMERICA

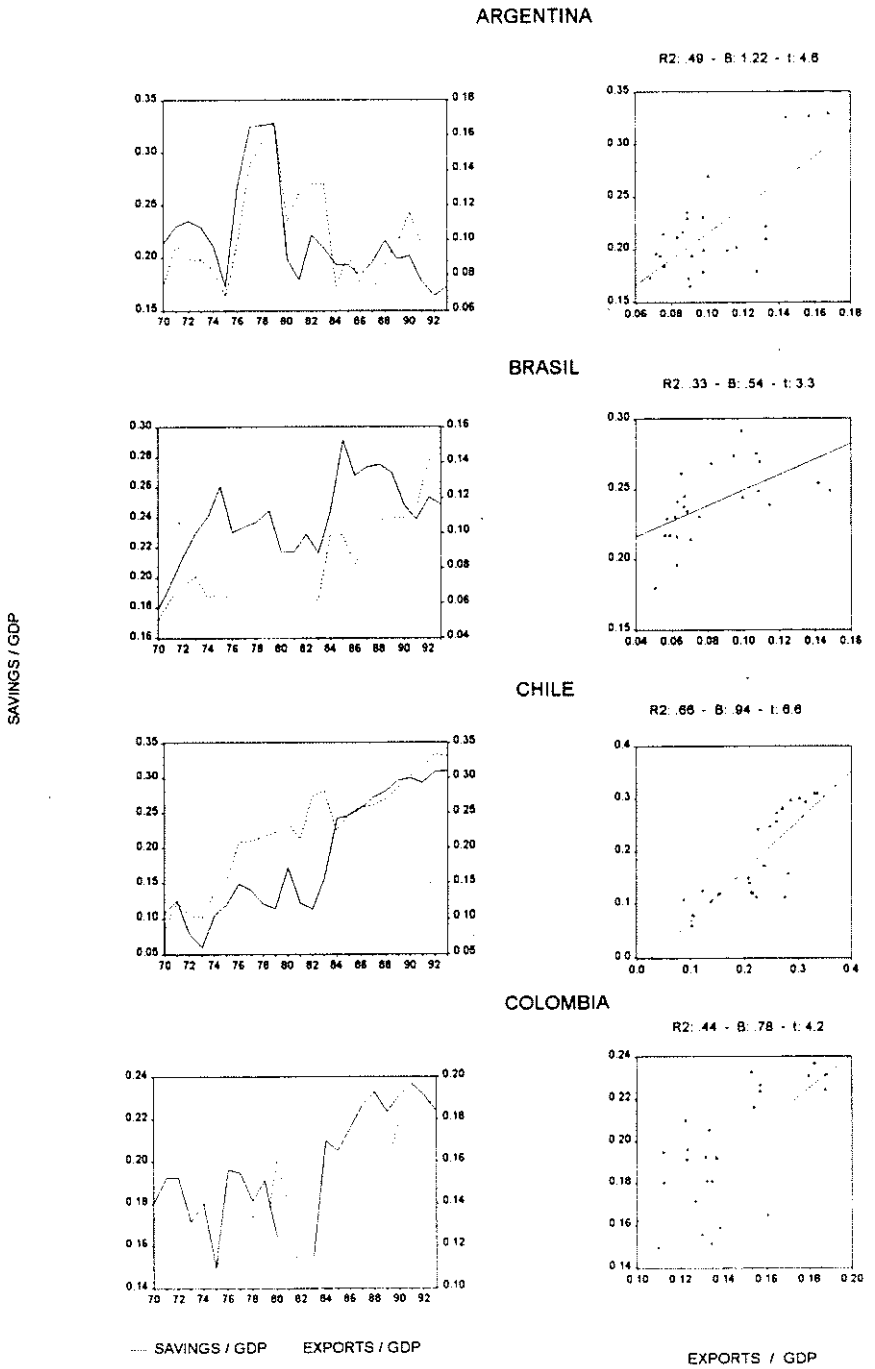
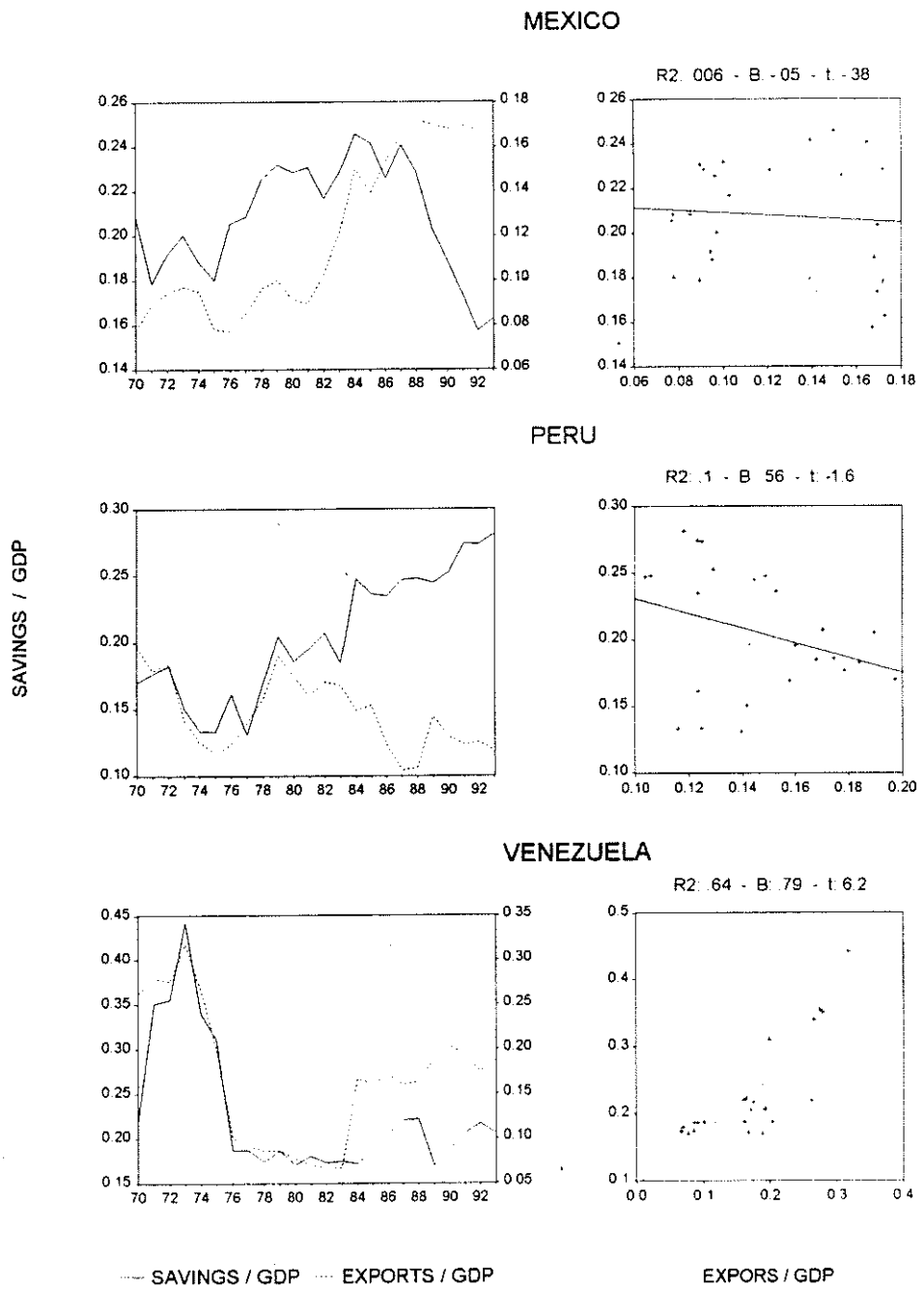


Figure 1.2: EXPORT SHOCKS AND SAVINGS IN LATINAMERICA (cont.)



above, and helps in explaining the cases where a puzzling negative relationship is observed, namely Mexico and Peru in the 1980s, and, as we will see, Colombia during the 1990s. Two main forces will be identified as affecting the time path of the saving rate: exports/GDP volatility and the prolonged overvaluation of real exchange rates.

The paper is divided as follows: the next section presents the theoretical framework; section 3 analyzes the effect of nominal export shocks; section 4 discusses the country cases; section 5 concludes.

2. THE MODEL

We will use modeling tools developed by the intertemporal open-economy macroeconomics literature. The idea of this research project is to derive the model from first principles, considering explicitly utility and profit maximization, and the type of market structure. The intertemporal approach considers forward looking agents whose choices are affected by intertemporal equilibrium conditions ($Marginal\ Rate\ of\ Substitution_{(s,t)} = Marginal\ Rate\ of\ Transformation_{(s,t)}$); it will provide the traditional results for closed economies, namely that the optimal path for consumption will be affected by the intertemporal elasticity of substitution. We assume perfect foresight, in which actual and expected variables are equal.

In order to analyze the effects of nominal export shocks it is necessary to split the tradeables sector into importables and exportables; their relative price (i.e. $p_x/\ p_m$) is the terms of trade (TOT). The standard definition of the real exchange rate is the price of tradeables in terms of non-tradeables; with three goods this definition can be considered either as $p_x/\ p_n$ or $p_m/\ p_n$, or a weighted average of the two. Ostry (1988) and Gavin (1990) choose the former definition, as we do in the theoretical part for the sake of simplicity. As Ostry (1988; p. 545) explains, simple algebra leads from one to the other.

2.1. The Demand side

A representative agent consumes two goods, one imported (c_{mt}) and one produced domestically which is non-tradeable (c_{nt}); his objective is to maximize the present value of the lifetime utility derived from the consumption of these two goods (β being his subjective rate for discounting the future):

$$\int_0^\infty u\ (C_t)\ e^{-\beta t}\ dt \tag{2.1}$$

where total consumption (C_t) is a weighted average of the two goods consumed;

a Constant Elasticity of Substitution (CES) index of total consumption is used, so as to make[3]

$$C_t = \left(c_{nt}^{(\sigma-1)/\sigma} + c_{mt}^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)} \tag{2.2}$$

The standard results of this family of models depend on the tension between the **inter-temporal** and the **intra-temporal** elasticities of substitution (see Ostry, 1988; Gavin, 1990; and CV, 1994a). That is, on the relative ease the consumer has in substituting consumption today for consumption in the future compared to the ease in substituting consumption of importables for that of the home-good. A Constant Relative Risk Aversion (CRRA) utility function allows for values of the inter-temporal elasticity of substitution (or coefficient of RRA, $\rho > 0$) different from 1:

$$u(C_t) = \frac{C_t^{1-1/\rho}}{1-1/\rho} \tag{2.3}$$

[3]Ogaki et al. (1995) report that the CES representation of preferences is not rejected by the data of the countries included in their sample (except for Korea); among these countries are Brazil, Colombia and Mexico. As it is well known this index has two advantages: it allows values for the intra-temporal elasticity of substitution ($\sigma > 0$) to be different from one, and it permits the shares of the two goods in total consumption to vary across time. Neither of these is possible under the Cobb-Douglas index: in it goods are consumed in fixed proportions and the intra-temporal elasticity is equal to one; in that case, inter-temporal allocations of aggregate consumption would be the whole story.

owning all firms, from which he receives a flow of wages and profits; he is also the sole consumer in the economy, which makes his lifetime budget constraint identical to the economy-wide one; his constraint is given by:

$$b_o + \int_0^\infty (y_{xt}p_{xt} + y_{nt}p_{nt}) \, e^{-rt} \, dt = \int_0^\infty (c_{nt}p_{nt} + c_{mt}) \qquad dt \qquad (2.4)$$

where y_x is the output (endowment) of exportable good; y_{nt} is the output (endowment) of the home good. He can also hold an internationally traded bond b, assumed to be denominated in terms of the imported good, and which pays an interest rate of r; hence, b_o is the initial real financial wealth of the consumer. The numeraire for each period is the import commodity (i.e. $p_{mt} = 1$); p_{nt} is the price of non-tradeables in terms of importables (i.e. the inverse of the real exchange rate) and p_{xt}, the price of exports in terms of imports (i.e. TOT).

To derive the time path for private consumption we find the solution to the representative consumer's problem:

$$\max_{c_{nt},\, c_{mt}} \int_0^{\infty} u\,(\,C_t)\; e^{-\beta\; t}\; dt \tag{2.5}$$

$$s.t.\ (2.4)$$

the first order conditions are:

$$c_{nt}: \frac{u'_{c_{nt}}(C_t)}{p_{nt}} = \lambda \tag{2.6}$$

$$c_{mt}: \quad u'_{c_{mt}}(C_t) = \lambda \tag{2.7}$$

here λ , the Lagrangian multiplier associated with the constraint, is the marginal utility (shadow price) of one unit of income[4]. Dividing (2.7) by (2.6) yields:

[4]As usual, the first-order conditions have the interpretation that along the optimal path the relation of the marginal utility of consuming traded or non-traded goods to their respective effective price should be equal to the extra utility that the agent gets when the constraint is relaxed by one unit (i.e. λ). Here we impose also the No-Ponzi-Game condition in order to rule

$$\frac{u'_{c_{nt}}(C_t)}{u'_{c_{mt}}(C_t)} = p_{nt} \tag{2.8}$$

which has to be satisfied at the optimal choice of c_{nt}, c_{mt}. Using (2.2) and (2.3), we get

$$u'_{c_{nt}}(C_t) = C_t^{-1/\rho} \left(\frac{C_t}{c_{nt}}\right)^{1/\sigma} \tag{2.9}$$

and a corresponding expression for $u'_{c_{mt}}(\cdot)$. Equation (2.8) can then be restated as

$$\frac{c_{mt}}{c_{nt}} = p_{nt}^{\sigma} \tag{2.10}$$

This is the Euler equation which states that the effect of relative price changes on the consumption of home-goods and importables depends on the intra-temporal elasticity of substitution (σ). Indeed, as already described, σ measures the ease, in terms of utility, with which consumption of one good can be foregone in favor of another in a given period. Let us use conventional notation and express $\hat{p}_{nt} = \frac{\dot{p}_{nt}}{p_{nt}}$

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out explosive indebtedness:
$\lim_{t\to\infty} b_t e^{-rt} \geq 0$.

(where a 'hat ' over the variable indicates its percentage changes, and a dot denotes its derivative with respect to time). Differentiating Eq. (2.10) w.r.t. time leads to: $\sigma\ \hat{p}_{nt}=\hat{c}_{mt}\ -\ \hat{c}_{nt}$. Now, if we take ϕ_n and ϕ_m to represent respectively the share of home and imported goods in total consumption, the next two expressions follow:

$$\hat{c}_{nt}=\hat{C}_t\ -\sigma\phi_m\ \hat{p}_{nt} \qquad (2.11)$$

$$\hat{c}_{mt}=\hat{C}_t\ +\sigma\phi_n\ \hat{p}_{nt} \qquad (2.12)$$

Eqs. (2.11) and (2.12) show the two motives behind the time path of di[illegible]g-gregate consumption; on the one hand, the demand for both types of goods will evolve in the same fashion as aggregate consumption (the first component of the RHS of both Eqs.), a behavior governed by the intertemporal substitution motive. On the other, each of them will respond to relative price changes depending on the strength of the intra-temporal elasticity of substitution (σ) and the share of each good in total consumption.

Since the real exchange rate is $1/p_n$, a real appreciation (e.g. $\hat{p}_{nt}> 0$) will lead to a declining path for consumption of home goods, and to an increasing path for importables. The reason is that since the price of home-goods is increasing over time it would be unwise to postpone their consumption to a costlier future;

instead, consumption of tradeables should be postponed to a period when their relative price is lower. This effect depresses current consumption of tradeables with respect to the future and with respect to current consumption of home-goods.

Finally, by using the fact that the rate of growth of total consumption is a weighted average of those of the two goods, we arrive at the following three expressions[5]:

$$\hat{C}_t = \rho\phi_m \ \hat{P}_{nt} \tag{2.13}$$

$$\hat{c}_{mt} = \hat{P}_{nt} \ (\phi_m \ \rho + \phi_n \ \sigma) \tag{2.14}$$

$$\hat{c}_{nt} = \hat{P}_{nt} \ \phi_n \ (\rho - \sigma) \tag{2.15}$$

These equations determine the time paths for the three types of consumption.

[5]Here we also made use of the fact that

$$-\frac{u''_{c_{mt}}(C_t) \ \dot{c}_{mt}}{u'_{c_{mt}}(C_t)} = \hat{P}_{nt}$$

and that in equilibrium $c_n = y_n$, and is time invariant; CV (p. 13, 1990) also uses this assumption, and here it is fully justified since we deal with an endowment economy in which non-tradeables output is constant.

They state that growth in aggregate and importables consumption moves in the same direction as the real exchange rate; whereas for non-tradeables consumption the sign of the change will depend on the relative strength of the inter- and intra-temporal substitution effects.

2.2. Endowments and Equilibrium Conditions

We will assume that the individual receives an endowment y_n of the non-traded good and y_{xt} of the exportable one, which is the simplest specification of supply[6]. The market clearing equation for the non-tradeable good will then be:

$$c_n = y_n \tag{2.16}$$

Replacing this condition in the Euler Equation, we obtain that non traded prices will change according to:

$$\hat{p}_{nt} = \frac{1}{\sigma} \hat{c}_{mt} \tag{2.17}$$

[6]In contrast, CV (1994) uses a supply of non-tradeables characterized by backward-looking contracts; the stickiness in prices generates a smooth adjustment of consumption to shocks. Another treatment is by Gavin (1990) who considers price flexibility and introduces the fact that some factors of production move only gradually between sectors, and hence it takes time to fully adjust to changes in relative prices.

which will guarantee equilibrium in non-tradeables market. We then have that (2.4) and (2.13) lead to the flow constraint for the economy:

$$\dot{b} = rb + y_{xt}p_{xt} - c_{mt} \tag{2.18}$$

where $\dot{b}$ is the growth of the consumer's net assets, which coincides with the country's current account. This endowment economy structure will allow us to concentrate on the effects of exogenous export shocks on consumption, the real exchange rate and the current account (i.e. domestic savings).

3. THE EFFECT OF EXPORT SHOCKS

Shocks to export prices or sudden increases in the availability of exportables (e.g. to $y_{xt}p_{xt}$, which will be called χ_t henceforth) will first affect this economy through the demand for imports. The equilibrium conditions summarized in the Euler equation and the time paths for consumption described in the previous sections will lead to changes in the price of non-tradeables and the current account. In order to see this we expand Eq. (2.13) to show explicitly that the time path for aggregate consumption depends on the consumption-based real interest rate, which is a weighted average of the interest rates relevant for importables and

home goods consumption (see Dornbusch, 1983; and CV, 1994); substituting this expression into (2.12) we obtain the time path for the consumption of imports:

$$\hat{c}_{mt} = \rho \left(r + \phi_m \hat{p}_{nt} - \beta \right) + \sigma \phi_n \hat{p}_{nt} \tag{3.1}$$

using the equilibrium value for the home good price of Eq. (2.17), we arrive at a linear homogeneous first order differential equation that governs the path for importables consumption:

$$\dot{c}_{mt} - \Psi\rho \ (r - \beta) c_{mt} = 0$$

where $\Psi = \frac{\sigma}{\phi_m(\sigma - \rho)}$. The solution to this differential equation is:

$$c_{mt} = c_{m0} \ e^{\Psi\rho \ (r-\beta)t} \tag{3.2}$$

replacing Eq. (3.2) into Eq. (2.4) we arrive at the expression we were looking for: the consumption of tradeables as a function of the terms of trade and the

availability of exports:

$$c_{mt} = [r(1 - \Psi\rho) + \Psi\rho\beta] \left[b_t + \int_0^\infty \chi_t \, e^{-rt} \, dt \right] \tag{3.3}$$

The first part of the product in the RHS is interpreted as the marginal propensity to consume out of wealth. One interesting fact about (3.3) is that both shifts in the endowment of exportables and increases in their price have the same effect. These types of shocks increase the present value of lifetime revenues from exports, which affects consumption of imports through the inter-temporal substitution effect. Notice that this is not a relative price shock which would also activate the intratemporal substitution effect. A shock to export revenues will imply an increase in the consumption of imports on impact; governed by Eq. (2.10), the price of the home good will move in the same direction, and the current account will adjust following (2.18).

In order for this system to have a steady state we need $\beta = r$; this leads to the following two expressions:

$$c_{mt} = r \left[b_t + \int_0^\infty \chi_t \, e^{-rt} \, dt \right] \tag{3.4}$$

$$\dot{b}_t = \chi_t - r \int_0^\infty \chi_t \, e^{-rt} \, dt \tag{3.5}$$

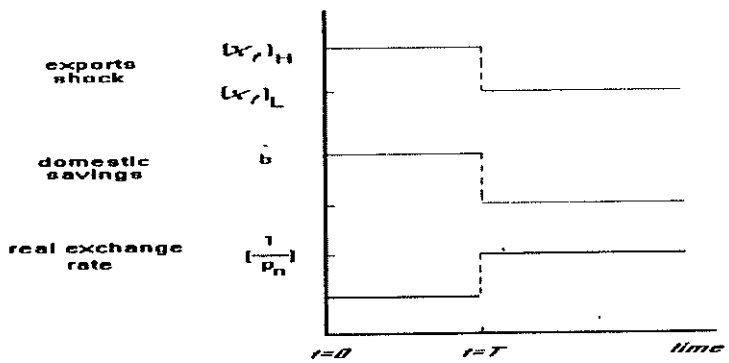
Hence, if the current value of (nominal) exports is equal to the present value of the future flow of export revenues, then $b_t = 0$. A **permanent** shock to χ_t, emerging either from quantity or price fluctuations will not affect the current account (i.e. savings). Now we can analyze the effect of a **transitory** favorable shock (see Fig. 3.1 and Velasco, 1994): at $t = 0$ exports jump from $(\chi_t)_L$ to $(\chi_t)_H$ and remain at that level until $t = T$, when they return to their pre-shock level. Between t and T the model predicts that the demand for imports, as well as the surplus in the current account will grow; that is, domestic savings will increase; this in turn will lead to the accumulation of foreign reserves and an appreciation of the real exchange rate.

The magnitude of the current account surplus is[7]: $b_t = [(\chi_t)_H - (\chi_t)_L]\ e^{-rt}$. This result states that *transitory shocks to nominal exports lead to shifts of the same sign in the amount of savings of the country.* The model is then suitable for explaining the behavior reported in Figs. 1.1 and 1.2 regarding the short run, time series correlation between exports/GDP and the savings rate. The moral

[7] this results from Eq. (3.5):

$$b_t = (\chi_t)_H + \left[(\chi_t)_H e^{-rt}\right]_0^T + \left[(\chi_t)_H e^{-rt}\right]_T^\infty$$

Figure 3.1: FAVORABLE TRANSITORY SHOCK TO EXPORTS



of the story is: these countries seem to have perceived all export fluctuations as transitory, and adapted their behavior accordingly.

Before closing this section it is appropriate to recall another result that will be useful in what follows: Eq. (2.13) shows that growth in aggregate and importables consumption moves in the same direction as the real exchange rate. If consumers consider the current real exchange rate too high and anticipate a real depreciation in the not so distant future, they will be inclined to raise current consumption of imports (durables in particular) , and consequently to reduce current savings. This effect will be important in explaining some of the country cases of the next section.

4. THE LATIN-AMERICAN EVIDENCE

In this section we will deal with three puzzling cases: Colombia after 1991, where in spite of well behaved aggregate savings, disaggregate ones displayed new historical patterns. And Mexico and Peru which represent polar discrepancies with our hypothesis; indeed, in Mexico the savings ratio fell from 16% of GDP to 8% between 1977 and 1992, a period characterized by historically high levels of exports/GDP; in contrast Peru experienced simultaneously a steady rise in the savings rate combined with an equally steady fall in the exports ratio between 1979 and 1992.

4.1. COLOMBIA

The case of Colombia is illustrative of the occurrence of repeated positive shocks to the nominal value of exports. The sources of shocks have been either sudden jumps in the price of coffee, as during the second half of the 1970s and in 1986, or the emergence of new export products whose revenues increase substantially in a short span of time, particularly cocaine since the late 1970s and oil since the mid-1980s. During the second half of the 1980s non-traditional exports also boomed, and in these episodes prices and quantities of different products alternated to produce a "wave "of growing nominal exports. Such events frequently affect developing

economies whose export structure is based primarily on a few products, or where important sources of foreign exchange (deposits of natural resources like oil, coal, non-traditional manufactured exports or indeed cocaine [8]) are discovered.[9]

A closer look at the recent evidence indicates that the correlation between exports/GDP and the savings rate, though stable at the aggregate level, changed dramatically, at the disaggregate level. We claim that our model offers a plausible explanation for this phenomenon. Fig. 4.1 shows[10] that during the period 1991-1994 the close relationship between export shocks and government savings disappeared, but was replaced by the clear coincidence of a negative exports shock and a fall in private savings (a consumption boom). During this period we have another phenomenon that, we consider, played a major role in the consumption boom: the appreciation of the real exchange rate and the reduction in tariffs that

[8] Of course the assumption of smallness made in the theoretical model is at issue in particular in the case of cocaine, on whose international price Colombia allegedly has some effect. Indeed, the Washington Post reported that the arrests of the barons of the Cali Cartel led to increases of cocaine prices in Washington Square in New York (Sep. 22nd, 1995).

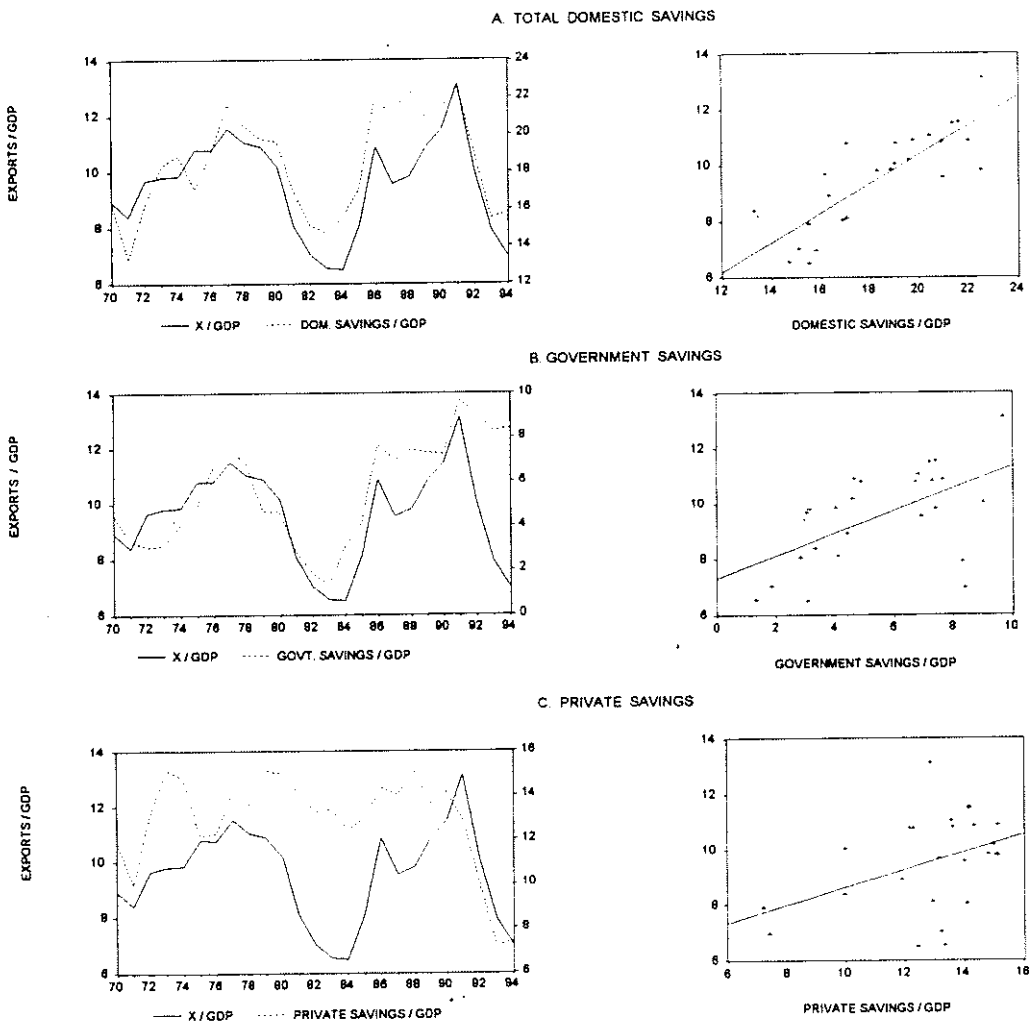
[9] The Dutch Disease literature has advanced several hypotheses for explaining widely reported stylized facts regarding the negative effects of these shocks on non-booming tradeables sector (see Corden and Neary, 1982; Corden, 1984; Kamas, 1986; and Wunder, 1994).

[10] The divergence between Fig. 4.1 and Fig. 1.1 is due to the source of data; in Fig.1.1 the source for all Latin-American countries is the report "*Progreso Economico y Social en America Latina* ", of the Inter-American Development Bank, adopted for the sake of homogeneity in the figures for the different countries. In Fig. 4.1 we use data from the Banco de la Republica of Colombia, which allows us to make the distinction between public and private savings; the relationship between domestic savings (as a percentage of GDP) and exports is closer in the last source.

followed the "Apertura " of 1990-91. Such appreciation was caused by the inflow of foreign exchange reserves whose origin is beyond the scope of the present article. We claim that the evolution of the effective price of imports, resulting from the reduction in tariffs and the appreciation of the real exchange rate, was perceived by the agents as transitory. Private agents then exploited the opportunity of acquiring imported goods, expecting a depreciation of the real exchange at some point in the near future, a behavior congruent with equations (2.13) and (2.14). Indeed, the evolution of the real exchange rate in the country during 1995 has validated such expectations.

There has been an ongoing discussion in Colombia during the first half of the 1990s regarding the high level of the real exchange rate, which allegedly might have negatively affected non-traditional exports, and triggered an imports boom. Our model is consistent with this explanation, insofar as agents expect the Central Bank to permit an acceleration in the rhythm of devaluation at some point in the future. If this is the case, and accepting that most of the episodes of domestic savings increases in the period 1970-1990 were due to the public sector, probably as part of stabilization packages, then we can conclude that our model offers a fair account the main shifts of Colombian domestic savings during the last twenty five years.

Figure 4.1: EXPORTS AND DOMESTIC SAVINGS IN COLOMBIA



Our explanation relies mainly on imports consumption, since by Eq. (2.14) we know that non-tradeables consumption moves in the same direction as the real exchange rate only if the intertemporal elasticity of substitution is bigger that the intra-temporal one. The evidence for Colombia in this regard is due to Gaviria (1993) and Ogaki et al. (1995); the former, using the methodology of Ostry and Reinhart (1992) obtains the following results for these elasticities of substitution: $.24 \leq \rho \leq .32$, and $.597 \leq \sigma \leq .713$. Ogaki et al. (1995) find values of (.588, .678) for the pair (ρ,σ)[11]. Therefore, home-goods consumption would change in the opposite direction to the real exchange rate; e.g. a real depreciation would be associated with an increase in non-tradeables consumption.

Urrutia and Lopez (1994) defend the hypothesis that the increase in consumption was due to a relaxation in the liquidity constraints binding on an important share of the population (75% according to them); the inflow of capital experienced in the first years of the 1990s, and the monetary policy of that period would have allowed an increase in outstanding loans directed specifically at consumption purposes. In their 1995 paper the reasons behind the fall in savings also include an inflation of assets (stocks and housing prices), and fiscal policy[12]. Although these

[11]These authors report lower and upper bounds of the intertemporal elasticity of: .407 and .768, which would imply that with some probability the intertemporal elasticity could exceed the intratemporal one.

[12]Posada (1995) coincides in the effect of the low nominal devaluation and nominal interest

factors certainly play a role, such an explanation cannot be the whole story. One reason for 75% of the population being financially constraint is probably related to agency problems and the lack of collateral (see Bernanke and Gertler, 1989). Is is implausible that these elements could have changed significantly with the inflow of foreign resources directed towards infrastructure and portfolio investments. One has to accept that an important share of the consumption increase was due to individuals who were previously not liquidity constrained. That is to say, that the increase in outstanding consumption loans was due to an increase in credit demand as well as supply. This question is not addressed by the Urrutia and Lopez hypothesis, which leaves unexplained the incentive for such individuals to increase their current consumption. Of course weighing the contribution of asset inflation vis-á-vis the temporariness of price effects pointed out in the present piece is an empirical issue.

4.2. MEXICO

The case of Mexico after 1987 is at odds with our hypothesis since the savings rate fell from 24% of GDP to 16% while the share of exports remained near 17%. The explanation coincides in part with what we have already said for Colombia, given

rates on saving. However he points out that the agents "may have expected a future real revaluation ", which is contrary to what our model predicts.

that durables consumption grew 3 times faster than other types of consumption, triggered by trade liberalization. However, Arrau and Oks (1992) found that some other factors were more important in explaining the apparent fall in the savings rate: **i.** according to them most of the savings declive originated in Mexican data problems. Basically two corrections are essential: income accruing from foreign assets should be included, and interest payments should be corrected by inflation. "The fall of savings is relatively less important than what is suggested by the conventional measures of private savings " (p. 337). **ii.** the biggest part of the actual variability of savings during the 1980s is attributable to fluctuation of disposable income, whose variations were bigger than those of private consumption. And **iii.** the strong real appreciation of 1988 and 1990 reduced the real income generated by foreign assets.

A complement to this explanation is to be found in Godínez (1994), who concludes that an important element behind the evolution of savings during the 1980s was the type of macroeconomic adjustment pursued by Mexico at the beginning of the decade. The fiscal adjustment did not increase government savings, generating instead strong income fluctuations which were associated with an increase in the average propensity to consume. Hence, the fall of domestic savings as percentage of the GDP was basically due to a reduction in private savings.

In summary, although an important share of the identified savings fall is a data problem, the forces behind its evolution lie within the elements considered by the model, namely, short run income fluctuations and changes in the real exchange rate generated by trade liberalization which were probably perceived by agents as transitory.

4.3. PERU

Our data indicate that between 1979 and 1983 Peru experienced a steady rise in the savings rate paired with an equally steady fall in the exports ratio. This pattern, however, is not obtained if data from the Penn World Tables are used. Ferrari (1991) also casts doubt on our data, reporting that national savings reached 19.7% at the beginning of the 1980s and fell to 12.8% in 1983, fluctuating slightly around 13% thereafter. The explanation given for such a fall in savings lies in the turmoil that characterized the country during the 1980s, where a sudden trade liberalization between 1980-82 led to price instability and unsuccessful anti-inflationary policy until 1985; later, expansionary measures during 1986-87 led to serious balance of payments difficulties and hyperinflation at the end of the decade.

More evidence supporting the fall of savings during the 1980s is provided by Thorne (1988), who documented a fall in government savings during the 1980s

caused basically by an increase in current expenditures: mainly interest payments on government debt and consumption (especially by the army). He also reported the crowding-out of the private sector in the credit and foreign exchange markets as a result of government needs for financial resources during the 1980s. In addition, the major share of external savings accrued to the public sector, promoting consumption and imports, and acting as disincentive to domestic savings.

The data and description of Ferrari and Thorne are consistent with a fall in the savings rate, coincident with the declive of the exports/GDP ratio reported in Table 1.2. This reconciles our main hypothesis with the Peruvian case, with the obvious caveat that, in addition to the external shocks, other important sources of instability also explain the fall in the savings rate in the country[13].

5. CONCLUDING REMARKS

A theoretical model is developed to analyze the effects of nominal export shocks and overvaluation of the real exchange rate on the savings rate. We focus on one aspect neglected in the literature; namely, the effect of transitory shocks to

[13]Some Peruvian economists assign part of the explanation to the effect of the inflationary tax during the 1980s, which they argue, obscure the true savings figures. The perception is that once the private savings implied by the inflation tax are removed, the clear rise of the savings ratio would vanish. For the 1990s the evolution of the savings rate should have been influenced by the Fujimori adjustment plan, the inflow of foreign resources and the overvaluation of the real exchange rate (see Moguillansky, 1995)

exports on the time series, short run fluctuations of savings. Such shocks alter the present value of the lifetime flow of income and consequently affect current consumption and savings.

The model is successful in accounting for some patterns of the evolution of savings for some major Latin-American economies. In this sense we can state that trade matters, and matters a lot, since it is a key determinant of the short run fluctuations in the savings rate, which itself is a crucial determinant of the growth path of the economy, as abundant recent literature has pointed out.

The puzzling phenomenon found for Colombia of a drastic fall in the savings rate during the 1990s was explained in terms of the expectations held by private agents regarding the effects of the Apertura on import prices and the temporariness of the high level of the real exchange rate. It is claimed that this explanation is more successful than other hypotheses put forward which assign all the responsibility for increased consumption to a relaxation of the liquidity constraint. Our interpretation explains why those agents who were not previously liquidity constrained found it attractive to dramatically increase their durables consumption during that period.

The puzzling case of Mexico seems to be due partly to a data problems; however, once these are removed, the forces behind the true evolution of savings

lie within the sphere of the elements proposed by the model, namely, short run income fluctuations and changes in the real exchange rate generated by trade liberalization, probably perceived by the agents as transitory. For the case of Peru as well, more accurate measures of savings reconcile its evolution with our main hypothesis.

One interesting fact regarding the general evidence on Latin-America presented in Figs. 1 and 2 is that in those countries for which a positive relationship between savings and exports is found, savings/GDP moves in a fairly close fashion with exports/GDP, indicating, if our model holds, that *individuals perceive almost all major changes in exports as transitory.* This is particularly interesting for Chile, which, during the last decade has penetrated foreign markets in a way that most observers tend to identify as permanent. Something similar can be said for Colombia, whose huge oil discoveries of the late 1980s seem to represent a permanent shift in exports. The fact that the rate of savings increased along with the higher inflow of reserves (true in Colombia at least until the beginning of the 1990s, as we already saw) highlights a certain skepticism on the part of the agents regarding the permanence of positive export shocks.

Further research should help in understanding more precisely the behavior of private and public agents towards such shocks. An alternative channel of causation

could go from exports to growth to savings; however, our interest in this paper is the short run, time series correlation between exports and savings rate volatility. Hence we believe that the relationship has to do with the consumption smoothing motive rather than with the accumulation one.

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