Trade Liberalization and Private Savings: The Spanish Experience, 1960-1995

by

Michele Boldrin[†]

Juan Manuel Martin Prieto[‡]

First Version: May 1996

Revised: October 1997

[†] Universidad Carlos III, Madrid and C.E.P.R.

[‡] Universidad Carlos III, Madrid.

1. Introduction

This paper provides an interpretation of the evolution of Spanish private and national savings over the period 1960-1995. Understanding the long-run determinants of the aggregate saving rate is of tantamount importance for the design of sound economic policies to foster stable economic development. There are a number of reasons for which the Spanish experience, during the 35 years we consider, is particularly interesting.

In this period Spain transformed itself from an economically backward country, into an advanced economy in which the composition of output and labor force is essentially identical to that of Italy, France and other major European countries. In this rapid process of economic transformation four episodes of structural change played a central role: three trade liberalization reforms and a successful transition from a dictatorial political system to a parliamentary democracy.

During these 35 years both the private and the national saving rates oscillated rather widely from very high levels in the 1960s to historical minima in the early and middle 1980s to a strong recovery in the more recent years. For the purposes of policy making, it would be interesting to know which of the structural changes had an impact on savings and which did not.

More precisely, we ask if some form of relatively stable "saving function" can be recovered from the data and how this saving function performed during the trade reform subperiods.

To anticipate our final conclusion, we find that a stable and economically meaningful "saving function" can be derived from first principles and consistently estimated using Spain's annual macroeconomic data. The theoretical underpinnings of the model we adopt are those of traditional intertemporal optimization by a representative agent, facing a complete set of borrowing/lending opportunities and an exogenous income process. We endow our representative agent with a "habit formation" utility function. This allows us to explain a *crucial* feature of the data; i.e. the strong and positive impact that innovations in the growth rate of income (either national or private) have upon saving (either national or private).

We treat each of the three trade liberalization processes as a sequence of shocks that change the growth rate of income, and the democratization experience as another sequence of shocks that change the saving behavior of the public sector and, as a consequence, its fiscal pressure on the private sector.

We show that when these two exogenous variables (innovation in income and growth rate of total fiscal pressure) are accounted for, the three trade reforms have no other systematic effects upon saving. The only other aggregate economic variable which, in our findings, retains significant explanatory power for the growth rate of private saving is the distribution of income between labor and capital as measured by the growth rate of the gross profit margin.

We move now to a more detailed description of the theoretical framework of analysis used in the paper.

By definition, national saving is the sum of private and public savings. In our framework of analysis public saving is taken as exogenous while private saving is interpreted as the equilibrium outcome of a process in which an aggregate representative agent reacts to variations in per capita income growth, its distribution, the long-run rate of return on investment, and the public sector taxing and spending decisions, among other things. In this sense only private saving is implicitely modeled here, while all other variables are taken as exogenous.

We are, therefore, attempting only a partial equilibrium exercise and the restrictive assumptions upon which it is founded should be discussed and clarified at the outset.

Public saving is, most certainly, not exogenous to the overall evolution of an economic system. Its two fundamental components, tax revenues and public expenditures, are affected in both the short and the long run by movements in national income. In the short run, for given fiscal and expenditure systems, changes in national income and in its distribution among individuals will automatically affect tax revenues and outflows. In the long run, the overall system of taxation and public expenditure must be seen as the outcome of the political and economic game played by the country's citizens whose interests, in turn, depend upon the growth rate and distribution of national income.

In principle, one would like to write down a political-economic model that takes as exogenous the stochastic processes representing Spain's technological advances and institutional evolution and deriving the growth rate of per capita income and the dynamic paths of taxes and public expenditure as equilibrium outcomes. No model of this kind exists which can be brought to the data. Hence our assumption of an exogenous process for the government's propensity to save out of national income. This implies the ancillary hypothesis, according to which private agents take per capita private disposable income as

the relevant exogenous variable: taxes and transfers will not be treated as an equilibrium outcome in our environment.

Again, there is no good reason to be satisfied with such an assumption. Private disposable income not only depends upon taxes and transfers but also upon private agents decisions to work, save and invest. Hence a good intertemporal model of saving would have to include a general equilibrium determination of rates of return and capital accumulation. While we feel that such a task can be accomplished and should be attempted, we leave it for future research.

Our list of exogenous variables should not be limited to those listed so far. Apart from the other obvious one, i.e. the real rate of return on investment, historical analysis and economic theory suggest that a number of other factors should also be considered. Central among them are the structural changes undergone by Spain's economy during the 35 years encompassed by our investigation: three trade liberalization reforms and a rapid successful transition (1975-78) from a dictatorial political system to a parliamentary democracy. We discuss the trade liberalization issue first.

The liberalization efforts span three subperiods (1960-69, 1970-1985, 1986-1995) characterized by very different fiscal policy and exchange rate regimes, different patterns of international trade, varying labor cost dynamics and wide oscillations in the real rate of return on financial assets, dramatic changes in the demographic pattern and immigration flows and a continuous expansion of the social security system which became particularly strong after 1976. All of these variables may, in principle, have a strong impact on private saving behavior and one important step we need to undertake is to isolate the pure liberalization process from other factors that may reasonably be seen as independent from it.

Our working hypothesis is that Spain's trade liberalization experiences (see section 3 for historical details) should be formalized as exogenous increases in the expected growth rate of permanent income. Such an increase in the exogenous growth rate is induced either by a more efficient allocation of factors or by the adoption of new, more efficient technologies. We will argue in section 3 that this is a reasonable way to interpret Spain's trade reforms. While the beginning of each reform period was marked either by the signing of an international treaty or the approval of some major legislative reform, none of them occurred rapidly. In each case the implementation required many years and the opening process was always relatively slow and not even monotone. Furthermore none of the

reforms (with perhaps the exception of the third one) involved using the exchange rate as a crucial policy instrument.

Periodizing the stochastic process of private saving propensity according to the dates of trade reform is rejected by the data. One cannot reject the hypothesis that a structural break occurred in 1960, but the shortness of the time series available before that year greatly reduces the information we can extract from this statistical finding. Altogether, these considerations suggest modeling Spain's trade reforms as positive innovations to the exogenous stochastic process of per capita income. This leads us to attempt quantifying their impact upon saving from within the framework of permanent income and intertemporal consumption smoothing.

Received theory of consumption-saving behavior (see, e.g., Deaton 1992a), based on the permanent income hypothesis and an intertemporally separable Von Neumann-Morgenstern preferences for consumption suggests that, in front of a permanent innovation in the income sequence, the representative consumer should react by temporarily running down his accumulated assets to move to the new permanent consumption position. The actual magnitude of such a movement will depend on the preference parameters and on the simultaneous changes in the expected rate of return on saving. In an open economy context, or better, in a "more open" economy context like Spain's, this will typically imply running down the current account surplus and generating a growth rate of imports that, for a few years, will exceed the growth rate of exports. In any case, the observation of a temporary reduction in national saving and an increase in the import of consumption goods would not constitute, from such a partial equilibrium point of view, much of a puzzle.

If we move to a general equilibrium model by making investment and labor supply decisions endogenous, then a positive shock to the production possibility set that sufficiently increases the expected rate of return, would bring about an increase in the level of investment. In a closed economy context this implies an increase in saving, while in an open economy this will also induce an external capital inflow. In any case, the channel through which a positive innovation in per capita income induces an increase in domestic saving propensity should be the rate of interest.

If private saving in Spain had behaved accordingly to either one of these simple models our task would be easily accomplished. But this is not the case. The overall correlation between national and private saving propensities, on one hand, and income growth rates, on the other turn out to be positive. This is even more so when the appropriate pairs of income

and saving variables are compared. As a matter of fact, only for the third liberalization period, i.e., post 1986, do the data show a *small and temporary* drop in private saving. We will argue later (section 3) that this fact is more coherently explained by other temporary factors than by the permanent increase in income that Spain's entrance into the EU may have caused. The evidence, in any case, rules out the simple partial equilibrium and constant interest rate approach.

The general equilibrium and rate of interest route, while theoretically more appealing, also fails to be convincingly supported by the data, at least as long as one maintains the view that (for a given level of the expected rate of return) saving propensities are negatively correlated with positive innovations in per capita income. As we will show in sections 4 and 5 measures of real interest rate display either very weak or no correlation with output and saving growth rates. Furthermore, a proper handling of this approach would require the construction of a fully specified dynamic general equilibrium model with endogenous production and labor supply, a task that clearly goes beyond the scope of the present research.

This leaves us, though, in need of a minimal consistent model of intertemporal consumption-saving behavior, able to accommodate, at least, an overall positive impact of income growth upon saving propensities. In section 4 we suggest a simple representative agent model in which saving propensities are more often than not an increasing function of income growth rates. That this may be the case has been recently argued by a number of authors (e.g. Boldrin, Christiano and Fisher 1994, Carroll and Weil 1994, Carroll, Overland and Weil 1995) on the base of various specifications of the Habit Formation preferences model originally analyzed by Ryder and Heal (1973) and then again by Abel (1990) and Constantinides (1990) in the context of asset pricing. Indeed, Boldrin, Christiano and Fisher (1994) argue that the strongly procyclical behavior of stock market prices and activity can and should be interpreted as an important piece of evidence supporting the proposed specification of preferences. In section 4 we take a simplified, partial equilibrium version of this model as the starting point of our empirical analysis and show that it does reasonably well in explaining the Spanish annual data.

Once this basic relation has been established one can move on to investigate the impact that other economic factors may have had upon private saving. As mentioned earlier, between 1975 and 1978 Spain moved in a rather peaceful and quick way from dictatorship to democracy. In the data set we are studying this shows up in a very simple form: around

those same years the amount of outstanding public debt, which as a percentage of GDP had been steadily declining since the early 1960s, starts to grow at a remarkably quick pace. Indeed, no matter which year one chooses within that interval, the hypothesis of a structural break in the stochastic process determining public saving propensity cannot be rejected. This sharp change in the government's propensity to save will be our way of representing the direct economic impact of the exogenous change in the political regime.

Our framework of analysis is based upon the figment of a representative agent. Indeed, on the back of our simple model we are assuming the existence of a number of fictitious representative agents, corresponding to the public, private, household and business saving ratios. This is a drastic simplification: arguing, as we will, that public saving affects private saving but that this occurs at less than a one-to-one ratio is equivalent to recognize that the splitting of the national pie between the public and the private agent has an impact upon the aggregate saving rate. A full examination of this issue (i.e., of the so-called "ricardian equivalence hypothesis") would nevertheless require the availability of reliable microeconomic data that are not available for Spain. Hence we will content ourselves with a simpleminded estimation of the aggregate impact that variations in fiscal pressure or the public sector income have upon private saving once the effects of income and interest rate are accounted for.

In Spain the transition from dictatorship to democracy and the opening to international trade flows also meant a substantial redistribution of power among the major social groups. This redistribution of power has generated or has been accompanied by changes in the distribution of income large enough to potentially affect the average private propensity to save. From an intuitive point of view this may occur in two forms: either because income flows from one income distribution decile to the others affect the average propensity to consume or because, due to some violation of the assumptions underlying the Modigliani-Miller equivalence results, shifts in the functional distribution of income bring about non-negligible changes in the average propensity to save of the private sector. We try, somewhat succesfully, to capture the empirical importance of this channel by using a simple measure of the variation of gross profit margins in Spain's private sector income.

The rest of the paper proceeds as follows. After providing an historical and statistical account of the data in section 2, we provide a summary chronicle of the liberalization policies in section 3. Section 4 concentrates on the relation between per capita income

growth and national and private saving. We then move on to consider the empirical relevance of a second set of exogenous factors in section 5. Here the linear relation between income growth and saving estimated in section 4 is taken as a starting point, and simple econometrics is used to test whether the other variables suggested by our historical analysis contain any additional explanatory power. Section 6 concludes the paper by drawing some very humble lessons for economic policy.

2. Spain's Saving During the Last Forty Years

2.1 Data Analysis and Description

In this section we concentrate on the following set of saving ratios:

(s) : Spain's per capita, annual, national gross saving rate over the period 1954-1995, defined as the ratio of gross national saving (S) to gross national disposable income ($GNDI$). S is obtained by deflating nominal saving with the implicit investment deflator while $GNDI$ is deflated with the implicit GDP deflator †. s_t is reported in Figure 2.1.

From a purely statistical viewpoint, the most appropriate time series representation for s_t is as an AR(1) process, with OLS estimates (standard deviations in parenthesis)

$$s_t = 0.034 + 0.85 s_{t-1} \tag{2.1}$$

$$(0.017) \quad (0.074)$$

and $R^2 = .78$. From (2.1) Dickey-Fuller tests can be computed, and neither of them rejects the null hypothesis of s_t behaving like a random walk. Furthermore, there is no apparent structure in the residuals of (2.1), which look like normally distributed white noise.

We do not attach any special economic significance to this purely statistical finding and to its implication that a simple cointegration relation between S and $GNDI$ does not exist. The economic framework we are adopting does not require, a-priori, the existence of any stable linear relationship between income and saving. From our vantage point the finding that Spain's saving rate behaves *like* a random walk is only evidence of its high persistence and volatility during the sample period, the explanation of which must be found in the movements of other relevant economic variables.

(sp) : Spain's annual gross private saving rate over the period 1964-1995, defined as the ratio of gross private saving (SP) to gross private disposable income ($GPrDI$). The latter is deflated by the implicit GDP deflator while the former is deflated by the implicit investment deflator. sp is reported in Figure 2.2.

† Reliable data from 1954 are available only for national saving; for the disaggregated values we must restrict our attention to the 1964-95 period.

If anything, the evidence of random walk-like behavior is even stronger for sp_t. The OLS regression of sp_t gives (standard deviations in parenthesis)

$$sp_t = 0.04 + 0.83 sp_{t-1} \tag{2.2}$$

$$(0.03) \quad (0.13)$$

and $R^2 = 0.58$. Considerations completely analogous to those already made for s_t apply also here.

(sg) : Spain's annual gross public saving rate over the period 1964-1995, defined as the ratio of gross public saving (SG) to gross national disposable income ($GNDI$). Here, also, the implicit investment deflator is used for the numerator and the implicit GDP deflator for the denominator. sg is reported in Figure 2.3.

Our choice of the implicit investment deflator to compute the real value of saving and consequently the saving ratios is, admittedly, unusual. The common practice is that of dividing nominal saving by nominal $GNDI$ or $GPrDI$, thereby implicitly assuming that the GDP deflator is also the appropriate price of saving.

Which deflator one adopts does make a non-negligible difference for some of the analytical conclusions. As Figure 2.4 displays, the implicit GDP and investment deflators behave rather differently over the sample period. More to the point, their ratio displays a very clear downward trend, which seems to become more pronounced right after the liberalization episodes of 1960 and 1986.

Formal econometric testing confirms our intuition. The overall regression shows the relative price of capital decreasing at a rate of -0.832 percent per year over the 1954-1995 interval. During various subperiods, though, one finds significantly different trends:

years	54-59	60-69	70-85	86-95
trend	-0.78%	-1.87%	0.15%	-1.87%

This finding should be taken into appropriate account. It suggests that during the postwar period, Spain, like most advanced countries, has witnessed a remarkable decrease in the relative price of investment goods †. Second, it lends credit to our working hypothesis of

† A number of papers, e.g., Greenwood, Hercowitz and Krusell 1995 and Greenwood and Yorukoglu 1996 have stressed the implicatons of this phenomenon for our understanding of U.S. data.

treating the trade liberalization process as equivalent to a sequence of permanent positive technological shocks. Such positive shocks materialize as, among other things, drops in the cost of new productive capital. Under this interpretation our statistical results confirm the widespread view that 1960 and 1986 were the major liberalization episodes, relegating 1970 and the entire decade of the 1970s to a very secondary role.

These considerations have led us to conclude that the appropriate price index for calculating the real value of saving is the investment deflator.

We also believe that this choice of deflator is the only one coherent with received economic theory. All theoretical models of which we are aware, are based on the assumption that economic agents save in order to acquire assets that will generate a future stream of income. That is to say, the purpose of saving is not the postponent of current consumption but the generation of future consumption.

If this assumption is maintained, explaining saving amounts to explaining the quantity of those income-producing assets agents decide to buy at each point in time. Everything else equal, if the cost (in current consumption units) of those assets decreases, forward-looking agents will react by increasing or decreasing the total quantity of purchased assets depending upon the relative income and substitution elasticities of their demand for future consumption. A proper evaluation of the net outcome is possible only if one can measure productive assets in their own units. This requires dividing nominal saving amounts by the price of new capital goods.

While doing this does not reduce the wide oscillations in saving rates over the sample period, it substantially eliminates the impression of a long-run decrease in saving propensities, both national and private. Given the tantamount importance of this fact, and in order to facilitate comparison, saving propensities calculated by dividing nominal saving by nominal income measures are also reported (see Figure 2.5) and areexplicitly discussed when relevant.

Private saving sp can be broken down further into two other measures
(sh) : the household gross saving rate out of $GPrDI$, and
(sb) : the business gross saving rate out of $GPrDI$,
the behaviors of which are reported in Figure 2.6.

Visual inspection of figures 2.1–2.3 tells the following story. National saving oscillated widely from a very low level at the beginning of the 1960s to its maximum in the early 1970s, to then collapse until 1982-83, when it started to recover, reaching relatively high

levels during the last cyclical expansion. This remarkable swing was the product of a large decrease in public saving (from a maximum of about 4 percent to a minimum near -3 percent) which began in the early 1970s, and of equally large variations in the private saving rate, which in thirty years has completed three full cycles, ranging between a minimum of about 22 percent in 1981 to a recent maximum of 32 percent.

Visual inspection alone will not tell us, though, if any particular correlation pattern is present. For this purpose a set of elementary statistics for s, sp, sg, sh and sb is reported in Table 2.1. Three features of the data are apparent: public saving is negatively correlated with both private and business saving, the last two are strongly positively correlated to each other, while household saving moves in the opposite direction of business saving.

Besides looking at pairwise correlations we are interested in checking whether either the trade liberalization reforms or the transformation to a democratic political system produced any structural break in the behavior of Spain's saving rates.

Only for the 1960 reform one must reject the hypothesis of a constant mean of the national saving rate, while for 1970 and 1986 the hypothesis of constancy cannot be rejected.

In spite of the statistical test's results our analysis dismisses the idea that the year 1960 witnessed a fundamental change in the national propensity to save, a decision that may need some justification. It is based not so much on the availability of very few observations for the years prior to 1960, but upon the more substantive fact that the three last observations before 1960 come from years of very low or even negative growth in national income.

As we argue in section 4, the data from Spain suggest the presence of a strong business cycle effect upon saving rates, even at the annual frequency. Drawing conclusions about structural breaks by comparing a sample mean from a sample where half of the points are recession years with another one in which recession years are not even a fifth of the total, would be rather questionable.

The other historical event which seems to have a strong influence upon Spain's saving behavior is the transition from a dictatorial to a democratic and parliamentary system. Statistical testing suggests that a change in the public's propensity to save occurred in the second half of the 1970s.

The democratization process began around 1976 and came to its first institutional conclusion in 1978 with the approval of a new constitution. In accordance with a common

convention we have chosen 1978 to date our test. The horizontal lines in figures 2.1-2.3 and 2.6 indicate the sample mean values over the pre- and post-democracy subperiods.

Table 2.2 reports sample statistics for the same set of saving propensities when the GDP deflator is applied to nominal savings. Some differences are worth noticing. The volatility of all saving ratios is somewhat reduced while the already strong positive correlation between national and public saving is magnified. On the other hand, the negative relation between public and private saving now disappears, leaving only a negative correlation between public and business savings. What is more important, though, is that the use of the GDP deflator would suggest that, with the sole exception of the business sector, a drop in all saving propensities occurred after the mid-1970s. We believe this to be a misleading conclusion, caused only by the adoption of an incorrect price measure.

Figure 2.7 adjusts the gross public and private saving ratios for the impact of inflation on the real value of the outstanding public debt, the time pattern of which is described in Figure 2.8. Besides the obvious increase in the average value of sg and the parallel reduction of sp, adjusting for inflation reinforces the conclusion that a drop in public saving occurred around 1978, while leaving all other stylized facts unaltered.

Table 2.1 - Basic Saving Ratio Statistics (1964-1995)

	s	*sp*	*sh*	*sb*	*sg*
Mean	0.2285	0.2561	0.1127	0.1434	0.0159
Max.	0.2846	0.3206	0.1489	0.2085	0.0452
Min	0.1692	0.2145	0.0819	0.0949	-0.0283
Std	0.0295	0.0235	0.0160	0.0247	0.0219

Correlation Matrix

	s	*sp*	*sh*	*sb*	*sg*
s	1.00	0.52	0.55	0.15	0.65
sp	0.52	1.00	0.27	0.78	-0.30
sh	0.55	0.27	1.00	-0.39	0.32
sb	0.15	0.78	-0.39	1.00	-0.49
sg	0.65	-0.30	0.32	-0.49	1.00

Test of Mean Break

	s	*sp*	*sh*	*sb*	*sg*
1964-78	0.2546	0.2532	0.1236	0.1295	0.0334
1979-95	0.2213	0.2586	0.1030	0.1556	0.0004
t-stat	-1.16	0.65	-4.73	3.47	-6.52

Table 2.2 - Saving Ratio Statistics 1964-1995 (GDP Deflator)

	s	sp	sh	sb	sg
Mean	0.2273	0.2110	0.0934	0.1176	0.0157
Max.	0.2727	0.2355	0.1285	0.1502	0.0438
Min	0.1869	0.1823	0.0614	0.0820	-0.0240
Std	0.0251	0.0152	0.0160	0.0150	0.0208

Correlation Matrix

	s	sp	sh	sb	sg
s	1.00	0.65	0.66	-0.51	0.83
sp	0.65	1.00	0.53	0.44	-0.13
sh	0.67	0.53	1.00	-0.52	0.48
sb	-0.05	0.44	-0.52	1.00	-0.38
sg	0.83	0.13	0.49	-0.39	1.00

Test of Mean Break

	s	sp	sh	sb	sg
1964-78	0.2515	0.2185	0.1067	0.1118	0.0330
1979-95	0.2049	0.2044	0.0817	0.1227	0.0005
t-stat	-7.00	-2.92	-7.14	2.17	-7.10

Here is a summary of the stylized facts we have come across so far.

I. Except for the 1960 liberalization, there is no statistical evidence of increasing or decreasing long-run trends or of abrupt changes of behavior in the national and private propensities to save, while a clear discontinuity exists in the average public saving ratio before and after democratization took place. In particular there is no prima facie evidence that the 1986 entrance into the EU and the associated liberalization of financial markets have been the causes of any sizeable drop in national or private saving propensities.

   Some of these results are sensitive to the choice of the price deflator. When the implicit GDP deflator is used one cannot reject the hypothesis of a structural break in 1978 also for the means of s and sp. When the impact of inflation upon the real value of public debt is taken into account, the large drop in public saving after 1978 is somewhat reduced but not eliminated †. More importantly, correcting for the inflationary tax does not change the dynamic behavior of sp_t.

II. The patterns of pairwise correlation are also worthy of some attention. Over the entire 1964-95 interval, government saving is negatively correlated with private saving, but in a relatively weak form. When a correlation matrix is computed for the two separate subperiods 1964-78 and 1979-95 the following is observed: sg and sp are practically uncorrelated ($\rho = 0.02$) during the first period and become strongly negatively correlated during the second ($\rho = -0.55$).

   If one computes the same correlations with inflation-adjusted data the pattern is more uniform across subperiods: sp and sg have correlation coefficients equal to $-.45$ in 1964-78 and $-.55$ in 1979-95. This behavior is even stronger for (non-inflation adjusted) household savings, which are again uncorrelated with sg until 1978 and display instead a -0.77 correlation coefficient between 1979 and 1995. These patterns are invariant to the choice of saving deflator and are in fact reinforced by the use of the implicit GDP deflator. To the extent that unconditional pairwise correlations can be taken to convey any information about ricardian relationships between public and private savings, they suggest that there is no reason to analyze the two subperiods separately.

† We coincide with most Spanish observers in interpreting the short-lived positive jump in government saving around 1986-88 as a one-time accident, due mostly to the introduction of VAT and to the temporary positive effect this had on the level of tax revenues.

III. The average saving ratios over the entire sample period are roughly within the EU and OECD range of values even if they are below the level of very high performers such as Italy (but only until the the middle 1980s) and Japan (over the whole sample period).

IV. If we look at the ratio of private savings to Gross Private Disposable Income (sp) and its components sh and sb, we note a strong positive correlation between sp and sb (.78) and a non-negligible negative correlation between sh and sb ($-.39$), which seems to be generated mostly by their behavior in the 1978-95 subperiods. A variety of specific tax provisions introduced in the last fifteen years is commonly believed to be the main reason for the large amount of tax arbitrage carried out by the private sector through movements of income between the household and business sectors. Unsystematic evidence about the saving behavior of small and medium-size businesses supports to this view.

V. Table 2.3 shows a pronounced positive correlation between the growth rate of national income and gross national saving, which is explained mostly by the strong correlation between sg and $GNDI$, since the correlation between sp and $GNDI$, while still positive, is substantially smaller. When $GPrDI$ is used, however, then sp also displays a high positive correlation with income growth rates. While we do not report statistics for sample subperiods, it is worth stressing that the described pattern is homogeneous across them.

We also find significant that the unconditional pairwise correlations are uniformly higher when each saving propensity is paired with the growth rate of "its own" income, i.e., $GNDI$ for s and sg and $GPrDI$ for sp. This reinforces our prior finding according to which, to a first approximation, each representative agent's saving propensity is determined by the information available about the stochastic process of his own income.

Table 2.3 - Saving Propensities and Income Growth Rates

	Corr. with $\hat{y}$ (64-95) †			
	s	sp	sg	sp
$\hat{y}_{-2}$	0.29	0.05	0.23	0.17
$\hat{y}_{-1}$	0.52	0.15	0.42	0.18
$\hat{y}_0$	0.69	0.17	0.63	0.42
$\hat{y}_{+1}$	0.77	0.14	0.77	0.29
$\hat{y}_{+2}$	0.69	0.09	0.73	0.24

†For the first three columns the measure of income is GNDI, for the fourth it is GPrDI.

VI. The behavior of aggregate demand and of its main components (Figure 2.9) does not exhibit any particular "jump" after each liberalization episode. A limited exception is the period 1986-1990, which we will discuss in detail in subsection 3.2. Also, and contrary to what one would have anticipated, each trade reform except the last one brought about a short-run *surplus* in the current account, which was later eliminated by the increase in internal demand and imports (Figure 2.10). The post-1986 external deficit was generated by an unusually rapid growth of the imports/$GNDI$ ratio and by the flat behavior of the export/$GNDI$ ratio until 1990. This suggests the importance of finding what was special in 1986.

VII. Figure 2.11 plots national saving and investment as percentages of national income, their pairwise correlation being equal to 0.84. Visual inspection suggests that national saving leads national investment by about one year. However, private saving and investment (Figure 2.12) appear to exhibit a much weaker intertemporal relation, if any, their sample correlation being just 0.18. This asymmetric pattern coincides with the one reported for a number of other countries by various investigators (Bayoumi 1990 and van Wincoop and Marrinan 1996 for a recent discussion). Visual inspection of Figure 2.13 instead makes apparent the important role played by external saving, se, in the dynamics of private investment. The latter, in fact, displays a much stronger correlation with external saving (0.50) than with internal private saving.

2.2 Stylized Facts: Spain and the Rest of the World

The elementary analysis we have carried out allows an assessment of the extent to which Spain's experience replicates the patterns of behavior recorded in most of the recent cross-country literature.

(a) *The world saving rate has been declining and the world real interest rate has increased since the 1970s.*

We have no clear evidence that private or national saving rates have declined in Spain. Public sector saving has certainly declined since the middle 1970s. As for real rates of return, Figure 2.14 suggests they have also increased in Spain since the (middle) 1970s. On the other hand, the same figure shows they have done little more than go back to the levels of the second half of the 1960s. The substantial difference, obviously, is that while in the 1960s those high rates of interest were the product of closed and scarcely competitive financial markets, the high rates of the last 15 years reflect a worldwide phenomenon.

(b) *Saving rates show divergent patterns across regions during the last two decades.*

Spain being an OECD country, this should imply a constant decrease in both private and public savings since the early 1970s. In Spain, public saving decreased sharply since 1978 while the private saving propensity decreased for most of the 1970s and part of the 1980s but rebounded in the last decade. The timing of Spain's decrease in public saving is only slightly off the average for OECD countries due to the particular timing of its internal political evolution. On the other hand, the rebound of Spain's private saving seems to have almost completely compensated for the decrease in sg, hence we really do not have evidence of a long-run decline in s.

(c) *Long-term saving and growth rates are positively correlated.*

Pairwise correlations suggest this is the case in Spain as well. We have tested for Granger-causality between various measures of income growth and saving, with mixed results. More precisely, using two lags on each side, there is no evidence that s "causes" or is "caused by" the growth rate of national income, nor that the log of real saving (national or private) "causes" or is "caused by" the log of income. On the other hand, past saving growth rates have predictive power for income growth rates:

$$\Delta y_t = 0.017 + 0.23\Delta y_{t-1} + 0.18\Delta s_{t-1} \tag{2.3}$$

with $R^2 = 0.46$ and standard deviations of estimated coefficients equal, respectively, to $(0.005), (0.16)$ and (0.06), while

$$\Delta y_t = 0.014 + 0.56 \Delta y_{t-1} \tag{2.4}$$

with $R^2 = 0.32$. Here Δy_t is the first difference of $\log(GNDI)$ and Δs_t is the first difference of $\log(S_t)$. Both the F and χ^2 usual tests reject the null hypothesis of no predictive power for s in (2.4).

Similar results are obtained for private saving and income. There is absolutely no evidence of either $GPrDI$ or its log or its growth rate to contain any predictive power about the future behavior of sp. In this case, the negative results also apply to the reverse: we have found no trace of Granger-causation from private saving to private income.

We will come back to the relation between income growth and saving in the fourth section.

(d) *Long-term saving rates and income levels are positively correlated.*
This is statistically hard to detect within a single country given the very short length of available time series. In any case, Spanish data do not seem to accomodate this presumption: while income per capita has increased remarkably over the 35 years of our sample we have not observed any clear trend in private and national saving rates.

(e) *Long-term saving and investment ratios are strongly and positively correlated.*
We have given evidence that this may be the case for national saving and investment while the relationship appears to be much weaker or altogether absent for the private sector. We will look further into this in section 5.

(f) *Long-term saving rates and income inequality appear uncorrelated.*
Two measures of the degree of inequality in the distribution of income have been traditionally adopted in the macro literature: the Gini coefficient and the percentage of national income controlled by the middle class where the latter is defined as consisting of households in the three central quintiles of the income distribution. We have been unable to reconstruct reliable time series for any of these indices. The little evidence available, covering only the last 15 years, suggests a relatively sharp and monotone decrease in all measures of Spain's income inequality (see Ruiz Castillo 1994 and literature therein). Neither the national nor the private saving rates decreased over this time interval, hence we should conclude that the time series evidence for Spain supports the stylized fact above.

On the other hand, the dispersion in the distribution of income among individuals is not the only channel through which the allocation of national product among different groups may affect saving. In the presence of credit frictions or market imperfections other sources of heterogeneity among economic agents may become important. We have in mind, in particular, the functional distribution of income between capital and labor. Relatively reliable time series of the division of value added between firms and workers are available covering the years 1964-1995. In section 5 we look at the effect of this income distribution variable on private saving propensities.

(g) *Trade and financial liberalization reforms are followed by sudden jumps in consumption and consequent sharp declines in private saving.*

As we have seen this did not occur in Spain after either the 1960 reform or the smaller 1970 reform. It is important to stress this because, as we explain in section 3, the 1960 plan allowed for the inflow of foreign capital and credit but maintained serious restrictions on the outflow of capital.

A small decline in the private saving ratio (and a sharper drop in household saving) did take place, nevertheless, between 1987 and 1990. On the other hand, the national saving ratio increased sharply in the few years after 1986, driven by a temporary but very strong increase in public saving. We will look further into this episode at the end of the next section and explore the ability of our model to accomodate it at the end of section 4.

To this collection of stylized facts we add an additional question, to be answered in section 5.

(viii) *Do higher interest rates cause higher saving propensities?*

3. Trade Reforms: A Chronicle

3.1 Trade Liberalization: 1960-1986

Until the end of 1959 Spain was a very closed economy which prohibited free foreign trade in any kind of goods and services by private companies or individuals. All imports of raw materials and other basic inputs not available in the country were directly controlled by the central government and subject to item-by-item authorizations. The same was true for the small exporting activity Spain was then able to generate.

As a consequence of this institutional environment and of the strongly autarkic policies the degree of openness of the economy (Imports + Exports as a percentage of GDP) had been decreasing steadily over the decade, from 19.68 percent in 1951 to 13.62 percent in 1959 (Gámir 1990, Cuadro 1) while overall competitiveness was collapsing with the ratio between exports and imports decreasing from 120.1 percent in 1951 to 62.6 percent in 1959.

The movement of labor and capital across national borders war practically impossible and a complicated system of multiple exchange rates was in place. Again, a small inflow of foreign capital took place but only under the direct control and authorization of the central government bureaucracy.

In spite of this, the economy had been growing at a healthy rate, which averaged 6.12 percent per year over the period 1949-1960. Due to a variety of internal and external circumstances, however, the situation deteriorated rapidly around 1958-59, with the growth rate of national income dropping to -2.7 percent in 1959.

On July 21, 1959 the *Plan de Estabilización y Liberalización* was adopted. This was the first and most ambitious effort to reform Spain's economic system in a free-trade direction. It allowed the convertibility of the peseta against most other important currencies, it permitted foreign investments to take place in Spain, and it also authorized some limited outflow of capital from Spain to foreign markets. More crucially, on the trade side a system of tariffs was introduced to replace the previous quotas and licences, transforming a completely centralized organization of international trade into one partially regulated by market transactions and based on the principle that the import of goods was free once the prescribed tariff had been paid. † This allowed the previously miniscule area of *comercio liberado* (free trade) to begin growing at a very high rate.

† A number of administrative authorizations were nevertheless maintained for both imports and exports.

As for capital, the inflow of foreign capital into Spain was highly liberalized, while most restrictions on the outflow of Spanish capital were maintained. Foreign commercial credit, direct investments (up to just under 50 percent of the firm's value) and real estate and portfolio investments were liberalized.

During the three decades following the *Plan de Estabilización y Liberalización* a slow and not always steady process of trade integration and liberalization took place, accompanied by a number of more or less small "competitive" exchange rate devaluations in 1967, 1971, 1973, 1976, 1977, 1980 and 1982. Spain was admitted as a member of GATT in 1963, which implied a further reduction in trade barriers between then and 1965 and then again in 1967 as a consequence of the Kennedy Round.

In June 1970 a preferential trade agreement with the European Economic Community was underwritten which brought the average tariff on Spanish imports around 60 percent and reduced to 14 percent the average protection on Spanish goods exported toward EEC member countries. At the same time the Bank of Spain undertook a process of modernization of the national banking system, introducing reserve requirements together with the first tools for the creation of a money market and scrapping a number of administrative controls and quotas on the allocation of bank credit. Also in this case the process of liberalization and tariff reduction progressed through a series of small steps, not all of which, however, went in the same direction.

A quantitative assessment of this long process is almost impossible to find, given the complex and often incoherent nature of the various systems adopted. From our vantage point two aspects are relevant; that is, (a) the fact that trade liberalization did not occur all at once, and (b) that by 1986, when Spain entered the EU and began the process of tariff harmonization with the other member countries, the extent to which it was still closed to foreign trade was already minimal.

Trying to quantify this argument, in Table 3.1 we report some indicative measures of trade protection and openess drawn from various sources (see in particular Gámir 1990 and De la Dehesa et al. 1990).

Table 3.1 - Measures of Trade Protection (1961-1986)

Year	Av. Tar.	ICGI/VAT	Total	% Lib.	(X+M)/Y
1960	16.50	0.00	16.50	40.0	19.6
1961	12.71	6.00	18.71	45.0	21.5
1962	11.90	6.24	18.13	55.0	23.7
1963	11.84	6.23	17.73	59.5	23.7
1964	11.61	7.31	18.91	63.5	25.6
1965	8.82	9.14	17.94	67.3	23.1
1966	9.97	9.39	19.28	71.2	25.2
1967	9.62	9.22	18.43	76.8	24.3
1968	7.97	8.05	15.19	75.9	24.5
1969	7.80	8.39	16.19	77.4	26.0
1970	7.29	8.15	15.44	76.2	27.9
1971	7.60	8.17	15.77	75.7	28.3
1972	7.86	8.43	16.29	74.2	31.1
1973	7.51	8.52	16.02	80.4	32.4
1974	5.21	6.67	11.88	85.2	32.1
1975	5.32	6.18	11.49	79.6	31.4
1976	5.15	6.03	11.17	78.6	33.4
1977	6.23	6.78	13.02	78.3	32.8
1978	5.15	6.86	12.02	80.0	33.8
1979	4.59	6.41	11.02	79.4	36.8
1980	3.82	6.08	9.90	91.0	37.0
1981	3.56	4.97	8.53	88.0	37.4
1982	3.77	5.45	9.22	87.0	39.2
1983	3.85	5.40	9.25	86.0	40.0
1984	3.65	5.36	9.01	88.3	42.4
1985	3.88	5.56	9.44	93.1	43.1
1986	4.95	10.51	15.46	100.0	43.3

The first column reports trade weighted pure tariff protection, in percentage. The second reports the *Impuestos de Compensación de Gravámenes Interiores* or, after 1986, the VAT, again in percentage. The fourth shows the percentage of total imports under liberalized status.

3.2 Trade and Financial Markets Liberalization: 1986

On January 1, 1986, after the transition to a democratic political system was completed, Spain entered the European Union by signing the *Tratado de Adhesión*.

This implied a total liberalization of trade with the members of the Union and the adoption of all the trade agreements established among the E.U. and other contries. It required the elimination, in the space of three to four years, of the residual quantity restrictions on imports and exports as well as the abolition of tariffs and the progressive substitution of the ICGI with the uniform European VAT rates. While the liberalization process was not instantaneous, about 70 percent of total trade in goods and services

with EU countries was liberalized immediately and free mobility of capital was practically completed by 1989. This rapid financial opening came to a brief halt between 1987 and 1990, when a number of exchange rate control measures were introduced, but it continued rather smoothly after that.

The degreee of trade liberalization that took place after Spain joined the EU, however, was far smaller than that put in place since 1960. What makes 1986 different from other years is not the lifting of some trading gate but instead the decision to peg the exchange rate of the peseta to the other European currencies participating in the EMS and the relatively rapid liberalization of private financial flows. Nothing like this had been done after 1960, except for a small simplification of exchange rate controls in March 1981.

Many observers have stressed the very strong reaction of private consumption in Spain to the 1986 reform. Beginning that year the (then positive) difference between private saving and investment starts dropping as export growth is unable to keep the pace of import growth (see figure 2.10, above).

The breakdown of imports between investment and consumption goods, available only from 1975, confirms but also qualifies the widespread impression of an EU "consumption binge." Figure 3.1 reports the series as percentages of $GNDI$ when the appropriate deflators are used, while Figure 3.2 reports the same data as ratios of undeflated nominal variables.

While both sets of data confirm the increase in the imports of consumption goods, a very different story is told about the real behavior of investment goods. Additional information about the extent to which the sharp rise in imports was due only to consumption is provided in Figure 3.3, which reports separately the proportion of imported capital goods and consumption durables.

The sharp rise of the latter after 1986 is clear, as is its decline (in percentage of total imports) after 1989-90. The rise in imports of capital goods, no less strong in 1986, is instead more permanent, and remains so even after the consumption binge is over.

Various hypotheses have been advanced to explain this relatively short-lived but intense jump in private consumption following the 1986 liberalization. In light of the analysis carried out so far, we believe a combination of the following two provide a reasonable description of what happened.

(a) First is the *overvalued peseta* and related very high real interest rates adopted to attract foreign capital and to prepare for the entrance in 1989 into the EMS. The

evidence supporting this hypothesis is mixed. While there is no doubt that Spain's real rates were maintained at a high level (relative to the EMS partners) during the four years between 1985 and 1989, the behavior of the exchange rate is less clear. Figure 3.4 shows the real effective peseta exchange rate with respect to the other EMS currencies over the interval 1980-1995 when deflated with the consumer price index. The rise in the peseta's purchasing power is clear, but the timing is not. The sudden increase in imports of consumption durables begins when the peseta exchange rate is still low (1986-88) and it is long over by the time the exchange rate reaches its maximum (1992).

The 1992 collapse of the peseta exchange rate reinforces the view that, perceiving the 1988-91 exchange rate as unsustainable, Spanish consumers rushed to purchase (temporarily) cheap foreign goods. There is nothing in the data or in the evolution of Spain's economic policies after 1992 to indicate whether the temporary nature of the real exchange rate evaluation should be attributed to lack of credibility or to the voluntary choice of an overvalued exchange rate as a disciplining device to curb internal inflationary pressures. All we can say is that the trade reforms have stayed, while inflation and the overvalued peseta are gone.

(b) Second is the easing of credit conditions: the consumption binge is therefore explained as pure and simple *pent-up demand* which, due to financial repression and the unavailability of credit, could not be satisfied before the liberalization. We do not have much structural evidence suggesting a drastic change in the conditions of Spain's credit markets after 1986, especially in the area of consumer credit. Once again the progressive entrance of foreign banks had started much earlier and continued thereafter in a relatively smooth fashion. The same is true for the increase in foreign capital inflows. It is important to recall (see above) that inflows of foreign capital had already begun to be liberalized in 1960 and that it was the outflow of capital which was still severely restricted until 1986.

Macro data can only confirm that a surge in consumer credit took place but, this being an equilibrium outcome, they cannot help much in discriminating the underlying mechanism. The year 1986 is a turnaround point in the dynamics of the total internal private credit to $GNDI$ ratio, as shown in Figure 3.5 and this increase in credit is particularly strong in the purchase of durable goods, as shown in Figure 3.6 . Figure 3.5 also shows that, after all, internal credit to the private sector just went back (as

a percentage of $GNDI$) to where it had already been in the middle 1970s, before the 1986 trade reforms occurred.

Furthermore, comparing figures 3.3 and 3.6 one must notice the parallelism in the temporary nature of the boom in the imports of durables and in the internal credit to durables. In summary, if any drop in private saving occurred because of financial liberalization and a run to the imports of durables financed by easy credit, it was certainly very short-lived.

4. Is There Anything Puzzling about Spain?

Our simple examination of recent Spanish history and saving data suggests the following hypotheses.

Both the national and the private propensities to save out of current income have been very volatile during the last 35 years but there is no prima facie evidence of any drastic change in their long-run behavior. Both saving propensities exhibit a strong and positive unconditional correlation with movements in income, either national or private, but the hypothesis that past-income movements Granger-cause saving (or vice versa) is easily rejected by the data.

The three sets of progressive trade liberalization reforms do not seem to have altered the underlying "Spanish saving function" in any substantial form, while it is apparent that they did have substantial and lasting positive effects on the growth rates of national and private income.

Private saving also displays some relatively strong and negative unconditional correlation with public saving and the latter drastically changed its behavior somewhere in the middle of the sample period. This did not coincide with one of the trade reform episodes but with the passage from a dictatorial to a democratic political system.

In this section we take up the task of sketching a simple partial equilibrium model of the causal dynamics linking income to saving. We will then take our model to the Spanish data and estimate a couple of simple saving equations for s and sp, respectively. Our working assumption is that the same equilibrium relations apply to the whole sample period. Finally we will assess its performance over the various subperiods.

The details of the model as well as the derivation of the relevant equilibrium relationships can be found in Boldrin, Christiano and Fisher 1994.

Let the stochastic process of per capita private disposable income be

$$y_t = y_{t-1} \cdot \exp \theta_t \tag{4.1}$$

where the growth rate θ_t obeys

$$\theta_{t+1} = (1-\rho)\overline{\theta} + \rho\theta_t + \epsilon_t \tag{4.2}$$

and ϵ_t is i.i.d. normally distributed with mean zero and constant standard deviation σ.

The representative agent intertemporal preferences for consumption are given by

$$U = \sum_{t=0}^{\infty} \delta^t \frac{\left[c_t - x_t\right]^{1-\phi} - 1}{1-\phi} \tag{4.3}$$

where x_t represents the habit stock, which evolves as follows

$$x_t = hx_{t-1} + bc_{t-1}$$

and the budget constraint is

$$a_{t+1} + c_t \leq (1 + r_t)a_t + y_t$$

where a_t is total financial assets, r_t is the real interest rate and a_0 is taken as given. Denote with W_t the present value of an individual total lifetime wealth as of period t. For illustrative purposes consider the case in which the random innovation in y_t is turned off (i.e., $\epsilon_t = 0$ for all t) and the rate of return r_t on saving is fixed and equal to $\frac{\gamma^\phi}{\delta}$ with $\gamma > 1$. One can show (see Boldrin, Christiano and Fisher 1994, Appendix A) that the equilibrium consumption policy is

$$c_t = \gamma^t \left[\psi^t x_0 + B_t Q\right] \tag{4.4}$$

where ψ, B_t and Q are simple functions of the underlying model parameters, of the time index t, of initial wealth W_0 and of x_0, the initial stock of habits. Algebraic manipulations allow one to compute the following derivative of current consumption with respect to unexpected innovations in total lifetime wealth:

$$\frac{dc_t}{dW_t} = \gamma \left(\frac{1}{\delta \gamma^{1-\phi}} - 1 \right) \left(\frac{\frac{\gamma^\phi}{\delta} - (h + b)}{\frac{\gamma^\phi}{\delta} - h} \right). \tag{4.5}$$

While (4.5) may look a bit complicated at first, careful inspection will show that whenever $b \neq 0$ and $\gamma \neq 1$ the standard predictions of time-separable permanent income theory do not apply to our model.

The latter says that current consumption should grow one-to-one with permanent income, i.e., with $dW_t \cdot r$ where r is the risk-free rate of interest in our case. But in (4.5) $\frac{dc_t}{dW_t}$ is now a decreasing function of b and also a decreasing function of h whenever $b > 0$. With habit persistence, the optimal response to an increase in wealth is to use financial markets to slow down consumption growth so that the stock of habits has a chance to increase and therefore equalize marginal utilities over time. The flip side of this is that saving propensity may increase in the aftermath of a positive shock to permanent income. It is this prediction that constitutes the core of our simple econometric exercise.

More generally, our model implies that, given the specification $(4.1)-(4.2)$ for the stochastic process of income growth, we can write down a general relation between variations in saving, $\Delta\log(S_t)$, and innovations in permanent income, ϵ_t, in which the latter should have a positive impact on the former. †.

We take a linear version of this relationship as our starting point of investigation and estimate it, jointly, with $(4.1)-(4.2)$ by using annual data for Spain. This will be done first to relate national saving S to $GNDI$, and then for private saving Sp and $GPrDI$, respectively, over the 1954-95 and 1964-95 intervals.

Estimation of $(4.1)-(4.2)$ over the interval 1954-95, when y_t is per capita $GNDI$, gives

$$\theta_t = 0.014 + 0.56\theta_{t-1} \tag{4.6}$$

$$(0.056) \qquad (0.13)$$

$R^2 = .30$ and the first order autocorrelation in the estimated ϵ is equal to 0.08.

We now use the estimated innovations in per capita $GNDI$ growth rates to run the following regression:

$$\Delta\log(S_t) = \alpha + \beta_1\epsilon_t \tag{4.7}$$

which gives (standard deviations in parentheses) $\hat{\alpha} = 0.04$ (0.01), $\hat{\beta}_1 = 5.50$ (0.92), with $R^2 = .48$ and the first order autocorrelation in the estimated residuals equal to -0.21 with a very normal-looking histogram.

Estimation of $(4.1)-(4.2)$ over the interval 1964-95 when y_t is per capita $GPrDI$ gives

$$\theta_t = 0.02 + 0.32\theta_{t-1} \tag{4.8}$$

$$(0.01) \qquad (0.18)$$

with $R^2 = .09$ and the first order autocorrelation in the estimated residuals equal to -0.09. While (4.8) gives a rather poor fit for the growth rate of $GPrDI$, it still is its optimal univariate representation (according to the AIC criterion) and there is nothing in the behavior of the residuals of (4.8) suggesting they should not be taken as normal white noise.

† Intuition suggests that one should be able to write a full general equilibrium model of endogenous growth in which past saving will have a negative impact on current saving. Even though this will not be attempted here, our preliminary estimates say that this prediction for Spain is not rejected by the data.

We now use the estimated innovations in per-capita $GPrDI$ growth rates from (4.8) to run the following regression:

$$\Delta \log(Sp_t) = \alpha + \beta_1 \epsilon_t. \tag{4.9}$$

OLS estimation gives (standard deviations in parentheses) $\hat{\alpha} = 0.04$ (0.011), $\hat{\beta}_1 = 3.03$ (0.44), with $R^2 = .63$ and first order autocorrelation in the residuals equal to 0.06.

Before moving on to characterize the impact that other factors may have had on private saving, we should pause and consider for a moment the quality of the fit that equations (4.7) and (4.9) provides for the post-1986 observations. Parameter estimates of both the income and the saving processes during the subperiods 1954(64)-85 are very similar to those obtained for the whole sample. Standard tests for a change in parameter values are largerly consistent with the null hypothesis of constant values.

Furthermore, and somewhat surprisingly, if one concentrates on private income and saving behavior, it turns out that (4.9) fits the last ten years *better* than it fits the previous period. Not only there is no trace of bias in the sign of the estimated residuals, but their variance is substantially lower (almost half the size) during 1986-1995 than during 1954(64)-1985.

We conclude, therefore, that our simple model of national and private saving behavior performs remarkably well over the intervals 1954(64)-1995, and that the entrance into the EU in 1986 did not cause any structural break in the equilibrium relation linking saving to innovations in per capita income growth.

5. Characterizing the Impact of Other Factors

In this section we concentrate our attention on the determinants of private saving, Sp, other than the innovations to the private income process. Our starting point is the estimates obtained in equations (4.8) and (4.9).

5.1 Real Interest Rates

It is well-known that, from a theoretical point of view, the impact that changes in real rates should have on saving is ambiguous because of the contrasting income and substitution effect. The stylized model of consumption-saving behavior sketched above is no exception to this rule. An increase in the expected return on saving may generate a positive increase in wealth without necessarily increasing current income. This should increase current consumption and therefore decrease current saving ratios. But the usual substitution effect will act the opposite way, generating an ambiguous net variation in saving propensities.

Not surprisingly, any reasonable specification of (4.9), including a measure of interest rates, fails to produce a statistically significant coefficient. We report here only one such specification which is, in a statistical sense, quite representative of many others.

$$\Delta \log(Sp_t) = 0.04 + 2.99\epsilon_t - 0.19\Delta r_t \tag{5.1}$$

$$(0.01) \qquad (0.47) \qquad (0.53)$$

where the $R^2 = .63$ and the autocorrelation in the residual is 0.07.

The measure of interest rate used in (5.1) is a long-run rate. Alternative measures give completely similar results. Once income growth is introduced real rates do not appear to have any explanatory power for private saving. Analogous results obtain for national saving when measures of the real interest rate are added to (4.7). What is more important is that, in conformity with most previous literature, real interest rates do not exhibit any explanatory power for saving rates even in univariate regressions. The value of the t-statistics is never above 1.2 and the R^2 coefficient is always practically zero.

5.2 Public Debt

We have seen in the analysis of section 2 that public saving ratios are strongly and negatively correlated with private saving. In light of the ricardian equivalence debate it is natural to ask whether variations in the public sector propensity to save have any effect on that portion of the variation in private saving that is not captured by the innovation in private income growth.

Coherently with the theoretical framework sketched above we can take the path of per capita government expenditure to national income ratio as given and model any variation in the ratio of government saving to $GNDI$ as due to a change in individual tax rates. This is equivalent to variations in fiscal pressure or, which is roughly the same, in income of the government sector. In our empirical analysis we have considered two different, but practically very correlated measures: one is fiscal pressure, FP, measured by the ratio between public income, $GPbDI$, and $GNDI$, and the other is the growth rate of public income. In both cases the symbols denote log first differences.

$$\Delta \log(Sp_t) = 0.04 + 2.17\epsilon_t - 3.10\Delta FP \tag{5.2}$$

$$(0.01) \qquad (0.48) \qquad (1.01)$$

with an $R^2 = 0.72$ and first order residuals' autocorrelation equal to 0.04.

$$\Delta \log(Sp_t) = 0.05 + 2.66\epsilon_t - 0.40\Delta \log(GPbDI) \tag{5.3}$$

$$(0.01) \qquad (0.42) \qquad (0.14)$$

with an $R^2 = 0.71$ and first order residuals' autocorrelation equal to 0.05.

The relevance of the public saving variable is quite strong and the sign is as expected. What is more interesting is that its introduciton does not practically change the point estimate of the income growth coefficient. We will use the specification (5.2) in our next exercise, but completely identical results would obtain using (5.3).

5.3 Changes in Income Distribution

What is the effect on the aggregate saving rate of a change in the distribution of income? We have already pointed out the fact that the scarce evidence about the evolution of income dispersion among individuals prevents us from using such a variable in a time-series regression. We have also suggested that inspection of the data leads us to believe that it is not likely to have a relevant impact on private saving rates.

On the other hand, we have also suggested a number of reasons one would expect that oscillations in the division of output between labor and capital may have some residual importance for private saving after an equation such as (5.2) or (5.3) has been estimated. To check this we compute the annual time series of the share of gross profit margin (*excedente bruto de explotación*) over total value added. Call it π_t. The following estimates are obtained:

$$\Delta \log(Sp_t) = -0.05 + 1.52\epsilon_t - 3.60\Delta FP + 1.03\pi_t. \tag{5.4}$$

$$(0.23) \quad (0.53) \quad (0.97) \quad (0.46)$$

$R^2 = .77$ and first order residuals' autocorrelation equal to -0.11.

We find equation (5.4) a clear improvement over (5.2) and conclude, therefore, that the way in which value added is shared between labor and capital seems to be relevant for the long-run evolution of private saving propensities.

5.4 Behavior after 1986

We have also tested the stability of our new set of regression equations between the two subperiods 1964-1985 and 1986-1995. In *every one* of the four regressions presented in this section there is a substantial decrease in the variance of estimated residuals after 1986, quite similar to the one we discussed at the end of section 4.

As an example, for equation (5.2) we have

$$var(u_t[1964-1985]) = 0.0038 \qquad var(u_t[1987-1995]) = 0.0007 \tag{5.5}$$

which we find quite remarkable. Figure 5.1, plotting the sample residuals, speaks for itself.

Our interpretation is simple: *if* the 1986 reform did change the access of Spain's private sector to credit markets it was by making it easier and less costly. Therefore this should have made the condition of the actual "Spanish representative agent" closer to the one of the idealized individual in our simple model, who is assumed to have a costless access to a full set of borrowing/lending markets. Since the post-1986 time series are generated by an environment closer to the one hypothesized in the model, a better fit should not come as a surprise.

6. Policy Implications and Conclusions

In this paper we have argued the following points:

- In order to properly assess the evolution of national and private saving in Spain during the last 35 years one must take into proper account the dramatic change in the relative price of new capital goods. The choice of a correct relative price to deflate nominal quantities allows us to compute real saving in a way both consistent with economic theory and common sense and which dispels the widespread belief that there was a dramatic drop in private saving propensities over the last 20 years. We consider this an important finding the impact of which goes beyond the evaluation of the Spanish experience. The relative price of capital has been decreasing in most industrialized countries and the speed of this process has actually accelerated durig the last 20 years.
- We also argue that a relatively stable saving function for Spain can be estimated using annual macroeconomic data over the period 1954(64)-1995. The functional form of this saving function is the same for both national and private gross savings.
- The behavior of saving described by our estimated equation is consistent with intertemporal optimization on the part of a "representative agent" and can in fact be derived from a simple, explicit model of consumer behavior.
- The crucial explanatory variable to capture the dynamics of Spain's national and private saving is the growth rate of per capita national or private income. To be more precise, we find that the variability in saving growth rates is explained, to a large extent, by the *innovations* in the income growth process.
- We also find that public saving or, alternatively, a related measure of the fiscal burden on the private sector, contains important additional explanatory power for the dynamics of private saving.
- The third crucial variable in our model turns out to be the share of profits in gross private disposable income, while real interest rates do not add anything to the explanatory power of this equation.

We have also found that the three liberalization reforms experienced by Spain during the period 1960-95 did not alter the functional relation we have just described among income growth, fiscal pressure, income distribution and private saving.

In fact, we find that the impact of each liberalization reform upon saving is well captured by modeling the trade reform process simply as a source of innovations for the income growth process.

This is particularly true for the last trade reform, which began in 1986 with the entrance of Spain into the European Union and which, contrary to the previous reforms, also involved a relatively deep liberalization of Spain's financial markets. Contrary to widespread belief we find no evidence of a permanent drop in private saving propensity after 1986. A short-lived drop in private saving was more than compensated by a surge in public saving, and when this decreased dramatically, private saving rebounded pretty much in line with our estimated saving function.

In fact, our estimated saving function fits the post-1986 data better and more convincingly than those from any other subperiod. In this sense the temporary boom in consumption of durables that took place between 1986 and 1990 should not be interpreted as a pathological effect of trade and financial liberalization. Instead, we suggest to see it as the rational response of private agents to positive innovations in the income process and temporarily favorable exchange rates taking place in that period. In particular, we stress that the response of private saving to innovations in income observed after 1986 is in line with the quantitative predictions of our model even when the latter is estimated only from annual data prior to 1986.

From the perspective of economic policy this suggests two main conclusions:

(a) Saving growth is determined by income growth. Hence the policies that most favor national and private saving are those that most favor a long-run increase in the growth rate of national and private income.

(b) Trade and financial liberalizations do not appear to modify the long-run structural relationship among income growth, public saving and private saving. The impact of liberalization on private saving can be ascribed to its impact on the former variables. In particular, we have found no evidence that trade and financial reforms should generate a permanent (or even temporary) reduction in the national and private propensity to save. Therefore we find no reason to support a policy of controlled or limited financial liberalization on the grounds that this would help avoid unjustified and damaging consumption booms.

Bibliography

Abel, A. (1990), "Asset Prices under Habit Formation and Catching up with the Joneses," *American Economic Review* **80**, 38-42.

Argimon, I. and J. Roldan, (1994), "Saving, Investment and International Capital Mobility in EC Countries," *European Economic Review* **38**, 59-67.

Bayoumi, T. (1990), "Saving-Investment Correlation," *IMF Staff Papers* **37**, 121-138.

Bayoumi, T. (1993), "Financial Deregulation and Household Saving," *Economic Journal* **103**, 1433-43.

Bayoumi, T., P.R. Masson and H. Samiei (1996), "International Evidence on the Determinants of Private Savings," C.E.P.R. Discussion Paper Series no. 1368.

Boldrin, M., L. Christiano and J. Fisher, (1994), "Asset Pricing Lessons for Modelling Business Cycles", third revision, N.B.E.R. Working Paper no. 5262.

Boadway, R. and D. Wildasin (1994), "Taxation and Savings. A Survey," *Fiscal Studies* **15**, 19-63.

Bosworth, B. (1993), *Savings and Investment in the Open Economy.* Washington D.C., The Brookings Institution.

Calvo, G. (1988), "Costly Trade Liberalizations. Durable Goods and Capital Mobility," *IMF Staff Papers* **35**.

Carroll, C. and D. Weil (1994), "Savings and Growth: A Reinterpretation," *Carnegie-Rochester Series on Public Policy* **40**, 133-192.

Carroll, C., J. Overland and D. Weil (1995), "Saving and Growth with Habit Formation", mimeo, Brown University, June.

Constantinides, G. (1990), "Habit Formation: a Resolution to the Equity Premium Puzzle," *Journal of Political Economy* **98**, 519-543.

Corrales, A. and D. Taguas (1991), *Series Macroeconómicas para el periodo 1954–1988: un intento de homogeneización*, Monografía n. 75, Instituto de Estudios Fiscales.

Deaton, A., (1992a), *Understanding Consumption.* New York, Oxford University Press.

Deaton, A. (1992b), "Household Savings in LDCs: Credit Markets, Insurance and Welfare," *Scandinavian Journal of Economics* **94**.

Deaton, A. (1995), "Growth and Savings: What do we Know and What Might we Learn", mimeo, Princeton University.

De la Dehesa, G., J.J. Ruiz and A. Torres (1990), "The Timing and Sequencing of a Trade Liberalization Policy: the Case of Spain", in M. Michaely et al. (eds.) *Liberalizing Foreign Trade,* Oxford: Basil Blackwell.

Doshi, K. (1994), "Determinants of Saving Rate: an International Comparison", *Contemporary Economic Policy* **12**, 37-45.

Edwards, S. (1995), "Why are Saving Rates so Different Across Countries? An International Comparative Analysis", N.B.E.R. w.p. 5097, Cambridge, MA.

Feldstein, M. and C. Horioka (1980), "Domestic Saving and International Capital Flows", *Economic Journal* **90**, 314- 329.

Ferson, W. and G. Constantinides (1991), "Habit Persistence and Durability in Aggregate Consumption", *Journal of Financial Economics* **29**, 199-240.

Gámir, L. (1990), "Politica Arancelaria", *ICE*, Dic. 89-En. 90, 19-50.

Gavin, M., R. Hausmann and L. Leiderman (1995) , "The Macroeconomics of Capital Flows to Latin America: Experience and Policy Issues", mimeo, IADB, August.

Gingberg, H. and A.K. Swoboda (1992), "Savings, Investment and the Current Account", *Scandinavian Journal of Economics* **94**.

Greenwood, J., Z. Hercowitz, and P.Krusell (1995), "Long-Run Implications of Investment-Specific Technological Change", Research Report 9510, Dept. of Economics, The University of Western Ontario.

Greenwood, J. and M. Yorukoglu (1996), "1974", mimeo, Dept. of Economics, University of Rochester, May.

Japelli, T. and M. Pagano (1994), "Saving, Growth, and Liquidity Constraints", *Quarterly Journal of Economics* **109**, .

McKinnon, R. (1991), *The Order of Economic Liberalization: Financial Control in the Transition to a Market Economy*, John Hopkins University Press, Baltimore.

Molinas, C. (1990), *MOISEES: Un modelo de investigación y simulación de la economía española*, Barcelona, Antoni Bosch.

Ruiz Castillo, J. (1994), "La Distribución de la Renta en España en la E.P.F.", Documento de Trabajo 94-12, Departamento de Economia, Universidad Carlos III de Madrid, May.

Ryder, H. and G. Heal (1973), "Optimal Growth with Intertemporally Dependent Preferences", *Review of Economic Studies* **40**, 1-31.

Schmidt-Hebbel, K. and L. Servén, (1995), "Saving in the World: Puzzles and Policies", mimeo, Macroeconomics and Growth Division, Policy Research Department, *The World Bank*, November 1995.

Taylor, A. (1994), "Domestic Saving and International Capital Flows Reconsidered", N.B.E.R. w.p. 4697.

van Wincoop, E. and J. Marrinan (1996), "Public and Private Saving and Investment", D.P. no. 172, Dept. of Economics and Business, Universitat Pompeu Fabra, Barcelona, June.

Appendix.

We provide here a brief description of the data set used and of the accounting and statistic criteria adopted.

We have made use of the database of MOISEES – a macroeconometric model for he Spanish economy (see Molinas, 1990) – for most of the variables we refer to. This database contains series for the main aggregates of the National Accounting starting at 1954. They result from the linkage of a number of partial series that were built with different standards.

In particular, data on the period 1954–1964 (corresponding to the first National Accounts series available in Spain) offer a lower reliability, and do not include estimates on the sectoral (private and public) breakdown of the variables.

From 1964, National Accounts figures have been produced by the Instituto Nacional de Estadística and are commonly accepted as more reliable.

Series of physical indices of the main aggregates are built by linking rates of variation directly. Those of components are linked in the same way, but correcting to ensure that the accounting identities hold at every period. Real values are expressed in pesetas of 1980 but relative prices are updated by means of chain indices.

The rate of return series refers to the mean return of public debt with 2 to 3 years maturity. Figures for the initial years (50's to early 70's) are drawn from returns on industrial corporate bonds. During those years the internal credit market was heavily regulated, and the latter index is assumed to better reflect market conditions. Real rates are computed by means of the private consumption deflator.

Other data series discussed in the text, as the breakdown of imports or the volume of credit to the private sector, correspond to the data set compiled and continuously updated by the Banco de España.