UNDERSTANDING CONSUMPTION IN COLOMBIA

Por:
Alejandro López
Martha Misas
Hugo Oliveros

1996 **No. 58**

Para comentarios favor dirigirse al autor:
Fax: 2865936 - Teléfono 3421111 Ext. 4325

UNDERSTANDING CONSUMPTION IN COLOMBIA*

Alejandro López**
The World Bank

Martha Misas
Hugo Oliveros
Banco de la República

Santafé de Bogotá, September, 1996

---

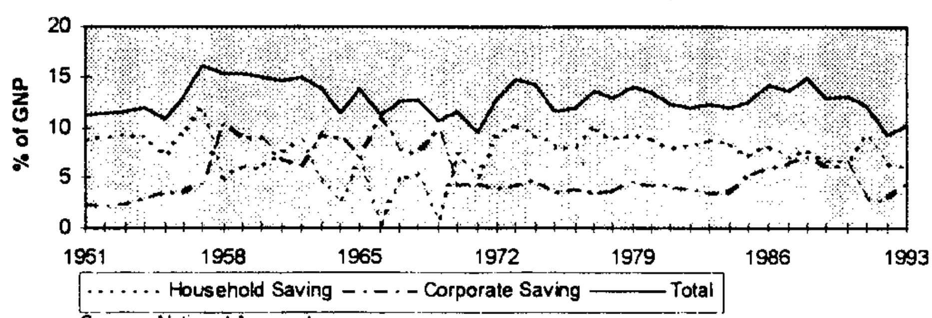
*This paper is part of a research project that is still in progress and some results might differ from the final version. We received useful comments on a first draft from Alberto Carrasquilla, Ernesto May, Luis Serven and Hernando Vargas.
** This paper was written while the author was a research fellow at The World Bank.

1. Introduction

One of the principal issues of Colombian macroeconomic policy in the 1990s has been the deterioration of private savings (Figure 1). The decline in the private saving rate was usually related to consumers real expenditure, which grew by an average of 3.9% in the period 1991-1993, compared to 1.9% per annum during 1950-1990. The trade reform, the acceleration of the financial liberalization process, a reassessment of permanent income due to the oil bonanza and a sterilization policy that increased real interest rates, and caused expectations of real exchange rate appreciation, were seen as the main determinants of the high consumption growth experienced in this decade (see, among others, Urrutia an López (1994, 1995), Echeverry (1996)).

López (1996) and López et. al (1996) pointed out new avenues of research. Looking closer to the Colombian National Accounts and correcting data inadequacies, they suggested that the behavior of private consumption was not the main factor behind the sharp drop in private savings in the 1990s. According to these studies, the consumption of durable goods after the trade reform could not be blamed for the decline in the private saving rate. In fact, the latter was falling since 1988 and, until 1993, the trade reform did not cause a stock adjustment of durable goods. Moreover, they argued that the private consumption boom of the 1990s did not happen, leaving without foundation most of the traditional explanations of the decline in private savings. In contrast to the prolonged and significant increases of private consumption observed in the early 1960s and 1980s, this aggregate only increased 2% of GNP in 1992. The higher growth of consumption between 1991 and 1993 was matched by a similar increase on the

Figure 1: Components of Unadjusted Gross Private Savings



Source: National Accounts.

rate of growth of labor per-capita income, which rose 4.3% in 1991-1993 compared to 2.4% per annum during 1950-1990. As a consequence, the potential explanatory power of the a reassessment of permanent income and financial liberalization as determinants of private consumption in the 1990s was reduced.

The behavior of the private saving rate in the 1990s was mainly seen in these studies as the result of a secular decline in private disposable income, closely linked to tax increases. However, given that disposable income of corporations is equivalent to corporate savings, it is crucial to distinguish between the determinants of household and corporate savings to have a better understanding of Colombian private savings. Figure 1 shows that the stability of the National Account measure of private saving observed between 1970 and 1990 was hiding a small but secular decline in household savings (almost equivalent to 4% of GNP) which was compensated by an increase in corporate savings, specially in the second half of the 1980s when it attained the highest level since 1970. Still, in the early 1990s the stability of the private saving rate was broken because household savings continued its secular fall whereas corporate savings returned to the levels attained during 1970 and 1985.

The study by Sanchez et.al (1996) has been the first attempt to understand the rise and fall of corporate savings observed in the period 1983-1994. Using micro evidence, their results indicate that the collapse of this aggregate in the early 1990s was not reflected in investment because there was almost a perfect substitution of domestic savings by external and domestic debt. They suggest that the traditional arguments regarding the collapse of the private saving rate (i.e. trade and financial liberalization) played a significant role through their effects on corporate behavior, as they relaxed liquidity constraints. However, the importance of the structural reforms as an explanation of corporate savings should remain an open question for future research.

The aim of this paper is to have a first look at the remaining part of Colombia's private saving puzzle: the secular deterioration of household savings. Following the literature that has developed since the paper by Davidson, Hendry, Srba and Yeo (1978) -DHSY-, particular attention will be paid to error correction mechanisms (ECMs). ECMs have been successful in accounting the short run behavior of aggregate private consumption in the U.K.. This is interesting since agents in those models have been usually assumed to be myopic. ECMs, however, do not necessarily imply a myopic or backward looking behavior of agents. Muellbauer and Bover (1986) showed that they could be interpreted as an Euler equation with liquidity constrained consumers. Still they are not incompatible with the pure Life Cycle Permanent Income Rational Expectations Hypothesis (LCPIREH) (Campbell (1987), Campbell and Shiller (1988)). The paper is structured as follows. Section 2 considers the theoretical background under the main models of consumer's behavior. Section 3 presents several ECMs representations for Colombian consumption and tests for weak, strong and super exogeneity. This is important to ensure efficient and consistent inferences, and accurate forecasts and policy simulations (Engle, Hendry and Richard (1983)). Section 4 summarizes the main findings and presents some final remarks.

2. The Theory of Consumers' Expenditure

The main idea of the Permanent Income Hypothesis is that consumption tends to be greater than current income when current income is low and expected to increase and it will be smaller than current income if current income is expected to decline. The problem of a consumer is to maximize his or her utility subject to a life time budget constraint and to a transversality condition establishing that consumers cannot die in debt:

$$
\begin{aligned}
&\max \underset{t}{\mathrm{E}} \sum_{s=0}^{T} (1+\delta)^{s-t} U(c_{t+s}) \\
&s.t.: w_t = (1+r)w_{t-1} + y_t - c_t \qquad (1) \\
&W_T \geq 0
\end{aligned}
$$

where δ is the rate of discount preference, r is the real interest rate, y is real per-capita labor income, c is real per-capita consumption and w is real per-capita wealth.

Under the assumption of a constant real interest rate and a quadratic utility function and substituting the first order conditions derived from (1) into the aggregate life time budget constraint, it is possible to obtain:

$$
c_t = (1+r)w_{t-1} + \mathrm{E}_t \sum_{s=0} \frac{y_{t+s}}{(1+r)^s} \qquad (2)
$$

where actual consumption is related to life-cycle wealth, which consists of financial and physical wealth, w, and human capital defined as the discounted present value of current and future labor income.

Since future variables are not observable it is necessary to assume an income generating process to get a closed form solution for consumption. For the sake of the exposition consider:

$$y_t - \bar{y} = a_1(y_{t-1} - \bar{y}) + \mu_t \tag{3}$$

where $0 \leq a_1 \leq 1$, $\bar{y}$ is the unconditional expected value of y and μ is a random error. Substituting (3) into (1) it is possible to derive the following consumption function:

$$c_t = (1+r)w_{t-1} + \left[\frac{r}{1+r-a_1}\right]y_t + \left[\frac{1-a_1}{1+r-a_1}\right]\bar{y} \tag{4}$$

Equation (4) can be considered as the equilibrium "cointegrating" relation for consumption. Therefore, if individuals are allowed to observe at each point of time their position relative to this long run relationship, in the short run consumption will increase (decrease) if agents are below (above) this equilibrium. In other words, if consumption is cointegrated with wealth and income there must be an ECM linking these variables (Engle and Granger (1987)). Moreover, if the ECM is consistent with a forward looking model, the parameters of the long run solution (4) will not be invariant to changes in the marginal process generating labor income and real interest rates. This is precisely the Lucas' (1976) critique which indicates that, under rational expectations, it is not valid to use models for policy evaluation if the parameters of interest change in the face of alternative economic policies. As will be explained in detail in section 3, the relevance of the Lucas' critique of econometric policy evaluation can be tested using the procedures suggested by Hendry (1988), Favero and Hendry (1990) and Engle and Hendry (1993).

Most of the consumption literature in the last 15 years have yield an overwhelming rejection of the Permanent Income Rational Expectations Hypothesis (PIREH). There have been two methodologies in the aggregate time series literature to test the theory. The first approach emerged as a response of the Lucas' critique. This procedure, first used by Hall (1978), studies the Euler equation derived from the intertemporal maximization of the utility function. If the PIREH holds, the first order conditions of the intertemporal problem imply that no other variable besides consumption of nondurables at time t-1 is helpful in predicting consumption of nondurables at time t. However, several studies using the Euler equation have rejected the theory (i.e. Hansen and Singleton (1982), Muellbauer (1983), Hayashi (1985), Poterba (1988), Campbell and Mankiw (1991)). The second approach to test the LCPIH is based upon structural models of consumption. Flavin (1981) rejected the theory by finding excess sensitivity of consumption to current income, that is, sensitivity in excess of the response attributable to the new information contained in current income. Deaton (1987), West (1988) and Campbell and Deaton (1989) also used structural models to test to what extent agents smooth consumption over the life cycle and found that consumption was smoother than predicted by the theory. The excess smoothness and excess sensitivity of consumption are the two sides of the same coin: if the PIREH fails due to a violation of one of its assumptions, consumption should respond "too" much to current income and "too" little to the innovation in current income.

Given the rejection of the PIREH, it is important to consider some of the arguments that have been given to account for the failure of the theory since they might be relevant to understand consumer's behavior. Among them it is possible to mention:

(1) Liquidity Constraints. Perhaps the most popular explanation of the failure of the PIREH is that the assumption of consumers having the same access to capital markets and being able to borrow and lend at the same interest rate is too strong. This assumption allows consumption smoothing and was made in the derivation of the consumption function (4). However, if some agents are liquidity constrained in the sense of credit rationing or different lending and borrowing rates, consumption will probably be excessively sensitive to current income. In fact, if individuals are not able to borrow, reductions in income go accompanied with decreases in consumption. Also, as Flemming (1973) pointed out, an interest rate differential leads to sharp declines in consumption when income falls.

(2) Precautionary savings. This factor was omitted from (4) since a quadratic utility function was assumed in order to get a closed form solution. Allowing for transitory savings might have important consequences for the Ricardian equivalence proposition and

the PIREH. As far as the Ricardian equivalence is concerned, Chan (1983), Barsky, Mankiw and Zeldes (1986) and Kimball and Mankiw (1989), for example, have shown that the existence of precautionary savings can lead to consumption rises as a result of a tax cut, rejecting the debt neutrality proposition. Moreover, as argued by Deaton (1990), the assumption of a quadratic utility function is particularly strong in the case of developing countries. He points out that savings not only are a question about accumulation but also of smoothing consumption in the face of volatile and unpredictable income. Therefore, he considers precautionary savings a necessary ingredient in modeling poor households in predominantly agricultural economies since their income is usually very uncertain.

(3) Non-Intratemporal separability in the utility function. If the utility function is assumed to be intratemporally and intertemporally separable, goods can be divided in different groups and the preferences in each group can be described independently of the quantities in other groups. Allowing for non separabilities in the utility function can eventually explain the rejection of the theory. In particular, those between durable and non durable goods (Bernanke (1985)), consumption and leisure (Mankiw, Rotemberg and Summers (1985) and private and government consumption (Aschauer (1985), Bean (1986)).

(4) Finally the effect of demographic changes should be considered. According to the life cycle hypothesis, a higher dependency ratio is associated with higher expenditure relative to income and wealth. Although this might not hold due to the bequest motive and uncertainty about the date of death (among other reasons), there is little doubt that the effécts of demographic changes are important to understand the long run behavior of savings.

3. Consumption in Colombia: The Econometric Evidence

The purpose of this section is to explain the movement in Colombian real per-capita private consumption expenditure using annual data for the period 1953-1993. This is an important issue given the secular decline of the household saving rate observed since 1970. The section is divided into four parts. The first justifies the use of a log-linear functional form and discusses preliminary issues such as data definitions and the introduction of additional explanatory variables to avoid misspecifiaction. The second part investigates the order of integration of the variables and tests for cointegration. The third presents the ECMs specifications and the last tests for exogeneity.

3.1. Preliminary Issues

As is the tradition in most of the studies on the consumption function, it was decided to use a log-linear functional form. Following Hendry, Muellbauer and Murphy (1990) and Favero (1992), the logarithmic specification can be justified by rewriting a static version of (4) as follows:

$$c = \beta_1 + \beta_2 w + \beta_3 y \tag{5}$$

where $\beta_1 = \frac{(1-a_1)}{(1+r-a_1)}\bar{y}$, $\beta_2 = (1+r)$ and $\beta_3 = \frac{(1+r)}{(1-a_1+r)}$.

Taking logarithms, and using a Taylor expansion, the static specification for consumption can be rewritten as:

$$\ln c = \beta_0 - \gamma r + \ln(\beta_3 y) + \frac{\beta_2 w}{\beta_3 y} \tag{6}$$

Several issues should be highlighted about this specification. First, labor income is used instead of disposable income. As pointed out by Flavin (1981), this avoids double counting in the return on wealth when the data is generated by the PIREH. Second, it seems plausible that the asset to income ratio, w/y, can forecast future values of income[1]. For example, Muellbauer and Murphy (1989) argued that the asset market falls of the mid 1970s were predicting slower growth and that the favorable economic changes of the 1980s raised asset values and income growth prospects. Third, the log-linear specification still allows testing the relevance of the Lucas' critique since the parameters of the long run solution for consumption will alter every time labor income and real interest rates are subject to structural breaks. Therefore, if the ECM model for consumption has constant parameters when the marginal processes are not constant, the ECM can not be considered

[1] A detail definition of financial and physical wealth , w, is presented in the data appendix. In order to capture the effects of asset inflation, physical wealth was divided between housing and non-housing assets and a relative price effect in the housing market was introduced.

as a reduced form of a forward looking model (Hendry (1988), Favero and Hendry (1990)).

Given the economic discussion of section 2, it should be clear that equation 6 omits several important influences on consumer behavior. In the case of Colombia, considering the following variables seems particularly relevant to understand consumption's behavior[2]:

(1) Financial liberalization. Credit to the private sector as a percentage of GDP was used as proxy of this variable[3]. Its importance is straightforward. In fact, according to López (1994), until 1989 70% of household's disposable income accrued to liquidity constrained consumers. Therefore, it could be possible to argue that this percentage has been declining over time given the slow and interrupted process of financial liberalization that started in the mid 1970s (see, among others, Herrera (1988)). In particular, Urrutia and López (1994, 1995) suggested that the main reason behind the decline in the private saving rate in the 1990s was the higher rate of household consumption growth as a consequence of the acceleration of the financial liberalization process.

(2) Income Uncertainty. This variable is measured as the standard deviation of labor income in the previous three years. As explained in the previous section, income uncertainty induces precautionary savings, an element that could be potentially important in Colombia since a significant part of its income has traditionally relied on the volatile prices of primary commodities (i.e. coffee).

(3) Non-Intratemporal separability between public and private consumption. This issue might be particularly important to understand the behavior of private consumption in the 1990s. Public consumption increased from 10% of GDP in 1990 to almost 15% of GDP in 1994 as a consequence of the political reforms undertaken during this decade. A significant amount of this rise is explained by higher salaries of the justice and military sectors given the enhanced role of the government in the provision of justice and security.

[2] The addition of these variables is ad-hoc (i.e. it is not derived from first principles). However, its advantage is that it addresses directly the most important hypothesis about the determinants of consumption in Colombia.

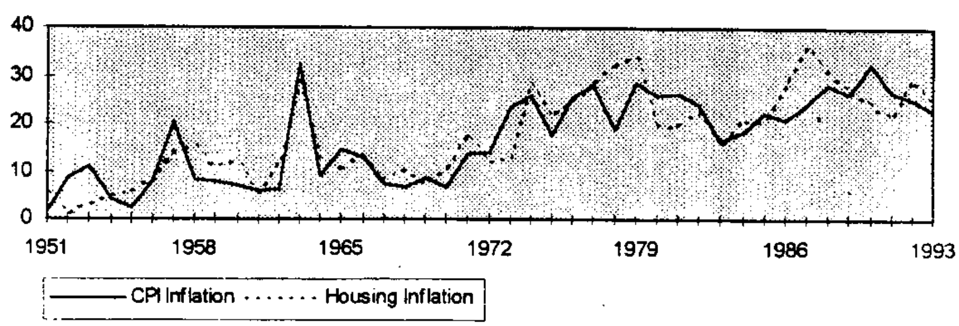
[3] Given that the aim of this variable is to measure its effects on household consumption, credit to households would have been a better proxy. However, this data was not available for the period under consideration.

Therefore, the lack of a stringent fiscal policy would be partly responsible of the decline of the household saving rate in the 1990s if it is found that public consumption complements, rather than substitutes, private consumption.

(4) Demographic structure of the population. This factor could have had a negative influence on expenditure in the last 20 years in Colombia given that the dependency ratio has decreased. In fact, as a consequence of the baby boom of the 1950s and 1960s, the population between 18 and 64 years of age had a permanent increase since 1970: after representing 44% of the population between 1950 and 1970 it reached 56% in 1993.

(5) Asset Inflation. According to the theory, private consumption should increase as a result of increments in domestic asset prices. In order to capture this effect, physical wealth of the private sector was constructed as follows. First, real private investment was divided between investment in housing and other buildings (IH) and investment different from housing and other buildings (IDH). Second, following Harberger's methodology (1969), the stock of each of these series was calculated assuming that IH and IDH depreciated in 40 and 20 years, respectively. Finally, the calculated real stock of IH and IDH were added. The effects of asset inflation were captured multiplying the real stock of IH by its implicit deflator presented in the National Accounts and making the strong assumption that the relative price effect of IDH was equal to 1. As can be seen in Figure 2, the National Accounts data suggest that housing inflation has been particularly important in the late 1970s and mid 1980s.

Figure 2: Housing and Consumer Price Index Inflation



Source: National Accounts and López, et.al (1996).

3.2. Testing for Unit Roots and Cointegration

The first step in the estimating procedure was to test for the integration of the variables under consideration. Table 1 presents two tests to determine the order of integration of the data: Dickey Fuller (DF) and Kwiatkowski-Phillips-Schmidt and Shin (KPSS). According to Dickey Fuller the null hypothesis of a unit root cannot be rejected for the following variables: log of real consumption (lc), log of public consumption (lcp), log of labor income (ly) and the percentage of the population between 18 and 64 years of age (P1864). As far as w/y is concerned, the presence of a unit root is marginally rejected. Although this test tends to accept the null hypothesis if the series present break points, the KPSS, whose null hypothesis is that the series do not possess unit roots, yields similar results. The principal differences between the two tests are that KPSS suggests lcp to be I(0) and w/y to be I(1)[4].

Table 1

	TEST DICKEY-FULLER				TEST KPSS
Variable	**Test**	**Critical Values McKinnon α: 10%**	**Lags**	**Ljung-Box (Residuals) Lags:12**	**Critical Values α: 10% η_t: 0.119 η_μ: 0.347 Barlett Window: 6**
lc	t_t: -3.13	-3.36	0	0.656	η_t: 0.138
lcp	t_t: -3.26	-3.36	1	0.885	η_t: 0.093
ly	t_t: -1.83	-3.36	0	0.716	η_t: 0.153
w/y	t_t: -3.55	-3.38	1	0.792	η_t: 0.119
r	t_μ: -4.42	-2.60	0	0.777	η_μ: 0.291
vol	t_t: -3.91	-2.60	0	0.758	η_t: 0.104
P1864	t_t: -2.17	-3.36	1	0.982	η_t: 0.194

Note: lc, lcp and ly stand for log of real private consumption, real public consumption and real labor income, respectively; w, r and vol represent wealth, real interest rates and volatility of labor income, respectively. Finally, P1864 represents the percentage of the population between 18 and 64 years of age.

[4] A more rigorous testing procedure should show that the first difference of the non stationary variables is I(0).

The next step after establishing the order of integration of the variables was to test for cointegration. This test is important since, as pointed out by Granger and Engle (1987), in order to have an ECM representation of the data it is necessary to have cointegration of the variables involved in the long run solution. The variables included were those suggested by the PIREH (i.e. those included in equations 4 and 6) plus one of the variables omitted from the long run relationship implied by that hypothesis (i.e. dependency ratio, public consumption and the proxies of income uncertainty and financial liberalization)[5]. As a consequence, if cointegration was found in several of these relationships, an equal number of ECM representations were estimated. Cointegration was tested using the Johansen (1988) procedure and the lag length of the VAR was determined using three criteria: Akaike, Schwarz and Hanna and Quinn. In those cases were there was any difference among them, the decision was taken based on those criteria suggesting the same lag length. The results are presented in Table 2 where the critical values are adjusted using Cheung and Lai's (1993) criteria for finite samples. The long run solution implied by the largest eigenvalue and the cointegrating parameters have been normalized on real per capita consumption. In the cases where more than one cointegrating relationship was found, the cointegrating vector was chosen on the basis of economic criteria and always corresponded to the first vector of the β matrix[6]. Several points are worth pointing out about the long run relationships:

(1) The semi-elasticity of consumption to the real interest rate is always negative and varies between 0.006 and 0.01. As a consequence, in the long run real consumption per capita increases between 0.6% and 1% if the real interest rate decreases one point.

[5] Therefore, with the exception of the last row of Table 2, no more than 5 variables were included in the long run solution due to lack of degrees of freedom.

[6] The results presented in Table 2 could be subject to several criticisms. The most severe of them is that the long run solutions should show at least two cointegrating vectors since the real interest rate is stationary according to the AD and KPSS tests (eventually, it should show three cointegrating vectors if w/y is I(0)). Still, the results of the univariate stationary tests are not necessarily relevant for the multivariate Johansen's cointegration test. Moreover, the argument would only be important for the long run solution including public consumption, which is the one that obtains 1 cointegrating vector. An additional criticism is that there is an identification problem arising from the existence of several cointegrating vectors. Nevertheless, given that the selection of the cointegrating vector was based not only on economic criteria but was always the first vector of the B matrix, there is more certainty about the long run equilibrium relationship.

The large and negative effect of real interest rates upon consumption indicates that higher real interest rates tend to increase household savings. This result contrasts with the usual finding in the Colombian consumption literature. In fact, Easterly (1994) found a significant and positive effect of real interest rates upon consumption, result that is theoretically possible. In addition, Ocampo et.al (1985) did not find any empirical relation between interest rates and saving and, using the Euler equation approach, Giovannini (1985) and López (1994) found no evidence of a relation between consumption growth

Table 2

System	Lag	Observations	Statistical Test			Cointegrating Vector
			LM Max.	r	Adjusted Critical Value	
lc ly w/y r P1864*	2	40	29.0 26.5 21.7 6.3 0.03	0 1 2 3 4	27.9 22.8 17.9 14.1 3.6	1, -1, -0.11, 0.009, 0.001
lc ly w/y r lcp	1	41	35.6 13.3 8.4 3.7 0.02	0 1 2 3 4	23.7 19.6 15.2 12.1 3.1	1, -0.62, -0.045, 0.006, -0.188
lc ly w/y r vol	2	38	42.1 26.4 11.1 5.5 0.3	0 1 2 3 4	28.4 23.3 18.2 14.3 3.7	1, -0.98, -0.06, 0.01, 0.33
lc ly w/y w/yfl r vol	2	38	46.1 29.9 16.5 10.9 5.1 1.2	0 1 2 3 4 5	36.0 30.5 25.1 19.6 15.5 3.9	1, -0.88, -0.03, -0.06, 0.008, 0.833

* The cointegrating vector presented for this system restricts the elasticity of consumption to labor income to be equal to 1. This restriction was not rejected by a LR test. In fact, it was found that a CHISQ (1) had a p value of 0.84.

and real interest rates. Nevertheless, Ogaki, Ostry and Reinhart (1994) also obtained a significant and negative effect of real interest rates upon consumption using Colombian data. Adopting a two-good framework that distinguishes between traded and nontraded goods, they found an elasticity of substitution between real interest rates and consumption of 0.6.

(2) The impact of government spending on private consumption is not clear. On one hand, there might be crowding out effects of government spending upon private consumption through the interest rate, variable that has been held constant in the analysis. However, the long run elasticity of private consumption to public consumption is 0.18, suggesting that the latter complements the former. This indicates that private and government consumption rise or fall together and is consistent with the fact that there are some categories of public spending (like national defense, health and education) that probably complement, rather than substitute, private consumption (see Bean (1986), Karras (1994)). This result does not contradict Corbo and Schmidt-Hebbel (1991). According to them, raising public saving through consumption cuts is more effective in increasing national saving than raising taxes. However, given that they found a small but negative effect of public expenditure cuts on the private saving rate, their result would be reinforced if public spending complements private consumption.

(3) There is a small effect on consumption coming from demographic influences: it decreases 0.1% if the percentage of the population between 18 and 64 years of age increases in 1 point. Given that this percentage increased from 44% in 1970 to 56% in 1993 as a consequence of the baby boom of the 1950s and 1960s, the demographic factor cannot explain the long run decline of the household saving rate observed in the last 20 years, but suggests that this tendency can be accentuated when the baby boomers retire. The importance of the life-cycle hypothesis in Colombia was previously stressed by Ramirez (1992). Using the income-expenditure survey, he showed that the saving rate increased with age and declined after retirement.

(4) Income uncertainty induces precautionary savings. The long run elasticity implied by the cointegrating vector indicates that consumption decreases 0.33% if income uncertainty increases 1 point. This estimate is significantly smaller than the 1.3 obtained by

Muellbauer and Murphy (1989) using U.K data. However, the reduced income volatility observed in the 1960s and 1980s might help explaining part of the consumption booms observed in those years (see López, et.al (1996) and López (1996)). In fact, the volatility measure declined from 4.7% in the 1950s to 3.1% in the 1960s and fell to 2.8% in the 1980s after being 3.2% in the 1970s. Nevertheless, given that the volatility measure increased to 3.3% during 1991-1993, its behavior does not help to explain the moderate increase in consumption observed in the 1990s.

(5) Given that financial liberalization has been one of the most popular explanations of consumption's behavior in the 1990s, it is perhaps surprising that the evidence of this effect is not strong. In fact, when this variable was included in the set of explanatory variables no evidence of cointegration was found. However, it could be possible to argue that the effects of financial liberalization are captured by the measure of wealth since it includes the relative price effects present in the housing market. As a consequence, given the housing price inflation experienced in the late 1970s and in the second half of the 1980s (Figure 2)[7], it does not seem unreasonable to suggest that part of this inflation was fed by the slow and interrupted process of financial liberalization that started in the mid 1970s. This type of argument has been suggested by Currie, Holly and Scott (1990) for the case of the U.K. and in Colombia could be relevant since most of the long run relationships presented in Table 2 vanished when the measure of physical wealth did not include a relative price effect in the housing stock.

The weak evidence of financial liberalization as a determinant of private consumption in Colombia contradicts the common explanations of consumer's behavior (see, among others, Urrutia and López (1994)). Therefore, the effects of financial liberalization upon consumption were explored further. In particular, since wealth attracts different propensities to consume depending on its liquidity (Pissarides (1976)), financial liberalization could have affected consumption by increasing the propensity to consume out of wealth. Under credit rationing, households cannot use their wealth as collateral but

[7] Figure 2 does not show a significant increase of housing prices in the 1990s. This could indicate a problem in the National Accounts data given the casual evidence of its presence during this decade. In any case, Figure 2 shows that housing inflation was higher than CPI inflation in the 1990s and a small increment was observed in 1992.

the situation changes if credit is relaxed leading to a rise in personal sector's debt. In other words, with financial liberalization households might regard their illiquid wealth as more fungible than previously. If that is the case, the coefficient β_2/β_3 in equation (6) should have increased during the period of financial liberalization (see Muellbauer and Murphy (1989)). In order to test this implication, that equation was substituted by :

$$\ln c = \beta_0 - \gamma_1 r + \beta_3 \ln y + (\beta_2/\beta_3 + \beta_4 fl)w/y \tag{7}$$

where fl is the proxy of financial liberalization. The cointegration analysis including the effects of financial liberalization yielded stationarity in the error term (or plausible economic results) only when income uncertainty was added to the system (last line of Table 2). Muellbauer and Murphy (1989) estimated the coefficient $\beta 4/\beta_2/\beta_3$ in 43% and considered that this was an evidence of a behavior shift resulting from the liberalization of credit in the U.K. In the case of Colombia, the increase fungibility of illiquid assets seems to be overestimated since it is equivalent to 184%. It might be that this is due to the proxy of financial liberalization (credit of the financial sector to the private sector). In fact, given that the aim is to measure the effects of this variable on household consumption, credit to households would have been a better proxy. However, this data was not available for the period under consideration.

Therefore, the results presented in Table 2 suggest that the effects of financial liberalization upon consumption in the 1990s have been overestimated. As argued in the introduction, this should not be a surprising result given that between 1991 and 1993 the explanatory power of financial liberalization is limited by the fact that the higher rate of consumption growth was matched by a similar increase in labor income. Moreover, the financial reforms of the 1990s should be seen as part of the slow and interrupted process of financial liberalization that started in Colombia in the mid 1970s. On the one hand, the reforms were an important step towards abandoning a history of financial repression since they eliminated forced investments, abolished the funds subsidizing credit and relaxed norms that restricted competition in the financial sector. On the other hand, in 1991 the financial liberalization process was reversed by a measure imposing a 100% marginal reserve requirement on deposits.

3.3 The Consumption Function in the Short Run

Having found cointegration in the systems presented in Table 2, the next step was to estimate an ECM specification. If the latter is interpreted as a partial adjustment model derived under adjustment costs, rational expectations and intertemporal optimization (see Kennan (1979), Nickell (1985)) it can be interpreted as a servomechanism in which the long run solution is what the outcome would be if consumers were rational and took into account the constraints they face (i.e., adjustment costs, credit rationing, income uncertainty) (See Hendry, Muellbauer and Murphy (1990), Cuthberson, Hall and Taylor (1993)).

Imposing the long run solution implied by the Johansen procedure, the following models were the last step of a reduction procedure:

$$\underset{(1.32)}{\Delta lnc = 0.013} + \underset{(7.44)}{0.684\Delta lny} - \underset{(-3.10)}{0.0017\Delta r_{t-1}} - \underset{(-1.88)}{0.001\Delta r_{t-3}} + \underset{(1.94)}{0.159\Delta lny_{t-6}}$$
$$- \underset{(-1.75)}{0.102}(lnc-lny-0.11w/y + 0.009r + 0.001P1864)_{t-1} \qquad (8)$$

$R^2 = 0.75$; DW=1.93; $\sigma = 0.019$; L-B p-Value: 0.969(4); Breush-Godfrey p value: 0.86 (1), 0.84 (4); Jarque-Bera: p-value: 0.56; Arch1: p-value: 0.87; Arch4: p-value= 0.93; White: p-value: 0.1; Reset: p-value: 0.12 (1)

$$\underset{(2.99)}{\Delta lnc = 0.573} + \underset{(8.18)}{0.681\Delta lny} - \underset{(-1.89)}{0.0011\Delta r_{t-1}} - \underset{(-1.69)}{0.001\Delta r_{t-3}}$$
$$- \underset{(-2.98)}{0.235}(lnc-0.615lny-0.045w/y + 0.006r - 0.188lcp)_{t-1} \qquad (9)$$

$R^2 = 0.76$; DW=2.11; $\sigma = 0.019$; L-B p-Value: 0.381(4); Breush-Godfrey p-value: 0.66 (1), 0.39 (4); Jarque-Bera: p-value: 0.46; Arch1: p-value: 0.81; Arch4: p-value: 0.69; White: p-value: 0.13; Reset: p-value: 0.43 (1)

$$\underset{(2.15)}{\Delta lnc = 0.068} + \underset{(7.47)}{0.664\Delta lny} - \underset{(-2.35)}{0.0015\Delta r_{t-1}} - \underset{(-1.79)}{0.0009\Delta r_{t-3}}$$
$$- \underset{(-2.13)}{0.12}(lnc-0.98lny-0.06w/y + 0.01r + 0.334vol2)_{t-1} \qquad (10)$$

$R^2 = 0.73$; DW=2.18; $\sigma = 0.020$; L-B p-Value: 0.482(4); Breush-Godfrey p-value: 0.66 (1), 0.39 (4); Jarque-Bera: p-value: 0.39; Arch1: p-value: 0.21; Arch4: p-value: 0.46; White: p-value: 0.10; Reset: p-value: 0.43 (1)

$$\Delta lnc = 0.543 + 0.701\Delta lny + 0.05\Delta flw/y - 0.0009\Delta r_{t-3} + 0.139\Delta lny_{t-6}$$
$$\quad (5.87) \qquad (8.84) \qquad (2.22) \qquad (-1.91) \qquad (1.91)$$

$$-0.387(lnc-0.88lny-0.033w/y-0.061flw/y+0.008r+0.833vol)_{t-1} \qquad (11)$$
$$(-5.89)$$

$R^2 = 0.80$; DW=2.13;$\sigma = 0.017$;L-B p-Value: 0.10(4);Breush-Godfrey p value: 0.54 (1), 0.33 (4); Jarque-Bera: p-value: 0.63; Arch1:p-value: 0.41; Arch4:p-value= 0.95; White: p-value: 0.94; Reset: p-value:0.34 (1)

These equations were estimated by OLS. The treatment of Δlny, Δr, Δlncp and Δflw/y as valid contemporaneous conditioning variables could be open to question due to potential contemporaneous from Δlnc. However, as will be seen in the next section, efficient inference is guaranteed because these variables are weakly exogenous for the parameters of interest. In other words, efficient estimation and testing can be conducted by analyzing the conditional models (8)-(11), ignoring the information of the marginal process generating Δlny, Δr, Δlncp and Δflw/y. The models pass all the misspecification tests, including the hypothesis of parameter constancy. The only exception is model 8 which, according to the CUSUM statistic, has severe signs of instability at the end of the period. Graphs 3 to 10 report CUSUM[8] tests and one step forecast errors with $\pm$ two standard errors from equations (7) to (10) [9]. The signs of instability reported in the sequence of one step forecast errors do not have to be a subject of concern. In fact, if a critical value of 95% is selected, one should expect 5 out of 100 tests to exceed the critical value since each test is independent of each other.

In the above ECM representations the error correction term varies between -0.10 and -0.38. However, the ECM coefficient in the model that allows for a demographic effect (equation 8) is only marginally significant. In addition, the effect of this term in the model that allows for fungibility of illiquid assets due to financial liberalization (equation (11)) seems to be too strong when compared to other studies. For example, Hendry, Muellbauer and Murphy (1990) and Currie, Holly and Scott (1990) found an ECM

---

[8] A more rigorous check on the constancy of the model is the test of parameter constancy proposed by Hansen (1992).

[9] CUSUMSQ statistics were also performed and yielded similar results. In addition, the ECM coefficient from equations (7) to (10) was computed recursively. In all the cases it was found that its t value was increasing with time and was significant for most of the sample period. These results are not reported in order to save space but are available upon request.

coefficient of -0.15 and -0.21, respectively. As far as the other coefficients is concerned, their signs agree with intuition. The ECM representations suggest that consumption growth will rise between 0.66% and 0.7% if the contemporaneous change in income is incremented in 1% and there is also a small but significant negative effect of the change in the real interest rate at time t-1 and t-3 in equations (8) to (10). Although it might be difficult to give an economic interpretation to the significant influence upon current consumption of changes in the real interest rate at time t-3, the most puzzling result is the significant effect of changes in labor income at t-6 in equations (8) and (11) and might just be a symptom of misspecification. Therefore, it seems prudent to dismiss these equations as a valid representation of the change in consumption in the short run not only

Figure 3

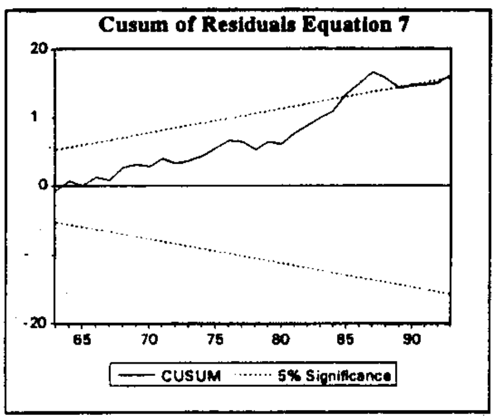


Figure 4

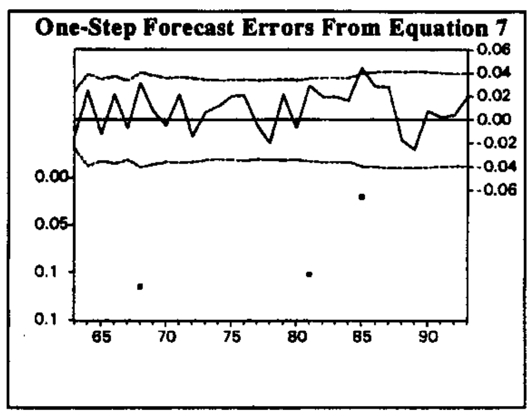


Figure 5

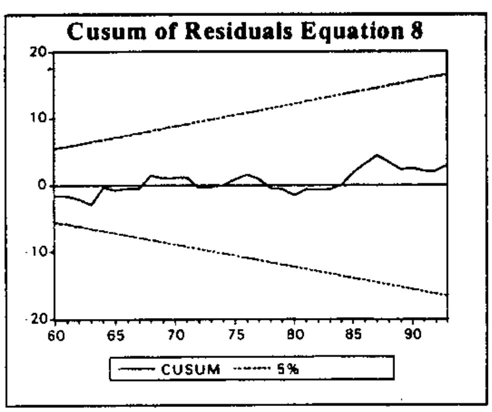


Figure 6

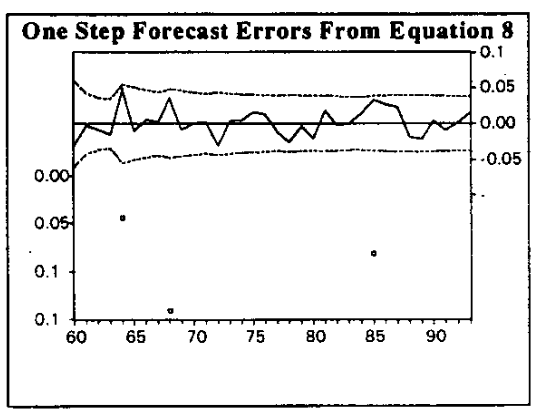


Figure 7

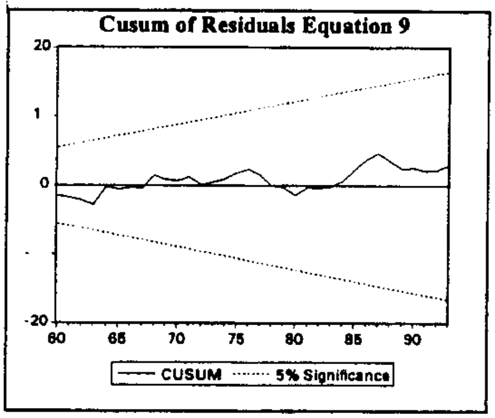


Figure 8

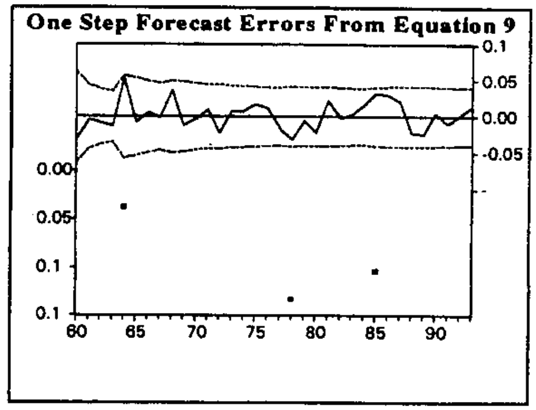


Figure 9

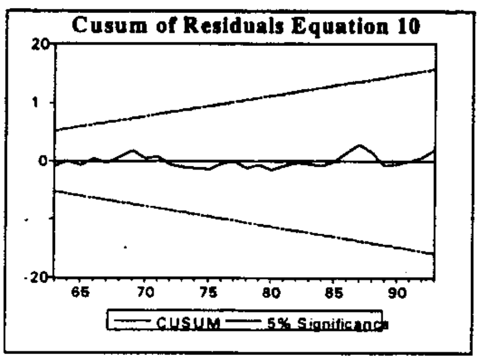
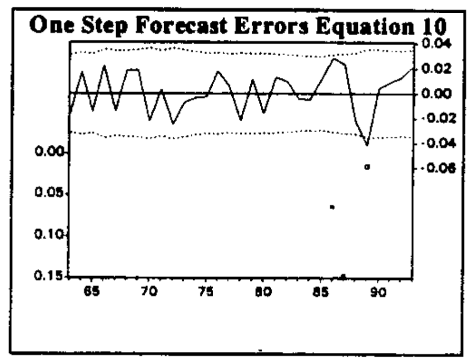


Figure 10



because of possible misspecification problems but also due to the signs of instability of equation 8 (figure 3) and the high ECM coefficient of equation (11). Under these circumstances, equations (9) and (10) should be selected as our best models for the short run Colombian consumption function. Nonetheless, a final step is required. It is important to test if these models are relevant for policy analysis. As will be seen in the next section, this issue becomes one of testing for super exogeneity.

3.4 Testing Exogeneity

3.4.1 An Overview of the Theory

According to Ericsson (1993) a variable is exogenous if it can be taken as "given" without any loss of information for the specific purpose the researcher is interested in.

Engle, Hendry and Richard (1983) defined three types of exogeneity, depending on the purpose of the research. If the interest is statistical inference and estimation, weak exogeneity is required and its existence reduces the modeling effort. On the other hand, if the purpose is forecasting or policy analysis the variables at hand should be strong and super exogenous, respectively. The presence of the latter plays a central role in applied economics because it implies that a conditional model is immune to the Lucas' (1976) critique of econometric policy evaluation.

In order to perform econometric analysis the relevant model has to be obtained from the unknown Data Generating Process (DGP) by reduction operations including sequential conditioning and marginalizing with respect to irrelevant variables (Hendry and Richard (1983)). Using the notation of the consumption function, the reduction procedure can be written as:

$$J(c_t, x_t | F_t; \Theta) = C(c_t | w_t, F_t; \beta)\, M(w_t | F_t; \gamma) \qquad (12)$$

where J, C and M represent the joint density, the conditional density of consumption, c, given w and the marginal density of w, respectively. Θ, β and γ are the parameters of J, C and M. The unknown DGP is the joint density function of the data. Therefore, x_t includes variables that the researcher might not take into account at the time of analyzing consumption. F_t is the sigma field and consists of present and past values of c and x and past values of other valid conditioning variables. In the process of reducing the DGP, the researcher dismiss some variables and, consequently, is interested in consumption given w_t (i.e. given income, wealth, interest rates, and the other variables included in equations (8)- (11)). If in this process important information is lost, it would imply inefficient or inconsistent inferences.

The variables w_t are weakly exogenous for a set of parameters of interest, ψ, if: (1) ψ is a function of β alone and (2) if β and γ are variation free. These conditions imply that even if there is perfect knowledge of γ, this information will not be useful for the improvement of the estimate of β during a period in which both parameters are constant. It should be clear that tests for weak exogeneity require modeling the marginal variables w_t, and special care has to be taken to reject it due to misspecification of the marginal process. If weak exogeneity is found and consumption does not Granger cause w_t, the latter will be strongly exogenous for ψ. Finally, w_t will be super exogenous for ψ if β is invariant to changes in policy makers' rules, via γ, and the Lucas' critique will be rejected. Under this circumstances, super exogeneity will be violated if w_t is not weakly exogenous and/or there is lack of invariance (For a detailed analysis of the three types of exogeneity see, among others, Engle, Hendry and Richard (1983), Engle and Hendry (1993), Ericsson (1993)).

The concept of constancy is strictly related to invariance and is central to tests of super exogeneity. In fact, as explained by Ericsson (1993), two common tests of the relevance of the Lucas' Critique include: (1) Establishing the constancy of β and the non constancy of γ since this implies that the former is invariant to the latter. It is important to notice that part of this test was already carried out in Section 3.3. In fact, the Graphs presenting one step forecast errors of equations (8) to (11) showed that the parameters of the ECM representations of Colombian consumption (i.e. the β_s) did not present any signs of instability. (2) Having found a well specified marginal model, add the variables included in it and test if they are significant in the conditional model (i.e. in the ECM representation of consumption). If they are not significant, the β_s are invariant to changes in the marginal process generating the variables w. This test takes the following form and is implemented in the next section (see Engle and Hendry (1993)):

$$\Delta c_t = \Delta w_t \beta_0 + ECM_{t-1}\beta_0 + \beta_0 \hat{\eta}_t + \beta_1 \hat{w}_t^2 + \beta_2 \sigma_t^{ww} + \beta_3 \hat{w}_t \sigma_t^{ww} + \varepsilon_t \qquad (13)$$

where ECM represents the cointegrating relationship, $\hat{\eta}_t$ are the residuals from the marginal process and $\beta_1 \hat{w}_t^2 + \beta_2 \sigma_t^{ww} + \beta_3 \hat{w}_t \sigma_t^{ww}$ proxies the variance of that process. Weak exogeneity implies a zero effect from $\hat{\eta}_t$ and invariance is present if $\beta_1 = \beta_2 = \beta_3 = 0$. The intuition behind introducing a proxy of the variance of the marginal process is that it should vary with regime's shifts. Therefore, super exogeneity will be present if variation in the marginal process are not transmitted to the consumption model.

3.4.2 Testing Exogeneity in the Colombian Consumption Function

As discussed in section 3.2, it was decided to dismiss equations (8) and (11) because they are difficult to interpret in economic terms and because the former presents severe signs of instability at the end of the sample. In the present section tests of exogeneity are presented only for the equation (9) which is the model that includes public consumption[10]. The first step is to specify the marginal models for the w_s in equation (9), i.e. income and real interest rates. The models are the following:

$$\underset{(5.16)}{\Delta \ln y = 0.033} - \underset{(-1.56)}{0.0015\Delta r_{t-1}} - \underset{(-1.98)}{0.323\Delta \ln y_{t-2}} + \underset{(3.64)}{0.066\Delta(w/y)_{t-4}} \qquad (14)$$

$R^2 = 0.32$; DW=1.56;$\sigma = 0.032$;L-B p-Value: 0.38(4);Breush-Godfrey p value: 0.28 (1), 0.05 (4); Jarque-Bera: p-value: 0.69; Arch1:p-value: 0.63; Arch4:p-value= 0.70; White: p-value: 0.52; Reset: p-value:0.12 (1)

$$\underset{(0.89)}{\Delta r = 0.925} - \underset{(-3.75)}{0.541\Delta r_{t-1}} - \underset{(-2.99)}{68.2\Delta \ln y_{t-2}} + \underset{(1.52)}{15.1\Delta \ln cp} \qquad (15)$$

$R^2 = 0.34$; DW=2.06;$\sigma = 5.16$;L-B p-Value: 0.99(4);Breush-Godfrey p value: 0.65 (1), 0.99 (4); Jarque-Bera: p-value: 0.09; Arch1:p-value: 0.25; Arch4:p-value= 0.62; White: p-value: 0.07; Reset: p-value:0.86 (1)

Once the marginal models have been estimated the next step is to implement the test explained in the last section (i.e. equation (12)):

$$\Delta \ln c = \underset{(2.87)}{0.708} + \underset{(2.47)}{0.96\Delta \ln y} - \underset{(-1.57)}{0.001\Delta r_{t-1}} - \underset{(-0.77)}{0.0004\Delta r_{t-3}}$$

$$- \underset{(-2.85)}{0.29}(\ln c - 0.615\ln y - 0.045w/y + 0.006r - 0.188lcp)_{t-1} \qquad (16)$$

$$\underset{(-0.54)}{-0.22\,\hat{\eta}(\Delta \ln y)} \underset{(-0.93)}{-5.72\,\Delta \ln \hat{y}^2} \quad \underset{(-1.51)}{-3.83\,\hat{\eta}^2(\Delta \ln y)} \underset{(-0.63)}{-3.02\,\Delta \ln \hat{y}\;\; \hat{\eta}(\Delta \ln y)}$$

$R^2 = 0.81$; DW=2.12;$\sigma = 0.018$

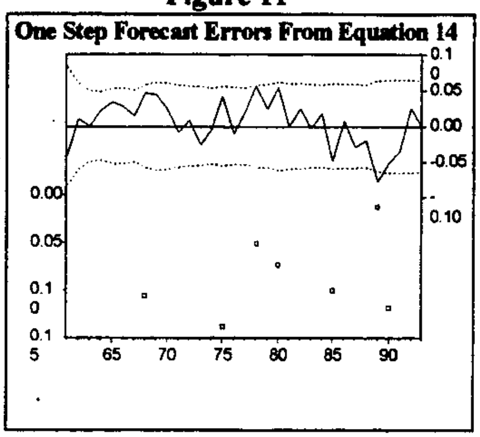
Equation (16) is the test for weak and super exogeneity of real per capita labor income for the parameters of interest in the consumption function specified in equation (9). As can be seen, this variable is weakly exogenous for the β_s since the residuals from the marginal process generating $\Delta \ln y$ are not significant. Moreover, the term proxying the

[10] The exogeneity tests for the remaining model (i.e. that which includes income uncertainty) were performed but are not reported to save space. However, they yielded similar results and are available upon request. It might be possible to argue that this testing procedure is not valid if more than one cointegrating vector has been found. However, notice that the tests of exogeneity are presented only for equation (9) which is the model with only one cointegrating vector.

variance of the marginal process of labor income is not significant, suggesting that our conditional model of Colombian consumption is not subject to the Lucas' critique[11].

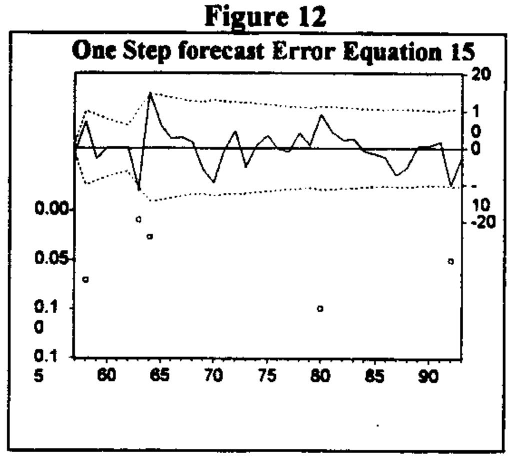
As mentioned in the last section, an additional test for super exogeneity of the marginal process generating labor income and real interest rates is to show that the β_s are invariant to γ. In section 3.3 it was shown that equation (9) had no serious signs of instability in its parameters (Figures 5 and 6). However, as can be seen in Figures 11 and 12, the marginal processes reveal non-constancy in its parameters, specially that of labor income. In addition, these breaks do not coincide with a period in which equation (9) exhibits constancy problems. Therefore, the β_s remain constant when γ varies implying that super exogeneity holds.

Figure 11



One Step Forecast Errors From Equation 14

Figure 12



One Step forecast Error Equation 15

4. Conclusions and Final Remarks

The stability of the private saving rate observed between 1970 and 1990 was broken in the early years of this decade when household savings continued its secular decline and corporate savings fall after an unprecedented period of increase. Given that Sanchez et.al (1996) started the study of the rise and fall of corporate savings observed during 1983 and 1994, the aim of this paper was to look at the remaining part of Colombia's private saving puzzle: the secular deterioration of household savings. In order

[11] A Wald test for the last three terms in equation (15) did not reject the null hypothesis that they were equal to 0: its p-value was 0.30. The same result was obtained for the real interest rate but it is not presented in order to save space.

to do so a consumption function derived from the PIREH was extended to capture possible misspecifications such as financial liberalization, income uncertainty, non-separability in the utility function between private and public consumption and a demographic variable measuring the percentage of the population between 18 and 64 years of age.

Contrary to the usual arguments explaining the decline of private savings in Colombia in the 1990s, the results presented in this paper found a weak evidence of financial liberalization upon the growth of consumers expenditure. In this regard, it seems that many observers (among others, Urrutia and López (1994, 1995)) have overestimated the effects of the financial reforms of the 1990s upon private consumption. The paper showed that labor income is a major determinant of consumption in the short run. In fact, all the ECM representations suggested that consumption growth will rise between 0.66% and 0.7% if the contemporaneous change in income is incremented in 1%. Therefore, given that in the 1990s the higher growth of consumption was matched by a similar increase in the rate of growth of labor income, the potential importance of financial liberalization as an explanation of consumption behavior is reduced.

According to the different ECM specifications, there is a negative and large effect of real interest rates upon consumption. Although in the short run the semi elasticity of consumption changes to real interest rates variation is low, in the long run real consumption per capita increases between 0.6% and 1% if the real interest rate decreases one point. As a consequence, it seems that higher interest rates increase household savings, a result that contrasts with the traditional lack of relationship between interest rates and savings found in empirical papers using Colombian data. The econometric evidence also suggests that precautionary savings and public consumption are determinants of private Colombian consumption.

The consumption booms of the early 1960s and 1980s could be partly explained by a reduction in income volatility but, given its increase in the 1990s, this variable does not help to explain the moderate rise of private consumption observed in this decade. On the other hand, it seems that public consumption complements household spending. This reinforces the idea that public expenditure cuts are the most efficient way in which government saving can increase the national saving rate and suggests that the unprecedented increase in public consumption in the 1990s is partly responsible for the recent decline in household savings. Although the rise in public consumption did not cause a decline in the public saving rate since taxes were also increased, the latter could have had an additional negative effect on the private saving rate. This issue is an empirical matter that deserves a careful investigation in Colombia given that private disposable income has had a permanent deterioration since the 1950s, closely related to tax increases (see, López (1996) and López, et. al (1996)).

Finally, the paper showed that the marginal processes for real interest rates and labor income are weakly exogenous for the parameters of the ECM specification of the Colombian consumption function. This result, together with the invariance of its parameters to changes in those of the marginal processes, suggest that the estimated consumption functions can be used for policy analysis since they are not subject to the Lucas critique. Moreover, it implies that the ECM specifications can not be considered as a reduced form of the PIREH.

References

-Aschauer, D. (1985), "Fiscal Policy and Aggregate Demand", *The American Economic Review*, 75, 117-127.

-Bagliano, F. (1992), "Do Anticipated Tax Changes Matter? Further Evidence From the United Kingdom", *Quaderni dell'istituto di Economia Politica G. Prato*, 4, 1-30.

-Barsky, G.B., Mankiw, N. G. and Zeldes, S. P. (1986), "Ricardian Consumers with Keynesian Propensities", *American Economic Review*, 76, 676-691.

-Bean, C. (1986), "The Estimation of the "Surprise" Models and the "Surprise" Consumption Function", *The Review of Economic Studies*, 53, 497-516.

-Bernanke, B.S. (1985), "Adjustment Costs, Durables, and Aggregate Consumption", *Journal of Monetary Economics*, 99, 587-614.

-Campbell, J. (1987), "Does Saving Anticipate Declining Labor Income? An Alternative Test of the Permanent Income Hypothesis", *Econometrica*, 55, 1249-1273.

-Campbell, J. and Deaton, A. (1989), "Why is Consumption so Smooth?", *Review of Economic Studies*, 56, 357-374.

-Campbell, J. and Mankiw, N. (1991), "The Response of Consumption to Income: A Cross-Country Investigation", *European Economic Review*, 35, 723-767.

-Campbell, J. and Shiller, R. (1988), "Interpreting Cointegrating Models", *Journal of Economic Dynamics and Control*, 12, 505-522.

-Chan, L. (1993), "Uncertainty and the Neutrality of Government Financing Policy", *Journal of Monetary Economics*, 11, 351-372.

-Cheung, YW. and Lai, K. (1993), "Finite-Sample Sizes of Johansen's Likelihood Ratio Tests for Cointegration", *Oxford Bulletin of Economics and Statistics*, 55, 313-328.

-Corbo, V. and Schmidt-Hebbel, K. (1991), "Public Policies and Saving in Developing Countries", *Journal of Development Economics*, 36, 89-115.

-Currie, D., Holly, S. and Scott, A. (1990), "A Seasonal Error Correction Model of UK Aggregate Consumption", *Discussion Paper No. 22-90*, Centre for Economic Forecasting, London Business School.

-Cuthberson, K., Hall, S. and Taylor, M. (1992), *Applied Econometric Tecniques*, Ann Arbor, The University of Michigan Press.

-Davidson, J., Hendry, D., Srba, F. and Yeo, S. (1978), "Econometric Modeling of the Aggregate Time-Series Relationship between Consumers' Expenditure and Income in the United Kingdom", *Economic Journal*,88, 661-92.

-Deaton, A. (1990), "Savings in Developing Countries: Theory and Review", *World Bank Economic Review*, Special Issue, Proceedings of the World Bank Annual Conference on Development Economics, 61-96.

-Deaton, A. and Muellbauer, J. (1980), *Economics and Consumer Behavior*, Cambridge University Press.

-Easterly, W. (1994), "Colombia: Avoiding Crises through Fiscal Policy", in Easterly, W., Rodriguez, C. and Schmidt-Hebbel, K. (eds.), *Public Sector Deficits and Macroeconomic Performance*, The World Bank, Oxford University Press.

-Echeverry, J.C. (1996), "Short Run Savings Fluctuations and Export Shocks: Theory and Evidence for Latin America", Borradores Semanales de Economía, 48, Banco de la República.

-Engle, R. and Granger, C. (1987), "Cointegration and Error Correction: Representation, Estimation and Testing" , *Econometrica*,51,251-276.

-Engle, R. and Hendry, D. (1993), "Testing Super Exogeneity and Invariance in Regression Models", *Journal of Econometrics*, 56, 119-139.

-Engle, R., Hendry, D. and Richard, J.D. (1983), "Exogeneity", *Econometrica*, 51, 277-304.

-Ericsson, N. (1994), "Testing Exogeneity: An Introduction", in *Testing Exogeneit,* Ericsson, N. and Irons, J. (eds.), Oxford University Press, 2-37.

-Favero, C. (1992), "Error Correction and Forward-Looking Models for the U.K. Consumers'Expenditure", Queen Mary and Westfield College, University of London, *Working Paper No 290.*

-Favero, C. and Hendry, D. (1992), "Testing the Lucas Critique: A Review", *Econometric Reviews,* 11, 265-306.

-Flavin, M. (1981), "The Adjustment of Consumption to Changing Expectations about Future Income", *Journal of Political Economy*, 89,974-1009.

-Flemming, J. (1973), "The Consumption Function when Capital Markets are Imperfect:The Permanent Income Hypothesis Reconsidered", *Oxford Economic Papers,* XXV, 160-172.

-Giovannini, A. (1985), "Saving and the Real Interest Rate in LDC's", *Journal of Development Economics,* 18,197-217.

-Hall, R.E. (1988), "Stochastic Implications of the Life-Cycle-Permanent-Income Hypothesis:Theory and Evidence", *Journal of Political Economy*, 86, 972-987.

-Hansen, L. and Singleton, K. (1982), "Generalized Instrumental Variables Estimation of Nonlinear Rational Expectations Models", *Econometrica*, 50, 1269-1286.

-Hansen, B. (1992), "Testing for Parameter Instability in Linear Models", *Journal of Policy Modeling*, 14, 517-534.

-Hayashi, F. (1987), "Tests for Liquidity Constraints: A Critical Survey and Some New Evidence", in T. Bewley (ed.), *Advances in Econometrics, Fifth World Congress*, vol. 2., Cambridge University Press, 91-120.

-Hendry, D.F. (1988), "The Encompassing Implications of Feedback versus Feedforward Mechanisms in Econometrics", *Oxford Economic Papers*, 40, 132-149.

-Hendry, D. and Richard, J.F. (1983), "The Econometric Analysis of Economic Time Series", *International Statistical Review*, 51, 111-163.

-Hendry, D., Muellbauer, J. and Murphy, A. (1990), "The Econometrics of DHSY", in *A Century of Economics: 100 Years of the Royal Economic Society and the Economic Journal*, edited by Hey J. and Winch D., Oxford:Basil Blackwell.

-Herrera, S. (1988), "Evolución, Situación Actual y Perspectiva del Mercado de Capitales en Colombia", in *Macroeconomia, Mercado de Capitales y Negocio Financiero*, XI Simposio sobre Mercado de Capitales, Asobancaria, 34-93.

-Johansen, S. (1988), "Statistical Analysis of Cointegrating Vectors", *Journal of Economic Dynamics and Control,* 12, 231-54.

-Karras, G. (1994), "Government Spending and Private Consumption:Some International Evidence", *Journal of Money, Credit and Banking*, 26, 9-22.

-Kennan, J. (1979), "The Estimation of Partial Adjustment Models with Rational Expectations", *Econometrica*, 47, 1441-55.

-López, A. (1994), "La Teoria del Ingreso Permanente y las Restricciones de Liquidez en Colombia", in Steiner, R. (ed.), *Estabilización y Crecimiento*, Tercer Mundo Editores-Fedesarrollo, Bogotá, Colombia.
-López, A. (1996), "Why Did Colombian Private Saving Decline in the Early 1990s?", *Mimeo*, The World Bank.
-López, A., Gómez, C. and Rodríguez, N. (1996), "La Caída de la Tasa de Ahorro en los Años Noventa: Evidencia a Partir de una Base de Datos para el Período 1950-1993", *Mimeo*, The World Bank-Banco de la República.
-Lucas, R.E. (1976), "Econometric Policy Evaluation: a Critique", in Brunner, K. and Meltzer, A. (eds.), *The Phillips Curve and Labour Markets*, 19-46, Amsterdam North Holland (Carnegie-Rochester Conference series on Public Policy, vol.1).
-Mankiw, N., Rotemberg, J. and Summers, L. (1985), "Intertemporal Substitution in Macroeconomics", *Quarterly Journal of Economics*, 100, 225-251.
-Muellbauer, J. (1983), "Surprises in the Consumption Function", *Conference Paper Supplement of the Economic Journal*, 34-49.
-Muellbauer, J. and Bover, O. (1986), "Liquidity Constraints and Aggregation in the Consumption Function Under Uncertainty", *Discussion Paper 12*, Oxford Institute of Economics and Statistics.
-Muellbauer, J. and Murphy, A. (1989), "Why has U.K. Personal Saving Collapsed?", *CSFB Economics*.
-Nickell, S. (1985), "Error Correction, Partial Adjustment and All That: An Expository Note", *Oxford Bulletin of Economics and Statistics*, 47, 119-30.
-Ocampo, J.A., Londoño, J.L., and Villar, L. (1985), "Ahorro e Inversión en Colombia", *Coyuntura Económica*, 93-141.
-Ogaki, M., Ostry, J. and Reinhart, C. (1995), "Saving Behavior in Low and Middle Income Developing Countries: A Comparison", *IMF Working Paper*, WP/95/3.
-Pissarides, C. (1976), "Liquidity Considerations in the Theory of Consumption", *Quarterly Journal of Econometrics*, 279-296.
-Pòterba, J. (1988), "Are Consumers Forward Looking: Evidence from Fiscal Experiments", *American Economic Review Papers and Proceedings*, 78, 413-418.
-Ramirez, M. (1992), "El Ahorro en Colombia", in Sarmiento, E. (ed.), *Cambios Estructurales y Crecimiento*, 109-141, Ediciones Uniandes, Bogotá, Colombia.
-Sanchez, F., Murcia, G. and Oliva, C. (1996), "La Dinámica de la Inversión y el Ahorro Empresarial en Colombia:1983-1994", *Mimeo*, Departamento Nacional de Planeación-InterAmerican Development Bank.
-Urrutia, M. and López, A. (1995), "El Ahorro en Colombia: Determinantes y Comportamiento Reciente", *Revista del Banco de la República*, Notas Editoriales, August.
-Urrutia, M. and López, A. (1994), "La Relajación de las Restricciones de Liquidez y el Aumento del Consumo Privado", *Revista del Banco de la República, Notas Editoriales*, August.

Data Appendix

For the period 1970-1993 the series are taken from "Departamento Nacional de Estadística" (DANE). Before 1970 the series are taken from López, et.al (1996). They use a procedure that allows the joint of the National Accounts produced by DANE with those produced by El Banco de la República for the period 1950-1980. The procedure has the advantage that the basic macroeconomic identities are maintained but it does not solve the problems of coverage in the public sector implicit in the period 1950-1969. The variables are defined as follows:

P: Consumer Price Index constructed by DANE since 1954. Before that year the cost of living index for Bogotá was used.

π: Is the Annual ex-post inflation rate of the CPI.

c: C/P where C is nominal per capita private consumption.

cp: CP/P where CP is nominal per capita public consumption.

y: Y/P where Y is nominal per capita labor income.

fl: Total financial credit to the private sector. The variable is taken from El Banco de la República.

w: (Bp + SKHp + SKDHp + DPp)/P where Bp is the nominal monetary base hold by the private sector and DPp is public debt held by the private sector. SK is the nominal stock of private capital and it was constructed allowing for a relative price effect in the housing market. In particular, physical wealth of the private sector (SK) was constructed as follows. First, real private investment was divided between investment in housing and other buildings (IH) and investment different from housing and other buildings (IDH). Second, following Harberger's methodology (1969), the stock of each of these real series was calculated assuming that IH and IDH depreciated in 40 and 20 years, respectively (i.e. $\delta = 0.025$ and $\delta = 0.05$). Finally, the effects of asset inflation were tried to be captured multiplying the real stock of IH by its implicit deflator presented in the National Accounts and making the strong assumption that the relative price effect of IDH was equal to 1.

r: R - π. R is the nominal interest rate. For the period 1950-1979 it is the so called "market rate" in Carrizosa (1985). For the period 1980-1993 it is the interest rate on three-month deposits on the "certificado de depósito a término" (CDT) and is taken from El Banco de la República.

P1864: Percentage of the population between 18 and 64 years of age. This variable is taken from Victor Vergara, Departamento Nacional de Población, Unidad de Desarrollo Social, División de Indicadores y Orientación del Gasto Social.