Wealth Effects in the Consumption Function of an Emerging Economy: Argentina 1980-2000

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Abstract

The effects of wealth on consumers´ expenditure have been widely studied since a long time ago, but a recent literature has suggested that consumers´ decisions respond to "wealth perception". This work models aggregate consumption of Argentina trying to identify such effects over a period of great macroeconomic variability. The results show that national disposable income is the only long-run determinant of private consumption and two proxies for adjusting wealth are adopted by the consumers in the short-run: a measure of real exchange rate and an effect from last peak income. Other determinants are also discussed.

Key words: consumption function – wealth perception – short and long-run determinants – liquidity constraints.

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* The views expressed herein are solely the responsibility of the authors and should not be interpreted as those of the Central Bank of Argentina.

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1. Introduction

The effects of wealth on consumers´ expenditure have been widely studied since a long time ago, in particular, after the pioneering work of Ando and Modigliani (1963). They introduced the "life cycle" hypothesis as part of the early studies formulated to reconcile the low short-run marginal propensity to consume from income with the relatively stability of the average propensity, as it was the well-known theory of "permanent income" due to Friedman (1957) (and Duesenberry (1949), Brown (1952)). A revival of the discussion around the wealth effects was motivated by Hall's work (1978) that took an alternative approach to the study of the life cycle – permanent income hypothesis. In his rational-expectation stochastic version of this hypothesis no variable apart from consumption lagged one period should be of any value in predicting current consumption. From this work, the Euler approach to the consumption function has been developed being dominant in empirical applied research in the U.S. Meanwhile, another approach has been based on the solved out consumption function concentrating on time-series properties of the data after the path-breaking work of Davidson, Hendry, Srba and Yeo (1978).

In the case of emerging economies, several studies have analysed consumers´ expenditure focussing particularly on the role of interest rates and liquidity constraints. However, in the case of unstable economies like Argentina – subject to structural changes from economic reforms generally following deep economic and political crises – the role of wealth effects deserves a more careful assessment.

For this kind of environment, Heymann and Sanguinetti (1998) have suggested that consumers´ behaviour responds to "wealth perception" (for which they meant to be an expectation formed with incomplete information) and leave open the question about how it should be empirically defined. In this direction, and given the different nature of shocks, a unique and time-invariant determinant of wealth, which could be used as instrument for consumption decisions, may not exist. Inflation, real exchange rate and debt default risk premium are studied as different "summary" measures of adjusting "wealth". This paper is aimed at modelling an aggregate consumption function for Argentina during the last two decades, a period of large macroeconomic variability. In brief, the eighties were characterised by high-inflation with hyper-inflation outbreaks and low activity level. Instead, the nineties showed price-stability along with income expansion, although unemployment and external indebtedness also increased.

Next section presents a review of the literature on the consumption function, in particular, to summarise the income-wealth discussion focussing also on empirical issues of interest for emerging economies. Section 3 presents a description of the Argentine data, the econometric results and discusses an interpretation of these results in terms of liquidity constraints. Section 4 evaluates such findings in relation to alternative models and it is divided in: (1) an asymmetric effect inflation, (2) liquid assets and interest rates, (3) wages and unemployment, (4) stock prices and (5) demographic variables. Section 5 presents the conclusions.

2. A review of the literature

The relationship between consumers´ expenditure and income has been undoubtedly one of the first and most intensively researched topics in macro-econometrics. Beginning with the interpretation of the Keynes´ hypothesis, the definition of a "consumption function" evolved from the early studies – formulated to reconcile the observed low short-run marginal

propensity to consume from income with the relatively stability of the average propensity – particularly due to the well-known theories of "permanent income" and "life cycle" (Duesenberry (1949), Brown (1952), Friedman (1957) and Ando and Modigliani (1963)). These theories are still part of the current discussion (as in Carroll (2001)).

Among the earlier studies, Duesenberry emphasised the effect of cyclical factors incorporated in his Relative Income Hypothesis (RIH), which merits investigation for empirical modelling of time-series aggregates on quarterly basis (like those employed in this paper). In the RIH, the ratio of current saving to current income depends on the ratio of current income to past peak income, Y_0,

$$S_t / Y_t = \alpha + \beta (Y_t / Y_0) + u_t \qquad (1)$$

where S_t = current savings, Y_t = current disposable income and Y_0 = previous peak disposable income. Thus, Duesenberry's RIH embodied two different hypotheses: in the long-run, savings are proportional to income ($Y_t = Y_0$) and in the short-run, the proportion of income saved (and consumed) depends (asymmetrically) on cyclical factors (Y_t = or < Y_0).

Also to reconcile short and long–run behaviour of the observed consumption function, Friedman (1957) proposed the theory of "permanent income" (PIH). In this framework, the level of consumption depends on current and expected future income stream, that is,

$$C_t = \theta Y_{pt} + \mu_t \qquad (2)$$

where μ_t is independent of Y_{pt} and has finite variance, and where Y_{pt} is "permanent income". The approximation of Y_{pt} presented by Friedman (1957) was $(1-\lambda L)\, Y_{pt} = (1-\lambda)\, Y_t$, to obtain

$$C_t = \theta(1-\lambda)\,(1-\lambda L)^{-1}\, Y_t + \mu_t \qquad (3)$$

The wealth effect on the consumers´ expenditure was also introduced in this literature after the pioneering work of Ando and Modigliani (1963). Often, this effect has been analysed as the life-cycle hypothesis (LCH) exposited by Modigliani (1975) in which private consumption is modelled as,

$$C_t = \alpha Y_t + (\delta - r) A_t \qquad (4)$$

where A_t is the end period private wealth and r is the rate of return on assets. If capital gains and interest are included in income A_t is defined as $A_t = A_{t-1} + Y_{t-1} - C_{t-1}$; replacing in (4) and reordering,

$$C_t = \alpha Y_t + (\delta - r - \alpha) Y_{t-1} + (1 - \delta + r)\, C_{t-1} \qquad (5)$$

which produces (similarly to Friedman's PIH) an autoregressive-distributed lag model of C_t and Y_t.

In addition, the LCH has introduced the effect of demography to the standard definition of consumption function as it could be seen as a solution to an optimisation over an individual's life cycle and thus, the different behaviour of consumers according to their age should be considered.

Since these earlier formulations a large amount of macroeconomic research has been interested in various and/or different aspects of the life-cycle permanent income hypothesis, but as Muellbauer and Lattimore (1995) indicate "1978 was a milestone for research on the

aggregate consumption function". Two papers of this year proved to be key pointers of the following research: Davidson, Hendry, Srba and Yeo (1978) (DHSY) and Hall (1978).

DHYS formulated an "error correction" (EC) model for the dynamic response of real consumers´ expenditure on non-durables to real personal disposable income (Y). They estimated (for the UK) an equation, which also included the change rate of prices (P), like the next one,

$$\Delta_4 c_t = \alpha_1 \Delta_4 y_t + \alpha_2 \Delta_1 \Delta_4 y_t + \alpha_3 \Delta_4 p_t + \alpha_4 \Delta_1 \Delta_4 p_t + \alpha_5 (c_{t-4} - y_{t-4}) + \varepsilon_t \qquad (6)$$

where the lower case letters represent the log of the corresponding capital letters. Equation (6) is a reparameterisation of an autoregressive-distributed lag model[1] of the (log) level of the variables as suggested by the LC-PIH (equation (3) and (5)). DHYS paper is seen in the literature as setting the scene for the next work on cointegration of non-stationary time series (Engle and Granger (1987)).

Hendry and Ungern-Sternberg (1981) (HUS) continued the DHSY formulation of an error correction for the dynamic response of real consumers´ expenditure on non-durables to real personal disposable income including the real personal liquid assets as an "integral correction". As most households were aware of their liquid asset position and the losses on their liquid assets are the major component of their financial loss during inflationary periods, the product of the rate of inflation and liquid assets should be taken into account for relating perceived to measured income. They extended the DHSY model making a re-interpretation of the role of the inflation variable, recalculating the real income by subtracting a proportion of the losses on real liquid assets due to inflation and yielding a ratio of consumption to perceived income, which resulted more stable. They concluded that during the periods of rapid inflation the conventional measure of disposable income could not be a good proxy of the real income and also found negative income effects of inflation on consumers´ expenditure.

Hall (1978) proposed -and opened the way for- an alternative econometric approach to the study of the life cycle–permanent income hypothesis. Modelling an intertemporal consumption decision by a "representative consumer" with "rational expectations", he showed the stochastic implication of the LC-PIH: no variable apart from the same consumption lagged one period should be of any value in predicting current consumption. To evaluate this hypothesis (for the US[2]) some equations were estimated including as regressors, apart from lagged values of consumption, real per capita disposable income, whose coefficients on lagged terms were found to be insignificant. With these results Hall concluded that the evidence[3] supports a modified version of the LC-PIH in which the consumption follows an approximate random walk as derived from the Euler equations (first order conditions of the consumers´ maximisation problem) in the simplest model.

Davidson and Hendry (1981) questioned the validity of Hall's model for the United Kingdom data given that DHSY and HUS had found a model which encompassed a random walk formulation of consumers´ expenditure. Based on Monte Carlo experiments, they also demonstrated that if an "Error Correction model" were the "true data generating process", the random walk model would also be a good description of the data; that is, a formulation of the consumption equation as a random walk with an autonomous error process generated independently of income, liquid assets and other variables. Moreover, they remarked that the stochastic implications obtained by Hall (1978) could be expressed as: "no other potential lagged variables Granger-cause the residuals of the equation $C_t=\alpha_0+\alpha_1 C_{t-1}+\varepsilon_t$". Since Granger–causality (or just anticipation) is a different concept from "exogeneity" (as discussed in Engle, Hendry and Richard (1980)) this finding did not preclude that shocks in "current income" had effects on current consumption as in the DHYS and HUS models. In other

words, Hall´s residuals are white noise but not necessarily “innovation” (see Hendry (1995)) with respect to an information set which includes “current” income.

Empirical modelling of Hall’s hypothesis was further developed based on the estimation of a dynamic rational expectation model by using the Generalised Method of Moments (GMM). Halls (1978) had obtained his conclusions estimating directly, from aggregate data, the first order condition being consumers as well informed as the econometricians studying their behaviour. If expectations were formed rationally, the errors in forecasting would be uncorrelated with the information people had available at the moment of the forecast. When econometricians could observe the subset of information people used, the rational expectations approach suggests the orthogonality conditions to be used for GMM. An application of this approach to the consumption function using GMM was presented by Hansen and Singleton (1982).They considered a model for real consumption expenditure of the aggregate United States (divided by population) as a measure of the level of spending on consumption goods by a particular stockholder and used lagged consumption growth rates and lagged rates of return as instruments (elements of the subset of the stockholder´s information set that the econometrician was also able to observe), which are assumed to be uncorrelated with the errors (the set of orthogonality conditions) to estimate the unknown parameters of the consumption function.

Following another direction of research on the permanent income hypothesis Campbell and Mankiw (1989) suggested that the time-series data on consumption, income and interest rates were best viewed as generated not by a single forward-looking consumer but by two types of consumers: (i) forward-looking consumers which consume their permanent income, but were extremely reluctant to substitute consumption intertemporally in response to interest rate movements and (ii) “rule of thumb” consumers which consume their current income. Thus, because of ii) the change in aggregate consumption responds to the change in current income.

More recent literature on consumption considered the liquidity constraints as the most popular explanation of why Hall´s consumption model failed (Muellbauer and Lattimore (1995)). Flavin (1981), using time series analysis to quantify the revision in permanent income, reported that consumption is excessively sensitive to income, a conclusion that has been interpreted as evidence of the fact that liquidity constraints are important for understanding consumers´ expenditure. Muellbauer and Lattimore (1995) considered that credit constraints could offer an explanation for the excess sensitivity of consumption to predictable income changes. While the Hall-type stochastic Euler equation of consumption (consumption depending on the previous lagged consumption) holds for the credit unconstrained consumers (1-π), credit constrained ones (π) consume their current income,

$$\Delta c_t = (1-\pi)\Delta c_t^{u} + \pi\Delta c_t^{c} = (1-\pi)\varepsilon_t + \pi\Delta y_t^{c} \qquad (7)$$

where the change in income for credit constrained would be proxied by the change in average non-property income. Thus taking expectations $E_{t-1}\Delta c_t = \pi E_{t-1}\Delta y_t$ which is not zero and could provide an explanation of the excess sensitivity of changes in consumption to anticipated income changes.

Another issue related to the analysis of the aggregate time-series behaviour of consumption is the “excess smoothness” or “Deaton paradox” (Deaton (1987)) based on the empirical fact observed in the US and other countries that consumption is much smoother than income. Muellbauer and Lattimore (1995) explains the “Deaton paradox” as follows “...in the simplest case of a random walk, income innovations are permanent and, by the rational expectations permanent income hypothesis, consumption should then vary at least as much as income”.

Muellbauer and Lattimore (1995) also indicated that credit constraints could offer a "potential explanation of an error correction form of the consumption function". Previous literature had suggested this interpretation. Using an alternative way of expressing the link between DHSY and credit constraints, Muellbauer and Bover (1986) solved an intertemporal optimisation problem subject to the credit constraint in Lagrangian form. The shadow price of the credit constraint at time t-1 resulted to be dependent on $E_{t-1}y_t - c_{t-1} = E_{t-1}\Delta y_t + y_{t-1} - c_{t-1}$ like the terms in DHYS form. They also found evidence for an expectational form of DHSY for the US.

Emphasising the effect of liquidity constraints for the consumption of developing countries that substantially diminishes consumers´ ability to substitute consumption intertemporally, Rossi (1988) estimated an approximation to the Euler equation incorporating credit constraints. He considered that consumers who are liquidity constrained at t may not expect to be constrained at (t+1) and may therefore be forced to let their consumption path follow more closely their income path. From the estimation results, using panel data for developing countries, he concluded that the expected growth of consumption would change (although in small magnitude) with variations in the real interest rate once that credit constraint were taken into account controlling by equilibrium correction models of consumption-income.

A related issue to liquidity constraints is the effect of "precautionary saving" (Deaton (1991), Carroll (1992)), the inability to borrow when times are bad provides an additional motive for accumulating assets when times are good, even for relative impatient consumers. Deaton (1991) showed that, with borrowing restrictions, the behaviour of saving and assets accumulation is sensitive to the consumers´ beliefs about the stochastic process that was generating their income. He found that "the more prudent are consumers and the more uncertain is income, the greater is the demand for these precautionary balances". But he also found that, in the limit, when income was a random walk, the consumers who wish to borrow could not do "better" than consume their incomes. This "rule of thumb" behaviour is optimal; the combination of the persistence of the random walks and the binding liquidity constraints precludes the accumulation of assets. Deaton (1991) analysed the difference between microeconomic income process and their macro aggregates and found that, although the behaviour of patient and impatient consumers respect to accumulation of wealth is different, some component of aggregate fluctuations in income growth were common to all consumers and could generate savings in the aggregate.

The behaviour of the "rule of thumb" consumers was reconsidered by DeJuan and Seater (1999), who used the 1986-1991 U.S. Consumer Expenditure Survey micro-data to test the permanent income life-cycle hypothesis against the alternative hypotheses of "rule of thumb" and also, liquidity-constrained consumers. The Euler equation they considered for estimation, which nests the permanent income life-cycle hypothesis and the "rule of thumb" consumers, is,

$$\ln(C_{i,\,t+1}/C_{it}) = B_0 + B_1 r_{i,\,t+1} + B_2 \ln(F_{i,\,t+1}/F_{it}) + B_3 R_i + B_4 \ln(Y_{i,\,t+1}/Y_{it}) + e'_{i,\,t+1} \quad (8)$$

where C is consumption, Y is real disposable income, R represents those household characteristics that affect the household's rate of time preference, r is the real after-tax interest rate and F denotes family size. Under the alternative hypothesis of liquidity constraints, consumers can never have negative net assets and this constraint of household non-human wealth greater than zero leads to a modified version of equation (8): the consumers´ response to positive changes in consumption should be greater than that to negative changes ($B_4^+ > B_4^-$). In the case of "rule of thumb" consumers, instead, they should have the same response to positive and negative changes ($B_4^+ = B_4^-$). Their principal finding of this work is that consumption behaviour is consistent with permanent income life-cycle hypothesis. They did not find evidence that current income movements "cause" changes in

total consumption (or in several subcategories of consumption). Their results did not support the liquidity constraints hypothesis either.

Hall's pioneering work found that changes in stock prices lagged by a single quarter were found to have a modest value in predicting the changes in consumption. Then Campbell and Mankiw (1989) remarked that "...Hall (1978) concluded that the evidence favours the permanent income hypothesis even though he reported formal rejections using stock prices...". Recently, Bertaut (2002), investigated the strength of wealth effect on consumption arising from higher equity values in industrial countries. Using calibration, equity prices as a proxy for equity wealth and wealth data itself, Bertaut (2002) found significant wealth effects in the United Kingdom and Canada of a size comparable to that in the United States, reflecting the importance of equities in aggregate household wealth. She also found that the wealth channel was no significant in explaining Japanese consumers´ behaviour. In continental European countries, her results showed modest consumption responses reflecting the relatively small shares that equities still occupy in aggregate household wealth, however in some small European countries where equity issuance is more common she found that wealth effects may be more important. Bertaut´s error correction results showed relatively slowly responses of consumption to either wealth or income changes, so consumption could not have responded completely to the most recent run up in equity prices in the industrial countries.

A different approach, more related to unstable economies, which also studies wealth effects on aggregate expenditure, was developed by Heymann and Sanguinetti (1998) who emphasised that consumption reflects the behaviour of "wealth perception". They considered that decisions about consumption are made taking into account future opportunities on spending, production and the supply of credit and individuals base their expectations on their beliefs about the behaviour of the economy as a whole. Growth in aggregate output could widen productive opportunities and, to the extent that wealth perceptions react positively to those expectations, individuals would then plan a higher consumption. However they argued that when an economy experienced important changes in its configuration (as political or economical reforms), it is very difficult to assume that the individuals introduce immediately these changes[4], they did not postulate that agents automatically know the process generating the relevant variables, and model a learning dynamics of the agents´ behaviour.

Heymann and Sanguinetti (1998) also conjectured that the dynamics of the expenditure would change according to the variations in the previsions of the exchange rate inasmuch as cycles in the perception of wealth have a correspondence to fluctuations in the exchange rate. They argued that in many cases wealth includes the estimated present value of the income of supply of non-tradable goods. Thus, the perception of wealth depends on the present prices of non-tradable goods and the individual's expectation about their future prices [5].

It is worthwhile noting that the effect of the interest rates on consumption was not part of the earlier Euler equation approach as one of the assumptions of Hall´s pioneering work was constant real interest rate. Campbell and Mankiw (1989) called attention to this issue since the random walk theorem for consumption rests crucially on that assumption. Their results showed little or no correlation between expected changes in consumption and ex ante real interest rate (including or not the effect of "rule of thumb"). Campbell and Mankiw concluded that this finding did not imply that "the elasticity of substitution is small", but the modified log linear version of the Euler equation, augmented by real interest rates, $\Delta c_t=\mu+\sigma r_t+\varepsilon_t$ should be rejected.

This version of the Euler equation has been particularly investigated for developing countries. Giovannini (1985) estimated the response of expected rate of growth of aggregate consumption to the expected real interest rate. He found that, in only five of eighteen

developing countries studied, the intertemporal substitutability in consumption was not small, in the majority of cases the response of consumption growth to real rate of interest is slightly different from zero. Rossi (1988) found that Giovannini´s results could be explained by the existence of liquidity constraints above commented, which are pervasive in this kind of countries.

A recent application of DHYS and HUS approach to a developing country is Campos and Ericsson (2000) who modelled consumers´ expenditure on non-durables and services of Venezuela over 1970-1985 with annual data. They presented an equilibrium correction model where consumers are hypothesised to keep expenditure (C) and wealth (W) (approximated by the end-of-year M2) proportional to income (I). Their estimation (involving dynamics) is closed to that obtained by HUS with quarterly data for the United Kingdom. They called attention to the similarity of the relationships even while the time series properties and data moments of the two countries differ markedly. They applied constructive "data mining" to the model and showed how such data mining could be successful empirically even on very short samples.

Previous studies for Argentina showed that lagged values of consumption, current and lagged income and the rate of inflation are the determinants of consumption. Dueñas (1985) found that the Argentine consumption function responded not only to anticipate changes in current income but also to non-anticipated ones, because private agents are liquidity constrained when they determined the optimum level of consumption. Giovannini (1985) concluded that for the Argentinean experience, intertemporal substitution in consumption was never significantly different from zero, when the time deposits interest rate and the rate of return on the foreign investment (proxied by the U.S. Treasury Bill rate) were used. Galiani and Sánchez (1994) following the general to particular methodology found a large effect of current income on consumer's expenditure as well as a channel of transmission of the volatility of inflation to the volatility of aggregate demand via consumer's expenditure. Ahumada, Canavese and Gonzalez Alvaredo (2000) estimated a consumption function, also following the general to particular methodology, in which the determinants of the private consumption were the income and the rate of inflation[6].

This paper empirically studies the consumption function of Argentina focussing on the effects of wealth perception taking into account the characteristic of the Argentine economy. Section 3 explains the model.

3. **Empirical model**

The starting point of the econometric study of the Argentine consumption (on quarterly basis over 1980 (1) - 2000(4) was an unrestricted autoregressive-distributed lag model for private consumption, disposable income and liquid assets. The empirical modelling was based on the principle of general to specific modelling (Hendry (1995)), proposed as desirable either under the Euler approach or the solved out consumption function approach (see Muellbauer and Lattimore (1995)). This analysis showed that only disposable income has a long-run relationship with the consumers´ expenditure of Argentina during the last two decades. A measure of real exchange rate, inflation, sovereign risk and an effect associated with last peak income were then included. The last variables are part of a model for Argentina since it emphasises "wealth perception" and thus adjusts the empirical definition of wealth. Again, only disposable income appears as the only long-run determinant.

Given these results, this section starts performing a deep analysis of the relationship between private consumption and disposable income, which was part of the oldest literature of the keynesian function but also of the more recent one on liquidity constraints and precautionary motives, as discussed in the previous section. Moreover, when an

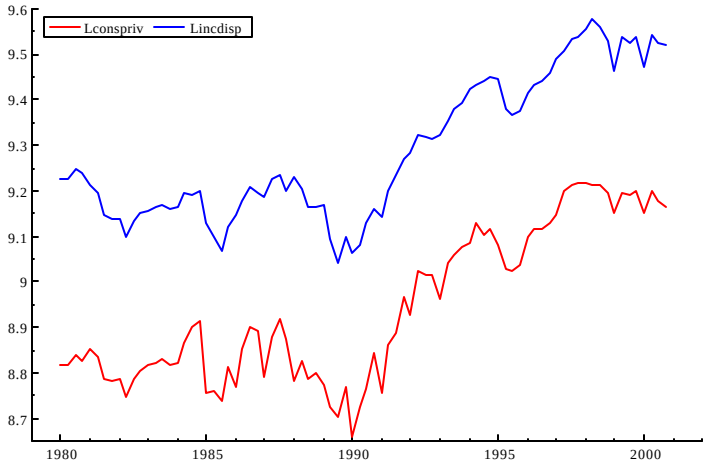
autoregressive-distributed lag specification is adopted (as in DHYS) for modelling this relationship, the life cycle -permanent income hypothesis could be assumed as in equation (5) and (6) from which the proportionality between consumers´ expenditure and income can be derived as a long-run solution. Section 3.1 describes consumption-income data, section 3.2 presents econometric results interpreting them in terms of wealth effects and section 3.3 discusses liquidity constraints.

3.1. Data description

In the life-cycle model (Ando and Modigliani (1963)), the determinants of consumption are labour disposable income and financial wealth. The statistics available for Argentina allow for working only with gross national disposable income[7], which is obtained as the sum of the gross national income and the current net transfers. The private consumer's expenditure series is calculated as the sum of the expenditure on goods and services of private residents and non-profit institutions[8]. These series are measured in thousands of pesos at 1986 over 1980-2000 period (on quarterly basis).

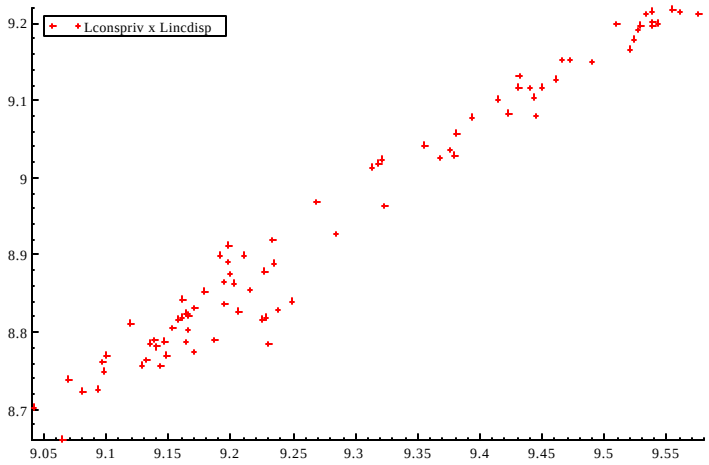
Figure 1 shows the behaviour of the consumer's private expenditure (conspriv) and the national disposable income (incdisp) in logs between 1980 (1) and 2000 (4) and Figure 2 shows a cross–plot of the same variables for such period of time.

Figure 1



From the time-plot inspection, two periods,1980-1990 and 1991-2000, could be distinguished according to the behaviour of both series. Between 1980 and 1989, consumption and income experienced no defined trend and even a strong fall was observed in 1985, just previous to the Austral Plan aimed at controlling the high inflation rates that the economy had been experienced. During the third and fourth quarters of 1989 and the beginning of 1990 the values of both private consumption and gross national disposable income considerably decreased. This was the hyperinflation period. Since the beginning of the Convertibility plan (1991) and during the periods of economic reforms carried out by the economic authorities in a context of exchange-rate and price stability, the two aggregates presented a positive trend. However, they suffered a considerable reduction in 1995, with the "Tequila" crisis, and also in 1998 and 1999, with the Russian and Brazilian crisis. These episodes changed the "mood" for "sustainability" of emerging markets. With them, also doubts about the permanence of the Argentine exchange-rate regime and the probability of external debt default were developing, given the increasing indebtedness of Argentine during the nineties.

Figure 2



In spite of the two different periods observed in Figure 1, the co-movements of both variables seem to maintain a strong positive linear relationship (the correlation coefficient is 0.986), as Figure 2 shows. This suggests the long–run relationship between private consumption and gross national disposable income, which was econometrically studied taking into account time series properties.

Finally, a startling feature of the Argentine data is that the consumption volatility exceeds international standards. It is just the opposite to the fact on which the Deaton Paradox was based. The relative excess of consumption volatility where huge for the old national accounts estimates (Kydland and Zarazaga (1997)). For the series analysed, private consumption is 7 % more volatile than disposable income.

3.2. Econometric results

The features of private consumption and disposable income of Argentina previously described are econometrically studied through the (joint) modelling of the consumption/income process considering the integrated nature of these series. It also leads to the exogeneity issue, which should be evaluated in order to validate a conditional model of consumption on disposable income. The analysis of cointegration, using the system-based procedure from Johansen (1988) and Johansen and Juselius (1990) for the whole sample (first quarter of 1980 to fourth quarter of 2000) is presented below.

lconspriv and lincdisp system

1981(1) to 2000(4) (4 lags and d88,d892,d893 and constant unrestricted)

λi	Ho:r=p	Maxλi			Tr		
0.296	p==0	28.18**	25.36**	11.4	30.94**	27.85**	12.5
0.033	p<=1	2.765	2.488	3.8	2.765	2.488	3.8

MAX λ_i is the maximum eigenvalue statistic(-Tlnλ_i)and Tr is the Trace statistic(-Tln $\Sigma(1-\lambda_i)$ for each statistic the second column presents the adjusted by degree of freedom and the third the 95% (Osterwald-Lenum,1992)critical values (See Hendry and Doornik (1997)).

	α		β´	
Δlconspriv	-0.60133	-0.085455	1.0000	-0.96395
Δlincdisp	-0.03421	-0.079089	-1.0463	1.0000

α is the matrix of standardised weight coefficients and β′ the matrix of eigenvectors (cointegration vectors and their weights in bold)

LR test(r=1)

Ho: α1=0; Chi^2(1) = 7.2904 [0.0069]**
Ho: α2=0; Chi^2(1) = 0.0386 [0.8441]
Ho: β2=-1; Chi^2(1) = 0.30817 [0.5788]

LR is the likelihood ratio statistics assuming rank =1

The bivariate system shows that private consumption (lconspriv) and national disposable income (lincdisp) have one long-run (cointegration) relationship with vector coefficient of (1,-0.96). Also LR tests indicate the validity of the conditional model of lconspriv on lincdisp (rejecting $\alpha_1=0$ and not rejecting $\alpha_2=0$) that is, the disequilibria from the cointegration relationship entering only in the private consumption equation[9]. Besides, since a long-run coefficient of income ($-\beta_2$) equal to 1 is not rejected, the long-run homogeneity between consumption and income could be assumed. Therefore the relationship between these two variables could be model as a simple version of an equilibrium correction model (of the form of DHSY (1978), Davidson and Hendry (1981)) :

$$\Delta lconspriv_t = \delta_0 + \delta_1 \Delta\, lincdisp_t - \delta_2(\, lconspriv_{t-1} - lincdisp_{t-1}) + \varepsilon_t$$

Hendry and Ungern-Sternberg (1981) continued the DHSY formulation of an error correction including the real personal liquid assets as an “integral correction”. The liquid assets could be seen as an integral control mechanism over past discrepancies between income and expenditure. Given the lack of suitable data for wealth, the monetary aggregate m3* in real terms was included in the system as a proxy for liquid assets (similarly, Campos and Ericsson (2000) included M2 in the case of Venezuela). No relationship was found between this variable (m3*[10]) and the Argentine consumers´ expenditure.

However, given the characteristics of the Argentine economic history the model of private consumption on disposable income model could be enriched with proxies of “wealth perception” derived from the performance of the economy as a whole, as suggested by Heymann and Sanguinetti (1998). In countries subject to internal and external shocks, consumers should adopt different economic variables as instruments in order to approximate wealth, on which to base their decisions**.** The extended information set also considers three variables: inflation, sovereign risk and a measure of real exchange rate. In addition, the first two variables were analysed for relevant sub-periods.

Inflation (first differences of the logs of consumers prices) could be seen as a proxy of the erosion of the real value of wealth until 1991, previous to the Convertibility regime, a period of high and variable inflation. Even, in this period, Argentina faced the acceleration of inflation until reaching hyperinflation rates.

The sovereign risk could enter since the Tequila crisis 1995 (1) as a measure of sustainability of wealth (and income), when fears of capital inflows reversal from emerging countries appears after the Mexican devaluation. Defined as the spread of interest rates of the Government bonds of U.S.A. and Argentina (in dollars) it is closely related to the domestic interest rate as it represents the effect of its difference from the foreign one that is taken as baseline. This risk could be an indicator about the possibility of public debt re-

payment and could also be related to a exchange rate effect, because private agents could modify their expectations over the changes in real rate of exchange according to changes in country's default risk (see Ahumada and Garegnani (2000)).

Finally, as previously suggested, the real value of the exchange rate could be considered as another measure of wealth. As the exchange rate remained fixed during the Convertibility regime, the ratio of wholesale to consumer prices was taken into account as a proxy. Given the higher participation of tradables/non tradables in the former relative to the second index, this ratio could reflect the relative price of these kinds of goods.

Four systems are presented in the Appendix 3 and the results show that, although the system is expanded to the three variable (altogether or one-by-one in each case), the same conclusions are still maintained : only the private consumption and the national disposable income have a long-run relationship and such relationship is of homogeneity (long-run coefficient equal to 1). Thus the econometric analysis continued with a "general" model that included an equilibrium correction term of the consumption-income (from a 1 to 1 long-run relationship) and the indicators of a wealth effect that did not enter in the long-run relationship but could be part of the dynamics: inflation for the pre-Convertibility period, the sovereign risk since Tequila crisis and the measure of the real exchange rate.

Apart from these variables, an asymmetric effect of rising and decreasing income from past peak was tried for cyclical effects following Duesenberry (1949). As previously explained, he proposed the Relative Income Hypothesis in which the ratio of current saving to current income depends on the ratio of current income to past peak of income, in order to analyse the cyclical variations in the ratio consumption to income.

The estimation started with the model presented in Appendix 4, an unrestricted model with 4 lags to each variable and quarterly dummies that allow for homocedastic white-noise and normal residuals. After simplification the model obtained was,

Equation 1

Dpondcpriv =	+0.02034	+0.925 DLincdisp	+0.2894 efdues
(SE)	(0.003953)	(0.07763)	(0.05223)
	-0.5386 Eqconsprivincdisp_1	-0.1063 drealexchrate34	-0.005419 Dsrteq
	(0.08491)	(0.03597)	(0.002717)
	-0.06163 d871	-0.1154 d881	-0.0477 d931
	(0.02022)	(0.02006)	(0.02028)
	-0.03885 d982		
	(0.02012)		

R^2 = 0.842447 F(9,69) = 40.994 [0.0000] σ=0.0197939 DW=2.10
RSS = 0.02703411943 for 10 variables and 79 observations

The first difference of the sovereign risk, the variable Dsrteq, has as expected a negative coefficient but it is just significant at 5% level. Since recursive estimation indicates that it is not the case for the whole sample, equation 1 was re-estimated without this variable and without the dummy for the Brazilian crisis because the last one resulted no statistically significant once the risk variable is not considered as a regressor[11]. The results are presented in Equation 2.

Equation 2

Dpondcpriv =	+0.01778	+0.9366 DLincdisp	+0.2647 efdues
(SE)	(0.003988)	(0.08025)	(0.0534)
	-0.537 Eqconsprivincdisp_1	-0.1105 drealexchrate34	-0.06074 d871
	(0.08814)	(0.03731)	(0.02099)
	-0.1137 d881	-0.04544 d931	
	(0.02082)	(0.02103)	

R^2=0.825275 F(7,71)=47.907 [0.0000] σ=0.0205491 DW=1.99
RSS = 0.02998075994 for 8 variables and 79 observations

The dependent variable in Equation 2 (and 1) has been linearly transformed as follow:

Dpondcpriv = Lconspriv-0.80*$Lconspriv_{-1}$-0.20*$Lconspriv_{-4}$;

Note that it is a weighted average of the first and four lags, reflecting some kind of seasonal behaviour[12].

Since the first difference in income, the Dlincdisp variable, entered contemporaneously in this equation, instrumental variable (IV) estimation was also carried out using the first lag of this difference and the first lag of the level of the variable lincdisp as IV. The coefficient of Dlincdisp was not statistically different from the one of the previous equation (0.94) but the specification of the model slightly deteriorated in comparison with results of Equation 2.

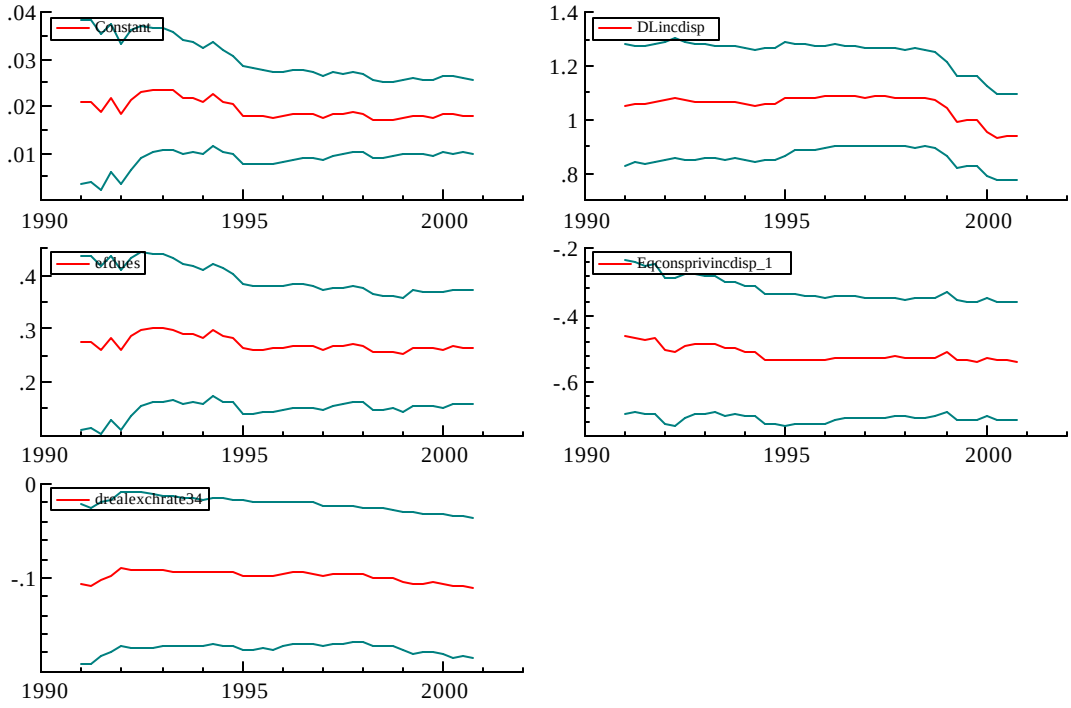
The model presented in Equation 2 indicates that private consumption is determined in the long-run only by national disposable income, the equilibrium correction is significant and has the correct sign. About a half of the disequilibria is corrected in the first quarter. The results also show a short-run effect of national disposable income on private consumption, an increase of 1% in the rate of growth of national disposable income increases the rate of growth of private consumption in 0.94%. However, this variation should be corrected with the Duesenberry´s effect, the estimated coefficient of the efdues variable (difference between the lincdisp of the period less the maximum lincdisp up to this quarter). It shows that if disposable income were growing over the last peak, a rise of 1% would have an impact effect on private consumption of approximately 1.20% (0.94 plus 0.26), that is an overshooting over the long-run effect. If instead, current income is increasing the same 1% but its level is lower than the previous peak, the impact effect is lower than 0.94, that is undershooting the long-run effect[13].

In addition, when the real exchange rate is measured by the ratio of wholesale to consumers prices as a proxy for the relative price of tradables over non-tradables, the change in the real rate of exchange between the third and fourth lag has a significant and negative impact effect on the private consumption of approximately 0.11. The delay in this effect could be due to the period of time the consumers need to adapt their decisions to variables that affect their perception of wealth[14].

Furthermore, the dummy variables included in Equation 2 for the first quarter of 1987 and the first quarter of 1988, coincide with periods of acceleration in the rate of prices growth. Instead, the dummy variable for the first quarter of 1993 could be due to a change in the measure of national accounts from this quarter. However, since all the dummy variables were for the first quarter, they could reflect a differential seasonality for this quarter.

Finally parameters constancy of the model of Equation 2 was evaluated -and not rejected- by their recursive estimation as observed in the next graphics (the recursive estimates of the main coefficients are inside the previous 2 times standard errors intervals).

Recursive graphics



3.3. An interpretation in terms of liquidity constraints?

It is worthwhile noting that the model of Equation 2, which includes an equilibrium correction term, does not admit an interpretation in terms of Rossi's model which follows Muellbauer and Bover (1986) view of DHYS. As explained in section 2, in Muellbauer and Bover (1986) the shadow price of the credit constraint at time t-1 resulted to be dependent on $E_{t-1}y_t - c_{t-1} = E_{t-1}\Delta y_t + y_{t-1} - c_{t-1}$ like the terms in DHYS form and justifies the inclusion of an equilibrium correction term as a way of testing the existence of liquidity constraints. However, it should be noticed that in this expectational form of the equilibrium correction the estimated coefficient of Δy_t and y_{t-1} are equal. In the case of Equation 2 the hypothesis of equal response of consumption to Dlincdisp and to the equilibrium correction term is strongly rejected as could be seen in the next linear restrictions tests.

```
Wald test for linear restrictions: β_Dincdisp=β_Eqconsprivincdisp-1
LinRes  F( 1, 70) = 168.73 [0.0000] **
```

However, another view to interpret these restrictions consists in verifying an asymmetric response of consumption to rising or falling income as DeJuan and Seater (1999) proposed, for whom symmetric effects of income are associated with "rule of thumb" behaviour, instead. Next equation shows the results of assuming different coefficient for increases and decreases in income growth and the statistic for an equal response.

Equation 3

Dpondcpriv =	+0.02043	+0.2685 efdues	-0.5387 Eqconsprivincdisp_1
(SE)	(0.00459)	(0.05597)	(0.08697)
	-0.1113 drealexchrate34	-0.005458 Dsrteq	-0.06251 d871
	(0.03714)	(0.002798)	(0.02083)
	-0.1136 d881	-0.0471 d931	**+0.8515 Dposincdisp**
	(0.02057)	(0.02078)	**(0.1478)**
	+0.9968 Dnegincdip		
	(0.1515)		

R^2=0.834718 F(9,69)=38.719 [0.0000] σ=0.0202736 DW=2.05
RSS = 0.0283603686 for 10 variables and 79 observations

Wald test for linear restrictions: $\beta_{Dposincdisp}=\beta_{Dnegincdisp}$
LinRes F(1, 69) = 0.32877 [0.5682]

According to these results the asymmetric response of consumption to income could not be present since the hypothesis of equal response of consumption to short-run increases and decreases of income is not rejected according to the previous linear restrictions tests.

Given these findings, the consumers' behaviour of Argentina cannot be interpreted in terms of models of liquidity constraints with asymmetric effects as nether can it from the expectational form of equilibrium correction terms. Although a sort of a "rule of thumb" behaviour could be assumed following DeJuan and Seater view on the effect of current income changes, the long run relationship and the equilibrium term representation admits another interpretation. The life cycle – permanent income hypothesis could be assumed from the proportionality between consumers´ expenditure and income derived as a long-run solution. In the short run, not only these desequilibria terms affect the consumption expenditure. The presence of the "efdues" term represents an asymmetric effect of rising and decreasing income as was presented before but it cannot be derived from liquidity constraints since there are income variations from last peak and not from past value. Such an effect can also be part of the adjustment to "wealth as Ando and Modigliani (1963, p.80) express "… if we interpret the role of highest previous income as that of a proxy for net worth, then Duesenberry-Modigliani consumption function can be considered as providing a good empirical approximation to the consumption function…". For the last decades, the Argentine wealth perception needed to be further adjusted by the behaviour of the real exchange rate.

4. Evaluating the econometric results

For the sample and data employed in this study, the results show that national disposable income is the only long-run determinant of private consumption of Argentina. The real exchange rate and the difference between the current disposable income and the previous peak income ("the Duesenberry´s effect") appear to be the variables adopted by the consumers as short-run determinants. In order to perform a deeper evaluation of the resulting model, other effects related to the consumers' behaviour in emerging economies are incorporated to the previous equation. This section is divided as follows: (1) an asymmetric effect of inflation, (2) liquid assets and interest rates, (3) wages and unemployment, (4) stock prices and (5) demographic variables.

4.1. An asymmetric effect of inflation

In an economy with high and variable inflation this variable could be seen as a measure of wealth perception. Since it was surprising that no effect from inflation could be detected previously to the Convertibility plan, it was re-evaluated. Two variables were incorporated but

still resulted insignificant to the model: the first lag of the pre-Convertibility inflation variable and the first difference of this variable.

In order to prove if the no significance of the inflation variable was due to omitted asymmetric effects of inflation on consumption, the inflation growth was introduced dividing it into positive and negative changes. It can be thought that only the "erosion of wealth", as a consequence of rising inflation, could matter for consumers´ expenditure. On the other hand, only a "euphoria" effect could be expected, created by a reduction in the rate of inflation, which overvaluates "wealth ". Alternatively, the estimated coefficient of these effects could be supposed to be different.

Equation 4

Dpondcpriv =	+0.01951	+0.9167 DLincdisp	+0.2917 efdues
(SE)	(0.004298)	(0.09112)	(0.06707)
	-0.1102 drealexchrate34	-0.005339 Dsrteq	-0.535 Eqconsprivincdisp_1
	(0.04099)	(0.002816)	(0.08871)
	-0.06107 d871	-0.1147 d881	-0.04701 d931
	(0.0209)	(0.02076)	(0.02099)
	-0.003839 Dinflpreconvpos	**+0.004575 Dinflpreconvneg**	
	(0.01488)	**(0.01681)**	

R^2=0.834222 F(10,68)=34.219 [0.0000] σ=0.0204528 DW=2.05
RSS=0.02844547146 for 11 variables and 79 observations

Although positive and negative growth of inflation was distinguished, none of them resulted statistically significant for any period of the sample (according to the recursive estimation). Moreover the effect of losses on real liquid assets due to inflation was introduced in the form of the inflation tax. This effect is proxied by the inflation times a monetary aggregate which does not pay interest (m1)[15]. The variable is called inflatm1 and is introduced in its first lag as an additional variable as could be seen in the following equation.

Equation 5

Dpondcpriv =	+0.02008	+0.892 DLincdisp	+0.34 efdues
(SE)	(0.004048)	(0.08315)	(0.07423)
	-0.5292 Eqconsprivincdisp_1	-0.09574 drealexchratet34	-0.005457 Dsrteq
	(0.08672)	(0.03813)	(0.002765)
	-0.06109 d871	-0.1184 d881	-0.04757 d931
	(0.02055)	(0.02067)	(0.02062)
	+0.004272 inflatm1_1		
	(0.003626)		

R^2=0.837206 F(9,69)=39.428 [0.0000] σ=0.0201205 DW=2.08
RSS=0.02793354081 for 10 variables and 79 observations

From the results of Equation 5 and the recursive estimation, it could be concluded that there is no effect of this variable on private consumption. The first difference of this variable was incorporated but also resulted insignificant to the model.

This suggests that no measures of wealth perception related to inflation were found as significant.

4.2 Incorporating liquid assets and the interest rate

For Argentina, the introduction of liquid assets seems particularly relevant due to the recent financial restrictions imposed by the financial reform named locally as "corralito" (which froze deposits from last December). For example, one advantage of relaxing the restrictions on cash retirements, yet under discussion, is based on the possibility of using these funds for

increasing private consumption. Policy makers who sustain this view should have in mind that these liquid assets are part of the "wealth" that influences private consumption.

To analyse this issue the first difference of monetary aggregate m3*[16] is introduced to Equation 2. The results are presented in the Equation 6.

Equation 6

Dpondcpriv =	+0.01814	+0.8518 DLincdisp	+0.2817 efdues
(SE)	(0.004048)	(0.08779)	(0.05544)
	-0.1605 drealexchrate34	-0.005243 Dsrteq	-0.5408 Eqconsprivincdisp_1
	(0.04984)	(0.002751)	(0.09224)
	-0.06332 d871	-0.1116 d881	-0.04568 d931
	(0.02058)	(0.02028)	(0.02052)
	-0.003476 Dm3*		
	(0.01863)		

R^2=0.847687 F(9,53)=32.774 [0.0000] σ=0.0199911 DW=2.25
RSS=0.02118107251 for 10 variables and 63 observations

From the results of Equation 6 and the recursive estimation, there would be no effect of monetary aggregates on private consumption once the real exchange rate and the Duesenberry´s effect are included as measures of "wealth". Similar results were found for first lag of m3*.

Other variable worthwhile analysing is the interest rate. The interest rate plays a fundamental role in asset pricing and as the opportunity cost of consumption (see Giovannini (1985)). However, as the results of Equation 1 has shown, the rate of growth of sovereign risk could be considered as a short-run determinant of private consumption only at 5% and it is closely related to domestic interest rates. In order to prove an additional effect, the level of the real domestic interest rate (rint) for deposits was introduced to the model.

Equation 7

Dpondcpriv =	+0.02028	+0.8933 DLincdisp	+0.3014 efdues
(SE)	(0.004363)	(0.09161)	(0.06375)
	-0.005421 Dsrteq	-0.5485 Eqconsprivicdisp_1	-0.1037 drealexchrate34
	(0.002788)	(0.08809)	(0.03756)
	-0.06052 d871	-0.1132 d881	-0.04667 d931
	(0.02072)	(0.0206)	(0.02075)
	-0.002517 rint		
	(0.003874)		

R^2=0.834941 F(9,69)=38.781 [0.0000] σ=0.02026 DW=2.02
RSS = 0.02832214503 for 10 variables and 79 observations

From these results and the recursive estimation, there is no effect of this variable on the private consumption. Giovannini (1985) also found that for the Argentine experience, intertemporal substitution in consumption was never significantly different from zero considering annual data between 1960-1977.

4.3 The role of wages and unemployment

As Equation 2 has shown, a short-run determinant of private consumption is the real exchange rate when it is approximated by the ratio of wholesale to consumers prices (for the relative price of tradables over non-tradables). Since real wages mainly reflect the behaviour of non-tradables prices (this follow from the assumption that non-tradables are more labour-

intensive than tradables), the changes in the real wage could also be seen as a proxy of the variations in the relative price between non-tradables and tradables and the effects of labour income cannot be clearly disentangled from those of real exchange rate. In order to clarify about the interpretation of the effects of the real exchange rate and the real wages, the first difference of industrial real wages[17] is introduced in Equation 2 replacing for the proxy of the real exchange rate.

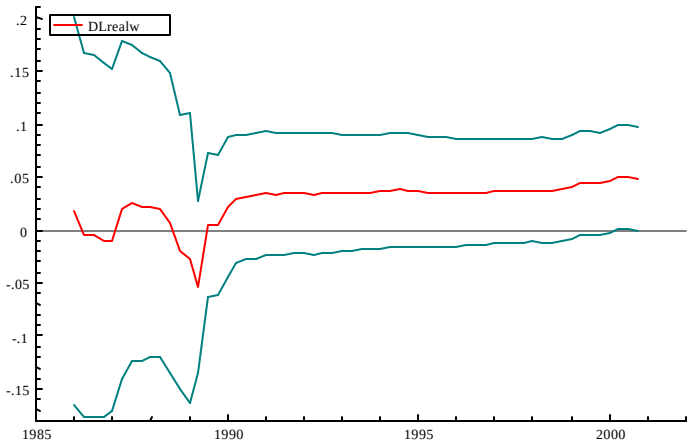
Equation 8

Dpondcpriv =	+0.02194	+0.8998 DLincdisp	+0.3138 efdues
(SE)	(0.004085)	(0.08555)	(0.05439)
	-0.005616 Dsrteq	-0.5716 Eqconsprivincdisp_1	-0.05259 d871
	(0.002858)	(0.08934)	(0.02123)
	-0.1164 d881	-0.04482 d931	**+0.04803 DLrealwage**
	(0.02112)	(0.02133)	**(0.02434)**

R^2=0.82297 F(8,70)=40.677 [0.0000] σ=0.0208314 DW=1.87
RSS=0.03037616035 for 9 variables and 79 observations

Although from Equation 8 the real wage could be considered individually significant at 1% level, the recursive graphic shows it was not the case for the whole sample.

Recursive graphic



The next step was to verify whether or not the industrial real wage was an omitted variable when real exchange rate is included as an explanatory variable. The first lag of the log of this variable was incorporated to the model but was not statistically different from zero for the whole sample.

Another indicator of labour income, the rate of unemployment, was proved for Equation 2. The first lag of this variable and its first difference were introduced to the model of Equation 2 but results showed the non-significance of the unemployment variable for the whole sample.

4.4 Incorporating stock prices

Hall's pioneering work had found that lagged changes in stock prices have a modest value in predicting the changes in consumption. Recently, Bertaut (2002), using equity prices as a proxy for wealth held in equities, has found a significant effect in for explaining consumption behaviour in several industrial countries. The proxy of stock prices considered in this paper is

the stock prices aggregate index known as Merval[18]. This measure, which is available from 1988:1 to 2000:1, could be considered as another proxy of wealth perception. Although it is commonly used as an indicator of the economic performance it should be noticed that the shares of stocks in aggregate wealth of Argentina are relatively small.

In order to investigate the effect of this alternative determinant of "wealth perception" once the other considered before are included in the model, the rate of growth of the Merval (DLmerval) is introduced as an additional explanatory variable.

Equation 9

Dpondcpriv =	+0.01755	+0.8248 DLincdisp	+0.2546 efdues
(SE)	(0.004394)	(0.09756)	(0.07139)
	-0.1349 drealexchrate34	-0.005594 Dsrteq	-0.5551 Eqconsprivincdisp_1
	(0.04406)	(0.002821)	(0.1128)
	-0.04345 d931	**-0.007981 DLmerval**	
	(0.02092)	**(0.00779)**	

R^2=0.825379 F(7,43)=29.035 [0.0000] σ=0.0202497 DW=2.19
RSS=0.01763208849 for 8 variables and 51 observations

From these results and the recursive estimation, there is no effect of this variable on the private consumption once the other measures of "wealth perception" are included.

4.5 Demographic variables

One of the main topics discussed in the literature on consumption is the problem of aggregation[19]. Two different issues regarding the effect of population are next considered: one related to the use of per capita data and the other, associated with the age structure.

There is not a simple translation from a representative agent to aggregate data. For instance, Hansen and Singleton (1982) who models time series data following Euler equation approach, approximated the level of consumption of a particular stockholder as the aggregate consumption divided by population. If he model of Equation 2 were interpreted as derived from the LC-PIH for an individual agent, the use of aggregate data merits validation. Therefore, the model is re-estimated for per capita data: consumption and national disposable income divided by total population.

Equation 10

DLconspc =	+0.009277	+1.026 DLincdispc	+0.1739 efdues
(SE)	(0.004095)	(0.082)	(0.05638)
	-0.07745drealexchrate34	-0.004652 Dsrteq	-0.7469 Eqconsprivincdisp_1
	(0.03875)	(0.002933)	(0.09187)
	-0.07399 d871	-0.1245 d881	-0.04639 d931
	(0.02178)	(0.02157)	(0.02185)

R^2=0.844811 F(8,70)=47.633 [0.0000] σ=0.0213179 DW=2.30
RSS=0.03181182445 for 9 variables and 79 observations

The results of Equation 10 are quite similar to those obtained in Equation 2, so the use of aggregate variables or per capita variables does not change the results obtained in previous sections.

The effects of changes in the population composition could also be taken into account when different age groups have different marginal propensities to consume (as life-cycle hypothesis assumed). In order to evaluate if the previous results could change when the age structure of population is introduced, the proportion of population in the labour force over total population is added in Equation 10 as a proxy[20].

Equation 11

DLconspc =	-0.00506	+1.029 DLincdispc	+0.1692 efdues
(SE)	(0.09269)	(0.0838)	(0.06436)
	-0.07779 drealexchrate34	-0.004696 Dsrteq	-0.7486 Eqconsprivincdisp_1
	(0.03908)	(0.002968)	(0.0932)
	-0.07377 d871	-0.1241 d881	-0.04638 d931
	(0.02198)	(0.02188)	(0.022)
	+0.03588 **eap**		
	(0.2317)		

R^2=0.844865 F(9,69)=41.753 [0.0000] σ=0.0214681 DW=2.29
RSS=0.03180077747 for 10 variables and 79 observations

The results show the non-significance of this demographic variable for the whole sample.

To sum up, no additional effects to those included in Equation 2 were detected from inflation, liquid assets, real interest rates, real wages, unemployment, stock prices and demographic variables.

5.Conclusions

This paper dealt with wealth effects in the consumption function of an emerging economy, Argentina during the last two decades. The integrated nature of the series was considered to evaluate long-run relationships between private consumption, national disposable income, and also several variables that were regarded as useful for measuring "wealth": liquid assets, inflation, sovereign risk and real exchange rate. The results show that national disposable income is the only long-run determinant of private consumption, as well as one of its short-run determinants. The long-run relationship is of homogeneity, but in the short-run the impact effect depends also on cyclical factors. However, consumers' behaviour of Argentina cannot be interpreted in terms of models of liquidity constraints with asymmetric effects neither as an expectational error correction. The presence of an equilibrium correction term suggests that consumption is kept in line with income but only in the long-run as it was maintained by LC-PIH.

Regarding the dynamics of the model of private consumption, not only the national disposable income has an impact, but also there are other effects from two measures of "wealth perception". The proxies adopted by the consumers as short-run determinants appear to be: a measure of real exchange rate and an effect associated with last peak income. When the real exchange rate is approximated by the ratio of wholesale to consumers prices as the relative price of tradable over non-tradables, it has a significant and negative lagged effect. A cyclical effect of the difference between current income and the last peak income is also detected and it reinforced the interpretation in terms of Ando-Modigliani LC-PIH.

Once the previous measures of "wealth perception" were taken into account, variables related to inflation and its asymmetric effect on private consumption could not be found as significant. The role of liquid assets, interest rate, labour income (real wages and unemployment) and demographic variables were also evaluated with no significant additional effects.

Given the ex-post parameter constancy of the model some exercises about the next path of consumers´ expenditure based on the current economic situation could be performed. Firstly, if national disposable income decreases about 10%, private consumption will also decrease about 9% in the next quarter. Considering the Duesenberry´s effect, if national disposable income were a 20% below the last peak value, the additional fall in

private consumption will be more than 5%. Secondly, relaxing financial restrictions imposed by the “corralito” would not have -per se- any effect on private consumption because consumers´ expenditure is dependent on other measures of “wealth” rather than the one associated with liquid assets. Thirdly, isolating the estimated effect of the wholesale to consumers prices ratio during the first quarter of 2002, 32% and 9.7% accumulated respectively, a decrease in private consumption of about 2.5% could be expected in the next third quarter. Then, a stabilisation of real exchange rate appears as a necessary condition to stop consumption falls.

Appendix 1: Data definitions and sources

- *Private Consumption*: Sum of the expenditure in goods and services of private residents and non-profit institutions (thousands of pesos at 1986 prices). Statistical Appendix of Economic Ministry and ECLAC Bs.As.
- *Gross National Disposable Income*: Sum of the gross national income and the current net transfers (thousands of pesos at 1986 prices). ECLAC Bs.As.
- *Real exchange rate*: Ratio of wholesale to consumer prices. INDEC.
- *Interest rate:* Deposit rate. International Financial Statistics-International Monetary Fund.
- *Sovereign Risk:* EMBI of Argentina. Carta Economica (Estudio Broda).
- *Inflation*: ($p_t - p_{t-1}$) being p_t the log of general level of consumers´ prices. INDEC.
- *M1:* Narrow money and current account deposits.
- *M3:* Narrow money and all kind of bank deposits in pesos. *M3** also includes deposits in dollars. B.C.R.A.
- *Real wages:* Industrial real wages. ECLAC Bs.As.
- *Unemployment*: Rate of unemployment. INDEC.

Appendix 2: Unit–Root Tests

Serie	ADF(j)
lconspriv	ADF(1)=-0.7077
lincdisp	ADF(1)=-0.4047
m3*	ADF(1)=-1.041
srteq	ADF(1)=-0.7307
exchrate	ADF(1)=-0.7415
inflpreconv	ADF(1)=-2.679

All cases include the constant and j indicates the lags of the Augmented Dickey-Fuller (ADF) test. In all cases the null hypothesis of order of integration equal to one can not be rejected at traditional levels of 1% and 5%.

Appendix 3: Systems

System 1: A three variable system of private consumption, national disposable income and m3*

Lconspriv, lincdisp and m3*

1985(4) to 2000(4) (3 lags and d902, d854, d901, d953 and constant unrestricted)

λi	Ho:r=p	Maxλi			Tr		
0.478	p==0	39.73**	33.86**	21.0	53.44**	45.55**	29.7
0.162	p<=1	11.16	9.515	14.1	13.71	11.69	15.4
0.040	p<=2	2.551	2.174	3.8	2.551	2.174	3.8

MAX λi is the maximum eigenvalue statistic(-Tlnλi)and Tr is the Trace statistic(-Tln Σ(1-λi) for each statistic the second column presents the adjusted by degree of freedom and the third the 95% (Osterwald-Lenum,1992)critical values (See Hendry and Doornik (1997)).

	α			β´		
ΔLconspriv	-0.31484	0.041120	-0.0028	1.0000	-1.0778	0.0051340
ΔLincdisp	0.80313	0.027521	-0.00159	0.79846	1.0000	-0.68369
Δm3*	1.1340	0.16583	-0.00060	4.5123	11.345	1.0000

α is the matrix of standardised weight coefficients and β' the matrix of eigenvectors (cointegration vectors and their weights in bold)

System 2: The system with the three measures of perception of wealth

Lconspriv, lincdisp, exchrate, srteq and inflpreconv system

1980(4) to 2000(4) (2 lags and d823,d902 and constant unrestricted)

λi	Ho:r=p	Maxλi			Tr		
0.351518	p == 0	35.08*	30.75	33.5	80.91**	70.92*	68.5
0.238787	p <= 1	22.1	19.37	27.1	45.83	40.17	47.2
0.180871	p <= 2	16.16	14.17	21.0	23.73	20.8	29.7
0.080015	p <= 3	6.755	5.921	14.1	7.566	6.632	15.4
0.009955	p <= 4	0.8105	0.7104	3.8	0.8105	0.7104	3.8

MAX λi is the maximum eigenvalue statistic(-Tlnλi)and Tr is the Trace statistic(-Tln Σ(1-λi) for each statistic the second column presents the adjusted by degree of freedom and the third the 95% (Osterwald-Lenum,1992)critical values (See Hendry and Doornik (1997)).

β´

Δlconspriv	1.0000	-0.98811	0.016339	-0.00091301	-0.0046196
Δlincdisp	-1.0492	1.0000	0.66504	0.0024484	-1.5896
Δexchrate	-2.0380	7.5881	1.0000	-0.16885	0.22398
Δsrteq	17.877	7.2274	28.391	1.0000	-7.1898
Δinflpreconv	-3.3171	9.0524	0.63104	0.14945	1.0000

α

Δlconspriv	-0.56735	-0.00081768	-0.037518	-0.0014544	-0.0011310
Δlincdisp	0.19042	-0.0016706	-0.028477	-0.0012272	-0.00052238
Δexchrate	-0.17218	0.079091	0.015140	0.0010046	0.0029735
Δsrteq	0.47876	0.015821	0.84301	-0.033970	0.014914
Δinflpreconv	-0.17151	0.25853	0.12287	0.0044127	-0.011201

α is the matrix of standardised weight coefficients and β′ the matrix of eigenvectors (cointegration vectors and their weights in bold)

LR test(r=1)

Ho: α0=0; Chi^2(1) = 5.1671 [0.0230] *
Ho: α1=0; Chi^2(1) = 1.1956 [0.2742]
Ho: α2=0; Chi^2(1) = 0.1905 [0.6625]
Ho: α3=0; Chi^2(1) = 0.00964[0.9218]
Ho: α4=0; Chi^2(1) = 0.01451[0.9041]
Ho: β6=0; Chi^2(1) = 12.77 [0.0004] **
Ho: β6=1; Chi^2(1) = 0.01549[0.9009]
Ho: β7=0; Chi^2(1) = 0.25581[0.6130]
Ho: β8=0; Chi^2(1) = 0.09577[0.7570]
Ho: β9=0; Chi^2(1) = 0.01808[0.8930]

LR is the likelihood ratio statistics assuming rank =1

Appendix 4: Unrestricted model

The first model is an autoregressive distributed lag model for the whole sample, with four lags for each variable and quarterly dummies that allow for homocedastic white-noise and normal residuals.

Lconspriv =	+0.8325	+0.2482 Lconspriv_1	+0.11 Lconspriv_2
(SE)	(0.4704)	(0.08063)	(0.07712)
	-0.06822 Lconspriv_3	+0.3958 Lconspriv_4	+1.037 Lincdisp
	(0.07135)	(0.07769)	(0.1227)
	-0.267 Lincdisp_1	-0.1839 Lincdisp_2	-0.000555 Lincdisp_3
	(0.1308)	(0.1238)	(0.1311)
	-0.3703 Lincdisp_4	-0.04322 realexchrate	-0.04366 realexchrate_1
	(0.1149)	(0.04532)	(0.057)
	+0.02822 realexchrate_2	-0.07976 realexchrate_3	+0.1401 realexchrate_4
	(0.08524)	(0.08441)	(0.05098)
	-0.00206 srteq	+0.0004975 srteq_1	+0.003516 srteq_2
	(0.002306)	(0.003011)	(0.002996)
	-0.001708 srteq_3	+0.002283 srteq_4	-0.04913 efdues
	(0.00304)	(0.002501)	(0.1176)
	-0.09108 d881	-0.05105 d851	-0.07743 d871
	(0.01878)	(0.01857)	(0.01759)
	-0.03912 d982	-0.03745 d931	+0.01529 inflpreconv
	(0.01618)	(0.01762)	(0.01488)
	+0.01588 inflpreconv_1	-0.02206 inflpreconv_2	-0.02002 inflpreconv_3
	(0.01583)	(0.01606)	(0.0143)
	-0.04051 inflpreconv_4	-0.02996 d921	
	(0.01299)	(0.01688)	

R^2 = 0.995125 F(31,47) = 309.48 [0.0000] σ= 0.0152045 DW = 1.77
RSS = 0.0108652937 for 32 variables and 79 observations

Test Summary

AR 1- 4 F(4, 44) = 0.96829 [0.4345]
ARCH 4 F(4, 40) = 0.91589 [0.4641]
Normality Chi^2(2)= 8.1202 [0.0172]

```
RESET   F( 1, 47) =     3.5712 [0.0650]
```

where LM statistics of autocorrelation (AR), heteroskedasticity (ARCH, square (`Xi^2`) and square and cross-product (`Xi*Xj`) of regressors); Normality and Specification (RESET) are reported (see Hendry and Doornik, 1996).

Coefficient tests

```
Wald test for linear restrictions: βLconspriv_1 = 0.26000
LinRes  F( 1, 47) =   0.021585 [0.8838]

Wald test for linear restrictions: βLconspriv_4 = 0.20000
LinRes  F( 1, 47) =     6.3491 [0.0152] *
```

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[1] Equation (6) is formulated for four lags instead of one as in Equation (3) and (5).

[2] The changes in stock prices lagged by a single quarter (that could be considered as proxies of wealth), were found to have a modest value in predicting the changes in consumption.
[3] This implication is tested with time-series data for the post-war United States (1948-1977).
[4] A similar approach in a different context was made by Baba, Hendry and Starr (1992) who model money holdings. They said, "a period of time is generally required for wealth holders to learn about, adopt and trust a new instrument".
[5] In Argentina, an important change in the perception of wealth seemed to appear with the Convertibility Plan, which implies a "credible" hard peg of the peso at parity to the US dollar.
[6] They used a modified version of the inflation variable in order to capture the asymmetric responses of the consumption to positive and negative changes in the rate of inflation.
[7] Gross national disposable income is defined as the income of factors owners that participate in the production process inside the country and in the rest of the world adjusted by payments (or reception) of current transfers to (or from) the rest of the world.
[8] In the old national accounts the private consumption is taken as a proportion of total consumption.
[9] See Johansen (1992) and Urbain (1992) and Ericsson (1994).
[10] m3* represents real M3* in logs. The information is available from 1985:1.
[11]However, it is incorporated in the next section in order to analyse if it could result as significant when additional variables are considered
[12]These coefficients are derived as a simplification of the general model presented in Appendix 4. The final coefficient for the first lag of lconspriv is 0.26 and for the fourth lag is 0.20, reasonable similar to those of the unrestricted model for lconspriv. As shown in the Appendix 4, the hypothesis of the coefficient of lag 1 equal to 0.26 could not be rejected at the traditional significant levels of 1%, 5% and 10% and the hypothesis of the coefficient of lag 4 equal to 0.20 could not be rejected at a 1% significant level.
[13] Note that in the long-run the relationship is of homogeneity, but in the short-run the impact effect will depend on cyclical factors.
[14]The difference between the third and fourth lag could also be due to the seasonality implicit in the dynamic of the exchange rate.
[15] m1 represents the real monetary aggregate M1 in logs.
[16] See note 9.
[17] The industrial real wage is the only labour income variable available for the whole sample.
[18] We thank Verónica Cohen Sabban for providing us with this series.
[19] For a detailed discussion see Muellbauer and Lattimore (1995), section 10.
[20] The rate of growth of population was also introduced to Equation 1 but it resulted non-significant and with the wrong sign.