An Overlapping Generations Model of the Savings Rate Decline: The Case of Portugal

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Using an overlapping generations model, we argue that a decline in the savings rate, such as the one that has been observed in Portugal over the past 30 years, may be motivated by an increase in the discount factor. This is a standard result for macroeconomic models with agents that live for two periods. However, we innovate in proxying empirically the discount factor by a number of items, such as the fertility rate and the marriage rate. A decline in these suggests that people value the present over the future. As such the discount factor increases. As it turns out, both variables are empirically significant in our econometric analysis and have the correct sign. Furthermore, Ricardian Equivalence effects seem to be absent from the savings behavior of Portuguese households, as increases in public debt are met with decreases in savings by households. Government expenditure is not being perceived as levying higher taxes in the future. Finally, we also show that precautionary saving motivated by the increase in the unemployment rate is only relevant for rates below 6,5%. Above this threshold, the decline in savings due to the decline in income is estimated to be the dominant effect, which becomes dramatic when we consider the current rate of nearly 16%. Portuguese households are simply unable to save currently. The empirical implications of our analysis are staggering, as they question the effectiveness of any austerity program that does rely on higher taxes: these are a tantamount to lower savings rate, which in turn increase country default probabilities, as measured in CDS and bond markets.

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1. Introduction

Santos (2011) has argued that credit default probabilities, as assessed by Credit Default Swap Markets, are strongly influenced by the country's savings rate. The author argues that is in fact a more fundamental factor than the ratios of the external or public debt to GDP. Hence, fostering savings rates should be a key objective of economic policy. Nonetheless, rescue programs, as the bail-outs suggested by the IMF, the European Commission and the European Central Bank, are effectively promoting a decline in the household's income levels, and, therefore, a decline in household savings as a whole. The fundamental issue seems to be the lack of political ability to cut public spending, with a clear preference for raising taxes. As it shall be exposed in this paper, higher taxation leads to lower savings, through lower disposable income.

Notwithstanding, in the Portuguese case (a country that is under IMF/ECB rescue since 2011), structural change in the household's time preferences seem to be playing a key role as well. As it stands, households are unable to save as much simply because a higher preference for the

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present over the future, has been showing hope. By proxying this preference, and properly including the time discount factor in the econometric model, we are able to account for this.

Finally, a third party comes into play when the role of precautionary savings is considered. It is shown there is parabolic relationship between savings and unemployment in Portugal. The turning point is estimated, and properly commented.

This paper is organized as follows: the following section discusses the literature on savings and discount factors, while presenting a simple overlapping generations model, where agents live for two periods. Standard literature comparative statics results are presented. Then, we turn into the issue of assessing the model statiscally. Section 3 describes the data, the econometric analysis, and the main results. Section 4 concludes, while presenting and discussing the main policy implications.

2. Literature Review and Theoretical Model

In this section we use a very simplified and common framework to assess the relevance of a number of decisions and exogenous shocks on household savings. Our aim is to motivate the variables we shall consider in the econometric analysis of section 4, rather than to extend economic theory. The model itself is extremely simplified, but provides solid intuition as to what one would expect to be the effects of some of such variables. In most of its features it is no more than the standard inter-temporal choice model between consumption today and tomorrow that is widely known. Nonetheless, some implications of this framework are hard to find, if at all existent, in the literature. We shall highlight these as we proceed.

2.1 Assumptions

a) All agents are identical and live for two periods alone, after which they die. We begin by assuming that no agent has an initial endowment. Agents work in both periods receiving a net income in each of them. Such income is assumed, at first, to be known with certainty, as agents are price takers in the labor market, and have no influence over the fixed wage rate. At a certain stage we will insert elements of uncertainty about the future in the model, in a particular way. Labor market is initially assumed to be in an equilibrium with no unemployment (frictional or otherwise).
Half of the population is made of men and half of women. Marriage decisions are made in the first period.

b) There are no credit constraints. y_1 and y_2 are the income levels in each period. Given the representative agent hypothesis, the relevant household income after marriage is still y_1 in the first period and y_2 in the second. No scale economies are assumed to result from marriage.

c) Agents are price takers in the credit and borrowing markets. Hence, inter-temporal transfers of income occur at the going interest rate i which we assume to be the same for borrowing and for lending. Together with the previous assumption, this implies total wealth to be given by: $\Omega = y_1 + \frac{y_2}{1+i}$ (evaluated in the first period).

d) The representative agent has an instantaneous utility function $u(.)$. We assume that $u' > 0 \; and \; u'' < 0$. Hence decreasing marginal utility holds in each period, albeit utility is always positive.

e) Contrary to most models of this type we assume no specific form for $u(.)$, allowing for several types of inter-temporal elasticity of substitution between present and future consumption.

f) Individuals need to consume a minimal amount of their income in both periods (this might be well above their basic needs): $\bar{c}$. Consumption in period i is denoted $c_i \geq \bar{c}$.

g) Individuals have a positive temporal preference with respect to consumption. This means that there exists a subjective discount factor of future consumption given by $\rho > 0$. Thus, individual utility in period 2, evaluated in period 1, is $\frac{u(c_2)}{1+\rho}$.

Total lifetime utility is therefore: $u(c_1) + \frac{u(c_2)}{1+\rho}$. We do not assume $\rho = i$, as some models of inter-temporal choice do.

h) All government expenditure is financed by taxes. There is no budget deficit or surplus in either period. As previously said, later in the model this assumption shall be relaxed.

i) Price of consumption in either period is 1, or, equivalently, the consumption good is itself the currency.

j) No agent acts as perceiving that household decisions may alter the economy as an aggregate. That is, there is incomplete information that leads agents to assume household decisions only affect their own households.

2.2 Equilibrium and Simple Comparative Statics

In the basic OLG model we have outlined above, there is no reason why optimizing individuals should not exhaust their resources over their lifetime, since they leave no heirs as they die. Hence, the inter-temporal optimization problem involves the choice of consumption levels for both periods: c_1^* and c_2^*, such that lifetime utility is maximized given the inter-temporal budget constraint. The maximization problem each individual or household faces is therefore summarized in the Lagrangean:

$$L = u(c_1) + \frac{u(c_2)}{1+\rho} + \lambda \left[\Omega - y_1 - \frac{y_2}{1+i} \right]$$

The above problem yields the well known equilibrium condition:

$$u'(c_1^*) = \frac{1+i}{1+\rho} u'(c_2^*) \qquad (1)$$

Where c_1^* is the optimal consumption level in the first period. Clearly,

$$c_2^* = y_2 + (y_1 - c_1^*)(1+i) \quad (2)$$

With c_2^* being the optimal consumption in the second period. With no uncertainty, c_2^* is determined by choice of c_1^* alone.

Having established this commonly known type of economy, the interesting exercise to motivate the econometric model of household savings, in section 4, is to change some of the parameters in equations (1) and (2) and to introduce new parameters, in what might be called, despite the dynamic nature of problem, comparative statics.

2.2.1 Implications over savings of a change in interest rates

It is widely known that a change in the interest rate has an unclear result in this model, depending on substitution, income and wealth effects. In particular, when the interest rate decreases, the right-hand side of equation (1) decreases, other things remaining constant. In order to restore equilibrium, given that u' is negatively sloped, one might consider c_1^* would increase until an equality is restored. Nonetheless, as the interest rate decreases the budget constraint in (2) is forcing c_2^* to decrease. That alone is increasing $u'(c_2^*)$. So, the rise in c_1^* needs not to be so pronounced. Furthermore, the increase in c_1^* is also reducing $(y_1 - c_1^*)$, thus reducing income available in the second period, and therefore, further reducing c_2^*, and diminishing again the need to cut c_1^*.

The net effect of these forces is unclear. In particular, the need for an increase in first period consumption, and the extent of that increase, critically depend on the balance between the interest rate decline and the reduction of c_2^* (or rather thee increase in $u'(c_2^*)$. It is conceivable that first period consumption rises sharply, with a significant fall on savings $(y_1 - c_1^*)$, but it is also conceivable that first period consumption would not decline so much, would not decline at all, or might even rise. This ambiguity is the reason why one would not be sure about what to expect on the savings behavior when interests rate go down.

2.2.2 Shifts in individual time preferences

The discount factor ρ is subjective and dependent on the degree of positive temporal preference individuals might have (Böhm-Bawerk, 1930). Working with a simplified model such as the one outlined above provides a unique discount factor, the representative agents' one. This is hardly a problem for the purpose of this paper as the aggregate behavior of the Portuguese household's savings rate is so clearly defined over the past two decades that any possible heterogeneity between agents seems to have been subsumed in the conclusion of the representative agent paradigm.

An increase in ρ means a higher preference for present consumption, and a decrease means a lower preference for the present. The net effect of an increase (or of a decrease) in ρ should then be unambiguous: when ρ increases the right hand side of equation (1) decreases, so that restoring equilibrium requires a rise in current consumption, given decreasing marginal utility. Hence, savings decrease as a result of a higher ρ.

It could be argued that such a decrease in savings would lead to a lower optimal consumption at time 2, causing future marginal utility to increase. However, it can hardly be disputed that even if this would mitigate part of the rise in c_1^*, there is no hope for the adjustment to occur unless the new equilibrium c_1^* is greater than the initial one. Hence, unambiguously a shift in time preferences in favor of present consumption is a tantamount to a decrease in savings.

The real issue one should be concerned with is to provide reasonable explanations as to what might shift the discount factor. It is one thing to say that in increase in the preference for present consumption unambiguously decreases current savings by households. Notwithstanding, it is clearly insufficient, as it does not provide a framework of how the "exogenous" discount rate shifts. In order to build the econometric model of the following section, we need to consider some hypotheses on the factors that might turn the discount factor into a variable that can itself be explained. We shall attempt to do so considering two sets of possibilities, which by no means are mutually exclusive: in subsection a) below, we look into a possible economics explanation,

considering the discount factor might reflect precautionary savings; subsection b) looks at social and demographic shifters of the discount factor, raising hypotheses as to how the marriage rate and the birth rate might be influencing the representative agents' decision as to save or to consume.

a) The discount factor, the savings rate and the unemployment rate

There is an extensive economic theory literature on precautionary savings. However, the expression is used with a rather explicit meaning pertaining to the existence of a positive third derivative of the utility function and of uncertainty about the future. Hence, precautionary saving is distinguished from the notion of buffer-stock savings (Deaton, 1991) whereby one would be referring to the stylized fact that households tend to leave aside a small amount of their current income, due to the possibility of future sharp falls in income or emergency spending needs. We are really not interested in making such formal statements about the utility function: it suffices to think that uncertainty alone might lead risk averse households to save, therefore implying that increases in that perceived uncertainty would be a tantamount to increases in household savings. Carroll (1992, 1997) argues that there exists a trade-off between the positive discount factor and risk aversion in an uncertain environment. The low savings of American households is explained on the basis that the discount factor is said to be high when compared to the precautionary motive for savings. Whilst it is indeed true that most households hold little wealth and consume most of their income in the US (see, *inter alia*, Wolff, 1998) a broader look at the OECD countries shows that some of them exhibit household savings rates that are nearly 305% of the ones observed in the US. Taking 2005 as an example, the net savings rate per household in Germany was 10.4%, whilst in the US it was as low as 3,4%. Indeed, it is not difficult looking at household savings rates over the last 20 years to conclude that the low savings behavior of US families is not necessarily representative of an OECD country: indeed, considering the average net household savings rate for the 20 OECD countries for which that data is available, US families are the fourth lower saving families, between 1993 and 2010, beaten only by the Czech Republic, the Slovak Republic and Australia.

All in all, it does not seem to us that the Carroll (1992, 1997) model of high discount rates combined with precautionary savings emerging from risk aversion and uncertainty, should be taken as a general economic law. It is perhaps more reasonable to think that although discount factors might be significant, they are not that high in most countries, simply because people take into account future risks when deciding between consumption and savings. Therefore, instead of assuming a sign for the third derivative of the utility function, we are more comfortable saying that uncertainty about the future decreases the discount factor for the representative household. Romer (1990) argues in favour of this, showing evidence that the fall in US consumption in 1930 was mostly due to uncertainty about current and future income, since the stock market was crashing and it was not foreseeable when could it recover. Dynan (1993) also argues that uncertainty and risk aversion imply a significant shift from current to future consumption (for certain parameters which the author deems as reasonable, that increase in future consumption is expected to reach 2.5 percentage points).

Having said this, the issue remains from the econometric point of view: how is one to proxy the discount factor, or changes in this coefficient due to uncertainty about the future. We take the view in this paper that agents do not have rational expectations, nor do they have complete information about the level of uncertainty. Therefore, we suggest that the unemployment rate is taken as an indicator of perceived risk by households. In particular, we deem as reasonable that in periods of high unemployment, there may exist an added pressure to spend less, for those

who have not lost their jobs. In fact, during a recession, as the unemployment rate rises, so does the perceived probability that an employed individual might lose his or hers job. Hence, it is likely that those with a job shall save for the possibility of having to face unemployment themselves. Without any state intervention, it would be our belief that

$$\frac{\partial \rho}{\partial un} < 0$$

Where *un* would stand for the unemployment rate. Given our prior argument, savings might be expected to rise during unemployment periods, due to a decline in the discount factor motivated by uncertainty. The level of public welfare assistance would, however, be crucial. As argued by Hubbard, Skinner and Zeldes (1994, 1995), if welfare acts as a strong insurance against sudden income drops, like the ones resulting from unemployment, the increased risk might not lower the discount factor by that much: on the one hand, welfare insurance guarantees a certain income level even in the most adverse economic situations; on the other, public welfare is likely to be financed in ways that discourage savings behavior, as they involve a heavier tax burden.

In our model we shall introduce the possibility of nonlinear effects between the unemployment rate and the discount factor. On the one hand, if we expect uncertainty to increase the savings of those still holding a job, on the other, there might exist a threshold level of unemployment such that for higher levels of recession in the labor market, it can be true that the income loss of the unemployed can no longer be matched by more saving by the employed as the income of the later still needs to provide for basic consumption, and it is simply not possible to save more. So, after a certain threshold level of unemployment, even with public welfare insurance, the income loss of the unemployed (the replacement rate of the unemployment subsidy relatively to the last salary is hardly 100%) is no longer added by added savings of the remaining households. Furthermore, high levels of unemployment, even with a less than perfect replacement rate with respect to the last salary, is a burden in public finances that might, above certain thresholds induce, as argued by Hubbard, Skinner and Zeldes (1994, 1995) a heavier tax burden on the economy, making it more difficult for households to engage on increased buffer-stock savings.

In short, if unemployment might be taken as a proxy of the probability of employed people losing their jobs, thus inducing them to increase savings, the fact is the unemployed, depending on their level of social protection, might have such a reduction in savings that offsets that effect, and that the increased tax burden imposes some ceiling on that effect. Hence, albeit not explicit in the original model, we shall consider for econometric purposes that the savings rate will be a function of the unemployment rate (mainly through ρ) and of the squared unemployment rate, to account also for nonlinear effects. This amounts to specifying household savings rates (*hs*), other things being equal, as:

$$hs = \alpha un + \beta un^2$$

where $\beta < 0 \ \wedge \ \alpha > 0$.

b) The discount factor, savings rates and socio-demographics influences: marriage and fertility rates

It is not uncommon for economic theory models to attempt to explain fertility and marriage decisions. Córdoba and Ripoll (2010) provide an educative survey on how mainstream neoclassical theory has so far attempted to deal with fertility. Grossbard (2006) develops a

similar exercise for economic theories of marriage. It is in our view fair to say both provide clamorous evidence of the poor understanding the Lakatos core of neoclassical economics has of human nature.

According to Córdoba and Ripoll (2010) neoclassical fertility models can be divided in two groups: "the joy of giving" and "the altruistic parenthood" models. Within the first group, potential children enter a utility maximization problem whereby they are themselves, either in number, or through bequests or even human capital formation, an element of the set of "goods" from which satisfaction is derived. Given the explicit and the shadow prices of such arguments, and the household income, utility would be maximized by rational households, hence determining fertility rates alongside with levels of consumption of other economic "goods" (see, inter alia, Greenwood and Seshodri (2002), and Galor and Weil (2000) for representative examples of such models).

Altruistic parenthood models would differ from these in that it would be the children's own utility that would be an argument in the potential parents' utility function, alongside with other economic goods, not the children themselves. Again, fertility would result as a by-product of constrained maximization of the utility function. The so-called "altruistic parenthood models", to which Córdoba and Ripoll (2010) themselves contribute, is said to have better microeconomic foundations (Blanchard and Fisher, 1989). Although the models by Barro and Becker (1989) and by Becker and Barro (1988) are said to have opened this research avenue, its roots might well be found in the work of Koopmans (1960) and Lucas and Stokey (1984). Córdoba and Ripoll's (2010) own contribution rests upon a similar insight to that of Dixit and Stiglitz (1977), assuming parents would also derive utility by the variety of children, each of which providing that would be discounted differently.

As far as marriage related issues are concerned, mainstream neoclassical theory is not widely different: decisions are explained within a rational utility maximization framework where the *homo economicus* acts supported by an explicit or implicit market mechanism (Grossbard, 2006). Becker's (1973) seminal paper on the topic focused on supply and demand in the marriage market, where brides and grooms would have certain prices (either actual or shadow prices). This framework has been extended to the study of dating, extra-marital affairs, marriage brokers, mutual investment in human capital, optimal bargaining and sorting when searching for a partner, income division within the household and even homosexuality and prostitution.

The literature summaries above should already be sufficient to explain why we shall take fertility and marriage decisions as exogenous in the econometric model of the following section. Clearly, we accept that such decisions might take into account the economic environment, although empirical evidence is far from being clear in that area. At the macro level, for one, the connection between overpopulation and underdevelopment as recently been seriously questioned on the grounds of the recent performance of emerging economies (Tedeschi and Camilleri, 2010). Moreover, Parente (2001) has found little and contradictory evidence relating economic variables and nuptiality in Portugal over the 1980-1998 period.
Although we shall not cast away the hypotheses that budget constraints and individual time preferences might shift the behavior of the birth rate over time, we shall take such a variable as weakly exogenous (Engle, Hendry and Richard, 1983) with respect to household savings decisions. This shall be due to the fact that growth in per capita income, the inflation rate and so forth (which might have a precautionary effect over the new births) are found to be irrelevant in the congruent long run description of behavior of household savings.

As far as the question of why we shall not accept birth rates or marriage rates to depend on other variables that neoclassical theory includes in the household's utility function alongside with children or with finding a partner, our position is clear: we refuse to follow the path whereby children or a spouse would be equivalent to other "economic goods" entailed in a utility maximizing framework. The economic theory of fertility and the views on marriage that we have previously exposed rest upon Jeremy Bentham's utilitarianism that had led to what several authors have been calling "Economics' original sin" (see Bruni, 2006). Indeed, by extending the market mechanism and the price system to these issues, neoclassical economics as dropped out the intrinsic value of personal relationships, and of such feelings as love or affection, showing a poor understanding of economics anthropology (Polanyi, 1944). We agree with Bruni (2006) that the root of this mis-conception that lies at the very core, in the Lakatos sense) of neoclassical economics, has its deepest roots in Aristoteles' conclusion that if inter-personal relationships based on trust and love are needed for human happiness, then happy life is unavoidably associated with tragedy (see Nicomachean Ethics for more on this notion). Even if Adam Smith (1776) has managed to keep family and close friendships outside of the scope of market oriented relationships, subsequent developments in economics failed to keep track of the anthropology he had clearly exposed in his Theory of Moral Sentiments. Indeed Smith, had picked up a general anthropological tendency of human beings to what is generally called "fellow-feeling", something that Robert Sudgeon (2005) recently defined as "mutual empathy".

Nussbaum (1986), Donati (1986), Gui (1987) and Uhlaner (1989) had resumed that tradition, which influenced Sen's work, albeit his clear closeness to Nichomeachean Ethics in his slavery metaphor (1993). It is most likely that only the behavioral and the experimental economics fields have research have clearly surpassed that old fashioned Aristotelian tradition. Bruni and Sudgeon (2007) provide an interesting confrontation between Vernon Smith, Ken Binmore and Daniel Kahnemon's novel ideas on the value of trust emerging in these new fields, and the old 19th century works on hedonistic utilitarian economics, along the lines of Vilfredo Pareto and Edgeworth.

Some of the most significant findings on the Economics of happiness were summed up by Layard (2005). From a series of conclusions from the new behavioral and experimental fields, the impact on happiness of a series of events was measured. The bullets below provide some insight into these estimates and the contrast they establish with the neoclassical paradigm:

- Surveys report that individuals suffer a loss of happiness by becoming widowers that is at least twice the reported effect of a drop of 1/3 in household income;
- Losing Health by one point (in a scale where health is measured from 1 to 5) is estimated to be equivalent to twice the effect of a 10 percentage points rise in the unemployment rate, and six times the loss entailed by a rise in inflation of the same magnitude.
- Moving from marriage to divorce entails a loss in happiness that is 250% of that of a drop of 1/3 of the household's income. To get abandoned by his or her spouse entails an even greater loss of happiness: 450% of that associated with the same 1/3 drop in household income. In fact, this change from marriage into separation when compared to a 10 percentage points rise in unemployment entails a loss of happiness of 300%.

Bearing the above examples in mind, it seems clear research on family issues should be left aside of the utility maximization framework. When thinking about the changes in the birth and marriage rates in Portugal, from 1970 to 2007, a number of cultural and socio-political issues should come into play, as shifts have been quite dramatic. If one is to take Layard's (2005) numbers seriously, the evolution we shall describe below pertaining marriage and divorce issues has to have entailed such a drop in the overall happiness of the Portuguese that should

require careful scientific examination instead of the mathematical confabulations within which neoclassical economics seems to frame all human actions.

Using a sample of 38 countries for which data can be retrieved from the Eurostat and the UN Statistical division, when compared to 1970, the marriage rate in Portugal has fallen by almost 57% in 2007, moving from 9,38 per thousand to 4,38 per thousand. In relative terms, this amounts to saying that when ordering these countries in descending order of marriage rates, Portugal ranked 6th in 1970 and currently ranks 31st! The Portuguese marriage rate in 2007 was clearly in the bottom 25% quantile, below the sample average of 5,35 and even the EU average of 4,88.

When considering the ratio of married persons to still being on their 1st marriage in 2006, Portugal had dropped 11 percentage points from 1970, clearly over-riding the 5 percentage points in Ireland, the 6 pp drop in Italy and the 7 pp drop in Spain, just consider the usual catholic references in Southern Europe. What is more striking is that 64% of this fall, in the Portuguese case, has happened after 1996! So the sharp increase in the number of people who moved from being in their first marriage to being in a later marriage happened mostly over the past 14 years in Portugal!

Finally, Portugal has the highest increase in the divorce rate of all OECD countries, moving from 0.1 per thousand in 1970 to 2.3 per thousand in 2007. In fact, 2.3 per thousand is well above the average divorce rate in the EU-25, and is only clearly smaller than that registered in Belgium, the Czech Republic, Latvia, Lithuania, Estonia, and the US).

With respect the fertility rates, Portugal was clearly in demographic winter in 2007, with 1,33 children per couple. This is only marginally smaller than Spain, but with the relevant difference that whilst Spain is in an upward trend since 1995, Portugal is clearly in a continuously declining trend over the same period. If it is true demographic winter seems to be a reality across Europe, it should be pointed out that fertility rates are still at or close the generations substitution level in Ireland (2,03), Norway (1,9), UK (1,9) and France (1,96), clearly making the Portuguese case a serious one.

If all of the above numbers were relevant in terms of Layard's (2005) happiness estimates, they will become even more dramatic when we consider the effect of marriage and children on household savings in the next section. Notwithstanding, the above numbers can't clearly be the result of a simple utility maximization framework. Their understanding does require contributions from different fields of analysis. On the remainder of this section we shall not attempt to include marriage and fertility as things economics can explain by itself, but rather, provide theory justification as to why they should matter when speaking about household savings.

We expect the effect of marriage on the discount factor to be negative. Indeed, marriage (mainly religious marriages, but also civil ones) is perceived as a stronger tie between the life projects of two individuals, than the simple fact of the two deciding to live together. It is easily understood that from a legal stand point the nature of the contract married people agree to celebrate clearly entails a more binding compromise. We hypothesize that married couples should have lower discount factors and save more, in the spirit of a planned long term union. Life insurances where one of the spouses is to be defended against premature death of the other are a sign of such long term commitments, showing concern with the future.

Adding to this, if the couple has a child, it is often the case that concerns might arise about saving from his or hers early days in order to help paying for higher education later, or to assist him or her when a decision to get into the labor market or to start a family is made. Furthermore, there might even be a concern with leaving a bequest to the couple's children, which would entail an additional element in the inter-temporal budget constraint in (2). Letting the planned bequest be denoted by *H*, (2) would be rewritten as:

$$c_2^* = y_2 + (y_1 - c_1^*)(1 + i) + H \quad (3)$$

With H > 0, no longer would (2) be satisfied as a strict equality. Whether H is generated by lowering first period consumption, second period consumption, or both, it always comprises an increase in the household savings, generating a surplus that will last after the parents die. This is equivalent to redefining the bequest as:

$$H = y_2 - c_2^* + (y_1 - c_1^*)(1 + i) > 0$$

The previous expression highlights that the former budget constraint needs to generate a surplus. All in all, denoting by *c* the fertility rate and by *m* the marriage rate, one would expect:

$$\frac{\partial \rho}{\partial c} < 0; \ \frac{\partial \rho}{\partial m} < 0$$

Implying both *c* and *m* would increase the savings rate.

2.3 Government Debt and Household Savings

One of the main results in Public Finance is the irrelevance between government's finance decisions. This is to say that financing current public expenditure by issuing bonds or by raising taxes is indifferent, from the point of view of households' consumption and saving patterns over time. Such result is known in Economic Theory as Ricardian Equivalence (although David Ricardo himself came to reject this idea (O' Driscoll (1977)).

The intuition behind Ricardian Equivalence is that if Public Debt is allowed for in a certain period and bought by infinitely lived individuals, these would not consider government bonds as an increase in their net wealth, rather a form of saving. Hence, their consumption shall not increase in the period when debt is issued, nor will their long term consumption In fact, being perfectly rational, they know government will have to pay in the future for what it is giving now as bonds, and it will necessarily do so by raising future taxes. In the end, the present value of the bonds at the time the government needs to repay its debt will be exactly equal to the tax raise. Hence, the bonds will not shift the households' inter-temporal budget constraint in on direction or the other, leaving consumption and savings patterns unchanged.

The obvious fact that individuals do not live infinitely has not posed a problem for Ricardian Equivalence defendants. Barro (1974) came up with a line of response that is still well alive in the academic community: in his view although individuals do not live infinitely, they care about the welfare of their descendents; as such, they often plan to leave bequests to their heirs, as we have discussed in the previous subsection. According to Barro, issuing new bonds, if all generations act with a bequest motive, should not change the pattern of consumption and savings over time either, since finitely lived generations can be thought of as a unique infinitely lived household. Bonds are passed on from one generation to another as part of the bequest,

with its valuing continuing to increase, so that the ones that will pay the taxes simply use their additional inheritance to do so.

Bernheim, Schleifer and Summers (1985), Bernheim and Bagwell (1988), Wilhelm (1996) and Altonji, Hayashi and Kotlikoff (1997) are among the several authors that have followed on Barro's tradition, concluding that finitely lived generations are made equivalent to a single infinitely lived household provided all generations wish to leave and inheritance to their descendents (that is, provided that bequests are not zero). Poterba and Summers argue (1987) argue also in favor of Ricardian Equivalence, even with finitely lived generation but resting on a different type of argument: in practice, they claim, individuals live long enough so that, they are most likely to be alive by the time of the tax raise to pay for government debt. Hence, rational expectations prevent them from perceiving bonds as additional wealth.

Although this strand of the public finance literature has itself identified two cases where government bond issuing might have a decline in current savings effect, it failed to notice a third one that it took for granted it would not happen. Notwithstanding, it is precisely that one that might be of the key drivers in the decline in savings in countries such as Portugal. We shall assess all three below:

- Tobin (1980) and Hubbard and Judd (1986) have argued that liquidity constraints are possible drivers of increased current household consumption in response to government's choice of debt financing, since the interest rate the government faces is often lower than the ones individuals would face if borrowing themselves. Hence, their net wealth increases, and the need for savings decreases. We do not view this as a plausible explanation in the case of periphery Euro countries like Portugal, Ireland and Greece, as it is precisely the case that the opposite is happening: it might be cheaper for the private sector to finance itself than it is for the government, given the high yields government bonds entails. However, even if not cheaper, the financial system is exposed to increased risk of default due to government's excess debt, and hence it reacts reducing the credit available to the private sector, namely by rising interest rates. Therefore, credit constraints are endogenous, and take into account the all exposure to default risk by the financial sector. Hence, in the end, Ricardian Equivalence would still hold because banks are restricting loans to households and firms as a result of excess exposure to government loans (Hayashi, 1987; Yotsuzuka, 1987). In short, we do not believe households' consumption is raising by virtue of lower interest rates on public debt.
- Barsky, Mankiw and Zeldes (1986) point to a second possibility which is far closer in spirit to what we deem to be the Euro Periphery case. In their view, a strong positive preference for current consumption (that is a high ρ as discussed in the previous section) and a buffer-stock savings behavior, combined with the fact that taxes are usually a function of income rather than lump-sum, creates the potential for households whose perceived future income is low to save less, as they shall pay for the tax increase as a response to a tax rate on lower taxes, hence increasing their wealth when receiving bonds today. We shall develop this argument below given the particular tax and debt structure of the Euro Periphery, but it should be noticed without further delay that a potential problem exists as a result of other forms of taxation rather than lump sum taxation, given contexts where households might have high discount factors.
- The third reason why Debt financing might reduce saving is related to Robert Barro's argument of intergenerational links through positive bequests to the heirs. As we have previously mentioned, Barro (1976) acknowledged that if bequests were to be zero, then

Ricardian Equivalence might fail due to the fact that finitely lived individuals could not be made equivalent to an infinitely lived household. Nonetheless, he neglected to pay huge attention to this issue. However, on the face of what we have previously described as the social and demographic changes that have been occurring in Portugal, with extremely steep declines in the marriage rate and in the birth rate, conditions were assembled for Barro's theoretical possibility to become a binding reality: without descendents, and without traditionally structured households, the bequest motif vanishes, and it has probably vanished in Portugal. Hence, the issue of new public debt, delaying taxation in time, so that it might be faced by other generations, would lead shellfish individuals to perceive government debt as an increase in net wealth, and without a concern for generations to come, such increase in net wealth, combined with a high discount factor has led people to save dramatically less. In short, in spite of all the debate around Ricardian Equivalence, it is Barro's argument about the need for positive bequests that would be a primary reason alone for one to include government debt in as a possible explanatory variable for the behavior of household savings. It is clear that if savings decline as the government issues new debt, this might well be connected, in the Portuguese case, with the dramatic fall in marriage and birth rates we had already discussed in the previous subsection as potential shifters of high to low savings behavior.

Nonetheless, there is a second most strong argument as the potential problem of Portuguese Public Debt over household savings. If government expenditure could either be financed by immediate taxes or by issuing debt now and raising taxes later, in the baseline scenarios considered previously, the fact is western high leveraged public sectors usually rest upon roll over schemes, where debt is financed by issuing new debt, to pay for the principal and the interest of the previous one. Rolling over existing debt became quite common, albeit the implicit risk of governments running into Ponzi games. In practice, a Ponzi scheme would be one in which the government would issue new debt at same debt and, provided certain conditions were assembled, it would be able to roll it over forever. In general, in an overlapping generations model of the Diamond type, the government would be able to do so provided the real interest rate would be below the real growth rate of the economy, so that the ratio of debt to GDP would be continuously declining. O' Connell and Zeldes (1988), Bohn (1995) and Ball, Elmendorf and Mankiw (1998) investigate these rather theoretical issues further.

In practice, rolling over indefinitely would amount to exploding the ratio of public debt to GDP, for countries like Portugal. Indeed, if one is to bear in mind that real GDP growth rates have experienced a declining trend over the past two decades, never exceeding 2.5% over the last ten years, it would be inconceivable, given the interest rates on public bonds to expect the debt to GDP ratio to fall. Instead, as yields have generally been well above growth rates, the sharp increase in the ratio could hardly be avoided. Notwithstanding, the situation is even more dramatic currently, where even in ECB assisted bond auctions the Portuguese Government is issuing new debt at yields that are well above 6.5%, a growth rate the country can't even imagine to achieve. Indeed, the situation as reached unsustainable levels.

The true nature of the problem lies, however a deeper level: it is our hypothesis in this paper that the roll over schemes might be reducing household perception of the need to repay existing debt in the future. In fact, with less than rational expectations and often incomplete information about the state of public finances, the increase in public debt to GDP ratio stayed largely outside of the scope of the vast majority of households, who had no perception of the situation public finances were running into. Hence, there is no well established conscience that increased

debt would be ultimately paid by the private sector, and so no extra saving measures were taken to cope with this. Most media attention had been focused on the budget deficit, given the limits imposed in the Stability and Growth Pact. No real concern existed, either in Portugal or in most of the Euro Area, for the debt to GDP ratio. Higher taxes were expected only with respect to periods were the deficit to GDP was above the 3% limit imposed at the time the Euro was introduced, as a follow up of the previous convergence criterion defined in the 1993 Maastricht Treaty.

In conclusion, it is due to lack of economic culture and the mistakes quite often assumed in economic anthropology about the nature of households' rationality that we deem to be necessary to include the ratio of Debt to GDP in our econometric model for the household savings rate, as we wish to test whether roll over schemes might have lowered such perception of the evilness nature of public indebtedness even further.

3. Methodology: Data Description and Econometric Analysis

Given the theoretical considerations described above, household savings in Portugal are assumed to behave according to the following model:

$$S_t = \beta_1 + \beta_2 i_t + \beta_3 m_t + \beta_4 n_t + \beta_5 DP_t + \beta_6 un_t + \beta_7 un_t^2 + \beta_8 G_t^2 + \vartheta_t$$

ϑ_t stands for the regression model's random errors. S_t stands for households savings rate (as a fraction of disposable income) at time t, i_t is the interest rate, m_t is the marriage rate, n_t the birth rate, DP_t is the ratio of public debt with respect to GDP, un_t is the unemployment rate at time t and G_t is the ratio of public expenditure to GDP. Data is annual and comprises the 1993-2008 period (from the Maastricht Treaty to the last year before the great recession has hit Portugal more severely[1] - therefore leaving aside turbulence years associated with the crisis in the European Monetary System and with the post 2008 recession). The option for this sample period took in mind that we wanted to isolate effects on the savings by households that would not be attributed to exogenous shocks, and that would comprise the entire Euro convergence period and the immediate period after the Euro creation.

Data was collected from the OECD (DP_t, G_t,), the Eurostat (i_t , S_t , un_t) and the Portuguese Office of National Statistics (m_t, n_t). Squared unemployment was simply calculated from the unemployment rate, obtained from the Eurostat. Annual data was chosen due to seasonality issues and because some variables are only available with that comparable periodicity.

3.1 Unit Roots and Cointegration Analysis

All variables in our model are autoregressive processes of order 1 (AR (1)). The estimated autoregressive coefficients for each individual series (say, $\{w_t\}$), and their p-values for individual significance tests ascertain that.
In fact, all variables considered are indeed unit root processes as Table 1 confirms through the reported Dickey-Fuller (t-DF) and Augmented Dickey-Fuller (t-ADF) test statistics, with respect to a canonical auxiliary model of type II:

$$\Delta w_t = \mu + \gamma w_{t-1} + \sum_{j=0}^{2} \theta_j \Delta w_{t-j} + \varepsilon_t$$

Equation above allows for *j = 0*, the standard Dickey-Fuller test and for the inclusion of one or two lags of the auxiliary regression dependent variable (the ADF tests, to control for the presence of possible residual autocorrelation[2]).

Test statistics reported for the DF and ADF tests match the observed individual significance test statistics for

$H_0: \gamma = 0,$

$$H_1: \gamma < 0,$$

where $\gamma = \rho - 1$, implying that the null is a unit root hypothesis. As it can be seen in table 1 the null is not rejected at a 5% significance level, for any of our variables, either with the DF or the Augmented DF test (the critical value provided by PcGive for all cases is -3.18, smaller than the observed t-DF, t-ADF(1) and t-ADF(2)).

Table 1: Dickey-Fuller, Augmented Dickey Fuller and Likelihood Ratio Unit Root Tests

	S_t	i_t	m_t	n_t	un_t	un^2_t	DP_t	G_t
BG	0.7543	0.736	0.3977	0.9834	0.055	0.059	0.826	0.024
t-DF	-0.4821	-2.753	-0.1082	-0.1964	-0.7125	-0.656	-0.127	-0.899
t-ADF(1)	-0.4628	-2.253	-0.5397	-0.1044	-1.842	-1.658	-0.301	-0.84
t-ADF(2)	-0.2727	-2.113	-0.3281	0.0306	-2.505	-2.52	-0.021	-0.471
LR	1.6756	7.0583	6.9065	0.9296	0.7449	0.7058	1.4153	0.568

Table 1 also reports results for the observed value of the likelihood ratio unit root tests (denoted LR). Canonical model II is used and, therefore, the appropriate 95% quantile of the type 2 – Dickey Fuller distribution, for the null hypothesis $H_0: \rho = 1 \wedge \mu = 0$, is 9.1, which shall be the critical value. Looking at the LR line in table 1, one can see that the null hypothesis of a random walk is never rejected, further confirming the existence of one unit root in each of the aforementioned series.

Our suggested model might therefore be a nonsense regression, as highlighted by Granger and Newbold (1974). Therefore, we have further investigated whether cointegration existed, through an Engle-Granger test (1987). The auxiliary regression used was:

$$\Delta e_t = \gamma e_{t-1} + \varepsilon_t$$

where e_t are the residuals from the temptative estimation of equation. When testing

$$H_0: \gamma = 0$$
$$H_1: \gamma < 0$$

the Mackinnon critical values, for any significance level were used. The observed test statistic is -5.9, showing that the no cointegration hypothesis is rejected at any relevant significance level.

3.2 Estimation Results and Congruency Analysis

Table 2 reports a plethora of misspecification testes, where the null hypothesis fails to be rejected in all cases. In particular, at a 5% significance level, we found no evidence of autocorrelation in the regression residuals, using the Breussh and Godfrey test, no evidence of

ARCH effects using Engle's test (1982), no heteroscedasticity using White's test (1980), and no evidence of outliers using the Doornik-Hansen test (1994) for normality. Ramsey's RESET test might raise some concern, but if a 1% significance level is used, the null is rejected. Thus, table 2 confirms the quality of the suggested model.

Table 2: PcGive reported Misspecification tests for the regression model

BG	F(1,5) = 1.6555 [0.2546]
ARCH	F(1,4) =0.00046071 [0.9839]
Normality	Chi^2(2) = 5.2525 [0.0724]
Hetero Test	
RESET	F(1,5) = 13.873 [0.0136]*

The estimated model is:

$$\hat{S}_t = -59.7 + 0.393i_t + 11.1m_t + 16.9n_t - 0.251DP_t + 3.87un_t - 0.298un_t^2 + 1.16G_t^2$$

Table 3 reports the observed individual test statistics for each variable in the aforementioned regression model.

Table 3: PcGive reported observed test statistics for individual significance

i_t	m_t	n_t	un_t	$un^2{}_t$	DP_t	G_t
4.63	2.33	3.05	3.96	-3.57	-2.38	4.37

Hence, individual significance of all variables is assured at a 5% level. The null of no joint global significance is also rejected at a 1% significance level[3]. Given this result, the aforementioned significance of all variables and the fact that no misspecification test indicated a rejection of the respective null hypothesis enforce the conclusion that our model is a congruent representation (see Hendry (1995) and Bärdsen (2005) for a discussion of congruency in the context of dynamic macro-econometric models) of the household saving behavior in Portugal. Cointegration assures us of the validity of the standard testing procedures.

4. Discussing the Empirical Results

The estimated signs of the relevant regression coefficients and the magnitude of such estimates are of the utmost importance. We give no special meaning to the fact the ratio of public expenditure to GDP is increasing household savings given that the public sector is over-sized in Portugal (the average wage in the Public Sector is 51,5% above the average wage in the private sector, indicating a major inefficiency of the Portuguese Economy, since, as it is suggested in the Mckinsey (2010) report for Portugal, the Public Sector is crowding out employees from the private sector, which is said to be more efficient (see, inter alia, Afonso and St. Aubyn (2003)). Moreover, Public Sector Wages stand for nearly 15,5% of annual GDP in Portugal, and the weight of employment in the public sector as a fraction of total employment is 14,4% (on the EU average, but clearly above the level for comparable countries: the EU average is pushed up by large Public Sector countries like the ones in Scandinavia, or France).

So we shall not make further considerations about the presence of public expenditure in the estimated model, given that this is simply a direct effect on income: most of the public sector expenditure is the wage bill, and that increases disposable income for public sector workers, thus increasing their household's savings.

More importantly, we should notice neither the level of taxation nor the grate of growth in GDP per capita are in the final model, as they were not selected by Autometrics from a General Unrestricted model. This is due to the fact that household savings are expressed as a fraction of disposable income in our model, therefore already taking into account the level of taxation and income growth.

The most striking conclusions from estimated equation above are the following:
- An increase of a percentage point in the interest rate is estimated to cause a 0.3 percentage points increase in savings, other things being equal. The relevant feature is the positive correlation between savings and interest rates for Portuguese Households. On the basis of section 3, we would argue that the substitution effect is the dominant force, when the interest rate is rising, since there appears to exist an increase in current consumption. More importantly, given that during the sample period Portugal has experienced a sharp decrease in interest rates during the convergence period to the Euro, as the markets anticipated the low interest rates associated the German Mark (and indeed one of the accession criteria to the Euro had to do with convergence of interest rates with the lower ones in the EU, as it was established in the Maastricht Treaty), the positive correlation between interest rates and household savings as drove down the level of household savings. If these had already been contracting since the financial liberalization in Portugal in 1989, and had benefited from the Portuguese Escudo's presence in the EMS, the interest rate convergence to the German ones has further lowered the costs of borrowing for Portuguese households.
- Clearly the estimated coefficient on the DP variable (public debt as a ratio of GDP) suggests that an increase of one percentage point in such ratio caused a decline of household savings by 0.25 percentage points. This is a striking conclusion as it suggests the presence of no Ricardian Equivalence type of effects in Portugal. Indeed, Public Debt is not being perceived as a form of saving by Portuguese families. This could be because they are in fact saving less as a fraction of GDP (hence not buying government bonds as a replacement to banking deposits) indicating a lack of perception that increased public debt in one period would mean higher taxes in the future. Either Portuguese households have failed to have this type of reasoning (which would amount to a failure in the rationality requirements of Ricardian Equivalence) or because, the successive governments have engaged more and more on roll over practices, lacking to signal the need to raise funds to finance their debt. Evidence suggests that these two were combined: at a certain stage the rolling over practice become too common for governments, and the perception that public debt meant higher future taxes was deficiently perceived by households. So, the estimated negative coefficient suggests the government might have a share of responsibility in the decrease of household savings in Portugal.
- Our econometric results suggest a dramatic effect on precautionary saving. In fact, if household savings emerge as a concave function of the unemployment rate, the estimated maximum of such function is 6.5%. Hence, for higher levels of unemployment, household savings would be decreasing when the unemployment rate increases. For low levels of unemployment, increases in the unemployment rate signal the precautionary effect and the increased savings arising from such an outcome would offset decreased savings from the households who have lost jobs. However, as unemployment increases above a certain threshold, the precautionary effect begins to be offset by the larger and larger number of households living on the dole. If one is to bear in mind the current level of unemployment in Portugal is nearly twice as much as the estimated threshold (and is

expected to increase further) one would have to estimate that current increases in the unemployment rate only aggravate further the low household savings rate.

- Both the birth ratio and the marriage ratio have an estimated positive impact on the savings rate. This means that, other things being equal, when the birth ratio increases by a permilage point, the savings rate is estimated to increase by 1.69 percentage points. Furthermore, when the marriage rate increases by 1/1000 the savings rate is estimated to increase by 1.1 percentage points. Hence, as expected from section 3, both the birth ratio and the marriage ratio entail a higher concern with the future which turns into a lower discount factor. In fact, positive temporal preference for consumption becomes weaker, and the future is relatively more valued.

  This result is of the utmost significance since the marriage rate has been dropping dramatically in Portugal with respect to its levels in the 1970's, and experienced a sharp decline in the sample period. Further, fertility and birth ratios have also been steadly declining, with Portugal currently having, along with Spain of the lowest birth ratios in the EU. These two processes are strikingly consistent with the pattern of decline in household savings. In fact, there is a clear suggestion that in the 1993-2008 period Portuguese households experienced a dramatic shift in their preferences towards present consumption, this saving less and consuming more in the present, generating high household indebtedness levels: in order to consume more, the birth and marriage ratios suffered very sharp declines.

5. Conclusions and Policy Implications

The implications of sections 2 and 3 of this paper are quite strong as far as comparing what the current policy is in Portugal, and to what it should be. More seriously even, there are measures which haven't yet produced effects and that will further aggravate the problem, if they are not counter acted in due time. The cases of Greece and Ireland where restrictive but blind budget measures have been taken, and the fact that they are still well within the top 3 of the most likely to default countries in the world, suggests, the findings in this paper have to be taken seriously into account, since they have not been in Greece or Ireland. In particular, we wish to stress the following:

- Section 2 makes it quite clear that savings rate is a fundamental variable in determining the implied rating by the credit default probability as of the 31st December 2010, as the CMA DataVision reports. Higher internal savings increase the credit rating, as shown by the estimated ordered probit model. This effect dominates that of external debt and that of public debt. Although both of these have the correct signs, the ordered probit model unambiguously shows how relevant it is for a country to be able of generating domestic saving so that it can successfully escape from the lower rating to the higher rating. In fact, the results for the ordered probit model show that in spite of global significance at the 2% significance level, and in the spite of the negative estimated impacts on ratings of increases either in public debt or in external debt, only the savings rate is statistically significant (at a 1% significance level), and has a positive estimated sign, showing that lower rated countries will necessarily have to save much more in order to climb the ratings table until the highest rated countries. The problem with the aggressive fiscal policy being conducted in Portugal is that the budget for 2011 and several measures already taken in 2010 seem to think public debt consolidation has to be achieved independently of the fact that this is being suggested to be the result of increased taxes. In 2010, and in 2011 the Portuguese Government, and the main opposition party have agreed on a high increase in direct and indirect taxes, mostly, income taxes of households and firms and the value added tax. Increased tax pressure is not only

reducing the after tax income of households, but also is it making fundamental goods and services that cannot be left out of a basic consumption basket more expensive. In the end, disposable income will be lower. This even more the case as subsidies to poor households have been cut in the 2011 budget, meaning the overall population will have a decreased disposable income in 2011. We do not see how can households afford more if budget consolidation is being tackled at the expense of private savings. Even if the government is able of reducing the deficit, families will most likely save less, thus, these measure are not aimed at increasing the Portuguese sovereign credit rating. In all likelihood, they will have the opposed effect given the forecasts of a GDP negative growth rate in 2011.

- Continuing to look at the results from section 2, but now focusing on the quantile regression results, it seems clear that the introduction of most risky countries in the Euro area (the top quantile of the Credit Default Probability variable) in comparison to say the bottom 50% quantile, again turns the countries savings rate as a key variable. Indeed, in these countries, both public debt and external debt are also statistically significant at 1%. Notwithstanding, countries under heavier scrutiny cannot try to fix their finances by reducing public debt at the cost of higher taxation. It is more important to increase private saving, but since public debt is also relevant here, budgets need to be contained by means of a strengthened reduction in public expenditure. The mistake that is being pursued in Portugal is to bet essentially on tax increases, caving in to trade unions when it comes to reduces the wages of the public sector (in 2011 a 5% wage cut was submitted with the government budget, but it contains several flaws: it starts only at an income of 1500€ when the Portuguese median wage is of about 700€; it has a much too small impact when compared to the necessary reduction in the wage bill that might allow Portugal to generate public budget surpluses to make for a reduction in public debt). In fact, a common mistake that was committed in Ireland and in Greece is that there is no goal of zero budget deficit, or indeed of a budget surplus, and Portugal is following the same path. Without a budget surplus, it is hard to see how public debt as a ratio of GDP is to be cut, bearing in mind that such a surplus requires sparing the economy from further tax increases, otherwise private savings decline would offset gains in public savings. Overall, the Portuguese economy needs to shrink: the public sector needs to shrink and households and firms would need to save more. Such a shrinkage might generate capacity to reduce external debt, whilst instead the debate is only flirting around reductions in deficits, but not in the debt itself: a negative deficit albeit smaller still increases debt ratios, worsening the default probabilities.

    Results for the correlation between domestic savings and secondary market bond yields further strengthen our perception that Portugal has to take decisive steps towards increasing its domestic savings rate.

- Results from section 3 suggest three areas in which the government should intervene quickly, reversing some of the past policy measures and implementing different ones:
    o The 2011 budget contemplates cuts in public expenditure that are most likely to further decrease the birth rate in Portugal, namely cutting support to poorer families, providing them with less financial aid per child. Clearly, in a recessive context, where the birth rate is already extremely low, this is only likely to reduce it even further. Apart from unsustainable social security issues in the short future, a further drop in the birth rate would further decrease household savings as the future would be valued even less. Instead pro-active pro-life policies should be enhanced in order for household savings to rise. Combining these with suppressing the tax increases the government has pursued would

mean a very strong effort to control other subsidies, government consumption, overall government size, and the government wage bill.

o It could be argued the cutting the public wage bill by something more than 5% would reduce disposable income. One needs, however to bear in mind, Portuguese public workers are 14 % of the labor force. Cutting their wages at the gain of increasing the disposable income in 86% of total employment, through reductions in direct and indirect taxes is likely to be politically difficult but it is a striking economics necessity!

o Still assessing the impact on savings of marriage and birth rates it seems that a number of recent legislative measures that decrease the likelihood of marriage in favor of other forms of couple cohabitation that involve no contractual relationship should be reversed. Fiscal benefits have been extended from those with a likely longer plan for a family to those who simply decide to live together. Such benefits generate fiscal indifference when the government should be favoring a higher marriage rate, discriminating contractual marriage positively.

o Finally this dataset does not include the effect of the enlarged abortion rights that have been approved in 2007. The net effect of such a low in the coming future should not be to favor the birth rate, and thus, the growth in household savings! So reversing such a law in a country where the number of children per couple is already as low as 1.4 (the limit for replacing existing generations is estimated to be 2.1), is to be considered in the short term.

o When include the no Ricardian Equivalence effects we are further persuaded of the pernicious nature of the high economic illiteracy rate combined with government rolling over of debt. In particular, the inexistence of a serious concerning in generating budget surpluses but rather deficit reduction clarifies that, in a country where potential output is extremely low, and forecasts point to very slow growth of GDP, the unsustainable nature of the roll over process. The vicious cycle of an increase in the public debt to GDP ratio, to a decrease in household savings, to increased default likelihood, and from that to higher yields on Portuguese Bonds, generating a rise in public debt whilst GDP is virtually stalled is prone to lead to a collapse in Portuguese ability to break the market perception of sovereign default. Indeed, the rise in public debt not only reduces household savings and thus, domestic savings (which are at the very best compensated by the reduced deficit, but never entailing debt reduction), but also has (as seen in section 2) a direct effect on bond yields and on lower credit rating. Again, the solution to this has to go through the path of shrinking government size, which is to be done mainly through the public sector wage bill.

o Finally, the conclusions concerning the fact Portugal's unemployment rate is nearly twice as high as the maximum that would not generate a reduction in household savings creates a major conundrum with the need to stop further unemployment growth and to attempt to reduce current levels of unemployment. Clearly this cannot be done through public investment, or any sort of outdated Keynesian stimulus package given the poor state of Portuguese public finances. So firing public employees to cut the wage bill seems totally inadequate as do labor market policies focused on encouraging workers displacement. Rather, the public wage bill cut has to come from the wage rate itself, which further enlightens why the 5% average wage cut is clearly insufficient, and why cutting wages at or above 1500€ per month cannot

be sufficient. Notwithstanding, proactive labor market policies to create employment in the private sector would have to entail a reduction in hiring costs, namely through corporate expenses with social security. Privatization security would be a mid-term goal, although an immediate step would be to cut back firms' contributions to public social security per worker. Furthermore, the Minimum Income Program should be halted as studies point out that, apart the 25% estimated fraud issues, there is a very high subsidy level when compared to the countries minimum wage: as a result those who benefit from such programs have low incentive to actively engage in the labor market. Cutting on social unemployment protection might also encourage workers to lower their reservation wages. To avoid long term unemployment it would seem wise to accept the insights from catholic social teaching and substitute an approach where nothing is asked in return of unemployment subsidies by an active involvement in the social sector of those living on the dole: doing completing a full time schedule of social work in benefit of the community. This is would avoid the creation of laziness habits and would avoid rises in reservation wages. Further, human capital skills would not deteriorate so rapidly.

End Notes

[1] It is commonly accepted that the post Lehman Brothers failure period took some time to hit the real economy in Portugal. Firstly, because banks had no significant direct exposure to Mortgage Backed Securities and other forms of the so-called toxic assets. Secondly, because there was no real estate boom and burst in Portugal, as there was in Spain or in Ireland. The Portuguese subsequent recession came mostly through contagion and very poor export performance, and lasted deeper to structural fragilities in the Portuguese Economy.

[2] Nonetheless, we also provide, Breusch-Godfrey tests' p-values (BG in table 1) to highlight there is no autocorrelation in the auxiliary regressions, when a 1% significance level is used.

[3] PcGive's reported observed global significance statistic was 31.9, which entails a p-value of nearly zero (rounded at the third decimal) given an $F(6,7)$ distribution under the null of no global significance.

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