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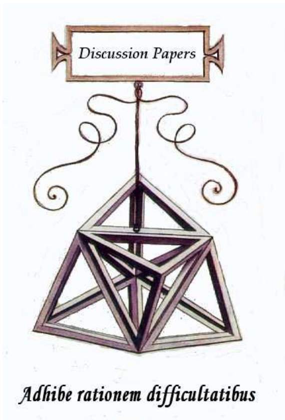

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Abstract

In a simple OLG small open economy with endogenous fertility, endogenous labour supply and intra-family old-age support, we show, in contrast with the preceding literature, that the saving rate is always reduced by an increasing longevity, while fertility is unaffected. As a consequence population ageing lead to an unambiguous increase in the long-run per capita foreign debt. Moreover transfers from children to parents are increasing (decreasing) for low (high) longevity rates.

Keywords Intra-family old-age support; Overlapping generations; Longevity; Labour supply

JEL Classification H52; J13; O41

1. Introduction

In the most part of countries where both capital markets and public pension systems are insufficiently developed, the main institution which has traditionally provided the support for old-age needs is the family.[1]

A recent stylised fact is the steadily rise in the share of the old-age people in total population experienced in several OECD countries, and in particular the mortality decline, which, once life expectancy has reached the mid to high 60s, occurs largely at older ages under the form of an increasing longevity.[2]

Although, on the one hand, the increased longevity has been retained a menace for the solvency of the widespread PAYG pension systems, on the other hand it seems to enhance the saving rate, at least in a basic OLG economy. Indeed the positive effect of longevity on savings is a general belief of the economic literature based on a life-cycle motive: "…increasing lifespans makes individuals effectively more patient and willing to invest" (Chakraborty, 2004, p.120). Zhang et al. (2001, p. 494), by assuming actuarially fair annuity markets in an OLG model with saving, human capital investment, bequests, uncertain lifetime and social security (funded or unfunded), claim that a rise in life expectancy increases the saving rate, and that "this result is intuitive. When surviving to old age becomes more likely, agents save more for own old-age consumption." Zhang et al. (2003), extend the previous model assuming accidental rather than voluntary bequests. While the paper cited above consider savings and mortality but abstract from intra-family transfers, Bental (1989) and Morand (1999) consider intra-family transfers but neglect the existence of savings and mortality. In particular, Bental (1989) carries out a welfare analysis under the old age support hypothesis, assuming both the cost of having children and the transfer from children to parents to be exogenous and fixed. Morand (1999) analyses the relationship between growth, income distribution and fertility with respect to the issue of Demographic Transition in a model where endogenous fertility is based on old-age support and capital markets are missing, so that children are the sole asset for parents to transfer income to their old age, and while he considers - different from Bental (1989) - the time-cost of producing a child, in accord with Bental (1989) he considers only an exogenous transfer.

Different from Bental (1989) and Morand (1999), Wigger (1999) considers on the one hand both motives for having children (i.e. pleasure from having children and gifts received from own children in the second period of life) and on the other hand both private alternatives to insure old-age consumption needs (i.e. private savings and intra-family transfers from children), but his focus is on the effects of the introduction of public pensions in such a context by abstracting from mortality issues.

[1] As Wigger (1999) p. 626, argues "voluntary intrafamily transfers from young to old individuals, either in cash or in kind, have been observed in virtually all societies, and they have substantially contributed to the livelihood of the old [see, e.g., Hansson and Stuart (1989) and Ehrlich and Lui (1991)]. These intrafamily transfers provide an individual rationale to settle down a family and to meet the cost of rearing children in order to secure old-age consumption."

[2] This permits the introduction of the observed mortality decline in an OLG context as an increased probability to be survived at the beginning of the retirement age, as Zhang et al. (2003) p. 84, argue: "the primary effect of mortality decline is to raise the life-cycle ratio of years lived in old age to years lived in the labor force. In an overlapping-generations model, this effect can be simply modeled as a declining adult mortality rate at the end of working age."

The importance of the "old-age support" motive in the individuals' behaviour is well ascertained. For instance, Cigno and Rosati (1992), using Italian time series data, argue that the old-age support motive is paramount. Indirect evidence of transfers from children to parents for providing old-age support, is in Jensen (1990) and Ehrlich and Lui (1994), where the implications of their theoretical models are tested.[3]

As regards the saving effects of an increasing longevity, Barro and Sala-i-Martin (1995, Ch. 12) found empirical evidence that initial life expectancy has highly significant positive impacts on subsequent per capita income growth and the ratio of investment to GDP in a sample including both developed and less developed countries, while Kelley and Schmidt (1995) found a positive effect of a declining mortality on economic growth in less developed countries from 1960 to 1990; but in developed countries, this effect diminishes over time and becomes negative in the 1980s.[4]

Following Zhang et al. (2001), amongst many others, in this paper we assume uncertain lifetime and the existence of a fair annuity market.[5] However, in the present model, parents depend for their old-age consumption partly on their own savings and partly on the support of their children, different from the most part of the preceding literature in which they consume in their old-age alternatively either only their own savings or only transfer payments by their sons and daughters. Moreover, we combine, as for the decision to have children, both parental weak altruism and old age support motives.[6] Finally, (*i*) different from Bental (1989), we endogeneise the labour supply introducing an endogenous cost of children, and (*ii*) different from Bental (1989) and Morand (1999), the transfer from children to parents is endogenously determined as well.[7]

How individuals save and whether and how the increase in the life expectancy affects saving, is a very important policy question whose answer is likely to influence policy programmes such as the introduction of public pensions and old-age health insurance. Providing meaningful answers to these question requires to account for many factors. Naturally, the present model is deliberately stylised in order to simplify and focus the analysis, and it is limited to a small open economy context. The main

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[3] However, there is also evidence that the importance of old-age support may decline with income: for instance a drop in the percentage of women who expect to rely on their children during old-age, as well as in the percentage of elderly who live with their children has been evidenced for Japan (e.g., Ogawa and Retherford, 1993).

[4] The non-monotonicity in the relationship between economic growth and mortality decline is obtained by Zhang et al. (2003) in a model with accidental bequests. It should be noted that by assuming instead altruistic bequests and perfect annuity markets, as in Zhang et al. (2001), the usual positive monotonicity would be obtained.

[5] An alternative assumption could be the presence of unintended bequests, in the absence of annuity markets. We note that in the presence of adult mortality treat savings left by agents who die before reaching old age is an important issue. We agree with Zhang et al.(2001) noting that "the analysis would also be very different depending on whether actuarially fair annuity markets are assumed or not. Thus, it s necessary to limit the scope of our analysis in one way or the other." (p. 488)

[6] In fact, we argue that both motives for having children may be complementary rather than competing and, although the degree of financial development reduces the need for investing in children for old-age security, the uncertainty as regards future financial returns as well as future public pensions payments (for instance, such an uncertainty is self-evident in the current financial crisis as well as in the current menaces to public pensions systems) may increase the value of the intra-family transfer.

[7] The interest for such generalizations was also indicated by Bental (1989, p. 300):"It seems desirable to try and relax some of these assumptions. In particular, endogenising the intergenerational transfer should be an important goal."

findings are: (*i*) the choice of fertility is always socially optimal and unaffected by longevity changes; (*ii*) the transfer payments show an inverted U-shape relation with longevity rates; (*iii*) interestingly, the saving rate is always reduced by a higher longevity, independently of whether transfers are always an increasing or inverted U-shaped function of rate of longevity, and thus population ageing causes an increased foreign indebtedness in small open economies. These results are in sharp contrast with the belief emerging from the received literature, according to which fertility is generally affected[8] and savings are increased by a higher longevity. Therefore, this paper by investigating a more general case of the joint presence of capital markets and voluntary transfers from children to parents with endogenous fertility and endogenous labour supply, contributes to the literature on the effects of longevity on savings and fertility in an OLG context. Our findings are, to the best of our knowledge, rather novel in this strand of literature.

The remainder of the paper is organised as follows. In Section 2 we develop the model; in Section 3 the main steady-state results are analysed and discussed. Section 4 makes some concluding comments.

2. The model

2.1. Firms

We assume a constant-returns-to-scale production function – which is constant through time, twice continuously differentiable, strictly monotonic increasing and concave, and satisfies the Inada condition. The output produced at time t; Y_t, is: $Y_t = G(K_t;L_t)= L_t\, g(k_t,1-l_t)$, with $k_t=K_t/N_t$, where N_t is the number of individuals in working age, K_t and $L_t=(1-l_t)N_t$ are the capital and labour employed at time t.

The economy is perfectly competitive so that production factors are paid their marginal product: $1+r_t=g'(k_t,1-l_t)$, and $w_t = g(k_t,1-l_t)-k_t g'(k_t,1-l_t)$, where $1+r_t$ is the gross rate of return on capital and w_t the wage rate per efficiency unit of labour. For simplicity we may suppose that the world rental rate is fixed at a level r. Since the small economy allows unrestricted lending or borrowing, its rental rate is set equal to the world rental rate, r. Therefore, the wage rate will be treated as constant over time. Moreover the saving rate is no more relevant for output growth, but only for the balance of payments.[9]

2.2. Individuals

Consider a three-period OLG economy with identical agents (e.g. Diamond, 1965). During childhood individuals do not make economic decisions. Young-adult agents (N_t) are endowed with one unit of time divided between working time ($1-l_t$) and child-rearing time (l_t). They earn wage income w_t, assumed to be entirely saved to support material consumption when old (c_{t+1}). The representative individual entering the

[8] In fact, most studies in an OLG context show a reduction in fertility caused by a higher longevity (e.g. Yakita, 2001; Zhang et al., 2001; Strulik, 2003). An exception is Fanti (2009, p. 350) who argues that "even in the textbook OLG model and regardless of whether accidental bequests or a perfect annuity market is considered, the relationship between fertility and longevity is an inverted U-shape."

[9] A balance of payments analysis is beyond of the scope of the paper. However a remark on the foreign indebtedness is made in section 3.

working period at time t draws utility from having children (n_t) as well as from material consumption when old (c_{t+1}). The assumption that individuals are interested to old-age consumption (neglecting that of the young-age period) is usual in the economic literature (e.g., Galor and Weil, 1996, Momota, 2000) and simplifies the model without loss of generality. Moreover, we assume that young individuals survive to the second period with (constant) probability $0<\pi<1$. Therefore, the existence of a perfect annuity market implies old survivors will benefit not only from their own past saving plus interest, but also from the saving plus interest of those who have deceased. Finally, a young adult agent chooses to transfer a fraction d_t of her wage income to a particular member of the previous generation who is the agent's "parent". In the third period of life, agents receive from each of their children a fraction d_t of their wage income and sell their capital asset in a competitive market. The transfer tuned by d_t is the "old age support" provided by children to their parents. Such a transfer is considered here as motivated by an exogenous social norm that everybody follows, also corroborated by the fact that this norm clearly exists in most societies; however, this transfer may not be coherent with the self-interested rational individual behaviour.[10] She must choose both the time spent raising children (l_t) and the fraction of income to transfer to her own parents (d_t) to maximise the logarithmic lifetime utility function[11]

$$U_t = \ln(n_t) + \pi\beta \ln(c_{t+1}) \tag{1}$$

subject to:

$$s_t = w_t(1-l_t)(1-\pi d_t), \tag{2}$$

$$c_{t+1} = \frac{(1+r)s_t}{\pi} + n_t w(1-l_{t+1})d_{t+1}, \tag{3}$$

$$n_t = q\,l_t \ , \tag{4}$$

where r is the interest rate, β is the subjective discount rate and Eq. (4) represents the child bearing technology, with $q>0$ being a scale parameter.

Exploiting Eqs. (2)-(4), the maximisation of Eq. (1) implies:[12]

$$\frac{\partial U_t}{\partial l_t} = 0 \Leftrightarrow l^* = \frac{1+r}{q} \tag{5}$$

$$\frac{\partial U_t}{\partial d_t} = 0 \Leftrightarrow d^* = \frac{(1+\pi\beta)(1+r)-q}{\beta\pi^2 q} \tag{6}$$

[10] For instance, it is worth noting with Bental (1989, p. 287) that: "this transfer does not seem to be incentive compatible. The relationship between this norm and individual rationality is till an open question."

[11] We note that here the motive for providing her parent with an amount of material support arises from some compelling social norm or custom, as usually maintained (e.g. Bental, 1989). However sometimes also a direct gratification from parental consumption may be assumed (Zhang and Nishimura, 1993; Wigger, 1999). In such a case even the consumption of parents enter the utility function of the young adult. The latter case of a semi-altruistic motive on the part of children may be an interesting extension of the present model and is left for future research.

[12] Note that the solution of the maximization problem involves a forward-looking difference equation $l_t = l(l_{t+1})$, and it is easy to ascertain that the positive equilibrium (l^*,d^*) is locally stable under forward-looking behaviour (the proof is omitted here for brevity and is disposable on request). In the sequel of the paper the analysis will be focused on the steady state outcomes.

From Eq. (5), we derive the following conditions for an economically meaningful value of the child-rearing time: (*i*) $l^*\geq 0$ is always satisfied; (*ii*) $l^*\leq 1$ requires that

$$q > 1 + r \qquad (7)$$

Inequality (7) says that the child rearing productivity index q must be high enough to avoid the corner solution where time is entirely devoted to rear children.
Eq. (6) reveals that the conditions for an economically meaningful value of the old-age support are the following: (*i*) a non-negative value of d^* requires that

$$0 \leq d^* \Leftrightarrow 1 + r < q \leq M_2 \qquad (8)$$

(*ii*) by considering the limit of the disposable income (i.e. $d^*\leq 1$), it is required that

$$d^* \leq 1 \Leftrightarrow M_1 \leq q \qquad (9)$$

(*iii*) since $(1+r) < M_1$, the overall condition which has to be satisfied is

$$0 \leq (1 - d^*) \leq 1 \Leftrightarrow M_1 \leq q \leq M_2, \qquad (10)$$

where $M_1 = \dfrac{[\beta\pi(1+\pi)+1](1+r)}{\pi^2\beta+1}$; $M_2 = (\beta\pi+1)(1+r)$.

We note that (9) implies also that (7) is satisfied. In what follows we assume as a technical condition that the parameter q always satisfies (10).

The economic intuition behind this condition is that when the child rearing productivity index is too low with respect to the price of the old-age consumption it would be convenient (although impossible in the present model) to revert the direction of the intergenerational transfer, while when such a productivity is relatively too high it would be better to transfer to old-age even more (although also this is impossible in the present model) than the disposable income.[13]

3. Steady-state analysis

In this section we analyse how fertility, intra-family transfers and savings are affected in the long run by a rise in longevity.

Eq. (5) implies that $n^*=(1+r)$. Therefore we note that:

(i) the fertility rate is always optimal, in the sense that the laissez faire solution always corresponds to the solution which would be obtained by a social planner;[14]

(ii) the fertility rate is unaffected by a change in the rate of longevity.

[13] Although we consider only intra-family transfers from children to parents, a theory developed by Caldwell (1976, 1982), argues that in all traditional societies, the flow has been from younger to older generations, but when various socio-economic changes reduce, *latu sensu*, people's willingness to place family interests above their own, then the direction of transfers may be reversed and rather than children contributing to their parents, parents begin transferring toward children through larger bequests or educational investments. On this issue see also Erlich-Lui (1997) and Blackburn and Cipriani (2005), who develop a model with transfers both from children to parents and from parents to children.

[14] We do not pursue here an optimality analysis, but it is easy to see that the chosen fertility rate (n^*) is equal to the interest rate, which is the well known optimal condition (golden rule) in OLG models à la Diamond (1965). By passing we note that, as a consequence, any child policy aiming at reducing or increasing fertility rates would be long-run welfare-worsening.

Now we analyse how the choice of the inter-family transfer for supporting old-age consumption is affected by an increasing life expectancy:

Proposition 1. *An increasing longevity implies either lower or higher transfer payments from children to parents; in particular the necessary and sufficient condition for having a negative effect of longevity on the income fraction transferred to parents is the following:* $\frac{\partial d^*}{\partial \pi} > 0 \Leftrightarrow q > M_3, \quad M_3 = \frac{(1+r)(\beta\pi + 2)}{2}$.

Proof. The proof uses the following derivative, which is positive if and only if the numerator is positive, that is when $q > M_3$. **Q.E.D.**

$$\frac{\partial d^*}{\partial \pi} = \frac{2[q-(1+r)] - (\beta\pi)(1+r)}{\beta\pi^3 q}.$$

It follows that, when $q>M_3$, a necessary condition for $\frac{\partial d^*}{\partial \pi} > 0$ is $M_3<M_2$ and a sufficient condition for $\frac{\partial d^*}{\partial \pi} > 0$ is $M_3<M_1$, while, when $q<M_3$, $M_1<M_3$ is a necessary condition for $\frac{\partial d^*}{\partial \pi} < 0$, given that $q>M_1$ must always hold.

Lemma 1. $M_3 < M_2$.

Proof. This straightforwardly follows from $M_2 - M_3 = \frac{\beta\pi}{2} > 0$. **Q.E.D.**

Lemma 2. $M_1 \underset{>}{\overset{<}{-}} M_3 \Leftrightarrow \pi \underset{<}{\overset{>}{-}} \frac{\sqrt{4\beta+4}-2}{2\beta}$.

Proof. The proof straightforwardly derives from:

$$M_1 \underset{>}{\overset{<}{-}} M_3 \Leftrightarrow (\beta\pi^2 + 2\pi - 1) \underset{<}{\overset{>}{-}} 0,$$

which holds if and only if $\pi \underset{<}{\overset{>}{-}} \frac{\sqrt{4\beta+4}-2}{2\beta}$. **Q.E.D.**

Therefore, by also using the conditions ensuring the economic existence of the model (Eq. 10) we can have the two following cases:

$$(i)\ M_1 < q < M_3 < M_2 \quad \Rightarrow \frac{\partial d^*}{\partial \pi} < 0 \qquad (11)$$

$$(ii)\ M_1 < M_3 < q < M_2 \quad \Rightarrow \frac{\partial d^*}{\partial \pi} > 0 \qquad (12)$$

Lemma 2 says that intra-family transfer payments could be decreasing with increasing longevity only if longevity is sufficiently high.

These conditions mean that such payments are increasing with increasing longevity depending on sufficiently low levels of both the existing longevity rate and the subjective discount factor. The following lemma clarifies the relationship between the parametric configuration and the sign of $\frac{\partial d^*}{\partial \pi}$.

Lemma 3. *i)* If $\pi > 0.499$ then $\frac{\partial d^*}{\partial \pi} < 0$; *ii)* if $\pi < 0.414$ then $\frac{\partial d^*}{\partial \pi} > 0$; *iii)* if $0.414 < \pi < 0.499$ then $\frac{\partial d^*}{\partial \pi} \gtrless 0 \quad \Leftrightarrow \quad \beta \lessgtr \frac{1-2\pi}{\pi^2}$

Proof: given that $0 < \beta \leq 1$, lemma 3 results from a simple manipulation of the inequality $\pi \gtrless \frac{\sqrt{4\beta+4}-2}{2\beta}$ and from lemma 2. **Q.E.D.**

From Proposition 1 and Lemmas 1, 2 and 3, the following remark holds:

Remark 1. Intra-family transfer payments are an inverted U-shaped function with respect to longevity.

A preliminary general analysis of the forces determining savings says us that the increasing longevity reduces directly the saving rate, owing to the increased number of parents survived to the old-age, while it may indirectly reduce or increase savings depending on its effect on the choice of the wage income fraction for transfer payments. In fact, given that, from Eq. (2), savings are

$$s^* = -\frac{w[q-(1+r)(1+\beta\pi)]}{\beta\pi^2 q} \qquad (13),$$

we may see that $\frac{ds^*}{d\pi} = \underbrace{\overbrace{\frac{\partial s^*}{\partial \pi^*}}^{-} + \overbrace{\frac{\partial s^*}{\partial d^*}}^{-} \cdot \overbrace{\frac{\partial d^*}{\partial \pi}}^{+/-}}_{+/-}$

However, despite this ambiguity a priori, it can be shown that, in the overall, the relation between savings and longevity is always negative,[15] as claimed by the following:

Proposition 2. A *higher longevity implies lower savings in the long run.*

Proof. The proposition is straightforwardly derived, after some algebraic manipulations, from the following derivative:

$$\frac{ds^*}{d\pi} = \frac{w[(1+r)-q]}{\beta\pi^2 q^2} < 0. \qquad (14)$$

We observe, from Eq. (14), that (*i*) the lower the rate of longevity, the interest rate and the subjective discount factor are, and (*ii*) the higher the wage rate and the child

[15] It might be noted that this result is expected when longevity is sufficiently low because, in the latter case, the analysis of the relationship between d and π (i.e. Remark 1) has revealed that such a relationship is positive.

rearing productivity are, the larger the negative effect of an increasing longevity on savings is.

Eq. (14) deserves some comments: the negative effect of a mortality decline on savings is significantly larger when both the existing levels of mortality and "myopia" are sufficiently high; in particular as regards the former the reduction in the saving rate is, for instance, about twenty times larger when π=0.20 than when π=0.90. The economic implication is that, since mortality and "myopia" are relatively higher in less developed economies, then the latter economies are relatively more damaged in terms of reduced savings by the rise in life expectancies.

To sum up, the relationship between savings and longevity occurring in the present economy seems to be always of opposite sign with respect to that occurring in the previous mentioned literature, according to which savings are always stimulated by an increasing longevity or at most the relation may be of the inverted U-shaped type (i.e. Zhang et al., 2003 found that at very high level of longevity an effect of opposite sign may occur, that is the growth rate may reduce for an increasing longevity). Indeed, in the present economy savings are always reduced by a higher longevity (and at most such a reduction, under some parametric configurations, may less strong at very high level of longevity).

As regards the effects on the international position of the small open economy, the following remark holds:

Remark 2. Given that the labour supply and thus the national installed capital as well as the national product are not affected by a change in longevity, a rise in longevity, by reducing domestic savings,[16] always worsens foreign indebtedness.

3.1. Numerical examples

Let us illustrate, in the light of a numerical example, the content of the analytical results of the previous section, by examining the sensitivity of both long-run savings and intra-family transfers to the increasing longevity. We choose, only for illustrative purposes, β=0.6 and r=2, and two values of the longevity rate, namely a low value (π=0.35) and a high value (π=0.80). Then we investigate how the transfers-longevity relationship as well savings evolve when the longevity rate slightly increases in the two polar cases.

First of all, we see that when π=0.35 we have M_0=3.01, M_1=3.39, M_2=3.64 and M_3=3.32. and when π=0.80 we have M_0=3.01, M_1=3.21, M_2=4.45 and M_3=3.73. We fix the parameter q=3.45. Therefore, when π=0.35, $M_0 < M_3 < M_1 < q < M_2$, and, when π=0.80, $M_0 < M_1 < q < M_3 < M_2$. The following table displays the numerical effects of an increase of one per cent in the two different longevity rates on the transfer (d), savings (s) and the change in savings (Δs).

Table 1.

π	d	s	Δs
0.35	0.7576	0.09465	-
0.36	0.7833	0.09248	- 0.002235
0.80	0.7585	0.05065	-
0.81	0.7531	0.05023	- 0.0004278

[16] The part of the steady state per capita installed capital stock owned by domestic individuals is $k_d^* = s^* / n^*$.

The results illustrates the previous analytical findings: d is increasing (decreasing) with low (high) longevity rates (see Proposition 1 and Lemma 2); d is an inverted U-shaped function with respect to longevity (see Remark 1); s always decreases with increasing longevity (see Proposition 2); the negative effect of a mortality decline on savings tends to be reduced when mortality is low.

4. Conclusions

This paper examined the impact of declines in adult mortality on savings and fertility in an OLG small open economy.

By introducing, as a novelty with respect to the previous literature, a combined presence of: (*i*) capital markets with perfect annuity markets; (*ii*) voluntary transfers from children to parents; (*iii*) fertility and labour supply endogenously determined, the present analysis produces a model and some results which generalise and extend those obtained previously. A decline in adult mortality affects savings through two channels: (*a*) an increase in the number of parents survived, and thus directly in the potential overall transfers for supporting them in old age, and (*b*) either a reduction or an increase in the income fraction transferred from children to parents.

The findings are that: 1) while fertility is unaffected by longevity and is always socially optimal, transfers may be increasing (or decreasing) with longevity increases depending on whether the existing longevity rate is sufficiently low (or high), and 2) savings are always decreasing with longevity. Moreover in the long run population ageing processes lead unambiguously to an increase in per capita foreign debt.

These findings are in contrast with those prevailing in the preceding literature. First of all, savings are always reduced when adult mortality declines, in contrast with the conventional result. The policy implications of these findings are direct, as regards in particular the public pensions effects. In fact on the one hand, the introduction or an enlargement of a public pension system with the purpose, for example, to face with the current and future adult mortality decline, despite its expected negative crowding-out effect on savings,[17] could prevent, rather paradoxically, an even larger reduction of savings provided that the social norm prescribing transfers from children to parents were significantly weakened by public pensions (i.e. the usually expected substitution of public pensions to the private intra-familiar support).

On the other hand, since the introduction of public PAYG pensions systems, as providers of the means for “old-age support”, has been retained responsible for a reduction not only in savings, but also of fertility rates,[18] and since such rates are optimal with intra-family transfers, then public pensions would be in any case harmful as regards the optimal fertility. The investigation of these policy effects is left for future research.

[17] This negative effect on savings is theoretically based on the well-known life cycle arguments. However it must be noted that empirically the effects are resulted more controversial, as noted by Cigno, 2007, p. 37: “The effect of pension policy on voluntary saving has long been the object of empirical research. A majority of the studies based on individual or household data finds that pensions will either discourage or have no statistically significant effect on household saving. Others find a positive effect.”

[18] For instance again Cigno, 2007, p. 38, states that the introduction of a public pension scheme weakens the motivations which lie behind the fertility decision: “For a number of adults, the investment motive for having children, and for investing money and time in their upbringing, will then disappear. These persons will have fewer children than they would have had without the scheme.”

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