Long-term care insurance and optimal taxation for altruistic children*

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Abstract

We model long-term care insurance in an optimal taxation framework. Every adult decides upon the amount and type of care he purchases for his dependent parent. We consider two alternatives: nursing-home care provided by the government and home-care paid by the child with some lump-sum subsidy by the government. The only source of information asymmetry stems from the governments inability to observe the degree of altruism of the adult child for his/her parent. Further tax collection entails some social costs. In such a second best setting, we show that the quality of institutional care has to be kept relatively low and that compared to altruistic children, non-altruistic ones enjoy a high level of consumption.

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1 Introduction

The ongoing demographic aging process represents a major challenge for the way our economies are organized from a social as well as from an economic point of view. This process is the combined result of two tendencies, namely a slowdown in birth rates and an increase in longevity. The consequences of these changes can be felt across a large array of domains touching all age groups, ranging from the very young to the oldest old. One often cited example is the provision of long-term care insurance to the oldest old, be it under the form of a private or a public system. Only a handful of countries or regions have set up such long-term care insurance systems, which are incidentally also sometimes called dependency insurance. The most prominent example is probably the public German system introduced in 1995. The relative scarcity of such systems and the difficulties of organizing them is linked to some conceptual problems intrinsically linked to the issue at hand. First, a definition of who is a person in need of long-term care cannot always objectively be given. However, this reason on its own is not sufficient to justify the lack of long-term care insurance programs around the world, as disability insurance systems are plagued by the same kind of problem but do exist. The second, and probably more fundamental reason is that a lot of long-term care is not provided through a formal market mechanism, but rather through informal family arrangements. In this respect, the problem is similar to the child-care market, where family care is competing with market-provided care in private or public arrangements. From a social point of view, this duality of providers is an interesting one, as these two types of providers seem to function on a very different basis. While institutional care is essentially a provision of a contribution-based service by a public or private (for-profit or non-profit) provider, family care is at least partly motivated by some degree of altruism, which in turn implies that the caregiving family member also derives utility from this activity. Further, while institutional care usually implies some degree of public subsidization and hence inter-family redistribution, the same does not always hold true for family-care arrangements. In contrast to the child-care market, the costs involved are much larger in long-term care insurance, as costs of medical and non-medical care are much more expensive at the end of lifecycle than at the beginning because of the very different physical conditions people find themselves in. Hence, the choice between family or institutional care has important budgetary implications, which a government or a social planner cannot ignore. In the present paper, we model the decision problem faced by a social planner who is unable to observe the degree of altruism of the young and use distortionary taxes. We derive optimality conditions for social and fiscal policy variables. Section 2 spells out the model, and the key theoretical results in a first best world as well as in a world of information asymmetry between the planner and the citizens. Section 3 illustrates these results using numerical simulations while Section 4 concludes.

2 The model

We consider a stylized country that is populated by two generations, young and old. The young generation is economically active and the old generation is retired and dependent on long-term care. The different generations are linked together by a family-type relation. Every young person (or alternatively, every young household) has an elderly dependent. We further make the rather extreme simplifying assumption that there is no private savings for dependency in this country. However extreme, the assumption is not void of a meaning in the real world context. First, on purely empirical grounds, a substantial fraction of the people dependent on long-term care reach that status with totally insufficient financial means, and hence rely on social assistance payments to make ends meet. The underlying reasons for this can be multiple, ranging from short-sightedness, to inability to evaluate the costs of long-term care dependency. Second, it is reasonable to argue that in a substantial fraction of cases, particularly those relating to patients suffering of dementia or other forms of mental impairment, the elderly person will no longer be in charge of his financial planning. In those cases, it is hence perfectly reasonable to lump together any potential savings that the elderly person might have done with the financial assets of the young, as they are in general the legal guardian of the elderly.

Indeed, even in the context of less severe dependency situations, most studies reveal that family members play a major role in long-term care arrangements decisions for their elderly parents. Nevertheless, empirical work by Sloan et al. (1996) shows that strategic behaviour is not an important determinant of these decisions, incidentally suggesting that altruism motivates much of informal care. Our model takes into account this kind of behaviour. The decision-maker is indeed supposed to be the child (i.e. the potential care-giver), and when maximizing his own utility, the altruistic child gives a particular weight to his parent's well-being. Further, we assume that the population is divided into two subgroups differentiated in terms of their degree of altruism β_i, which is the only source of heterogeneity in the economy. Altruists ($i = a$) derive utility from seeing their parents being taken care of ($\beta_a = \beta > 0$, $\beta \leq 1$), non-altruists ($i = n$) are indifferent as to their parents' well-being ($\beta_n = 0$). For reasons of simplicity, we assume that all young have the same income (or wealth) endowment level y. Defining $u(c)$ and $v(d)$ as being the instantaneous utility functions of the consumption of the young (c) and the old (d), we can write their respective utility functions as

$$\begin{aligned} \text{young} &: \quad u\left(c_i\right) + \beta_i v\left(d_i\right) \\ \text{elderly dependent} &: \quad v\left(d_i\right), \end{aligned}$$

where $u\left(c\right)$ and $v\left(d\right)$ have the usual properties $u'\left(c\right), v'\left(d\right) > 0$, $u''\left(c\right), v''\left(d\right) < 0$. In the present paper, we interpret $v(d)$ as the utility function of consumption of long-term care services rather than consumption of a basket of goods. The young are assumed to have a production technology at their disposal, which allows them to transform one unit of their income into one unit of care for the elderly.

2.1 Laissez-faire equilibrium

In this section, we derive the equilibrium conditions in a market economy without government intervention. In this setting, only the young have the ability to determine the use of their resources, as they are the sole income purveyors of the family. If they are altruistic, they hand over part of their resources transformed into long-term care to their dependent parents. The market outcome can thus be summarized by the following consumption levels of the different subgroups of the population:

$$\begin{aligned} c_a &= y - s & \qquad d_a &= s \\ c_n &= y & \qquad d_n &= 0 \end{aligned}$$

where s satisfies the conditions for utility maximization by the young altruists:

$$-u'(y-s) + \beta v'(s) = 0$$

The resulting resource allocation in the economy leads to the following results $u(c_a) < u(c_n)$ and $v(d_a) > v(d_n)$. These results are rather extreme, in the sense that we exclude all kinds of government intervention and the absence of savings on the side of the current old. However, though extreme, they can also be seen as clear-cut baseline scenario which is easy to understand and interpret.

2.2 First-best problem

An omniscient utilitarian social planner (knowing the value of the parameter β) in charge of this economy has two approaches at his avail to choose the levels of consumption of the four different types of agents. Either he ignores the utility derived from altruistic feelings, and hence maximizes the weighted sum of individual utilities, $\sum (u_i + v_i)\,\alpha_i$, where the weights α_i represent the fractions of families of type i.

Or alternatively, he can opt for a maximization taking into account the utility derived by young altruists, in which case his objective can be written as $\sum [u_i + (1+\beta_i) v_i] \alpha_i$. Implicitly, the latter formulation implies some form of double counting, as dependents of altruistic children get a weighting larger than 1.

In the present paper, we opt for the former setup for reasons perfectly explained in Hammond (1987, p.86)[1]. In a few words, altruistic regard for others would be an instance of a 'publicly oriented want'. Thus "*people's altruistic preferences are irrelevant in determining what should be the distribution of income, except in so far as they correspond to what is anyway ethically appropriate*".

Furthermore, we assume that $\beta_a = \beta = 1$ so that there is no conflict between the social planner and altruistic children in the way they weight both utilities ua and v_a.

Let us now define the first-best in this model. To reach it, we assume that the social planner has the ability to directly control the level of resources allocated to the different subgroups in the population. However, the planner cannot force young non-altruists to provide units of care for their elderly dependents and thus it proposes a system of public care facilities. These public care facilities are characterized by a production technology having a lower performance than the one used by the altruistic children. We summarize this difference in productivity by a parameter $\mu < 1$, and write the production technology used in the public care facilities as $d = \mu g$, where g is the quantity of resources used per institutionalized person. The intuition for this assumption is again rather straightforward. Because of their very nature, formal care institutions have to deal with a much stricter legal, administrative, and organizational structure than do private caregivers in a family context. Hence, even in the presence of perfect information, the planner faces the handicap that the services provided through institutions are less efficient than the services provided by family members.

Other first-best setting could be considered. For example, one could force

[1]See on this Cremer and Pestieau (2001).

non-altruistic children to take care of their elderly parents. Such a scheme would be more efficient but we exclude it.

Using $\alpha_a = \alpha$ and $\alpha_n = 1 - \alpha$ (with $0 < \alpha < 1$) and denoting the multiplier on the resource constraint of the economy φ the first-best problem thus resumes to

$$\text{Max } \alpha\{u[c_a]+v[d_a]\}+(1-\alpha)\{u[c_n]+v[\mu g]\}-\varphi\{\alpha(c_a+d_a)+(1-\alpha)(c_n+g)-y\}$$

with the optimality conditions

$$u'_a = u'_n = v'_a = \mu v'_n$$

which along with budget constraint determine the optimal full information consumption levels. If we consider $u = v$ we observe that $c_a = d_a = c_n > d_n = \mu g$, implying imperfect consumption equalization due to the inefficiency of public institutional care (waste of resources denoted by μ)[2]. The young adults and the parents of altruistic children get the same consumption; the parents of non-altruistic children are less well off[3]. Assuming $\beta = 1$, the government can easily decentralize this optimum by using non-distortionary lump-sum taxation on the young and providing d_n to the parents of the non-altruists. With $\beta < 1$, a subsidy on β could be required.

As already mentioned, we assume that $\beta = 1$ to clearly separate the problem of insufficient resource allocation to the parents of non-altruists from the different but admittedly related problem of a divergence in the weighting of the utility of the parents of altruistic children by the latter and the social planner. Indeed, with $\beta \neq 1$, the planner's objective function displays two differences with respect to the problems of the young individuals, while with $\beta = 1$, only the one difference relating to altruism subsists.

[2]This results from our utilitarian objective. Note that whether $c_n \gtreqless g$ depends on $v(\cdot)$ and $u(\cdot)$. With $v(x) = u(x) = \frac{x^{1-\rho}}{1-\rho}$, $c_n = c_a = d_a = g\,\mu^{\frac{\rho-1}{\rho}}$. With a Rawlian criterion, we would have $c_a = d_a = c_n = d_n$ and thus $g > d_n$.

[3]This result is in line with findings of Besley and Coate (1998).

2.3 Second-best problem

The social optimum as described by the first-best conditions above is however out of reach in a more realistic setting. First, next to the inefficiency in public care provision, any real world government is also limited in its ability to collect taxes. We explore the properties of the equilibrium under the assumption that the government can only levy distortionary taxes on y, but that it continues to be able to allocate a lump-sum subsidy σ to the young altruists[4]. Our assumption of a lump-sum subsidy rather than a proportional subsidy results from our assumption of $\beta = 1$. In this setting, the government does not want to intervene on the margin in the altruists' decision problem, as the latter faces the socially optimal marginal incentive structure.[5] We assume that the inefficiency in tax collection process can be summarized by a quadratic cost function such that for a tax rate of t levied on an individual, there is a loss of resources $\gamma t^2/2$, where $\gamma \geq 0$ can be thought of as a synthetic cost parameter of government resources. Accordingly the planner's budget constraint is

$$y\left(t - \frac{\gamma t^2}{2}\right) \geq \alpha\sigma + (1-\alpha)g. \tag{1}$$

This assumption is made to keep the model as simple as possible by introducing tax distortions with identical earnings. A model with two levels of productivity and endogenous labour supply, both non observable, would have been more satisfactory but also very complicated.

Second, the planner's ability to identify young altruists and non-altruists can be limited. Hence, the government has to design a system of taxes, subsidies and public care provision that respects incentive constraints preventing young altruists from declaring themselves as non-altruists, in order to take advantage of the public-care services. Indeed, it is reasonable to assume that

[4]Pauly (1996) notes that governments generally prefer institutional care over subsidies of home care out of fear of moral hazard problems. We do not encounter this problem in our setting given that all parents need long-terme care.

[5]In the more general case of $\beta \neq 1$, proportional subsidies would be required to correct the inefficient market allocation of resources between the young altruists and their parents.

such an outcome where all elderly would be taken care of in a formal care institution would simply not be viable from a public finance point of view. Vollmer (2000) cites an interesting real-world example from Germany. The long-term care insurance scheme explicitly decided not to reimburse living and accomodation costs in institutional care arrangement for fear of giving "relatives an incentive to 'push off' the 'old man' or (for that matter) the 'old lady' into a nursing home and keep his or her pension". The following two subsections analyze this second-best problem in the absence and the presence of an active incentive constraint on the side of the young altruists.

We introduce the incentive constraint that altruists should not mimic non-altruists, which we formalize using the following standard incentive inequality

$$u\left(y\left(1-t\right)-s^{*}+\sigma\right)+v\left(s^{*}\right)\geq u\left(y\left(1-t\right)\right)+v\left(\mu g\right). \tag{2}$$

This constraint will not necessarily be active at the social optimum we are going to investigate. It is likely that this will depend upon μ: the smaller is μ *ceteris paribus* the lower will also be at the social optimum the welfare of the old whose children are non-altruistic and who thus rely on public spending.

We only consider the offering of two consumption bundles, one for the altruists – children and parents – and one for the non-altruists – children and parents. Hence, a non-altruist cannot mimick an altruist when young and then send his dependent parent to a nursing home. In these conditions, it is clear that the non-altruists will never have an incentive to mimick the altruists. When the planner's problem has to include this additional incentive constraint, it can be stated as follows

$$\begin{aligned}
\mathrm{Max}_{\sigma,t,g}\mathcal{L} \quad = \quad & \alpha\left[u\left(y\left(1-t\right)-s^{*}+\sigma\right)+v\left(s^{*}\right)\right]+(1-\alpha)\left[u\left(y\left(1-t\right)\right)+v\left(\mu g\right)\right] \\
& +\varphi\left[y\left(t-\frac{\gamma t^{2}}{2}\right)-\alpha\sigma-(1-\alpha)g\right] \\
& +\lambda[u\left(y\left(1-t\right)-s^{*}+\sigma\right)+v\left(s^{*}\right)-u\left(y\left(1-t\right)\right)-v\left(\mu g\right)] \qquad (3)
\end{aligned}$$

with φ (≥ 0) as defined before, and λ (≥ 0) denoting the multiplier associated with the incentive constraint. The level of s^{*} is optimally chosen by the young altruists such that $u'_a = v'_a$.[6]

Case where $\lambda = 0$.

We first consider the case of a non-binding incentive constraint, i.e. $\lambda = 0$, which is likely to occur whenever institutional care is highly inefficient, *i.e.* for a low value of μ. A first intuition would lead us to think that a high value of γ has the same impact. However, when γ increases, the government might prefer to use the limited tax proceeds for adjusting the level of funding of public retirement homes rather than the lump-sum subsidy to altruists (σ may even be negative in some cases). Being altruist thus becomes less interesting and the incentive constraint is more powerful. Taking first order conditions of the above objective function with respect to the three decision variables of the government σ, t and g and using the envelope theorem[7] we find

$$u'_a = \varphi \tag{4}$$

$$\alpha u'_a + (1-\alpha)u'_n = \varphi\,(1-\gamma t) \tag{5}$$

$$\mu v'_n = \varphi, \tag{6}$$

In the special case of non-distortionary taxation ($\gamma = 0$) and no incentive constraint ($\lambda = 0$) we would thus find back the first-best utilitarian optimum of the previous subsection: $\mu v'_n = u'_n = u'_a = v'_a$. In the more realistic case of inefficient tax collection, φ can be interpreted as the marginal cost of public funds (MCPF):

$$\varphi = \frac{\alpha u'_a + (1-\alpha)u'_n}{1-\gamma t}.$$

The subsidy given to altruistic children is pushed up to the level where their marginal utility of income is equal to this MCPF. Like in the first best, due to the presence of inefficiency parameter μ, the consumption level of the non-altruistic children's parents is lower than that of altruistic children. From (4) and (5) it can however be inferred that $u'_n < u'_a$: contrary to the first best the

[6]Comparative statics analysis gives $s^*(t,\sigma)$, with $\frac{ds^*}{d\sigma} > 0$ and $\frac{ds^*}{dt} < 0$.

[7]For $\beta \neq 1$, the envelope theorem would not be applicable.

consumption of non-altruistic children is higher than that of altruistic ones. Eliminating φ from the above first-order conditions yields:

$$u'_a = \mu v'_n \tag{7}$$

and

$$\alpha u'_a + (1-\alpha)u'_n = u'_a(1-\gamma t). \tag{8}$$

Together with budget constraint (1), conditions (7) and (8) provide us with a system of three equations whose solution gives the optimal values of t, σ and g.

These optimal values depend upon three factors: the degree of inefficiency in the collection of tax revenue (γ), the proportion of altruists in the population (α), and the degree of concavity of the children's utility $u(\cdot)$. It has proved impossible to obtain clear-cut results on the comparative statics of t, σ and g with respect to those three factors. Therefore, we present in Section 3 the results of numerical calculations.

Case where $\lambda > 0$

Now looking at the problem where the incentive constraint is binding at the social optimum, we must take into account the potential mimicking of altruistic children. Thus, the optimization problem takes the structure defined in (3). Taking advantage of the envelope theorem, we can derive the three following standard first-order conditions with respect to subsidy, tax rate and public care:

$$(\alpha+\lambda)u'_a - \alpha\varphi = 0 \tag{9}$$

$$-y[(\alpha+\lambda)u'_a + (1-\alpha-\lambda)u'_n] + \varphi y(1-\gamma t) = 0 \tag{10}$$

$$(1-\alpha-\lambda)\mu v'_n - \varphi(1-\alpha) = 0 \tag{11}$$

To see how these first-order conditions are related to those obtained when the incentive constraint does not bind it is worth recognizing that when binding this constraint imposes that σ be a function of g and t: $\sigma = \sigma(g, t)$.

Differentiating this incentive constraint (2), we have:

$$\begin{aligned}\frac{d\sigma}{dg} &= \frac{\mu v_n'}{u_a'} > 0,\\ \frac{d\sigma}{dt} &= y\left(1-\frac{u_n'}{u_a'}\right) \gtrless 0 \text{ if } u_a' \gtrless u_n'.\end{aligned}$$

Quite intuitively, one infers from the first relation that a rise in public spending on institutional care must be matched by an increase in the subsidy to altruistic children for the incentive constraint to remain satisfied. From (9), (10) and (11) one then infers after a few manipulations that:

$$y\left[\alpha u_a' + (1-\alpha)u_n' - \varphi(1-\gamma t)\right] - \alpha[u_a' - \varphi]\frac{d\sigma}{dt} = 0, \tag{12}$$

$$(1-\alpha)[\mu v_n' - \varphi] + \alpha[u_a' - \varphi]\frac{d\sigma}{dg} = 0. \tag{13}$$

When the incentive constraint is not binding, all expressions in brackets in (12) and (13) are equated to zero, which is no longer the case in the present setting. Because of the binding incentive constraint some "compromise" must be found.

Since $\lambda > 0$, we infer from (9) that $u_a' < \varphi$ and therefore from (13) that $\mu v_n' > \varphi$. We have thus $u_a' < \mu v_n'$. However, it is not possible to infer from (12) how u_n' is related to u_a'.

Furthermore, a combination of the first-order conditions with respect to σ and g implies an order-relationship between the marginal utilities of young adults (either altruistic or not) and parents of non-altruists. The first one yields

$$u_a' = \frac{\alpha}{\alpha+\lambda}\varphi \quad \Rightarrow \quad u_a' < \varphi$$

while the condition on g is

$$\mu v_n' = \frac{1-\alpha}{1-\alpha-\lambda}\varphi \quad \Rightarrow \quad \mu v_n' > \varphi$$

Consequently, the introduction of a binding incentive constraint gives rise to an inequality between those marginal utilities:

$$u_a' < \varphi < \mu v_n',$$

Therefore, the presence of the incentive constraint implies a lower degree of redistribution. The result is in line with intuition since we use a utilitarian social welfare function. The parents of the non-altruists who have the socially most expensive consumption are also the ones with the lowest consumption levels.

To sum up our results, we now look at the ordering of the marginal utilities of the four population subgroups, successively with a slack ($\lambda = 0$) and a binding incentive ($\lambda > 0$) constraint. For $\lambda = 0$, we have a higher marginal utility, and hence a lower consumption level for young altruists as compared to their non-altruistic counterparts. The ordering of marginal utilities for the four population subgroups is

$$u'_n < u'_a = v'_a = \mu v'_n.$$

Due to their informational advantage, young non-altruists are better off. There is a partial shift of the financial burden onto young altruists, which is possible because the government has only a limited set of tax tools at hand. Indeed, the distortive proportional income tax is the only way to reach the non-altruists. However, this tax is also levied on the altruists and further imposes an efficiency cost γ. Hence, the government faces a trade-off between the loss of efficiency due to the cost parameter γ and the gain in equity from increased proportional income taxation.

With a binding incentive constraint ($\lambda > 0$), redistribution between altruists and parents of non-altruists is lessened :

$$u'_a = v'_a < \mu v'_n$$

A complete ordering of the marginal utility levels is no longer possible. However, in the case of similar utility functions ($u = v$), we can obtain a complete ordering of utilities. Indeed, the binding incentive constraint along with $u'_a = v'_a$ and $u'_a < \mu v'_n$ yields:

$$u'_n < u'_a = v'_a < \mu v'_n$$

Given the inability to derive a complete ordering for the constrained general case, we now proceed on to numerical calculations for some reference scenarios. These calculations will also yield some comparative static results as well as indicate what makes the incentive constraint binding or not.

3 Numerical simulations

The utility function of children is assumed to be isoelastic: $u(x) = \frac{x^{1-\rho}}{1-\rho}$ with $\rho < 1$. Elderly parents may have a distinct iseolastic utility function: $v(x) = \frac{x^{1-\theta}}{1-\theta}$ with $\theta < 1$. In the benchmark case the parameters take the following values: $\rho = \theta = 0.8,\ \alpha = 0.6,\ \ \mu = 0.7,\ \gamma = 0.4$ and $y = 100$. We proceed in two steps. To start with, we compute the "simple" optimization problem, not taking account of the incentive constraint. The aim is to show that for some parameter values, this constraint is simply not binding.

We first consider the benchmark case[8] with identical values for ρ and θ. We find that at the optimum, $u_n' < u_a' = v_a' < \mu v_n'$, or $c_n > c_a = d_a > d_n$, as our theoretical results suggested for a non-binding incentive constraint.

We then proceed to some comparative statics. For each set of parameter values, we observe the behaviour of the three consumption levels (given that $c_a = d_a$). In the benchmark case we make each of parameters α, μ, γ and ρ vary in turn. For $\rho = \theta$, there are threshold values for α, μ, γ and ρ below which $\lambda = 0$ and above which $\lambda > 0$. When ρ is much smaller than θ the constraint is binding for any value[9] of α and γ.

Figure 1 shows the effect of an increase in α on the consumption levels. The frontier between the two regimes (with the incentive constraint non-binding and then binding) is at $\alpha^0 = 0.53$, indicated by a vertical line.

After a small decrease for very low values of α, the consumption level of the young altruists increases, while the consumption level of the young non-altruists always rises. As it is the case for altruists, the consumption level of

[8]The results are quite similar for $\rho < \theta$.

[9]Other parameters being kept constant.

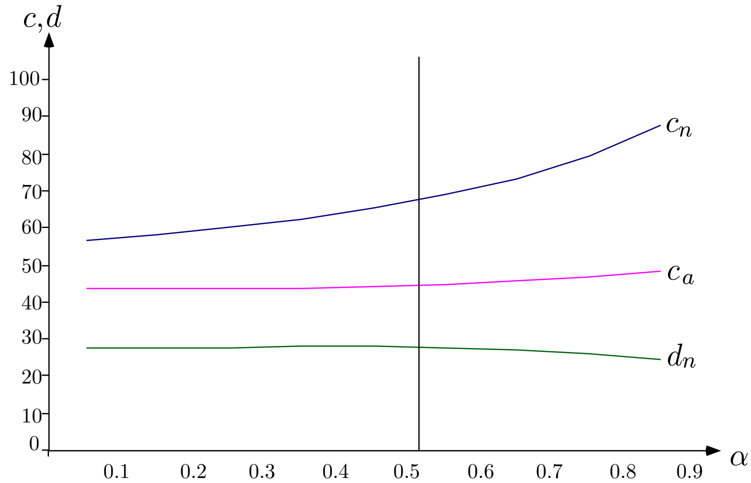

Figure 1: Consumption levels as α increases
($y = 100$, $\beta = 1$, $\gamma = 0.4$, $\mu = 0.7$, $\rho = \theta = 0.8$)

the parents of non-altruists first decreases for the lowest values of α before increasing but this time it increases slowly, and only until the point where the constraint becomes binding. From this point onto ($\alpha = 0.53$), they experience a decreasing consumption level. In addition, the gaps between consumption levels widen when the proportion α increases[10]. Since the disposable income of non-altruistic adults is $y(1-t)$, their utility is only affected by the tax rate t. It is obvious that a more inefficient taxation system makes the redistribution between young adults more costly and less efficient. When the proportion of altruists (α) increases, the tax rate and the subsidy decrease. Taxes are less needed due to the rising proportion of altruists, therefore leading them to care more as long as the subsidy is not too reduced. There is less and less individual redistribution as α increases: the net contribution of altruists to the public system serving the parents of non-altruists declines (denoted by the decrease of $ty - \sigma$), and non-altruists pay less taxes. Indeed, the growth rate of the non-altruistic children's consumption is higher than the (negative) growth

[10]We obtain the same result when γ increases.

rate of their parents' consumption. The growth rate of altruists' consumption is negligible.

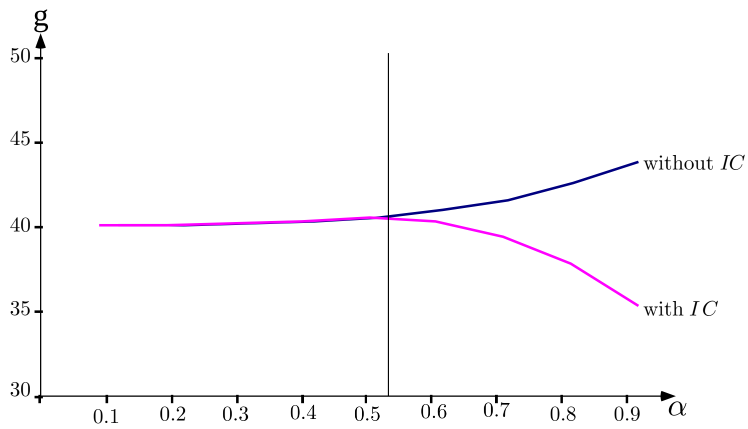

Figure 2: Public spending levels in the 2 regimes
($y = 100$, $\beta = 1$, $\gamma = 0.4$, $\mu = 0.7$, $\rho = \theta = 0.8$)

Figure 2 illustrates the effect of the incentive constraint on the level of public care g. We immediately see that in the absence of an incentive constraint, public care would be steadily increasing with α, while the introduction of this constraint induces a sharp decrease in g as soon as it is binding [11]. Of course, this gap would be lessened were μ smaller. The higher μ, the more the government has to reduce g in order to prevent altruists from mimicking non-altruists. This result is quite intuitive, since the altruistic children won't be tempted by mimicking if they know that public facilities are really inefficient. The same is true for small values of pairs (α, γ). Indeed, the smaller α, the higher γ has to be in order for the constraint to be binding. Note that in the case of $\rho = \theta$, the Lagrange multiplier λ starts to decrease for a very

[11]This is one of the main result of this paper. An increasing α means that the tax base y relative to public spending $(1-\alpha)g$ increases. Given the quadratic tax distortion one can afford providing higher level of g as α increases. However as soon as the self-selection constraint binds, there is a risk that altruist children be tempted to "send" their dependent parents in nursing homes. This explains the sudden decrease in g for $\alpha \geq 0.53$.

high proportion of altruists (i.e. a very high value of α). But the constraint is always binding when α is very large, whatever γ is. In addition, we show in a set of non-reported simulations that public care is smaller than family care $((s - \mu g) > 0)$, which seems very intuitive.

When we focus on a variation of μ, we see on Figure 3 that consumption level of non-altruistic children is decreasing while their parents' consumption

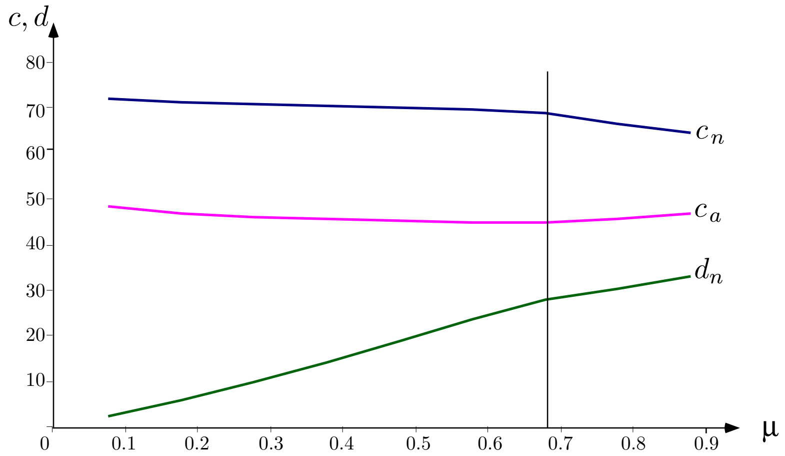

Figure 3: Consumption levels as μ increases
($y = 100$, $\beta = 1$, $\gamma = 0.4$, $\alpha = 0.6$, $\rho = \theta = 0.8$)

increases, with both steeper slopes when the constraint is binding, that is for $\mu \geq \mu^0 = 0.67$. Altruistic children have a decreasing consumption below the cut-off point μ^0; above μ^0 their consumption increases.

Another significant effect is that even for a binding constraint, the subsidy may be negative for small values of μ; in these cases it seems that the most efficient policy is to have the altruistic children pay twice, as the value of μ is not big enough to make them consider the alternative of public nursing homes for their own parents. Similarly, for a high value of γ, a sufficient increase in α

implies a negative subsidy, the tax system being too inefficient. In addition, as μ increases the redistribution between the two types of young adults improves, as well as the one between the two types of parents.

Let us now turn to the effect of ρ. We first take ρ and θ as equal and moving together. The consumption levels tend to be more equal as ρ ($\rho = \theta$) increases, as shown on Figure 4. The cut-off point is then $\rho^0 = 0.54$.

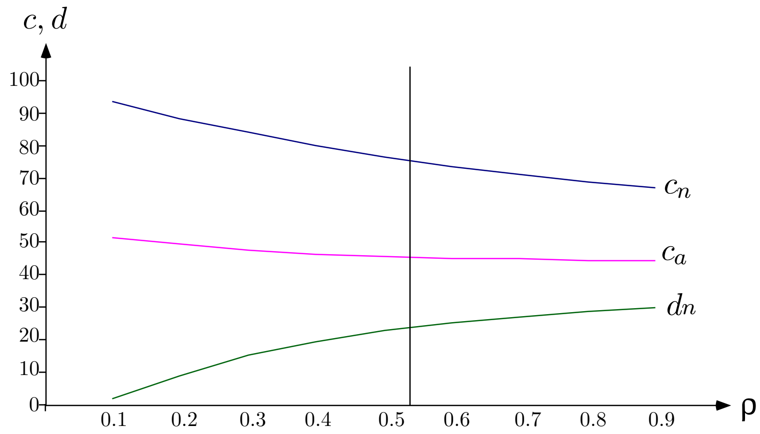

Figure 4: Consumption levels as ρ increases
($y = 100, \beta = 1,\ \gamma = 0.4,\ \alpha = 0.6,\ \mu = 0.7$)

Above that point convergence proceeds at the same pace as below. We also tried some simulations with different concavity parameters for parents and children. For example, if we keep θ constant ($= 0.8$) and let ρ increase, we obtain Figure 5, with a cut-off point $\rho^0 = 0.83$.

Consumption of non-altruistic children is always higher than that of altruistic ones, which is always greater than parents of non-altruists' consumption. Note that the cut-off point between the two regimes is located slightly above

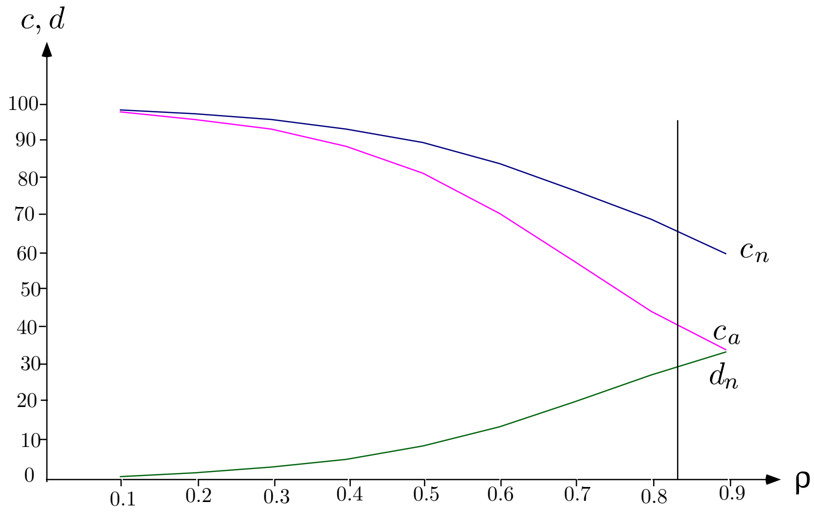

Figure 5: Consumption levels as $\rho(\neq \theta)$ increases
$(y = 100, \beta = 1,\ \gamma = 0.4,\ \alpha = 0.6,\ \theta = 0.8,\ \mu = 0.7)$

$\theta = 0.8$ as $\rho^0 = 0.83$. Here too the binding constraint does not modify the convergence process. For $\rho = 0.95$, $c_a = d_a = d_n$.

4 Conclusions

This paper observes the government opportunities when facing the organization of a simple long-term care structure with adequate tax and subsidy system, in a world where some adult children are altruistic, while others are not. We have seen that when public care is less efficient than family care and with a somewhat inefficient tax collection system (which seems quite realistic), the governement will have to take into account the possibility that altruistic children could be tempted by mimicking their non-altruistic counterparts. Indeed, they should take into account this incentive constraint as long as the efficiency of public care, the proportion of altruists and aversion for inequality are not low enough to make sure that altruists won't be willing to let their parents being taken care of by public institutions. We also checked that consumption of non-altruistic children is always higher than that of altruists, so there is no reason for the former to mimic the latter. In the first-best solution, there is no waste of resources except the relative inefficiency of public care, so young adults' income can be distributed between the four types of individuals so that their marginal solutions are equated, that of the non-altrustic parents being weighted by μ, the inefficiency factor. If we accept that the government cannot decentralize this optimum by means of lump-sum transfers, we know that the introduction of an inefficiency parameter in the tax collection induces another waste of resources. Thus the second-best solution implies a first inequality; familial redistribution between young altruists and their parents is still efficient, but utility of young non-altruists is higher. They benefit from this costly taxation, even more if the proportion of altruists increases. There is a second loss if the government has to deal with the incentive constraint. Indeed, in this case the parents of the non-altruists are even worse-off. This is the consequence of the "incentive constraint play", meaning that the government has to penalize these parents in order to get the "right" behaviour from the altruistic children. Numerical simulations let us know that once again non-altruistic children are the "winners" in this game.

These results are valid for a single source of differentiation. An interesting case for further research would be the one of different income levels with non linear income tax. Another one would be to consider the possibility of $\beta < 1$ coupled with a proportional (distortionary) subsidy.

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