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Gregory Ponthiere*

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Abstract

The public provision of long-term care (LTC) can replace family-provided LTC when adults are not sufficiently altruistic towards their elderly parents. But State intervention can also modify the transmission of values and reduce the long-run prevalence of family altruism in the population. That evolutionary effect questions the desirability of the LTC public provision. To characterize the optimal LTC policy, we develop a three-period OLG model where the population is divided into altruistic and non-altruistic agents, and where the transmission of (non) altruism takes place through a socialization process *à la* Bisin and Verdier (2001). The optimal short-run and long-run LTC policies are shown to differ, to an extent varying with the particular socialization mechanism at work.

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1 Introduction

The provision of long-term care (LTC) constitutes a major challenge for advanced economies. As a consequence of the ageing process, an increasingly large number of persons report having some type of functional limitation (e.g. sensory, physical or mental limitations), which prevent them from being autonomous. To give an idea, the European Union (2009) forecasts that the number of elderly dependents in the EU-27 will grow from about 21 millions of people in 2007 to more than 44 millions of people in 2060. Such a substantial rise in the number of elderly dependents will stimulate the aggregate demand for LTC services.

Whatever the demand for LTC services is satisfied by informal care (provided by family or friends) or by formal care (either at home or in nursing homes), helping the dependent elderly is extremely costly.[1] This explains why the funding of LTC services has become a major research area.

A large number of articles have recently focused on what is called the "LTC insurance puzzle".[2] That puzzle can be stated as follows: although the probabilities to become dependent are large, and although LTC is costly, individuals do not, in general, purchase a private insurance against LTC.[3] Various explanations have been provided, such as excessive loading factors (Cutler 1993; Brown and Finkelstein 2004a), crowding out of private insurance by social insurance (Sloan and Norton 1997; Norton 2000; Brown and Finkelstein 2004b), and trust into family altruism (Hoerger *et al* 1996; Sloan *et al* 1997).

A related issue concerns the design of the optimal public intervention in the context of old-age dependency. In a pioneer paper, Jousten *et al* (2005) studied the optimal LTC policy in an economy where households are composed of one dependent parent and one child, under heterogeneity on the degree of altruism of children towards their parents. They found that, under asymmetric information about the altruism of children, the optimal policy consists of providing low quality of institutional care to the elderly in need, to satisfy the incentive compatibility constraint. More recently, Pestieau and Sato (2008) examined the optimal tax policy in an economy where a fraction of the elderly becomes dependent, and where young adults differ in their productivity at work.

Those articles, by paying attention to heterogeneity within families, and to the difficulties raised by informational asymmetries, cast an original light on the optimal State intervention in the context of LTC provision. However, those static frameworks cannot account for another key aspect of the problem: the impact of public intervention on the family's private provision of LTC, through its influence on the transmission of family *values*.

Suppose that we are in the economy studied by Jousten *et al* (2005), and that the government commits itself to helping elderly parents in need as a result

[1] For instance, the average cost of institutional LTC for old persons in France is about 35,000 euros per year (OECD 2006), whereas the yearly price of a nursing home in the U.S. ranges between 40,000 and 75,000 $ (see Taleyson 2003).

[2] See Pestieau and Ponthiere (2011) for a survey.

[3] According to Kemper and Murtaugh (1991), a man of age 65 has a 0.33 probability to enter a nursing home in the U.S., whereas that probability exceeds 0.50 for women.

of non-altruistic children. Is it then the case that altruism, as a value, will, in the long-run, survive in the population? Or will the State's intervention crowd out family altruism, by influencing the society's transmission of values? What kind of restrictions does the intergenerational transmission of values impose on the optimal LTC provision by governments?

Those questions can only be answered in a dynamic framework, where the composition of the population in terms of altruistic and non-altruistic individuals is a variable, which evolves over time as the output of a socialization process. The goal of the present paper is precisely to examine, within such a framework, the conditions under which the provision of LTC by the State crowds out the provision of LTC by families through its effects on the intergenerational transmission of values.

For that purpose, we develop here a three-period overlapping generations model (OLG) where the adult population is divided into altruistic and non-altruistic agents, and where the transmission of (non) altruism takes place through a socialization process *à la* Bisin and Verdier (2001). In that framework, parents, who are certain to be dependent at the old age, can influence the probability that their child will take some trait thanks to socialization efforts. Socialization is costly, but it exhibits also some potential gains at the old age: the parent of an altruistic child will, once dependent, receive the help of his child (whatever he was himself altruistic or not). The incentive to socialize the child depends thus on what the elderly receive when his child is *not* altruistic. This is where the State's intervention influences the socialization process, and, hence, the long-run composition of the population.

Anticipating our results, we firstly study the dynamics of heterogeneity at the laissez-faire, and identify the determinants of the survival or disappearance of family altruism, under alternative assumptions regarding the transmission mechanisms of traits. Then, we introduce lump sum transfers towards the parents of non-altruistic children, and show how this transfer scheme may, under some conditions, affect the long-run composition of the population. The conditions under which the State crowds out the family provision of LTC are identified. In a third stage, we characterize the optimal public intervention, both in the short-run (i.e. for a fixed partition of the population into altruistic and non-altruistic agents), and in the long-run (i.e. for a variable partition). We show that the existence of intergenerational composition effects through socialization tends, under some conditions, to restrict the optimal public provision of LTC to a (positive) level that is *lower* than the optimal short-run provision.

The rest of the paper is organized as follows. Section 2 presents the model. The long-run population dynamics under the laissez-faire is studied in Section 3. Section 4 examines the impact of State-provided LTC on the population dynamics. The optimal short-run and long-run public interventions are compared in Section 5. Section 6 concludes.

2 The model

2.1 Environment

Let us consider a three-period OLG economy. Each cohort is a continuum of agents whose length is normalized to unity. First period is childhood, during which the child does not work, does not consume, and does not take any decision. Second period is young adulthood, during which agents work, consume, and make one child. All young adult agents earn an income $y > 0$ during that period. Third period is the old age; elderly persons are retired and dependent.[4] Thus every young adult has an elderly dependent parent. We assume also, like Jousten *et al* (2005), that there is no private saving for dependency.[5]

All children are assumed to be identical. However, there exist two types of adult agents: altruistic agents (i.e. type a) care about their parents, whereas non-altruistic parents (i.e. type n) do not care about their parents. We denote by q_t the fraction of altruistic adults within the young adult cohort at time t. The difference between agents of types a and n lies in the fact that type-a agents derive, when being young, some welfare from the resources consumed by their parents, unlike type-n agents. Following Jousten *et al* (2005), that difference can be modelled by assuming that the utility from consumption for a young adult agent of type $i \in \{a, n\}$ takes the form:

$$u(c^i) + \beta^i v(d^i) \tag{1}$$

where c^i denotes the young adult's own consumption when being young, d^i is the consumption of his parent, while $u(\cdot)$ and $v(\cdot)$ are temporal utility functions for the young adult and the elderly adult. We assume that those functions satisfy standard properties: $u'(\cdot) > 0$, $u''(\cdot) < 0$, $v'(\cdot) > 0$ and $v''(\cdot) < 0$. The parameter β^i accounts for the altruism of children towards their elderly parent. Agents of types a and n differ as to the level of β^i:[6]

$$0 = \beta^n < \beta^a = 1 \tag{2}$$

2.2 Socialization

The population follows an adaptation and imitation process of the type modelled by Bisin and Verdier (2001). The transmission of the parameter β^i reflecting children's altruism towards their old dependent parents, is modelled as a mechanism where socialization *inside* the family and socialization *outside* the family interact. The first type of socialization is called the vertical transmission (from parents to children), whereas the second type is called the oblique transmission (from a "role model" in the society to the child).

[4] We assume here no risk about the length of life, which is a significant simplification. See Ponthiere (2010) on the interactions of life expectancy with the socialization process.

[5] Although simplifying the picture, that assumption accounts for the fact that a substantial fraction of dependent people reach that status with totally insufficient financial means (which are here approximated by zero for the sake of simplicity).

[6] To simplify the presentation, we take altruistic agents as perfectly altruistic ($\beta^a = 1$).

Families are composed of one parent and one child. Children are born at time t without any cultural trait $i \in \{a, n\}$. Direct vertical socialization to the parent's trait $i \in \{a, n\}$ occurs with a probability ρ^i_{t+1}. If the direct vertical socialization does not take place, which happens with a probability $1 - \rho^i_{t+1}$, the child then picks up the trait of a model chosen randomly in the population of reference, which is the population of young adults. Thus, the child will take the trait a with a probability q_t, and the trait n with a probability $1 - q_t$.

Hence, if p^{aa}_{t+1} and p^{an}_{t+1} (resp. p^{nn}_{t+1} and p^{na}_{t+1}) denote the probabilities that a child born at t in a family with trait a (resp. n) is socialized to, respectively, trait a and trait n (resp. n and a), the transition probabilities are:

$$\begin{array}{ll} p^{aa}_{t+1} = \rho^a_{t+1} + \left(1 - \rho^a_{t+1}\right) q_t & p^{an}_{t+1} = \left(1 - \rho^a_{t+1}\right)(1 - q_t) \\ p^{nn}_{t+1} = \rho^n_{t+1} + \left(1 - \rho^n_{t+1}\right)(1 - q_t) & p^{na}_{t+1} = \left(1 - \rho^n_{t+1}\right)(q_t) \end{array} \tag{3}$$

By the Law of Large Numbers, p^{ij}_{t+1} is also equal to the proportion of children whose parents are of type i who have the cultural trait j. Hence, the proportion q_{t+1} of agents born at time t who become of type a follows the dynamic law:

$$q_{t+1} = \left[\rho^a_{t+1} + \left(1 - \rho^a_{t+1}\right) q_t\right] q_t + \left[\left(1 - \rho^n_{t+1}\right) q_t\right](1 - q_t) \tag{4}$$

The first term is the probability to be socialized to trait a when having a family of type a, multiplied by the probability to belong to a family of type a. The second term is the probability to acquire trait a when being born in a family of type n, multiplied by the probability to belong to a family of type n.

Following Bisin and Verdier (2001), we assume that parents of type $i \in \{a, n\}$ can socialize their children born at time t vertically, by educating them through a (purely physical) socialization effort e^i_t ($0 \le e^i_t \le 1$). The socialization effort e^i_t is an input in the cultural production of their children as adults: $\rho^i_{t+1} = \rho(e^i_t)$. A welfare loss $C(e^i_t)$ is generated by a socialization effort e^i_t. For simplicity, the disutility from socialization efforts takes a quadratic form:

$$C(e^i_t) = \delta \frac{\left(e^i_t\right)^2}{2} \tag{5}$$

where δ accounts for the disutility of socialization efforts ($\delta > 0$).

Parents, when choosing e^i_t, weight the cost of socialization - $C(e^i_t)$ - against its expected gains, which depend on the influence of their effort e^i_t on probabilities p^{ii}_{t+1} and p^{ij}_{t+1}, determined by the relation $\rho^i_{t+1} = \rho(e^i_t)$. We assume that all parents would like their children to be altruistic towards them, in order to benefit from their children's help.[7] This egoistic motivation invites a significant refinement of the standard Bisin-Verdier (2001) set up, which relies on parental imperfect altruism, parents wanting their children to be like them.

Regarding how parental efforts affect the probabilities of direct transmissions of traits, there exist various possible transmission technologies. We will first consider a transmission technology called "It's the family" by Bisin and Verdier

[7] As such, we depart from Olivera (2011), who assumes that non-altruistic parents prefer their children to be non-altruistic.

(2001). Under that technology, the probability of direct vertical socialization is independent from the composition of the population. We assume that, for a child in a family of type a, the probability of direct vertical socialization is:

$$\rho_{t+1}^{a} = e_t^a \tag{6}$$

The probability of direct vertical socialization for a child in a family of type n is equal to 1 *minus* the parental effort:

$$\rho_{t+1}^{n} = 1 - e_t^n \tag{7}$$

The intuition is that egoistic parents, by their efforts, reduce the probability that their children are egoistic like them.

Alternatively, we assume that the probability of direct vertical socialization for a child depends on the parental socialization effort, as well as on the current composition of the population. This consists of what Bisin and Verdier (2001) call the "It takes a village" technology. The probability of direct vertical socialization for a child in a family of type a is equal to the socialization effort of the parent multiplied by the fraction of the population that is altruistic:

$$\rho_{t+1}^{a} = e_t^a q_t \tag{8}$$

Regarding the probability of direct vertical socialization for a child in a family of type n, this is assumed to be equal to 1 *minus* the socialization effort of the parent, multiplied by the proportion of parents with the altruistic trait:

$$\rho_{t+1}^{n} = 1 - q_t e_t^n \tag{9}$$

2.3 Preferences and decisions

Type-a's expected lifetime welfare is given by:

$$u(c_t^a) + v(d_t^a) - \delta \frac{(e_t^a)^2}{2} + p_{t+1}^{aa} v(d_{t+1}^a) + p_{t+1}^{an} v(d_{t+1}^n) \tag{10}$$

Hence the problem faced by an altruistic child can be written as[8]

$$\begin{aligned} &\max_{c_t^a, d_t^a, e_t^a} u(c_t^a) + v(d_t^a) - \delta \frac{(e_t^a)^2}{2} + p_{t+1}^{aa} v(d_{t+1}^a) + p_{t+1}^{an} v(d_{t+1}^n) \\ &\text{s.t.} \quad c_t^a + d_t^a \leq y \end{aligned}$$

First-order conditions for consumption and aid to the parent yield:

$$u'(c_t^a) = v'(d_t^a) \tag{11}$$

[8] As the agent takes d_{t+1}^a as given, we abstract here from demonstration effects. Note, however, that in a three-period OLG setting, demonstration effects face an inconsistency. Indeed, a parent does not need to help his own parent to give the example to his child, since his child will have to help his parent to show the example to his own child. Hence demonstration cannot work here.

This condition is independent from the socialization process, that is, from e_t^a, and from the expected gains from socialization $p_{t+1}^{aa} v(d_{t+1}^a) + p_{t+1}^{an} v(d_{t+1}^n)$.

Regarding the socialization effort, we have, under "It's the family":[9]

$$e_t^a = (1 - q_t) \frac{v(d_{t+1}^a) - v(d_{t+1}^n)}{\delta} \tag{12}$$

Thus the socialization effort is decreasing in the cost parameter δ and increasing in the gains from having an altruistic child, equal to $v(d_{t+1}^a) - v(d_{t+1}^n)$. The effort is decreasing in the proportion of the population being altruistic. That property is known as the "cultural substitution property" (see Bisin Verdier 2001).

The problem faced by a non-altruistic child can be written as:

$$\begin{aligned} &\max_{c_t^n, d_t^n, e_t^n} u(c_t^n) - \delta \frac{(e_t^n)^2}{2} + p_{t+1}^{na} v(d_{t+1}^a) + p_{t+1}^{nn} v(d_{t+1}^n) \\ &\text{s.t.} \quad c_t^n + d_t^n \leq y \end{aligned}$$

First-order conditions for consumption and aid to the parent yield:

$$\begin{aligned} c_t^n &= y && (13) \\ d_t^n &= 0 && (14) \end{aligned}$$

Thus non-altruistic children consume their entire income, and do not give any help to their dependent parent.

Regarding socialization efforts, we have, under "It's the family":

$$e_t^n = q_t \frac{v(d_{t+1}^a) - v(d_{t+1}^n)}{\delta} \tag{15}$$

e_t^n differs from e_t^a, since e_t^n is *increasing* in the proportion of altruistic parents in the population q_t. The reason is that, by socializing their children, non-altruistic parents reduce the probability of direct vertical socialization to their (egoistic) trait. That strategy makes sense only if the society includes a large number of altruistic role models.[10]

Consider now the "It takes a village" transmission. We have:

$$\begin{aligned} e_t^a &= q_t(1 - q_t) \frac{v(d_{t+1}^a) - v(d_{t+1}^n)}{\delta} && (16) \\ e_t^n &= q_t^2 \frac{v(d_{t+1}^a) - v(d_{t+1}^n)}{\delta} && (17) \end{aligned}$$

Given that $q_t < 1$, a parent invests more, *ceteris paribus*, in socialization under "It's the family" than under "It takes a village", since the return on socialization is always lower under the latter technology. Hence the particular socialization

[9] Throughout this paper, we assume the interiority of optimal socialization efforts, with $0 < e_t^i < 1$. This imposes some (weak) restrictions on $v(\cdot)$ and on the parameter δ.

[10] Otherwise, it is better not to socialize children, and to let them take their egoistic trait in a costless way.

mechanism at work is not neutral as far as the parental socialization decision is concerned. The dependency of the socialization effort is observed both for altruistic and non-altruistic parents.

Having solved for consumptions, aid to parents, and socialization decisions, we can now characterize the temporary equilibrium of our economy at the laissez-faire, under the two distinct transmission technologies considered.[11]

Proposition 1 *Consider the laissez-faire economy.*

- *Under the "It's the family" technology, we have:*

$$\begin{aligned} c^a &< c^n = y; \quad d^a = \theta y > d^n = 0 \\ e_t^a &= (1-q_t)\frac{v(\theta y)-v(0)}{\delta}; \quad e_t^n = q_t \frac{v(\theta y)-v(0)}{\delta} \end{aligned}$$

- *Under the "It takes a village" technology, we have:*

$$\begin{aligned} c^a &< c^n = y; \quad d^a = \theta y > d^n = 0 \\ e_t^a &= (1-q_t)\, q_t \frac{v(\theta y)-v(0)}{\delta}; \quad e_t^n = q_t^2 \frac{v(\theta y)-v(0)}{\delta} \end{aligned}$$

Proof. See the above FOCs. ■

At the temporary equilibrium under the laissez-faire, there exists a large inequality between the resources enjoyed by elderly individuals, depending on whether their children are altruistic or not. Parents of altruistic children benefit from a positive amount of resources given to them by their children, whereas parents of non-altruistic children are left with no resource at all, which is most problematic in front of LTC needs. Hence the laissez-faire involves large inequalities at the old age. Similar inequalities - but in the reverse direction - occurs at the young age, where non-altruistic young adults benefit from higher consumptions than altruistic young adults. As a consequence, the proportion q_t of altruistic adults in the population is a major determinant of the aggregate distribution of consumption at the different ages of life.

3 Long-run population dynamics

Whereas the previous section characterized the temporary equilibrium of the economy, that is, its equilibrium for a *given* partition of the population q_t, let us now examine the dynamics of population. The proportion of altruistic adults in a cohort follows the dynamic law:

$$q_{t+1} = \left[\rho_{t+1}^a + \left(1-\rho_{t+1}^a\right) q_t\right] q_t + \left[\left(1-\rho_{t+1}^n\right) q_t\right](1-q_t) \tag{18}$$

[11] Given the constancy of income over time, we can rewrite d_{t+1}^a as a constant fraction $\theta > 0$ of the income (i.e. $d_{t+1}^a = \theta y$), and substitute for $d_{t+1}^n = 0$ in the appropriate FOCs.

Consider first the "It's the family" transmission. Substituting for probabilities of vertical socialization and denoting $[v(\theta y) - v(0)]$ by Δ, we get:

$$\begin{aligned} q_{t+1} &= \left[e_t^a + (1 - e_t^a)\, q_t\right] q_t + \left[(1 - (1 - e_t^n))\, q_t\right](1 - q_t) \\ &= q_t^2 + q_t\,(1 - q_t)\,\frac{\Delta}{\delta} \end{aligned}$$

The existence, uniqueness and stability of a stationary equilibrium can be studied by analyzing the properties of the transition function $F(q_t) \equiv q_t^2 + q_t\,(1 - q_t)\,\frac{\Delta}{\delta}$. The results are summarized in the following proposition.

Proposition 2 *Consider the long-run dynamics of q_t under the "It's the family" transmission technology:*

- *If $\frac{v(\theta y) - v(0)}{\delta} < 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 0$ is locally stable.*
- *If $\frac{v(\theta y) - v(0)}{\delta} = 1$, there exists a continuum $[0, 1]$ of stationary equilibria, which are all unstable.*
- *If $\frac{v(\theta y) - v(0)}{\delta} > 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 1$ is locally stable.*

Proof. See the Appendix. ■

The dynamics of the population can take three forms. If the welfare gain from having altruistic children is low, any population including initially some non-altruistic individuals will turn out to be fully non-altruistic in the long-run. On the contrary, if the welfare gain from altruistic children is large, the long-run population will only include altruistic individuals. In the intermediate case, where $\frac{v(\theta y) - v(0)}{\delta} = 1$, any initial population will reproduce itself in the long-run.

Under the "It takes a village" technology, q_t follows the law:

$$\begin{aligned} q_{t+1} &= q^2 + e_t^a q_t q_t (1 - q_t) + e_t^n q_t q_t (1 - q_t) \\ &= q_t^2 + q_t^3 (1 - q_t)\frac{\Delta}{\delta} \end{aligned}$$

Proposition 3 summarizes the long-run dynamics of the population in that case.

Proposition 3 *Consider the long-run dynamics of q_t under the "It takes a village" transmission technology:*

- *If $\frac{v(\theta y) - v(0)}{\delta} < 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 0$ is locally stable.*
- *If $\frac{v(\theta y) - v(0)}{\delta} = 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 0$ is locally stable.*
- *If $\frac{v(\theta y) - v(0)}{\delta} > 1$, there exist only three stationary equilibria, $q = 0$, $q = \sqrt[2]{\frac{\delta}{v(\theta y) - v(0)}}$ and $q = 1$. Equilibria $q = 0$ and $q = 1$ are locally stable, whereas $q = \sqrt[2]{\frac{\delta}{v(\theta y) - v(0)}}$ is unstable.*

Proof. See the Appendix. ■

Under a low welfare gain from having altruistic children, the population dynamics is close to the one under "It's the family": altruism towards dependent parents will disappear in the long-run. However, when there is a large welfare gain from altruistic children, there exist now *three* - instead of *two* - stationary equilibria. The intermediate equilibrium is unstable, and acts as a threshold below which altruism will disappear, and beyond which altruism will be universal in the long-run. Such a threshold did not exist in the "It's the family" case, where, under $\frac{v(\theta y)-v(0)}{\delta} > 1$, the population would be fully altruistic in the long-run for any $q_0 > 0$. This result does not remain true under "It takes a village", where the generalization of altruism requires $q_0 > \sqrt[2]{\frac{\delta}{v(\theta y)-v(0)}}$.

In sum, the proportion of the dependent who are helped by their children is likely to vary over time, in a direction that depends on how large the welfare gain from having altruistic children is in comparison to the welfare cost from socialization. In the long-run, altruism towards the dependent can either disappear or become general, depending on the relative welfare gains from altruistic children. That result is robust to the specification of the transmission technology, even though the "It takes a village" technology involves an unstable intermediate stationary equilibrium that makes initial conditions relevant, unlike under the "It's the family" technology.

4 An economy with LTC policy

Let us now introduce a government, which taxes young adults in a non-distortionary way, in order to provide a help for the elderly parents who are in need of LTC. The government can observe whether individuals are altruistic or not, and helps the dependent elderly who are not helped by their children (and not the others). The government runs a balanced budget, and taxes only the non-altruistic young adults. Hence, denoting by g the resources spent by the government on each elderly dependent person in need, and by T the lump sum tax on non-altruistic children, we have:

$$\begin{aligned} (1-q_t)T &= (1-q_t)g \\ T &= g \end{aligned} \tag{19}$$

Following Jousten *et al* (2005), we assume that the government's productivity in the provision of LTC services is less good than the one of children. Thus the elderly who is helped by the State benefits from an aid equal to a fraction μ $(0 < \mu < 1)$ of the dedicated resources g. Hence, if the government cannot tax more than what would be given by altruistic children, each dependent elderly parents with non-altruistic children receives an aid equal to μg, with:

$$0 < \mu g < T < \theta y \tag{20}$$

4.1 Socialization decisions

As a consequence of public intervention, we now have, under the "It's the family" technology, the following socialization efforts:

$$e_t^a = (1 - q_t)\,\frac{v(\theta y) - v(\mu g)}{\delta} \quad \text{and} \quad e_t^n = q_t \frac{v(\theta y) - v(\mu g)}{\delta} \tag{21}$$

The welfare gain from having an altruistic child is now lower than under the laissez-faire, since the government, by providing μg to the dependent in case of non-altruistic children, reduces the loss due to having non-altruistic children.

Consider now the "It takes a village" technology. We have:

$$e_t^a = (1 - q_t)\,q_t \frac{v(\theta y) - v(\mu g)}{\delta} \quad \text{and} \quad e_t^n = q_t^2 \frac{v(\theta y) - v(\mu g)}{\delta} \tag{22}$$

Here again, the socialization efforts chosen by parents are now lower, *ceteris paribus*, in comparison to the laissez-faire. The State aid, by raising the elderly's welfare in case of non-altruistic children, reduces welfare gains from having an altruistic child, as under the "It's the family" technology.

Proposition 4 *Consider an economy with a lump sum transfer $\mu g > 0$ to the elderly parents with non-altruistic children. Whatever we consider the "It's the family" or the "It takes a village" technologies, the optimal socialization efforts for all parents are inferior to what these are at the laissez-faire.*

Proof. The proof follows from the monotonicity of $v(\cdot)$. ■

The extent to which LTC public policy affects parental socialization decisions depends on how large the governmental aid is with respect to the intrafamily aid provided by altruistic children. The impact of governmental aid depends also on the productivity of the government in the production of LTC services. The higher the productivity of the government is (i.e. the higher μ is), the lower the socialization efforts are *ceteris paribus*, yielding a larger differential in terms of socialization efforts in comparison to the laissez-faire.

The impact of governmental aid depends also on the shape of the elderly's temporal utility function $v(\cdot)$. When $v(\cdot)$ is close to be flat on the $[0, \theta y]$ interval, the introduction of a governmental aid $\mu g \in]0, \theta y]$ has little effect on the welfare gain from altruistic children, and, thus, on socialization decisions. However, if $v(\cdot)$ is quite steeply on the $[0, \theta y]$ interval, the governmental aid reduces the welfare gain from altruistic children significantly in comparison to the laissez-faire, which, in turn, affects the socialization process strongly.

4.2 Long-run population dynamics

As shown above, the introduction of a governmental aid to the dependent elderly in need reduces the parental incentive to socialize their children. Given that this tendency affects *all* parents - whatever these are altruistic or not - it is tempting to believe that the introduction of the governmental aid is neutral regarding long-run population dynamics. However, as we shall now see, that belief is misleading: the governmental intervention is not neutral for population dynamics.

Proposition 5 *Consider the long-run dynamics of q_t under the "It's the family" transmission technology. When the government provides a help μg to the dependent elderly who have non-altruistic children, we have:*

- *If $\frac{v(\theta y)-v(\mu g)}{\delta} < 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 0$ is locally stable.*
- *If $\frac{v(\theta y)-v(\mu g)}{\delta} = 1$, there exists a continuum $[0, 1]$ of stationary equilibria, which are all unstable.*
- *If $\frac{v(\theta y)-v(\mu g)}{\delta} > 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 1$ is locally stable.*

Proof. See the Appendix. ■

The governmental aid to the dependent in need, by reducing the level of $\frac{v(\theta y)-v(\mu g)}{\delta}$, tends to make the first case more likely, and the third case less likely. Hence a public policy helping the dependent in need tends, in the long-run, to make the disappearance of altruism more likely. There is thus a kind of "crowding-out" of the family by the State. That crowding-out is larger the larger the State resources dedicated to LTC are (i.e. the larger g is), and the more effective the State is in the production of LTC (i.e. the larger μ is).

That crowding-out effect relies on socialization: as soon as the State provides a sizeable and efficient help to the dependent elderly in need, young parents have little incentive to socialize their children, since making these altruistic is costly and has little welfare effects. Hence, due to the State intervention, family altruism must disappear. Note, however, that although that crowding-out is possible, it is by no way necessary. It remains possible that $\frac{v(\theta y)-v(\mu g)}{\delta} > 1$ despite a positive and efficient public aid. In that case, the population will turn out to be fully altruistic in the long-run, despite the State aid. Hence the crowding-out effect is by no way inevitable.

Let us now consider the "It takes a village" technology.

Proposition 6 *Consider the long-run dynamics of q_t under the "It takes a village" transmission technology. When the government provides a help μg to the dependent elderly who have non-altruistic children, we have:*

- *If $\frac{v(\theta y)-v(\mu g)}{\delta} < 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 0$ is locally stable.*
- *If $\frac{v(\theta y)-v(\mu g)}{\delta} = 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Only $q = 0$ is locally stable.*

- *If* $\frac{v(\theta y)-v(\mu g)}{\delta} > 1$*, there exist only three stationary equilibria,* $q = 0$*,* $q = \sqrt[2]{\frac{\delta}{v(\theta y)-v(\mu g)}}$ *and* $q = 1$*. Equilibria* $q = 0$ *and* $q = 1$ *are locally stable, whereas* $q = \sqrt[2]{\frac{\delta}{v(\theta y)-v(\mu g)}}$ *is unstable.*

Proof. See the Appendix. ■

Here again, the introduction of governmental aid makes the long-run disappearance of altruism more likely than under the laissez-faire. But that "crowding out" is even more likely here than under the "It's the family" technology. Indeed, whereas the condition $\frac{v(\theta y)-v(\mu g)}{\delta} > 1$ suffices to avoid the disappearance of altruism under the "It's the family" transmission technology, the same is not true under the "It take a village" technology. Indeed, in that case, the level of the unstable intermediate steady-state equilibrium is now larger than at the laissez-faire, which suggests that, even if $\frac{v(\theta y)-v(\mu g)}{\delta} > 1$, State aid may, depending on initial conditions, still make altruism disappear in the long-run.

In sum, the public provision of LTC may crowd out family-provided LTC, by making the disappearance of family altruism more likely. This suggests that the State and the family may be *substitutes* in the provision of LTC services. However, that section shows also that this crowding-out effect varies with the size and efficiency of the public provision of LTC, as well as with the transmission technology and with individual preferences.

5 The social optimum and optimal LTC policy

Governmental aid to the dependent in need may modify the composition of the population, allowing the disappearance of the - (possibly) otherwise surviving - family altruism. Can we deduce from this that there should be no governmental policy from a long-run perspective? What would be the best long-run LTC policy? How would it differ from the optimal short-run LTC policy?

To address those issues, note that the lifetime welfares of altruistic agents with altruistic and non-altruistic children are given by:

$$u(c^a) + v(d^a) - \delta\frac{(e_t^a)^2}{2} + v(d^a) \quad \text{and} \quad u(c^a) + v(d^a) - \delta\frac{(e_t^a)^2}{2} + v(\mu g) \tag{23}$$

whereas the lifetime welfares of non-altruistic agents with altruistic and non-altruistic children are given by:

$$u(c^n) - \delta\frac{(e_t^n)^2}{2} + v(d^a) \quad \text{and} \quad u(c^n) - \delta\frac{(e_t^n)^2}{2} + v(\mu g) \tag{24}$$

Those expressions differ by the additional term present in the utility function of the altruistic children, i.e. $v(d^a)$.

As this is well-known, the construction of a social welfare function when the population is heterogeneous in altruism can raise serious difficulties, since altruism allows the double-counting of the interests of some agents, whereas the interests of others are counted only once (see Hammond 1987). Two possibilities arise regarding the treatment of altruism. On the one hand, the social planner can ignore altruism, and only consider the *private* part of individuals' welfare. On the other hand, the planner can take altruism into account, possibly by weighting individual utility functions differently. Throughout this paper, we will choose the former solution, and consider only, in the social welfare function, the private part of agents' welfare, in order to avoid double-counting.

5.1 The optimal short-run policy

Let us first consider the first-best problem in the short-run, that is, for a *given* partition q of the population into altruistic and non-altruistic individuals. For that purpose, we will take, as a social objective, the maximization of social welfare *ex post*, that is, social welfare once the type of children has been revealed.

The social planner's problem can be rewritten as the following Lagrangian:

$$\max_{c^a,d^a,c^n,g,e^a,e^n} \begin{array}{c} qp^{aa}\left[u(c^a)-\delta\frac{(e^a)^2}{2}+v(d^a)\right]+qp^{an}\left[u(c^a)-\delta\frac{(e^a)^2}{2}+v(\mu g)\right] \\ +(1-q)p^{na}\left[u(c^n)-\delta\frac{(e^n)^2}{2}+v(d^a)\right]+(1-q)p^{nn}\left[u(c^n)-\delta\frac{(e^n)^2}{2}+v(\mu g)\right] \\ +\lambda\left[y-qc^a-(1-q)c^n-qp^{aa}d^a-(1-q)p^{na}d^a-qp^{an}g-(1-q)p^{nn}g\right] \end{array}$$

where λ is the Lagrange multiplier associated with the resource constraint. The first term is the lifetime welfare of altruistic parents who had altruistic children; the second term is the lifetime welfare of altruistic parents who had non-altruistic children; the third term is the lifetime welfare of non-altruistic parents who had altruistic children, while the fourth term is the lifetime welfare of non-altruistic parents who had non-altruistic children. After simplifications, the first-order conditions for consumptions yield:

$$u'(c^a)=u'(c^n)=v'(d^a)=v'(\mu g)\mu=\lambda$$

If we consider $u(\cdot)=v(\cdot)$, we have:

$$c^{a*}=c^{n*}=d^{a*}>d^{n*}=\mu g^*$$

Hence all first-period consumptions should be equal. Moreover, the consumption at the old age for the dependent elderly should be, if he has altruistic children, the same as what he had when being young. Only the dependent elderly with non-altruistic children should get fewer resources, due to the inefficiency of public LTC services. Under $u(\cdot)\neq v(\cdot)$, we still have an equalization of all consumptions at young adulthood (i.e. $c^{a*}=c^{n*}$), but things are less clear regarding how these differ from consumption at the old age.

The FOCs for optimal effort are:[12]

$$\begin{aligned}
\delta e^{a} &= p^{aa\prime}\left[u(c^{a})-\delta\frac{(e_{t}^{a})^{2}}{2}+v(d^{a})\right]+p^{an\prime}\left[u(c^{a})-\delta\frac{(e_{t}^{a})^{2}}{2}+v(\mu g)\right] \\
\delta e^{n} &= p^{na\prime}\left[u(c^{n})-\delta\frac{(e_{t}^{n})^{2}}{2}+v(d^{a})\right]+p^{nn\prime}\left[u(c^{n})-\delta\frac{(e_{t}^{n})^{2}}{2}+v(\mu g)\right]
\end{aligned}$$

Hence, after simplification, we obtain:

$$\begin{aligned}
e^{a*} &= (1-q)\frac{[v(d^{a*})-v(\mu g^{*})]}{\delta} \\
e^{n*} &= q\frac{\left[v(d^{a^{*}})-v(\mu g^{*})\right]}{\delta}
\end{aligned}$$

which coincide with the socialization efforts chosen in the decentralized economy when $d^{a}=d^{a*}$ and $g=g^{*}$.

Alternatively, under the "It takes a village" technology, we have:[13]

$$\begin{aligned}
e^{a*} &= (1-q)q\frac{[v(d^{a})-v(\mu g)]}{\delta} \\
e^{n*} &= q^{2}\frac{[v(d^{a})-v(\mu g)]}{\delta}
\end{aligned}$$

which coincide with the socialization efforts chosen in the decentralized economy when $d^{a}=d^{a*}$ and $g=g^{*}$.

Regarding the decentralization of the social optimum, note first that, at the laissez-faire, we have, under $u(\cdot)=v(\cdot)$, that altruistic children dedicate $1/2$ of their income to their elderly parent (i.e. $\theta=1/2$), so that:

$$\begin{aligned}
c^{a} &= \frac{y}{2}=d^{a} \\
c^{n} &= y \\
d^{n} &= 0
\end{aligned}$$

Hence, we have, at the laissez-faire, the equality of c^{a} and d^{a}, in conformity with the social optimum. This is not the case for the consumptions of the non-altruistic children and their parents. Hence the decentralization of the social

[12] Remind that:

$$\begin{aligned}
p^{aa\prime} &= 1-q \quad \text{and} \quad p^{an\prime}=-(1-q) \\
p^{na\prime} &= q \quad \text{and} \quad p^{nn\prime}=-q
\end{aligned}$$

[13] Remind that we have:

$$\begin{aligned}
p^{aa\prime} &= q(1-q) \quad \text{and} \quad p^{an\prime}=-q(1-q) \\
p^{na\prime} &= -q^{2} \quad \text{and} \quad p^{nn\prime}=q^{2}
\end{aligned}$$

optimum requires a lump sum transfer T from non-altruistic children towards their dependent parent, so insure that

$$\begin{aligned} c^n &= y - T = \frac{y}{2} = c^a \\ d^n &= T = \mu g^* \end{aligned}$$

Given that the decentralized levels of socialization coincide with the optimal ones under optimal consumptions, those transfers suffice to decentralize the short-run social optimum. The following proposition summarizes our results.

Proposition 7 *Consider a social planner maximizing the average ex post welfare under a fixed partition of the population q.*

- *Under $u(\cdot) = v(\cdot)$, the social optimum involves:*

  $$c^{a*} = c^{n*} = d^{a*} > d^{n*} = \mu g^*$$

  as well as socialization efforts:

  $$e^{a*} = (1-q)\frac{\left[v(d^{a*}) - v(\mu g^*)\right]}{\delta}; \quad e^{n*} = q\frac{\left[v(d^{a^*}) - v(\mu g^*)\right]}{\delta}$$

  under the "It's the family" technology and

  $$e^{a*} = (1-q)q\frac{\left[v(d^{a*}) - v(\mu g^*)\right]}{\delta}; \quad e^{n*} = q^2\frac{\left[v(d^{a^*}) - v(\mu g^*)\right]}{\delta}$$

  under the "It takes a village" technology.

- *Under $u(\cdot) = v(\cdot)$, the social optimum can be decentralized by means of lump sum transfers g^* from young non-altruistic agents to the dependent elderly, with $g^* = \frac{y}{2}$.*

Proof. The proof follows from the comparison of FOCs of the laissez-faire and the social optimum. ■

Thus, when the composition of the population is taken as *fixed*, the social optimum can be decentralized by means of lump sum transfers from non-altruistic children to their parents. Let us now compare this with the decentralization of the *long-run* optimum, where the composition of the population is a variable.

5.2 The optimal long-run policy

To examine the long-run social optimum and its decentralization, it is first necessary to consider the issue of the optimal composition of the population q. In the light of the analysis of the long-run dynamics, that question can be reduced to the comparison of two situations: one in which the population is entirely composed of altruistic persons (i.e. $q = 1$), and one where the population is entirely composed of non-altruistic persons (i.e. $q = 0$).[14] As stated in Lemma 1, social welfare is, under $u(\cdot) = v(\cdot)$, larger in the former case, even when the State intervenes optimally.

Lemma 1 *Under $u(\cdot) = v(\cdot)$, social welfare is larger under a fully altruistic population (i.e. $q = 1$) than under a fully non-altruistic population (i.e. $q = 0$), even when the government intervenes optimally in the later case.*

Proof. See the Appendix. ■

Whereas the proof of Lemma 1 is in the Appendix, we can give here a brief sketch, to provide the underlying intuitions. Under the laissez-faire, the indirect utilities under the situations where $q = 1$ and $q = 0$ are respectively:

$$u\left(\frac{y}{2}\right) + v\left(\frac{y}{2}\right) \gtreqless u(y) + v(0) \tag{25}$$

Under $u(\cdot) = v(\cdot)$, we know, by the concavity of $u(\cdot)$, that social welfare under $q = 1$ exceeds the one under $q = 0$. Moreover, when the government intervenes under $q = 0$, and taxes the non-altruistic children in order to fund some aid for their dependent parents, social welfare is, under $u(\cdot) = v(\cdot)$:

$$u\left(\frac{y}{2}\right) + u\left(\mu\frac{y}{2}\right) > u(y) + u(0) \tag{26}$$

However, comparing the maximum utility under $q = 1$ and $q = 0$ yields:

$$u\left(\frac{y}{2}\right) + u\left(\frac{y}{2}\right) > u\left(\frac{y}{2}\right) + u\left(\mu\frac{y}{2}\right) \tag{27}$$

Therefore, the inefficiency of the government in the provision of LTC services (i.e. $\mu < 1$) implies that the maximum social welfare under a fully altruistic population always exceeds, *ceteris paribus*, the maximum social welfare under a fully non-altruistic population. Thus the optimal composition of the population consists of a population fully made of altruistic persons, since altruism leads to a more efficient production of LTC in comparison to what a government could achieve. Hence, the social optimum involves $q = 1$.

Let us now turn back to the design of the optimum policy from a long-run perspective. In the light of Section 4, the optimal short-run policy g^* is not necessarily optimal from a long-run perspective. Indeed, if the parents of non-altruistic children receive a governmental aid μg^*, this aid, by reducing the welfare gain from socializing a child, may induce too low socialization efforts, with the consequence that the long-run population will not be altruistic, in contradiction with what the maximization of social welfare recommends (see

[14] Note that, in theory, under the "It's the family" technology, the case where $\frac{v(\theta y) - v(0)}{\delta} = 1$ coincides with a continuum of equilibria. However, we rule out that very special case here. Moreover, under the "It takes a village" transmission technology, the case where $q = \sqrt[2]{\frac{\delta}{v(\theta y) - v(0)}}$ could also occur, but only under the special initial conditions $q_0 = \sqrt[2]{\frac{\delta}{v(\theta y) - v(0)}}$. But given that this third case is unlikely to occur, we will concentrate here on the two other stationary equilibria: $q = 0$ and $q = 1$.

Lemma 1). Hence, the optimum short-run policy may be at odds with the maximization of the long-run social welfare, because of the impact of that policy on the composition of the population through the socialization mechanism.

That tension between the short-run and the long-run social welfare maximization is not automatic, as this depends on various aspects of population dynamics. Several cases should be distinguished. For that purpose, we start by considering the economy with the "It's the family" technology.

Proposition 8 *Consider the economy under the "It's the family" transmission technology. Suppose $u(\cdot) = v(\cdot)$ and $0 < q_0 < 1$. The optimal provision of LTC by the government is determined as follows:*

- *If $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} < 1$ for any $0 \leq g \leq \frac{y}{2}$, the optimal (short-run and long-run) policy is a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents.*

- *If $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} > 1$ for any $0 \leq g \leq \frac{y}{2}$, the optimal (short-run) policy is a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents, whereas the laissez-faire is optimal in the long-run.*

- *Otherwise, the convergence towards a stationary equilibrium with $q = 1$ requires that the (short-run) lump sum transfer from non-altruistic children towards their parents g^* satisfies the condition: $\frac{u\left(\frac{y}{2}\right)-u(\mu g^*)}{\delta} > 1$, implying $g^* \in \left]0, \frac{y}{2}\right[$. The laissez-faire is optimal in the long-run.*

Proof. See the Appendix. ■

The first two cases are situations where the State aid to the dependent has no effect on the long-run composition of the population. As a consequence, the optimal policy coincides with the optimal short-run policy: a lump sum transfer from the non-altruistic children towards their dependent parents. In the first case, that policy will also hold in the long-run, where altruism has disappeared. In the second case, that policy will only be transitional, as the disappearance of non-altruism in the long-run will make that policy irrelevant.

In the third case, the long-run composition of the population is likely to vary with the level of the governmental aid to the dependent. The lump sum transfer g^* cannot take its optimal short-run level, because it has to be compatible with the inequality $\frac{u\left(\frac{y}{2}\right)-u(\mu g^*)}{\delta} > 1$, which is necessary and sufficient for the convergence towards a fully altruistic society. That transfer will thus be smaller than the optimal short-run transfer $g = \frac{y}{2}$, but will nonetheless be strictly positive.[15] Note also that this transfer will only be transitory, since in the long-run, the population will be fully altruistic, making that transfer irrelevant.

[15] The influence of intergenerational composition effects on optimal policy in the context of socialization models was also highlighted in Ponthiere (2010), but in the context of choices affecting one's welfare rather than the welfare of others.

Note that, in the latter case, we do not fully characterize the optimal long-run transfer, but only provide an interval for it. The reason is that, from a long-run perspective, what matters is that the population becomes fully altruistic. Hence, as soon as g^* satisfies $\frac{u\left(\frac{y}{2}\right)-u(\mu g^*)}{\delta} > 1$, social welfare in the long-run is maximized, whatever the precise level of g^* is. Of course, if one included, in the social objective, the welfare of all generations living during the *transition* towards the steady-state, then the choice of g^* would be more constrained.[16]

Let us now consider the "It takes a village" technology.

Proposition 9 *Consider the economy under the "It takes a village" transmission technology. Suppose $u(\cdot) = v(\cdot)$ and $0 < q_0 < 1$. The optimal provision of LTC by the government is determined as follows:*

- *If $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} \leq 1$, for any $0 \leq g \leq \frac{y}{2}$, the optimal (short-run and long-run) policy is a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents.*
- *If $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} > 1$ for any $0 \leq g \leq \frac{y}{2}$, the optimal (short-run) policy is a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents, whereas the laissez-faire is optimal in the long-run.*
- *Otherwise, the convergence towards a stationary equilibrium with $q = 1$ requires that the (short-run) lump sum transfer from non-altruistic children towards their parents g^* satisfies the conditions: $\frac{u\left(\frac{y}{2}\right)-u(\mu g^*)}{\delta} > 1$ and $q_t > \sqrt[2]{\frac{\delta}{u\left(\frac{y}{2}\right)-u(\mu g^*)}}$, implying $g^* \in \left]0, \frac{y}{2}\right[$. The laissez-faire is optimal in the long-run.*

Proof. See the Appendix. ■

In the first two cases, the long-run dynamics of the population will not vary with public intervention, and so there is no discrepancy between the optimal short-run policy and what maximizes social welfare at the stationary equilibrium. The same is not true for the third case, where the size of the transfer will affect the dynamics of the population. In comparison to the "It's the family" technology, the lump sum transfer must satisfy here not one, but two conditions: $\frac{u\left(\frac{y}{2}\right)-u(\mu g^*)}{\delta} > 1$ and $q_t > \sqrt[2]{\frac{\delta}{u\left(\frac{y}{2}\right)-u(\mu g^*)}}$. The second constraint, which depends on the current partition of the population, comes from the intermediate stationary equilibrium. This acts like a threshold, below which the population will be non-altruistic in the long-run. That condition restraints the interval of possible lump sum transfers more than under the "It's the family" technology.

[16] Regarding this, note that, although it is tempting to recommend the highest transfer such that $\frac{u\left(\frac{y}{2}\right)-u(\mu g^*)}{\delta} > 1$ holds (in order to get as close as possible to what maximizes social welfare in the short-run), such a strategy may not maximize the intertemporal social welfare, since this may reduce the speed of convergence towards the steady-state.

Corollary 1 *Take the case where neither* $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} \leq 1$*, for any* $0 \leq g \leq \frac{y}{2}$*, nor* $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} > 1$*, for any* $0 \leq g \leq \frac{y}{2}$*. The maximum lump sum transfer* g^* *from non-altruistic children to their parents that is compatible with a convergence towards* $q = 1$ *is lower under the "It takes a village" technology than under the "It's the family" technology. The lower* q_t *is, the larger is the gap between the two maximum transfers.*

Proof. The two conditions from Proposition 9 can be rewritten as:

$$\begin{aligned} u\left(\frac{y}{2}\right) - \delta &> u(\mu g^*) \\ u\left(\frac{y}{2}\right) - \frac{\delta}{(q_t)^2} &> u(\mu g^*) \end{aligned}$$

Given that $0 < q_t < 1$, the second term in the LHS of the first condition is smaller, *ceteris paribus*, than in the second condition. Hence the LHS of the first condition is larger than in the second condition. Thus the lump sum transfer g^* has a lower maximum value under the second condition. ■

The intuition is that, under the "It takes a village" technology, the convergence towards a fully altruistic population is conditional on initial conditions, unlike under "It's the family". Hence, the public aid towards the dependent is more constrained under the "It takes a village" technology, in order to prevent the non-convergence towards the equilibrium with a fully altruistic population.

To sum up, there exists a tension between the optimal short-run LTC policy, which reduces inequalities among the dependent, and the long-run social optimum. The former may, by affecting parental socialization decisions, prevent the convergence towards the latter. Thus, if one wants to allow the - socially desirable - convergence towards a stationary equilibrium with generalized altruism, the LTC policy should be lower than its optimum short-run level. Evolutionary forces act thus here as a constraint for policy-makers.

6 Concluding remarks

As a consequence of the ageing process, the provision of LTC services to the elderly dependent is a major challenge for advanced economies. It is not straightforward to define the optimal role to be played by governments in the provision of LTC. On the one hand, the large heterogeneity among families justifies some intervention aimed at helping elderly persons in need. On the other hand, public intervention may crowd out intrafamily aid, and, hence, reduce social welfare.

The goal of this paper was to examine the optimal design of LTC policy when the public aid to the elderly dependent can crowd out intrafamily aid. We focused on a particular kind of crowding-out effect: the government, by intervening, may affect the transmission of values within and across families, and may make family altruism disappear.

We developed a three-period OLG model where the population is partitioned in two groups: altruistic persons, who care about their parents, and non-altruistic persons, who do not. That partition is the outcome of a socialization process *à la* Bisin and Verdier (2001), where parental direct vertical socialization and oblique socialization interact. However, a significant departure from the Bisin Verdier approach is that all parental efforts are here oriented towards making children altruistic, whatever parents are altruistic or not.

We showed that a public provision of LTC, by reducing the expected (net) welfare gains from having an altruistic child, lowers the parental socialization efforts. That reduction does not necessarily imply the disappearance of family altruism. Whether such a crowding out exists or not depends on (1) individual preferences; (2) the characteristics of the socialization process (cost and transmission); (3) initial conditions (under the "It takes a village" technology).

We identified conditions under which there is a conflict between the optimal *short-run* LTC policy (i.e. under a fixed partition of the population) with the optimal *long-run* LTC policy (i.e. under a varying partition). Such a conflict is not inevitable, but the public intervention, if fixed to its optimal short-run level, may, under general conditions, prevent the economy from reaching the long-run social optimum. It is then optimal to reduce the public aid to the highest level compatible with the long-run social optimum. That "compatible" public provision of LTC is not zero (i.e. unlike at the laissez-faire), but is generally inferior to the level decentralizing the short-run social optimum.

In sum, although the public provision of LTC can affect the transmission of values, and may even make altruism disappear, such a crowding out is by no way automatic. The existence and size of such a crowding out effect depends on individual preferences, and on the particular socialization process that governs the transmission of values. The latter point, although generally unnoticed, is worth being underlined. The optimal public intervention depends significantly on the "response" induced by the socialization process at work. Given the complexity of socialization phenomena, there is little doubt that further attention will have to be paid, in the future, to the interactions between policy and socialization.

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8 Appendix

8.1 Proof of Proposition 2

The dynamics of the economy is described by the equation:

$$q_{t+1} \equiv F(q_t) = q_t^2 + q_t\,(1-q_t)\,\frac{\Delta}{\delta}$$

The existence, uniqueness and stability of a stationary equilibrium can be studied by analysing the properties of the transition function $F(q_t)$.

Note that $F(0) = 0$ and $F(1) = 1$, so that both $q = 0$ and $q = 1$, being fixed points of $F(\cdot)$, are stationary equilibria. Regarding the existence of an intermediate equilibrium, note that:

$$F'(q_t) = 2q_t + (1-2q_t)\,\frac{\Delta}{\delta}$$

is necessarily positive. We also have:

$$F'(0) = \frac{\Delta}{\delta} \quad \text{and} \quad F'(1) = 2 - \frac{\Delta}{\delta}$$

Hence, if $\frac{\Delta}{\delta} > 1$, we have: $F'(0) > 1$ and $F'(1) < 1$, so that the transition function lies above the 45° line in the neighborhood of 0, and above the 45° line in the neighborhood of 1. Taking the second-order derivative, we have:

$$F''(q_t) = 2 - 2\frac{\Delta}{\delta}$$

Given $\frac{\Delta}{\delta} > 1$, we have $F''(q_t) < 0$ for all levels of q_t, so that $F(q_t)$ is concave and admits no inflection point, and remains above the 45° line for all levels of $0 < q_t < 1$. Hence, in that case, there is no intermediate stationary equilibrium. Moreover, only $q = 1$ is locally stable, as

$$|F'(0)| > 1 \quad \text{and} \quad |F'(1)| < 1$$

Alternatively, if $\frac{\Delta}{\delta} < 1$, we have: $F'(0) < 1$ and $F'(1) > 1$, so that $F(q_t)$ lies below the 45° line in the neighborhood of 0, and below the 45° line in the neighborhood of 1. We have also:

$$F''(q_t) = 2 - 2\frac{\Delta}{\delta}$$

Given $\frac{\Delta}{\delta} < 1$, we have $F''(q_t) > 0$ for all levels of q_t, so that $F(q_t)$ is convex and admits no inflection point, and remains below the 45° line for all levels of $0 < q_t < 1$. Hence, in that case, there is no intermediate stationary equilibrium. Moreover, only $q = 0$ is locally stable, as

$$|F'(0)| < 1 \quad \text{and} \quad |F'(1)| > 1$$

Finally, if $\frac{\Delta}{\delta} = 1$, we have:

$$F'(q_t) = 2q_t + (1 - 2q_t)\,1 = 1$$

$F(q_t)$ is linear and of slope 1. Hence, given $F(0) = 0$, this coincides with the 45° line, so that any partition of the population is a stationary partition. There is a continuum of stationary equilibria, all of these being unstable.

8.2 Proof of Proposition 3

Consider now the "It takes a village" technology. We have:

$$q_{t+1} \equiv G(q_t) = q_t^2 + q_t^3(1 - q_t)\frac{\Delta}{\delta}$$

We have: $G(0) = 0$, $G(1) = 1$. Hence both $q = 0$ and $q = 1$, being fixed points of $G(\cdot)$, are stationary equilibria. Regarding the existence of an intermediate equilibrium, note that:

$$G'(q_t) = 2q_t + q_t^2\,(3 - 4q_t)\,\frac{\Delta}{\delta}$$

We have

$$G'(0) = 0 \quad \text{and} \quad G'(1) = 2 - \frac{\Delta}{\delta}$$

Hence $G(\cdot)$ lies below the 45° line in the neighborhood of 0, and lies above or below the 45° line in the neighborhood of 1, depending on:

$$\frac{\Delta}{\delta} \gtrless 1$$

Thus, if $\frac{\Delta}{\delta} < 1$, $G(\cdot)$ lies below the 45° line in the neighborhood of 1. On the contrary, if $\frac{\Delta}{\delta} > 1$, then $G(\cdot)$ lies above the 45° line in the neighborhood of 1. As a consequence, there must exist at least one intersection of $G(\cdot)$ with the 45° line for a level of q_t that is larger than 0 and smaller than one: an intermediate steady-state must then exist.

Note also that the second-order derivative is:

$$G''(q_t) = 2 + 6q_t\,(1 - 2q_t)\,\frac{\Delta}{\delta}$$

Its sign is ambiguous, and may depend on q_t. Note that:

$$G''(0) = 2 > 1 \quad \text{and} \quad G''(1) = 2 - 6\frac{\Delta}{\delta}$$

Thus the transition function is convex around $q_t = 0$, and may turn out to be concave at $q_t = 1$, provided $\frac{\Delta}{\delta} > \frac{1}{3}$.

To study the stability of the stationary equilibria, note that

$$|G'(0)| < 1$$

Hence $q = 0$ is a locally stable equilibrium. Moreover, we have, when $\frac{\Delta}{\delta} < 1$:

$$|G'(1)| > 1$$

so that $q = 1$ is not stable in that case. However, when $\frac{\Delta}{\delta} > 1$, we have:

$$|G'(1)| < 1$$

so that $q = 1$ is then locally stable.

Regarding the intermediate stationary equilibrium, note that equalizing q_{t+1} and q_t in the transition function yields:

$$q_t = q_t^2 + q_t^3(1 - q_t)\frac{\Delta}{\delta}$$

From which we get a unique value: $q_t = \sqrt[2]{\frac{\delta}{\Delta}}$. Thus the interior equilibrium is unique. To study its stability, let us notice that:

$$G'\left(\sqrt[2]{\frac{\delta}{\Delta}}\right) = 3 - 2\sqrt[2]{\frac{\delta}{\Delta}}$$

Given that $\frac{\delta}{\Delta} < 1$, we necessarily have $\left| G'\left(\sqrt[2]{\frac{\delta}{\Delta}}\right)\right| > 1$, implying instability.

Finally, note that, if $\frac{\Delta}{\delta} = 1$, there exist only two stationary equilibria, $q = 0$ and $q = 1$. Moreover, we have:

$$G'(0) = 0 < 1 \quad \text{and} \quad G'(1) = 1$$

Hence only the first equilibrium is locally stable.

8.3 Proof of Proposition 5

The dynamics of the economy is described by the equation:

$$\begin{aligned} q_{t+1} \equiv F(q_t) &= \left[e_t^a + (1 - e_t^a)\, q_t\right] q_t + \left[\left(1 - (1 - e_t^n)\right) q_t\right] (1 - q_t) \\ &= q_t^2 + q_t\,(1 - q_t)\, \frac{v(\beta^a y) - v(\mu g)}{\delta} \end{aligned}$$

The existence, uniqueness and stability of a stationary equilibrium can still be studied by analyzing the properties of the transition function $F(q_t) \equiv q_t^2 + q_t\,(1 - q_t)\,\frac{\Delta}{\delta}$, where $\Delta = v(\beta^a y) - v(\mu g)$ instead of $v(\beta^a y) - v(0)$ at the laissez-faire. The existence and stability analyses, which are close to the ones under the laissez-faire, are not reproduced here.

8.4 Proof of Proposition 6

The dynamics of the economy is described by the equation:

$$\begin{aligned} q_{t+1} \equiv G(q_t) &= q^2 + e_t^a q_t q_t (1 - q_t) + e_t^n q_t q_t (1 - q_t) \\ &= q_t^2 + q_t^3 (1 - q_t) \frac{v(\beta^a y) - v(\mu g)}{\delta} \end{aligned}$$

The existence, uniqueness and stability of a stationary equilibrium can thus be studied by analyzing the properties of the transition function $G(q_t) \equiv q_t^2 + q_t\,(1 - q_t)\,\frac{\Delta}{\delta}$, where $\Delta = v(\beta^a y) - v(\mu g)$ instead of $v(\beta^a y) - v(0)$ at the laissez-faire. Those analyses being close to the ones under the laissez-faire ones are not reproduced here.

8.5 Proof of Lemma 1

Let us compare social welfare under two extreme cases, where the population is composed exclusively of altruistic persons (i.e. $q = 1$) and where the population is composed exclusively of non-altruistic persons (i.e. $q = 0$). Those two cases coincide with the outcomes that will, under quite general conditions, prevail in the long-run, as shown in Section 4.

When the long-run population is fully altruistic, social welfare is equal to:

$$u(c^a) - \delta \frac{(e^a)^2}{2} + v(d^a)$$

Hence maximum social welfare at the steady-state is obtained by solving:

$$\max_{c^a,d^a,e^a} u(c^a) - \delta\frac{(e^a)^2}{2} + v(d^a) + \lambda\left[y - c^a - d^a\right]$$

First-order conditions yield, under $u(\cdot) = v(\cdot)$:

$$c^a = d^a = \frac{y}{2} > e^a = 0$$

Those consumptions prevail also in the long-run under the laissez-faire. Hence the indirect utility: $u\left(\frac{y}{2}\right) + v\left(\frac{y}{2}\right)$ achieved at the steady-state under $q = 1$ is the same as the one that can be achieved at the social optimum.

When the long-run population is fully non-altruistic, social welfare is:

$$u(c^n) - \delta\frac{(e^n)^2}{2} + v(d^n)$$

Hence maximum social welfare is obtained by solving the problem:

$$\max_{c^n,d^n,e^n} u(c^n) - \delta\frac{(e^n)^2}{2} + v(d^n) + \lambda\left[y - c^n - d^n\right]$$

First-order conditions yield, under $u(\cdot) = v(\cdot)$:

$$c^n = d^n = \frac{y}{2} > e^n = 0$$

Consumptions do not coincide with the laissez-faire, at which we have: $c^n = y > d^n = 0$. If one introduces a system of lump sum transfers from the young to the old, we have, with $T = \frac{y}{2}$,

$$c^n = y - T = \frac{y}{2} > d^n = \mu\frac{y}{2}$$

Hence, the indirect utility under the optimal policy when $q = 0$, which is equal to $u\left(\frac{y}{2}\right) + v\left(\mu\frac{y}{2}\right)$, is inferior to the one obtained when $q = 1$, as a consequence of the inefficiency of the State in the provision of LTC ($\mu < 1$):

$$u\left(\frac{y}{2}\right) + u\left(\frac{y}{2}\right) > u\left(\frac{y}{2}\right) + u\left(\mu\frac{y}{2}\right)$$

Therefore the optimum consists of a population that is entirely made of altruistic persons, since altruism leads to a more efficient production of LTC in comparison to what a government achieves. Hence, the social optimum involves $q = 1$.

8.6 Proof of Proposition 8

If $\frac{u\left(\frac{y}{2}\right) - u(\mu g)}{\delta} < 1$ for any $0 \leq g \leq \frac{y}{2}$, we have, in the long-run, $q = 0$. That result holds whatever g is. Hence, in that case where public intervention has no effect on the population dynamics, the optimal policy in the long-run consists of the optimal policy in the short-run, that is, a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents.

If $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} > 1$ for any $0 \leq g \leq \frac{y}{2}$, the long-run composition of the population is $q = 1$. That result holds whatever the public transfer g is. Hence, in that case, the optimal long-run policy is the laissez-faire. However, in the short-run, it is optimal to implement a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents.

Otherwise, if we exclude those two cases, the level of the lump sum transfer g will determine the long-run composition of the population. Given that the optimal composition is $q = 1$, the optimal long-run transfer is limited from above, and is lower than the optimal short-run transfer, since $g = \frac{y}{2}$ would prevent the survival of altruism in the population in this case. The convergence towards the stationary equilibrium with $q = 1$ requires: $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} > 1$. Hence the (short-run) lump sum transfer g^* from non-altruistic children towards their parents. g^* must satisfy the condition: $\frac{u\left(\frac{y}{2}\right)-u(\mu g^*)}{\delta} > 1$, implying $g^* \in \left]0, \frac{y}{2}\right[$. Here again, the laissez-faire is optimal in the long-run (when $q = 1$).

8.7 Proof of Proposition 9

Consider first the case where $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} \leq 1$ for any $0 \leq g \leq \frac{y}{2}$. In that case, the long-run composition of the population is $q = 0$. That result holds whatever the level of g is. Hence, in that case where the public intervention has no effect on the population dynamics, the optimal policy in the long-run consists of the optimal policy in the short-run, that is, a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents.

If $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} > 1$ for any $0 \leq g \leq \frac{y}{2}$, the long-run composition of the population is $q = 1$. Here again, that result holds whatever the public transfer g is. Hence, in that case, the optimal long-run policy is the laissez-faire. However, in the short-run, it is optimal to implement a lump sum transfer $g^* = \frac{y}{2}$ from non-altruistic children towards their parents.

Otherwise, if we exclude those two cases, the level of the lump sum transfer g will determine the long-run composition of the population. Given that the optimal q equals 1, the optimal long-run transfer is limited from above, and is lower than the optimal short-run transfer, since $g = \frac{y}{2}$ would prevent the survival of altruism in the population in this case. The convergence towards the stationary equilibrium with $q = 1$ requires: $\frac{u\left(\frac{y}{2}\right)-u(\mu g)}{\delta} > 1$. implying $g^* \in \left]0, \frac{y}{2}\right[$. Moreover, unlike in the "It's the family" case, we need also q_0 to be strictly larger than the intermediate equilibrium, implying $q_0 > \sqrt[2]{\frac{\delta}{u\left(\frac{y}{2}\right)-u(\mu g^*)}}$. Therefore the optimal short-run transfer must satisfy those two conditions. Here again, the laissez-faire is optimal in the long-run (when $q = 1$).