WORKING PAPERS

N° 1352

June 2026

"Family bargaining and the gender gap in informal care"

Chiara Canta and Helmuth Cremer

Toulouse School of Economics

Family bargaining and the gender gap in informal care*

Chiara Canta†
TBS Business School
31068 Toulouse, France

Helmuth Cremer
Toulouse School of Economics,
University of Toulouse Capitole
31015 Toulouse, France

This version: June 2026

*Financial support from the Chaire "*Marché des risques et création de valeur*" of the FdR/SCOR is gratefully acknowledged. Helmuth Cremer gratefully acknowledges the funding received by TSE from ANR under grant ANR-17-EURE-0010 (Investissements d'Avenir program).

†Corresponding author. Email: c.canta@tbs-education.fr

Abstract

We study the optimal long-term care (LTC) policy when informal care can be provided by children in exchange for monetary transfers from their elderly parents. We consider a bargaining model with single-child families, where daughters have lower labor market wages, and bargaining power within the family varies by the child's gender.

In the laissez-faire scenario, daughters always provide more informal care than sons. When their bargaining weight is smaller, they also experience lower welfare; however, this may be reversed if their bargaining weight is sufficiently high. The first-best outcome involves redistribution from families with sons to families with daughters and can be implemented through a gender-specific schedule of public LTC benefits and state-contingent transfers to adult children.

Gender neutrality disadvantages families with daughters and may even leave daughters worse off than under laissez faire. It also leads to a distorted allocation of care within families with daughters and affects the distribution of transfers in all families.
JEL classification: D13, H23, H31, I19

Keywords: Long-term care, informal care, strategic bequests, family bargaining, gender neutrality.

Highlights

- If daughters have lower wages than sons, they provide more informal care to elderly parents.
- The socially optimal policy redistributes resources from families with sons to families with daughters through gender-specific LTC benefits.
- Gender neutrality can harm daughters even with respect to the laissez faire.

1 Introduction

With an aging population and increased longevity, the provision of adequate long-term care (LTC) to the dependent elderly represents a major challenge faced by all developed countries. Elderly people affected by cognitive diseases, such as Alzheimer's or other forms of dementia, or by motor disorders due to amyotrophic lateral sclerosis (ALS) or Parkinson's disease, need assistance with their personal care and daily activities. These LTC needs come in addition to their demand for medical services. Health care is typically covered by public or private insurance, albeit to a degree that differs across countries. LTC, by contrast, is rarely or only minimally covered by social insurance. Private insurance markets are also very thin on the ground, even though the risk is substantial. This phenomenon is often referred to as the "LTC insurance puzzle", which can be explained by a variety of reasons, including adverse selection, myopia and avoiding the crowding out of informal care; see Cremer *et al.* (2012) and Klimaviciute and Pestieau (2023) for detailed discussions and references.

Currently, informal care provided by family members represents a significant part of long-term care services; see Bonsang and Schoenmaeckers (2015) and Norton (2016, Section 3) for an overview of the relevant empirical studies. For instance, Bolin *et al.* (2008) use SHARE (Survey of Health, Aging, and Retirement in Europe) data and find that elderly individuals with at least one child are likely to receive some informal care. More recent and precise estimates of the contribution of informal care to total care hours across countries are provided by Barczyk and Kredler (2019). They show that informal care is indeed very important in most countries; in Europe informal care ranges from 22% of total care hours in the Northern countries (Belgium, Denmark, the Netherlands and Sweden) to 81% in Southern countries (Italy and Spain), with approximately 43% in Middle European countries (Austria, France and Germany). In the US, it is estimated at 54%.

Casual observations suggest that women and daughters, in particular, are the main providers of informal LTC. This stylized fact is confirmed by the empirical literature; see, among many others, Dentinger and Clarkberg (2002) and Schmid *et al.* (2012).

As Bott *et al.* (2017) state: "The best long-term care insurance is a conscientious daughter". Indeed, among adult children taking care of their old parents, daughters typically provide more informal care than sons (Arber and Ginn, 1990; Bracke *et al.*, 2008; Haberkern and Szydlik, 2010; Schmid *et al.*, 2012; Tolkacheva *et al.*, 2014). While caregivers might enjoy providing some care to their relatives, informal care can be costly and may also impose an emotional and physical burden on caregivers.[1] Providing care often reduces labor supply so that many women find that the "child penalty" is supplanted by a "good daughter penalty".[2]

We study the optimal long-term care policy taking into account gender differences in the provision of informal care within the family. Since, on average, daughters and sons are not equally involved with informal care, public long-term care policies are likely to affect the gender gap in labor participation and the redistribution across genders and across families. We characterize the optimal gender-specific policy (depending on the gender of the children potentially providing care), and we contrast this case with the one where the policy has to be gender-neutral. Gender neutrality is increasingly popular, and to our knowledge our paper is the first one to study its consequences in the context of LTC.

In a fairy tale world, informal care would be motivated by altruism. However, in reality, other factors appear to be at work. Care may be "bought" through implicit exchanges or be "imposed" by social norms.[3] These three motives (altruism, implicit exchanges and social norms) have been shown to coexist, and their relative importance depends on the social and family context.[4] In this paper, we focus on exchange-based transfers. Informal care is compensated for by monetary transfers, gifts or bequests. From an empirical point of view, the interpretation of these transfers as gifts seems

[1] On the impact of informal care on female labor supply, see also Pezzin and Steinberg (1999) and Wilson et al. (2007). Di Novi *et al.* (2015) analyze the impact of the provision of care on the health and quality of life of female informal caregivers using the Survey of Health, Ageing and Retirement in Europe (SHARE).

[2] For instance, Schmitz and Westphal (2017) study the long run consequences of informal care in Germany and show that female caregivers have a probability of working full-time 4 percentage points lower than non-caregivers (with a baseline probability of 35%).

[3] See, for instance, Canta and Pestieau (2013) or Klimaviciute *et al.* (2017).

[4] For a detailed survey of the empirical literature, see Arrondel and Masson (2006).

particularly compelling. The literature provides evidence that inter vivos transfers tend to be larger for children who provide informal care (see, among others, Norton and Van Houtven, 2006; Norton et al., 2013; Barczyk and Kredler, 2018).

While our paper is inspired by the strategic bequest approach,[5] we depart from the traditional model by considering a different and more cooperative representation of the exchanges between generations. In the original strategic bequest model, parents manage to extract all the surplus generated by the exchanges. This is a rather extreme assumption, which has already been challenged by Canta and Cremer (2019), who argue that uncertainty or asymmetric information may force parents to leave some surplus (rents) to children. Here we abstract from informational issues but assume that the terms of the care-for-transfer exchange are determined by bargaining. The procedure is cooperative so that the solution is on the family Pareto frontier and shares the surplus between parents and children depending on their respective bargaining weights.[6] The underlying model of family exchanges is similar to Cremer and Pestieau (1993), who focus on educational choices and study neither policy design nor gender differences.

We consider a bargaining model with single-child families and focus on insurance and gender-related issues. Daughters and sons differ in their labor market wage and in their bargaining weight within the family. We assume that daughters have a lower labor-market wage, which reflects the gender-wage gap. Gender differences in labor earnings have been extensively documented in the literature; see Bertrand (2020) for a recent survey. On average, women in the EU earn around 11.1 % less per hour than men (Eurostat, 2025).[7] Eurostat (2025) also documents that the gender-wage gap varies across countries, cohorts, and employment categories. In some cases, the unadjusted gap is now close to zero or even negative, particularly for young workers. However, the relevant opportunity cost of informal care is the wage of adult children

[5]See, for instance, Kotlikoff and Spivak (1981) and Bernheim *et al.* (1985).

[6]In this respect the model differs from the models of informal care proposed by Byrne et al. (2009) and by Barczyk and Kredler (2018). The former study assumes that children provide care because of altruism and receive no transfers. The latter study assumes, like us, that children can receive transfers, but considers a non-cooperative model.

[7]See also Blau and Kahn (2017) who show that in the US the female/male wage ratio in 2010 was between 72% and 82%.

at the time parents become dependent, not necessarily the gender-wage gap at labor-market entry. This distinction matters because childbirth reduces women's earnings (the so-called child penalty), employment, hours worked, and wage rates over a long horizon, so gender differences in opportunity costs may remain substantial at the ages at which adult children are likely to provide care. The assumption that wages are lower for daughters should therefore be interpreted as a reduced-form representation of life-cycle gender differences in labor-market opportunities, including the persistent effects of child-related career interruptions. The pay gap, associated with occupational choices and the so-called child penalty, implies that women across the EU earn just 77% of what men earn annually (European Institute for Gender Equality, 2025).

Bargaining weights, on the other hand, are difficult to observe, and the empirical evidence is thin.[8] In this paper, we allow the bargaining weights of daughters and sons to differ but do not make any specific assumptions about which is higher. In our model, the bargaining weight captures various factors that may influence the threat points of parents and children. These factors include parents' preference for help from their children, as well as social norms, which are an important determinant of informal care. In our framework all these factors are captured in reduced form by the gender-specific bargaining weights. A lower bargaining weight for daughters may reflect not only weaker outside options but also stronger family expectations, internalized obligations, or social sanctions associated with not providing care. Conversely, a higher bargaining weight for daughters may reflect parents' stronger preference for care provided by daughters or daughters' greater influence in family decisions. We do not claim that exchange motives are the only determinant of caregiving. Rather, we focus on exchange-based care and allow social norms to affect the division of surplus through the bargaining weights.

Due to the assumption about wages, daughters provide more informal care than sons in the laissez-faire scenario.[9] Additionally, daughters have lower welfare than sons

[8] There are some attempts to estimate bargaining weights within families, but to our knowledge they are limited to couples. See for instance Couprie (2007), who estimates budget shares rather than weights, and more recently Gu et al. (2021), who use households' financial decisions. For a discussion of the challenges raised when estimating bargaining weights see Browning et al., (2013).

[9] More generally, our results can be read as applying to two caregiver types with different opportunity costs of time. If the wage ranking were reversed, the model would predict the corresponding reversal in

unless their bargaining weight is significantly higher. The laissez-faire outcome thus raises two key issues that justify policy intervention. First, despite receiving informal care, parents are typically not fully insured against dependency risk. Second, society may object to the gender inequality implied by this outcome and seek to incorporate a redistributive dimension into LTC policy. In other words, LTC policy can be used to eliminate (or at least mitigate) inequalities arising from intra-family exchanges.

To assess solutions, we consider a simple utilitarian welfare function. In other words, all individuals are weighted equally irrespective of their position in the family (parent or child) and their gender. This introduces a paternalistic dimension because social welfare weights will, in general, differ from intra-family bargaining weights. We show that the first best involves redistribution from families with sons to families with daughters and can be implemented by a gender-specific schedule of public LTC benefits and state-contingent public transfers to adult children, which may be positive or negative. All young parents pay the same "premium", but LTC benefits depend on the gender of their child.

However, in practice, gender-specific transfers are problematic because they violate gender neutrality. Advocates for gender-neutral policies argue that it is a matter of fairness and equality. They believe that public policies should treat individuals equally, regardless of gender, and that charging different payments based on gender could be seen as discriminatory and violating horizontal equity. This position is reflected to an increasing degree in legal and regulatory requirements prohibiting gender differentiation. The intent of these requirements is of course to prevent discrimination against women to increase their economic status and their utility.

Consequently, we devote the second part of this paper to the study of gender neutral policies. While gender is in principle observable, this information can no longer be used by the social planner. The situation is formally equivalent to a setting where gender is not observable so that a feasible policy must be self-selecting. In other words, incentive compatibility constraints must be added to the problem. With these added restrictions, we find that the informal care provided by daughters should be distorted upwards to

the opportunity-cost component of informal care provision.

enhance redistribution from families with sons to families with daughters. Care provided by sons is not distorted and is the same as in the laissez faire. Transfers within the family should be distorted in both types of families. To be more precise, while all individuals are fully insured (full redistribution across states of nature), marginal utilities are not equalized across generations. Finally, we show that the solution does not change when fair private insurance is available but that the presence of a market for insurance adds a degree of freedom to the design of social transfers.

We complete our analysis with numerical illustrations. They allow us to compare the welfare effects of tagging and gender-neutral policies depending on the family bargaining weights. Families with daughters are always better off under tagging, while families with sons are always better off under the gender-neutral policy. Children win from both policy interventions with respect to the laissez faire as long as their bargaining weight is lower than 1/2, as the social planner gives the same weight to all generations. We also find that, when daughters have a high bargaining weight, the gender-neutral policy makes daughters worse off even with respect to the laissez faire.

The literature on LTC provision and gender is mostly empirical. We have provided a selection of references above and more can be found in Barigozzi et al. (2020), which is the only theoretical paper we are aware of. Their paper and ours both consider a bargaining solution, but otherwise the approaches are very different and complementary. They consider a static setting in which there is no uncertainty (all parents are dependent), so that insurance issues which are key to our setting do not arise. Furthermore, bargaining weights are not gender specific and there are no monetary intergenerational transfers, including strategic ones used as payment for care. In their model, informal care and the need for policy intervention is driven by an endogenous social norm, which affects daughters and leads to an inefficient outcome, with daughters providing an excessive level of care. They show that this inefficiency can be corrected (or at least mitigated) by a subsidy on formal care. In our setting, by contrast, policy intervention is motivated by the need to provide insurance and to correct for gender inequalities.

The paper is structured as follows. First, we present the model and the laissez faire. We then derive the first-best allocation and show how it can be implemented through a gender-specific policy. We contrast this policy with the gender-neutral one. Finally, we provide some numerical illustrations and we extend our model to the case where a market for private LTC insurance exists. The last section summarizes our results.

2 Model and laissez-faire solution

Consider a generation of parents who are *ex ante* identical. They all have a single child who can be either a daughter or a son with identical probability. We denote the gender of the child by the subscript $i = b, g$ where b stands for sons (boys) and g stands for daughters (girls). When they are young, parents receive an exogenous income y and allocate it between consumption and savings k_i, which depends on the gender of the child. When old, parents are dependent with probability π and healthy with probability $(1-\pi)$. The expected utility of a parent having a child of gender i is

$$V_i^P = U(y - k_i) + (1-\pi)\, U\left(k_i\right) + \pi H\left(m_i\right),$$

where $m_i = k_i + \gamma(a_i) - \tau_i$ is consumption when old and dependent. This includes LTC, which can be bought on the market from savings, or obtained informally from children. The monetary equivalent of a_i units of time devoted by children is given by $\gamma(a_i)$, which is a strictly increasing and concave function. Dependent parents receive care $a_i \in (0,1)$ from their child in exchange for a transfer $\tau_i \in \mathbf{R}$.[10] The healthy elderly simply consume their savings. We assume that $U' > 0$, $H' > 0$, $U'' < 0$, $H'' < 0$, and that both functions satisfy the Inada conditions. Furthermore, we assume that for all x, $U'(x) < H'(x)$. This ensures that there is a role for insurance against the risk of dependence.

The assumption $U'(x) < H'(x)$ captures the idea that resources are especially valuable in the dependent state because they can be used to finance long-term care needs. It should not be interpreted as a general claim that poor health always raises the marginal utility of ordinary consumption. The empirical evidence on state-dependent utility is mixed, and Finkelstein et al. (2013), for example, find that marginal utility may decline as health deteriorates. In our LTC setting, H can for instance be interpreted

[10]The transfer can be negative, i.e. a transfer from children to parents.

as representing the case where the disutility of dependency is expressed in monetary terms. In other words, H would then represent the utility from resources available in the dependent state, including resources used to purchase care and the monetary utility cost of dependency. Under this interpretation, dependency creates additional needs and hence a role for insurance. If the marginal utility of resources were instead lower in the dependent state, the insurance motive for public intervention would be weakened or possibly reversed, but the gender and redistribution mechanisms studied below would still be relevant whenever children differ in opportunity costs or bargaining positions.

In the baseline model, y should be interpreted as the resources of the elderly household rather than as the labor income of a single male or female parent. These resources may include pooled spousal income, accumulated wealth and pension entitlements. We therefore abstract from gender differences within the parental generation in order to focus on the gender of the adult child, which determines the opportunity cost of informal care. This assumption is not meant to deny that mothers and fathers may have experienced different labor-market histories. Rather, it isolates one mechanism: how LTC policy should respond when the potential caregiver is a son or a daughter. If parental resources also differed by gender, the planner would face an additional redistributive motive. The redistribution from families with sons to families with daughters derived below should therefore be understood as conditional on equal parental resources, and not as a complete account of lifetime gender redistribution.

When parents are healthy, children do not provide care and devote their full unit of time to market work; their consumption is therefore equal to their labor earnings w_i, and their utility is $u(w_i)$, with $u' > 0$ and $u'' < 0$. When parents are dependent, children devote part of their time (a_i) to helping their parents. Their utility is equal to

$$u(\tau_i + w_i(1 - a_i)).$$

Expected utility of children is thus

$$V_i^C = \pi u(\tau_i + w_i(1 - a_i)) + (1 - \pi)u(w_i).$$

We assume that daughters' wages are lower than the wages of sons, *i.e.,* $w_g \leq w_b$. As mentioned above, this is intended to capture the empirically dominant pattern for the population most relevant to informal care decisions (namely, middle-aged individuals facing their parents' dependence).

The level of savings, care and the family transfer are chosen collectively by parents and children. All these variables are chosen when the gender of the child is known but before the realization of the health status, that is to maximize expected utility. Care and transfers are of course only relevant when the parent becomes dependent. While savings are likely to be chosen before the other variables, given that no new information is revealed at that point we can for simplicity treat the choices as simultaneous. We denote by α_i the gender-specific bargaining weight of the child. Then, the levels of care and transfers are chosen to maximize[11]

$$\begin{aligned} W_i &= (1-\alpha_i)V_i^P + \alpha_i V_i^C \\ &= (1-\alpha_i)[U(y-k_i) + (1-\pi)\,U(k_i) + \pi H\,(k_i + \gamma(a_i) - \tau_i)] \\ &+ \alpha_i[\pi u(\tau_i + w_i(1-a_i)) + (1-\pi)u(w_i)]. \end{aligned} \tag{1}$$

The first-order conditions with respect to a_i and τ_i are, respectively

$$(1-\alpha_i)H'(k_i + \gamma(a_i) - \tau_i)\gamma'(a_i) = \alpha_i u'(\tau_i + w_i(1-a_i))w_i \tag{2}$$

and

$$(1-\alpha_i)H'(k_i + \gamma(a_i) - \tau_i) = \alpha_i u'(\tau_i + w_i(1-a_i)). \tag{3}$$

Combining (2) and (3), we obtain

$$\gamma'(a_i) = w_i.$$

In words, the optimal level of informal care equalizes the marginal benefit and the marginal cost of care. It does not depend on the bargaining weights, but exclusively on the wage of the child. The allocation of informal care is fully governed by opportunity costs: a_i decreases with w_i. Hence, daughters provide more care than sons under the maintained assumption $w_g \leq w_b$. If the wage ranking were reversed, ($w_g > w_b$), the model would predict the opposite ranking in levels of care, all else equal. The

[11] We assume that functions H, U, u, and γ are twice continuously differentiable and that the solution for a_i is interior.

gender interpretation of the result therefore relies on the empirical relevance of the wage ranking. More generally, the model says that the child with the lower opportunity cost of time provides more care.

The optimal transfer satisfies

$$\frac{H'(k_i + \gamma(a_i) - \tau_i)}{u'(\tau_i + w_i(1 - a_i))} = \frac{\alpha_i}{1 - \alpha_i}.$$

Finally, the level of savings is determined according to the following first-order condition.[12]

$$-U'(y - k_i) + (1 - \pi)U'(k_i) + \pi H'(k_i + \gamma(a_i) - \tau_i) = 0. \tag{4}$$

2.1 Comparative statics

The first-order condition with respect to a_i (2) implicitly defines a_i as a function of w_i: $a_i(w_i) = \gamma'^{-1}(w_i)$. The derivative with respect to w_i is

$$\frac{\partial a_i}{\partial w_i} = \frac{1}{\gamma''} < 0.$$

Substituting $a_i(w)$ into the first-order conditions with respect to τ_i and k_i, (3) and (4), we have

$$FOC\tau = -(1 - \alpha_i)H'(k_i + \gamma(a_i(w_i)) - \tau_i) + \alpha_i u'(\tau_i + w_i(1 - a_i(w_i))) = 0,$$

and

$$FOCk = -U'(y - k_i) + (1 - \pi)U'(k_i) + \pi H'(k_i + \gamma(a_i(w_i)) - \tau_i) = 0.$$

The Hessian matrix of W_i with respect to τ_i and k_i is given by

$$\mathcal{H} = \begin{bmatrix} (1 - \alpha_i)H'' + \alpha_i u'' & -(1 - \alpha_i)H'' \\ -\pi H'' & U_1'' + (1 - \pi)U'' + \pi H'' \end{bmatrix},$$

with $|\mathcal{H}| > 0$, $U_1'' = U''(y - k_i)$, and $U'' = U''(k_i)$.

We have

$$\begin{bmatrix} \frac{\partial FOC\tau}{\partial w_i} \\ \frac{\partial FOCk}{\partial w_i} \end{bmatrix} = \begin{bmatrix} \alpha_i u''(1 - a_i) - [(1 - \alpha_i)H''\gamma\prime + \alpha_i u'' w_i]\frac{1}{\gamma''} \\ \pi H''\gamma\prime\frac{1}{\gamma''} \end{bmatrix},$$

[12] We could alternatively assume that savings are chosen by young parents anticipating the levels of a_i and τ_i. As long as all variables are chosen to maximize (1), this would give the same result.

and

$$\begin{bmatrix} \frac{\partial FOC\tau}{\partial \alpha_i} \\ \frac{\partial FOCk}{\partial \alpha_i} \end{bmatrix} = \begin{bmatrix} H' + u' \\ 0 \end{bmatrix}.$$

Using Cramer's rule we find

$$\frac{\partial \tau_i}{\partial w_i} = \frac{-\alpha_i u''[(1-a_i) - \frac{w_i}{\gamma''}][U_1'' + (1-\pi)U'' + \pi H''] + (1-\alpha_i)H''\frac{\gamma'}{\gamma''}[U_1'' + (1-\pi)U''(k_i)]}{|\mathcal{H}|} < 0, \tag{5}$$

$$\frac{\partial k_i}{\partial w_i} = \frac{-\pi H'' \alpha_i u''(1-a_i)}{|\mathcal{H}|} < 0, \tag{6}$$

$$\frac{\partial \tau_i}{\partial \alpha_i} = \frac{-[H' + u'][U''(y-k_i)(1-\pi)U''(k_i) + \pi H'']}{|\mathcal{H}|} > 0, \tag{7}$$

$$\frac{\partial k_i}{\partial \alpha_i} = \frac{-\pi H''[H' + u']}{|\mathcal{H}|} > 0. \tag{8}$$

Intuitively, transfers to children decrease in their wages and increase in their bargaining weights. Parents' savings are affected in a similar way by wages and weights, since an increase in transfer needs to be compensated by higher savings. However, simple inspection of conditions (5)–(8) shows that

$$\frac{\partial \tau_i}{\partial w_i} < \frac{\partial k_i}{\partial w_i} \quad \text{and} \quad \frac{\partial \tau_i}{\partial \alpha_i} > \frac{\partial k_i}{\partial \alpha_i},$$

implying that τ_i is more responsive to changes in wages and bargaining weights relative to k_i, so that parents do not fully compensate an increase in τ_i with higher savings. This is not surprising, given that savings are also consumed in the healthy state of the world.

Finally, fully differentiating (1) and applying the envelope theorem, we get

$$\frac{\partial W_i}{\partial w_i} = \alpha_i[\pi u'(\tau_i - w_i(1-a_i))(1-a_i) + (1-\pi)u'(w_i)] > 0.$$

$$\frac{\partial W_i}{\partial \alpha_i} = -V_i^P + V_i^C > 0 \iff V_i^C > V_i^P.$$

To sum up, we show that $a_g > a_b$, but we cannot rank τ_g and τ_b. The difference in wages calls for a higher transfer to daughters. If daughters also have a higher bargaining weight than sons, they will then get a higher intra-family transfer. However, this may be reversed if daughters have lower bargaining weights.

Furthermore, we can characterize the situations where daughters are worse off than sons in the laissez faire; that is to say, $V_b^C > V_g^C$. First assume that the bargaining weight for sons is the same as for daughters so that $\alpha_b = \alpha_g$, while $w_g < w_b$. Equation (4) can be rewritten as

$$H'(k_i + \gamma(a_i) - \tau_i) = \frac{U'(y - k_i) - (1 - \pi)U'(k_i)}{\pi}.$$

Since k_i decreases in w_i according to (6), $k_g > k_b$. Evaluating the RHS of the equation above at k_g and k_b, we have that $H'(k_g + \gamma(a_g) - \tau_g) > H'(k_b + \gamma(a_b) - \tau_b)$. Using this inequality and the fact that $\alpha_b = \alpha_g$, it follows from (3) that $u'(\tau_g + w_g(1 - a_g)) > u'(\tau_b + w_b(1 - a_b))$, which proves that daughters are worse off if the bargaining weights are the same.

If the bargaining weight of the sons increases so that $\alpha_b > \alpha_g$ this will not affect a_b, but implies a higher transfer τ_b, which makes sons even better off. Conversely, when the bargaining weight of sons decreases, the transfer τ_b will decrease, which reduces the welfare of sons. Then, in this case, daughters may get a higher welfare than sons if α_b is sufficiently low and w_b is not too high relative to w_g.

The main results of this section are summarized in the following proposition

Proposition 1 *The laissez-faire solution has the following properties:*

(i) Neither parents nor children are fully insured against the dependency risk; furthermore marginal utilities differ across genders and generations;

(ii) The level of care decreases with the child's wage w_i, but does not depend on the bargaining weights α_i. Consequently, daughters provide more care than sons;

(iii) The transfer received by children decreases with their wage and increases with their bargaining weight. The comparison between τ_b and τ_g is ambiguous;

(iv) When $\alpha_g \leq \alpha_b$, daughters are worse off than sons. This may be reversed if $\alpha_g > \alpha_b$.

In the next section we characterize the first-best allocation and we will show it differs from the laissez faire for two reasons. First, the laissez-faire allocation is clearly not efficient, since neither children nor parents are able to fully insure. Second, the laissez-faire allocation implies inequalities that are not socially optimal.

3 First-best allocation

The first-best (FB) solution is defined as the allocation that maximizes a utilitarian social welfare function. In other words, the social objective weights all individuals equally irrespective of their gender or the gender of their children. Consequently social welfare is "individual based" and does not reflect the family-specific bargaining weights. This introduces a paternalistic dimension.

Assuming an equal measure of families with sons and families with daughters, social welfare is defined as

$$SWF = \sum_{i=g,b} \frac{1}{2}[U(c_i^1) + (1-\pi)U(c_i^h) + \pi H(c_i^s)] + \frac{1}{2}[\pi u(d_i^s) + (1-\pi)u(d_i^h)], \qquad (9)$$

where c_i^1, c_i^s and c_i^h are consumption levels of parents of children of type $i = b, g$ when young, when old and dependent and when old and healthy. Similarly, d_i^s and d_i^h are consumption levels of type i children when their parents are dependent and when they are healthy. The resource constraint requires

$$\sum_{i=g,b} [c_i^1 + \pi(c_i^s + d_i^s) + (1-\pi)(c_i^h + d_i^h)] \leq \sum_{i=g,b} [y + \pi[w_i(1-a_i) + \gamma(a_i)] + (1-\pi)w_i]. \qquad (10)$$

The social planner maximizes (9) subject to (10). The first-order conditions with respect to consumption levels and informal care yield:

$$U'(c_i^1) = U'(c_i^h) = u'(d_i^h) = H'(c_i^s) = u'(d_i^s) \quad i = b, g \qquad (11)$$

$$w_i = \gamma'(a_i). \qquad (12)$$

These define the optimal levels of consumption and informal care $c_i^{1*}, c_i^{h*}, c_i^{s*}, d_i^{h*}, d_i^{s*}, a_i^*$ for $i = b, g$. These expressions imply

$$c_g^{1*} = c_b^{1*} = c_g^{h*} = c_b^{h*} = c^*, c_g^{s*} = c_b^{s*}, d_g^{h*} = d_b^{h*} = d_g^{s*} = d_b^{s*}. \qquad (13)$$

In words, there is full insurance and full redistribution: marginal utilities are equalized across states of nature, generations, and gender. Neither of these conditions is satisfied in the laissez faire. While the laissez-faire informal care is indeed optimal, consumption allocations are inefficient. Then, the laissez-faire allocation is not Pareto-optimal. Even if the family bargaining weights were equal to the social weights, the laissez faire would not be socially optimal.

4 Implementation: nonlinear policy with tagging

We assume that both informal care (equivalently labor supply) and the intra-family transfers are observable. This is a strong assumption and should be interpreted as applying to verifiable components of care and transfers. Care time may be partially documented through labor-supply reductions, caregiver allowances, or certified caregiving hours. Monetary transfers may be observable when they take the form of documented gifts or bequests. Other forms of support, such as companionship and emotional care, are much harder to verify. Our implementation result is therefore a benchmark. If informal care or intra-family transfers are imperfectly observable, the first-best allocation may not be implementable, and additional incentive constraints would arise. The qualitative comparison between gender-specific and gender-neutral policy, however, continues to illustrate the cost of prohibiting the use of caregiver gender as a policy-relevant tag.

The first-best allocation can be implemented by a set of gender-specific transfers. The required instruments are a set of transfers to dependent parents $T_i^s(a_i, \tau_i)$, transfers to the children of non-dependent parents (those that do not get any family transfers), $L_i^h(a_i, \tau_i)$, and transfers to young parents, $T_i^1(a_i, \tau_i)$. As long as no restrictions are imposed on these functions, this is equivalent to a situation where the government can set a_i and τ_i, and impose lump sum transfers T_i^s, L_i^h, and T_i^1. We show below how the appropriate levels of a_i and τ_i can be induced by appropriately designing the transfer functions and particularly their derivatives with respect to a_i and τ_i. This is not the only way to implement the first best. In Appendix A we show that the first best can also be decentralized by linear instruments. We assume that savings, k_i, cannot be observed so that families can choose them freely and they cannot be taxed (or be an argument of the transfer functions).[13]

[13] This assumption is intended to keep the informational requirements as small as possible. However,

With these instruments, the family problem becomes

$$\begin{aligned}\max_{k_i} W_i &= (1-\alpha_i)V_i^P + \alpha_i V_i^C \\ &= (1-\alpha_i)[U(y-k_i+T_i^1) + (1-\pi)\,U\,(k_i) + \pi H\,(k_i+\gamma(a_i)-\tau_i) + T_i^s)] \\ &+ \alpha_i[\pi u(\tau_i + w_i(1-a_i)) + (1-\pi)u(w_i + L_i^h)].\end{aligned}$$

The first-order condition is

$$-U'(y-k_i+T_i^1) + (1-\pi)U'(k_i) + \pi H'(k_i + \gamma(a_i) - \tau_i + T_i^s) = 0. \tag{14}$$

Let $\widehat{k}_i$ denote the solution to this equation. Combining condition (14) with equations (11) and (12) shows that the first best can be decentralized by inducing a transfer τ_i^* and setting the other transfers such that

$$H'(c^*) = u'(\tau_i^* + w_i(1-a_i^*)),$$

$$T_i^1 = 2c^* - y, \tag{15}$$

$$T_i^s = c^{s*} - c^* - \gamma(a_i^*) + \tau_i^*, \tag{16}$$

$$L_i^h = \tau_i^* - w_i a_i^*. \tag{17}$$

With these transfers, (14) yields $\widehat{k}_i = c^*$. Note that a transfer to healthy parents T_i^h is not necessary. Furthermore, equation (15) implies that $T_b^1 = T_g^1$ and that $\tau_g > \tau_b$.

From a LTC policy perspective, one can interpret T_i^1 as an insurance premium paid by young parents, while T_i^s represents the benefit received in case of dependency. Because $T_b^1 = T_g^1$, the premium is the same for all, but benefits T_i^s are gender specific—or more precisely, are conditioned on the gender of the child. While (16) shows that T_b^s and T_g^s will in general differ, their comparison appears to be ambiguous. In addition to this, equation (16) implies $T_b^s - \tau_b^* > T_g^s - \tau_g^*$, since informal care provided by daughters is higher than that provided by sons. In other words, the net transfer received by parents (the transfer received from the government minus the transfer given to children) must be larger for parents with sons than for parents with daughters. This may be surprising at first because to achieve gender equality, as stated by (11) and (13), we

it will become clear below that nothing would change if k were observable.

have to redistribute from families with sons towards families with daughters. However, dependent parents of sons receive less informal care, and have to be compensated by a higher net transfer in order to get the same level of insurance (full) as the parents of daughters.[14]

The instrument L_i^h denotes the public transfer to the adult child when the parent is healthy. More generally, the implementation uses state-contingent transfers to adult children to achieve the desired allocation across generations and states of nature. These transfers need not be positive: depending on the allocation to be implemented, they may be either subsidies or taxes. They should therefore not be interpreted as wage subsidies or as transfers conditional on employment status.

With the transfers considered here, the budget constraint of the government is

$$\sum_{i=g,b}[T_i^1 + \pi T_i^s + (1-\pi)L_i^h] \leq 0 \tag{18}$$

Using the expressions (15)–(17), this condition can be rewritten as

$$4c^* + 2(1-\pi)c^* + 2\pi c^{s*} + 2d^* \leq \sum_{i=g,b}[y + \pi\gamma(a_i^*) + w_i - \pi w_i a_i^*],$$

which, after simplification, yields the resource constraint (10) so that (18) is satisfied.

To achieve the desired levels a_i^* and τ_i^* it is sufficient to make T_i^s dependent on a and τ, and the marginal transfers must be designed as follows. The first-order conditions with respect to τ_i and a_i are given by

$$(1-\alpha)\pi H'(\widehat{k}_i + \gamma(a_i) - \tau_i + T_i^s)\left[\frac{\partial T_i^s}{\partial \tau_i} - 1\right] + \alpha\pi u'(\tau_i + w_i(1-a_i)) \tag{19}$$

$$(1-\alpha)\pi H'(\widehat{k}_i + \gamma(a_i) - \tau_i + T_i^s)\left[\gamma'(a_i) + \frac{\partial T_i^s}{\partial a_i}\right] - \alpha\pi u'(\tau_i + w_i(1-a_i))w_i. \tag{20}$$

From (19) we must have

$$(1-\alpha_i)\left[1 - \frac{\partial T_i^s}{\partial \tau_i}\right] = \alpha_i,$$

so that

$$\frac{\partial T_i^s}{\partial \tau_i} = \frac{1-2\alpha_i}{1-\alpha_i}.$$

[14] The term "redistribution from families with sons to families with daughters" refers to redistribution across families that differ only in the gender, wage, and bargaining position of the potential caregiver. It does not imply that families with sons are necessarily richer in a broader life-cycle sense.

Consequently, the marginal subsidy on transfers decreases with α_i and we have

$$\frac{\partial T_i^s}{\partial \tau_i} \lesseqgtr 0 \qquad \Longleftrightarrow \qquad \alpha_i \gtreqless \frac{1}{2}, \tag{21}$$

so that transfers should be subsidized (at the margin) and thus encouraged when the child has a lower bargaining weight than the parent, while they should be taxed and discouraged in the opposite case.

Equation (20) requires

$$(1-\alpha_i)\left[\gamma'(a_i^*) + \frac{\partial T_i^s}{\partial a_i}\right] = \alpha_i w_i$$

or

$$\frac{w_i + \frac{\partial T_i^s}{\partial a_i}}{w_i} = \frac{\alpha}{1-\alpha},$$

which yields

$$\frac{\partial T_i^s}{\partial a_i}/w_i = \frac{2\alpha - 1}{1-\alpha}.$$

This corresponds to the expressions we obtain in the linear case considered in Appendix A. The intuition behind this expression is the same as for (21), except that the sign is, of course, reversed. For instance, when children have a low bargaining weight, they provide more care than is socially optimal, so that informal care should be taxed (at the margin) and thus discouraged.

Our results pertaining to the first-best solution are summarized in the following proposition

Proposition 2 *(i) The first-best solution implies full insurance and full redistribution: marginal utilities are equalized across states of nature and generations;*

(ii) This allocation can be implemented by a system of transfers, where the gender specific transfer to dependent parents (which can be interpreted as a social long-term care benefit) is a nonlinear function of a and τ. Young parents are subject to a lump sum transfer, which can be interpreted as an insurance premium, and does not depend on the gender of the child;

(iii) When the child has a lower bargaining weight than the parent, transfers should be subsidized (at the margin) and thus encouraged, while informal care should be taxed

(at the margin) and thus discouraged. When the child has the larger bargaining weight, the signs of these marginal transfers are reversed.

5 Gender-neutral policy

In the previous section, we show how the first best can be implemented by a (nonlinear) policy that is gender specific. More precisely, the transfer scheme offered to families depends on the gender of the child. In practice, such a gender specific policy may be hard to implement for mainly political reasons. Consequently, we shall now also study the optimal gender-neutral policy.

The term “gender neutrality” should not be interpreted as literal unobservability of gender. The gender of the child is typically observable. The restriction we impose is instead that public policy cannot condition transfers directly on gender. This may reflect legal, regulatory, or political constraints requiring equal treatment by gender. Formally, such a restriction is equivalent to a mechanism-design problem in which gender is not an admissible conditioning variable.

Gender neutrality can be achieved by using a pooling (uniform) policy; that is, by applying the same policy to all families. Alternatively, one can think of a more general policy offering a menu of contracts that is self-selecting (incentive compatible). The policy is gender-neutral in the sense that all families face the same choice (the same menu of transfer schemes), but it is designed such that families self-select and choose the policy designed for their gender. Indeed, it is likely that this brings us to a second-best world, unless the policy implementing the first best happens to be incentive compatible. The incentive-compatible policies include pooling as a special case, but the results presented below show that it is never optimal.

The problem is formally the same as if gender were not observable. In other words, the only way to differentiate the policy is to design it so that it is self-selecting. In this context a family with a son “mimics” a family with a daughter in the sense that it selects the contract intended for families with daughters.[15]

[15] A similar approach is used by Finkelstein et al. (2009) who study annuity contracts in the UK where insurers are not allowed to offer gender specific contracts.

We continue to consider the same nonlinear instruments as in the previous section, which effectively means that we can impose the levels of transfers τ_b and τ_g and care, a_b and a_g. As in the first-best implementation, this can be achieved by specifying the transfer to dependent parents T_i^s, that is the level of social LTC, as a function of τ and a. The problem of a family i reporting type j is then given by

$$\begin{aligned}\max_{k_{ij}} W_{ij} &= (1-\alpha_i)V_{ij}^P + \alpha_i V_{ij}^C \\ &= (1-\alpha_i)[U(y-k_{ij}+T_j^1) + (1-\pi)\, U\,(k_{ij}) + \pi H(k_{ij}+\gamma(a_j)-\tau_j+T_j^s)] \\ &+ \alpha_i[\pi u(\tau_j + w_i(1-a_j)) + (1-\pi)u(w_i+L_j^h)].\end{aligned}$$

The only variable left to choose "freely" is k which is not observable. We can then define $\widehat{k}_{ij}$ as the solutions to this problem. The first-order condition with respect to $\widehat{k}_{ij}$ is similar to (14) and given by

$$-U'(y-k_{ij}+T_j^1) + (1-\pi)U'(k_{ij}) + \pi H'(k_{ij}+\gamma(a_j)-\tau_j+T_j^s) = 0. \tag{22}$$

Observe that this condition does not depend on w nor on α so that we have $\widehat{k}_{ij} = \widehat{k}_{jj} = \widehat{k}_{ii}$. For instance, we have $\widehat{k}_{bg} = \widehat{k}_{gg}$ so that families with sons who mimic families with girls save the same amount as families with daughters who truly report their type.[16]

Further define

$$\widehat{V}_{ij}^P(T_j^1, T_j^s, L_j^h, a_j, \tau_j) = U(y-\widehat{k}_{ij}+T_j^1) + (1-\pi)\, U\left(\widehat{k}_{ij}\right) + \pi H\left(\widehat{k}_{ij}+\gamma(a_j)-\tau_j+T_j^s\right), \tag{23}$$

$$\widehat{V}_{ij}^C(T_j^1, T_j^s, L_j^h, a_j, \tau_j) = \pi u(\tau_j + w_i(1-a_j)) + (1-\pi)u(w_i+L_j^h). \tag{24}$$

Because of the gender-neutrality requirement the maximization of social welfare is now subject to the following two incentive constraints

$$(1-\alpha_b)\widehat{V}_{bb}^P + \alpha_b \widehat{V}_{bb}^C \geq (1-\alpha_b)\widehat{V}_{bg}^P + \alpha_b \widehat{V}_{bg}^C, \tag{25}$$

$$(1-\alpha_g)\widehat{V}_{gg}^P + \alpha_g \widehat{V}_{gg}^C \geq (1-\alpha_g)\widehat{V}_{gb}^P + \alpha_g \widehat{V}_{gb}^C, \tag{26}$$

where $\widehat{V}_{ij}^P$ and $\widehat{V}_{ij}^C$ are defined by (23) and (24) so that subscripts bb and gg correspond to truthful reporting while bg and gb to mimicking. In all cases, the first subscript

[16]This implies that nothing would be gained by distorting k if it were observable.

represents the true type, while the second is the reported type. These conditions ensure that types self-select and pick the transfer scheme that is designed for them.

To obtain some insight into which of these constraints will be binding, we start by examining which condition (if any) is violated in the first-best implementation considered in the previous section. Continuing to denote first-best quantities by a $*$ we proceed in several steps. First, as already mentioned in the previous section, (15) implies that $T_b^1 = T_g^1$. Furthermore, since $c_g^{s*} = c_b^{s*}$, we have

$$T_g^s + \gamma(a_g^*) - \tau_g^* = T_b^s + \gamma(a_b^*) - \tau_b^*.$$

This, together with $\widehat{k}_{bg} = \widehat{k}_{bb}$, implies that, in case of dependence, the parents of sons are indifferent between choosing the policy designed for families with sons and the one designed for families with daughters. Using the fact that $d_g^{s*} = d_b^{s*}$, we have that $\tau_g^* + w_g(1 - a_g^*) = \tau_b^* + w_b(1 - a_b^*)$, which implies that $\tau_g^* = \tau_b^* + w_b(1 - a_b^*) - w_g(1 - a_g^*)$. Then, in case of dependence, the son of a family choosing the transfers designed for families with daughters obtains $\tau_g^* + w_b(1 - a_g^*) = \tau_b^* + w_b(1 - a_b^*) - w_g(1 - a_g^*) + w_b(1 - a_g^*)$, which is greater than $\tau_b^* + w_b(1 - a_b^*)$. Finally, since $d_b^{h*} = d_g^{h*}$, it follows that $L_g^h > L_b^h$ because $w_g < w_b$. Substituting these expressions into (25)–(26) while using definitions (23) and (24) shows that (25) is violated in the first best so that families with sons are better off with the transfer scheme designed for families with daughters.

To avoid repetition, we skip the proof, but not surprisingly, the same arguments show that (26) always holds in the first best. Intuitively, the fact that (25) is violated is due to the fact that the first best implies redistribution from families with sons to families with daughters. Consequently, it is not surprising that families with daughters cannot gain by mimicking families with sons. To sum up, the first-best solution cannot be implemented under gender neutrality, and the binding incentive constraint is (25).

The optimal gender-neutral solution then solves the following problem

$$\begin{aligned}
\max_{T_i^1, T_i^s, L_i^h, L_i^s, \tau_i, a_i} & \sum_{i=g,b} \left(\frac{1}{2} \widehat{V}_{ii}^P + \frac{1}{2} \widehat{V}_{ii}^C \right) \\
\text{s.t. } & (1-\alpha_b) \widehat{V}_{bb}^P + \alpha_b \widehat{V}_{bb}^C - \\
& [(1-\alpha_b) \widehat{V}_{bg}^P + \alpha_b \widehat{V}_{bg}^C] = 0, \\
& \sum_{i=g,b} [T_i^1 + \pi(T_i^s) + (1-\pi) L_i^h] = 0. \qquad (27)
\end{aligned}$$

In words, we maximize the utilitarian welfare subject to b's incentive constraint and the government budget constraint. Let λ denote the Lagrange multiplier associated with the incentive constraint and μ the one associated with the budget constraint. Differentiating the Lagrangian expression $\mathcal{L}$ then yields the first-order conditions as provided in Appendix B.

Combining (A6), (A8), (A10), and (A12), and rearranging, we obtain

$$U'(y - \widehat{k}_{bb} + T_b^1) = H' \left(\widehat{k}_{bb} + \gamma(a_b) - \tau_b + T_b^s \right) = \frac{\mu}{1 + \lambda(1-\alpha_b)}, \qquad (28)$$

and

$$u'(\tau_b + w_b(1-a_b) + L_b^s) = u'^s(w_b - L_b^h) = \frac{\mu}{1 + \lambda\alpha_b}. \qquad (29)$$

These expressions show that for families with sons, the marginal utilities of consumption are equalized across states of the world and across periods for parents, but not across parents and children. In other words, there is full insurance but the distribution across generations is distorted. The marginal utility of consumption should be greater for parents if their weight is lower than 1/2. Formally, equations (22), (28) and (29) imply

$$U'(c_b^1) = U'(c_b^h) = H'(c_b^s) \gtreqless u'(d_b^s) = u'(d_b^h) \quad \Longleftrightarrow \quad \alpha_b \gtreqless 1/2.$$

Consequently, the traditional "no-distortion at the top" property is violated unless $\alpha_b = 1/2$; that is, when paternalistic considerations are not relevant for b families. A distortion is optimal even for the top family (whom the other does not want to mimic) because the parent's and children's consumption levels are weighted differently in the incentive constraint than in the social objective. This opens the door for relaxing incentive constraints by not restoring a first-best trade-off for this family. Specifically, when children have a higher weight ($\alpha_b > 1/2$), parents will receive a lower share of the surplus than in the first best to strike a compromise between paternalism and incentives.

Turning to families with daughters, combining (A7), (A11) and (A13) along with the property that $\widehat{k}_{bg} = \widehat{k}_{gg}$ yields

$$U'(y - \widehat{k}_{gg} + T_g^1) = H'\left(\widehat{k}_{gg} + \gamma(a_g) - \tau_g + T_g^s\right) = \frac{\mu}{1 - \lambda(1 - \alpha_b)},$$

and

$$u'(\tau_g + w_g(1 - a_g) + L_g^s) = u'^s(w_g - L_g^h) = \frac{\mu}{1 - \lambda\alpha_b}.$$

These expressions are similar to (28) and (29), except that the sign preceding the second term in the denominator is reversed. Consequently, we again have full insurance but the marginal utilities across generations are not equalized unless $\alpha_b = 1/2$. The extent of the distortion increases again as α_b moves away from 1/2 but the impact of α_b is reversed. The marginal utility of consumption should now be greater for parents if their weight is larger than 1/2. Formally, we have

$$U'(c_g^1) = U'(c_g^h) = H'(c_g^s) \gtreqless u'(d_g^s) = u'(d_g^h) \qquad \Longleftrightarrow \qquad \alpha_b \lesseqgtr 1/2.$$

As in the case of sons, this distortion strikes a compromise between paternalism and incentives. The sign however is reversed, implying that daughters get a lower share of the surplus with respect to the first best when the bargaining weight of sons is higher than that of their parents ($\alpha_b > 1/2$). This is desirable to make the consumption bundle for families with daughters less attractive to families with sons.

The distortions discussed so far are associated with paternalism as they arise because welfare weights and family weights differ. We now turn to the trade-off determining the levels of care, which as we will see, involves more standard properties. Starting with sons, combining equations (A12) and (A14) yields

$$\gamma'(a_b) = w_b,$$

which implies that the informal care for a family with sons is not distorted. Consequently, as far as a_b is concerned, we do have the traditional no distortion at the top property.

Turning to families with daughters, we can rewrite (A15) as

$$H'_{gg}\gamma'(a_g) - u'_{gg}w_g - \lambda\left[(1-\alpha_b)H'_{bg}\gamma'(a_g) - \alpha_b u'_{bg}w_g\right] - \lambda\alpha_b u'_{bg}(w_g - w_b) = 0,$$

where $H'_{gg} \equiv H'\left(\widehat{k}_{gg} + \gamma(a_g) - \tau_g + T^s_g\right)$, $H'_{bg} \equiv H'\left(\widehat{k}_{bg} + \gamma(a_g) - \tau_g + T^s_g\right)$, $u'_{gg} \equiv u'(\tau_g + w_g(1-a_g) + L^s_g)$, and $u'_{bg} \equiv u'(\tau_g + w_b(1-a_g) + L^s_g)$. Using (A9) and (A11), we get

$$\mu(\gamma'(a_g) - w_g) - \lambda\alpha_b u'_{bg}(w_g - w_b) = 0,$$

so that

$$(\gamma'(a_g) - w_g) = \lambda\alpha_b u'_{bg}(w_g - w_b)/\mu < 0.$$

Consequently, care provided by daughters, a_g, is distorted upwards. This is in line with the usual intuition that a distortion is desirable if it relaxes an otherwise binding incentive constraint. This is exactly what increasing a_g above the first-best level does: sons' wage is higher, then care is more costly for the mimicker (sons) than for the mimicked (daughters).

The results concerning the gender-neutral solution are summarized in the following proposition.

Proposition 3 *The gender-neutrality requirement has the following implications:*

(i) The first-best solution cannot be implemented by a gender-neutral policy. If the policy cannot be conditioned on the gender of the child, families with sons would prefer the transfer schedule designed for families with daughters to their own schedule. Consequently, the requirement of gender neutrality hurts families with daughters;

(ii) Informal care is not distorted and at its first-best level for sons (the "top family"), while it is distorted upwards for families with daughters;

(iii) There is full insurance as in the first best, but the allocation across generations is distorted in both families including the "top" one, as long as children and parents have different bargaining weights. This distortion strikes a compromise between paternalism and incentives.

The gender-neutral policy characterized above is nonlinear and allows the government to offer a menu of self-selecting contracts. It therefore provides an upper bound on what can be achieved under gender neutrality. A simpler uniform linear policy would be more restrictive. Consider a restricted policy in which the transfer to dependent parents is $T^s(a,\tau) = T_0^s + s_a a + s_\tau \tau$, and the transfers to young parents and to children of healthy parents are common across family types. All families face the same schedule, so that the policy is both gender-neutral and pooling. The government chooses $(T^1, T_0^s, L^h, s_a, s_\tau)$ subject to its budget constraint, taking into account the family choices of (a_i, τ_i). Since the same marginal instruments s_a and s_τ apply to both $i = b, g$, this policy cannot in general reproduce the type-specific marginal incentives characterized in Proposition 3. The restricted linear problem is therefore weakly dominated by the nonlinear gender-neutral mechanism and coincides with it only in degenerate cases where gender is not payoff relevant. In particular, the nonlinear gender-neutral policy distorts the care margin for families with daughters while leaving the care level of the families with sons undistorted. A uniform linear policy cannot target this distortion in the same way: any marginal incentive applied to care affects both types of families. Thus, although uniform linear policies may be attractive for administrative reasons, they generally imply a lower level of welfare and a less precise redistribution-efficiency trade-off than the nonlinear gender-neutral policy studied here.

Note also that while in taxation theory the use of linear commodity taxation can be justified on informational grounds this is not the case here: both policies require the levels of informal care a are observable—which is admittedly a strong assumption as discussed above (see beginning of Section 4).[17]

We have thus shown that the gender-neutral policy is generally second-best. The second-best nature of gender neutrality in our analysis arises because sons and daughters differ in wages and in bargaining weights, so that the first-best policy redistributes across families. When these differences vanish, the value of gender tagging vanishes as well. Policies aimed at removing the gender pay gap or to impact family norms may thus affect the welfare effects of the gender-neutral policy.

[17] In contrast, linear commodity taxes require only observing anonymous transactions whereas non-linear policies require observing individual consumption levels.

6 Numerical illustrations

In this section, we present numerical examples to illustrate the welfare implications of our policies. Ranking social welfare levels achieved in the considered solutions is of course trivial: tagging yields the first best, the gender-neutral policy a second-best scenario, while the laissez faire yields the lowest welfare. Indeed, with respect to the laissez faire, our policy scenarios provide both insurance against dependence and redistribution across genders and generations. Note that in any event the laissez faire continues to be feasible under gender neutrality so that it is of course dominated even by the second best.

Ranking the family utility levels is more complex. On the one hand, public intervention provides insurance, which is valuable to families. On the other hand, the family bargaining weights for children and parents do not generally coincide with the welfare weights. The resulting redistribution across generations will reduce the families' utility evaluated at their own weights. Consequently, the net impact is ambiguous. Finally, redistribution across genders benefits families with daughters, but hurts families with sons.

From a welfare perspective, it is also interesting to distinguish between parents and children of different gender. Do parents of daughters/boys always benefit from public intervention? How does gender neutrality affect daughters and sons? In our general model, we cannot derive analytical results providing precise answers to these questions, which have important policy implications. Consequently, we present some numerical examples to illustrate the potential welfare effects of our policies. While these results are specific to our example, they point to some interesting patterns that can arise.

For this purpose, we consider a constant relative risk aversion utility function of the form $U(c) = c^{(1-\rho)}/(1-\rho) + K$, with $\rho \in (0, \infty)$ and $K > 0$.[18] We assume that children and non-dependent parents have the same utility function (i.e. $u(c) = U(c)$), while dependence implies a monetary loss of L, so that $H(c) = U(c - L)$. We assume that the function $\gamma(a)$ determining the monetary value of care provided by children to

[18]We introduce a positive constant to obtain positive levels of utility function and facilitate the exposition. This constant has no impact on welfare comparisons and on the results in Appendix E.

dependent parents is given by $A^z a^{(1-z)}$, where A is a positive constant, and $z \in (1/2, 1)$.

In Table 1 we present the welfare levels for an example where $\rho = 1.2$, $K = 10$, $L = 80$, $A = 1000$, and $z = 0.7$.[19] Furthermore, we assume that children's and parents' income levels $w_g = 40$, $w_b = 50$, and $y = 100$.[20] Finally, we consider a probability of dependence π of 50%.

In the examples presented in the main text, we focus on the case where $\alpha_g < \alpha_b$. In words, we assume that daughters have a lower bargaining weight than sons. This would be true, for instance, when social norms of caregiving are more demanding for daughters. In this case, when daughters provide low levels of care they incur a higher psychological or social cost with respect to sons. This is captured by a lower bargaining weight for daughters.[21] We successively consider three cases depending on the welfare weights. In the first one, both daughters and sons have lower bargaining weights than their parents ($\alpha_g = 0.3$ and $\alpha_b = 0.4$). In the second one, only daughters have a lower bargaining weight ($\alpha_g = 0.4$ and $\alpha_b = 0.6$). In the last example, both daughters and sons have higher bargaining weights than their parents ($\alpha_g = 0.6$ and $\alpha_b = 0.8$). To facilitate comparisons, the highest welfare level in each line is in bold font.

Not surprisingly, social welfare is higher under tagging (this corresponds to the first-best solution), decreases under gender neutrality, and is at its lowest under the laissez-faire solution. Concerning the family welfare evaluated with the family bargaining weights, in the first example it is at its highest in the laissez faire for both families with daughters and families with sons. Despite the fact that the public policies provide insurance, the difference between social weights and private weights explains this result. In the second and third example, however, families with daughters are better off with tagging. These families benefit from redistribution across genders, and this appears to dominate in this case. Furthermore, in all the cases examined, families with sons

[19]The full derivation of consumption levels, transfers, and informal care in different scenarios is provided in Appendix E, Tables 3-5.

[20]In order to avoid negative family transfers, we assume that parents have a sufficiently higher income than children. One can assume that parents in period 1 are in fact at the end of their career and have already accumulated some wealth.

[21]In Appendix D, Table 2 provides the numerical results when $\alpha_g > \alpha_b$, which are very similar to the ones presented in this section

are better off under gender neutrality than with tagging, while the opposite is true for families with daughters. This is not surprising, as gender neutrality does not allow for as much redistribution across genders as tagging.

Turning now to the individual utilities of sons, daughters, and their parents, the results show that the welfare ranking depends on the bargaining weights. Sons and their parents are always better off under the gender-neutral policy than under tagging, while daughters and their parents are better off under tagging than under the gender-neutral policy. This result relates to redistribution across genders, which is larger under tagging. Children are worse off in the laissez faire with respect to at least the scenarios with policy interventions if their bargaining weight within the family is lower than 1/2. This is due to the fact that the social planner gives the same weight to children and parents, so that public intervention redistributes to children in this case. Conversely, if children have larger bargaining weights than their parents, they are better off in the laissez faire.

The effect of α_g on daughters' utility under gender neutrality is not necessarily monotonic. A larger α_g strengthens the daughters' position in intra-family bargaining and tends to increase the private transfer they receive. At the same time, public policy is evaluated with equal social weights, so changes in α_g modify the gap between the family's bargaining weights and the planner's weights. Under gender neutrality, the incentive constraint further limits redistribution toward daughter families. The interaction of these three forces—private bargaining, paternalistic redistribution, and incentive compatibility—can generate a non-monotonic relationship. However, in our numerical examples, it turns out that the relationship is actually monotonic (with the utility of daughters decreasing in α_g under gender neutrality).

An interesting point can be made by looking at Case 3. If daughters have a relatively high bargaining weight within the family, the gender-neutral policy is not only worse for daughters with respect to tagging, but is also worse with respect to the laissez faire. This is particularly surprising since, in our examples, daughters not only have lower wages but also lower bargaining weights than sons.[22] However, in our framework,

[22]This is also true in Case 3 in Appendix D. However, this is less surprising, because in that case

a gender-neutral policy may hurt female caregivers more than the absence of public intervention.

7 Private LTC insurance

So far, we have assumed that private LTC insurance was not available. Social insurance, then addresses several issues: it provides full LTC insurance and redistributes across generations and genders. Suppose now that actuarially fair long-term care insurance is available. It provides a transfer I to dependent parents in exchange for a premium πI paid by parents when they are young. The expected utility of parents of type i becomes

$$V_i^P = U(y - k_i - \pi I_i) + (1-\pi)\, U\left(k_i\right) + \pi H\left(k_i + \gamma(a_i) - \tau_i + I_i\right).$$

In the absence of any policy, the first-order condition of parents with respect to insurance is given by

$$U'(y - k_i - \pi I_i) = H'\left(k_i + \gamma(a_i) - \tau_i + I_i\right).$$

Consequently, parents are now fully insured against the risk of dependence. We assume that the choice of I is not publicly observable. This is the most interesting case. When I is observable and can be controlled by the government through nonlinear instruments, the only role that it plays is to provide an extra degree of freedom for the implementation of the solution. All that matters for the parents and the caregivers is the total (positive or negative) transfer they receive in the different states of nature. The solutions described in the previous sections can still be implemented exactly as described, and by setting $I = 0$. One could also set I to a positive level and adjust the transfers accordingly. To sum up, when private insurance is publicly observable, it does not change the outcome. Consequently, it is not needed but could also be set to provide full insurance against dependence. In this case social insurance would merely take care of redistribution across generations and genders.

By contrast, when I is not observable, we can no longer rule out from the outset that it might affect the solution, particularly for the gender-neutral policy where private

daughters have a higher bargaining weight than sons.

insurance might affect the incentive constraints. Next, we analyze the tagging and gender-neutral policy separately.

7.1 Tagging

The family problem becomes

$$\begin{aligned}\max_{k_i,I_i} W_i &= (1-\alpha_i)V_i^P + \alpha_i V_i^C \\ &= (1-\alpha_i)[U(y-k_i+T_i^1-\pi I_i) + (1-\pi)\,U\,(k_i) + \pi H\,(k_i+\gamma(a_i)-\tau_i) + T_i^s + I_i)] \\ &+ \alpha_i[\pi u(\tau_i + w_i(1-a_i)) + (1-\pi)u(w_i + L_i^h)].\end{aligned}$$

The first-order conditions are

$$-U'(y-k_i+T_i^1) + (1-\pi)U'(k_i) + \pi H'(k_i+\gamma(a_i)-\tau_i+T_i^s) = 0,$$

and

$$U'(y-k_i-\pi I_i+T_i^1) = H'\left(k_i+\gamma(a_i)-\tau_i+I_i+T_i^s\right).$$

Denote the solutions to these equations $\hat{k}_i$ and $\hat{I}_i$. The second condition implies that, for any T_i^1 and T_i^s, $U'(.) = H'(.)$, which is the first-best trade-off.

The FB can be decentralized by inducing a level τ_i^* and setting the other transfers such that

$$\begin{aligned}H'(c^*) &= u'(\tau_i^* + w_i(1-a_i^*)), \\ T_i^1 &= 2c^* - y + \pi\hat{I}_i, \\ T_i^s &= c^{s*} - c^* - \gamma(a_i^*) + \tau_i^* - \hat{I}_i, \\ L_i^h &= \tau_i^* - w_i a_i^*.\end{aligned} \tag{30}$$

Since private insurance is set optimally by individuals, any $T_i^1 \in [0, 2c^*-y]$ decentralizes the first best. Since $T_i^1 - \pi\hat{I}_i$ is constant, as T_i^1 increases from 0 to $2c^*-y$, insurance coverage $\hat{I}_i$ decreases from $(2c^*-y)\pi$ to 0. Then, with insurance, T_i^1 becomes a redundant instrument. We can set for instance $T_i^1 = 0$ and let private insurance take care of the risk of dependence, while T_i^s and L_i^h are set to equalize utilities across generations and genders. Alternatively, the social planner can set $T_i^1 = (2c^*-y)\pi$ so that private insurance is fully crowded out and we return to the implementation described in Proposition 2. Either way, even when private insurance is not observable, it does not affect the solution.

7.2 Gender-neutral policy

In this scenario, individuals choose k and I, which are assumed not to be publicly observable. Define $\widehat{k}_{ij}$ and $\widehat{I}_{ij}$ as the solutions to the family problem, implicitly given by the first order conditions

$$-U'(y-k_{ij}+T_j^1-\pi\widehat{I}_{ij})+(1-\pi)U'(k_{ij})+\pi H'(k_{ij}+\gamma(a_j)-\tau_j+T_j^s+\widehat{I}_{ij})=0.$$

and

$$-U'(y-k_{ij}+T_j^1-\pi\widehat{I}_{ij})+H'(k_{ij}+\gamma(a_j)-\tau_j+T_j^s+\widehat{I}_{ij})=0. \tag{31}$$

These conditions depend on neither w nor on α so that we have $\widehat{k}_{ij}=\widehat{k}_{jj}$ and $\widehat{I}_{ij}=\widehat{I}_{jj}$.

If individuals can purchase insurance coverage, we can also show that the IC constraint violated in the first-best implementation is that of families with sons. First, as mentioned in the previous section, (30) implies that $T_b^1-\pi\hat{I}_b=T_g^1-\pi\hat{I}_g$. Furthermore, since $c_g^{s*}=c_b^{s*}$, we have

$$T_g^s+\gamma(a_g^*)-\tau_g^*+\widehat{I}_b=T_b^s+\gamma(a_b^*)-\tau_b^*+\widehat{I}_g.$$

This, together with $\widehat{k}_{bg}=\widehat{k}_{gg}$, implies that, in case of dependence, the parents of sons are better off when choosing the policy designed for families with daughters. To show that the sons are also better off when choosing the policy designed for daughters, we can proceed exactly as in the previous section.

The first-order conditions of the government problem (27) with private insurance are given in Appendix C. Comparing these expressions to their counterparts in the absence of insurance given in Appendix B shows that the trade-offs are exactly the same as before, so that the solution is not affected by private insurance. To be more precise, the equilibrium *allocation* remains the same but the transfers change. Indeed, a simple inspection of the first-order conditions in the two cases shows that we have $(i = g, b)$

$$T_i^{1N} = T_i^{1I} - \pi \widehat{I}_{ii} \tag{32}$$

$$T_i^{sN} = T_i^{sI} + \widehat{I}_{ii} \tag{33}$$

where the second superscripts N and I refer to the solution without and with private insurance, and where the $\widehat{I}_{ii}$ is endogenous and defined by (31). In words, $\widehat{I}_{ii}$ depends on T, which is adjusted to yield full insurance.

Consequently, private insurance provides the government with one extra degree of freedom. It can implement the same solution as without insurance and totally crowd out insurance. Alternatively, it can set lower levels of T and let individuals supplement by private insurance. Combining (32) and (33), we obtain that it is sufficient to set the transfers so that for all $i = g, b$

$$T_i^{1N} + \pi T_i^{sN} = T_i^{1I} + \pi T_i^{sI}.$$

In words, the net transfer (benefit minus premium) to each type of family must remain the same as when there is no private insurance. However, the level of social insurance (premium and benefit) can be lower, and the difference is made up by private insurance. Consequently, the two issues addressed by social insurance absent private insurance can now be addressed by separate instruments. Insurance against the dependence risk can be provided privately while social insurance concentrates on redistribution across families.

8 Conclusion

We study the optimal long-term care (LTC) policy when informal care can be provided by children in exchange for monetary transfers from their elderly parents. We consider a bargaining model with single-child families. Daughters have lower labor market wages than sons, but their bargaining weights may be either lower or higher. They always provide more informal care and experience lower welfare unless their bargaining weights are sufficiently large.

The laissez-faire solution raises two key issues. First, despite receiving informal care, parents are typically not fully insured against dependency risk. Second, society may object to the gender inequality implied by this outcome and incorporate a redistributive dimension into LTC policy design. In other words, LTC policies can be used to reduce (or even eliminate) these inequalities.

To assess the solutions, we consider a simple utilitarian welfare function, where all individuals are weighted equally regardless of their position in the family (parent or child) or their gender. This introduces a paternalistic dimension, as social welfare weights generally differ from intra-family bargaining weights.

We demonstrate that the first-best outcome involves redistribution from families with sons to families with daughters. This can be implemented through a gender-specific schedule of public LTC benefits and state-contingent transfers to adult children. All young parents pay the same "premium," but LTC benefits vary based on the gender of their child. If the policy is restricted to be gender-neutral, we find that the informal care provided by daughters should be distorted to enhance redistribution from families with sons to families with daughters. In contrast, the care provided by sons remains unchanged at the laissez-faire level. Transfers within families should be distorted in both types of families. Specifically, while all individuals are fully insured (achieving full redistribution across states of nature), marginal utilities are not equalized across generations.

Overall, our results cast serious doubt on the desirability of gender-neutrality requirements. We show that such policies always disadvantage families with daughters compared to policies that allow for gender-based differentiation. While gender neutrality is typically intended to enhance women's welfare, we demonstrate that it may backfire and harm women instead (and in our model, it always does). Furthermore, such policies lead to distortions in the informal care provided by children, which are otherwise optimal in the laissez faire.

The impact of the proposed policies, both with and without gender neutrality, is more complex. In particular, the effect on family utility is ambiguous due to a conflict between insurance and paternalism. The impact on individual utilities (for parents, sons, and daughters) is even more intricate, and no general results can be obtained without further restrictions.

Numerical examples allow us to compare the welfare implications of each policy and illustrate potential outcomes. In our specification, tagging leads to the highest welfare for families with daughters, while the gender-neutral policy enhances welfare for families with sons, regardless of bargaining weights. If children have a lower bargaining weight than their parents, both policies improve children's welfare. However, when daughters have a higher bargaining weight than their parents, the gender-neutral policy makes daughters worse off—even compared to the laissez-faire scenario. Though derived from a specific example, this possibility casts a particularly negative light on gender neutrality.

Finally, we show that fair private insurance does not alter the solutions for either tagging or gender-neutral policies, regardless of whether it is publicly observable. This adds an extra degree of flexibility to the design of social insurance, allowing it to focus on redistribution while leaving dependency risk coverage to private markets.

Our results are derived in a model where care is fully exchange-based. In reality, informal care is likely to be motivated by several forces. Children may care for altruistic reasons, because they value their parents' well-being; they may also respond to social norms or family expectations; and they may provide care in exchange for monetary transfers, gifts, or bequests. These motives are not mutually exclusive. Our paper focuses on the exchange margin because it is directly connected to the design of LTC policy: public intervention affects both the provision of informal care and the monetary transfers that accompany it. Altruism would reduce the extent to which care needs to be compensated by transfers, but it would not remove the opportunity-cost channel or the relevance of gender-specific family exchange. The exchange-based formulation should be read as isolating one channel through which informal care is provided, not as denying the coexistence of altruism, social norms, and strategic transfers within families.

Our analysis has several limitations. First, the implementation assumes observability of care and monetary transfers. Relaxing this assumption would lead to a richer second-best problem with moral hazard in care provision, which we leave for future research.

We also focus on LTC policies and ignore labor-market policies aimed at reducing or eliminating the pay gap. However, labor-market policy and LTC policy address different margins. Eliminating the gender-wage gap would remove the opportunity-cost channel through which daughters provide more informal care in our baseline model. If, however, social norms or bargaining positions remain gender-specific, equal wages would not by itself eliminate all gender differences in family caregiving. Our analysis should therefore be read as conditional on the labor-market environment faced by potential caregivers, not as an argument against policies aimed at reducing wage inequality. Furthermore, a complete elimination of wage gaps does not appear to be a realistic objective of labor market policies. In this context, our analysis remains relevant.

Finally, we model the cost of informal care as a time cost, measured by forgone labor income. This abstracts from possible health costs borne by caregivers. Empirical studies often find that intensive caregiving is associated with worse physical or mental health. One could introduce in our model a direct cost associated with care, possibly gender-specific, in the utility of the children.[23] The efficient care condition would then equate the marginal benefit of care to the full marginal cost, including both forgone earnings and the marginal health cost. Since daughters provide more care in our baseline model, adding health costs would create an additional gender gap among children and would tend to strengthen the case for policies that reduce the burden of informal caregiving. We leave a full treatment of caregiver health for future research.

[23]Such costs could be incorporated by writing the utility of a child with a dependent parent as $u(\tau_i + w_i(1 - a_i)) - \psi_i(a_i)$, where ψ_i is increasing and convex.

References

[1] **Arber S. and J. Ginn** (1990), "The meaning of informal care: gender and the contribution of elderly people," *Ageing and Society*, 10 (4), 429–454.

[2] **Arrondel L. and A. Masson** (2006), "Altruism, exchange or indirect reciprocity: what do the data on family transfers show?" in Kolm S-C. and J. Mercier Ythier (Eds.), Handbook of the Economics of Giving, Altruism and Reciprocity, Elsevier B.V., Amsterdam, Volume 2, pages 971–1053.

[3] **Barigozzi, F., H. Cremer and K. Roeder** (2020), "Caregivers in the Family: Daughters, Sons and Social Norms," *European Economic Review*, 130, Article 103589.

[4] **Barczyk, D., and M. Kredler** (2018), "Evaluating Long-Term-Care Policy Options, Taking the Family Seriously," *Review of Economic Studies*, 85, 766-809.

[5] **Barczyk, D., and M. Kredler** (2019), "Long-Term Care across Europe and the U.S.: The Role of Informal and Formal Care," *Fiscal Studies*, 40 (3), 329–373.

[6] **Bertrand M.** (2020), "Gender in the 21st Century," *American Economic Association Papers and Proceedings* 110(5), 1–24.

[7] **Bernheim, B., A. Shleifer and L. Summers** (1985), "The strategic bequest motive," *Journal of Political Economy*, 93, 1045–1076.

[8] **Blau, F.D., and L.M. Kahn** (2017), "The gender wage gap: extent, trends, and explanations," *Journal of Economic Literature*, 55 (3), 789–865.

[9] **Bolin K., B. Lindgren and P. Lundborg** (2008), "Informal and formal care among single-living elderly in Europe," *Health Economics*, 17 (3), 393–409.

[10] **Bonsang, E. and J. Schoenmaekers** (2015) "Long-term care insurance and the family: Does the availability of potential caregivers substitute for long-term care insurance?" in Edited by: Börsch-Supan A., T. Kneip , H. Litwin, M. Myck and

G. Weber (Eds.): Ageing in Europe-Supporting policies for an inclusive society, Degruyter, pages 369–379.

[11] **Bott, N.T., C.C. Sheckter and A.S. Milstein** (2017), "Dementia care, women's health, and gender equity: the value of well-timed caregiver support," *JAMA Neurol.* Published online May 08, doi:10.1001/jamaneurol.2017.0403.

[12] **Bracke P., W. Christiaens and N. Wauterickx** (2008), "The pivotal role of women in informal care," *Journal of Family Issues*, 29 (10), 1348–1378.

[13] **Browining M., P-A. Chiappori and A. Lewbel** (2013), "Estimating Consumption Economies of Scale, Adult Equivalence Scales, and Household Bargaining Power," *Review of Economic Studies*, 80, 1267–1303.

[14] **Byrne D., M.S. Goeree, B. Hiedemann and S. Stern** (2009), "Formal Home Health Care, Informal Care, and Family Decision Making," *International Economic Review*, 50, 1205–1242.

[15] **Canta, C. and H. Cremer** (2019), "Long-term care policy with nonlinear strategic bequests," *European Economic Review*, 119, 548-566.

[16] **Canta, C. and P. Pestieau** (2013), "Long-term care insurance and family norms", *The B. E. Journal of Economic Analysis & Policy (Advances)*, 14, 401–428.

[17] **Couprie, H.** (2007), "Time Allocation Within the Family: Welfare Implications of Life in a Couple," *The Economic Journal*, 117, 287–305.

[18] **Cremer, H. and P. Pestieau** (1993), "Education for attention: A Nash bargaining solution to the bequest-as-exchange model," *Public Finance/Finances Publiques*, 48, 85–97.

[19] **Cremer, H., P. Pestieau, and G. Ponthière** (2012), "The economics of long-term care: a survey," *Nordic Economic Policy Review*, 2, 107–148.

[20] **Dentinger, E. and M. Clarkberg** (2002). "Informal caregiving and retirement timing among men and women: Gender and caregiving relationships in late midlife," *Journal of Family Issues*, 23(7), 857–879.

[21] **Di Novi C., R. Jacobs and M. Migheli** (2015), "The Quality of Life of Female Informal Caregivers: From Scandinavia to the Mediterranean Sea," *European Journal of Population,* 31, 309–333.

[22] **European Institute for Gender Equality** (2025), "Gender Equality Index 2025,"available at https://eige.europa.eu/gender-equality-index/2025/country

[23] **Eurostat** (2025), "Gender pay gap statistics,"available at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Gender_pay_gap_statistics

[24] **Finkelstein A, E. F. P. Luttmer, M. J. Notowidigdo** (2013), "What Good is Wealth Without Health? The Effect of Health on the Marginal Utility of Consumption,"*Journal of the European Economic Association*, 11, 221–258.

[25] **Finkelstein, A., J. Poterba and C. Rothschild** (2009), "Redistribution by insurance market regulation: Analyzing a ban on gender-based retirement annuities," *Journal of Financial Economics* 91, 38–58.

[26] **Gu, R., C. Peng and W. Zhang** (2021), "The Gender Gap in Household Bargaining Power: A Portfolio-Choice Approach,"*Cambridge Working Papers in Economics*, 2130, Faculty of Economics, University of Cambridge.

[27] **Haberkern, K. and M. Szydlik** (2010), "State care provision, societal opinion and children's care of older parents in 11 European countries,"*Ageing and Society*, *30*, 299–323.

[28] **Klimaviciute, J., S. Perelman, P. Pestieau and J. Schoenmaeckers** (2017), "Caring for dependent parents: altruism, exchange or family norm?" *Journal of Population Economics,* 30, 835–873.

[29] **Klimaviciute, J. and P. Pestieau** (2023), "The economics of long-term care. An overview,"*Journal of Economic Surveys*, 37, 1192–1213.

[30] **Kotlikoff, L. and A. Spivak** (1981), "The Family as an Incomplete Annuities Market," *Journal of Political Economy*, 89, 372–91.

[31] **Norton, E.C.** (2016), "Health and long-term care,"in J. Piggott and A. Woodland (Eds.): Handbook of the Economics of Population Aging, Edition 1, Volume 1, Chapter 16, pages 951-989, Elsevier.

[32] **Norton, E.C., H. Nicholas and S. Huang** (2013), "Informal Care and Inter-vivos Transfers: Results from the National Longitudinal Survey of Mature Women," *BEJEAP*, 14, 377–401.

[33] **Norton, E. C. and C. H. Van Houtven** (2006), "Inter-vivos Transfers and Exchange," *Southern Economic Journal*, 73, 157–72.

[34] **Pezzin, L. E. and S. B. Steinberg** (1999), "Intergenerational household formation, female labor supply and informal caregiving," *Journal of Human Resources*, 34(3), 475–803.

[35] **Schmid, T., M. Brandt, and K. Haberkern** (2012), "Gendered support to older parents: do welfare states matter?", *European Journal of Ageing*, 9, 39–50.

[36] **Schmitz H. and Westphal M.** (2017), "Informal care and long-term labor market outcomes," *Journal of Health Economics*, 56, 1–18.

[37] **Tolkacheva, N., M.B. van Groenou and T. van Tilburg** (2014), "Sibling similarities and sharing the care of older parents," *Journal of Family Issues*, *35* (3), 312–330.

[38] **Wilson, M. R., van Houtven, C. H., Stearns, S. C. and Clipp, E. C.** (2007), "Depression and missed work among informal caregivers of older individuals with dementia," *Journal of Family and Economic Issues*, 28(4), 684–698.

Tables

Case 1	$\alpha_g = 0.3$ and $\alpha_b = 0.4$		
	Laissez faire	Gender neutrality	Tagging (FB)
Social welfare	23.078	23.103	**23.104**
Family b welfare	**12.342**	12.331	12.322
Family g welfare	**13.105**	13.082	13.092
Sons' utility	7.662	**7.705**	7.701
Parents of sons' utility	**15.461**	15.415	15.402
Daughters' utility	7.544	7.697	**7.701**
Parents of daughters' utility	**15.489**	15.390	15.402
Case 2	$\alpha_g = 0.4$ and $\alpha_b = 0.6$		
	Laissez faire	Gender neutrality	Tagging (FB)
Social welfare	23.092	23.103	**23.104**
Family b welfare	**10.799**	10.796	10.782
Family g welfare	12.315	12.307	**12.322**
Sons' utility	**7.751**	7.713	7.701
Parents of sons' utility	15.372	**15.419**	15.402
Daughters' utility	7.605	7.689	**7.701**
Parents of daughters' utility	**15.456**	15.386	15.402
Case 3	$\alpha_g = 0.6$ and $\alpha_b = 0.8$		
	Laissez faire	Gender neutrality	Tagging (FB)
Social welfare	23.035	23.103	**23.104**
Family b welfare	**9.299**	9.260	9.241
Family g welfare	10.763	10.764	**10.782**
Sons' utility	**7.828**	7.722	7.701
Parents of sons' utility	15.182	**15.413**	15.402
Daughters' utility	7.695	7.680	**7.701**
Parents of daughters' utility	15.365	15.392	**15.402**

Table 1: *Numerical illustrations:* $U(c) = u(c) = -c^{-0.2}/(0.2)+10$, $H(c) = U(c-80)+10$, $\gamma(a) = 1000^{0.7}a^{0.3}$, $w_g = 40$, $w_b = 50$, $y = 100$, *and* π *=50%.*

Appendix

A Implementation of the first best with linear instruments

The first-best allocation can be implemented by a set of gender-specific linear taxes on intrafamily transfers τ_i at rate t_i and on children's informal care a_i at rate θ_i. In addition, we need state and gender specific transfers to dependent parents, T_i^s, transfers to children of non-dependent parents (the ones that do not get any family transfers), L_i^h, and transfers to young parents, T_i^1. With these instruments the family problem becomes

$$\begin{aligned}\max_{k_i,a_i,\tau_i} W_i &= (1-\alpha_i)V_i^P + \alpha_i V_i^C \\ &= (1-\alpha_i)[U(y-k_i+T_i^1) + (1-\pi)\,U\,(k_i) + \pi H\,(k_i+\gamma(a_i)-\theta_i a_i - \tau_i(1+t_i)) + T_i^s] \\ &+ \alpha_i[\pi u(\tau_i + w_i(1-a_i)) + (1-\pi)u(w_i + L_i^h)].\end{aligned}$$

The first-order conditions of the family problem, under this system of taxes and transfers are

$$(1-\alpha_i)H'(k_i+\gamma(a_i)-\theta_i a_i-\tau_i(1+t_i)+T_i^s)(\gamma'(a_i)-\theta_i) = \alpha_i u'(\tau_i+w_i(1-a_i))w_i, \quad \text{(A1)}$$

$$(1-\alpha_i)(1+t_i)H'(k_i+\gamma(a_i)-\theta_i a_i-(1+t_i)\tau_i+T_i^s) = \alpha_i u'(\tau_i+w_i(1-a_i)), \quad \text{(A2)}$$

$$-U'(y-k_i+T_i^1)+(1-\pi)U'(k_i)+\pi H'(k_i+\gamma(a_i)-\theta_i a_i-\tau_i(1+t_i)+T_i^s) = 0.$$

In the first best we must have $w_i = \gamma(a_i)$, and $H'(c_i^s) = u'(d_i^s)$. Using these equations we can solve (A1) and (A2) to obtain

$$t_i = \frac{2\alpha-1}{1-\alpha} \quad \text{and} \quad \theta_i/w_i = \frac{1-2\alpha}{1-\alpha},$$

which corresponds to the negative of the marginal subsidies obtained in the nonlinear case.

Furthermore, in order to implement the first-best consumptions, one needs to set T_i^s such that

$$T_i^s = c_i^{s*} - c_i^{h*} - \gamma(a_i^*) + \tau_i^*(1+t_i) + \theta a_i^*, \tag{A3}$$

and

$$T_i^1 = c_i^{1*} + c_i^{h*} - y, \tag{A4}$$

Where τ_i^* is the solution to (A2). Then, the solution of (14) is $k_i = c_i^{h*}$.

Finally, L_i^h should be set so that $d_i^s = d_i^h = w_i + L_i^h = w_i(1-a_i^*) + \tau_i^*$, which implies that

$$L_i^h = \tau_i^* - w_i a_i^*. \tag{A5}$$

The budget constraint is

$$\sum_{i=g,b} [T_i^1 + \pi(T_i^s - t_i\tau_i^* - \theta_i a_i) + (1-\pi)L_i^h] \leq 0$$

Using (A3), (A4), and (A5), this condition rewrites

$$\sum_{i=g,b} [c_i^1 + \pi c_i^s + (1-\pi)c_i^h + d_i^s] \leq \sum_{i=g,b} [y + \pi\gamma(a_i^*) + w_i - \pi w_i a_i^*]$$

which is satisfied by first-best consumptions and informal care levels.

B First-order conditions of problem 27

Differentiating the Lagrangian expression with respect to the instruments yields

$$\frac{\partial \mathcal{L}}{\partial T_b^1} = \frac{\partial \widehat{V}_{bb}^P}{\partial T_b^1} + \frac{\partial \widehat{V}_{bb}^C}{\partial T_b^1} - \mu + \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bb}^P}{\partial T_b^1} + \alpha_b \frac{\partial \widehat{V}_{b}^C}{\partial T_b^1} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial T_g^1} = \frac{\partial \widehat{V}_{gg}^P}{\partial T_g^1} + \frac{\partial \widehat{V}_{gg}^C}{\partial T_g^1} - \mu - \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bg}^P}{\partial T_g^1} + \alpha_b \frac{\partial \widehat{V}_{bg}^C}{\partial T_g^1} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial T_b^s} = \frac{\partial \widehat{V}_{bb}^P}{\partial T_b^s} + \frac{\partial \widehat{V}_{bb}^C}{\partial T_b^s} - \pi\mu + \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bb}^P}{\partial T_b^s} + \alpha_b \frac{\partial \widehat{V}_{bb}^C}{\partial T_b^s} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial T_g^s} = \frac{\partial \widehat{V}_{gg}^P}{\partial T_g^s} + \frac{\partial \widehat{V}_{gg}^C}{\partial T_g^s} - \pi\mu - \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bg}^P}{\partial T_g^s} + \alpha_b \frac{\partial \widehat{V}_{bg}^C}{\partial T_g^s} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial L_b^h} = \frac{\partial \widehat{V}_{bb}^P}{\partial L_b^h} + \frac{\partial \widehat{V}_{bb}^C}{\partial L_b^h} - \mu(1-\pi) + \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bb}^P}{\partial L_b^h} + \alpha_b \frac{\partial \widehat{V}_{bb}^C}{\partial L_b^h} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial L_g^h} = \frac{\partial \widehat{V}_{gg}^P}{\partial L_g^h} + \frac{\partial \widehat{V}_{gg}^C}{\partial L_g^h} - \mu(1-\pi) - \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bg}^P}{\partial L_g^h} + \alpha_b \frac{\partial \widehat{V}_{bg}^C}{\partial L_g^h} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial \tau_b} = \frac{\partial \widehat{V}_{bb}^P}{\partial \tau_b} + \frac{\partial \widehat{V}_{bb}^C}{\partial \tau_b} + \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bb}^P}{\partial \tau_b} + \alpha_b \frac{\partial \widehat{V}_{bb}^C}{\partial \tau_b} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial \tau_g} = \frac{\partial \widehat{V}_{gg}^P}{\partial \tau_g} + \frac{\partial \widehat{V}_{gg}^C}{\partial \tau_g} - \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bg}^P}{\partial \tau_g} + \alpha_b \frac{\partial \widehat{V}_{bg}^C}{\partial \tau_g} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial a_b} = \frac{\partial \widehat{V}_{bb}^P}{\partial a_b} + \frac{\partial \widehat{V}_{bb}^C}{\partial a_b} + \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bb}^P}{\partial a_b} + \alpha_b \frac{\partial \widehat{V}_{bb}^C}{\partial a_b} \right] = 0,$$
$$\frac{\partial \mathcal{L}}{\partial a_g} = \frac{\partial \widehat{V}_{gg}^P}{\partial a_g} + \frac{\partial \widehat{V}_{gg}^C}{\partial a_g} - \lambda \left[(1-\alpha_b)\frac{\partial \widehat{V}_{bg}^P}{\partial a_g} + \alpha_b \frac{\partial \widehat{V}_{bg}^C}{\partial a_g} \right] = 0,$$

Using equation (22) these conditions can rearranged as follows

$$\frac{\partial \mathcal{L}}{\partial T_b^1} = (1+\lambda-\lambda\alpha_b)U'(y-\widehat{k}_{bb}+T_b^1) - \mu = 0, \tag{A6}$$
$$\frac{\partial \mathcal{L}}{\partial T_g^1} = U'(y-\widehat{k}_{gg}+T_g^1) - \mu - \lambda(1-\alpha_b)U'(y-\widehat{k}_{bg}+T_g^1) = 0, \tag{A7}$$

$$\frac{\partial \mathcal{L}}{\partial T_b^s} = (1+\lambda-\lambda\alpha_b)H'\left(\widehat{k}_{bb}+\gamma(a_b)-\tau_b+T_b^s\right) - \mu = 0, \tag{A8}$$
$$\frac{\partial \mathcal{L}}{\partial T_g^s} = H'\left(\widehat{k}_{gg}+\gamma(a_g)-\tau_g+T_g^s\right) - \mu - \lambda(1-\alpha_b)H'\left(\widehat{k}_{bg}+\gamma(a_g)-\tau_g+T_g^s\right) = 0, \tag{A9}$$

$$\frac{\partial \mathcal{L}}{\partial L_b^h} = (1+\lambda\alpha_b)u'(w_b - L_b^h) - \mu = 0, \tag{A10}$$
$$\frac{\partial \mathcal{L}}{\partial L_g^h} = u'(w_g - L_g^h) - \mu - \lambda\alpha_b u'(w_b - L_g^h) = 0, \tag{A11}$$

$$\frac{\partial \mathcal{L}}{\partial \tau_b} = -(1+\lambda-\lambda\alpha_b)H'\left(\widehat{k}_{bb} + \gamma(a_b) - \tau_b + T_b^s\right) + (1+\lambda\alpha_b)u'(\tau_b + w_b(1-a_b)) = 0, \tag{A12}$$

$$\frac{\partial \mathcal{L}}{\partial \tau_g} = -H'\left(\widehat{k}_{gg} + \gamma(a_g) - \tau_g + T_g^s\right) + u'(\tau_g + w_g(1-a_g))$$
$$- \lambda\left[-(1-\alpha_b)H'\left(\widehat{k}_{gb} + \gamma(a_g) - \tau_g + T_g^s\right) + \alpha_b u'(\tau_g + w_b(1-a_g))\right] = 0, \tag{A13}$$

$$\frac{\partial \mathcal{L}}{\partial a_b} = (1+\lambda-\lambda\alpha_b)H'\left(\widehat{k}_{bb} + \gamma(a_b) - \tau_b + T_b^s\right)\gamma'(a_b) - (1+\lambda\alpha_b)u'(\tau_b + w_b(1-a_b))w_b = 0, \tag{A14}$$

$$\frac{\partial \mathcal{L}}{\partial a_g} = H'\left(\widehat{k}_{gg} + \gamma(a_g) - \tau_g + T_g^s\right)\gamma'(a_g) - u'(\tau_g + w_g(1-a_g))w_g$$
$$- \lambda\left[(1-\alpha_b)H'\left(\widehat{k}_{gb} + \gamma(a_g) - \tau_g + T_g^s\right)\gamma'(a_g) - \alpha_b u'(\tau_g + w_b(1-a_g))w_b\right] = 0. \tag{A15}$$

C First-order conditions of problem (27) with private insurance

We omit the conditions with respect to the transfers L since they continue to be given by (A10) and (A11)). The other conditions are given by

$$\frac{\partial \mathcal{L}}{\partial T_b^1} = (1+\lambda-\lambda\alpha_b)U'(y - \widehat{k}_{bb} + T_b^1 - \pi\widehat{I}_{bb}) - \mu = 0,$$
$$\frac{\partial \mathcal{L}}{\partial T_g^1} = U'(y - \widehat{k}_{gg} + T_g^1 - \pi\widehat{I}_{gg}) - \mu - \lambda(1-\alpha_b)U'(y - \widehat{k}_{bg} + T_g^1 - \pi\widehat{I}_{bg}) = 0,$$

$$\frac{\partial \mathcal{L}}{\partial T_b^s} = (1+\lambda-\lambda\alpha_b)H'\left(\widehat{k}_{bb} + \gamma(a_b) - \tau_b + T_b^s + \widehat{I}_{bb}\right) - \mu = 0,$$
$$\frac{\partial \mathcal{L}}{\partial T_g^s} = H'\left(\widehat{k}_{gg} + \gamma(a_g) - \tau_g + T_g^s + \widehat{I}_{gg}\right) - \mu - \lambda(1-\alpha_b)H'\left(\widehat{k}_{bg} + \gamma(a_g) - \tau_g + T_g^s + \widehat{I}_{bg}\right) = 0,$$

$$\frac{\partial \mathcal{L}}{\partial \tau_b} = -(1+\lambda-\lambda\alpha_b)H'\left(\widehat{k}_{bb} + \gamma(a_b) - \tau_b + T_b^s + \widehat{I}_{bb}\right) + (1+\lambda\alpha_b)u'(\tau_b + w_b(1-a_b)) = 0,$$
$$\frac{\partial \mathcal{L}}{\partial \tau_g} = -H'\left(\widehat{k}_{gg} + \gamma(a_g) - \tau_g + T_g^s + \widehat{I}_{gg}\right) + u'(\tau_g + w_g(1-a_g))$$
$$- \lambda\left[-(1-\alpha_b)H'\left(\widehat{k}_{bg} + \gamma(a_g) - \tau_g + T_g^s + \widehat{I}_{bg}\right) + \alpha_b u'(\tau_g + w_b(1-a_g))\right] = 0,$$

$$\frac{\partial \mathcal{L}}{\partial a_b} = (1+\lambda-\lambda\alpha_b)H'\left(\widehat{k}_{bb} + \gamma(a_b) - \tau_b + T_b^s + \widehat{I}_{bb}\right)\gamma'(a_b) - (1+\lambda\alpha_b)u'(\tau_b + w_b(1-a_b))w_b = 0,$$

$$\begin{aligned}\frac{\partial \mathcal{L}}{\partial a_g} &= H'\left(\widehat{k}_{gg} + \gamma(a_g) - \tau_g + T_g^s + \widehat{I}_{gg}\right)\gamma'(a_g) - u'(\tau_g + w_g(1-a_g))w_g \\ &- \lambda\left[(1-\alpha_b)H'\left(\widehat{k}_{bg} + \gamma(a_g) - \tau_g + T_g^s + \widehat{I}_{bg}\right)\gamma'(a_g) - \alpha_b u'(\tau_g + w_b(1-a_g))w_b\right] = 0.\end{aligned}$$

D Numerical example, case $\alpha_g > \alpha_b$

Case 1	$\alpha_g = 0.4$ and $\alpha_b = 0.3$		
	Laissez faire	Gender neutrality	Tagging (FB)
Social welfare	23.078	23.1034	**23.1035**
Family b welfare	**13.126**	13.099	13.092
Family g welfare	**12.3154**	12.3157	12.322
Sons' utility	7.601	**7.703**	7.701
Parents of sons' utility	**15.494**	15.411	15.402
Daughters' utility	7.605	7.699	**7.701**
Parents of daughters' utility	**15.456**	15.393	15.402
Case 2	$\alpha_g = 0.6$ and $\alpha_b = 0.4$		
	Laissez faire	Gender neutrality	Tagging (FB)
Social welfare	23.092	23.103	**23.104**
Family b welfare	**12.342**	12.331	12.322
Family g welfare	10.763	10.774	**10.782**
Sons' utility	7.662	**7.705**	7.701
Parents of sons' utility	**15.461**	15.415	15.402
Daughters' utility	7.695	7.697	**7.701**
Parents of daughters' utility	15.365	15.390	**15.402**
Case 3	$\alpha_g = 0.8$ and $\alpha_b = 0.6$		
	Laissez faire	Gender neutrality	Tagging (FB)
Social welfare	23.034	23.103	**23.104**
Family b welfare	**10.799**	10.796	10.782
Family g welfare	**9.253**	9.228	9.241
Sons' utility	**7.751**	7.713	7.701
Parents of sons' utility	15.372	**15.419**	15.402
Daughters' utility	**7.772**	7.689	7.701
Parents of daughters' utility	15.174	15.386	**15.402**

Table 2: *Numerical illustrations:* $U(c) = u(c) = -c^{-0.2}/(0.2)+10$, $H(c) = U(c-80)+10$, $\gamma(a) = 1000^{0.7}a^{0.3}$, $w_g = 40$, $w_b = 50$, $y = 100$, *and* π =*50%.*

E Numerical examples, details

Weight daughter	$\alpha_g = 0.3$	$\alpha_g = 0.4$	$\alpha_g = 0.6$	$\alpha_g = 0.4$	$\alpha_g = 0.6$	$\alpha_g = 0.8$
Weight son	$\alpha_b = 0.4$	$\alpha_b = 0.6$	$\alpha_b = 0.8$	$\alpha_b = 0.3$	$\alpha_b = 0.4$	$\alpha_b = 0.6$
			Laissez Faire			
a_g	0.921	0.921	0.921	0.921	0.921	0.921
a_b	0.670	0.670	0.670	0.670	0.670	0.670
τ_g	27.50	36.16	54.87	36.19	54.88	80.12
τ_b	23.58	42.57	68.11	14.76	23.58	42.57
c_g^1	53.24	51.55	46.57	51.55	46.57	36.48
c_b^1	51.84	46.92	36.86	53.51	51.84	46.92
c_g^h	46.76	48.45	56.43	48.45	53.43	63.52
c_b^h	48.16	53.08	63.14	46.49	48.16	53.08
c_g^s	142.09	135.12	121.39	135.12	121.39	106.23
c_b^s	136.21	122.14	106.65	143.36	136.21	122.14
d_g^h	40.00	40.00	40.0	40.00	40.00	40.000
d_b^h	50.00	50.00	50.00	50.00	50.00	50.00
d_g^s	30.65	39.31	58.03	39.32	58.03	83.27
d_b^s	40.09	59.08	84.62	31.27	40.09	59.08

Table 3: *Numerical illustrations of the laissez faire:* $U(c) = u(c) = -c^{-0.2}/(0.2) + 10$, $H(c) = U(c-80) + 10$, $\gamma(a) = 1000^{0.7}a^{0.3}$, $w_g = 30$, $w_b = 50$, $y = 100$, *and* π =*50%.*

First best	
a_g	0.921
a_b	0.670
$c_g^1 = c_b^1 = c_g^h = c_b^h$	48.68
$c_g^s = c_b^s$	128.68
$d_g = d_b$	48.68

Table 4: *Numerical illustrations of the first best:* $U(c) = u(c) = -c^{-0.2}/(0.2) + 10$, $H(c) = U(c-80) + 10$, $\gamma(a) = 1000^{0.7}a^{0.3}$, $w_g = 30$, $w_b = 50$, $y = 100$, *and* π *=50%.*

Weight daughter	$\alpha_g = 0.3$	$\alpha_g = 0.4$	$\alpha_g = 0.6$	$\alpha_g = 0.4$	$\alpha_g = 0.6$	$\alpha_g = 0.8$
Weight son	$\alpha_b = 0.4$	$\alpha_b = 0.6$	$\alpha_b = 0.8$	$\alpha_b = 0.3$	$\alpha_b = 0.4$	$\alpha_b = 0.6$
	Gender-Neutral Policy					
a_g	0.925	0.932	0.940	0.923	0.925	0.932
a_b	0.670	0.670	0.670	0.670	0.670	0.670
τ_g	45.23	44.65	44.06	45.39	45.23	44.65
τ_b	32.61	33.47	34.38	32.37	32.61	33.47
T_g^1	-1.31	-0.90	-1.53	-1.69	-1.31	-0.90
T_b^1	-3.98	-4.39	-3.75	-3.60	-3.98	-4.39
T_g^s	2.25	1.39	0.47	2.49	2.25	1.39
T_b^s	0.98	1.84	2.76	0.74	0.98	1.84
L_g^h	8.23	7.37	6.45	8.47	8.23	7.37
L_b^h	-0.88	-0.02	0.90	-1.12	-0.88	-0.02
c_g^1	48.01	47.81	48.12	48.20	48.01	47.81
c_b^1	49.34	49.55	49.24	49.15	49.34	49.55
c_g^h	48.01	47.81	48.12	48.20	48.01	47.81
c_b^h	49.34	49.55	49.24	49.15	49.34	49.55
c_g^s	128.04	127.81	128.12	128.20	128.01	127.81
c_b^s	129.34	129.55	129.24	129.15	129.34	129.55
d_g^h	48.23	47.97	46.45	48.47	48.23	47.37
d_b^h	49.12	49.99	50.90	48.88	49.12	49.99
d_g^s	48.23	47.37	46.45	48.47	48.23	47.37
d_b^s	49.12	49.99	50.90	48.88	49.12	49.99

Table 5: *Numerical illustrations of the second-best policy:* $U(c) = u(c) = -c^{-0.2}/(0.2) + 10$, $H(c) = U(c-80)+10$, $\gamma(a) = 1000^{0.7}a^{0.3}$, $w_g = 30$, $w_b = 50$, $y = 100$, *and* π *=50%.*