J Popul Econ (2017) 30:805–834
DOI 10.1007/s00148-017-0639-y

ORIGINAL PAPER

Self-enforcing family rules, marriage and the (non)neutrality of public intervention

Alessandro Cigno[1] · Mizuki Komura[2] · Annalisa Luporini[1]

Received: 30 June 2016 / Accepted: 15 February 2017 / Published online: 1 March 2017

Abstract We demonstrate that the notion of a family 'constitution' (self-enforcing, renegotiation-proof norm) requiring adults to provide attention for their elderly parents carries over from a world where identical individuals reproduce asexually, to one where individuals differentiated by sex and preferences marry, have children and bargain over the allocation of domestic resources. In this heterogenous world, couples are sorted by their preferences. If a couple's common preferences satisfy a certain condition, the couple have an interest in instilling those preferences into their children. Policies are generally nonneutral. In particular, wage redistribution may raise, and compulsory education will reduce, the share of the adult population that is governed by family constitutions, and thus the share of the elderly population who receive attention from their children.

Keywords Support of the elderly · Marriage · Matching · Family constitution · Preference transmission · Policy neutrality

JEL Classification D1 · I2 · I3 · J1

Responsible editor: Junsen Zhang

Invited paper to the European Society for Population Economics 30th Anniversary Conference, Berlin 2016.

✉ Alessandro Cigno
cigno@unifi.it

1 Department of Economics and Management, University of Florence, Florence, Italy

2 Faculty of Economics, Musashi University, Tokyo, Japan

1 Introduction

Sociological research and mere introspection suggest that individual decisions are constrained not only by the law of the land but also by unwritten, often unspoken rules. Applied economists are aware of these extra-legal constraints, and account for them in their estimates by introducing control variables such as religion or ethnicity. Theoretical economists, by contrast, tend to ignore them altogether. But there are exceptions. Cigno (1993) demonstrates that a family norm ordering adults to support their young children and elderly parents is self-enforcing (in the sense that it yields a subgame-perfect Cournot-Nash equilibrium) under fairly unrestrictive conditions. Caillaud and Cohen (2000) show that the same applies to society-level norms. Cigno (2006) further demonstrates that, again under fairly bland conditions, a family norm is renegotiation-proof (meaning that it is not in anyone's or any generation's interest to amend it). Such a norm may be regarded as the family-level equivalent of the political constitution that restricts a parliament's legislative powers (in particular, its power to pass legislation detrimental to future generations).[1]

Like standard microeconomic models, 'constitutional' ones assume rationality. In the former, however, individuals respond rationally to a given economic and legal environment. In the latter, by contrast, individuals respond rationally to a norm that is itself a collectively rational response to the environment. Constitutions bear similarities to, but are not to be confused with, relational contracts (see Bull (1987), MacLeod and Malcomson (1989), and Levin (2003)). The latter are in fact negotiated by the interested parties, and differ from legally enforceable contracts only in that they require mutual trust because they concern actions or outcomes that can be observed but not verified. The former, by contrast, come about at the instance of a person, couple or generation, and remain in place after their initiators are gone, simply because it is not in their successors' interest to disobey or amend them. Put more formally, relational contracts belong in repeated games where the players are always the same, while constitutions arise in repeated games where the players change at each round (see Smith (1992)). The basic family constitution model has been extended by Rosati (1996) to accommodate uncertainty, by Anderberg and Balestrino (2003) to include educational investment and by Chang and Zijun (2015) to explain bequest rules. Thus extended, the model appears to be consistent with the available data. For aggregate time-series evidence, see Cigno and Rosati (1992, 1996, 1997) and Cigno et al. (2003). For micro-econometric or cross-country evidence, see Cigno et al. (2006), Galasso et al. (2009), Gábos et al. (2009), Billari and Galasso (2014), Chiapa and Juarez (2016), Fenge and Scheubel (2017), and Klimaviciute et al. (2017). For an early survey, see Arrondel and Masson (2006).

A conceptual limitation of the family constitution models developed to this date is that they abstract from sex differentiation, sexual reproduction and marriage, and presume that children are identical to their parents. What if individuals divide into

[1] Self-enforceability and renegotiation-proofness are not needed at the political level, where making sure that a piece of legislation conforms with the country's constitution is a High Court's job, and constitutional amendments require either a qualified majority or confirmation by referendum.

men and women, and a woman will normally team-up with a man to have a child?[2] Whose family rules will apply then, his, hers or both? The problem does not arise in traditional societies where a party (usually the woman, but in some cases the man)[3] 'marries into' the other party's family, and becomes automatically subject to the rules governing the latter. It does arise, however, in modern societies where both parties retain (or do not retain, as the case may be) their links with their families of origin. A further problem is that the children's preferences may be different from their parents'. The present paper extends the existing framework to take account of these complications and addresses the question whether family constitutions exist (not necessarily for all families, and not necessarily the same for all of them) in a world where individuals differentiated by sex, and by their preferences, pair-off to reproduce themselves and bargain with their partners over the allocation of domestic resources. We demonstrate that people seek out and marry partners with the same preferences as themselves. We also demonstrate that family constitutions exist for some preference parameter configurations and not for others. If they do, the couple have an interest in transmitting their common preferences on to their children. We use this extended framework to address two important issues, namely the care of the elderly and the effectiveness of public intervention.

Material support of elderly parents by grown-up children is widespread in developing countries, but not in developed ones. What the elderly get from their grown-up children in developed countries is essentially personal services.[4] The reason is that, while in developing countries most adults have limited opportunities for accumulating assets (the most desirable asset, land, seldom comes on to the market) and social security tends to be patchy or inexistent, adults in developed countries can provide for their future consumption of market goods (including the services of professional helpers) by buying assets or compulsorily participating in the public pension system. There is a good, however, filial attention, that only one's own children can supply, and for which there is no perfect market substitute. The problem is how to get it. Most models of intra-family transfers assume that individuals may be altruistic towards their children ('descending altruism'), but not towards their parents. Under this assumption, if a parent wants her children's attention, she has to pay for it one way or the other.[5] Offering to pay cash for it would not be a good idea, however, because the children could form a cartel and thus extract the parent's entire surplus by making her an all-or-nothing offer.[6] Bernheim et al. (1985) argue that, as an alternative to paying cash, a parent could commit to bequeathing her entire fortune either to the child who gives her most attention or, if that attention falls below a specified

[2]Normally, because advances in medical science have made this unnecessary.

[3]For example, in Japan at least until the Meji revolution, and in India still today, if the bride's family has no male heirs, her parents may effectively adopt the groom.

[4]See, among many others, Crimmins and Ingegneri (1990), Cigno and Rosati (2000).

[5]Assuming ascending or bilateral altruism does not get rid of the problem entirely because, if the children are more than one, each of them will be tempted to free-ride on the other or others; see Cremer and Pestieau (1996), Chiappori and Weiss (2007, 2009), Pezzin et al. (2009), and Cremer and Roeder (2017).

[6]Indeed, the 'exchange' (money-for-services) hypothesis is generally rejected by the data; see, for example, Arrondel and Masson (2006), Cigno et al. (2006), and Klimaviciute et al. (2017).

minimum, to a third party. According to this argument, the parent could thus extract the children's entire surplus. Cigno (1991, Ch. 11) objects, however, that the children could counter the parent's strategy by drawing-up a perfectly legal contract committing only one of them to give the parent the minimum amount of attention required to inherit the lot, and to share the inheritance (minus a specified amount as compensation for the minimum attention given to the parent) equally with the others.[7] That would give the entire surplus back to the children. The problem goes away if a family constitution requiring adults to give attention to their parents is in place.

Regarding the effectiveness of public intervention, Bernheim and Bagwell (1988) show that, if everybody were altruistically linked to everyone else by blood or marriage, any public action, no matter whether distortionary or non-distortionary, would be neutralized by private reaction.[8] Does the same apply to a world where adults are not altruistic towards their parents, but will behave as if they were if a family constitution makes it in their interest to do so? We show that it does not. In particular, certain forms of intervention affect couples governed by family constitutions differently from the rest, and either raise or lower the share of the elderly who enjoy the attention of their grown-up children.

2 Assumptions

Individuals live three periods, labelled $p = 0, 1, 2$. A person is an infant in period 0, an adult in period 1 and old in period 2. Adults can work, marry[9] and have children; infants and the old cannot. In this and the next two sections, we will assume that everybody has the same preferences. Preference heterogeneity will be introduced in Section 5. People derive utility from their consumption of market goods in periods 0, 1 and 2, from parental attention in period 0 and from filial attention in period 2. Market goods (including the personal services of professional helpers) are not a perfect substitute for either parental or filial attention. Adults may be altruistic towards their children, but not towards their parents or spouses. This widely used assumption ('descending altruism') is somewhat extreme, but little of substance changes if we contemplate also altruism towards parents and spouses so long as it is not as strong as altruism towards children. Adults may thus donate their money or their time to their children, but not to their parents. If they do anything for the latter, it must be that it is in their own interest to do so. As we are primarily concerned with developed societies, we will assume that what the old want from their grown-up children is

[7] Other possible objections to Bernheim et al. (1985) are that (a) it may be difficult for a parent to commit to assigning the estate in the way described because testaments can be re-written at the last minute, and (b) certain legislations prescribe that at least a certain share of the estate has to go to the children. For alternative parental strategies, see Cremer and Pestieau (1996).

[8] As government policies appear to be nonneutral in practice, the authors take their result as a symptom that private actions affecting the wellbeing of others cannot be entirely explained by altruism. Indeed, Altonji et al. (1992) find that micro-data reject the altruism hypothesis.

[9] To simplify, we will not distinguish legally married from de-facto couples. For an analysis of the behavioural consequences of marriage in the legal sense, see Cigno (2012, 2014).

essentially attention (because, as we argued in the Introduction, they can buy market goods with their accumulated savings).

Unmarried individuals do not have children. If a person chooses to remain single, her or his lifetime utility is given by

$$U = c_0 + \phi \ln g + c_1 + \ln c_2, 0 < \phi < 1,$$

where c_p is this person's consumption of market goods in period $p = 0, 1, 2$, and g is the amount of parental attention he or she receives in period 0. Given that this person's decisions are taken in period 1, when c_0 and g are bygones, the budget constraints facing this individual are

$$c_1 + s = w$$

and

$$c_2 = sr,$$

where s is the amount she or he saves in period 1, w is her or his wage rate and r is the interest factor. Given that capitalized savings are this person's only source of period-2 consumption, s will be chosen strictly positive. The pay-off of remaining single is

$$R = \max_s (w - s + \ln sr) = w - 1 + \ln r.$$

If a couple marries, they have a daughter and a son. This is a simple way of ensuring the balance of the sexes. A more realistic assumption with the same effect would be to say that the adult population is large, and that the probability of a male birth is equal to the probability of a female birth, but that would complicate the analysis unnecessarily. As in a long series of contributions starting with Manser and Brown (1980), we posit that the allocation of domestic resources is Nash-bargained between the partners. The object of the bargaining is not only the destination of the couple's joint income but also the allocation of their time endowments. We will assume that couples are sorted by their outside option. Taken together with the assumption that the two have the same preferences, this implies that the two have the same w as in Lam (1988).[10]

Take the couple formed by a particular woman, f, and a particular man m. Let D denote this couple's daughter, and S this couple's son. When they decide to marry, the couple know their own, but not their children's wage rates. We assume that the latter is the only source of uncertainty in the model.[11] A child's wage rate will be high, w^H, with probability π_k, and low, w^L, with probability $1 - \pi_k$, where

$$\pi_k = \pi(z_k), \pi'(z_k) > 0, \pi''(z_k) < 0, \pi(0) = 0,$$

[10] According to Peters and Siow (2002), this gives altruistic parents an incentive to invest in their childen's education, not only because it will raise the latter's expected earnings but also because it will improve their marriage prospects. The incentive structure is more complicated in Cigno (2007), where the domestic division of labour is bargained by the spouses, and it is thus worthwhile to invest in a child's education only if that will make her or him the main earner in the prospective couple.

[11] Following Ben-Porath (1980), we will further assume that asymmetric information is not a major problem where closely related individuals are concerned, and that it may thus be disregarded in the present context.

and z_k is the amount of education that $k = D, S$ in period 0 of her or his life (period 1 of k's parents' life). Assuming for simplicity that consumption during infancy is a constant, and normalizing this constant to zero, the expected lifetime utility of $i = f, m$ is given by

$$\begin{aligned} EU_i &= \phi \ln g_i + c_{1i} + \ln c_{2i} \\ &\quad + \max\left(0, \delta\left\{\pi(z)\left(\ln \beta t_D^H + \ln \beta t_S^H\right) + [1-\pi(z)]\left(\ln \beta t_D^L + \ln \beta t_S^L\right)\right\}\right) \\ &\quad + \alpha\left(EW_D + EW_S\right), 0 \le \alpha \le 1, 0 < \delta \le 1, \ (\beta, \phi) > 0, \end{aligned}$$

where t_k^J is the amount of attention that i will receive from k in old age if k's wage rate turns out to be w^J, $J = H, L$, and β is a scaling factor designed to make $\ln \beta t_k^J$ positive for t_k^H sufficiently large.[12] The form of the utility function allows for corner solutions with $t_k^J = 0$ (we will argue that t_k^J is positive only if there is a constitution). The term

$$EW_k = \phi \ln g_k + \ln b_k + \pi(z_k) \ln w^H + [1 - \pi(z_k)] \ln w^L,$$

where g_k is the amount of parental attention that k receives during infancy, and b_k the amount of bequests that k receives in adult life, is the altruistic component of i's expected utility. As this term is the same for f and m, it has the nature of a local public good. As it is not obtained by maximizing k's utility conditional on (g_k, b_k, z_k), EW_k may be taken to reflect 'impure' altruism in the sense of Andreoni (1990).

In general, f's and m's contributions to g_k will not be perfect substitutes, at least during the very early stages of k's life. To simplify, we make the extreme assumption that g_k can be provided only by the mother. This is a crude but effective way of distinguishing between the sexes. We further assume that f pays for all of z_k, and m for all of b_k, but this does not entail any further loss of generality because we allow for the possibility of monetary transfers between the spouses. Like most of the economics of marriage literature, we take it for granted that neither party can commit to compensate the other in period 2 (because the transactions cost of negotiating a legally enforceable contract ahead of marriage is prohibitively high), and that the payment must thus occur in period 1.[13] As D and S enter i's expected utility function symmetrically (no gender preferences), they will receive the same treatment. Therefore,

$$g_k = g, b_k = b, z_k = z \text{ and } EW_k = EW.$$

Now let t_i denote the amount of time that i devotes to each of her or his parents in period 1.[14] Let T denote a monetary payment (positive, negative or zero) from m

[12] Otherwise, $\ln t_k^J$ would be negative for any t_k^J smaller than unity.

[13] In contrast with this literature, however, Cigno (2012, 2014) shows that a spouse may be able to commit even in the absence of a legally enforceable contract if divorce courts tend to compensate the disadvantaged party.

[14] Recall that, unlike k's wage rate, i's is known. Given that, at this stage, preferences are the same across individuals, we can anticipate that the amount of time devoted to the father will be the same as that devoted to the mother. This assumption will be relaxed in Section 5.

to f, again in period 1. Normalizing the adult period-1 time endowment to unity, the period budget constraints facing f can then be written as

$$c_{1f} + s_f + 2z = \left(1 - 2g - 2t_f\right) w + T$$

and

$$c_{2f} = rs_f.$$

Those facing m will be

$$c_{1m} + s_m + T = (1 - 2t_m)\, w$$

and

$$c_{2m} + 2b = rs_m.$$

The pay-off of marriage will depend on whether a family constitution is or is not in place.

3 Marriage in the absence of a family constitution

In the absence of a family constitution, f and m will marry if and only if the pay-off is at least as large as R for each of them. Having argued in the Introduction that elderly parents will not receive filial attention for free, and that they would have nothing to gain from buying it (because the children would extract the entire surplus),

$$t_i = t_k^J = 0,\ J = H, L.$$

If a Nash-bargaining equilibrium exists under these circumstances, it will then maximize

$$N = (EV_f - R)\,(EV_m - R)\,, \tag{1}$$

where

$$EV_f = w(1 - 2g) - 2z - s_f + T + \ln rs_f + 2\alpha EW, \tag{2}$$

$$EV_m = w - s_m - T + \ln\left(rs_m - 2b\right) + 2\alpha EW \tag{3}$$

and

$$EW = \phi \ln g + \ln b + \pi(z) \ln w^H + [1 - \pi(z)] \ln w^L. \tag{4}$$

Notice that EV_i differs from EU_i in that it does not include i's period-0 utility (a bygone in period 1, when the bargaining takes place).

If α is positive, marriage expands i's utility-possibility set because it generates an otherwise unattainable local public good. Therefore, a Nash-bargaining equilibrium conditional on marriage exists (i.e., the (R, R) point lies inside the utility-possibility frontier), and the couple will consequently marry. We show in the Appendix that the Nash-bargaining equilibrium is

$$\begin{aligned}
\hat{g} &= \frac{2\alpha\phi}{w} \\
\hat{b} &= 2\alpha r \\
\hat{s}_f &= 1 \\
\hat{s}_m &= 1 + 4\alpha \\
\hat{T} &= \hat{z} - 2\alpha\,(1-\phi) \\
\pi'\,(\widehat{z}) &= \frac{1}{2\alpha\Delta\ln w}
\end{aligned}$$

where

$$\Delta \ln w \equiv \ln w^H - \ln w^L.$$

Notice that $\hat{g}$ is decreasing in its opportunity-cost, and that $\widehat{z}$ is increasing in the high-to-low wage ratio. The compensatory payment T is so determined that

$$(EV_f - R) = (EV_m - R)$$

and thus that

$$EV_i = E\widehat{V},$$

where

$$E\widehat{V} = w - 2\alpha\,(1+\phi) - \widehat{z} - 1 + \ln r + 2\alpha E\widehat{W}$$

and

$$E\widehat{W} = \phi \ln \frac{2\alpha\phi}{w} + \ln 2\alpha r + \pi(\widehat{z}) \ln w^H + [1 - \pi(\widehat{z})] \ln w^L. \tag{5}$$

If α is zero, the (R, R) point lies actually on the utility-possibility frontier, and f and m are consequently indifferent between marrying and staying single. In that case, $\hat{g} = \hat{b} = \widehat{z} = \hat{T} = 0$ and $\hat{s}_f = \hat{s}_m = 1$.

4 Marriage in the presence of a family constitution

We now investigate the possible existence of a family norm requiring every adult female F (male M) to give a certain amount of attention t_F^J (t_M^J) to each of her (his) elderly parents, conditional on the giver's realized wage rate being w_F^J (w_M^J), $J = H, L$, and the receiver having done the same for her or his own parents (F's and M's grandparents) a period earlier. By complying with such a norm, an adult implicitly threatens to punish her or his parents if they fail to comply.[15] We go about

[15]The parents know that, if they do not comply, their children will be legitimated to give them nothing without forfeiting the entitlement to receive attention from the grandchildren.

our task in three steps. First, we characterize the Nash-bargaining equilibrium of the (f, m) couple conditional on the norm. When the bargaining takes place, the couple's common wage rate w is known, and the amount that f and m must give each of their respective parents is consequently known too. What is not known yet is the amount f and m will receive from their daughter D and son S, because that will depend on the realization of D's and S's wage rates. Second, we look for a pair of functions, $t_F(.)$ and $t_M(.)$, such that the Nash-bargaining equilibrium associated with

$$t_f = t_F(w),\ t_m = t_M(w), t_D^J = t_F\left(w_D^J\right) \text{ and } t_S^J = t_M\left(w_S^J\right) \tag{6}$$

is not Pareto-dominated by any of the equilibria associated with different $t_F(.)$ and $t_M(.)$ functions. If this equilibrium exists, Eq. 6 is renegotiation-proof in the sense of Bernheim and Ray (1989), and Maskin and Farrell (1989),[16] and may thus be regarded as a constitution. Third, we check that the equilibrium in question exists.

Our first step is then to maximize

$$N = (EV_f - E\widehat{V})(EV_m - E\widehat{V}), \tag{7}$$

where

$$\begin{aligned} EV_f =& [w(1-2g-2t_f) - 2z - s_f + T] + \ln\left(rs_f\right) \\ &+ \max\left(0, \delta\left\{\pi(z)\left(\ln\beta t_F^H + \ln\beta t_M^H\right) + [1-\pi(z)]\left(\ln\beta t_F^L + \ln\beta t_M^L\right)\right\}\right) \\ &+ 2\alpha EW, \end{aligned} \tag{8}$$

$$\begin{aligned} EV_m =& [w(1-2t_m) - s_m - T] + \ln(rs_m - 2b) \\ &+ \max\left(0, \delta\left\{\pi(z)\left(\ln\beta t_F^H + \ln\beta t_M^H\right) + [1-\pi(z)]\left(\ln\beta t_F^L + \ln\beta t_M^L\right)\right\}\right) \\ &+ 2\alpha EW \end{aligned} \tag{9}$$

and EW is still determined by Eq. 4.

In the last section, we established that, if α is positive, marriage expands f's and m's utility-possibility set because it gives them access to an otherwise unavailable local public good, $2EW$. Would the presence of the family norm in question further expand that set? This norm gives i access to a pair of otherwise unavailable private contingent goods, t_D^J and t_S^J, but it also obliges i to give t_i to each of her or his parents. It is thus possible that the norm will expand the couple's utility-possibility set for certain $t_F(.)$ and $t_M(.)$, and restrict it for others.

[16] As already pointed out, asymmetric information is not a major problem where members of the same family are concerned. The same cannot be assumed in other contexts, however, for example in a business relation. For a definition of renegotiation-proofness in the presence of asymmetric information, see, among others, Aghion et al. (1990) and Dewatripont and Maskin (1990), and Neeman and Pavlov (2013).

We show in the Appendix that, given the norm, the Nash-bargaining equilibrium is

$$\begin{aligned} g &= \frac{2\alpha\phi}{w} \\ b &= 2\alpha r \\ s_f &= 1 \\ s_m &= 1 + 4\alpha \\ T &= w(t_f - t_m) + z^C - 2\alpha\,(1-\phi) \\ \pi'(z) &= \frac{1}{2\alpha\Delta\ln w + \delta\Delta\ln t} \end{aligned}$$

where

$$\Delta\ln t \equiv \left(\ln t_F^H + \ln t_M^H\right) - \left(\ln t_F^L + \ln t_M^L\right).$$

The compensatory transfer T is so determined that

$$(EV_f - E\widehat{V}) = (EV_m - E\widehat{V})$$

and thus that

$$\begin{aligned} EV_i &= EV \\ &= [w(1 - t_f - t_m) - 1 - z^C - 2\alpha\,(1+\phi) + \ln r] \\ &\quad + \delta\left\{\pi\,(z)\left(\ln\beta t_F^H + \ln\beta t_M^H\right) + [1-\pi\,(z)]\left(\ln\beta t_F^L + \ln\beta t_M^L\right)\right\} \\ &\quad + 2\alpha EW, i = f, m. \end{aligned} \tag{10}$$

Our second step is to find functions $t_F(.)$ and $t_M(.)$, such that the norm is renegotiation-proof, and may thus be regarded as a family constitution. As this norm is supposed to apply not only to the (f, m) couple but also to f's and m's respective parents, the z chosen by the latter will be the same as that chosen by the former. Given that the norm will have been formulated *before* f's and m's common wage rate w was revealed (indeed before f and m were even born), we will then maximize the expectation of EV over w^J, $J = H, L$,

$$\begin{aligned} E\,(EV) &= \pi\,(z)\,w^H + [1-\pi(z)]\,w^L - 2\alpha\,(1+\phi) - z - 1 + \ln r \\ &\quad - \left\{\pi\,(z)\,w^H\left(t_F^H + t_M^H\right) + [1-\pi(z)]\,w^L\left(t_F^L + t_M^L\right)\right\} \\ &\quad + \max\left(0, \delta\left\{\pi\,(z)\left(\ln\beta t_F^H + \ln\beta t_M^H\right) + [1-\pi\,(z)]\left(\ln\beta t_F^L + \ln\beta t_M^L\right)\right\}\right) \\ &\quad + 2\alpha\left\{\phi\ln\frac{2\alpha\phi}{w} + \ln 2\alpha r + \pi(z)\ln w^H + [1-\pi(z)]\ln w^L\right\}. \end{aligned}$$

The solution (see Appendix) may be either interior,

$$t_F^J = t_M^J = \frac{\delta}{w^J}, \tag{11}$$

or at a corner

$$t_F^J = t_M^J = 0. \tag{12}$$

If the solution is at a corner, there is no constitution.

If a constitution exists, the Nash-bargaining equilibrium is

$$\begin{aligned} g^C &= \frac{2\alpha\phi}{w} \\ b^C &= 2\alpha r \\ s_f^C &= 1 \\ s_m^C &= 1 + 4\alpha \\ T^C &= z^C - 2\alpha\,(1-\phi) \\ \pi'(z^C) &= \frac{1}{2\,(\alpha-\delta)\,\Delta \ln w}. \end{aligned}$$

Therefore, g, b and s_i are the same as without the constitution, but z and consequently T may be different. If α is zero, z is also zero as without a constitution. If α is positive, however, educational expenditure is lower than without a constitution,

$$z^C < \widehat{z},$$

and will be actually zero if α is no larger than δ. In the presence of a family constitution, therefore, the equilibrium level of education may be zero even if the couple is altruistic. The intuition is straightforward. With a constitution, education raises the probability that a child's wage rate will be high—and this will make altruistic parents happier. But it also reduces the expected amount of attention that the child will give her or his parents—and this will make the parents less happy. A couple governed by such a constitution will then give their children an education if and only if they, the parents, take more pleasure in seeing these children happy, than in receiving their attention,

$$\alpha > \delta. \tag{13}$$

As the mother spends for the children's education less than she would in the absence of a family constitution, she will then receive a smaller (less positive or more negative) compensation,

$$T^C < \widehat{T},$$

from the father. Another difference between the equilibrium with, and the equilibrium without a constitution is that t_F^J and t_M^J are positive in the former and zero in the latter. In the presence of a constitution, therefore, f and m are never indifferent between marrying and staying single. They are better-off marrying even if α happens to be zero.

Substituting from Eq. 11 into either Eq. 8 or Eq. 9, we get f's and m's common pay-off from marrying under the constitution,

$$\begin{aligned} EV^C &= w - 2\alpha\,(1+\phi) - 2\delta - z^C - 1 + \ln r \\ &\quad + 2\delta\left\{\pi\left(z^C\right)\ln\frac{\beta\delta}{w^H} + \left[1-\pi\left(z^C\right)\right]\ln\frac{\beta\delta}{w^L}\right\} \\ &\quad + 2\alpha\left\{\phi\ln\frac{2\alpha\phi}{w} + \pi(z^C)\ln w^H + \left[1-\pi(z^C)\right]\ln w^L + \ln 2\alpha r\right\} \end{aligned} \tag{14}$$

We are now ready to address the question whether such a constitution exists. If it does, EV^C will be larger than $E\widehat{V}$, or

$$\begin{aligned}&2\delta\{(\ln\beta\delta - 1) - \pi(z^C)\ln w^H - [1-\pi(z^C)]\ln w^L\}\\&+2\alpha\{\pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\} - z^C\\&> 2\alpha\{\pi(\widehat{z})\ln w^H + [1-\pi(\widehat{z})]\ln w^L\} - \widehat{z}.\end{aligned} \tag{15}$$

This is therefore the condition for the existence of a family constitution.

The first line of Eq. 15 represents the benefit of receiving attention from one's children net of the cost of giving attention to one's parents. It will thus be positive,

$$2\delta\{(\ln\beta\delta - 1) - \pi(z^C)\ln w^H - [1-\pi(z^C)]\ln w^L\} > 0, \tag{16}$$

if the constitution exists. The second line is the difference between the expected benefit and the cost of giving children an education in the presence of a constitution. It will thus be nonnegative,

$$2\alpha\{\pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\} - z^C \geq 0,$$

for any positive z^C. The third line is similarly nonnegative for any positive $\widehat{z}$ because it represents the difference between the expected benefit and the cost of giving children an education in the absence of a constitution,

$$2\alpha\{\pi(\widehat{z})\ln w^H + [1-\pi(\widehat{z})]\ln w^L\} - \widehat{z} \geq 0.$$

Therefore, Eq. 15 will hold for some parameter configurations, but not for others. If α is equal to zero, this existence condition reduces to Eq. 16, which in turn implies

$$\ln\beta\delta - 1 - \ln w^L > 0 \tag{17}$$

because z^C is now equal to zero, and the children's wage rates are consequently low.

Is it a problem that a family constitution may or may not exist? It is if everybody has the same preferences as we have assumed so far, because either all couples will then be governed by a family constitution, the same for everyone, or none of them will. It is not a problem—indeed, it makes the model more realistic—if different persons have different preferences, because some couples may then be governed by a family constitution, not necessarily the same for all of them, and some may not.

5 Preference heterogeneity and preference transmission

The equilibria examined in the last two sections were based on the assumption that all individuals—past, present and future—have the same preferences. What happens if we allow α and δ, the preference parameters that enter the existence condition,[17] to vary across individuals? Let (α_i, δ_i) denote i's preference parameters. We have

[17] Recall that β is only a scaling factor.

already assumed that there is an equal number of men and women at each round. We now make the additional assumptions that the relevant preference parameters have the same joint distribution across men and women, and that everybody is fully informed about everybody else's preferences.[18]

For the (f, m) couple, the pay-off of marrying without a family constitution is now (see Appendix)

$$\begin{aligned} E\widehat{V} &= w - (\alpha_f + \alpha_m)(1+\phi) - \widehat{z} - 1 + \ln r \\ &\quad + (\alpha_f + \alpha_m)\left\{\phi \ln \frac{(\alpha_f + \alpha_m)\,\phi}{w}\right. \\ &\quad \left. + \ln(\alpha_f + \alpha_m) r + \pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L \right\}. \end{aligned} \tag{18}$$

Notice that α_f and α_m raise $E\widehat{V}$,

$$\begin{aligned} \frac{\partial E\widehat{V}}{\partial \alpha_i} &= \phi \ln \frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m) r + \pi(z^C)\ln w^H \\ &\quad + [1-\pi(z^C)]\ln w^L > 0, i = f, m. \end{aligned}$$

The intuition is straightforward. As the couple bargain to the point of the utility-possibility frontier where the gain relative to their common outside option is the same for both of them, either party would benefit from marrying someone more altruistic than itself because that would shift the frontier outwards. As nobody will marry a person who is less altruistic than her or himself, however, couples will be formed by persons with the same preferences.[19]

The argument becomes more complicated if we assume that, although different, both f's and m's preferences satisfy the condition for the existence of a family constitution (15). The first complication is that the difference between f and m could now concern the value of δ_i, as well as, or instead of, that of α_i. The second complication is that we must now specify how much attention f and m would receive from their children if f gave $\frac{\delta_f}{w}$ units of attention to each of her own parents, and m gave $\frac{\delta_m}{w}$ units of attention to each of his, as the constitutions ruling their families of origin bid them to.

One possibility is that $i = f, m$ would receive $\frac{\delta_i}{w^J}$, $J = H, L$, from each child. That is the same as saying that the rules governing f's and m's families of origin

[18]This is rather strong. In reality, information gathering is costly, and mistakes are made (marriages break down); see Smith (2006).

[19]Given that (α_i, δ_i) have the same joint distribution for men and women, and that the values of these parameters are bounded upwards, there cannot be an equilibrium where the spouses have different values of these parameters. The latter would in fact imply that, for at least one value of α, there are men and women whose partners have lower α than themselves, and thus, that it would be profitable for these men and women to deviate, and marry someone who has the same α as themselves. The same would not be necessarily true if α were unbounded.

would continue to operate side by side. If that were the case, the couple's common pay-off would be (see Appendix)

$$
\begin{aligned}
EV^C =\; & w - (\alpha_f + \alpha_m)(1+\phi) - (\delta_f + \delta_m) - z^C - 1 + \ln r \\
& - (\delta_f + \delta_m)\{\pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\} + \delta_f \ln \beta\delta_f + \delta_m \ln \beta\delta_m \\
& + (\alpha_f + \alpha_m)\{\phi \ln(\alpha_f + \alpha_m)\frac{\phi}{w} + \pi(z^C)\ln w^H \\
& + [1-\pi(z^C)]\ln w^L + \ln(\alpha_f + \alpha_m) r\}. \qquad (19)
\end{aligned}
$$

Note that EV^C is increasing not only in α_i,

$$
\begin{aligned}
\frac{\partial EV^C}{\partial \alpha_i} =\; & \phi \ \ln \frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m) r + \pi(z^C)\ln w^H \\
& + \ [1-\pi(z^C)]\ln w^L > 0
\end{aligned}
$$

but also in δ_i,

$$
\frac{\partial EV^C}{\partial \delta_i} = \ln \beta\delta_i - \{\pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\} > 0,
$$

because $2\delta_i \left(\ln \beta\delta_i - 1 - \pi\,(z)\,\Delta \ln w - \ln w^L\right)$ is the net expected benefit to i of complying with the constitution inherited from her or his own family, and thus positive if that constitution remains operative. Therefore, either party would gain from marrying a person with α, δ or both larger than its own. For the same reason, however, the counterpart would not accept the marriage proposal. What if the counterpart has a larger α and a smaller δ (or a smaller α and a larger δ)?

In Fig. 1, let the coordinates of point P represent f's preference parameters $\left(\alpha_f, \delta_f\right)$. The curve through P represents the preference parameters (α_m, δ_m) , also satisfying (15), of the men that would give f the same pay-off, if she married any of them, as a man with the preference parameters represented by P (i.e., as a man with her same preferences).[20] This curve is concave to the origin because its absolute slope,

$$
\left|\frac{d\delta_m}{d\alpha_m}\right| = \frac{\phi \ln \frac{(\alpha_f+\alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m) r + \pi(z^C)\ln w^H + \left[1-\pi(z^C)\right]\ln w^L}{\ln \beta\delta_m - \left\{\pi(z^C)\ln w^H + \left[1-\pi(z^C)\right]\ln w^L\right\}}, \qquad (20)
$$

is increasing in α_m and decreasing in δ_m. As f's pay-off is increasing in α_m and δ_m, f would be happier (less happy) marrying a man with the preference parameters represented by any of the points above (below) this curve, than marrying one with the preference parameters represented by a point on the curve itself.

Given that Eq. 20 is increasing also in α_f, the curve would be flatter (steeper) if f's own preference parameters were those represented by a point NW (SE) of P. In particular, if f's preferences were represented by point Q' (Q''), the curve would look like the dashed one through that point.

[20] As we can have a constitution if α is equal to zero, but not if δ is, this curve may cut the vertical axis, but not the horizontal one.

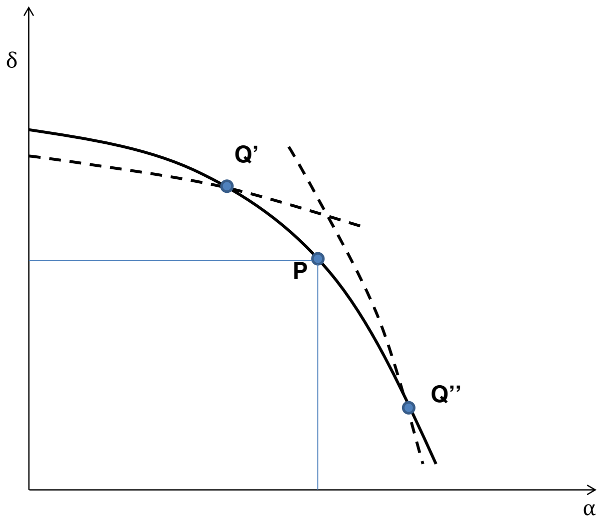

Fig. 1 Preferences over partner's preferences

Switching labels, we can re-interpret the coordinates of P as m's preference parameters (α_m, δ_m), and those of each point of the curve through P, with absolute slope

$$\left|\frac{d\delta_f}{d\alpha_f}\right| = \frac{\phi \ln \frac{(\alpha_f+\alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m)r + \pi(z^C)\ln w^H + \left[1-\pi(z^C)\right]\ln w^L}{\ln \beta\delta_f - \left\{\pi(z^C)\ln w^H + \left[1-\pi(z^C)\right]\ln w^L\right\}}, \tag{21}$$

as the preference parameters of the women that would give m the same pay-off as one with the preference parameters represented by P. As his pay-off is increasing in α_f and δ_f, and Eq. 21 is increasing in α_f and deceasing in δ_f, everything we said regarding f then applies to m too.

Summing up, a woman with preference parameters P would be indifferent between marrying a man with her same preferences, or with the preference parameters Q'. But any such man would turn her down because he would rather marry any of the women with preference parameters on or above the dashed curve through point Q' (including any of those who have his same preferences). The same is true of all men with preference parameters falling in the area above the solid curve and to the left of point P. Analogously, a woman with preference parameters P would be indifferent between marrying a man with her same preferences, or one with the preference parameters represented by point Q''. But the latter would turn her down, because he would rather marry any of the women with preference parameters on or above the dashed curve through Q'' (including one with his same preferences), and so would all men with preference parameters falling in the area above the solid curve and to the right of P. Given that the same argument applies if we look at the issue from a man's point of view, it then follows that an adult whose preferences satisfy (15) will marry one who holds the same preferences as her or himself. Assortative mating is practiced not only by individuals without constitution-compatible preferences (for whom only α matters) but also by individuals with constitution-compatible preferences (for whom α and δ matter).

As an alternative to assuming that k will give $\frac{\delta_f}{w^J}$ to f and $\frac{\delta_m}{w^J}$ to m, suppose that k will give the same amount of attention $\frac{\widetilde{\delta}}{w^J}$, where

$$\widetilde{\delta} = a\delta_f + (1-a)\delta_m, 0 \le a \le 1, \tag{22}$$

to both of them. That is the same as saying that, if a woman marries a man with preferences different from her own, they will apply the rules inherited from their families of origin, but their children may apply any linear combination of the two rules. The common pay-off would then be (see Appendix)

$$\begin{aligned} EV^C = {} & w - (\delta_f + \delta_m) - 1 - z^C - (\alpha_f + \alpha_m)(1+\phi) + \ln r \\ & - (\delta_f + \delta_m)\{\{\pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\} - \ln \beta\widetilde{\delta}\} \\ & + (\alpha_f + \alpha_m)\left\{\phi \ln \frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m)r + \pi(z^C)\ln w^H \right. \\ & \left. + [1-\pi(z^C)]\ln w^L \right\}, i = f, m. \end{aligned} \tag{23}$$

As in the previous case, EV^C is increasing in α_i,

$$\frac{\partial EV^C}{\partial \alpha_i} = \phi \ln \frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m)r + \pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L > 0,$$

and δ_i,

$$\frac{\partial EV^C}{\partial \delta_i} = \ln \beta\widetilde{\delta} - 1 - \{\pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\} + (1-a)\frac{\delta_f + \delta_m}{\widetilde{\delta}} > 0.$$

Given f's preference parameters $\left(\alpha_f, \delta_f\right)$, the curve showing the preference parameters of the men that would give f the same pay-off as one with her same tastes has absolute slope

$$\left|\frac{d\delta_m}{d\alpha_m}\right| = \frac{\phi \ln \frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m)r + \pi\,(z)\,\Delta \ln w + \ln w^L}{\ln \beta\widetilde{\delta} - 1 - \left\{\pi\,(z)\,\Delta \ln w + \ln w^L\right\} + (1-a)\frac{\delta_f + \delta_m}{\widetilde{\delta}}}.$$

Conversely, given m's preferences (α_m, δ_m), the curve showing the preference parameters of the women that would give m the same pay-off as one with his same tastes has absolute slope

$$\left|\frac{d\delta_f}{d\alpha_f}\right| = \frac{\phi \ln \frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m)r + \pi(z^C)\ln w^H + \left[1-\pi(z^C)\right]\ln w^L}{\ln \beta\widetilde{\delta} - 1 - \{\pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\} + a\frac{\delta_f + \delta_m}{\widetilde{\delta}}}.$$

Going through the same steps as is the case examined earlier (where f and m receive different amounts of filial attention), it can be shown that, in this case too, an adult whose preferences satisfy (15) will marry one who holds the same preferences as her or himself.

We have thus established that preferences may vary across, but not within couples. It remains to be argued that children will have the same preferences as their parents. How high is the probability that this will actually happen? Not very high if personal preferences were genetically transmitted like personal traits. Could it rather be the case that preferences are imprinted or inculcated? Stark (1993, 1995) hypothesizes that selfish adults give attention to their elderly parents in order to impress on their own children that they should do the same when the time comes ('demonstration effect'), and try to insulate their children from the possibly countervailing influence of the outside world by sending them to church, or enrolling them at a certain type of school. Consistently with this hypothesis, Cox and Stark (2005) report evidence that couples with children are more likely to care for elderly parents than either singles, or couples without children. Evidence that parents use religious schools as a means of sheltering their children from undesirable influences is reported in Cohen-Zada (2006). Along the same lines, Pezzin et al. (2009) hypothesize that an able-bodied mother will provide care for her disabled partner in order to impress on the children that they should do the same for her when she in turn becomes disabled.[21] The same authors bring evidence that the presence of a child does indeed raise the probability that the able-bodied parent will care for the disabled one. On the other hand, Ottoni-Wilhelm et al. (2017) find that children can be talked into doing good deeds, but setting them a good example has limited effect.

Bisin and Verdier (2001) assume that parents motivated by a form of paternalistic altruism ('imperfect empathy') not unlike the impure altruism assumed in our analysis transmit their preferences to their offspring. Tabellini (2008) similarly assumes that parents choose to instil their 'values' into their offspring. Values are not the same as preferences. They are rather norms of good conduct that, in the parents' own judgement, are beneficial to society at large and, in some circumstances (in a certain type of equilibrium), beneficial also to the children themselves. According to Tabellini, therefore, parental benevolence extends beyond children to society at large. Bisin and Topa (2003) show that it is possible to discriminate empirically between the effect of the family and the effect of the outside world in the formation of preferences. Interestingly, Bjorklund et al. (2006) find evidence that the transmission mechanism works even in the absence of genetic links (e.g., in the case of adopted children), and Albanese et al. (2016) report that family influence weakens, but does not vanish, when the child becomes exposed to external (e.g., school and peer group) influence.

Although inspired by a different theoretical literature, the evidence cited is compatible with our model's prediction that it may be in a couple's interest to pass their preferences on to their children. Unlike that literature, however, we demonstrate rather than simply assume that mother and father have the same preferences and, if those preferences are compatible with the existence of a family constitution, that they will have an interest in transmitting them to their children.

[21] The same paper examines also the alternative hypothesis that the able-bodied mother provides care for the disabled father because she fears that the children will otherwise punish her by denying her care when she in turn becomes disabled ('punishment effect'). The implicit assumption here is either that the children have an innate sense of justice, or that they are guided by some kind of family rule, akin to our idea of a family constitution (but the paper does not derive conditions for the existence of such a rule).

6 Policy analysis

We now come to the effects of public intervention, in particular to the question whether public action is neutralized by private reaction. With that purpose in mind, we will compare the effects of a number of policies on the behaviour of couples governed by family constitutions, and of couples that are not so constrained. We will also enquire whether those policies affect the relative numerical weight of those two groups. Having shown that preferences may vary across but not within couples, we will take that to be the case.

6.1 One-off public transfer from children to parents

The first policy we consider is the promise to pay a lump-sum subsidy τ to all members of a certain generation when they will become old, financed by a lump-sum tax of the same size on all members of the next generation when they will become adults. This is to be interpreted as a one-off move (if *every* generation were taxed a fixed amount in favour of the preceding one, there would be no public intergenerational transfer). An example of such a policy is debt-financed public expenditure. Another are the 'inaugural gains' enjoyed by the first generation of pensioners when the government introduces a pay-as-you-go public pension system. Assuming descending altruism, Barro (1974) shows that any such policy will be neutralized by a private transfer of opposite sign, because parents will perceive the subsidy as a tax on their children ('Ricardian equivalence'). In Barro's world, however, there is no sexual differentiation, no marriage, no bargaining between spouses and no family constitutions. Does the same apply to our realistically more complicated world?

Take the (f, m) couple. If f and m are altruistic ($\alpha > 0$), and the policy is announced in period 1 of this couple's life, we can simply add τ to rs_i ($i = f, m$) in EV, and subtract it from b in EW. Following the same procedure as without the policy, we then find that, no matter whether a constitution is or is not in place, the policy will raise bequests by the amount of the subsidy, and lower (raise) the woman's (man's) savings by the present value of the same. The equilibrium values of g and z are not affected by the policy. If f and m are not altruistic ($\alpha = 0$), however, and again no matter whether a constitution is or is not in place, they will simply keep the subsidy for themselves. If all couples were altruistic, the policy would thus be neutralized by an induced change in bequest behaviour. Otherwise, the policy will make selfish couples better-off, and their children worse-off. Where this policy is concerned, therefore, family constitutions do not matter, and the share of the adult population that is governed by them is not affected.

6.2 Wage redistribution

Our next experiment concerns a policy that systematically taxes high wages and subsidizes low ones. Unlike the previous one, this policy redistributes within rather than between generations, and it is permanent rather temporary. As it reduces the expected return to education, this policy will induce couples who would have chosen z positive without the policy to spend less for their children's education. But there may also be couples that would have chosen z equal to zero without the policy, and will do so with the policy. The couples falling in this category include all the non-altruistic ones ($\alpha = 0$), and those that are governed by a family constitution but are not sufficiently altruistic ($\alpha \leq \delta$) to spend money for their children's education.

The other policy effects are easily seen by looking at the extreme case where the policy equalizes take-home wage rates. If parents did not respond to the policy, everybody would then take home the same wage rate (lower than w^H, but higher than w^L). As parents will respond by spending nothing for their children's education ($\widehat{z} = z^C = 0$ for $\Delta \ln w = 0$), however, and recalling that $\pi(0) = 0$, everybody will be paid w^L. By the usual procedure we find that, given the policy, the Nash-bargaining equilibrium is

$$\begin{aligned} g(R) &= \frac{2\alpha\phi}{w^L} \\ b(R) &= 2\alpha r \\ z(R) &= 0 \\ s_f(R) &= 1 \\ s_m(R) &= 1 + 4\alpha \\ T(R) &= 2\alpha(\phi - 1), \end{aligned} \tag{24}$$

where the R label signals that wage redistribution is in action.

The pay-off of marriage for a couple without a family constitution is

$$\begin{aligned} \widehat{V}(R) = {} & w^L - 2\alpha(1+\phi) - 1 + \ln r \\ & + 2\alpha\left(\phi \ln \frac{2\alpha\phi}{w^L} + \ln 2\alpha r + \ln w^L\right). \end{aligned}$$

If a family constitution exists, the rule determining how much attention each adult should give each of her or his elderly parents given the policy is

$$t_F = t_M = \frac{\delta}{w^L}. \tag{25}$$

For a couple governed by such a constitution, the pay-off of marriage is then

$$\begin{aligned} V^C(R) = {} & w^L - 2\alpha(1+\phi) - 2\delta(1 - \ln\beta\delta) - 1 + \ln r \\ & + 2(\alpha - \delta)\ln w^L \\ & + 2\alpha\left(\phi \ln \frac{2\alpha\phi}{w^L} + \ln 2\alpha r\right), \end{aligned}$$

and the existence condition is Eq. 17, less stringent than Eq. 15. As we saw in Section 4, Eq. 17 is also the condition for the existence of a family constitution in the absence of policy if $\alpha = 0$ (which implies $z = 0$). With the policy, however, Eq. 17 is the existence condition even if $\alpha > 0$ because, in that case, z will always be zero. Therefore, wage equalization extends the range of preference parameters that are consistent with the existence of a family constitution only if at least some of the couples are altruistic. If that is the case, the policy will raise the share of constitution-abiding adults, and consequently the share of the elderly who receive their children's attention.

Are people at least as well-off with as without the policy? Egoists ($\alpha = 0$) are as well-off, because their own wage rate would have been low ($w = w^L$), and they would have had the same constitution, anyway. The same applies to all those who would have had the same constitution even without the policy, but would not have invested in their children's education because they are not sufficiently altruistic ($\alpha < \delta$). Everyone else will be worse-off however, because, with the policy, nobody will invest in education and everybody, including the present adults, will have a low wage rate. Consequently, all couples other than those who would have had a constitution and a low wage rate even without the policy will find themselves giving more attention to their parents. On the other hand, however, all couples will miss the expected gain from investing in their children's education, and this loss will not be fully compensated by the expected gain of receiving more filial attention (or they would have all had a constitution, and chosen $z = 0$, even without the policy). Therefore, the policy makes some people worse-off and leaves the rest as well-off.

Let us now turn to the less extreme case where wages are redistributed but not equalized. All we said concerning couples with $\alpha = 0$, or $0 < \alpha < \delta$ and a constitution still applies. For the other couples, the probability that $w = w^H$ is now positive, but still lower than without the policy. For couples with $w = w^H$, there will then be a loss due to both the reduction in consumption and the reduction in the expected gain from investing in their children's education, caused by the tax. For couples with $w = w^L$, the effect is ambiguous because the reduction in the expected gain of investing in their children's education is counterbalanced by the increase in present consumption caused by the subsidy. The policy is again nonneutral.

6.3 Compulsory education

Our last experiment concerns compulsory education. Like wage redistribution, this policy is intended to be permanent. Suppose that the government imposes a minimum level of education, $\overline{z}$. Take the extreme case where $\overline{z}$ is higher than the z any couple would choose. Like the introduction of a pay-as-you-go pension system, this policy entails an intergenerational transfer (more educational investment). In this case, however, the direction of the transfer is from parents to children, and the latter have no reason to counter this by making a voluntary transfer to the former.

Following the usual procedure, we find that the Nash-bargaining equilibrium of a couple with common wage rate w is now

$$
\begin{aligned}
g(\overline{z}) &= \frac{2\alpha\phi}{w} \\
b(\overline{z}) &= 2\alpha r \\
s_f(\overline{z}) &= 1 \\
s_m(\overline{z}) &= 1 + 4\alpha \\
T(\overline{z}) &= 2\alpha\phi + \overline{z} - 2\alpha.
\end{aligned}
$$

If this couple is not governed by a constitution, their pay-off of marriage is

$$E\widehat{V}(\overline{z}) = w - 2\alpha\phi - \overline{z} - 1 - 2\alpha + \ln r + 2\alpha\left\{\phi\ln\frac{2\alpha\phi}{w} + \ln 2\alpha r + \pi(\overline{z})\ln w^H + [1 - \pi(\overline{z})]\ln w^L\right\}.$$

If a constitution prescribing (11) is in place, the pay-off of marriage is

$$\begin{aligned} EV^C(\overline{z}) = {} & w - 2\alpha\phi - 2\delta - \overline{z} - 1 - 2\alpha + \ln r \\ & + 2\delta\left\{\pi(\overline{z})\ln\frac{\beta\delta}{w^H} + [1 - \pi(\overline{z})]\ln\frac{\beta\delta}{w^L}\right\} \\ & + 2\alpha\left\{\phi\ln\frac{2\alpha\phi}{w} + \ln 2\alpha r\right\} \\ & + 2\alpha\left\{\pi(\overline{z})\ln w^H + [1 - \pi(\overline{z})]\ln w^L\right\}. \end{aligned}$$

For any given w, and irrespective of whether the couple is or is not governed by a family constitution, the policy makes people worse-off because it distorts their choice of z. However, the policy makes it more likely that the couple's w will be equal to w^H. Ex ante, therefore, the policy *may* make people better-off.[22]

With the policy, the condition for the existence of a family constitution is

$$\ln\beta\delta \geq 1 + \pi(\overline{z})\ln w^H + [1 - \pi(\overline{z})]\ln w^L. \tag{26}$$

As this is more stringent than Eq. 15, the policy narrows the range of preferences that support a constitution. It thus reduces the share of constitution-abiding adults, and the share of the elderly who receive filial attention.

7 Conclusion

The primary aim of the present paper was to establish whether the notion that some individuals may be constrained by family 'constitutions' (self-enforcing, renegotiation-proof rules) that oblige them to do things they would not otherwise do (e.g., give attention to their elderly parents) carries over from a world where individuals reproduce asexually, to one where they are differentiated by sex. In the latter, reproduction is normally the outcome of the union of a man and a woman, and the allocation of a couple's time and money is bargained between the two. Assuming perfect information (or zero search costs), we demonstrate that men are matched with women who hold their same preferences with regard to children. Consistent with evidence that a share of the adult population behave as if they were constrained by family

[22]There may be also positive externalities (overlooked here), and redistributive effects (ruled out here because the cost of education falls entirely on the parents), that could make the policy more desirable.

constitutions,[23] and that preferences are transmitted from parents to children,[24] we also demonstrate that certain combinations of preference parameters are compatible with the existence of a family constitution, and that individuals holding such preferences have an interest in passing them on to their offspring. Some of these individuals may not be altruistic towards their offspring, but they will still have children, because that will give them access to an otherwise unattainable good without perfect market substitutes, namely to those children's attention. Other individuals, those whose preferences are incompatible with a family constitution, will marry only if they are altruistic towards their children, and thus get direct utility from having them.

A secondary aim was to establish whether policy affects individuals governed by family constitutions differently from the rest, and whether it raises or lowers the share of the population who are so constrained. We find that the effect of a one-off public transfer from future to present adults does not depend on whether the latter are governed by family constitutions, but on whether they are altruistic towards their children. This policy does not affect the share of the population who are governed by constitutions. By contrast, wage redistribution and compulsory education affect couples governed by family constitutions differently from the rest. Furthermore, wage redistribution may raise the share of constitution-abiding adults, and thus the share of the elderly who receive their children's attention, while compulsory education reduces both. These predictions are of some importance, because neither the market nor the public sector provides perfect substitutes for filial attention.

A corollary of these results is that the argument in Bernheim and Bagwell (1988) that, if everybody were altruistically linked to everybody else by blood or marriage, any public action no matter whether distortionary or non-distortionary would be neutralized by private reaction does not remain true if some individuals are not altruistic, even if they behave as if they were because family constitutions oblige them to do so. The intuitive explanation is that, at any given date, the adult population consists of individuals who are vertically integrated into dynasties characterized by the observance of common norms and possibly also by altruism, and individuals who are not. Policies involving transfers between generations of the same dynasty will then be neutralized if those who benefit are altruistic towards those who bear the cost as in the case of debt-financed public expenditure, but not if the former are only apparently altruistic towards the latter as in the case of compulsory education. A policy like wage redistribution, that cuts across individuals belonging to different dynasties or not belonging to any dynasty, will not be neutralized because givers and receivers are not linked by altruism or family obligations.

[23] Cigno et al. (2006) find that a large share, but by no means the totality, of Italian adults behave as if they were governed by a family constitution. Galasso et al. (2009), Gábos et al. (2009), Billari and Galasso (2014), Chiapa and Juarez (2016) and Klimaviciute et al. (2017) find that the same may be true also of other countries.

[24] See Bisin and Topa (2003), Cox and Stark (2005), Bjorklund et al. (2006), Albanese et al. (2016) and Ottoni-Wilhelm et al. (2017).

Acknowledgments Valuable comments by two anonymous referees, and editorial guidance by Junsen Zhang, are gratefully acknowledged. Remaining errors are the authors' responsibility. Mizuki Komura was supported by the project 'Comprehensive Cooperative System for Fostering Researchers with Doctoral Degrees' of Building of Consortia for the Development of Human Resources in Science and Technology and JSPS KAKENHI Grant Number 15K17074.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Appendix

A.1 Nash-bargaining in the absence of a family constitution

For $\alpha > 0$, the FOCs for the maximization of Eq. 1 are

$$\begin{aligned}
\frac{\partial N}{\partial T} &= (EV_f - R) - (EV_m - R) = 0 \\
\frac{\partial N}{\partial g} &= -2w\,(EV_m - R) + \frac{2\alpha\phi}{g}(EV_f - R + EV_m - R) = 0 \\
\frac{\partial N}{\partial z} &= -2\,(EV_m - R) + 2\alpha\pi'(z)(\ln w^H - \ln w^L)(EV_f + EV_m - 2R) = 0 \\
\frac{\partial N}{\partial s_f} &= \left(-1 + \frac{r}{rs_f}\right)(EV_m - R) = 0 \\
\frac{\partial N}{\partial s_m} &= \left(-1 + \frac{r}{rs_m - 2b}\right)(EV_f - R) = 0 \\
\frac{\partial N}{\partial b} &= \left(\frac{-2}{rs_m - 2b}\right)(EV_f - R) + \frac{2\alpha}{b}(EV_f - R + EV_m - R) = 0
\end{aligned}$$

Using the first of these equations, the conditions on g, z and s_f yield

$$\hat{g} = \frac{2\alpha\phi}{w},$$

$$\pi'(\hat{z}) = \frac{1}{2\alpha(\ln w^H - \ln w^L)}$$

and

$$\hat{s}_f = 1.$$

The condition on s_m can then be re-written as

$$\frac{1}{rs_m - 2b} = \frac{1}{r},$$

which substituted back into the conditions for b and s_m yields

$$\hat{b} = 2\alpha r$$

and

$$\hat{s}_m = 1 + 4\alpha.$$

Using these expressions, and the first FOC, we obtain

$$\hat{T} = 2\alpha\phi + \hat{z} - 2\alpha.$$

A.2 Family constitution

For $\alpha > 0$, when a constitution prescribing $t_F^j, t_M^j > 0$, $j = H, L$, is in place, the FOCs for the maximization of Eq. 7 are

$$\begin{aligned}
\frac{\partial N}{\partial T} &= (EV_f - E\hat{V}_f) - (EV_m - E\hat{V}_m) = 0\\
\frac{\partial N}{\partial g} &= -2w(EV_m - E\hat{V}_m) + \frac{2\alpha\phi}{g}(EV_f - E\hat{V}_f + EV_m - E\hat{V}_m) = 0\\
\frac{\partial N}{\partial z} &= -2(EV_m - E\hat{V}_m)\\
&\quad + \delta\pi'(z)\left[\left(\ln\beta t_f^H + \ln\beta t_m^H\right) - \left(\ln\beta t_f^L + \ln\beta t_m^L\right)\right](EV_f - E\hat{V}_f + EV_m - E\hat{V}_m)\\
&\quad + 2\alpha\pi'(z)(\ln w^H - \ln w^L)(EV_f - E\hat{V}_f + EV_m - E\hat{V}_m) = 0\\
\frac{\partial N}{\partial s_f} &= \left(-1 + \frac{r}{rs_f}\right)(EV_m - E\hat{V}_m) = 0\\
\frac{\partial N}{\partial s_m} &= \left(-1 + \frac{r}{rs_m - 2b}\right)(EV_f - E\hat{V}_f) = 0\\
\frac{\partial N}{\partial b} &= \left(\frac{-2}{rs_m - 2b}\right)(EV_f - E\hat{V}_f) + \frac{2\alpha}{b}(EV_f - E\hat{V}_f + EV_m - E\hat{V}_m) = 0.
\end{aligned}$$

Following the same procedure as in the case without the constitution, we find

$$\begin{aligned}
g &= \frac{2\alpha\phi}{w},\\
\pi'(z) &= \frac{1}{\delta\left[\left(\ln t_F^H + \ln t_M^H\right) - \left(\ln t_F^L + \ln t_M^L\right)\right] + 2\alpha\left(\ln w^H - \ln w^L\right)},\\
s_f &= 1,\\
b &= 2\alpha r,\\
s_m &= 1 + 4\alpha,\\
T &= w\,(t_F - t_M) + 2\alpha\phi + z^C - 2\alpha.
\end{aligned}$$

Substituting back into the expressions for EV_f or EV_m, and setting

$$t_f^J = t_D^J = t_F^J, t_m^J = t_S^J = t_M^J, J = H, L,$$

the value of EV_i expected before w is revealed is

$$\begin{aligned}
E\left(EV_i\right) &= E\left(EV\right) \\
&= \pi(z^C)w^H\left(1-t_F^H-t_M^H\right)+[1-\pi(z^C)]w^L\left(1-t_F^L-t_M^L\right) \\
&\quad - z^C - 2\alpha\phi - 1 - 2\alpha + \ln r \\
&\quad + \max\left(0, \delta\left\{\pi(z^C)\left(\ln\beta t_F^H + \ln\beta t_M^H\right) + [1-\pi(z^C)]\left(\ln\beta t_F^L + \ln\beta t_M^L\right)\right\}\right) \\
&\quad + 2\alpha\left[\pi(z^C)\phi\ln\frac{2\alpha\phi}{w^H} + [1-\pi(z^C)]\phi\ln\frac{2\alpha\phi}{w^L}\right] \\
&\quad + 2\alpha\{\ln(2\alpha r) + \pi(z^C)\ln w^H + [1-\pi(z^C)]\ln w^L\}.
\end{aligned}$$

At an interior solution, the FOCs for the maximization of $E\left(EV\right)$,

$$\frac{\partial E\left(EU\right)}{\partial t_F^j} = -w^J + \frac{\delta}{t_k^J} = 0$$

and

$$\frac{\partial E\left(EV\right)}{\partial t_M^J} = -w^J + \frac{\delta}{t_k^J} = 0,$$

yield (11).

A.3 Heterogeneous preferences in the absence of a family constitution

In the absence of a family constitution, if (α_f, δ_f) may differ from (α_m, δ_m),

$$EV_f = w(1-2g) - 2z - s_f + T + \ln rs_f + 2\alpha_f EW$$

and

$$EV_m = w - s_m - T + \ln\left(rs_m - 2b\right) + 2\alpha_m EW.$$

The FOCs for the maximization of Eq. 1 are then

$$\begin{aligned}
\frac{\partial N}{\partial T} &= \left(EV_f - R\right) - \left(EV_m - R\right) = 0, \\
\frac{\partial N}{\partial g} &= -2w\left(EV_m - R\right) + \frac{2\alpha_f\phi}{g}\left(EV_m - R\right) + \frac{2\alpha_m\phi}{g}\left(EV_f - R\right) = 0, \\
\frac{\partial N}{\partial z} &= -2\left(EV_m - R\right) + 2\alpha_f\pi'(z)(\ln w^H - \ln w^L)\left(EV_m - R\right) \\
&\quad + 2\alpha_m\pi'(z)(\ln w^H - \ln w^L)(EV_f - R) = 0, \\
\frac{\partial N}{\partial s_f} &= \left(-1 + \frac{r}{rs_f}\right)\left(EV_m - R\right) = 0, \\
\frac{\partial N}{\partial s_m} &= \left(-1 + \frac{r}{rs_m - 2b}\right)\left(EV_f - R\right) = 0, \\
\frac{\partial N}{\partial b} &= \left(\frac{-2}{rs_m - 2b}\right)\left(EV_f - R\right) + \frac{2\alpha_f}{b}\left(EV_m - R\right) + \frac{2\alpha_m}{b}\left(EV_f - R\right) = 0.
\end{aligned}$$

Following the same procedure as in the case of homogeneous preferences, these FOCs yield

$$\begin{aligned}
\hat{g} &= \frac{(\alpha_f + \alpha_m)\phi}{w}, \\
\pi'(\hat{z}) &= \frac{1}{(\alpha_f + \alpha_m)(\ln w^H - \ln w^L)}, \\
\hat{s}_f &= 1, \\
\hat{b} &= (\alpha_f + \alpha_m)r, \\
\hat{s}_m &= 1 + 2(\alpha_f + \alpha_m) \\
\hat{T} &= \hat{z} - (\alpha_f + \alpha_m)(1 - \phi) \\
&\quad + (\alpha_m - \alpha_f)\left[\phi \ln \frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m)r \right. \\
&\quad \left. + \pi(z)\ln w^H + [1 - \pi(z)]\ln w^L\right].
\end{aligned}$$

Substituting these expressions into those for EV_f and EV_m, we obtain the value of $E\widehat{V}$ in Eq. 18.

A.4 Heterogeneous preferences in the presence of a family constitution

In the presence of a family constitution, for the case where $t_i^J = \frac{\delta_i}{w^J}$,

$$\begin{aligned}
EV_f &= w\left(1 - 2g - 2\frac{\delta_f}{w}\right) - 2z - s_f + T + \ln r s_f \\
&\quad + 2\delta_f\left\{\pi\,(z)\ln\beta\frac{\delta_f}{w^H} + [1 - \pi\,(z)]\ln\beta\frac{\delta_f}{w^L}\right\} + 2\alpha_f EW
\end{aligned}$$

and

$$\begin{aligned}
EV_m &= w\left(1 - 2\frac{\delta_m}{w}\right) - s_m - T + \ln\left(r s_m - 2b\right) \\
&\quad + 2\delta_m\left\{\pi\,(z)\ln\beta\frac{\delta_m}{w^H} + [1 - \pi\,(z)]\ln\beta\frac{\delta_m}{w^L}\right\} + 2\alpha_m EW.
\end{aligned}$$

The FOCs for the maximization of Eq. 7 are then

$$\begin{aligned}
\frac{\partial N}{\partial T} &= (EV_f - E\hat{V}_f) - (EV_m - E\hat{V}_m) = 0, \\
\frac{\partial N}{\partial g} &= -2w(EV_m - E\hat{V}_m) + \frac{2\alpha_f\phi}{g}(EV_m - R) + \frac{2\alpha_m\phi}{g}(EV_f - E\hat{V}_f) = 0, \\
\frac{\partial N}{\partial z} &= -2(EV_m - E\hat{V}_m) \\
&\quad + 2\delta_f\pi'(z)\left(\ln\beta\frac{\delta_f}{w^H} - \ln\beta\frac{\delta_f}{w^L}\right)(EV_m - E\hat{V}_m)
\end{aligned}$$

$$
\begin{aligned}
&+ 2\delta_m \pi'(z)\left(\ln\beta\frac{\delta_m}{w^H} - \ln\beta\frac{\delta_m}{w^L}\right)(EV_f - E\hat{V}_f)\\
&+ 2\alpha_f\pi'(z)(\ln w^H - \ln w^L)(EV_m - E\hat{V}_m) + 2\alpha_m\pi'(z)(\ln w^H - \ln w^L)\\
&\times (EV_f - E\hat{V}_f) = 0,\\
\frac{\partial N}{\partial s_f} &= \left(-1 + \frac{r}{rs_f}\right)(EV_m - E\hat{V}_m) = 0,\\
\frac{\partial N}{\partial s_m} &= \left(-1 + \frac{r}{rs_m - 2b}\right)(EV_f - E\hat{V}_f) = 0,\\
\frac{\partial N}{\partial b} &= \left(\frac{-2}{rs_m - 2b}\right)(EV_f - E\hat{V}_f) + \frac{2\alpha_f}{b}(EV_m - E\hat{V}_m) + \frac{2\alpha_m}{b}(EV_f - E\hat{V}_f) = 0.
\end{aligned}
$$

Following the same procedure as in the case of homogeneous preferences, we obtain

$$
\begin{aligned}
g^C &= \frac{(\alpha_f + \alpha_m)\phi}{w},\\
\pi'(z^C) &= \frac{1}{\left(\alpha_f + \alpha_m - \delta_f - \delta_m\right)\left(\ln w^H - \ln w^L\right)},\\
s_f^C &= 1,\\
b^C &= (\alpha_f + \alpha_m)r,\\
s_m^C &= 1 + 2(\alpha_f + \alpha_m),\\
T^C &= z^C - (\alpha_f + \alpha_m)(1 - \phi) - \delta_f\left\{(\pi(z)\ln\beta\frac{\delta_f}{w^H} + [1 - \pi(z)]\ln\beta\frac{\delta_f}{w^L}\right\}\\
&\quad + \delta_m\left\{\pi(z)\, 2\ln\beta\frac{\delta_m}{w^H} + [1 - \pi(z)]\, 2\ln\beta\frac{\delta_m}{w^L}\right\} + (\delta_f - \delta_m)\\
&\quad + \left(\alpha_m - \alpha_f\right)\left[\phi\ln\frac{\left(\alpha_f + \alpha_m\right)\phi}{w} + \ln\left(\alpha_f + \alpha_m\right)r + \pi(z)\ln w^H\right.\\
&\qquad \left. + [1 - \pi(z)]\ln w^L\right].
\end{aligned}
$$

Substituting into the expressions for EV_f and EV_m, we obtain the value of EV^C in Eq. 19.

For the case where $t_f^J = t_m^J = \frac{\widetilde{\delta}}{w^J}$,

$$
\begin{aligned}
EV_f &= w\left(1 - 2g - 2\frac{\widetilde{\delta}}{w^H}\right) - 2z - s_f + T + \ln rs_f\\
&\quad + 2\delta_f\left\{\pi(z)\ln\beta\frac{\widetilde{\delta}}{w^H} + [1 - \pi(z)]\ln\beta\frac{\widetilde{\delta}}{w^L}\right\} + 2\alpha_f EW
\end{aligned}
$$

and

$$EV_m = w\left(1 - 2g - 2\frac{\widetilde{\delta}}{w}\right) - s_m - T + \ln(rs_m - 2b)$$
$$+ 2\delta_m \left\{\pi(z)\ln\beta\frac{\widetilde{\delta}}{w^H} + [1 - \pi(z)]\ln\beta\frac{\widetilde{\delta}}{w^L}\right\} + 2\alpha_m EW.$$

The FOCs for the maximization of Eq. 7 have the same form as in the previous case, except for

$$\frac{\partial N}{\partial z} = -2(EV_m - E\hat{V}_m) + 2\delta_f\pi'(z)\left(\ln\beta\frac{\widetilde{\delta}}{w^H} - \ln\beta\frac{\widetilde{\delta}}{w^L}\right)(EV_m - E\hat{V}_m)$$
$$+ 2\delta_m\pi'(z)\left(\ln\beta\frac{\widetilde{\delta}}{w^H} - \ln\beta\frac{\widetilde{\delta}}{w^L}\right)(EV_f - E\hat{V}_f)$$
$$+ 2\alpha_f\pi'(z)(\ln w^H - \ln w^L)(EV_m - E\hat{V}_m) + 2\alpha_m\pi'(z)(\ln w^H - \ln w^L)$$
$$\times(EV_f - E\hat{V}_f) = 0$$

Together with the other FOCs, this yields

$$g^C = \frac{(\alpha_f + \alpha_m)\phi}{w},$$
$$\pi'(z^C) = \frac{1}{(\alpha_f + \alpha_m - \delta_f - \delta_m)(\ln w^H - \ln w^L)},$$
$$s_f^C = 1,$$
$$b^C = (\alpha_f + \alpha_m)r,$$
$$s_m^C = 1 + 2(\alpha_f + \alpha_m),$$
$$T^C = z^C - (\alpha_f + \alpha_m)(1 - \phi) + (\delta_f - \delta_m)$$
$$+ (\delta_m - \delta_f)\left\{(\pi(z)\ln\beta\frac{\widetilde{\delta}}{w^H} + [1 - \pi(z)]\ln\beta\frac{\widetilde{\delta}}{w^L}\right\}$$
$$+ (\alpha_m - \alpha_f)\left[\phi\ln\frac{(\alpha_f + \alpha_m)\phi}{w} + \ln(\alpha_f + \alpha_m)r + \pi(z)\ln w^H\right.$$
$$\left. + [1 - \pi(z)]\ln w^L\right].$$

Substituting into the expressions for EV_f and EV_m gives us the value of EV^C in Eq. 23.

References

Aghion P, Dewatripont M, Rey P (1990) On renegotiation design. Eur Econ Rev 34:322–329

Albanese G, De Blasio G, Sestito P (2016) My parents taught me: evidence on the family transmission of values. J Popul Econ 29:571–592

Altonji JG, Hayashi F, Kotlikoff LJ (1992) Is the extended family altruistically linked? Direct tests using micro data. Am Econ Rev 82:1177–1198

Anderberg D, Balestrino A (2003) Self–enforcing intergenerational transfers and the provision of education. Economica 70:55–71

Andreoni J (1990) Impure altruism and donations to public goods: a theory of warm-glow giving. Econ J 100:464–477

Arrondel L, Masson A (2006) Altruism, exchange or indirect reciprocity: what do the data on family transfer show? In: Kolm SC, Mercier Ythier J. (eds) Handbook of the economics of giving, altruism and reciprocity, vol 2, pp 971–1036. Amsterdam: Elsevier North Holland Elsevier

Barro RJ (1974) Are government bonds net wealth J Polit Econ 82:1095–1117

Ben-Porath Y (1980) The F-connection: families, friends and firms, and the organization of exchange. Popul Dev Rev 6:1–30

Bernheim BD, Bagwell K (1988) Is everything neutral? J Polit Econ 96:308–338

Bernheim BD, Ray D (1989) Collective dynamic consistency in repeated games. Games and economic behavior 1:295–326

Bernheim BD, Schleifer A, Summers LH (1985) The strategic bequest motive. J Polit Econ 93:1045–1076

Billari FC, Galasso V (2014) Fertility decisions and pension reforms. Evidence from natural experiments in Italy, IdEP Economic Papers 1403, USI Università della Svizzera Italiana

Bisin A, Verdier T (2001) The economics of cultural transmission and the dynamics of preferences. J Polit Econ 97:298–319

Bisin A, Topa G (2003) Empirical models of cultural transmission. J Eur Econ Assoc 1:363–375

Bjorklund A, Lindahl M, Plug E (2006) The origins of intergenerational associations: lessons from Swedish adoption data. Q J Econ 121:999–1028

Bull C (1987) The existence of self-enforcing implicit contract. Q J Econ 102:147–159

Caillaud B, Cohen D (2000) Intergenerational transfers and common values in a society. Eur Econ Rev 44:1091–1103

Chang Y.-M., Zijun L (2015) Endogenous division rules as a family constitution: strategic altruistic transfers and sibling competition. J Popul Econ 28:173–194

Chiapa C, Juarez L (2016) The schooling repayment hypothesis for private transfers: evidence from the PROGRESA/Oportunidades experiment. Rev Econ Househ 14:811–828

Chiappori PA, Weiss Y (2007) Divorce, remarriage, and child support. J Labor Econ 25:37–74

Chiappori PA, Iyigun M., Weiss Y (2009) Investment in schooling and the marriage market. Am Econ Rev 99:1689–1713

Cigno A (1991) Economics of the family. Oxford and New York: Clarendon Press and Oxford University Press

Cigno A (1993) Intergenerational transfers without altruism: family, market and state. Eur J Polit Econ 9:505–518

Cigno A (2006) A constitutional theory of the family. J Popul Econ 19:259–283

Cigno A (2007) A theoretical analysis of the effects of legislation on marriage, fertility, domestic division of labour, and the education of children, CESifo WP 2143

Cigno A (2012) Marriage as a commitment device. Rev Econ Househ 10:193–213

Cigno A (2014) Is marriage as good as a contract? CESifo Econ Stud 60:599–612

Cigno A, Rosati FC (1992) The effects of financial markets and social security on saving and fertility behaviour in Italy. J Popul Econ 5:319–341

Cigno A, Rosati FC (1996) Jointly determined saving and fertility behaviour: theory, and estimates for Germany, Italy, UK, and USA. Eur Econ Rev 40:1561–1589

Cigno A, Rosati FC (1997) Rise and fall of the Japanese saving rate: the role of social security and intra-family transfers. Jpn World Econ 9:81–92

Cigno A, Rosati FC (2000) Mutual interest, self-enforcing constitutions and apparent generosity. In: Gérard-Varet LA, Kolm SC, Ythier JM (eds) The economics of reciprocity, giving and altruism, 226–247. London and New York: MacMillan and St. Martin's Press

Cigno A, Casolaro L, Rosati FC (2003) The impact of social security on saving and fertility in Germany. FinanzArchiv 59:189–211

Cigno A, Giannelli GC, Rosati FC, Vuri D (2006) Is there such a thing as a family constitution? A test based on credit rationing. Rev Econ Househ 4:183–204

Cohen-Zada D (2006) Preserving religious identity through education: economic analysis and evidence from the US. J Urban Econ 60:372–398

Cox D, Stark O (2005) On the demand for grandchildren: tied transfers and the demonstration effect. J Public Econ 89:1665–1697

Crimmins EM, Ingegneri D (1990) Interactions and living arrangements of older parents and their children. Res Aging 12:3–35
Cremer H, Pestieau P (1996) Bequests as a heir ”Discipline Device”. J Popul Econ 9:405–414
Cremer H, Roeder K (2017) Rotten spouses, family transfers and public goods, Journal of Population Economics 30
Dewatripont M, Maskin E (1990) Contract renegotiation in models of asymmetric information. Eur Econ Rev 34:311–321
Fenge R, Scheubel B (2017) Pensions and fertility: back to the roots. J Popul Econ 30:93–139
Gábos A., Gál RI, Kézdi G (2009) The effects of child-related benefits and pensions on fertility by birth order: a test on Hungarian data. Popul Stud 63:215–231
Galasso V, Gatti R, Profeta P (2009) Investing for the old age: pensions, children and savings. Int Tax Public Financ 16:538–559
Klimaviciute J, Perelman S, Pestieau P, Schoenmaeckers J (2017) Caring for dependent parents: altruism, exchange or family form? J Popul Econ 30:forth
Lam D (1988) Marriage markets and assortative mating with household public goods: theoretical results and empirical implications. J Hum Resour 23:462–487
Levin J (2003) Relational incentive contracts. Am Econ Rev 93:835–856
MacLeod BW, Malcomson JM (1989) Implicit contracts, incentive compatibility and involuntary unemployment. Econometrica 57:447–480
Manser M, Brown M (1980) Marriage and household decision-making: a bargaining analysis. Int Econ Rev 21:31–44
Maskin E, Farrell J (1989) Renegotiation in repeated games. Games and economic behavior 1:327–360
Neeman Z, Pavlov G (2013) Ex post renegotiation-proof mechanism design. J Econ Theory 148:473–501
Ottoni-Wilhelm M, Zhang Y, Estell DB, Perdue NH (2017) Raising charitable children: the effects of verbal socialization and role-modeling on children’s giving. J Popul Econ 30:189–224
Peters M, Siow A (2002) Competing premarital investments. J Popul Econ 110:592–608
Pezzin LE, Pollak RA, Schone B (2009) Long-term care of the disabled elderly: do children increase caregiving by spouses? Rev Econ Househ 7:323–339
Rosati FC (1996) Social security in a non-altruistic model with uncertainty and endogenous fertility. J Public Econ 60:283–294
Smith L (1992) Folk theorems in overlapping generations games. Games and economic behavior 4:426–449
Smith L (2006) The marriage model with search frictions. J Polit Econ 114:6
Stark O (1993) Nonmarket transfers and altruism. Eur Econ Rev 37:1413–1424
Stark O (1995) Altruism and beyond: an economic analysis of transfers and exchanges within families and groups. Cambridge University Press, Cambridge
Tabellini G (2008) The scope of cooperation: values and incentives. Q J Econ 123:905–950