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Long-term economic implications of Demeny voting: A theoretical analysis

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ABSTRACT

Despite the intense debate over possible correctives to the propensity of contemporary democracies experiencing population aging to favor the elderly, a formal analysis of the long-term economic implications of introducing such correctives is lacking. This paper bridges the gap by modeling *intergenerational redistribution* policies by the government through a simple overlapping-generations framework with endogenous fertility. An original feature of our model is that the government policy rule is also endogenized because the weight assigned by the government to the well-being of each living cohort in its objective function changes with both the demographic composition of the voting population and the possibility for young adults to exercise their minor children's voting rights (called Demeny voting). Within this setup, we study the long-term effects of the introduction of Demeny voting on population growth, capital accumulation, output and consumption per capita, and individuals' lifetime well-being.

1. Introduction

This paper analytically explores the long-term economic implications of some political reforms that make myopic governments more responsive to the interests of younger generations than to those of older generations. An example of such reforms is the introduction of "Demeny voting," that is, a proposal in which custodial parents are permitted to exercise their children's voting rights until they come of age. Although this proposal was formulated in the past,[1] more recently it was reconsidered and put forward by the demographer Demeny (1986) in order to "make the political system more responsive to the young generation's interests" and as a

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[1] In 1848, Antonio Rosmini, an Italian philosopher and theologian, proposed a constitution, in which article 59 reads: "The right to vote is exercised solely by men. It can be exercised through legal representation: fathers, husbands, tutors, and caretakers exercise it on behalf of children who are legal wards, wives, minors, and the interdicts" (Rosmini, 2007). Since the mid-nineteenth century, different concepts of family voting have been developed and discussed in France and Germany (see Gesley, 2018). For a comprehensive discussion of the extension of suffrage through proxy votes for children and other proposals put forward to secure intergenerational justice, see Van Parijs (1998).

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part of pronatalist policies in low-fertility countries. Since then, it has been discussed in a few countries and by various scholars.[2] This growing interest is explained by the concern in contemporary democracies that public policies can be biased toward the elderly, as they comprise an increasing share of voters and thus have more influence on political decision making.[3] This fact, in turn, might reduce the resources redistributed to the younger generation and contribute to reduction in the fertility rate. Therefore, Demeny voting has been mentioned as a tool for contrasting a possible vicious circle between, on the one hand, the increase in the relative political weight of the elderly due to the reduction in birthrates and the increase in longevity and, on the other hand, the reduction in the propensity to have children due to public policies that disadvantage young people.

Despite the intense debate over possible correctives to the propensity of contemporary democracies experiencing population aging to favor the elderly, no formal analysis has been conducted to date on the long-term economic implications of introducing these correctives. This paper bridges the gap by modeling intergenerational redistribution policies through a simple overlapping-generations framework with endogenous fertility, in which the young and the old cohorts both pay taxes or receive transfer payments, which also gives subsidies to young adults in proportion to the number of children they have. The novelty of our model is that the government policy rule is endogenized, because the weight assigned by the government to the well-being of each living cohort in its objective function depends on this cohort's influence on the voting process, which in turn is assumed to change with both the relative size of the cohort and the ability of young adults to vote in place of their children. Within this setup, we study the long-term effects of political reform—such as a change in the voting system that enables parents to exercise their children's voting rights—on population growth, capital accumulation, output and consumption per capita, and individuals' lifetime well-being.

The rest of the paper is organized as follows. The relevant empirical and theoretical literature is briefly discussed in Section 2, the model is presented in Section 3, the difference equation governing the equilibrium path of the economy is derived in Section 4, the steady-state and welfare analysis is in Section 5, and Section 6 concludes.

2. Relevant empirical and theoretical literature

The evidence on many democracies shows that the intergenerational allocation of public spending is influenced by the age structure of the population. In particular, the aging of population in the advanced economies since the later part of the twentieth century has inspired a large number of papers that investigate the effects of the changing demographic structure on both the size of the welfare state and the composition of social spending.[4] Although in almost all countries, population aging has undoubtedly led to an increase in the share of public spending on the elderly, driven by growth in expenditure on pensions and health care due to their rising number, the evidence is more varied with regard to the effects of population aging on net public spending per elderly person.[5] In recent years in particular, growing concern about the sustainability of the welfare system has counterbalanced the increasing weight of the older cohorts in elections, leading many countries to reduce generosity toward the elderly in the system. Nonetheless, most countries have experienced a common trend toward improvement in the position of the elderly relative to that of the young and the very young. Lee (2020), for instance, notes that, in the United States, the ratio of consumption expenditure between those age 80 and those age 20 more than doubled from 1960 to 2011 and that similar changes occurred in Sweden and (over a shorter period) in Japan, remarking that this growing intergenerational gap in consumption expenditure is likely attributable at least in part to the increased generosity of the public pension system. This long-term trend is also consistent with the evidence on the incidence of

[2] A reform of the voting system that allows parents to vote in place of their not-yet-enfranchised children was formally discussed by the German parliament (Deutscher Bundestag, 2004). Sanderson and Scherbov (2007) see Demeny voting as a way of reducing the weight in the voting process of those who receive a public pension or are close to receiving one. Aoki and Vaithianathan (2009) argue that Japan should adopt Demeny voting in order to introduce more generous family policies, which are necessary to raise its low fertility rate. An extreme version of Demeny voting theorizes that the right to vote should be assigned directly to minors beginning at age six (Wall, 2014, 2021; Runciman, 2021). Campiglio (1997, 2005) and Campiglio and Lorenzetti (2022) discuss the absence of representation of minors in democracies. Kamijo et al. (2015) perform a laboratory experiment, obtaining mixed evidence about whether the resource allocation across generations is affected by the introduction of Demeny voting.

[3] It is often emphasized that seniors' influence on public policy exceeds what their share among those eligible to vote would justify, as they vote at higher rates than younger cohorts. However, the link between the turnout rates of particular groups and policy outcomes has been questioned for both empirical and theoretical reasons (see Anzia, 2019).

[4] Preston (1984) was one of the earliest to document that population aging in the United States is accompanied by an allocation of public funds that dramatically improved conditions for the elderly and worsened conditions for children. Among the subsequent papers that focus on the link between changes in age structure and public policy in the United States, Poterba (1998) presented evidence that older and childless voters are less likely to support spending on public education than younger voters with children. Among the studies that use cross-national evidence, McDonald and Budge (2005) focus on 21 democracies from 1950 to 1995, showing that the allocation of public expenditure depends on both the ideology of the political party in power and the age structure and that the proportion of the population age 65 and older had a significantly positive impact on government social spending in the 1990 s, after the ideology of the political party in power is controlled for. Disney (2007) also finds that from the 1970 s to the 1990 s, in 21 industrialized countries the size of the welfare state increased with the relative size of the population age 65 years and older, after relevant economic factors are controlled for.

[5] According to Tepe and Vanhuysse (2009), the evidence on 18 member countries in the Organization for Economic Cooperation and Development (OECD) between 1980 and 2002 does not support the theory that Western societies are becoming "gerontocracies," because this theory predicts not only that aggregate expenditure on pensions increases with the number of older people who are qualified to draw pensions but also that individual pensions become more generous as the proportion of elderly voters in the population grows—i.e., that pensions *per elderly person* increase with aging in the population.

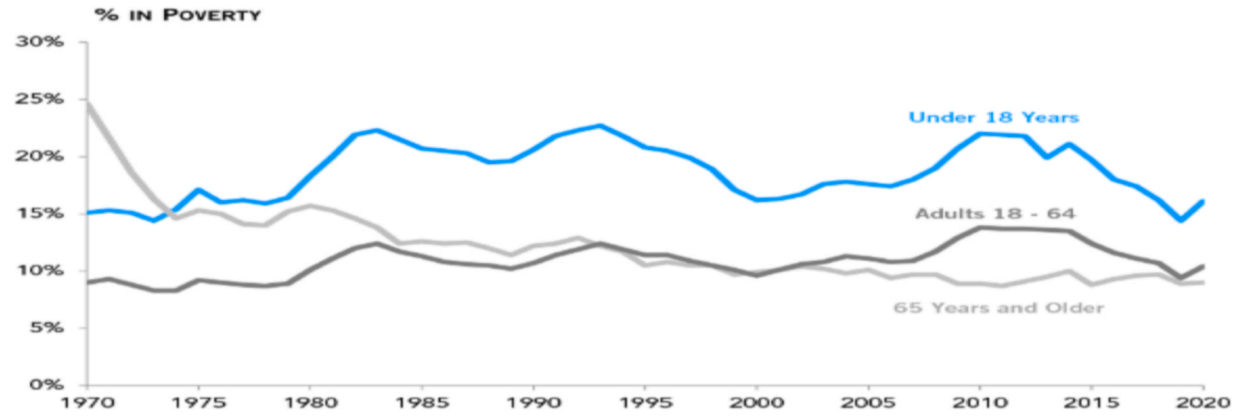

Fig. 1. Population of different ages living in poverty in the United States, 1970–2020. *Source*: Peter G. Peterson Foundation (2022).

poverty among different age groups in the United States (see Fig. 1), which did not fall in 2020 relative to 1970 for those under age 18, whereas over the same period it declined dramatically for the elderly (age 65 and older). Therefore, it is not surprising that, in many advanced economies, per capita net public spending is considerably lower on children than on the elderly.[6]

Some sociologists argue that the fact that the older cohorts are larger and more powerful electorally does not necessarily lead to redistribution policies biased in favor of the elderly: national institutional arrangements interact with the age composition of the population in shaping the intergenerational distributional conflict (see, e.g., Esping-Andersen and Sarasa, 2002; Pampel, 1994).[7] It is in this spirit that the model in the next section analyzes how reforms in the institutional framework, in particular the electoral system, can affect intergenerational redistribution, and thereby long-term economic growth, as well as the demographic composition of the population. The impact of public policies on the demographic structure is modeled here based on the hypothesis that these policies affect fertility choices by changing the cost of raising children, whether in monetary terms or in terms of opportunity costs. Indeed, robust evidence indicates that family policies contributed to a rebound in fertility that occurred in some developed countries, after a sharp decline in birthrates beginning in the mid-1970s (see, e.g., Luci-Greulich and Thévenon, 2013; Wesolowski and Ferrarini, 2018).[8]

The evidence that public policies can influence fertility by decreasing the direct costs of having children through cash benefits (subsidies and tax relief) and the opportunity cost of raising them through in-kind benefits is captured in a series of theoretical models. Although providing an exhaustive survey of the models with endogenous fertility is beyond the scope of this paper, a brief discussion of a few models that deal with the impact of public policies on fertility can be useful in clarifying the details in our formal setup.[9]

The existence of a compulsory pay-as-you-go (PAYG) pension system generates a positive externality, because the social benefit of having an additional child (who, as a future worker, will contribute to the pension system) exceeds the private benefit enjoyed by the child's parents (Cigno, 1993). Recognition of this outcome has given rise to a strand of literature that explores whether child allowances can increase the fertility rate, make the pension system sustainable, and improve social welfare (see, e.g., Cipriani and Pascucci, 2020; Groezen et al., 2003; Groezen and Meijdam, 2008; Schoonbroodt and Tertilt, 2014; Stauvermann and Wernitz, 2019; Yasuoka, 2013; Yasuoka and Goto, 2011). Baudin (2011) analyzes the conditions under which it is socially optimal to subsidize or to tax births and education, regardless of whether a PAYG pension plan is in place, and Granelli (2016, 2017) studies the effects of

[6] In the United States, for instance, in 2011 per capita net transfer payments were USD 13,400 to those less than 24 years old, compared with USD 15,900 to those age 65 or older (see Lee & Mason, 2018); in 2020 US federal spending per child made up approximately 75 % of the federal expenditure per capita age 18 and older (see Peter G. Peterson Foundation, 2022). In the United Kingdom, where the gap in per capita government spending between children and pensioners more than doubled between 1999 and 2000 and 2018–2019, the government spent £ 14,655 per child, £ 10,178 per working-age adult, and £ 20,789 per pensioner in 2018–2019 (see Bui, 2021).

[7] Pampel (1994) suggests that the intergenerational distributional clash becomes more severe in countries where insiders' and pensioners' lobbies succeed in affecting pension reforms. Esping-Andersen and Sarasa (2002) claim that the old-age bias is more country specific than universal, because national political systems that organize and concentrate interests tend to encourage solidarity across generations. Busemeyer et al. (2009) study the determinants of individual attitudes toward social policies in 14 OECD countries, showing that these attitudes are determined not only by one's position on the income scale but also by one's position in the life cycle (age), and some countries, such as the United States, show higher salience of the age cleavage across all policy fields.

[8] Family policies include a wide range of instruments with different effects on fertility. Cohen et al. (2013) exploit variations in Israel's child subsidy program over the period 1999–2005 and find a significant and positive effect of subsidies on fertility. For a survey of the available evidence on the effects of family policies on fertility, see Sobotka et al. (2019). For a recent review of the literature on the effects of policy on fertility since 1970 in developed countries (Europe, the United States, Canada, and Australia), see Bergsvik et al. (2021).

[9] Models of endogenous fertility are inspired by Becker's (1960) representation of fertility at the family level as the result of rational decision-making. In subsequent variants of the standard model, parents may decide about the number of children to have and possibly about their quality (i.e., about how much to invest in the human capital of each child) and about consumption, savings, transfers to children, spending on health, and time allocation among work, leisure and child care.

pronatalist fiscal subsidies on fertility using a general equilibrium model with dynastic households. Fanti and Gori (2014) incorporate endogenous fertility (together with endogenous longevity) into a growth model with overlapping generations, showing that a child tax can be used to increase capital accumulation, escape poverty, and maximize long-term welfare.

In all these papers, public policies are not the result of a democratic decision-making process but, rather, are exogenously given or derived as solutions to a social planning problem. In contrast, in the simple overlapping-generations model (OLG) presented here, the redistributive policies implemented by the government respond in any period to the interests of the living generations based on the electoral weight of the different cohorts (young and old adults), which is affected by the possible introduction of Demeny voting. To the best of our knowledge, Kaganovich and Meier (2012) and Kaganovich and Zilcha (2012) are the only other papers that formally account for the role of the democratic process in deciding on intergenerational public transfers.[10] However, although these papers demonstrate that the existence of a social security system (whether pay-as-you-go or fully funded) strengthens political support among current workers for public investment in the education of the future workforce, our objective is more general: to show that giving greater electoral weight to voters—such as adults with minor children—who tend to have a longer time horizon than older voters is conducive to public policies that, in the long run, enable individuals to enhance their lifetime well-being.[11]

3. The model

We consider a closed economy with an infinite time horizon that consists of firms, households, and the government. Time is discrete, and agents' expectations are consistent with the actual processes, followed by the relevant variables. We rule out the possibility of stochastic shocks, which implies perfect foresight.

3.1. Firms

The number of perfectly competitive firms is large, normalized to 1. In each period t, the representative firm produces Y_t (the numeraire of the system) based on the following Cobb-Douglas technology:

$$Y_t = K_t^{1-\alpha} L_t^{\alpha},\ 0 < \alpha < 1,\ \mathrm{t} = 0,\ 1,\ 2..., \tag{1}$$

where K_t and L_t are, respectively, the stock of productive assets ("capital") and the labor services used for the production of Y_t.

In every t, the representative firm chooses K_t and L_t so as to maximize its profit

$$\pi_t = K_t^{1-\alpha} L_t^{\alpha} - R_t K_t - W_t L_t,\ \mathrm{t} = 0,\ 1,\ 2... \tag{2}$$

where R_t and W_t are, respectively, the rental rate of capital and the real wage.

3.2. Households

Population evolves according to

$$N_t = N_{t-1} n_t,\ N_{-1} \text{ and } N_{-2} \text{ given},\ t = 0,1,2\ \ldots, \tag{3}$$

where N_t is the number of newborns in period t (children), N_{t-1} is the number of young adults in period t (those born in t-1), and n_t is the number of children that each young adult has in t. The young adults alive in period t survive another period, becoming old in period $t + 1$, after which they die. Therefore, in every period t, the adult population consists of two generations: the young and the old.

Every adult who is young in period t (every "young household") works full time, inelastically supplying one unit of labor to firms at the ongoing real wage W_t. The net transfers that it receives from the public sector in period t are negative (positive) whenever the taxes that it pays to the government are higher (lower) than the transfer inflows that it receives as the beneficiary of a government program. In period t, a young household decides how much of its disposable income to spend on consumption c_{yt}, rather than productive assets k_{t+1}, which it can rent out to firms in period $t + 1$ when it becomes old.[12] These productive assets are assumed to fully depreciate at the end of $t + 1$. Finally, during t, every young household also decides on the number of children n_t that it wants to have.

In contrast, every adult who is old in period t (every "old household") does not work, renting to firms the productive assets accumulated in the previous period at the ongoing rental rate R_t. In addition, the net transfers that every old household receives from the government in period t are negative (positive) when the taxes that it pays are higher (lower) than the transfer inflows that it receives as the beneficiary of a government program, such as a public pension. Finally, it spends all its disposable income on consumption c_{ot}.

[10] In these papers, the tax rate on which the level of public education provided to the young cohort in any period depends is the most preferred by the majority of voters.

[11] One could argue that the longer time horizon that characterizes the younger cohorts helps to explain why opinion surveys in all developed countries show that the salience of climate change decreases with the age of the respondent.

[12] It is immaterial in this context whether the young households buy some productive assets directly or through investment (or pension) funds that manage their savings on their behalf.

The lifetime utility of a young household in period t ($t = 0,1,2 \ldots$) is:

$$U_t = u(c_{yt}, n_t) + \beta v(c_{ot+1}),\ 0 < \beta < 1,\ u_c > 0,\ u_{cc} \leq 0,\ u_n > 0,\ u_{nn} \leq 0,\ \mathrm{t} = 0,\ 1,\ 2..., \tag{4}$$

where β is a time discount factor. The current utility of a young household increases with its consumption and number of children, whereas the utility of an old household depends only on its consumption.

In period *t*, the budget constraint faced by the representative young household is:

$$c_{yt} + k_{t+1} + \eta n_t \leq W_t(1 - \tau_t) + s_t n_t,\ \eta > 0,\ \tau_t \leq 1,\ k_0 \text{given},\ \mathrm{t} = 0,\ 1,\ 2..., \tag{5}$$

whereas the budget constraint faced by an old household is:[13]

$$c_{ot+1} \leq k_{t+1} R_{t+1}(1 - \gamma_{t+1}),\ \gamma_{t+1} \leq 1,\ \mathrm{t} = 0,\ 1,\ 2..., \tag{6}$$

where η is the cost of raising a child,[14] τ_t is the tax rate on labor income, s_t is a government subsidy received by a young household for each child that it has, and γ_t is the tax rate on capital income. It is not relevant here whether subsidies take the form of monetary transfers or government services.

In every period *t*, the representative young household chooses c_{yt}, n_t, and k_{t+1} so as to maximize its lifetime utility (4), subject to the budget constraints (5) and (6). In contrast, the representative old household has no choice to make (it consumes all its disposable income).

3.3. Government

In every period *t*, the government chooses its policy instruments τ_t, γ_t, and s_t so as to maximize:

$$G_t = \frac{(N_{t-1} + \xi N_t)}{N_{t-1} + \xi N_t + N_{t-2}}[u(c_{yt}, n_t) + \beta v(c_{ot+1})] + \frac{N_{t-2}}{N_{t-1} + \xi N_t + N_{t-2}} v(c_{ot}),\ 0 \leq \xi \leq 1,\ t = 0,\ 1,\ 2... \tag{7}$$

which is a weighted average of the utility of the living (and voting) adult cohorts, subject to:

$$N_t s_t \leq \tau_t N_{t-1} W_t + \gamma_t N_{t-2} R_t k_t,\ \mathrm{t} = 0,\ 1,\ 2... \tag{8}$$

where the weight of the well-being of young adults in the government's objective function increases with ξ, which captures the importance that the government assigns to children in its decision-making. One might think that this importance would grow if the electoral system permitted every young adult with children to cast more than one vote, and the number of additional votes depended on the number of children. $\xi = 0$ consistently fits the current situation, in which no country gives parents of minor children more weight in the electoral process than adults without minor children, whereas $\xi = 1$ holds if the number of additional votes assigned to each household equals the number of its minor children. A value of ξ between 0 and 1 is appropriate when the number of additional votes assigned to each household with minor children is a fraction of the number of its children. In addition, consider that the government in office in period t does not have full control over policies in subsequent periods, as it cannot commit governments in office in those later periods to implement policies that are not optimal from their perspective. Finally, notice that the government cares only about the current voters, but since current young adults also care about their own consumption in old age, the government does include their old-age utility in its objective function.

3.4. Market equilibrium

Market equilibrium for the single good produced in this economy can be represented as:

$$Y_t = N_{t-1}(c_{yt} + k_{t+1} + \eta n_t) + N_{t-2} c_{ot},\ \mathrm{t} = 0,\ 1,\ 2..., \tag{9}$$

Market equilibrium in labor and capital, respectively, can be represented as,

$$N_{t-1} = L_t,\ \mathrm{t} = 0,\ 1,\ 2..., \tag{10}$$

and

$$N_{t-2} k_t = K_t,\ \mathrm{t} = 0,\ 1,\ 2.... \tag{11}$$

[13] Note that $\gamma_t \leq 1$ leaves open the possibility that in period t old households receive positive net transfers from the government in proportion to their income ($\gamma_t < 0$). Similarly, $\tau_t < 0$ implies that in period *t*, young households receive positive net transfers from the government.

[14] Assuming that the cost of raising a child is fixed, as well as assuming that each household inelastically supplies one unit of labor services, we simplify the analysis without losing anything essential with regard to the scope of the model.

4. Solving the model

4.1. Firms

To solve the problem of the representative firm, we use the equilibrium conditions (10) and (11), together with the law governing the evolution of the population given by Eq. (3), to obtain:

$$W_t = \alpha k_t^{1-\alpha} n_{t-1}^{\alpha-1} \tag{12}$$

and

$$R_t = (1-\alpha) k_t^{-\alpha} n_{t-1}^{\alpha} \tag{13}$$

4.2. Households

Assuming that the household utility function is logarithmic and using the budget constraint given by (6), Eq. (4) can be rewritten as:

$$U_t = \ln(c_{yt}) + \varphi \ln(n_t) + \beta \ln[k_{t+1} R_{t+1}(1-\gamma_{t+1})],\ \varphi > 0, \tag{14}$$

where φ is a parameter that measures the importance of children in the well-being of young adults. It is straightforward that the use of a specific functional form for the utility function of the representative household limits the generality of our analysis. However, some empirical evidence shows that preferences can be approximated with a log utility function, which is commonly also used because it vastly simplifies the analysis.

Maximizing the utility function (14) subject to the budget constraint (5) with respect to c_{yt}, n_t, and k_{t+1}, we obtain the optimal decision rules of the representative young household:

$$c_{yt} = \frac{W_t(1-\tau_t)}{1+\beta+\varphi}, \tag{15}$$

$$n_t = \frac{\varphi c_{yt}}{(\eta - s_t)} = \frac{\varphi W_t(1-\tau_t)}{(1+\beta+\varphi)(\eta - s_t)}, \tag{16}$$

$$k_{t+1} = \beta c_{yt} = \frac{\beta W_t(1-\tau_t)}{1+\beta+\varphi}. \tag{17}$$

4.3. Government

Considering the household utility function given by (14), and using the Eqs. (12)-(13) and the optimal decision rules (15)-(17), the government's objective function (7) can be rewritten as:

$$G_t = \frac{(N_{t-1}+\xi N_t)}{N_{t-1}+\xi N_t + N_{t-2}} \left\{ \ln\left[\frac{\alpha k_t^{1-\alpha}(1-\tau_t)}{n_{t-1}^{1-\alpha}(1+\beta+\varphi)}\right] + \varphi \ln\left[\frac{\alpha k_t^{1-\alpha}(1-\tau_t)\varphi}{n_{t-1}^{1-\alpha}(1+\beta+\varphi)(\eta-s_t)}\right] + \beta \ln\left[\frac{(1-\alpha)\alpha k_t^{1-\alpha}(1-\tau_t)\beta^{1-\alpha}\varphi^{\alpha}(1-\gamma_{t+1})}{n_{t-1}^{1-\alpha}(1+\beta+\varphi)(\eta-s_t)^{\alpha}}\right] \right\} + \frac{N_{t-2}}{N_{t-1}+\xi N_t + N_{t-2}} \ln[(1-\alpha)k_t^{1-\alpha} n_{t-1}^{\alpha}(1-\gamma_t)], \tag{18}$$

whereas the government's budget constraint (8) can be rewritten as:

$$N_{t-1} s_t \frac{\alpha k_t^{1-\alpha}(1-\tau_t)\varphi}{n_{t-1}^{1-\alpha}(1+\beta+\varphi)(\eta-s_t)} \le \tau_t N_{t-1} \frac{\alpha k_t^{1-\alpha}}{n_{t-1}^{1-\alpha}} + \gamma_t N_{t-2}(1-\alpha) k_t^{1-\alpha} n_{t-1}^{\alpha}. \tag{19}$$

Maximizing the government's objective function (18) subject to the budget constraint (19) with respect to τ_t, γ_t, and s_t, and using the population's law of motion (3), we obtain the government's policy rules:

$$s_t = \bar{s} = \frac{\alpha\beta\eta(1+\beta+\varphi)}{(\varphi+\alpha\beta)(1+\beta)}. \tag{20}$$

and

$$\gamma_t = 1 - \frac{(1-\tau_t)\alpha\varphi\eta}{(\varphi+\alpha\beta)(\eta-\bar{s})(1+\beta+\varphi)(1+\xi n_t)(1-\alpha)n_{t-1}} \tag{21}$$

Moreover, it follows from Eqs. (12), (16), (17), and (20) that

$$\tau_t = 1 - \frac{(1+\beta+\varphi)n_t}{\alpha\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha}. \tag{22}$$

Taking into account Eqs. (21) and (22), we can confirm that a larger ξ tends to raise the tax rate on the older generation's capital income. This might provide a rationale for the old generation's opposition to reform in the voting system to give more weight to the parents of minor children.

4.4. The equilibrium path of the economy

Because along an optimal path the government's budget constraint holds as an equality, we can use Eqs. (3) and (20)-(22) to derive from the budget constraint (19) the difference equation in n_t that governs the equilibrium path of the economy:

$$\Psi(n_t, n_{t-1}) = 1 + \xi n_t - (1+\xi n_t)\left[\frac{(1+\beta+\varphi)n_t}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}n_t}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right] - \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}n_t}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}n_{t-1}} = 0. \tag{23}$$

5. Steady-state and welfare analysis

5.1. Steady state: Existence, uniqueness, and stability

At a steady state, $n_t = n_{t-1} = n$, and Eq. (23) can be rewritten as:

$$\Phi(n, \xi) = 1 + \xi n - (1+\xi n)\left[\frac{(1+\beta+\varphi)n}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}n}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right] - \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}} = 0 \tag{24}$$

The steady-state value of n exists and is unique:

$$n^* = \begin{cases} -\frac{(\xi^{-1}-A)}{2} + \sqrt{\left(\frac{\xi^{-1}-A}{2}\right)^2 + A\left[1 - \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}}\right]\xi^{-1}} \text{ if } 0 < \xi \leq 1 \\ A\left[1 - \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}}\right] \text{ if } \xi = 0, \end{cases} \tag{25}$$

where $1 - \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}} > 0$ and $A \equiv \left[\frac{(1+\beta+\varphi)(\eta-\bar{s})}{\varphi} + \bar{s}\right]^{-1}\left[\frac{(\eta-\bar{s})\beta}{\varphi}\right]^{1-\alpha}$.

One can easily check that there is a non-empty set of parameter values that satisfies $1 - \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}} > 0$, which is a necessary and sufficient condition for the existence of n^*.

This steady state is also locally stable, because[15]

$$\left.\frac{dn_t}{dn_{t-1}}\right|_{n_t=n_{t-1}=n^*} = -\frac{\left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_{t-1}}\right|_{n_t=n_{t-1}=n^*}}{\left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_t}\right|_{n_t=n_{t-1}=n^*}} \tag{26}$$

where $0 < -\frac{\left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_{t-1}}\right|_{n_t=n_{t-1}=n^*}}{\left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_t}\right|_{n_t=n_{t-1}=n^*}} < 1.$

[15] Indeed, $0 < \left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_{t-1}}\right|_{n_t=n_{t-1}=n^*} = \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}n^*} < \left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_t}\right|_{n_t=n_{t-1}=n^*} = \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}n^*} - \xi + (1+2\xi n^*)\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right]$,

which holds because $1 - \frac{\eta\beta^{\alpha-1}\varphi^{1-\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}} > 0$ and Eq. (24), together, entail $(1+2\xi n^*)\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right] - \xi > 0.$

5.2. Welfare Analysis

An increase in the weight of the utility of young adults in the government's objective function leads to a larger steady-state value of n:[16]

$$\frac{dn^*}{d\xi} = -\frac{\left.\frac{\partial\Phi(n,\xi)}{\partial\xi}\right|_{n=n^*}}{\left.\frac{\partial\Phi(n,\xi)}{\partial n}\right|_{n=n^*}} > 0 \tag{27}$$

Given Eqs. (16) and (17), this yields $\frac{dc_y^*}{d\xi} > 0$ and $\frac{dk^*}{d\xi} > 0$, in which the asterisk denotes the steady-state value of a variable. Furthermore, a larger ξ leads to a larger steady-state value of output per adult, as shown by the following:

$$\frac{dy^*}{d\xi} = \frac{dn^*}{d\xi}\frac{dy^*}{dn^*} = \frac{dn^*}{d\xi}\left[\frac{(\eta-\bar{s})\beta}{\varphi}\right]^{1-\alpha}\frac{1}{(1+n^*)^2} > 0, \tag{28}$$

where $\frac{dn^*}{d\xi}$ is given by Eq. (27), $y_t \equiv \frac{Y_t}{N_{t-2}+N_{t-1}}$ and $y^* = \left[\frac{(\eta-\bar{s})\beta}{\varphi}\right]^{1-\alpha}\frac{n^*}{1+n^*}$.

Therefore, the following proposition holds:

Proposition 1. In the long run, giving more weight to the interests of young adults in the government's objective function increases the population growth rate, the consumption level of each young adult, the capital stock per worker, and the output per adult.

The larger stock of capital accumulated by young workers as a result of the increase in ξ in the long run leads to a higher steady-state level of pretax capital income R^*k^*. However, a larger ξ raises the steady-state value of the tax rate γ^* to which the capital income of the old generation is subject. Thus, the overall long-term impact of a larger ξ on the old generation's steady-state level of consumption $c_o^* = R^*k^*(1-\gamma^*)$ is ambiguous $\left(\frac{dc_o^*}{d\xi} \lesseqgtr 0\right)$, depending on the parameter values. Nevertheless, the long-term impact of a larger ξ on the lifetime utility of a young household U^* is strictly positive [17]:

$$\frac{dU^*}{d\xi} = \frac{dn^*}{d\xi}\left[\frac{(1+\beta+\varphi)}{n^*} - \frac{\beta\xi}{(1+\xi n^*)}\right] - \frac{\beta n^*}{(1+\xi n^*)} > 0, \tag{29}$$

where $\frac{dn^*}{d\xi}$ is given by (27), and $U^* = \ln(c_y^*) + \varphi\ln(n^*) + \beta\ln(c_o^*) = (1+\varphi+\beta)\ln(n^*) - \beta\ln(1+\xi n^*) + \ln\left(\frac{\eta-\bar{s}}{\varphi}\right) + \beta\ln\left[\frac{\eta}{(\varphi+\alpha\beta)}\right]$.

Inequality (29) leads us to state the following proposition:

Proposition 2. In the long run, giving more weight to the interests of young adults in the government's objective function increases the discounted sequence of utilities that individuals obtain over their lifetime.

Even if reform in the voting system that gives more weight to young adults has ambiguous effects on the steady-state utility of old adults, in the long run this reform unambiguously enhances the well-being that, at birth, individuals can expect to achieve over their lifetime.

6. Conclusion

In a democracy, the influence of each demographic group on the political decision-making process is related to its relative numeric weight within the electorate. In this paper, this link between the political influence of each demographic group and its numeric

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[16] Indeed, $\left.\frac{\partial\Phi(n,\xi)}{\partial\xi}\right|_{n=n^*} = n^*(1+n^*)\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right] > 0$ and $\left.\frac{\partial\Phi(n,\xi)}{\partial n}\right|_{n=n^*} = \left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_{t-1}}\right|_{n_t=n_{t-1}=n^*} + \left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_t}\right|_{n_t=n_{t-1}=n^*} = \xi - (1+2\xi n^*)\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right] < 0$ (see the previous note)

[17] Indeed, Eq. (29) can be rewritten as $\frac{dU^*}{d\xi} = \frac{n^*(1+n^*)\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right]\left[\frac{(1+\beta+\varphi)}{n^*} - \frac{\beta\xi}{(1+\xi n^*)}\right]}{(1+2\xi n^*)\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right] - \xi} - \frac{\beta n^*}{(1+\xi n^*)} > 0$, which holds since $1 - \frac{\eta\beta^{\alpha}}{(\varphi+\alpha\beta)(\eta-\bar{s})^{1-\alpha}\varphi^{\alpha}} > 0$ and Eq. (24), together, entail $\frac{(1+n^*)}{(1+\xi n^*)}\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right][(1+\varphi)(1+\xi n^*)+\beta] > \frac{\beta n^*}{(1+\xi n^*)}\left\{(1+2\xi n^*)\left[\frac{(1+\beta+\varphi)}{\beta^{1-\alpha}\left(\frac{\varphi}{\eta-\bar{s}}\right)^{\alpha}} + \frac{\bar{s}}{\beta^{1-\alpha}}\left(\frac{\eta-\bar{s}}{\varphi}\right)^{\alpha-1}\right] - \xi\right\}$.

weight is endogenized, and it is shown that a reform in the electoral system that permits every young adult with minor children to cast more than one vote (Demeny voting) has relevant long-term effects on the economy. Hence, our article is at the intersection of literature on Demeny voting and on formal models with endogenous fertility that address the problem of an aging population and focuses on the fiscal redistribution of resources between young and old cohorts. Linking these issues to economic growth through a simple OLG model, we demonstrate that, even if the government is myopic, in the sense that it cares only about the well-being of the living (and voting) generations, in the long run an increase in the importance that it attaches to the interests of young cohorts relative to those of older cohorts leads to a higher population growth rate and raises the consumption level of every young adult, the capital stock per worker, and the output per adult. We also show that, in the long run, this increase improves the well-being that individuals can expect at birth throughout their lives.

The long-term effects mentioned above depend on redistributing more resources to that portion of the population (the younger generation) that, having a longer life expectancy—and thus a longer time horizon—by virtue of its age, is more willing to invest in the future. In general, giving more political leverage to young voters could lead to the adoption of public policies with long-run benefits, rather than those with a short-term payoff. However, in the period in which reforms (e.g., the introduction of Demeny voting) are implemented, the income redistribution due to the government tax and transfer system becomes more favorable to the young cohort and less generous to the old cohort. Therefore, the old cohort is expected to oppose the implementation of these reforms.

The problem of how to overcome opposition by groups that are penalized by a reform that, in the long run, has benefits for everyone but that, at the time of its implementation, involves costs for a portion of the population that is currently living is not new. Typically, for instance, shifting from a pay-as-you-go pension system to a fully funded one can enhance capital accumulation and thus long-term growth. However, the cohorts that are of working age when the reform of the pension system is implemented can experience a negative impact from it, because they have to save for their old age knowing that they will not have access to a public pension and yet they have to make mandatory contributions to fund the public pensions of current retirees.

To make this reform easier to accept, some have proposed that the cohorts that are negatively affected by the reform receive compensation in the future from the government, that will finance it by borrowing from cohorts who—being young at that time—will benefit from the incremental income growth made possible by the reform (see, e.g., Belan et al., 1998; Cipriani and Makris, 2012). Apart from the credibility problem that this compensation scheme would face, because the government that will disburse the compensation in the future is unlikely to be the same as the one that is currently implementing the reform and promising to compensate the cohorts that are on the losing side, this scheme does not in any case facilitate the introduction of Demeny voting. Indeed, the generation penalized by granting more electoral weight to the young cohorts is the old one, who will no longer be alive when the beneficial effects of the reform are felt. Alternatively, one could argue that the older cohorts would be induced to accept the introduction of Demeny voting if the government could credibly promise to leave unchanged the transfers for those who are currently old. In this case, however, it would be the young cohorts who would oppose it because they would not benefit from it in the present, despite knowing that in the future the reform would penalize them to the advantage of the cohorts who would then be young.

Therefore, it seems unlikely that the introduction of a reform that reduces the electoral weight of the older cohorts can find sufficient consensus on the basis of a purely economic calculation. It is more likely that a consensus on redistributive measures in favor of the younger generation, aimed at raising the birthrate, would rely on people's identitarian sentiments. In some Western countries, indeed, these sentiments are associated with a growing concern among voters about the ongoing decline in the native population. Future research should analyze the interaction between this cultural-identitarian dimension and the socioeconomic one to determine public policies on intergenerational redistribution of resources and ways to support fertility.

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