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10039
2022

October 2022

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CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
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CESifo *Working Paper No. 10039*

Long-Term Economic Implications of Demeny Voting: A Theoretical Analysis

Abstract

This paper places itself at the intersection between the literature on "Demeny voting" (the proposal of letting custodial parents exercise their children's voting rights until they come of age) and the vast literature on formal models with endogenous fertility that address the problem of fiscal redistribution between young and old cohorts in the presence of an aging population. Linking these issues to the process of economic growth through a simple overlapping generations model, we show that, even if the government is myopic, in the sense that it cares only about the current well being of the living (and voting) generations, an increase in the relative importance that it attaches to the interests of the young cohort (for instance, due the introduction of Demeny voting) leads in the long run to a higher population growth rate and raises the consumption level of each young adult, the capital stock per worker and the output per adult. We also show that in the long run such a reform raises the well being that individuals can expect at birth to achieve during their lifetime.

JEL-Codes: D100, D720, H230, J130, O410.

Keywords: OLG model, fertility, fiscal redistribution, well being, child allowances.

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1. INTRODUCTION

This paper intends to explore analytically the long-term economic implications of "Demeny voting", i.e. the proposal of letting custodial parents exercise their children's voting rights until they come of age. This proposal was put forward by the demographer Paul Demeny (1986) in order to "make the political system more responsive to the young generation's interests" and as a part of pronatalist policies in low-fertility countries. Although it was already formulated in the past,[1] it is only in the last few decades that this proposal has been reconsidered and discussed.[2] This growing interest finds its rationale in the concern that in contemporary democracies public policies can be biased in favor of the elderly, since the latter represent an increasing share of the voters, thus exerting more influence on political decision making.[3] In its turn, this fact may reduce the resources redistributed to the young cohorts and contribute to depress the fertility rate. Therefore, Demeny voting has been individuated as an instrument to contrast a possible vicious circle between the increase in the relative political weight of the elderly population due to the reduction in birth rates and the increase in longevity on the one hand, and the reduction in the propensity to have children due to public policies that disadvantage young people on the other hand.

A formal approach to the economic implications of Demeny voting is missing, and this paper bridges the gap by modelling intergenerational redistribution policies through a simple overlapping

[1] In 1848, the Italian philosopher and theologian Antonio Rosmini proposed a constitution whose article 59 reads as follows: "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-19th 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).

[2] A reform of the voting system allowing 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 of those who are receiving a public pension or are close to receiving one in the voting process. Aoki and Vaithianathan (2009) argue that Japan should adopt Demeny voting in order to introduce those more generous family policies which would be 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 from the age of six (Wall, 2014, 2021; Runciman, 2021). Campiglio (1997, 2005), and Campiglio and Lorenzetti (2022), discuss the void of representation of minors in democracies. Kamijo et al. (2015) ran 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 on the basis of both empirical and theoretical reasons (see Anzia, 2019).

generations framework with endogenous fertility, where the government can tax both the young and the old cohorts in order to finance the subsidies paid to the young adults in proportion to the number of children they have. The original feature of our model is that the government policy rule is also endogenized, since the weight that the government assigns to the well-being of each living cohort in its objective function depends on this cohort's relative influence on the voting process, which in its turn is a function of both the cohort's numerosity and the possibility of the young adults to vote in place of their children. Within this setup, we study what are the long-term effects of an electoral reform allowing 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 contained in section 5, section 6 concludes.

2. RELEVENT EMPIRICAL AND THEORETICAL LITERATURE

There is evidence for many democracies that the intergenerational allocation of public spending is influenced by the age structure of the population. In particular, the aging of population that is going on in the advanced economies since the last decades of the twentieth century has given rise to a huge literature that investigates the effects of the changing demographic structure on both the size of the welfare state and the composition of social spending.[4] While there seems to

[4] Preston (1984) was one of the earliest papers that documented how population aging was accompanied in the United States by an allocation of public funds that had improved dramatically the condition of the elderly and deteriorated that of the children. Among the subsequent papers focusing on the link between changes in age structure and public policies in the United States, Poterba (1998) presented evidence suggesting that older and childless voters were less likely to support public-school spending than younger voters with children. Among the studies using cross-national evidence, McDonald and Budge (2005) focused on 21 democracies from 1950 through to 1995, showing that the allocation of public spending depended both on the ideology of the political parties in power and on the age structure, and that the proportion of the population aged 65 and older had a significant, positive, impact on government social spending in the 1990s, after having controlled for the ideology of the political party in power. Also Disney (2007) found that the size of the welfare state in 21 industrialized countries from the 1970s through the 1990s increased with the relative size of the population aged 65 years and older, after having controlled for relevant economic factors.

be no doubt that in almost all countries population aging has led to an increase in the share of public spending in favor of the elderly, driven by the growth in pension and health expenditure brought about by their rising number, the evidence is more varied with regard to the effects of population aging on net public spending per elderly person.[5] Especially in recent years, indeed, the growing concern for the sustainability of the welfare system has counterbalanced the increasing weight of the old cohorts in the electoral process, thus leading in many countries to the introduction of restraints and cuts to the system's generosity towards the elderly. This notwithstanding, a common trend in most countries is the improvement of the position of the elderly relative to that of the young and the very young. Lee (2020), for instance, notices that by 2011 the ratio of consumption at age 80 to age 20 in the United States had more than doubled relative to 1960, and that similar changes have occurred in Sweden and (over a shorter time span) 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 concerning the incidence of poverty among different age groups in the United States (see figure 1), which has not fallen in 2020 relatively to 1970 for those under age 18, whereas over the same years it has dramatically fallen for the elderly (65 years and older). It is therefore not surprising, that in many advanced economies per capita net public spending is considerably lower for children than for the elderly.[6]

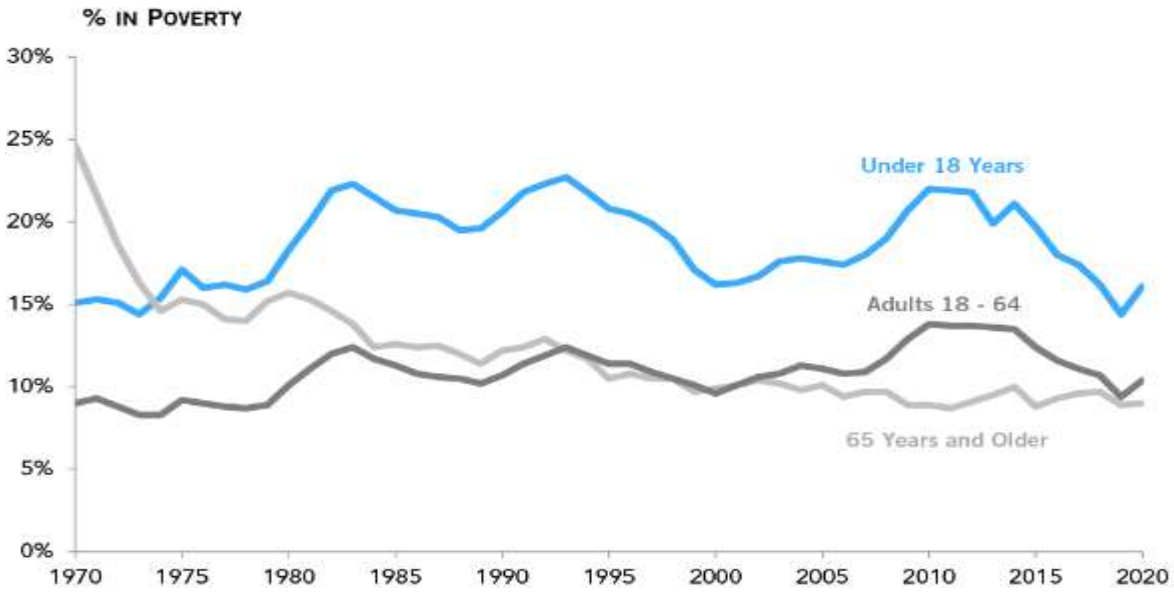
Some sociologists have argued that the fact that the old cohorts are ever more numerous and electorally powerful not necessarily leads to redistribution policies biased in favor of the

[5] According to Tepe and Vanhuysse (2009), the evidence concerning 18 OECD countries between 1980 and 2002 does not support the theory that western societies are becoming "gerontocracies", since this theory predicts not only that aggregate pension expenditure increases with the number of older people that qualify to draw pensions, but also that individual pensions become more generous as the proportion of elderly voters in the population grows, namely that pensions *per elderly person* increase with population aging.

[6] In the United States, for instance, per capita net public transfers to those of 0-24 years of age were 13,400 dollar in 2011, as compared with 15,900 dollar to those aged 65 years or older in the same year (see Lee and Mason, 2018); in 2020 US federal spending per child was approximately 75% of federal spending per person aged 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 1999–00 and 2018–19, the government spent £14,655 on each child, £10,178 on each working-age adult and £20,789 on each pensioner in 2018-19 (see Bui, 2021).

elderly: national institutional arrangements interact with the age composition of the population in shaping the intergenerational distributional conflict (see, e.g., Pampel, 1994; Esping-Andersen and Sarasa, 2002).[7] It is in this spirit that the model presented in the next section analyzes how reforms of the institutional framework, and in particular of the electoral system, can have effects on intergenerational redistribution, and through this also on long-term economic growth, as well as on the demographic composition of the population. The impact of public policies on the demographic structure is modeled here in the hypothesis that the former affect fertility choices by changing the cost of raising children, either in monetary terms or in terms of opportunity costs. Indeed, there is a robust evidence that family policies contributed to the rebound in fertility that occurred in some developed countries after the sharp decline in birth rates beginning in the mid-1970s (see, e.g., Luci-Greulich and Thévenon, 2013; Wesolowski and Ferrarini.[8]

FIGURE 1 Population at different ages in poverty in the United States, 1970-2020



Source: Peter G. Peterson Foundation (2022)

[7] Pampel (1994) suggested that the intergenerational distributional clash becomes harsher in countries where insiders' and pensioners' lobbies succeed in affecting pension reforms. Also Esping-Andersen and Sarasa (2002) claimed that the old-age bias is more nation-specific than universal, since national political systems which organize and centralize interests tend to encourage solidarity across generations. Busemeyer et al. (2009) studied the determinants of individual attitudes towards social policies in 14 OECD countries, showing that these attitudes are not only determined by one's position on the income scale, but also by one's position in the life cycle (age), with some countries, such as the United States, showing a 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 during the period 1999-2005 to 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 the developed countries (Europe, the United States, Canada, and Australia), see also Bergsvik et al. (2021).

The evidence that public policies can influence fertility by decreasing the direct costs of children through cash benefits (subsidies and/or tax reliefs), and by lowering the opportunity costs of raising them through in-kind benefits, is captured by a series of theoretical models. Although providing an exhaustive survey of the models with endogenous fertility is beyond the scope of this paper, [9] a brief discussion of a selected number of models dealing with the impact of public policies on fertility can be useful to better clarify the specificities of our formal setup.

The recognition that the existence of a compulsory pay-as-you-go pension system generates a positive externality, due to the fact that the social benefit of an additional child (who—as a future worker—will pay contributions to the pension system) exceeds the private benefit enjoyed by the child's parents (Cigno, 1993), has given rise to a strand of literature exploring whether child allowances can increase the fertility rate, make the pension system sustainable and improve the social welfare (see, e.g., Groezen et al., 2003; Groezen and Meijdam, 2008; Yasuoka and Goto, 2011; Yasuoka, 2013; Schoonbroodt and Tertilt, 2014; Stauvermann and Wernitz, 2019; Cipriani and Pascucci, 2020). Regardless of whether a pay-as-you-go pension scheme is in place, Baudin (2011) analyzes the conditions under which it is socially optimal to subsidize or to tax births and education, while Granelli (2016, 2017) studies the effects of pro-natalist fiscal subsidies on fertility by using a general equilibrium model with dynastic households. Fanti and Gori (2014) incorporate endogenous fertility (together with endogenous longevity) in a growth model with overlapping generations, showing that a child tax can be used to increase capital accumulation, escape from poverty and maximize long-term welfare.

In all the above-mentioned papers, public policies are not the result of some democratic decision-making process, but are exogenously given or derived as solutions of a social planner problem. In contrast, in the simple overlapping generations model (OLG) presented here, the redistributive

[9] Models of endogenous fertility are inspired by Becker's (1960) representation of fertility at the family level as the result of a rational decision-making process. 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), about consumption, savings, transfers to children, spending on health, time allocation among work, leisure and child care, etc.

policies implemented by the government respond in any period to the interests of the living generations on the basis of 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), together with Kaganovich and Zilcha (2012), are the only other papers that formally account for the role of the democratic process in deciding on public intergenerational transfers.[10] However, while these papers want to demonstrate that the existence of a social security system (pay-as-you-go or fully funded) strengthens the political support among the current workers for public investment in the education of the future workforce, our objective is more general: to show that giving more electoral weight to voters—such as the adults with minor children—who tend to have longer time horizons than older voters is conducive to public policies that in the long run allow individuals to reach higher levels of lifetime well being.[11]

3. THE MODEL

We consider an economy with an infinite time horizon. In this economy there are firms, households and the government. Time is discrete and agents' expectations are consistent with the actual processes followed by the relevant variables. Since we rule out the possibility of stochastic shocks, this implies perfect foresight.

3.1 Firms

There is a large number—normalized to be 1—of perfectly competitive firms. In each period t, the representative firm produces Y_t (the numeraire of the system) according to the following Cobb-Douglas technology:

$$Y_t = K_t^{1-\alpha} L_t^{\alpha}, \ 0.2 < \alpha < 0.8, \qquad (1)$$

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

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

where K_t and L_t are, respectively, the stock of productive assets ("capital") and the labor services used in t for production. The restrictions to the technological parameter are consistent with the empirical evidence.

In each t, the representative firm chooses K_t and L_t so as to maximize its profits

$$\pi_t = K_t^{1-\alpha} L_t^{\alpha} - R_t K_t - W_t L_t, \qquad (2)$$

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

3.2 Households

Population evolves according to

$$N_t = N_{t-1} n_t, \qquad (3)$$

where N_t is the number of newly born individuals in period t (the "children"), N_{t-1} is the number of young adults in period t (those who were born in t-1) and n_t is the number of children that each young adult has in t.

The young adults living in period t survive another period becoming old in period t+1, after which they die. Therefore, in each period t, the adult population consists of two generations, the young and the old.

Each household who is young in period t works full time, supplying inelastically one unit of labor services to firms at the ongoing real wage W_t. It must pay a fraction of this labor income to the government as taxes and it can decide how much of its after-tax income to spend for buying consumption c_{yt} rather than productive assets k_{t+1}, which it can rent out to firms in period t+1 when it will become old.[12] These productive assets are assumed to fully depreciate at the end of t+1. Finally, each young household also decides in t on the number of children n_t that it wants to have.

In contrast, each household who is old in period t does not work, renting out the productive assets accumulated in the previous period to firms at the ongoing rental rate R_t. It must pay a fraction of this

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

capital income to the government as taxes and it can spend all its after-tax income for buying consumption c_{ot}.

The lifetime utility of each household who is young in period t is:

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

where β is a time discount factor. Notice that the current utility of a young households increases with its own consumption and the number of children, while its old-age utility depends only on its consumption.

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

$$c_{yt} + k_{t+1} + \eta n_t \leq W_t(1 - \tau_t) + s_t n_t, \quad \eta > 0, \ 0 \leq \tau_t \leq 1, \qquad (5)$$

while its old-age budget constraint is:

$$c_{ot+1} \leq k_{t+1} R_{t+1}(1 - \gamma_{t+1}), \ \ 0 \leq \gamma_{t+1} \leq 1, \qquad (6)$$

where η is the cost of rearing a child, τ_t is the tax rate that a young household must pay on its labor income, s_t is the subsidy that a young household receives from the government for each child that it has (it is not relevant here whether this subsidy takes the form of a monetary transfer or a service provided by the government), and γ_t is the tax rate that an old household must pay on its capital income.

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

3.3 Government

In each period t, the government chooses its policy instruments τ_t, γ_t and s_t so as to maximize a weighted average of the current utilities of the living (and voting) adult cohorts

$$\frac{(N_{t-1} + \xi N_t)}{N_{t-1} + \xi N_t + N_{t-2}} u(c_{yt}, n_t) + \frac{N_{t-2}}{N_{t-1} + \xi N_t + N_{t-2}} v(c_{ot}), 0 \leq \xi \leq 1, \qquad (7)$$

subject to

$$N_t s_t \leq \tau_t N_{t-1} W_t + \gamma_t N_{t-2} R_t k_t, \qquad (8)$$

where the weight that the well being of the young adults has in the government's objective function increases with ξ, which captures the importance that the government assigns to children in its decision-making process. One may think that this importance would grow if the electoral system permitted to each young adult with children to cast more than one vote, with the number of additional votes depending on the number of children. Consistently, $\xi = 0$ fits the current situation in which in no country parents of minor children have more weight in the electoral process than adults without minor children, while $\xi = 1$ would hold in case the number of additional votes assigned to each household were equal to the number of its minor children. Values of ξ in between 0 and 1 would be appropriate whenever the number of additional votes assigned to each household with minor children were a fraction of the number of children.

3.4 Markets equilibrium

Equilibrium in the market for the single good produced in this economy entails

$$Y_t = N_{t-1}\left(c_{yt} + k_{t+1} + \eta n_t\right) + N_{t-2}c_{ot}. \qquad (9)$$

Equilibrium in the markets for labor and capital entails, respectively,

$$N_{t-1} = L_t \qquad (10)$$

and

$$N_{t-2}k_t = K_t. \qquad (11)$$

4. SOLVING THE MODEL

4.1 Firms

Solving the problem of the representative firm and using the equilibrium conditions (10) and (11), we obtain:

$$W_t = \alpha k_t^{1-\alpha} n_{t-1}^{\alpha-1} \qquad (12)$$

and

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

4.2 Households

Assuming that the households' utility function is logarithmic and using (6), one can rewrite (4) as:

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

where φ is a parameter measuring how important are the children for the well being of the young adults.

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

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

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

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

4.3 Government

Considering the households' utility function given by (14), and using (12)-(13) and the optimal decision rules (15)-(16), the government's objective function (7) can be rewritten as:

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

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

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

Maximizing (18) subject to (19) with respect to τ_t, γ_t and s_t, and using (3), we obtain the government's policy rules:

$$s_t = \bar{s} = \frac{1+\varphi-\beta}{\varphi-\beta} > 0 \ [13] \qquad (20)$$

and

[13] The parameter values are restricted to be such that $\frac{1+\varphi}{\varphi} < \eta < \frac{1+\varphi}{\beta}$ (entailing $\varphi > \beta$), thus insuring $0 < \bar{s} < \eta$.

$$\gamma_t = 1 - \frac{(1-\tau_t)\alpha\left[1+\frac{\varphi\bar{s}}{(1+\beta+\varphi)(\eta-\bar{s})}\right]}{(1+\varphi)(1-\alpha)(1+\xi n_t)n_{t-1}}. \qquad (21)$$

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

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

Considering (21) and (22), one can verify that a larger ξ tends to raise the tax rate on the old generation's capital income. This may provide a rationale for the old generation's opposition to a reform of the voting system giving more weight to the parents of minor children.

4.4 The equilibrium path of the economy

Finally, one can use (3) and (20)-(22) to derive from (19) the difference equation in n_t that governs the equilibrium path of the economy:

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

5. STEADY- STATE AND WELFARE ANALYSIS

5.1 Steady state: existence, uniqueness and stability

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

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

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

$$n^* = \begin{cases} -\frac{(\xi^{-1}-A)}{2} + \sqrt{\left(\frac{\xi^{-1}-A}{2}\right)^2 + [A-(1+\varphi)^{-1}]\xi^{-1}} & if\ 0 < \xi \leq 1 \\ A - (1+\varphi)^{-1} & if\ \xi = 0, \end{cases} \qquad (25)$$

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

One can easily check that there is a non-empty set of parameter values that satisfies both $A-(1+\varphi)^{-1}>0$ and $\frac{1+\varphi}{\varphi}<\eta<\frac{1+\varphi}{\beta}$, which are necessary and sufficient conditions for the existence of n^*.[14]

This steady state is also locally stable, since

$$\left.\frac{dn_t}{dn_{t-1}}\right|_{n_t=n_{t-1}=n^*}=-\frac{\left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_{t-1}}\right|_{n_t=n_{t-1}=n^*}}{\left.\frac{\partial\Psi(n_t,n_{t-1})}{\partial n_t}\right|_{n_t=n_{t-1}=n^*}}=\frac{1+\xi n^*}{1+(1+\varphi)(1+\xi n^*)^2}\ , \qquad (26)$$

where $0<\frac{1+\xi n^*}{1+(1+\varphi)(1+\xi n^*)^2}<1$.

5.2 Welfare analysis

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

$$\frac{dn^*}{d\xi}=-\frac{\left.\frac{\partial\Phi(n,\xi)}{\partial\xi}\right|_{n=n^*}}{\left.\frac{\partial\Phi(n,\xi)}{\partial n}\right|_{n=n^*}}=\frac{\frac{n^*}{(1+\varphi)(1+\xi n^*)^2}}{\left[1-\frac{\xi}{(1+\varphi)(1+\xi n^*)^2}\right]}>0. \qquad (27)$$

Given (16) and (17), this entails $\frac{dc_y^*}{d\xi}>0$ and $\frac{dk^*}{d\xi}>0$, where the asterisk denotes the steady-state value of a variable. Furthermore, one can show that a larger ξ brings about a larger steady-state value of output per adult:

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

where $\frac{dn^*}{d\xi}$ is given by (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, one can state the following proposition:

Proposition 1. *In the long run, giving more weight to the interests of the 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 capital stock accumulated by the young workers as an effect of the increase in ξ leads in the long run to a higher steady-state level of pre-tax capital income R^*k^*. However, a larger ξ raises

[14] Take for instance $\alpha=\frac{2}{3}, \beta=0.9, \eta=1.3$ and $\varphi=20$.

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. It is nevertheless unambiguous that the long-term impact of a larger ξ on the lifetime utility of a young household U^* is strictly positive:

$$\frac{dU^*}{d\xi} = \frac{dn^*}{d\xi}\left[\frac{(1+\beta+\varphi)}{n^*} - \frac{\beta\xi}{(1+\xi n^*)}\right] - \frac{\beta n^*}{(1+\xi n^*)} > 0,^{15} \qquad (29)$$

where $\frac{dn^*}{d\xi}$ is given by (27),

$U^* = ln(c_y^*) + \varphi ln(n^*) + \beta ln(c_o^*) = (1+\varphi+\beta)ln(n^*) - \beta ln(1+\xi n^*) + G$ and

$G \equiv (1+\beta)ln\left(\frac{\eta-\bar{s}}{\varphi}\right) + \beta ln\left[\frac{(1+\varphi+\beta)}{(1+\varphi)} + \frac{\varphi\bar{s}}{(1+\varphi)(\eta-\bar{s})}\right]$.

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

Proposition 2. *In the long run, giving more weight to the interests of the young adults in the government's objective function increases the discounted sequence of utilities that individuals can get in the course of their entire life.*

It is noteworthy that, even if a reform of the voting system giving more weight to the young adults has ambiguous effects on the steady-state utility of the old adults, in the long run such a reform raises unambiguously the well being that individuals can expect at birth to achieve during their lifetime.

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[15] To show that (29) holds, notice that $\frac{dU^*}{d\xi} > 0$ if and only if $1+\beta+\varphi > \beta(1+\varphi)n^*(1+\xi n^*)$. To check that $1+\beta+\varphi > \beta(1+\varphi)n^*(1+\xi n^*)$ holds, consider that $n^* < A$. Hence, $1+\beta+\varphi > \beta(1+\varphi)A(1+\xi A)$ is sufficient to demonstrate that $\frac{dU^*}{d\xi} > 0$ holds. In its turn, to check that $1+\beta+\varphi > \beta(1+\varphi)A(1+\xi A)$ holds, consider that A reaches its maximum at $\eta = \frac{\alpha+\varphi-\beta+\alpha\beta}{\alpha\varphi}$. Substituting $\frac{\alpha+\varphi-\beta+\alpha\beta}{\alpha\varphi}$ for η in A, one has $A = \frac{(\varphi\alpha)^\alpha[\beta(1-\alpha)]^{1-\alpha}}{1+\varphi}$ and the inequality $1+\beta+\varphi > \beta(1+\varphi)A(1+\xi A)$ can be rewritten as $1+\beta+\varphi > \beta(\varphi\alpha)^\alpha[\beta(1-\alpha)]^{1-\alpha}\left\{1+\xi\frac{(\varphi\alpha)^\alpha[\beta(1-\alpha)]^{1-\alpha}}{1+\varphi}\right\}$, which holds for all admissible parameter values, thus showing that $\frac{dU^*}{d\xi} > 0$ holds.

6. CONCLUSION

This paper places itself at the intersection between the literature on Demeny voting and the vast literature 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 the process of economic growth through a simple OLG model, we have shown that, even if the government is myopic, in the sense that it cares only about the current well being of the living (and voting) generations, an increase in the relative importance that it attaches to the interests of the young cohort (for instance, due to a reform of the electoral system permitting to each young adult with minor children to cast more than one vote) leads in the long run to a higher population growth rate and raises the consumption level of each young adult, the capital stock per worker and the output per adult. We have also shown that in the long run such a reform raises the well being that individuals can expect at birth to achieve during their lifetime.

The long-term effects listed above depend on redistributing more resources to that part 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 the young voters could favor the adoption of public policies with long-run benefits rather than those with short-term payoffs. However, in the period in which reforms such as the introduction of Demeny voting are implemented, the income redistribution operated by the government tax and transfer system becomes relatively more favorable to the young cohort and less generous towards the old cohort. Therefore, it is natural to expect that the old cohort opposes the implementation of such reforms. Future research should be devoted to suggest politically feasible strategies to overcome this opposition in a democracy in which the age distribution of the living population is unbalanced in favor of the old cohorts, and to attenuate the preponderance of the elderly in the decision-making process of contemporary democracies.

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