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Positional preferences and efficiency in a dynamic economy

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Abstract

In an endogenous growth model, we characterize the conditions under which positional preferences for consumption and wealth do not cause inefficiency and derive an optimal tax policy response in cases where these conditions are not satisfied. The concerns for relative consumption and relative wealth partly emanate from social comparisons with people in other countries. We distinguish between a (conventional) welfarist government and a non-welfarist government that does not attach any social value to relative concerns. We also compare the outcome of Nash-competition among local/national governments with the resource allocation implied by a global social optimum both under welfarism and non-welfarism.

JEL Classification E71 · H11 · O43

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1 Introduction

There is overwhelming evidence that people care about social status, whether measured by a preference for high relative consumption, high relative wages, or high relative wealth. In that context, an important question arises: does status-seeking behavior induced by positional preferences lead to inefficient economic outcomes in the long run? This paper examines whether positional preferences for consumption and wealth distort the consumption-savings trade-off and hence economic growth.

As positional concerns imply that individuals impose externalities on one another, it may be presumed that such preferences introduce intertemporal distortions, which therefore call for corrective taxation. We show that this is not always the case, and that the answer critically depends on a number of factors. One such factor is whether individuals are positional with respect to consumption, wealth, or both. Another refers to the underlying social objective: do governments use a welfarist objective or some non-welfarist objective for identifying these distortions (if any)? It also matters whether social comparisons are local in nature or international, such that agents compare their own consumption and wealth with those of people in other countries. If they do, allocations that are efficient based on a national objective may, nevertheless, be inefficient at the supranational level. In this paper, we emphasize that it is the interaction among these various elements that allows us to identify whether or not positional preferences distort the consumption-savings tradeoff.

The contribution of the present paper is threefold. First, we develop an endogenous growth model to characterize the conditions under which positional preferences for consumption and wealth do not give rise to intertemporal distortions from the perspective of national governments.[1] Second, we derive an optimal corrective tax policy in cases where these conditions are not satisfied. Finally, we extend the analysis to a global economy with multiple jurisdictions to examine whether the choices made by national governments lead to a globally efficient resource allocation.

A central feature of our analysis is that we allow preferences to depend on wealth, not just consumption, and that individuals can be positional both in terms of their consumption and wealth. This is of crucial importance for the results derived below and also consistent with empirical evidence. Following the ideas put forward by Veblen (1899), Duesenberry (1949) and Hirsch (1976), there is now a large literature based on questionnaire experimental research and happiness research showing that people are concerned with their relative consumption or income (e.g., Easterlin 2001; Johansson-Stenman et al. 2002; Blanchflower and Oswald 2005; Ferrer-i-Carbonell 2005; Luttmer 2005; Solnick and Hemenway 2005; Carlsson et al. 2007; Clark and Senik 2010). In fact, up to 50–60% of the increase in well-being from an additional unit of income spent on consumption might be due to increased relative consumption. This suggests that the resulting positional consumption externalities are sizeable.

[1] This is in contrast to most previous studies which concentrate on how positional concerns affect the atemporal consumption-leisure choice and the policy implications thereof (e.g., Tuomala 1990; Dupor and Liu 2003; Aronsson and Johansson-Stenman 2008, 2018).

Over the past few years, there has been a growing body of research generalizing the standard neoclassical framework by assuming that households derive utility from holding wealth.[2] This includes work on the household debt leverage (Kumhof et al. 2015), secular stagnation (Michau 2018), rational bubbles (Michau et al. 2018), New Keynesian models with wealth-positional households (Michaillat and Saez 2021a, b), and optimal capital taxation (Saez and Stantcheva 2018). These papers demonstrate that important stylized facts can only (or better) be explained with a direct preference for wealth.

Empirical evidence suggests that households derive utility from accumulating and holding wealth; both in absolute terms and relative to others. Carroll (2000) demonstrates that a direct wealth accumulation motive is indispensable in explaining at least some of the observed behavior of the very wealthy. Kumhof et al. (2015) consider the impact of changes in the income distribution on the dynamics of household debt leverage and, in the process, estimate the wealth preference (of affluent households). Yamada and Sato (2013) conduct a large-scale internet survey and provide empirical evidence on social comparisons both in terms of income and wealth, while Ono and Yamada (2018) examine the nature of social comparisons in the wealth dimension in greater detail.

Another central feature of our study is the distinction between welfarist and non-welfarist approaches to distortions and corrective policy. A welfarist government (or social planner) respects all aspects of consumer preferences, including concerns for relative consumption and relative wealth, and forms the social objective thereupon. Such a government aims at internalizing positional externalities. By contrast, a non-welfarist government does not respect attributes relating to relative consumption and relative wealth in individual preferences, although it respects all other aspects of these preferences. This government "launders"the individual preferences when forming the social objective by not attaching any social value to changes in relative consumption and relative wealth. Welfarist and non-welfarist approaches to optimal taxation under consumption positionality have been analyzed and compared in different contexts in Micheletto (2011), Dodds (2012), Eckerstorfer and Wendner (2013) and Aronsson and Johansson-Stenman (2018), all of which focus on static models where relative concerns affect the labor-leisure tradeoff or the atemporal consumption mix. Our study is the first to compare welfarism and non-welfarism in a dynamic model, where consumption *and* wealth positionality may distort the consumption-savings tradeoff.

Why is the distinction between welfarism and non-welfarism important in our context? Although welfarism is a standard assumption, it is by no means uncontroversial when people have positional preferences. Concerns for relative consumption and relative wealth can be interpreted as an expression of envy, an "anti-social" preference that several authors have argued against including in a social

[2] Perhaps the first to have introduced the idea that people may have preferences for wealth (capital), in addition to consumption, via a felicity function was Kurz (1968). Weber (1905) argued that the pursuit of wealth for its own sake epitomizes the spirit of capitalism (cf. Zou 1994 for a first interpretation and justification in terms of modern growth theory).

welfare function (e.g., Sen 1979; Harsanyi 1977, 1982; Goodin 1986).[3] Other authors (such as Blackorby et al. 2005; Piketty and Saez 2013, p. 453) are more in favor of the welfarist approach of including positional preferences in the social welfare function. Irrespective of which perspective one takes, a relevant question is whether positional concerns distort the resource allocation and, in that case, what the policy response should be. This suggests to us that a broad perspective is useful when characterizing the distortive effects of social comparisons.[4]

A third central feature of our study is that concerns for relative consumption and relative wealth may partly emanate from social comparisons with people in other jurisdictions. To incorporate such comparisons in the analysis, we follow the methodological approach outlined by Aronsson and Johansson-Stenman (2015).[5] In our setting, where individuals are positional in two dimensions, we decompose the measures of reference consumption and reference wealth—the variables by which each individual compares their own consumption and wealth, respectively—in two parts: one originating from within-country comparisons and the other from comparisons with people in other countries.

Clearly, the international dimension of positional concerns is likely to increase with globalization and the development of transportation and telecommunication technologies (internet, social networks, etc.), and also via traveling.[6] This accords well with empirical evidence presented in Becchetti et al. (2013), showing a negative relationship between life satisfaction and the distance between the average disposable income in the individual's own country and that of the richest country in a given geographical area, and that this relationship has become stronger over time. We show that cross country comparisons have important implications for the distortions that positional concerns give rise to, and that these implications vary between welfarist and non-welfarist objectives.

To the best of our knowledge, no earlier study addresses the relationships between positional preferences and intertemporal tradeoffs, as well as the policy implications thereof, as comprehensively as we do. Instead, the results of earlier comparable studies follow as special cases of our more general approach. Arrow and Dasgupta

[3] Harsanyi (1977), p. 29–30, nicely sums up this view by suggesting to define social welfare in terms of the various individuals' "true" preferences rather than their explicit preferences, as the latter may be distorted by factual errors, ignorance, careless thinking, rash judgments, or strong emotions hindering rational choice. In fact, he goes further, suggesting that one needs to disregard not only the above but also preferences based on clearly anti-social attitudes.

[4] Using an opinion survey, Weinzierl (2017) demonstrates that the American public is skeptical of envy-based redistribution, even when its direct effect would be to increase welfare. These patterns are consistent with respondents using non-welfarist principles to express concerns about the welfare consequences of policy.

[5] Aronsson and Johansson-Stenman (2015) analyze a two-country model where people's concerns for relative consumption have an international dimension. By assuming that policymakers have a welfarist objective, the contribution of their study is to compare the optimal labor income tax policy implicit in a non-cooperative (Nash and Stackelberg) equilibrium with the corresponding policy implicit in a cooperative equilibrium.

[6] Clark and Senik (2010) appeal to a number of questions in the European Social Survey and find that those with no internet access attach less importance to income comparisons. Those who spend more than one hour per weekday watching TV compare more with other people than those who spend less time watching TV, and city-dwellers compare more than rural inhabitants.

(2009) show in a model without any wealth-dependent preferences that consumption positionality does not distort the resource allocation if people's concerns for relative consumption do not change over time. This result is, in turn, closely related to findings by Fisher and Hof (2000) and Liu and Turnovsky (2005) showing that positional consumption preferences have no impact on the steady state equilibrium (and, therefore, do not have a distortionary effect) once labor supply is exogenous. This result appears as a special case of our model; in general, concerns for relative consumption give rise to intertemporal distortions even if these concerns do not vary over time. Similarly, Nakamoto (2009) considers a model with wealth in the utility function, as we also do, although his model does not include wealth externalities (i.e., utility depends on absolute, not relative, wealth). He shows that consumption positionality always distorts the consumption-savings tradeoff. This is not necessarily the case in our framework, where individuals can be positional both in terms of their consumption and wealth. Nakamoto's (2009) paper also relates to Tournemaine and Tsoukis's (2008) findings, showing that both consumption and wealth comparisons impact economic growth. Finally, note that none of the above studies allows for interjurisdictional spillover effects of social comparisons, and none of them examines the optimal resource allocation (or corrective policies) implied by a non-welfarist objective.[7]

The value-added of our study stems from the interaction of the crucial features discussed above. None of the three main results presented below could have been derived in models focusing on the various elements in isolation. Our results are summarized as follows. First, the conditions under which an unregulated market economy is locally efficient (i.e., from the perspective of a local/national government) differ depending on whether this assessment is made by a welfarist or non-welfarist government. We express these conditions in terms of degrees of consumption and wealth positionality, i.e., the extent to which the utility gain of increased consumption (wealth) is driven by concerns for relative consumption (relative wealth). Under non-welfarism, and if individuals are positional in both dimensions, the unregulated market equilibrium is locally efficient if the degrees of consumption and wealth positionality are the same. With a welfarist government, it also matters to what extent the social comparisons occur internationally, since the (national) welfarist government only internalizes the domestic part of the externality.

Second, we characterize, under both types of government, the capital income tax/subsidy implications of relative concerns in cases where the conditions for economic efficiency referred to above are not satisfied in the unregulated market economy. A non-welfarist government would choose this tax to be proportional to the difference between the degrees of wealth and consumption positionality, reflecting the net

[7] Ghosh and Wendner (2018) develop a model similar to ours, which includes positional consumption and wealth externalities, albeit based on specific functional forms for the utility and production functions. Their study neither examines the conditions under which positional preferences give rise to intertemporal inefficiencies, nor addresses interjurisdictional social comparisons or non-welfarism, all of which are key issues in our study.

behavioral failure from the perspective of this government. Under welfarism, the tax is instead proportional to a measure of "net domestic marginal externality", which reflects the difference between the two degrees of positionality and the extent to which each externality is generated by domestic agents.

Third, by considering the domestic and foreign economies simultaneously, we show that Nash-competing national governments have incentives to implement a global social optimum if based on a non-welfarist objective, while the global social optimum typically differs from Nash equilibrium under a welfarist objective.

The rest of the paper is structured as follows. Section 2 presents the model and characterizes the efficient resource allocations under a welfarist and a non-welfarist government. Section 3 characterizes the conditions for efficiency in a single-country context and examines the optimal tax policy implications for cases where distortions arise. Section 4 extends the analysis to a global economy, where a globally optimal resource allocation is compared with a non-cooperative Nash-equilibrium based on a welfarist and non-welfarist objective, respectively. Section 5 concludes the paper. Proofs are presented in the appendix.

2 The model

Consider a dynamic, general equilibrium model allowing for endogenous growth through constant returns to capital (*Ak* model). The time indicator, t, will be suppressed unless needed for clarity. We start by presenting the technology and preferences, respectively, and then continue by characterizing the unregulated market equilibrium as well as the resource allocations ideally preferred by the welfarist and non-welfarist governments.

2.1 Technology

A homogeneous output is produced by competitive firms according to the linear technology:

$$y = A\,k\,, \quad A > 0\,, \tag{1}$$

where y is gross production per capita, and k is capital per capita. The depreciation rate of capital is $\delta \in [0, 1]$, and we shall assume that $(A - \delta)$ exceeds the pure rate of time preference (see below) to ensure nonnegative endogenous growth.

2.2 Preferences

The economy is populated with a large number of identical consumers, whose number is normalized to one. The representative consumer derives utility from their own consumption, c, relative consumption, Δ_c, wealth, k, and relative wealth, Δ_k. Relative consumption is given by individual consumption relative to some consumption reference level $\bar{c}$, and relative wealth is given by individual wealth relative to some

wealth reference level $\bar{k}$. Individuals are atomistic agents in the sense of treating the reference levels $(\bar{c}, \bar{k})$ as exogenous, as in the existing literature.

The consumption and wealth reference levels are determined by two factors. The first factor is mean consumption and mean wealth, respectively, in the domestic economy: $\bar{c}^d$ and $\bar{k}^d$. As agents are homogeneous, mean consumption and mean wealth represent natural determinants for the reference levels. Importantly, these determinants are endogenous from the point of view of the domestic government. The second factor represents consumption and wealth, respectively, abroad: $\bar{c}^f$ and $\bar{k}^f$, which are considered exogenous to both individuals and the domestic government. We begin by analyzing a one-country version of the model, where the foreign reference measures are fully exogenous, and extend the analysis to a two-country setting in Sect. 4, in which the foreign reference measures are endogenous (albeit treated as exogenous by each national policy maker).

For analytical convenience, we follow much earlier research on social comparisons in assuming that relative consumption, Δ_c, and relative wealth, Δ_k, can be defined in terms of differences as follows:[8]

$$\Delta_c \equiv c - \bar{c}\,, \quad \bar{c} = \alpha\,\bar{c}^d + (1-\alpha)\bar{c}^f\,, \quad 0 \leq \alpha \leq 1\,, \tag{2}$$

$$\Delta_k \equiv k - \bar{k}\,, \quad \bar{k} = \beta\,\bar{k}^d + (1-\beta)\bar{k}^f\,, \quad 0 \leq \beta \leq 1\,. \tag{3}$$

Parameters α and β determine the importance of the domestic parts of the reference levels, while $(1-\alpha)$ and $(1-\beta)$ determine the importance of the foreign parts. The standard case of fully endogenous mean value comparisons at the national level is obtained by $\alpha = 1$ and $\beta = 1$.[9] Although it is difficult to identify both the reference levels and the reference parameters, two points are worth emphasizing. First, foreign economic behavior impacts domestic reference levels. Recent empirical studies, including Becchetti et al. (2013) or Clark and Senik (2011), find that the importance of inter-country comparisons has increased over time. Second, the empirical evidence discussed above suggests that $0 < \alpha \leq 1$ and $0 < \beta \leq 1$. Therefore, throughout the analysis below, we consider all permissible values of α and β.[10]

[8] See, for instance, Akerlof (1997), Corneo and Jeanne (1997), Ljungqvist and Uhlig (2000), Bowles and Park (2005), Carlsson et al. (2007) and Aronsson and Johansson-Stenman (2008, 2010, 2015, 2018). An alternative would be to assume that the relative concerns are driven by ratio comparisons (as in Boskin and Sheshinski 1978; Layard 1980; Abel 2005; Wendner and Goulder 2008; Ghosh and Wendner 2018). The choice between difference and ratio comparisons is not important for the qualitative results.

[9] Note that our model implies that individuals compare their current consumption and wealth with other people's current consumption and wealth, respectively, i.e., the social comparisons are of the keeping-up-with-the-Joneses type. An alternative would be to assume a catching-up-with-the-Joneses mechanism, where the reference measures partly reflect other people's earlier consumption and wealth. However, as demonstrated in different contexts by Turnovsky and Monteiro (2007) and Aronsson and Johansson-Stenman (2014), this distinction is not important for the qualitative results.

[10] That foreign consumption/wealth is important is reflected in the purchase of luxury goods in foreign markets (31% of total) or at airports (16% of total) by consumers of such goods. These proportions rise to 40% and 20% respectively when consumers from emerging markets are considered, who typically do not

The instantaneous utility function is given by

$$u(c, \Delta_c, k, \Delta_k)\,. \tag{4}$$

Let a subscript to the utility function refer to a partial derivative. In a standard model where individuals neither derive utility from social comparisons nor from wealth per se, we have $u_c(.) > 0$, and $u_i(.) = 0$ for $i = \Delta_c, k, \Delta_k$. If $u_{\Delta_c}(.) > 0$, individuals have positional preferences for consumption. Thus, an increase in the individual's own consumption leads to higher utility also through increased relative consumption (for a given $\bar{c}$). By a similar argument, if $u_k(.) > 0$, agents derive utility from their own wealth, while $u_{\Delta_k}(.) > 0$ means that they have positional preferences for wealth.

Throughout, we assume that the instantaneous utility function (4) is strictly concave, twice continuously differentiable, strictly increasing in c and weakly increasing in all other arguments.

The consumer's intertemporal utility function, U, as viewed from date $t = 0$, is given by:

$$U_0 = \int_{t=0}^{\infty} u(c, \Delta_c, k, \Delta_k)\, e^{-\rho t} dt\,, \quad \rho > 0\,, \tag{5}$$

where ρ is the constant pure rate of time preference.

2.3 Unregulated market equilibrium

Consider the following maximization problem at date $t = 0$:

$$\max_{(c(t),k(t))_{t=0}^{\infty}} U_0 = \int_{t=0}^{\infty} u(c, \Delta_c, k, \Delta_k)\, e^{-\rho t} dt\,, \tag{6}$$

$$\text{s.t. } \dot{k} = r k - c\,, \tag{7}$$

$$c \geq 0\,, \quad k \geq 0\,, \tag{8}$$

$$\bar{c}\,, \bar{k} \quad \text{exogenous}\,, \tag{9}$$

$$k_0 \ \text{ given}\,. \tag{10}$$

Agents choose $(c(t), k(t))_{t=0}^{\infty}$ so as to maximize intertemporal utility (6) subject to (7)–(10). Differential equation (7) reflects the flow budget constraint of the representative agent, and the variable r denotes the interest rate. In a competitive market, $r = A - \delta$. Restriction (9) reflects the fact that individuals treat the measures

Footnote 10 (continued)
have access to the same range of products or brands that are available in more mature markets (Deloitte 2017, p.5).

of reference consumption and reference wealth as exogenous. The current value Hamiltonian corresponding to problem (6)–(10) can then be written as

$$H(c, \Delta_c, k, \Delta_k, \mu) = u(c, \Delta_c, k, \Delta_k) + \mu\,(rk - c), \tag{11}$$

where the costate variable μ represents the shadow price of wealth. Let superscript "m" denote "market equilibrium" such that $(c^m, k^m, \mu^m)_{t=0}^{\infty}$ solves problem (6)–(10). An interior solution implies the following conditions:

$$\mu^m = u_c(c^m, \Delta_c^m, k^m, \Delta_k^m) + u_{\Delta_c}(c^m, \Delta_c^m, k^m, \Delta_k^m)\,, \tag{12}$$

$$\frac{\dot{\mu}^m}{\mu^m} = -[r - \rho] - \frac{u_k(c^m, \Delta_c^m, k^m, \Delta_k^m) + u_{\Delta_k}(c^m, \Delta_c^m, k^m, \Delta_k^m)}{u_c(c^m, \Delta_c^m, k^m, \Delta_k^m) + u_{\Delta_c}(c^m, \Delta_c^m, k^m, \Delta_k^m)}\,, \tag{13}$$

$$\lim_{t\to\infty} \mu^m k^m e^{-\rho t} = 0\,, \tag{14}$$

where we have used the fact that $\partial\,\Delta_c/\partial\,c = 1$ and $\partial\,\Delta_k/\partial\,k = 1$ from the point of view of an individual agent. Equation (12) is the conventional first-order condition for consumption, according to which the costate variable equals the marginal utility of consumption at each point in time. Equation (13) essentially implies that the negative of the growth rate of the costate variable equals the difference between the rate of interest and the pure rate of time preference (as in the standard model), plus an additional term measuring the marginal willingness to pay for wealth out of consumption.

In a symmetric equilibrium, due to homogeneity of individuals, $\bar{c}^d = c$ and $\bar{k}^d = k$. In summary, a competitive equilibrium is characterized by a path $(c^m, k^m, \mu^m)_{t=0}^{\infty}$ for which (7), (8), (10), (12)–(14) hold, and where $\bar{c}^m = \alpha\bar{c}^{d,m} + (1-\alpha)\bar{c}^f = \alpha c^m + (1-\alpha)\bar{c}^f$, $\bar{k}^m = \beta\bar{k}^{d,m} + (1-\beta)\bar{k}^f = \beta k^m + (1-\beta)\bar{k}^f$, and $r = A - \delta$.

2.4 Welfarist optimum

A welfarist government respects individual preferences, including the concerns for relative consumption and relative wealth. Since the welfarist government aims at internalizing the positional externalities, it takes into account that $\bar{c} = \alpha\bar{c}^d + (1-\alpha)\bar{c}^f = \alpha c + (1-\alpha)\bar{c}^f$, $\bar{k} = \beta\bar{k}^d + (1-\beta)\bar{k}^f = \beta k + (1-\beta)\bar{k}^f$ in equilibrium. However, both $\bar{c}^f$ and $\bar{k}^f$ are considered exogenous. Consequently, from the point of view of this government, Δ_c and Δ_k are evaluated at: $\Delta_c = (1-\alpha)(c - \bar{c}^f)$, and $\Delta_k = (1-\beta)(k - \bar{k}^f)$.

The welfarist government chooses a path $(c(t), k(t))_{t=0}^{\infty}$ to maximize intertemporal utility

$$\max_{(c(t),k(t))_{t=0}^{\infty}} U_0 = \int_{t=0}^{\infty} u(c, \Delta_c, k, \Delta_k)\, e^{-\rho t} dt\,, \tag{15}$$

$$\text{s.t.}\quad \dot{k} = (A - \delta)k - c\,, \tag{16}$$

$$c \geq 0\,, \quad k \geq 0\,, \tag{17}$$

$$\bar{c} = \alpha c + (1-\alpha)\bar{c}^f\,, \quad \bar{k} = \beta k + (1-\beta)\bar{k}^f\,, \tag{18}$$

$$k_0 \ \text{ given}\,. \tag{19}$$

The current value Hamiltonian corresponding to this decision-problem is given as follows:

$$H(c, \Delta_c, k, \Delta_k, \mu) = u(c, \Delta_c, k, \Delta_k) + \mu\left[(A-\delta)k - c\right]. \tag{20}$$

Let the superscript "w" indicate optimum from the perspective of the welfarist government. An interior solution, $(c^w, k^w, \mu^w)_{t=0}^{\infty}$, satisfies the following first-order conditions:

$$\mu^w = u_c(c^w, \Delta_c^w, k^w, \Delta_k^w) + (1-\alpha)\, u_{\Delta_c}(c^w, \Delta_c^w, k^w, \Delta_k^w)\,, \tag{21}$$

$$\frac{\dot{\mu}^w}{\mu^w} = -[(A-\delta)-\rho] - \frac{u_k(c^w, \Delta_c^w, k^w, \Delta_k^w) + (1-\beta)\, u_{\Delta_k}(c^w, \Delta_c^w, k^w, \Delta_k^w)}{u_c(c^w, \Delta_c^w, k^w, \Delta_k^w) + (1-\alpha)\, u_{\Delta_c}(c^w, \Delta_c^w, k^w, \Delta_k^w)}\,, \tag{22}$$

$$\lim_{t\to\infty} \mu^w k^w e^{-\rho t} = 0\,. \tag{23}$$

The canonical equations (21)–(23) have the same interpretations as given for the unregulated market economy above. The only difference is that the welfarist government takes into account that the domestic parts of the reference measures for consumption and wealth are endogenous as shown by the optimality conditions; in other words, that part of consumption and saving is considered by such a government as wasteful due to the negative positional externalities.

2.5 Non-welfarist optimum

In this subsection, we consider a non-welfarist government that respects all aspects of consumer preferences except the concerns for relative consumption and relative wealth. Therefore, instead of forming the social objective upon the individuals's actual preferences, the non-welfarist government wants the agents to behave as if these relative concerns were absent.[11]

In our framework, the non-welfarist government attaches no social value to changes in relative consumption and relative wealth, which means that relative consumption and relative wealth are treated as exogenous when solving the optimization problem, even if these entities are (of course) endogenous in equilibrium. As

[11] That is, the government's and agents' preferences differ under this criterion; see Kanbur et al. (2006) for an excellent discussion, in a survey article on non-welfarist approaches to optimal taxation.

such, the non-welfarist government chooses a path $(c(t), k(t))_{t=0}^{\infty}$ so as to maximize intertemporal utility, i.e.,

$$\max_{(c(t),k(t))_{t=0}^{\infty}} U_0 = \int_{t=0}^{\infty} u(c, \bar{\Delta}_c, k, \bar{\Delta}_k)\, e^{-\rho t} dt\,, \tag{24}$$

$$\text{s.t.} \quad \dot{k} = (A - \delta)k - c\,, \tag{25}$$

$$c \geq 0\,, \quad k \geq 0\,, \tag{26}$$

$$\bar{\Delta}_c\,,\ \bar{\Delta}_k \quad \text{exogenous}\,, \tag{27}$$

$$k_0 \quad \text{given}\,. \tag{28}$$

As before, let μ denote the current value costate variable, i.e., the marginal utility of wealth, and suppose that $(c^{nw}, k^{nw}, \mu^{nw})_{t=0}^{\infty}$ solve decision-problem (24)–(28), where superscript "nw" denotes optimum from the perspective of the non-welfarist government. By using the fact that $\bar{\Delta}_c = c - \bar{c}$ and $\bar{\Delta}_k = k - \bar{k}$ in equilibrium [where $\bar{c}$ and $\bar{k}$ are determined according to Eqs. (2) and (3)], we can write the first-order conditions for an interior solution as follows:

$$\mu^{nw} = u_c(c^{nw}, \Delta_c^{nw}, k^{nw}, \Delta_k^{nw})\,, \tag{29}$$

$$\frac{\dot{\mu}^{nw}}{\mu^{nw}} = -[(A - \delta) - \rho] - \frac{u_k(c^{nw}, \Delta_c^{nw}, k^{nw}, \Delta_k^{nw})}{u_c(c^{nw}, \Delta_c^{nw}, k^{nw}, \Delta_k^{nw})}\,, \tag{30}$$

$$\lim_{t\to\infty} \mu^{nw} k^{nw} e^{-\rho t} = 0\,. \tag{31}$$

The canonical equations have the same general interpretation as the ones for the welfarist government. In contrast to the welfarist government, however, the non-welfarist government disregards status concerns, and the canonical equations equal those we would have for an economy without positional preferences.

It is useful to compare (30) with (22) for the extreme case where $\alpha = \beta = 1$. This is the case where the foreign components of the reference consumption and reference wealth are absent, and thus the reference consumption (wealth) is nothing but the mean-value of domestic consumption (wealth). This means that the social first-order conditions coincide for the welfarist and non-welfarist objectives, which can be seen if we plug in $\alpha = \beta = 1$ in (22): we then obtain (30). In other words, the two types of government would make the same choice in this case, albeit for different reasons. The intuition is that the externality coincides with the marginal behavioral failure of individuals (who are identical by assumption), in which case

the non-welfarist government wants to implement the same resource allocation as the welfarist government.[12]

3 Conditions for efficiency and corrective policies

In this section, we present our first main result, answering the question of whether or not positional preferences give rise to intertemporal economic distortions in a single-country context. By *distortions*, we refer to situations in which the unregulated market equilibrium differs from the allocation preferred by a welfarist or non-welfarist government. As we will see below, these distortions are manifested in terms of differences between the private and social marginal rates of substitution of wealth for consumption. The *private* marginal rate of substitution of k for c, evaluated at the respective (welfarist and non-welfarist) optimum is defined by:

$$MRS^i_{k,c} = \frac{u_k(c^i, \Delta^i_c, k^i, \Delta^i_k) + u_{\Delta_k}(c^i, \Delta^i_c, k^i, \Delta^i_k)}{u_c(c^i, \Delta^i_c, k^i, \Delta^i_k) + u_{\Delta_c}(c^i, \Delta^i_c, k^i, \Delta^i_k)}, \quad i = w, nw. \tag{32}$$

The *social* marginal rates of substitution of k for c for the welfarist and the non-welfarist government, respectively, are defined as follows:

$$SMRS^w_{k,c} = \frac{u_k(c^w, \Delta^w_c, k^w, \Delta^w_k) + (1-\beta)u_{\Delta_k}(c^w, \Delta^w_c, k^w, \Delta^w_k)}{u_c(c^w, \Delta^w_c, k^w, \Delta^w_k) + (1-\alpha)u_{\Delta_c}(c^w, \Delta^w_c, k^w, \Delta^w_k)}, \tag{33}$$

$$SMRS^{nw}_{k,c} = \frac{u_k(c^{nw}, \Delta^{nw}_c, k^{nw}, \Delta^{nw}_k)}{u_c(c^{nw}, \Delta^{nw}_c, k^{nw}, \Delta^{nw}_k)}. \tag{34}$$

Our analysis also employs the concept of the *degree of positionality* (Johansson-Stenman et al. 2002), as a measure of how status-concerned or positional an individual is. The degree of positionality with respect to consumption and wealth, respectively, is given by

$$\zeta_c \equiv \frac{u_{\Delta_c}(c, \Delta_c, k, \Delta_k)}{u_c(c, \Delta_c, k, \Delta_k) + u_{\Delta_c}(c, \Delta_c, k, \Delta_k)}, \tag{35}$$

[12] As shown by Aronsson and Johansson-Stenman (2018), welfarist and non-welfarist governments do not in general make the same choices, even if the reference levels are fully endogenous. The intuition is that the externalities (that a welfarist government would like to internalize) do not in general coincide with the behavioral failures (that a non-welfarist government wants to correct). For instance, if the individuals were allowed to be heterogeneous, and if we continue to assume (1) mean-value comparisons and (2) that $\alpha = \beta = 1$, the value of the marginal externality would reflect the average marginal willingness to pay (measured among all consumers) to avoid this externality, while the behavioral failure always arises because of the individual's own preference for relative consumption or relative wealth. Thus, the corrective policies that the two governments decide on would differ as well.

$$\zeta_k \equiv \frac{u_{\Delta_k}(c, \Delta_c, k, \Delta_k)}{u_k(c, \Delta_c, k, \Delta_k) + u_{\Delta_k}(c, \Delta_c, k, \Delta_k)} \,. \tag{36}$$

The degree of consumption positionality defines the fraction of the utility gain from an additional unit of consumption stemming from a rise in relative consumption Δ_c. A value of zero indicates no positionality at all, while a value of unity indicates that only relative (not absolute) consumption matters. The degree of wealth positionality has a parallel interpretation.[13] These degrees of positionality will play an important role in the characterization of efficiency, distortions, and corrective taxation.

3.1 Efficiency and distortions

Our efficiency results employ the assumption of stationarity of the degrees of positionality, ζ_c, ζ_k, over time.

Assumption 1 The degrees of positionality, ζ_c, ζ_k, are stationary:
$\dot{\zeta}_c(c, \Delta_c, k, \Delta_k) = 0$, and $\dot{\zeta}_k(c, \Delta_c, k, \Delta_k) = 0$.

In the appendix, we show that Assumption 1 is satisfied under the following conditions:

(i) $u(c, \Delta_c, k, \Delta_k)$ is homogeneous of some degree $R < 1$ in (c, Δ_c) and homogeneous of some degree $\hat{R} < 1$ in (k, Δ_k);
(ii) $c^f = \lambda^c c$, $k^f = \lambda^k k$, $\lambda^c, \lambda^k > 0$ constant.

Equipped with Assumption 1, we now state[14]

Proposition 1 *Suppose that Assumption 1 is satisfied.*

1. *Welfarism*:
   The unregulated market equilibrium is efficient in the sense of replicating the social optimum if and only if either

$$\beta \zeta_k = \alpha \zeta_c \,,$$

   or

[13] Evidence based on quasi-experimental research suggests that the (average) degree of consumption positionality is in the range 0.2–0.6 (see, e.g., Johansson-Stenman et al. 2002; Wendner and Goulder 2008; Clark and Senik 2010). There are no corresponding empirical estimates of the degree of wealth positionality, although more visible goods, which include domestics and other durables, are most likely characterized by higher degrees of positionality than other goods (e.g., Alpizar et al. 2005; Solnick and Hemenway 2005; Carlsson et al. 2007). An informative brief discussion is provided in Wendner (2014).

[14] As the degree of wealth positionality is not defined for $u_k = u_{\Delta_k} = 0$, this case is stated separately from those cases in which either $u_k > 0$ or $u_{\Delta_k} > 0$ in Proposition 1.

$$u_k = u_{\Delta_k} = 0\,.$$

The equilibrium is distorted if these conditions are not satisfied. Specifically, if $\zeta_k > 0$ *and* $\zeta_c > 0$, *then* $\beta\,\zeta_k > \alpha\,\zeta_c$ *implies over-saving and* $\beta\,\zeta_k < \alpha\,\zeta_c$ *implies over-consumption relative to the allocation preferred by the welfarist government.*

2. *Non-welfarism*:
   The unregulated market equilibrium is efficient in the sense of replicating the social optimum if and only if either

$$\zeta_k = \zeta_c\,,$$

or

$$u_k = u_{\Delta_k} = 0\,.$$

The equilibrium is distorted if these conditions are not satisfied. Thus, if $\zeta_k > 0$ *and* $\zeta_c > 0$, *then* $\zeta_k > \zeta_c$ *implies over-saving and* $\zeta_k < \zeta_c$ *implies over-consumption relative to the allocation preferred by the non-welfarist government.*

Proof In the appendix, we show that the proposition follows directly from comparing the private and social marginal rates of substitution of wealth for consumption, as given by (32)–(34). We note that a negative (positive) difference between the private and social marginal rates of substitution implies over-consumption (over-saving). ∎

Under Assumption 1, the positional consumption externality is the same at each point in time, so there is no incentive for the consumer to reallocate the consumption over time in order to keep-up-with-the-Joneses in the consumption dimension. As such, in the absence of any preferences for wealth ($u_k = u_{\Delta_k} = 0$), the unregulated market economy is efficient regardless of whether the government is welfarist or non-welfarist. This special case will be further discussed in Sect. 3.2 and related to earlier research on economic growth under relative consumption concerns.

If the individuals are also positional in terms of wealth, the condition under which the unregulated market economy is efficient differs across the two governments. In the welfarist case, we can interpret ζ_c and ζ_k as the value of the marginal positional consumption externality and wealth externality, respectively, meaning that $\alpha\zeta_c$ and $\beta\zeta_k$ reflect the marginal willingness to pay to avoid the externalities generated by domestic agents. Thus, if $\alpha\zeta_c = \beta\zeta_k$, the two distortions cancel out. Under non-welfarism, we can correspondingly interpret ζ_c and ζ_k in terms of the marginal behavioral failure in the consumption and wealth dimension, respectively. If these behavioral failures are the same, their net effect on the consumption-saving tradeoff vanishes.

The efficiency conditions for the welfarist and non-welfarist governments coincide if $\alpha = \beta = 1$, such that $\zeta_k = \zeta_c$. The intuition is that in this case, the externality generated by domestic agents equals the behavioral failure of these agents. However, if $\alpha < 1$ or $\beta < 1$, the externality generated by domestic agents (as viewed by the welfarist government) is smaller than the behavioral failure of these agents (as

viewed by the non-welfarist government). The non-welfarist government attempts to internalize the same behavioral failure regardless of whether the relative concerns are driven by domestic or foreign comparisons (or a combination thereof). Thus, in this case, the efficiency conditions, as stated in Proposition 1, differ between the welfarist and non-welfarist governments.

Note that Proposition 1 also characterizes the conditions for over-consumption and over-saving in cases where the consumption distortion differs from the wealth distortion. The following corollary is a direct consequence of Proposition 1.

Corollary 1 *If individuals are positional both in terms of consumption and wealth, there is over-saving according to the welfarist criterion and, at the same time, over-consumption according to the non-welfarist criterion if*

$$1 > \frac{\zeta_k}{\zeta_c} > \frac{\alpha}{\beta}.$$

There is over-consumption according to the welfarist social welfare criterion but over-saving according to the non-welfarist criterion if

$$1 < \frac{\zeta_k}{\zeta_c} < \frac{\alpha}{\beta}.$$

Corollary 1 thus identifies cases where positional preferences cause one type of distortion under the welfarist criterion and, at the same time, another type of distortion according to the non-welfarist criterion. As such, the choice of welfare criterion alone may determine whether the optimal policy response is a tax or a subsidy.

3.2 Special cases in the literature

Let us first consider the special case where individuals do not have a preference for wealth: $u_k = 0, u_{\Delta_k} = 0$. Then, under Assumption 1, positional concerns with respect to consumption do not introduce any distortions. The result follows from stationarity of the degree of positionality, ζ_c, implying the same constant growth rate of the marginal utility of consumption in market equilibrium and in the two social optima (the analytical details are shown in the Appendix). Let g denote the endogenous, constant growth rate of c (thereby of k). As initial consumption is given by $c(0) = [(A - \delta) - g]k_0$, not only the growth rates coincide but also the levels—thereby the full path $(c(t), k(t))_{t=0}^{\infty}$. Thus, the positional consumption externality does not introduce a distortion, as in Liu and Turnovsky (2005) and Arrow and Dasgupta (2009).

The fact that there is no distortion, when Assumption 1 is satisfied, does not mean that the positional consumption externality has no impact on consumption- and savings behavior, on the c/k-ratio, or on the endogenous growth rate. All of these are affected by the positional consumption externality, albeit in the same way as in the (welfarist and non-welfarist) social optimum.

Now, by adding preferences for wealth, two special cases arise. Suppose first that $u_k > 0$ and $u_{\Delta_k} = 0$ such that $\zeta_k = 0$. According to the welfarist criterion, if $\alpha = 0$ positional consumption externalities do not introduce any distortion in this case, as the government is solely concerned with the domestic part of the externality. However, if $\alpha > 0$, positional consumption externalities always create a distortion, as $\alpha\,\zeta_c > 0$, as in Nakamoto (2009). Specifically, $\alpha\,\zeta_c > 0$ implies over-consumption, as the private marginal rate of substitution of wealth for consumption is smaller than the social one. A similar result holds for the non-welfarist criterion if $\zeta_k = 0$. Since $\zeta_c > 0$, positional consumption externalities always create a distortion (over-consumption). For $\alpha = 1$, the distortions according to the two welfare criteria coincide, as the behavioral failure equals the externality in the consumption dimension.

Suppose next that $u_{\Delta_k} > 0$ and $u_k = 0$. From definitions (32)–(36), it follows that

$$\beta = \alpha\,\zeta_c \tag{37}$$

implies efficiency, as the private and social marginal rates of substitution of wealth for consumption coincide under welfarism. Clearly, for $\beta > (<)\,\alpha\,\zeta_c$ the private marginal rate of substitution of wealth for consumption exceeds (falls short of) the social one, implying over-saving (over-consumption). For the non-welfarist government, the social marginal rate of substitution of wealth for consumption equals zero, as individuals do not have a preference for absolute wealth, and Δ_k is exogenous in the government's social welfare function. Therefore, the private marginal willingness to pay for wealth formation (in terms of consumption) strictly exceeds the social one that equals zero.

3.3 Tax policy implications

We now turn to the optimal tax policy implications of the social comparisons described above. A welfarist government would like to internalize the positional externalities that the relative consumption and wealth concerns give rise to, whereas the non-welfarist government would like each individual to behave as if these concerns were absent. As such, the two types of government have different reasons to intervene.

To simplify the interpretation, and connect the analysis to the results presented in Proposition 1, we consider the case where Assumption 1 is satisfied. In this case, the two market (behavioral) failures reduce to a single effective distortion. As such, we only need one properly designed corrective tax instrument combined with the lump-sum repayment of the tax revenue. We exemplify by considering a capital income tax policy.[15] The asset accumulation equation, facing each individual at any time t, can now be written as

$$\dot{k}^m = (A - \delta)k^m(1 - \tau) - c^m + T \tag{38}$$

[15] We could alternatively use a wealth tax or a consumption tax, which would give optimal policy rules very similar to those in Proposition 2.

where τ denotes the capital income tax and T represents a lump-sum transfer (positive or negative). Since the individuals are identical by assumption, the only role of the welfarist (non-welfarist) government is to correct for market (behavioral) failures; therefore, since the timing of the lump-sum transfer is not important here, we assume that the government's budget constraint balances at each instant, such that

$$\tau(A-\delta)k = T. \tag{39}$$

We follow Aronsson and Johansson-Stenman (2008, 2010, 2018) by characterizing the corrective tax policy in terms of degrees of positionality (which can be empirically estimated), which are constant under Assumption 1. By using the private and social marginal rates of substitution of wealth for consumption, given by (32)–(34), the optimal tax policy response to relative consumption and wealth concerns is summarized in Proposition 2.

Proposition 2 *Under Assumption 1, the optimal tax policy responses to positional preferences are as follows.*

1. *Welfarist optimum: If τ satisfies*

$$\tau(A-\delta) = MRS^{w}_{k,c} - SMRS^{w}_{k,c} = MRS^{w}_{k,c}\,\frac{\beta\zeta_k - \alpha\zeta_c}{1-\alpha\zeta_c} \tag{40}$$

   for all t, then $c^m = c^w$ and $k^m = k^w$ for all t, such that the market economy replicates the welfarist government's preferred resource allocation.
2. *Non-welfarist optimum: If τ satisfies*

$$\tau(A-\delta) = MRS^{nw}_{k,c} - SMRS^{nw}_{k,c} = MRS^{nw}_{k,c}\,\frac{\zeta_k - \zeta_c}{1-\zeta_c} \tag{41}$$

   for all t, then $c^m = c^{nw}$ and $k^m = k^{nw}$ for all t, such that the market economy replicates the non-welfarist government's preferred resource allocation.

Proof See the appendix. ∎

Starting with the tax policy chosen by the non-welfarist government, we can see that the optimal corrective tax depends on a discrepancy between $MRS^{nw}_{k,c}$ and $SMRS^{nw}_{k,c}$. If the private marginal rate of substitution exceeds the social marginal rate of substitution, such that $MRS^{nw}_{k,c} > SMRS^{nw}_{k,c}$, then $\tau > 0$. The intuition is that the tendency to over-accumulate wealth (due to wealth positionality) dominates the tendency to over-consume (due to consumption positionality), in which case an unregulated market economy would lead to more wealth accumulation at each point in time than preferred by the non-welfarist government. A capital income tax based on the policy rule given in Eq. (41) internalizes this behavioral failure. Correspondingly, if the $MRS^{nw}_{k,c} < SMRS^{nw}_{k,c}$, the behavioral failure implied by consumption positionality

dominates the behavioral failure implied by wealth positionality, in which case Eq. (41) would imply $\tau < 0$.

The final part of Eq. (41) allows us to interpret the optimal tax policy response directly in terms of degrees of positionality. We should tax capital income if the degree of wealth positionality exceeds the degree of consumption positionality, i.e., if $\zeta_k > \zeta_c$, and subsidize capital income if the degree of wealth positionality instead falls short of the degree of consumption positionality such that $\zeta_k < \zeta_c$. The net behavioral failure (which is given by the difference between the two degrees of positionality times $(1-\zeta_c)^{-1}$) determines the sign of the corrective tax.[16] We can also see that the corrective tax is zero for all t if, and only if, $\zeta_k = \zeta_c$, in which case the two behavioral failures cancel out, or $MRS^{nw}_{k,c} = 0$ (in which case individuals have neither absolute nor positional preferences for wealth).

Continuing with the tax policy implemented by the welfarist government given in Eq. (40), the sign of the optimal capital income tax will also in this case depend on a discrepancy between the private and social marginal rates of substitution between wealth and consumption. However, in the welfarist case, we can interpret the degree of wealth positionality, ζ_k, in terms of the marginal positional wealth externality per unit of wealth, and the government internalizes the domestic fraction, β, of this externality. Similarly, the degree of consumption positionality, ζ_c, measures the marginal positional consumption externality per unit of consumption, and the government internalizes the domestic fraction, α, of this externality. From the perspective of a national welfarist government, the net marginal externality is given by $(\beta\zeta_k - \alpha\zeta_c)/(1-\alpha\zeta_c)$, where the division by $(1-\alpha\zeta_c) > 0$ adjusts for differences in the private and social marginal utility of consumption. If this measure of net marginal externality is positive (negative), the optimal capital income tax is positive (negative). In other words, the larger the positional wealth externality (ζ_k) *or* the larger the fraction of this externality that the government internalizes (β), ceteris paribus, the higher will be the optimal capital income tax. Conversely, the larger the positional consumption externality (ζ_c) *or* the larger the fraction of this externality that the government internalizes (α), ceteris paribus, the lower will be the optimal capital income tax. The corrective tax is zero if the two "effective externalities" cancel out, i.e., $\beta\zeta_k = \alpha\zeta_c$, or if the individuals have no preferences for wealth such that $MRS^{w}_{k,c} = 0$.

4 Extension to an economy with two countries

Contrary to the previous sections, which focus on a single country and treat "the rest of the economy" ("the rest of the world") as exogenous, this section extends the analysis to an economy with two countries.[17] In this setting, the foreign parts of the reference

[16] The division by $(1-\zeta_c) > 0$ on the RHS of (41) adjusts for the fact that a private agent and the non-welfarist government make different assessments about the marginal utility of consumption, such that $SMRS^{nw}_{k,c} = MRS^{nw}_{k,c}\,[(1-\zeta_k)/(1-\zeta_c)]$. See the appendix (Proof of Proposition 1) for technical detail.

[17] The number of countries (as long as it exceeds one) is not important for the results to be presented below. Without loss of generality, therefore, we consider the simplest possible case with only two countries.

measures for consumption and wealth, respectively, have natural interpretations in terms of the consumption and wealth of individuals in the other country. The purpose is to examine to what extent national policy-making, as reflected in the choices made by the national governments in the preceding sections, is able to internalize market and behavioral failures emanating from positional preferences also on a supranational level (to be referred to as the global level). In other words, we shall briefly discuss whether positional consumption and wealth preferences are still distortive on a global level, despite the national governments having made their optimal choices. The benchmark is thus an optimal resource allocation from the perspective of a global social planner, whose objective is based on welfarism and non-welfarism, respectively, as formalized above.

With a welfarist social planner, a global social optimum can be derived by choosing consumption streams to maximize the following sum of intertemporal utilities (where super-indices $i = 1, 2$ and $j = 1, 2$ ($j \neq i$) are country indicators):

$$\max_{(c^\ell(t),k^\ell(t))_{t=0}^{\infty}} U_0 = \int_{t=0}^{\infty} \sum_{\ell=1}^{2} u(c^\ell, \Delta_c^\ell, k^\ell, \Delta_k^\ell)\, e^{-\rho t} dt\,, \tag{42}$$

$$\text{s.t. } \dot{k}^i = (A - \delta)k^i - c^i\,, \tag{43}$$

$$c^i \geq 0\,, \quad k^i \geq 0\,, \tag{44}$$

$$\bar{c}^i = \alpha c^i + (1 - \alpha)c^j\,, \quad \bar{k}^i = \beta k^i + (1 - \beta)k^j\,, \tag{45}$$

$$\Delta_c^i = c^i - \bar{c}^i, \quad \Delta_k^i = k^i - \bar{k}^i\,, \tag{46}$$

$$k_0^1 = k_0^2 \text{ given}\,. \tag{47}$$

Except for the country indicators, the notation is the same as above. A welfarist social planner takes into account that $\bar{c}^{d,i} = c^i$, and $\bar{k}^{d,i} = k^i$ in equilibrium. To be able to focus on the distortions caused by positional preferences in the simplest possible way, the above decision-problem assumes that the countries are identical. This allows us to abstract from redistribution policies at the international level, as well as from capital mobility, which are not essential for the nature of the positional externalities involved.[18] If the global social planner is non-welfarist, the instantaneous utility function in Eq. (42) is replaced by $u(c^\ell, \bar{\Delta}_c^\ell, k^\ell, \bar{\Delta}_k^\ell)$ for $\ell = 1, 2$, where $\bar{\Delta}_c^\ell$ and $\bar{\Delta}_k^\ell$ are treated as exogenous during optimization albeit endogenous in

[18] Instead of assuming that the initial capital stocks are equal, an alternative way of deriving Proposition 3 would be to assume a redistribution policy by adding a lump-sum subsidy to each country, T^i, along with a budget constraint for the global social planner, $T^1 = -T^2$. In a more general model with capital mobility, there might also be an international fiscal externality, which remains uninternalized in Nash-equilibrium. In such a model, Corollary 2 below could be interpreted as being conditioned on the correction for this possible fiscal externality.

equilibrium (such that $\bar{\Delta}_c^{\ell} = \Delta_c^{\ell}$ and $\bar{\Delta}_k^{\ell} = \Delta_k^{\ell}$). Thus, restriction (45) is redundant in the non-welfarist case.

By using the approach presented in Sect. 3, the social optimum is characterized in Proposition 3.

Proposition 3 *Based on the decision-problem* (42)–(47)*, and irrespective of whether the global social planner is welfarist or non-welfarist, the global social optimum satisfies the following conditions*:

$$\mu = \mu^i = u_c(c^i, \Delta_c^i, k^i, \Delta_k^i), \tag{48}$$

$$\frac{\dot{\mu}}{\mu} = -[(A-\delta)-\rho] - \frac{u_k(c^i, \Delta_c^i, k^i, \Delta_k^i)}{u_c(c^i, \Delta_c^i, k^i, \Delta_k^i)}, \tag{49}$$

$$\lim_{t\to\infty} \mu^i k^i e^{-\rho t} = 0, \tag{50}$$

for $i = 1, 2$.

Proof See the appendix. ∎

The result given in Proposition 3 arises because the two countries are identical, meaning that $c^1 = c^2$ and $k^1 = k^2$. Therefore, the externalities that the global welfarist planner internalizes coincide with the behavioral failures that the non-welfarist planner corrects for.

We can now compare the global social optimum characterized in Proposition 3 with the Nash-equilibrium allocation that would follow if (1) the policies were based on national objectives and (2) each national social planner treats the decision-variables of the other country as exogenous. Such an allocation would imply that each country satisfies Eqs. (21) and (22) or Eqs. (29) and (30), depending on whether the national decision-makers are welfarist or non-welfarist governments. More specifically, and in addition to (43)–(47), Nash-competition among welfarist national governments satisfies the conditions

$$\mu^i = u_c(c^i, \Delta_c^i, k^i, \Delta_k^i) + (1-\alpha)\, u_{\Delta_c}(c^i, \Delta_c^i, k^i, \Delta_k^i), \tag{51}$$

$$\frac{\dot{\mu}^i}{\mu^i} = -[(A-\delta)-\rho] - \frac{u_k(c^i, \Delta_c^i, k^i, \Delta_k^i) + (1-\beta)\, u_{\Delta_k}(c^i, \Delta_c^i, k^i, \Delta_k^i)}{u_c(c^i, \Delta_c^i, k^i, \Delta_k^i) + (1-\alpha)\, u_{\Delta_c}(c^i, \Delta_c^i, k^i, \Delta_k^i)}, \tag{52}$$

whereas Nash-competition among non-welfarist national governments satisfies

$$\mu^i = u_c(c^i, \Delta_c^i, k^i, \Delta_k^i), \tag{53}$$

$$\frac{\dot{\mu}^i}{\mu^i} = -\left[(A-\delta)-\rho\right] - \frac{u_k(c^i, \Delta_c^i, k^i, \Delta_k^i)}{u_c(c^i, \Delta_c^i, k^i, \Delta_k^i)}, \tag{54}$$

for $i = 1, 2$. Since the two countries are identical by assumption, we have $c^1 = c^2$ and $k^1 = k^2$ (even if the levels typically differ between the two governments). The following corollary is a direct consequence of Proposition 3 and Eqs. (51)–(54):

Corollary 2 *Within the given framework, Nash-competing non-welfarist governments would always implement the global social optimum. Under Assumption 1, Nash-competing welfarist governments would implement the global social optimum if, and only if,* $(1-\alpha\,\zeta_c)/(1-\beta\,\zeta_k) = (1-\zeta_c)/(1-\zeta_k)$.

Therefore, whereas the choices made by Nash-competing non-welfarist national governments lead to a global social optimum, Nash-competition among welfarist national governments does not in general lead to a globally optimal resource allocation. The intuition is, of course, that the behavioral failure of each individual, which the non-welfarist government wants to correct for, is the same regardless of whether the social comparisons have an international dimension. In the welfarist case, on the other hand, the national governments only internalize the domestic parts of the two externalities, implying that the resource allocation implemented by Nash-competing welfarist governments will typically differ from the allocation preferred by a global social planner. This is because a welfarist national government and a global social planner differ in their assessments of externalities. $\alpha\,\zeta_c$ represents the value of the marginal positional consumption externality from the perspective of a national welfarist government, meaning that $1-\alpha\,\zeta_c$ is interpretable in terms of the marginal social value that this government attaches to consumption. Similarly, ζ_c measures the value of the marginal positional consumption externality and $1-\zeta_c$ the marginal social value of consumption from the perspective of the global planner. There is a corresponding discrepancy between a national welfarist government and the global social planner in their assessments of externalities in the wealth dimension. The allocation implemented by Nash-competing welfarist governments and the allocation implemented by a global social planner will coincide if, and only if, their marginal valuations of consumption relative to wealth coincide, i.e., if, and only if

$$\frac{1-\alpha\zeta_c}{1-\beta\zeta_k} = \frac{1-\zeta_c}{1-\zeta_k},$$

in which case the intertemporal tradeoff is the same. If the extent to which the relative concerns are based on domestic comparisons is the same for consumption and wealth such that $\alpha = \beta < 1$, then Nash-competing welfarist governments would implement the global social optimum if, and only if, the degrees of consumption positionality and wealth positionality are equal. A more distinct special case arises

if $\alpha = \beta = 1$, in which the welfarist allocation coincides with the global social optimum.[19]

5 Conclusion

This paper uses an endogenous growth model to examine whether positional preferences for consumption and wealth distort the consumption-savings trade-off and thus lead to inefficient outcomes in the long-run. In cases where inefficiencies arise, we suggest a corrective tax policy that allows the decentralized economy to replicate the social optimum. In our study, social comparisons arise both in the consumption and wealth dimensions, and (partly) emanate from social comparisons with people in other countries.

We highlight three distinct results. First, the conditions under which the unregulated market economy is locally efficient depend on whether this local government has a welfarist or a non-welfarist objective. Under the latter, the unregulated market economy is efficient if the behavioral failures, as measured by the (estimable) degrees of positionality, are the same in both dimensions. With a welfarist objective, the analogous condition is that the marginal externality generated by domestic agents is the same in both dimensions. Consequently, welfarism and non-welfarism can lead to different optimal resource allocations in models with homogeneous agents. An interesting implication of this result is that the unregulated market economy may imply over-consumption according to one welfare criterion and over-saving according to the other.

Second, if the conditions for local efficiency of the unregulated market economy described above are not satisfied, we show that a non-welfarist government can implement its desired resource allocation through a capital income tax proportional to the difference between the degrees of wealth and consumption positionality. As such, this government taxes capital income if the behavioral failure in the wealth dimension exceeds that in the consumption dimension, and vice versa. For a welfarist government, the corresponding corrective tax is proportional to the difference in the effective marginal externality in the wealth and consumption dimensions.

Third, having characterized conditions for economic efficiency (as well as corrective policies in cases these conditions are not satisfied) at the local/national

[19] Note once again that Corollary 2 presupposes Nash-competition among national governments, which is a natural assumption when the two countries are identical. If one of the countries instead were acting Stackelberg leader and the other country follower, Corollary 2 still applies in modified form. In the welfarist case, the follower would satisfy the same optimality conditions as under Nash-competition, while the leader would recognize that it may influence the externality generated abroad via the reaction function of the follower. Thus, Stackelberg-competing welfarist governments would not in general implement a global social optimum (even if the optimality conditions of the leader differ from Eqs. (51) and (52)). See Aronsson and Johansson-Stenman (2015) for a study of Stackelberg-competition in an economy with international consumption externalities. Under non-welfarism, on the other hand, each national government would still obey Eqs. (53) and (54), since none of them attaches any social value to changes in the relative consumption and relative wealth. This applies regardless of whether the measures of reference consumption and reference wealth contain foreign components.

level, we extend the analysis to a global economy where the foreign reference levels (for consumption and wealth) are endogenous. The main result here is that Nash-competing non-welfarist governments would implement a global social optimum, whereas, generically, Nash-competing welfarist governments do not.

Several research questions, not addressed in this study, are potentially important. If agents are heterogeneous in terms of wealth, skills, or preferences, an interesting extension of our research would be to simultaneously examine redistributive and corrective aspects of consumption and wealth positionality. In addition, since empirical research on relative concerns and well-being has started to discern social reference groups, as well as estimated degrees of positionality for consumption and for certain aspects of wealth (or related durable goods), there is scope for testing our theoretical predictions. Such estimates are likely to vary between individuals and between countries (Davis and Wu 2020), and so would the policy implications thereof. We leave these and related questions for future research.

Appendix

Assumption 1

Assumption 1 is satisfied under the following conditions:

(i) Homogeneity: $u(c, \Delta_c, k, \Delta_k)$ is homogeneous of some degree $R < 1$ in (c, Δ_c) and homogeneous of some degree $\hat{R} < 1$ in (k, Δ_k);
(ii) Proportionality: $c^f = \lambda^c\, c\,, \quad k^f = \lambda^k\, k\,, \quad \lambda^c,\ \lambda^k > 0$ constant.

The homogeneity requirements (i) imply that the marginal rates of substitution of Δ_k for k as well as of Δ_c for c are functions of respectively Δ_k/k and Δ_c/c. The proportionality requirements (ii) imply that $\Delta_k/k = (1-\beta)(1-\lambda^k)$ and $\Delta_c/c = (1-\alpha)(1-\lambda^c)$ are constants. Thus, the marginal degrees of positionality, as defined by (35) and (36), are constants.

Proposition 1

1. $(u_{\Delta_c} > 0)$ and $(u_{\Delta_k} > 0$ or $u_k > 0)$

Consider the private and social marginal rates of substitution of wealth for consumption, as given by (32)–(34). Considering the definitions of ζ_c and ζ_k, we can express the social marginal rates of substitution by:

$$SMRS^{nw}_{k,c} = MRS^{nw}_{k,c}\,\frac{1-\zeta_k}{1-\zeta_c}\,,$$

$$SMRS^{w}_{k,c} = MRS^{w}_{k,c}\,\frac{1-\beta\,\zeta_k}{1-\alpha\,\zeta_c}\,.$$

Hence, the differences between the private and social marginal rates of substitution are given by

$$MRS^{nw}_{k,c} - SMRS^{nw}_{k,c} = MRS^{nw}_{k,c}\,\frac{\zeta_k - \zeta_c}{1-\zeta_c}\,,$$

$$MRS^{w}_{k,c} - SMRS^{w}_{k,c} = MRS^{w}_{k,c}\,\frac{\beta\,\zeta_k - \alpha\,\zeta_c}{1-\alpha\,\zeta_c}\,.$$

These differences equal zero (no distortion), when $\zeta_k = \zeta_c$ (non-welfarist government) or $\beta\,\zeta_k = \alpha\,\zeta_c$ (welfarist government). ∎

2. $(u_{\Delta_c} > 0)$ and $(u_{\Delta_k} = 0, u_k = 0)$

It is easy to show that—as in the standard *Ak* framework—the dynamic system is one-dimensional, and the steady state is unstable. That is, there is no transitional dynamics, and consumption and capital grow at their balanced growth rates "from the beginning." This argument follows standard textbook reasoning.

Step 1. In this case, ζ_k is undefined. Define $\xi_c = u_{\Delta c}/u_c = \zeta_c/(1-\zeta_c)$.

Consumption and capital grow at the same rate. We show that the endogenous growth rate of the market economy equals that of the welfarist- and non-welfarist governments: $g^m = g^w = g^{nw}$. Given that consumption and capital grow at their balanced growth rates "from the beginning," $\dot{k}/k$ is constant, and (7) requires c to grow at the same rate as k. Let g denote this growth rate. In the following we show that $g = \dot{c}/c$ is the same for the unregulated market economy as for the welfarist-/non-welfarist optima. Although the costate variables μ^m, μ^w, μ^{nw} may differ in levels, their respective growth rates are the same: $-[(A-\delta)-\rho] = \dot{\mu}^m/\mu^m = \dot{\mu}^w/\mu^w = \dot{\mu}^{nw}/\mu^{nw} = \dot{u}_c/u_c$, where the last equality follows from $\mu^m = u^m_c(1+\xi_c)$, $\mu^w = u^w_c(1+(1-\alpha)\xi_c)$ and $\mu^{nw} = u^{nw}_c$, with α, ξ_c being constant by assumption.

In order to find the consumption growth rate, we note that

$$\frac{\dot{\mu}}{\mu} = \frac{\dot{u_c}}{u_c} = \frac{u_{cc}c}{u_c}\frac{\dot{c}}{c} + \frac{u_{c\Delta_c}c}{u_c}\frac{\dot{\Delta}_c}{c}\,.$$

Employing (i) $\dot{\Delta}_c/c = (1-\alpha)(1-\lambda^c)\dot{c}/c$; (ii) $u_{c\Delta_c} = u_{\Delta_c c} = \partial\, u_{\Delta_c}/\partial\, c = \partial\, \xi_c u_c/\partial\, c = \xi_c u_{cc}$; (iii) homogeneity of degree R, $u_{cc}c/u_c = -(1-R)$, yields

$$g^i = \left(\frac{\dot{c}}{c}\right)^i = \frac{(A-\delta)-\rho}{(1-R)[1+\xi_c(1-\alpha)(1-\lambda^c)]}\,, \quad i \in \{m, w, nw\}\,. \tag{55}$$

First, (i) $\dot{\Delta}_c/c = (1-\alpha)(1-\lambda^c)\dot{c}/c$ follows directly when Proportionality is applied to (2). Second, in (ii), $u_{c\Delta_c} = u_{\Delta_c c}$ follows from Young's Theorem. The final step follows from (35) and (36): $u_{\Delta_c} = \xi_c\, u_c$. Thus, $u_{\Delta_c c} = \xi_c\, u_{cc}$. Third, in (iii), by Homogeneity, $u(c, \Delta_c, ., .) = c^R\, u(1, (1-\alpha)(1-\lambda^c), ., .)$, where $u(1, (1-\alpha)(1-\lambda^c), ., .)$ is a constant. Obviously, $u_{cc}c/u_c = -(1-R)$.

Step 2. As $g^m = g^w = g^{nw}$ we have $c^m_t = c^w_t = c^{nw}_t$ for all $t \geq 0$. From (7), (16) and (25), $c_0 = [(A-\delta)-g]\,k_0$, where the initial capital stock is the same across regimes. Therefore, $c^m_0 = c^w_0 = c^{nw}_0$. Finally, as the growth rates are identical, we also have $c^m_t = c^w_t = c^{nw}_t$ for all $t > 0$.

Step 3. The transversality conditions (TVC) are satisfied. Let $\hat{u} \equiv u(1, (1-\alpha)(1-\lambda^c), ., .)$. We have $\mu^m = R(1+\xi_c)\hat{u}c^{R-1} \neq \mu^w = R(1+\xi_c(1-\alpha))\hat{u}c^{R-1} \neq \mu^{nw} = R\hat{u}c^{R-1}$. Next we

consider $\mu_t^i = \mu_0^i\, e^{-[(A-\delta)-\rho]t}$, $i \in \{m, w, nw\}$, $c_t = c_0\, e^{gt}$, and $k_t = k_0\, e^{gt}$. Plugging these expressions into the respective TVC yields the following necessary and sufficient condition for the TVC (in all three frameworks) to be satisfied: $(A-\delta) > g$. This condition, however, is satisfied in all three frameworks (market, welfarist, non-welfarist), as $c/k = (A-\delta) - g > 0$.

From steps 1 to 3 we conclude that the equilibrium path $(c^m(t), k^m(t))_{t=0}^{\infty}$ equals the paths of both the welfarist and the non-welfarist optima. ∎

Proposition 2

The proof of Proposition 2 builds on the proof of Proposition 1. The tax rates described in (40) and (41) ensure that the private and respective social marginal rates of substitution of wealth for consumption become equal. Naturally, the (sign of the) tax rates are closely related to the efficiency conditions provided by Proposition 1. ∎

Proof of Proposition 3

With a non-welfarist planner at the global level, a social optimum satisfies the following first-order conditions:

$$\mu^i = u_c(c^i, \Delta_c^i, k^i, \Delta_k^i)\,, \tag{56}$$

$$\dot{\mu}^i = -\mu^i[(A-\delta)-\rho] - u_k(c^i, \Delta_c^i, k^i, \Delta_k^i), \tag{57}$$

whereas a welfarist planner satisfies the corresponding conditions

$$\mu^i = u_c(c^i, \Delta_c^i, k^i, \Delta_k^i) + (1-\alpha)[u_{\Delta_c}(c^i, \Delta_c^i, k^i, \Delta_k^i) - u_{\Delta_c}(c^j, \Delta_c^j, k^j, \Delta_k^j)]\,, \tag{58}$$

$$\dot{\mu}^i = -\mu^i[(A-\delta)-\rho] - u_k(c^i, \Delta_c^i, k^i, \Delta_k^i) - (1-\beta)[u_{\Delta_k}(c^i, \Delta_c^i, k^i, \Delta_k^i) - u_{\Delta_k}(c^j, \Delta_c^j, k^j, \Delta_k^j)] \tag{59}$$

for $i = 1, 2$ and $j \neq i$. Since the two countries are identical, Eqs. (56)–(57) and Eqs. (58)–(59) are equivalent. As such, and irrespective of whether the global social planner is welfarist or non-welfarist, the optimal resource allocation satisfies Eqs. (48)–(50) in Proposition 3. ∎

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