Status-driven group realignment and welfare

Dennis J. Snower*and Steven J. Bosworth†

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Abstract

This paper seeks to extend the domain of identity economics by exploring motivational foundations of in-group cooperation and out-group competition. On this basis, we explore the reflexive interaction between individual economic decisions and social identities in response to technological change in market economies. Our analysis explores how technological change falling on marketable goods and services, rather than non-market caring relationships, leads to a restructuring of identities, which increases the scope of individualism and promotes positional competition at the expense of caring activities. Since positional competition generates negative externalities while caring activities create positive ones, these developments have important welfare implications.

1 Introduction

This paper explores motivational foundations of identity formation and their implications for individualism in economic decision making. The underlying idea is simple. Identity formation partitions our social space into in- and out-groups. Our motivations differ across these groups. We tend to be more prosocially cooperative with our in-groups and more positionally competitive with our out-groups. We form our in- and out-groups by trading off prosocial cooperation against positional competition. The size of our in-groups reflects our degree of individualism.[1]

In this context, we examine the economic consequences of technological progress. Positional competition usually rests more heavily on market activities than does prosocial cooperation. Technological progress, falling mainly

*Institute for the World Economy, Kiel; Christian Albrechts University, Kiel; CEPR; IZA.

†Institute for the World Economy, Kiel.

[1]Our model also describes further aspects of individualism, in particular, what care-driven versus status-driven relationships people choose with others and how much value people place on the former relationships. Each of the three aspects of individualism – the size of our in-groups, the types of relationships we form and the value placed on supportive relationships – is represented by a different parameter of our model (we are grateful to Bryony Reich for pointing this out). Related aspects of individualism are examined in Advani and Reich (2015).

on market activities, changes our balance between positional competition and prosocial cooperation, thereby leading to a restructuring of our identities.

Our analysis sheds light on economic causes and consequences of three well-documented phenomena in market economies: the rise of individualism ("bowling alone"),[2] the rise of positional competition, and increasing scope of economic markets in organizing the production and distribution of goods (the "commercialization of life"). We show how these developments are driven, in part, by technological progress and explore the resulting welfare effects. Our analysis explains how technological progress, falling primarily on market activities, encourages Status-seeking at the expense of Care. Since Status-seeking generates negative externalities while Care creates positive ones, social welfare need not necessarily rise in response to technological progress. Under certain conditions, to be described rigorously below, it may even fall.[3]

The rest of the paper is structured as follows. Section 2 summarizes the empirical background for our analysis. Section 3 presents the purview of our analysis. Section 4 describes the decisions underlying the three activities (prosociality, positional competition and self-interestedness) generating the three outputs (caring relationships, positional goods and non-positional goods, respectively). The positional goods and non-positional goods arise from market activities, whereas caring relationships are generated by non-market activities. Section 5 describes the overall equilibrium, in terms of identities, caring relationships, positional goods and non-positional goods. Section 6 derives important welfare comparative static results and provides a concluding discussion in light of these results.

2 Empirical backdrop

Over the past 350 years there has been an unprecedented explosion in material living standards, much of it driven by technological advances in the design, production and distribution of goods and services. These advances have fallen primarily on market activities, rather than non-market activities associated with caring relationships. The reason is akin to the "Baumol effect:" Caring relationships with one's spouse and children, for example, require similar time and effort nowadays as they did a century ago, whereas the production of goods and services has seen huge technology-driven productivity improvements.

Caring relationships tend to be associated with non-market activities. Although these relationships may involve marketable goods and services, the latter

[2] See Putnam (2000), who assesses rising individualism in terms the decline in membership of civic organizations and other social groups. He relates this to a decline in other forms of in-person social intercourse and, more generally, to a decline in social capital in the United States since the 1950s. Our model captures this form of individualism through the size of social groups to which individuals belong.

[3] The empirical evidence on the rise of positional competition relative to care points to various other forces that lie beyond the scope of this analysis, such as the role of advertising in raising the salience of positional goals, the crowding out of caring activities through time and cognitive load devoted to positional battles, etc.

are incidental rather than central to these relationships. In fact, caring relationships need to be driven by intrinsic motives that tend to be displaced by the extrinsic motives of market activities. By contrast, positional contests tend to center on marketable goods and services, whose values can be measured and compared.

In our model, positional and non-positional goods are assumed to benefit proportionally from technological progress. This is a conservative assumption, since the the evidence suggests that positional goods benefit more than non-positional goods, since demands for the former are less satiable than demand for the latter. As countries have become more affluent, basic human needs for food, shelter and clothing are progressively satisfied, so that a progressively larger proportion of these goods and services (such as sports cars, designer clothing, consumer electronics and luxury cruises) serve "status wants," i.e. the desire for ostentatious consumption, rather than non-positional needs. On this account, it is widely accepted that technological advances have conferred their benefits disproportionately on positional goods.

Our model shows how such technological progress leads to a progressively larger proportion of market goods and services to be devoted to these status wants. At the same time, our model accounts for a well-documented rise in individualism, in the sense of a contraction in one's circle of social solidarity (as illustrated by the fragmentation of family structures and a rise in contractual relative to communal relationships).

There is a large body of evidence documenting these three phenomena – the rise of positional competition, the rise of individualism and the commercialization of everyday life.

The importance of positional competition in market economies has received substantial empirical attention. For example, on the basis of social surveys and contingent choice studies, Easterlin (1974), Kahneman et al. (1999) and others have found that people's subjective well-being and life satisfaction were more closely associated with their relative material status than their absolute income. These findings are consonant with survey evidence that people voluntarily accept reductions in their absolute incomes in return for improvements in their rank within the income distribution (e.g. Solnick and Hemenway, 1998).

The first major investigation of how economic growth is associated with a proportional growth of positional goods relative to non-positional goods was conducted by Hirsch (1976). He argued that rising affluence is associated with a rising proportion of expenditure devoted to status-seeking pursuits. Much corroborating evidence was found by subsequent contributors (e.g. Frank, 1999). This time-series evidence is not necessarily matched by cross-section evidence, as there is much anthropological and historical data indicating that positional competition is prevalent in various low-income societies (e.g. Boas, 1897; Maus, 1954). Only the time-series evidence, however, is relevant to our analysis.

The adverse welfare consequences of positional competition have been investigated by contributors to ecological economics (e.g. Daly, 1977; 1996; and Durning, 1992), who explore how status concerns are linked to environmental problems and resource depletion. Adverse welfare consequences of status seek-

ing are one of the important rationales for the "hedonic treadmill" phenomenon (e.g. Kahneman et al., 1999; Frank, 2000; Frey and Stutzer, 2002).

There is much evidence that well-being depends significantly and substantially on personal relationships, starting with psychologists' recognition of such relationships as a basic human need (e.g. Baumeister and Leary, 1995; Kasser and Ryan, 1999; Ryff and Singer, 2000; Deci and Ryan, 2001) and proceeding to economists' studies on the correlation between self-reported happiness and personal relationships (e.g. Uhlaner, 1989; Gui, 2000; Frey and Stutzer, 2002; Helliwell, 2002; Bruni and Stanca, 2008; Bechetti et al., 2008; 2009; Gui and Stanca, 2010).

There is a large literature on the rise of individualism, particularly in the West (e.g. Rahn and Transue, 1998; Putnam, 2000; McPherson et al., 2006). The implications of individualism for well-being has also been studied extensively, with much evidence indicating that a decline in social ties is inversely associated with self-reported happiness and various objective measures of well-being (e.g. Ogihara and Uchida, 2014). The reasons adduced for why individualism can reduce well-being are diverse: an erosion of trust, a decline in the sense of connectedness to others, and a rise in narcissism (e.g. Bosson et al., 2008; Putnam, 2000; Twenge, 2006; Twenge and Campbell, 2010).

The rising prevalence of economic markets in daily life (the "commercialization of life") has received much attention recently, particularly in the wake of prominent contributions by Sandel (2012), Satz (2010), and Skidelsky (2012). The empirical literature suggests a variety of reasons why rising marketization, connected with increasing materialism, often reduces well-being: (a) the accumulation of material wealth requires time, often at the expense of time for personal relationships, (b) increases in material wealth, together with loss aversion, raise the subjective experience of insecurity, (c) rising commercialization and materialism are commonly associated with status seeking and thereby generate increasing stress, strain, and anxiety, (d) commercialization promotes narcissism, which is associated with lower self-reported happiness, (e) commercialization promotes a contingent self-esteem and thus a more fragile sense of self-worth, (f) commercialization often reduces empathy, compassion, generosity and gratitude, thereby reducing well-being, (g) commercialization drives out intrinsic goals and thereby reduces life satisfaction (see, for example, Kapteyn and Wansbeek, 1982; Cohen, P. and J., 1996; Sheldon et al., 2000; Williams et al., 2000; Kasser and Ryan, 2001; Kasser, 2002).

3 Underlying ideas and purview of analysis

In accordance with the literature on motivation psychology, we recognize that people can be affected by multiple, discrete *motives*, each of which is understood as a force that gives direction and energy to one's behavior, thereby determining the objective of the behavior. This recognition differs markedly from standard neoclassical and behavioral economics, where each individual is assumed to have a unique set of preferences that are internally consistent, temporally stable and

context-independent. Our analysis, by contrast, recognizes that an individual's objectives depend on which motives are active, and the activation of motives is influenced by the individual's social context. Thus preferences in our analysis are not located exclusively in the individual, but rather are the outcome of the interplay between the individual and the social environment. Individuals are *multi-directed*, in the sense that different environmental cues may give rise to different motives, associated with different objectives of decision making.[4]

Our analysis considers three motives: (1) *Care* with regard to in-group members, whereby an individual's utility depends positively on the payoff of others, (2) *Status-seeking* with regard to out-group members, whereby an individual's utility depends on the difference between her payoff and that of others, and (3) *Self-interested Wanting*, whereby an individual's utility depends on her own payoff.

Care refers to the motive generating the desire to promote the wellbeing of others and to alleviate their suffering. It includes acts of benevolence, altruism, sympathy, and so on. It occurs naturally among kin and is frequently extended to friends and other non-kin groups with whom one identifies. Status-seeking takes a wide variety of forms in market economies, including concern with one's wealth, physical appearance, possessions, political clout, business success, intellectual prowess, sports achievements, etc. relative to the other members of one's reference group. It is manifested as ostentatious consumption, keeping up with the Jones's, tournament contracts in the labor market, rankings of fund managers, tennis seeds, football leagues, and much more. Self-interested Wanting corresponds to the standard neoclassical notion whereby an individual's utility depends only on costs and benefits flowing to the individual herself.

The motives that our analysis focuses on – Care, Status-seeking and Self-interest – are associated with three activities: *prosociality*, *positional competition* and *self-interestedness*, respectively. These activities generate three outputs: caring relationships, positional goods and non-positional goods, respectively. Positional competitiveness and prosociality are very commonplace activities, though both are ignored in neoclassical economics, which assumes that agents are purely self-interested,[5] so that their direct payoffs[6] are independent of one another. By contrast, both Status-seeking and Care make people's wellbeing interdependent.

Our analysis focuses on Status-seeking and Care since these motives exemplify two common, yet contrasting economic objectives: Under Status-seeking, one's payoff is diminished by the payoff of one's competitors; whereas under care, one's payoff is enhanced by the payoff of the members of one's reference group.

[4] A survey of psychological motives underlying economic decisions, their biological substrates, and an account of multi-directedness are given in Przyrembel et al. (mimeo, 2015). Implications of multi-directedness for economic activity are explored in Bosworth et al. (2016).

[5] Self-interest does not receive much attention in motivation psychology, though it is related to McDougall's (1932) propensity for foraging and ownership, Reiss' (2004) desire for eating, Gilbert's (2014) drive-, seeking-, acquisition-focused system, and in a broader sense, Bakan's (1966) concept of agency.

[6] Needless to say, however, their payoffs may be indirectly interdependent, e.g. through the price system or externalities.

Although the motivation psychology literature has identified further motives – such as achievement,[7] affiliation,[8] aggression,[9] and fear[10] – these are not considered here. This is clearly a strong analytical simplification, since these other motives may also be relevant for identity formation. For example, in the foundational models of identity economics (summarized in Akerlof and Kranton, 2010), people's in-group behavior is governed by social categories, associated with distinctive norms and ideals, promoted by the motive of affiliation.[11] Furthermore, people's out-group behavior may be driven by the motives of fear or anger, not just Status-seeking.

Non-positionally competitive activities arise when we satisfy our basic needs for food, shelter, clothing, and other essentials for the maintenance of life. Except for people living in extreme poverty, most of our consumption activities satisfy "wants" rather than "needs," and many of these wants arise from positional battles in social settings. The prevalence of such positional battles is clarified through evolution-based theories describing how survival and procreation depends on one's ranking within one's social group. Prosociality is virtually universal within families. No child would survive without it. Much of the evolutionary success of homo sapiens is due to our ability to extend prosociality to non-kin groups.

The utility from in-groups is generated through the production of *caring relationships*, which may be understood as a club good,[12] shared by in-group members. Each in-group constitutes a cooperative social setting. The care motive is particularly appropriate to this setting, since it induces people to take each other's welfare into account when deciding to contribute to the club good, thereby internalizing the positive externality from this good.

The utility from out-groups arises from the production of *positional goods*, conferring status. People's performance in positional competition depends on their differing abilities, defined in terms of goods produced per unit of effort. Superior positional performance generates *pride* (a utility gain) and inferior performance generates *envy* (a utility loss). In this social setting, people's actions generate negative externalities.

Both Status-seeking and Care take place with respect to preexisting reference groups. These reference groups are defined by our social identities. For the purposes of our analysis, we restrict our conception of social identity to the formation of in-groups. Specifically, each identity describes (1) a set of in-groups, the payoff of whose members we seek to promote, (2) a set of "competing

[7] See for example Atkinson and Feather, 1966; Pang, 2010.

[8] McClelland (1967), H. Heckhausen (1989), or Heckhausen and Heckhausen (2010).

[9] This motive matches McDougall's (1932) concept of anger/rage, Murray's (1938) aggression and defendance, Heckhausen's (1989) aggression, and Reiss' (2004) vengeance.

[10] McDougall (1932), Thorndike (1898), Lewin (1935) and Hull (1943) use the term avoidance, whereas Murray (1938) refers to harm avoidance and Trudewind (2000) to anxiety.

[11] While Affiliation coordinates the actions of in-group members through adherence to norms and ideals, Care is a welfare-driven coordination device.

[12] Following the tradition of Iannaccone (1992), we conceive of these club goods rather broadly. This could involve activities within a religious denomination or following a particular sports club.

out-groups," the payoff of whose members we seek to exceed, and (3) a set of "non-competing out-groups," the payoff of whose members is irrelevant to our decisions.

Our analysis portrays a drastically simplified picture of social groups. In particular, we will assume that each person's identity is associated with a single in-group, whose members are motivated by Care. Furthermore, all people outside this group are assumed to constitute the competing out-group, so that there are no non-competing out-group members. People are assumed to engage in Status-seeking with respect to their competing out-group.[13] The size of the individual's in- and out-group depends on the tradeoff between the benefit from caring relationships and the net benefit from status. We will examine how technological progress affects the nature of this tradeoff, promoting Status-seeking at the expense of Care.

4 Cooperation versus competition

We now construct a simple model of care-driven cooperation and status-driven competition.

4.1 Non-market activities

Each individual i contributes a production of q_i units to the non-marketable club good (caring relationships) in each period of analysis. The marginal cost of providing one unit is a constant $1/\alpha$ in terms of effort e_i spent for each unit produced. That is, $e_i = q_i/\alpha$. Here α is a positive productivity parameter. Every individual has one unit of effort which may be devoted to caring relationship production or disposed of.

The total amount of the club good available to each in-group member is

$$Q = \sum_i q_i = N_i q_i,$$

where N_i is the size of individual i's in-group.

Individual i's payoff is

$$U_i^q = Q - e_i.$$

We assume for simplicity that individual i is motivated by "Perfect Care" for the other member's of her in-group. Under Perfect Care, the individual's utility is weighted equally with that of the other group members, so that the individual's utility is

$$U_i^c = \frac{1}{N_i}\left(U_i^q + \sum_{j \neq i} U_j^q\right).$$

[13] In practice, individuals generally belong to several in-groups. Furthermore, in-group relations are often motivated by more than Care and out-group relations by more than Status-seeking. For example, rivalries among in-group members are common, and out-group members often evoke indifference. Nevertheless, in-group relations are usually more caring than out-group relations and have more stringent constraints on positional competition.

Differentiating i's utility with respect to effort, we obtain

$$\frac{dU_i^c}{de_i} = \alpha N_i - 1.$$

Since i has one unit of effort, she contributes the entire unit provided that $\alpha > 1/N_i$. We assume that this condition holds.[14] The production function for caring relationships is therefore

$$q_i = \alpha.$$

Consequently, individual i derives the following utility from her caring relationships of her other in-group members:

$$\begin{aligned} U_i^c &= \frac{1}{N_i}\left((Q - e_i) + \sum_{j \neq i}(Q - e_i)\right) = Q - 1 \\ &= \alpha N_i - 1, \end{aligned}$$

i.e. utility is an increasing function of group size (N_i) and productivity (α).

4.2 Market activities

Each individual i produces x_i market goods. The marginal cost of producing one unit is $1/\beta\,(1 + a_i)$ in terms of effort η_i spent for each unit produced, where a_i is the individual's ability (higher a_i stands for higher ability), and β is a positive productivity parameter. Stated explicitly, $\eta_i = x_i/\beta\,(1 + a_i)$. Every individual has one unit of effort which may be devoted to market good production or disposed of.

Ability is uniformly distributed over the range $[0, 1]$. For a group containing individual i, the ability of its lowest-ranked member is $\underline{a}_i$ and that of its highest-ranked member is $\overline{a}_i$. Thus, the size of the in-group is $N_i = \overline{a}_i - \underline{a}_i$.

For the x_i market goods produced by individual i, γx_i are non-positional and $(1 - \gamma)\,x_i$ are positional, where γ is a constant ($0 < \gamma < 1$). The individual's utility from the non-positional good is

$$U_i^n = \gamma\,(x_i - \eta_i)\,.$$

In each period of analysis she also competes with a random member from her out-group. Her utility from positional competition with the outsider j is

$$U_{i,j}^s \equiv \pi \max(x_i - x_j, 0) - \varepsilon \max(x_j - x_i, 0) - \overline{U}^s,$$

where π is a *pride parameter*, ε is an *envy parameter*, and $\overline{U}^s = \int_0^1 E_j[U_{i,j}^s]\,da_i$ is the average level of status utility in the population[15].

[14] If this condition did not hold then production of caring relationships would be socially inefficient.

[15] This is made for normalization purposes. We assume that status is zero-sum to account for the fact that social status is zero-sum and that the total level of social status cannot change over time.

Her expected utility from competing with a random outsider is

$$\underline{a}_i U_i^{\underline{s}} + (1 - \overline{a}_i) U_i^{\overline{s}}$$

where $\underline{a}_i$ is the probability of encountering an inferior-ability outsider and $U_i^{\underline{s}}$ is i's pride-driven utility from this encounter, whereas $(1 - \overline{a}_i)$ is the probability of encountering a superior-ability outsider and $U_i^{\overline{s}}$ is i's envy-driven utility from that encounter. Denote by

$$U_i^s \equiv E\left(U_{i,j}^s\right) = (1 - \gamma)\left(\underline{a}_i U_i^{\underline{s}} + (1 - \overline{a}_i) U_i^{\overline{s}} - \eta_i\right)$$

i's overall expected utility from competition.

Differentiating the sum of positional and non-positional utility with respect to market good production, we obtain

$$\frac{d}{d\eta_i}\left[U_i^s + U_i^n\right] = \beta\left(1 + a_i\right)\left(\left(1 - \gamma\right)\left(\pi \underline{a}_i + \varepsilon\left(1 - \overline{a}_i\right)\right) + \gamma\right) - 1.$$

Since i has one unit of effort, she expends the entire unit provided that the condition $\beta\left(\left(1 - \gamma\right)\min\left\{\pi, \varepsilon\right\} + \gamma\right) > 1$ holds. We assume that this is the case.

The production function is therefore

$$x_i = \beta\left(1 + a_i\right),$$

making the utility from market goods production U_i^s and U_i^n equal to

$$U_i^s = (1 - \gamma)\left(\frac{\beta}{2}\left(\pi \underline{a}_i\left(2a_i - \underline{a}_i\right) - \varepsilon\left(1 - \overline{a}_i\right)\left(1 + \overline{a}_i - 2a_i\right)\right) - 1\right)$$

and

$$U_i^n = \gamma\left(\beta\left(1 + a_i\right) - 1\right).$$

5 The overall equilibrium

In each period of analysis i encounters in- and out-group members with probabilities proportional to the number of in- and out-group members, respectively. The proportionality factors are A and $(1 - A)$, respectively, measuring the degree of assortative matching.[16] Letting θ be the weighting of positional utility relative to caring utility, the expected utility of individual i is

$$U_i = (1 - \theta) A U_i^c + \theta (1 - A) E\left(U_{i,j}^s\right) + U_i^n.$$

All individuals seek to join the highest-ranking group that will accept them, as U_i is increasing in $\overline{a}_i$. Since the highest-ability member of each group has the greatest incentive to leave the group with a subset of group members that would willingly follow, the lower boundary of each group maximizes the utility

[16] $A = 1/2$ represents random matching and $A = 1$ stands for extreme in-group matching bias.

of this highest-ranking member. When the lowest-ability members are successively expelled and the lower bound $\underline{a}$ rises, there is a progressively larger fall in the highest-ability member's utility from caring relationships and a progressively smaller rise in the highest-ability member's pride-driven utility from status competition. At the margin, expelling the lowest-ability group member leads to a fall in the highest-ability member's utility from caring relationships that is exactly equal to the rise in the member's pride-driven utility from competition. Accordingly, it can be shown that, for group k with upper bound $\overline{a}_k$, the utility-maximizing group size is

$$N^* = \overline{a}_k - \underline{a}_k^* = \frac{A\alpha\left(1-\theta\right)}{\beta\pi\theta\left(1-A\right)\left(1-\gamma\right)}. \tag{1}$$

The upper bound of the highest-ability group is the upper bound of the ability distribution. The boundaries of each group may be derived recursively, moving down the ability ladder.

In this context, we now consider the implications of technological progress for economic activities and welfare. A technological advance in the production of the market good is represented by a rise in the productivity parameter β. Note that

$$\frac{\partial N^*}{\partial \beta} = -\frac{A\alpha\left(1-\theta\right)}{\beta^2\pi\theta\left(1-A\right)\left(1-\gamma\right)} < 0,$$

i.e., a rise in productivity reduces the size of social groups and increases the scope of positional competition. By increasing the productivity of engaging in positional competition, it induces individuals to substitute status relationships for caring relationships by reducing the extent of their in-group identification.

On account of the forces of habit, cultural transmission, and loss aversion, the wider scope of positional competition may be expected to lead to a heavier weighting (rising θ) of positional utility relative to caring utility in people's expected utility functions. This also leads to a reduction in the size of in-groups as

$$\frac{\partial N^*}{\partial \theta} = -\frac{A\alpha}{\beta\pi\theta^2\left(1-A\right)\left(1-\gamma\right)} < 0.$$

Furthermore, increased positional competition may also lead to an increased sensitivity to the gains from such competition (rising π), which also leads smaller in-groups and more positional competition as

$$\frac{\partial N^*}{\partial \pi} = -\frac{A\alpha\left(1-\theta\right)}{\beta\pi^2\theta\left(1-A\right)\left(1-\gamma\right)} < 0.$$

The three developments above – smaller in-groups, less value placed on caring relationships relative to status relationships, and increased sensitivity to gains from status – are different aspects of increased individualism.

6 Welfare implications of technological progress

What are the welfare implications of technologically-driven economic growth, accompanied by a growing quest for status, whereby people can gain only at each other's expense? The developments arising from increases in market-based productivity β operate through multiple channels. The welfare implications may be assessed in terms of the social welfare function

$$W = \sum_{k=1}^{K+1} \int_{\underline{a}_k}^{\overline{a}_k} U_i da_i,$$

i.e. the sum of the utilities of all groups. Suppose that there are $K+1$ social groups, with the upper K groups having equilibrium size N^*. Then the number of people in the bottom group are $1 - KN^*$.

6.1 Group size and status utility

Let us first calculate the derivative dU^s/dN^*. We will first consider discrete changes in group size, and then took a limit to derive the differential effect on welfare. The process of individualization leads to a cascade of social demotions down the ladder of status, starting with a shrinking top-status group and rippling down to the progressively shrinking lower-status groups. Each step in the individualization process generates "*demotees*" (who are relegated to the next-lower social position) and remaining "*incumbents*" (who maintain their previous social position). In our analysis, each social group is of equal size, comprising the incumbents and demotees from a higher-status group. This implies however that groups' lower membership boundaries will shift by more than their upper membership boundaries, and in fact the lower down the social stratum, the more demotees relative to incumbents there will be. Figure 1 illustrates. The highest-status group 1 shrinks by $\Delta\underline{a}_1$. The next-highest-status group both shrinks in size by $\Delta\underline{a}_1$ but also shifts to incorporate all the demotees from the first group. Therefore the lower membership boundary for this second group shifts by $\Delta\underline{a}_2 = 2\Delta\underline{a}_1$. Likewise $\Delta\underline{a}_3 = 3\Delta\underline{a}_1$. Taking the limit of $\Delta\overline{a}_k/\Delta\underline{a}_k$ as $\Delta y \to 0$, we know that $d\overline{a}_k/d\underline{a}_k < 1$.

As noted, people are envious of higher-status groups and proud regarding lower-status groups, but they experience neither pride nor envy regarding members of their own social group. For simplicity, we assume that the utility of pride is linear and homogeneous across social groups (given by parameter π) and similarly for the disutility of envy (given by parameter ε)

Suppose that the group size changes by ΔN^* and that this implies changes in group boundaries by $\Delta\overline{a}_k$, $\overline{a}_{k+1}$ by $\Delta\overline{a}_{k+1}$, and so on. Then the change in the aggregate status-driven utility U^s may be expressed

$$\Delta U^s = \sum_k \underbrace{\int_{\underline{a}_k+\Delta\underline{a}_k}^{\overline{a}_k} \Delta U_i^s da_i}_{incumbents} + \underbrace{\int_{\underline{a}_k}^{\underline{a}_k+\Delta\underline{a}_k} \Delta U_i^s da_i}_{demotees}$$

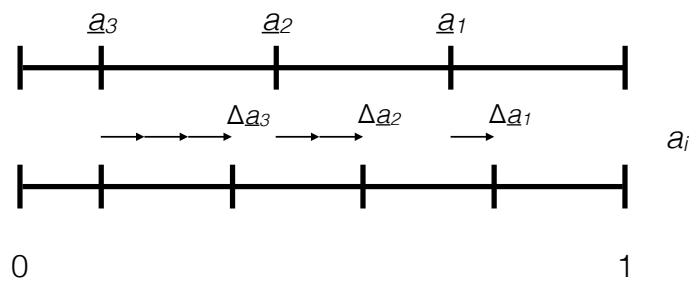

Figure 1: Visualizing the cascade of social demotions

where the first term represents the change in utility of the people who have not switched groups, and the second term represents the change in utility of all those who have switched groups. Intuitively (for positive Δ_k), the people in this second group used to be members of group k but are now members of group $k+1$.

Now, let us take the limit of $\Delta U^s/\Delta N^*$ as ΔN^* approaches zero:

$$\begin{aligned}\frac{dU^s}{dN^*} &= \lim_{\Delta N^* \to 0} \frac{\Delta U^s}{\Delta N^*} \\ &= \lim_{\Delta N^* \to 0} \sum_k \int_{\underline{a}_k + \Delta \underline{a}_k}^{\overline{a}_k} \left(\frac{\Delta U_i^s}{\Delta \overline{a}_k} \cdot \frac{\Delta \overline{a}_k}{\Delta N^*} + \frac{\Delta U_i^s}{\Delta \underline{a}_k} \cdot \frac{\Delta \underline{a}_k}{\Delta N^*} \right) da_i \\ &+ \int_{\underline{a}_k}^{\underline{a}_k + \Delta \underline{a}_k} \left(\frac{\Delta U_i^s}{\Delta \underline{a}_k} \cdot \frac{\Delta \underline{a}_k}{\Delta N^*} \right) da_i.\end{aligned}$$

At this moment it is worth pausing to consider explicitly the $\Delta \underline{a}_k/\Delta N^*$. Since the upper boundary of the highest-status group, $\overline{a}_1$, is equal to 1, we know that $\Delta \overline{a}_1/\Delta N^* = 0$, as it does not depend on N^*. The lower boundary of this group, $\underline{a}_1$, is equal to $1 - N^*$ and therefore $\Delta \underline{a}_1/\Delta N^* = -1$. Equivalently, $\Delta \overline{a}_2/\Delta N^* = -1$. Similarly, the lower boundary of the second-highest group, $\underline{a}_2$, is equal to $1 - 2N^*$ and therefore $\Delta \underline{a}_2/\Delta N^* = -2$. We can see in general that $\Delta \underline{a}_k/\Delta N^* = -k$ and $\Delta \overline{a}_k/\Delta N^* = -(k-1)$. Finally, since the lower bound of the rump group, $\underline{a}_{K+1}$, is equal to zero we therefore know that $\Delta \underline{a}_{K+1}/\Delta N^* = 0$.

This allows us to express the above:

$$
\begin{aligned}
\frac{dU^s}{dN^*} = & \int_{\underline{a}_1}^{1} \left(-\frac{\partial U_i^s}{\partial \underline{a}_k} \right) da_i + \Delta U_{\underline{a}_1}^s \\
& + \sum_{k=2}^{K-1} \left(\int_{\underline{a}_k}^{\overline{a}_k} \left(-(k-1) \frac{\partial U_i^s}{\partial \overline{a}_k} - k \cdot \frac{\partial U_i^s}{\partial \underline{a}_k} \right) da_i + k \cdot \Delta U_{\underline{a}_k}^s \right) \\
& + \int_{\underline{a}_K}^{\overline{a}_K} \left(-(K-1) \frac{\partial U_i^s}{\partial \overline{a}_K} - K \cdot \frac{\partial U_i^s}{\partial \underline{a}_K} \right) da_i + K \cdot \Delta U_{\underline{a}_K}^s \\
& + \int_{0}^{\overline{a}_{K+1}} \left(-K \cdot \frac{\partial U_i^s}{\partial \overline{a}_k} \right) da_i
\end{aligned}
$$

where

$$
\Delta U_{\underline{a}_k}^s = \frac{\beta\theta}{2} (1-A)(1-\gamma)(\pi+\varepsilon) N^{*2}
$$

was the discrete jump in utility experienced by the marginal group member by moving from group $k+1$ to group k; and $\Delta U_{\underline{a}_{K+1}}^s = 0$ as the rump group has no expellees. We can further simplify the above to

$$
\begin{aligned}
\frac{dU^s}{dN^*} = & -\frac{\beta\theta}{2}(1-A)(1-\gamma)N^{*2}\pi + \frac{\beta\theta}{2}(1-A)(1-\gamma)N^{*2}(\pi+\varepsilon) \\
& + \sum_{k=2}^{K-1} \left(-\frac{\beta\theta}{2}(1-A)(1-\gamma)N^{*2}(k\pi + (k-1)\varepsilon) + \frac{\beta\theta}{2}(1-A)(1-\gamma)N^{*2}k(\pi+\varepsilon) \right) \\
& - \frac{\beta\theta}{2}(1-A)(1-\gamma)N^{*2}(K\pi + (K-1)\varepsilon) + \frac{\beta\theta}{2}(1-A)(1-\gamma)K\left((1-KN^*)^2\pi + N^{*2}\varepsilon\right) \\
& - \frac{\beta\theta}{2}(1-A)(1-\gamma)K(1-KN^*)^2\varepsilon \\
= & \frac{\beta}{2}\theta(1-A)(1-\gamma)N^{*2}\varepsilon \\
& + \frac{\beta}{2}\theta(1-A)(1-\gamma)N^{*2}\sum_{k=2}^{K-1}(-k\pi + (1-k)\varepsilon + k(\pi+\varepsilon)) \\
& - \frac{\beta}{2}\theta(1-A)(1-\gamma)K(1-KN^*)^2\varepsilon \\
= & \frac{\beta}{2}\theta(1-A)(1-\gamma)N^{*2}\varepsilon \\
& + \frac{\beta}{2}\theta(1-A)(1-\gamma)N^{*2}(K-2)\varepsilon \\
& + \frac{\beta}{2}\theta(1-A)(1-\gamma)N^{*2}\varepsilon - \frac{1}{2}\theta(1-A)(1-\gamma)K\left(N^{*2} - (1-KN^*)^2\right)\pi \\
& - \frac{\beta}{2}\theta(1-A)(1-\gamma)K(1-KN^*)^2\varepsilon \\
= & \frac{\beta}{2}\theta(1-A)(1-\gamma)K\left(N^{*2} - (1-KN^*)^2\right)(\varepsilon - \pi).
\end{aligned}
$$

6.2 Technological progress

We can now express $dW/d\beta$ by using the expression for the total derivative:

$$\frac{dW}{d\beta} = \frac{\partial W}{\partial \beta} + \frac{\partial N^*}{\partial \beta} \cdot \frac{dW}{dN^*}.$$

We have already shown that

$$\frac{\partial N^*}{\partial \beta} = -\frac{A\alpha\left(1-\theta\right)}{\beta^2 \pi\theta\left(1-A\right)\left(1-\gamma\right)}.$$

As per above, [17]

$$\frac{dW}{dN^*} = \alpha A\left(1-\theta\right) + \frac{\beta}{2}\theta\left(1-A\right)\left(1-\gamma\right)K\left(N^{*2} - \left(1-KN^*\right)^2\right)\left(\varepsilon - \pi\right) > 0.$$

Finally, we assume that overall status utility is

$$\frac{\partial W}{\partial \beta} = \gamma$$

– i.e. holding group size fixed β only affects welfare through non-positional goods production.

Hence,

$$\frac{dW}{d\beta} = \gamma - \frac{A\alpha\left(1-\theta\right)}{\beta\pi\theta\left(1-A\right)\left(1-\gamma\right)} \cdot \left(\alpha A\left(1-\theta\right) + \frac{1}{2}\theta\left(1-A\right)\left(1-\gamma\right)K\left(N^{*2} - \left(1-KN^*\right)^2\right)\left(\varepsilon - \pi\right)\right).$$

$$= \underbrace{\gamma}_{direct\ effect} - \underbrace{\frac{A^2\alpha^2\left(1-\theta\right)^2}{\beta\pi\theta\left(1-A\right)\left(1-\gamma\right)}}_{lost\ caring\ relationships} - \underbrace{\frac{A\alpha\left(1-\theta\right)K\left(N^{*2} - \left(1-KN^*\right)^2\right)\varepsilon}{2\beta\pi}}_{increased\ envy/pride}$$

The first term is the direct welfare effect, which is conventional; the second and third terms are the indirect effect, which may be decomposed into the effect of increased individualization (smaller social groups) on the welfare from caring relationships and positional competition, respectively.

7 Conclusion

The overall welfare implications are clear. The exogenous developments above – the technological advance (a rise in β), heavier weighting of positional utility (a rise in θ), and increased sensitivity to competitive gains (a rise in π) – have standard direct effects, but their indirect effects via increased individualization

[17] The facts that 1) $N^* = A\alpha\left(1-\theta\right)/\pi\theta\left(1-A\right)\left(1-\gamma\right)$, 2) $KN^* < 1$ and 3) $\left(K+1\right)N^* > 1$ imply that dW/dN^* is positive. The intuition is that only the highest member of each group is at their preferred mix between care and pride. Therefore everyone else would always want to expand group size in equilibrium as the increased care would offset the lost pride.

are negative. The unambiguous welfare loss from individualization arises from the deterioration of caring relationships and the deterioration of the position of the residual demotees. This result runs counter to the conventional wisdom that increased positional competition leaves social welfare unchanged, provided that the gains from pride are equal to the losses from envy and the resource cost of positional competition is ignored.[18]

Beyond the scope of the model above, the rising demand for positional goods may be expected to promote incentives for further innovation in the production of these goods, leading to another round of increased individualism. This chain reaction of effects may be called the "innovation-individualization multiplier," which may drive a process of endogenous growth.

Our analysis sheds light on how identity formation strikes a balance between prosocial cooperation and positional competition. It also explains how technological progress may affect this balance, by promoting individualization, positional competition at the expense of care, and market activities at the expense of non-market ones. In this context, the standard positive direct effects of technological progress may be mitigated by negative indirect effects arising from diminished prosociality and increased positional competitiveness.

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[18] Whereas our analysis highlights important sources of welfare losses from individualization, it is of course worth noting that our simplified model also overlooks potentially important welfare gains from individualization (such as possible utility from an increased sense of agency or from an increased impetus for creativity and innovation).

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