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ABSTRACT

On the Inefficiency of Inequality*

A number of studies have examined the implications of preference interdependence. This paper models utility as depending on other people's consumption levels and shows that welfare declines with inequality, equilibrium inequality is inefficient, and the optimal intervention leads to a more equal distribution.

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On the Inefficiency of Inequality

1. Introduction

Recent studies have shown a negative impact of inequality on growth.[1] As far as we know, a negative relationship between inequality and efficiency has not been established.[2] This paper aims to establish such a link.

In neoclassical theory, the competitive equilibrium is Pareto optimal. On the other hand, "[c]onsumption externalities potentially break the link between Pareto optimality and competitive equilibria and open the door for beneficial government intervention" (Dupor and Liu, 2003). The idea that individual well-being depends on the consumption of others has been used in the literature in analyses of government policy (e.g., Ljungqvist and Uhlig, 2000; Dupor and Liu, 2003) and of stock market behavior (e.g., Abel, 1990; Campbell and Cochrane, 1999). That idea is used here to show that welfare declines as inequality rises, that equilibrium inequality is inefficient, and that some redistribution is optimal.[3]

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[1] Empirical analyses of inequality and growth include Alesina and Rodrik (1994), Persson and Tabellini (1994), Benabou (1996) and Barro (2000). Theoretical analyses include Banerjee and Newman (1991) and Galor and Zeira (1993).

[2] Various studies (e.g., Baland and Platteau, 1997; Bardhan et al. 2002; and Dayton-Johnson and Bardhan, forthcoming) have examined the relationship between inequality and the efficiency of provision of public or collective goods.

[3] A literature on social capital (including social norms, trust and cooperation) has interpreted recent findings from experimental and other empirical studies that individuals behave non-opportunistically or cooperatively in Prisoner's Dilemma and other games by assuming that individuals have preferences for reciprocity or aversion to inequality (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Schiff,

Define "concern" ("jealousy") as an increase (decrease) in individual utility when other people's consumption rises. In other words, an increase in other people's consumption generates a positive (negative) externality in the case of concern (jealousy). It is argued here that as general consumption grows, preferences gradually evolve from being dominated by concern to being dominated by jealousy.

Dupor and Liu (2003) examine the implications of jealousy and of "keeping up with the Joneses." This paper expands on the former in two ways. First, the analysis in Dupor and Liu assumes symmetry, with all individuals being identical. We extend the analysis to the case of inequality. Second, consumption externalities depend on the *level* of per capita consumption in their analysis. We also examine the case where consumption externalities depend on the *difference* between individual and per capita consumption.[4]

The paper is organized as follows. Section 2 presents a model of consumption externalities under asymmetry, with consumption externalities depending on the difference in consumption. Section 3 concludes.

2. Model

Whether individuals experience concern or jealousy with respect to other people's consumption is likely to depend on the specifics of the situation. For instance, there is reason to believe that individual preferences exhibit concern for the consumption of others when that consumption is very low, that the extent of concern diminishes as the

2002). This is not the case in this paper where, even though they may be affected by other people's consumption, individuals are exclusively concerned with maximizing their own utility.

[4] The two cases lead to the same results. The analysis of the first case, with externalities depending on the level of per capita consumption, is available from the author.

consumption of others increases, and that concern eventually turns to jealousy as the consumption of others continues to increase. For instance, a reduction in homelessness or hunger is likely to make most people feel better. At the other extreme, individuals are likely to envy people who own a private jet or are buying their third Summer home.

Let society be divided into two groups X and Y. The size of the population is fixed and normalized to unity, and the size of each group is $1/2$. Welfare is $W = (U^X + U^Y)/2$. Per capita consumption is x and y, respectively. Individual consumption is c_i, $i = X, Y$. Assume $c_X = x$ and $c_Y = y$, i.e., there is symmetry within each of the two groups.

Consumption externalities depend on the difference between individual and per capita consumption, $c_i - x$ and $c_i - y$, $i = X, Y$.[5] Let the individual utility function be $U^i = U(c_i, c_i - x, c_i - y, n_i)$, $i = X, Y$, where n_i is individual labor, $c_i, x, y, n_i \geq 0$, and U is twice differentiable, with $U_{c_i} > 0$, $U_{n_i} < 0$, $U_{n_i n_i} \leq 0$, $\forall\, c_i, n_i, x, y$. In order to abstract from redistribution based on differences in marginal utility, we assume $U_{c_i c_i} = 0$, with $U_{c_X} = U_{c_Y}$.

Assume that $U_{c_Y - x} = U_{c_X - y} = 0$ for $c_Y - x = c_X - y = 0$. Since individuals are identical within each group (that is, $c_X = x$ and $c_Y = y$), externalities associated with consumption differences only occur across groups, and the utility function simplifies to

$$U^X = U(c_X, c_X - y, n_X),\ U^Y = U(c_Y, c_Y - x, n_Y), \qquad (1)$$

[5] We abstract from externalities associated with per capita leisure, based on evidence that consumption externalities are more likely and more important (Solnick and Hemenway, 1998; Dupor and Liu, 2003).

with $U_{c_X-y} = U_{c_Y-x}$ for $c_X - y = c_Y - x$, and $U_{c_X} + U_{c_X-y} > 0$, $U_{c_Y} + U_{c_y-x} > 0$, i.e., individual utility in a group increases when everyone's consumption in that group increases. Taking $y\,(x)$ as given, individuals in group $X\,(Y)$ choose c_X (c_Y) in order to maximize U^X (U^Y) subject to the constraint $c_i = f^i(n_i), f^i_{n_i} > 0, f^i_{n_i n_i} < 0$, where f^i is the twice differentiable production function of individuals in group i, $i = X, Y$. Assuming conditions for an interior solution are satisfied, the first-order condition is

$$U_{c_X} + U_{c_X-y} + \frac{U_{n_X}}{f^X_{n_X}} = 0;\ U_{c_Y} + U_{c_Y-x} + \frac{U_{n_Y}}{f^Y_{n_Y}} = 0. \qquad (2)$$

The social optimum is given by

$$U_{c_X} + U_{c_X-y} + \frac{U_{n_X}}{f^X_{n_X}} - U_{c_Y-x} = 0;\ U_{c_Y} + U_{c_Y-x} + \frac{U_{n_Y}}{f^Y_{n_Y}} - U_{c_X-y} = 0. \qquad (3)$$

Let t_i be a proportional tax or subsidy rate. The private optimum is given by

$$U_{c_X} + U_{c_X-y} + \frac{U_{n_X}}{(1-t_X) f^X_{n_X}} = 0;\ U_{c_Y} + U_{c_Y-x} + \frac{U_{n_Y}}{(1-t_Y) f^Y_{n_Y}} = 0. \qquad (4)$$

From equations (3) and (4), the optimum tax rates are:

$$t^*_X = \frac{U_{c_Y-x}}{U_{c_X} + U_{c_X-y}},\ t^*_Y = \frac{U_{c_X-y}}{U_{c_Y} + U_{c_Y-x}}. \qquad (5)$$

If U_{c_Y-x}, U_{c_X-y} < (>) 0, preferences exhibit concern (jealousy). For instance, if x falls so that $c_Y - x$ increases, the externality $U_{c_Y-x} < 0$ if individuals in group Y feel concern for the fall in consumption in group X, and $U_{c_Y-x} > 0$ if the individuals feel jealousy. Assume individuals are concerned (jealous) about those whose consumption is

lower (higher) than their own, with $U_{c_x - y}(U_{c_y - x}) \lesseqgtr 0$ for $c_x - y\,(c_y - x) \gtreqless 0$ and $U_{c_X - y, c_X - y}$, $U_{c_Y - x, c_Y - x} < 0$.

Proposition 1: Equilibrium inequality is inefficient, and the optimal intervention entails a reduction in inequality.

Proof: We start from an equilibrium with $f^Y = f^X$ and $c_Y - x = c_X - y = 0$. Then, $U_{c_Y - x} = U_{c_X - y} = 0$ and $t_X^* = t_Y^* = 0$ (equation 5). Let f^Y increase and f^X decrease, such that y increases by β and x decreases by β, with $c_y - x = 2\beta$ and $c_x - y = -2\beta$. Then, $U_{c_x - y} > 0 > U_{c_y - x}$ and $t_X^* < 0 < t_Y^*$.

Thus, equilibrium inequality is inefficient and the optimal policy reduces inequality by redistributing from the rich (Y) to the poor (X).

Proposition 2: An increase in inequality reduces welfare.

Proof: Inequality increases with β, with $\partial U^X / \partial \beta = -U_{c_X} - U_{c_X - y} + U_{c_Y - x}$, $\partial U^Y / \partial \beta = U_{c_Y} + U_{c_Y - x} - U_{c_X - y}$, and $\partial W / \partial \beta = \dfrac{U_{c_Y} - U_{c_X}}{2} + (U_{c_Y - x} - U_{c_X - y})$. The first term is equal to zero. The second term is negative because $U_{c_X - y} > 0 > U_{c_Y - x}$. Thus, $\partial W / \partial \beta < 0$.

Is there support for the conclusion that an increase in inequality reduces welfare? Alesina et al. (2002) explore whether inequality affects individual utility, with utility measured in terms of survey answers about happiness. They find, after controlling for individual income and a set of other individual and aggregate characteristics, that in the

US, a 10 percentage point increase in inequality reduces the number of people who report themselves as "Very Happy" by 18.5% and increases those who report themselves as "Not Too Happy" by 26%, with the corresponding figures for the EU being similar, namely, 21% and 27%, respectively. These findings are consistent with the implications of the model.

3. Conclusion

The paper examined the implications of the interdependence of preferences. It expands on aspects of Dupor and Liu (2003) by examining optimal interventions under inequality and by considering two alternative types of interdependencies. In the first case, which is available from the author, a low (high) *level* of consumption generates concern (jealousy) in other consumers. In the second case, a low (high) level of consumption *relative* to that of others generates concern (jealousy) in the latter. We show that welfare declines as inequality rises, that equilibrium inequality is inefficient, and that the optimal intervention lowers inequality.

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