

SOCIAL CAPITAL AND THE REPRODUCTION OF INEQUALITY IN SOCIALLY POLARIZED ECONOMIES

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May 2004

*Submitted for presentation at the August 2004 Annual Meeting of
the American Agricultural Economics Association*

JEL Classifications:

Z130 – Social Norms and Social Capital

O – Economic Development, Technological Change, and Growth

Keywords: Social capital; social collateral; inequality; socio-economic polarization; credit

Abstract

This paper explores the idea that how wealth is distributed across social groups (ethnic or language groups, gender, etc.) fundamentally affects the evolution of economic inequality. By providing microfoundations suitable for this exploration, this paper hopes to enhance our understanding of when social forces contribute to the reproduction of economic inequality, and what the relevant policy implications might be. In tackling this issue, this paper offers contributions in two domains. First, it adds a dimension to the literature on social capital. Second, it offers a modest generalization of the concepts of identity, alienation and economic polarization used by Esteban and Ray (1994). This generalization permits us to consider the multiple characteristics that shape social identity, inclusion and exclusion. It also underwrites a higher-order measure of socio-economic polarization that permits us to explore the hypothesis of Frances Stewart and others that economic inequality is most pernicious and persistent when it is socially embedded. Among other things we are able to show that holding constant the initial levels of economic polarization and inequality, increases in socio-economic polarization deepen the reproduction of economic inequality.

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Social Capital and the Reproduction of Economic Inequality in Polarized Societies

A number of factors have renewed interest in economic inequality, including demonstrations (empirical and theoretical) that inequality may slow the rate of growth, and that a number of economic forces may tend to reinforce inherited inequality.¹ While the econ-centricity of this literature is interesting, several contributions have argued that economic inequality is most durable, problematic and pernicious when it is socially embedded, meaning that wealthy and the poor are distinguished not only by their money, but also by their culture, language or appearance. In the case of Latin America, Adolfo Figueroa (1996 and 2003) argues that inequality is most severe and inhibits economic growth in the Andean and Central American regions where inequality is socially embedded. On a more global scale, Frances Stewart (2001) has argued that it is socially embedded inequality—what she calls horizontal inequality—which is most economically and socially problematic, drawing on examples such as the United States and South Africa.

The goal of this paper is to explore this idea that non-economic characteristics of society fundamentally affect the evolution of inequality. By providing microfoundations suitable for this exploration, this paper hopes to enhance our understanding of when social forces contribute to the reproduction of economic inequality, and what the relevant policy implications might be. In tackling this issue, this paper offers contributions in two domains. First, it adds a dimension to the literature on social capital by showing how social relationships—directly valued for their own enjoyment—can serve as collateralizable social capital assets. Second, it offers a modest generalization of the concepts of identity, alienation and economic polarization used by Esteban and Ray (1994). This generalization permits us to consider the multiple characteristics that shape social identity, inclusion and exclusion. It also underwrites a higher-order measure of socio-

¹ The detrimental impact of economic inequality on growth (Alesina and Rodrik 1994, Deininger and Squire 1998, Persson and Tabellini 1994, Aghion et al. 1999, Birdsall and Londono 1997, to name just a few) has been well documented.

economic polarization that permits us to explore the ideas of Figueroa and Stewart. Among other things we are able to show that holding constant the initial level of economic polarization and inequality (the latter as defined by Esteban and Ray), increases in socio-economic polarization deepen the reproduction of economic inequality.

The core of this paper is built around a model in which individuals not only directly value social ties as a consumption good, but also seek economic benefits through these relationships in the form of financial capital, or loans from their friends. With incomplete or missing formal financial markets, one's only means of access to capital may be such social ties. The key mechanism available to encourage repayment in these non-market transactions is social exclusion: a defector faces the penalty of having his or her relationship with the group severed. It is the inherent value that individuals see in having social networks which enables such relationships to function as social collateral for the loan provided. The core model of this essay, then, relates the intrinsic value of social capital to its instrumental value, with the existence of the former making possible the realization of the latter.

The notion that resources committed to building up social capital are not equally productive for all individuals is critical to this paper. Returns to social investment are strongly impacted by people's identity characteristics. In particular, each individual has an identity, which is a function of economic characteristics (wealth) and socially relevant immutable characteristics such as race, gender, and family background. In deciding how much to invest in one of two available social groups, each person's identity comes into play, determining the size of the social capital stock he or she can build up given a certain amount of social investment, and therefore by affecting the size of social collateral that this investment could represent.

Moving from this agent-level to an aggregate analysis, the paper provides an analysis of the reproduction of inequality in highly polarized economies in which social interactions underpin

economic activity. The role of population distribution in identity space is examined, in order to investigate what types of initial distributions may make inequality in access to social capital, and consequently in economic welfare, more persistent. Special consideration is given to distributions depicting various degrees of ‘polarization’. For this, we formalize the concept of socio-economic polarization as a specific feature of distribution, one that is distinct from the concepts of economic polarization and inequality. Using the theoretical framework of social capital as social collateral described above, we show that, when social networks take the place of missing financial markets, greater initial socio-economic polarization will lead to the persistence of income inequality.

The remainder of paper organized as follows. Section 1 offers a brief review of the literature on social capital and the economics of identity. Section 2 builds on that literature, and tries to rectify some of its shortcomings with a model of the accumulation of social capital as social collateral in the presence of social identity and alienation. Section 3 then undertakes a numerical analysis of the model, linking economic outcomes to the degree of initial socio-economic polarization and showing how social forces can deepen economic inequality in polarized societies. Finally, Section 4 concludes the paper with thoughts on its policy implications and how the analysis might be deepened and carried forward.

Section 1 Social Capital and the Economics of Identity

Scholars who have sought to incorporate social structure in economic analysis of human behavior have mostly done so acknowledging that development of theoretical frameworks for, and meaningful and empirically tractable measurement of, the concept of ‘social capital’ has not yet intellectually matured. Definitions of the term are varied in generality and focus. For example, while some of the literature focuses on the community as the unit of analysis (Woolcock and Narayan 2000, Putnam 1993, Bowles 1999), inherent in most definitions is the view of individuals as the “owners” and benefactors of social capital (Coleman 1988, Portes 1998).

Whichever is the definition used, an area which research has come short on is the examination of the forces which help create and strengthen social capital. Especially in empirical analysis, while social capital as a variable is itself intellectually dissected for greater insight into its workings, it is often taken as ‘externally’ given, as in several studies examining the impact of household memberships in groups on household expenditures (Narayan and Pritchett 1999, Maluccio et al. 2000, Grootaert 1999). However, some notable exceptions exist (e.g. Alesina and La Ferrara 2000). In our model presented in Section 2, the creation of and investment in social capital is central.

In addition to the body of work on social capital, the most recent economic literature reflects the nascent recognition that economic models would be well served by paying attention to the centrality of identity in economic behaviour of individuals. People care not only about goods and services that they (and others, as the work on altruistic behaviour captures) consume, but they also care about whether their actions and the actions of others around them are in accordance with their identity. A recent study (Akerlof 2000) draws on some elemental ideas from sociology and social psychology to create a model in which one’s identity informs, and is informed by, one’s actions and the actions of others. In this model, people care not only about economic goods in the broadest sense of the term, but also about affirming their identity, which can mean doing things to differentiate themselves from the advantaged groups even if these actions are not optimal from the standpoint of material welfare..

Elsewhere, the role of identity in contributing importantly to the deleterious effects of economic inequality between social groups has been the focus of attention (Stewart 2001) and has served as a motivation to measure economic polarization (Esteban and Ray 1994).² Stewart (2001) argues that identity is usually attached to those group traits that cannot easily be changed, but that

² In Section V, we build on the conceptualization of identity in Esteban and Ray.

the very erosion over time of identification with formerly socially significant group traits, for which examples abound, is evidence of the fact that identity is indeed subject to manipulation. In examining how people choose actions according to behavioural social codes, ethnicity has been an issue of focus. This is often modelled by changing the basic assumptions regarding the motivation for action. For example, in Kuran (1998) utility is composed not only of personal taste, but also of the desire to gain approval of those in one's ethnic group, which may require actions such as practicing a cultural ritual.

The literature on identity has some important running themes, which include the questions: What is the nature of the interface between one's actions and perceptions of oneself on the one hand, and the actions and norms of one's environment on the other, and what does the feedback loop for this look like? How does one's identity adjust in response to one's and others' behaviour? And: how do people trade off economic advancement and identity affirmation, if indeed these constitute a trade-off? Some of these issues also come to the fore in the theoretical framework of this paper.

Section 2 A Model of Social Capital and Identity

We consider here a two-period model of individual investment in social relationships.³ In the first period individuals allocate their time between wage work and social relationships. They may also invest funds in an entrepreneurial project. To focus on the role of social relationships, we assume that financial markets do not exist. In this version of the model, we also assume that individuals do not invest their own inheritances in the entrepreneurial activity. Thus, the only funds available for investment are those that can be borrowed under informal loan contracts, as discussed below.

³ A natural extension will be to place this model in an overlapping generations framework.

While these assumptions are stark, they serve to bring into sharp relief ways in which social processes can reinforce economic processes and inequality.⁴

In the second period, profits from any entrepreneurial investment are realized, individuals decide whether or not to repay informal loans invested in the entrepreneurial project, stocks of social capital are updated, and individuals enjoy both their consumption of materials goods (purchased with wage and entrepreneurial income) and their stock of social relationships. Each individual enjoys four endowments: Inherited wealth; An immutable social characteristic such as gender, language or ethnicity; Time; and, An initial stock of social relationships, or inherited social capital. We will let the vector D denote the individual's socio-economic location as determined by their inherited wealth D_y and an immutable social characteristic D_x . Given these endowments, individuals must choose both how to allocate their time between work and social activity, as well as with which social group to invest their social time. Any group can also be characterized by its socio-economic location, denoted by the vector E , which measures the modal wealth and social characteristics of the group's members. Section 2.3 below discusses identity and its significance in more detail.

We will first consider the time allocation decision, taking the choice of group as given. After establishing the logic of social capital as social collateral, we will then turn to the details of an individual's identity and ultimately to the choice of group affiliation.

2.1 Social Capital as Social Collateral

This section will provide the basic structure of the model of social capital as social collateral, presenting first the incentive compatibility problem within the context of access to credit from

⁴ Note that if individuals could invest their own wealth, then initial inequality would tend to be reinforced. Similarly, if access to market mediated capital is wealth biases—as many have argued—than this feature would add yet another factor that tends to reproduce initial inequality, but again through economic, not social mechanisms.

social groups. Consider an agent who seeks to invest in a project but does not have own funds to do so, nor does she have access to formal sources of credit. The agent belongs to a social group that is able to pool funds. The group requires a return r on the loaned funds to compensate its members for consumption they have to delay until the loan is repaid. Denote as B the amount that the group is willing to lend to the individual. As argued in a moment, the group will choose B so as to assure incentive compatibility, meaning that the agent will have incentives to repay rather than (intentionally) default on the group.

At the beginning of period 1, the stock of social capital S_1 is given. Also, the agent is able at this time to invest in social capital through the time, L_1^s , that she spends building social networks. In particular, the time thus committed affects the rate $\tilde{\delta}$ at which social capital grows:

$$S_2 = (1 + \tilde{\delta}) S_1, \quad (1)$$

where $\tilde{\delta} = -\delta + L^s (1 - T(E, D))R$, $\delta \in (0, 1)$ is the ‘raw’ depreciation rate of social capital growth, and the function $T(E, D \in (0, 1))$ is the degree of effective alienation between the individual and the social group. Note that irrespective of time allocated to social activities, an individual will build up no social capital with the group if she is perfectly alienated from it (*i.e.* if $T(E, D)=1$). The binary choice variable R denotes the loan repayment decision, with $R=0$ if the individual decides not to repay the loan extended to her by the group and $R=1$ if she repays. If the individual decides to default on the group, then the group can effectively exclude her. This is reflected in the fact that when she fails to repay (*i.e.*, when $R=0$), the social relationships available for direct enjoyment will have declined, as opposed to growing, regardless of how much time the person had invested in the group, *i.e.* the stock of social capital becomes $S_2 = (1 - \delta) S_1$. Also, (1)

implies that for a non-joiner the social capital constraint is $S_2 = (1 - \delta) S_1$, just as is the case for a joiner but defaulter.

Investment in social relationships comes at a cost of forgone labor income, in the sense that total time L has to be allocated between labor L_t^w and time spent fostering social networks:

$$L_1^s + L_1^w \leq L$$

At the end of period 1 the agent seeks to borrow funds. The returns from the project $f(B)$ into which she invests these funds are realized in the next period, and these can immediately be consumed. Upon realization of the return, repayment of the loan with interest is due. Also, each period the agent can consume her labor income, $w L_t^w$, where w is the wage per unit of labor time. Finally, the individual gets utility both from consumption of material goods as well as from social interaction (friendship) with members of their social network. Formally, then, the stock of social capital S enters the utility function directly, so that the objective function of the model is:

$$U = u(c_1, S_1) + \beta u(c_2, S_2)$$

where c_t is consumption at time t . The agent's problem is:

$$V(B^{IC}, \cdot) \equiv \max_{c, L_1^s, L_1^w, B, S_2, R} [u(c_1, S_1) + \beta u(c_2, S_2)] \quad (2)$$

subject to:

$$L_1^s + L_1^w \leq L;$$

$$L_2^s + L_2^w \leq L;$$

$$c_1 \leq w L_1^w;$$

$$c_2 \leq w L_2^w + f(B) - (1 + r)B \quad R; \quad \text{where} \quad f'(B) > 0, f''(B) < 0.$$

$$S_2 \leq (1 + \tilde{\delta}) S_1$$

$$B \leq B^{IC}.^5$$

Denote the optimal solution to the maximization problem with this constraint as $V(B^{IC})$. Incentive compatibility under this representation of individual behavior requires that

⁵ In order to focus on the problem of time allocation between work for direct consumption and social investment for future enjoyment of social relationships and credit access through social networks, the model does not incorporate intertemporal savings.

$$V_{co}(B^{IC}) \geq V_{dev}(B^{IC})$$

where the subscript co stands for cooperator (who repays the loan) and dev refers to a deviator.

Implicitly, this condition defines the maximum loan B^{IC} that the group will be willing to lend to the individual, i.e.,

$$B^{IC} = \max\{ B \mid V_{co}(B) \geq V_{dev}(B) \}.$$

The incentive compatibility condition becomes:

$$\begin{aligned} u(c_1^{co}, S_1) + \beta u(c_2^{co}, S_2^{co}) &\geq u(c_1^{dev}, S_1) + \beta u(c_2^{dev}, S_2^{dev}) \quad \text{or:} \\ u(wL_1^{w,co}, S_1) + \beta u(wL_2^{w,co} + f(B(S_2^{co})) - (1+r)B(S_2^{co}), S_2^{co}) &\geq \\ &\geq u(wL_1^{w,dev}, S_1) + \beta u(wL_2^{w,dev} + f(B(S_2^{dev})), S_2^{dev}) \end{aligned} \quad (3)$$

where $S_2^{co} = S_2(R=1)$ and $S_2^{dev} = S_2(R=0)$. Also, the first-period time allocation must be the same whether someone cooperates or not. That is, $L_1^{w,co} = L_1^{w,dev}$ and therefore $L_1^{s,co} = L_1^{s,dev}$. If this were not so, with social investment being observable to the group, the group could directly differentiate between cooperator and deviator and the incentive compatibility condition would not be needed. Therefore we get

$$\begin{aligned} u(wL + f(B(S_2(L^s))) - (1+r)B(S_2(L^s)), S_2(L^s)) &\geq \\ &\geq u(wL + f(B(S_2(L^s))), (1-\delta)S_1) \end{aligned} \quad (4)$$

Note that neither the deviator nor the cooperator will choose to invest any time in social networks in period $t=2$, since such investment pays off only in the subsequent period, but there are only two periods in this model. Therefore, 2nd period consumption from labor income is wL . So we will simplify notation by using $L_1^s = L^s$.

In this framework, friendship serves in a sense as social collateral for the loan given.⁶ The notion of social collateral has commonalities with more familiar forms of physical/economic collateral, but it is also distinct in some ways. Just like traditional collateral (such as land or physical assets), it can be taken away in the event of default, and the borrower is thus made worse off. Also, social collateral can be insufficiently large, in which case the borrower may be denied a loan.

However, a significant difference between social and economic collateral is the former's specificity: The particular social network is valuable to a borrower in the network, but it is not a good that can be easily transferred to someone outside of the group and that can be found immediately valuable by the outsider.⁷ A second difference is that social collateral is not of direct value to the lender and does not, unlike economic collateral, provide economic redress to her in the event of default. Indeed, if the group is sufficiently small, the group might actually bear a *cost*, in the sense of suffering a thinned out social network, from excluding one of its members.⁸ Hence the only value to the lender of social collateral is its ability to create appropriate incentives for the borrower by imposing costs of deviation on her.⁹

2.2 Investment and the Accumulation of Social Capital

For purposes of further analysis, consider a strongly separable utility function that is concave in social capital and linear in consumption:

$$U(c, S) = u(c_1, S_1) + \beta u(c_2, S_2) = a c_1 + v(S_1) + \beta \cdot (a c_2 + v(S_2)),$$

⁶ Besley and Coate (1995) also analyze social collateral by modeling social sanctions as a cost that other group members can impose on a defaulter, but the ability of the group to sanction is taken as exogenous in this game-theoretic framework.

⁷ This conception of social capital as idiosyncratic (or network-specific) collateral finds its analogue in firm-specific human capital (Hashimoto 1981, Laing 1994) in which training or education is of value to the specific firm that provided for this training, but of little to no value to other firms.

⁸ This paper does not incorporate in the model the group size, nor the impact of individuals' social investment decisions on the group. This is an interesting area for future research.

⁹ This is of course true of any collateral in the sense that ignoring behavioral considerations, a lender can realize any expected rate of return by manipulating the interest rate on a loan.

where $a > 0$, $v'(\cdot) > 0$, $v''(\cdot) < 0$. Then the incentive compatibility condition from (4) becomes

$$a c_2^{*co} + v(S_2^{*co}) \geq a c_2^{*dev} + v(S_2^{*dev})$$

which can be written as

$$a \cdot (f(B_{dev}) - (f(B_{co}) - (1+r)B_{co})) \leq v(S_1 [1 - \delta + L^s (1 - T(E, D))]) - v((1 - \delta)S_1) \quad (4')$$

From this it becomes clear that the benefits from deviating, which are in the form of the difference in gross returns between a repayer and a defaulter plus the money saved from failing to repay, must be no larger than the benefits from cooperating, which come in the form of higher direct utility because of continued social relationships.

The incentive compatibility constraint will allow the characterization of the loan supply. In (4') it is implied that the credit taken by the individual may differ depending on his decision to cooperate. This indicates that the loan offer may not bind, arising from the fact that a person who intends to repay may choose to take a smaller amount of loan than someone who intends to default. This will be the case if the loan supply B^* is larger than the loan size that would maximize profits, that is, if $f'(B^*) < 1+r$. We will assume for now that $f(\cdot)$ is of a form so that for all levels of group wealth W considered in the analysis,

$$f'(W) > 1+r$$

This means that even if the group were to extend its entire endowment as a loan to the individual, it would still be profitable for him to invest this capital in his enterprise. Then $B^{dev} = B^{co}$, and (4') simplifies to

$$B \leq \frac{1}{a(1+r)} [v(S_2) - v((1 - \delta)S_1)], \quad (5)$$

where,

$$S_2 = [1 - \delta + L^s (1 - T(E, D))] S_1. \quad (6)$$

With this as the loan supply, the individual will choose $R^* = 1$. Equation (5) makes clear how the instrumental value of social capital — the access to credit it enables — and its instrumental value are linked. The loan size is determined by the excess direct utility one obtains by not being socially excluded, discounted by the interest rate. Also, (6) makes it explicit that the loan supply is not completely exogenous from the individual's point of view, but that he affects it by his decision on how much time to invest in the group.

However, a person may be confronted with a low-wealth social group. Then it may well be the case that the individual is seen as very credit-worthy by this group, but that the group's capacity to lend to the person will form the binding constraint, and not the fact that too large a loan would create incentives to default. Mogues (in progress) presents additional analysis of this model and its properties.

2.3 Alienation and the Formation of Social Groups

In the above two stages of the model, the notion of identity as affecting economic outcomes was introduced as an alienation function $T(E,D)$ that affected the growth rate of social capital. We view identity as being intimately tied up with the way individuals are embedded in their social environment. Therefore we deem it appropriate to model the interface between identity and economics via the way the former encourages or deters a person from making efforts to create relationships with a given social grouping, association with which may have material benefits along with non-pecuniary outcomes. In this section we will first elaborate on the two elements constituting identity in the model, and then develop the mechanism through which identity becomes economically important.

The idea that one's economic position is an integral part of one's identity has been suggested by authors from varied disciplines (e.g. Esteban and Ray 1994, , Deutsch 1971, Gurr 1980, Shanin 1966, Coser 1956). The economic literature has hardly explored the income- or

wealth-dimension of identity, but less so noneconomic dimensions such as race, ethnicity, language, religious affiliation, etc. Even less research has been done on the *combination* of these two elements of identity, and what are the economic implications of this (see Stewart 2001).

The basis for our model is the notion that identity affects people's ability to accumulate and make economic use of their social capital. Every person has an immutable, socially relevant characteristic, or ISC, labeled D_x ¹⁰ and has a particular economic status, or inherited wealth D_y . These two variables, which can be seen as continuous, together constitute the person's identity.¹¹ Therefore, identity here is a two-dimensional concept. For purposes of illustration and analysis, a numerical range will be associated both with ISCs as well as with wealth. The interpretation of such a range for wealth is straightforward, in that low numbers refer to relatively low wealth levels, and vice versa. Similarly, low numbers will be given to those ISCs which are more strongly correlated with low wealth levels in the initial state. This numerical scale is of course arbitrary and implies nothing about the intrinsic value of any person or group characteristic.

Consider the range of identity to be given by the plane $[x, y] \in [0, 1]$, and a particular person's identity to be the vector $D = [D_x, D_y]$. For the analysis here, we will assume two exogenously given groups.¹² Motivated by later analysis of bi-modal socio-economic distributions (such as South Africa), we will assume that one group is located at a low level of wealth and a "low" value of the immutable social characteristic. The other group will have the opposite configuration, meaning a high value of wealth and a "high" value of the social characteristic.

¹⁰ " D_x " will interchangeably be referred to as characteristic, immutable social characteristic, or socially relevant characteristic.

¹¹ While continuity of income is immediately intuitive, there may be alternative ways to model social characteristics. Continuity here has been assumed for analytical convenience and as a way to generalize the notion of diversity in social characteristics. In some cases, such as where the sole critical social characteristic is gender, or when the society exhibits sharply delineated religious groups, a special case of discrete social categories may be more applicable. In other scenarios however, continuity would be distinctly more appropriate than a discrete treatment, for example when skin color as a social characteristic is considered in a society such as Brazil (see Telles 2002).

¹² As this work progresses, we hope to endogenize the location and perhaps the number of groups.

Denote the location of the two social groups in identity space is $E^i = (E_x^i, E_y^i)$, where $i = \text{'low'}$ or 'high' . Let $h(x,y)$ denote the joint distribution of agents in the two-dimensional, wealth-social characteristic space.

A person's identity influences her sentiments towards each of the two groups, and the sentiments of the groups towards her. There are two elements that influence the sentiment, or the degree of 'alienation' toward a given group. The first is the social distance between the individual and the group. The second is the group-identification, i.e. the extent to which existing members of the social group feel strongly about their group identity. Taking these elements together: someone whose characteristics make her very different from the group, and/or who faces a group that has a strong sense of its identity, is considered to be highly alienated from the group in question. These two elements will be next explained in greater detail. The first element that one's identity has a direct influence on is the degree to which one is "distant" from a particular social group. This social distance is simply expressed as the norm of the vector of attributes of the social group, E , and of the individual, D :

$$\phi(E,D) = \|E-D\| \equiv \sqrt{(E_x - D_x)^2 + (E_y - D_y)^2} \quad (7)$$

Second, it is posited that the degree to which a group feels strongly about its identity depends on the size of the core group.¹³ If there are only a handful of people who form the core of the group, then such a group will not have the critical mass of people to develop a strong identity. Intuitively, strong group identification requires the existence of group-related institutions that give members a forum in which to interact with each other and build a strong sense of group identity. With economies of scale in group institutions, a significant presence of a particular category of the

¹³ The following model of identity is an extension of Esteban and Ray (1994).

population must exist for identity-forming institutions relating to this category to emerge.¹⁴

Formally, the group identification function is

$$J(E) = \int_0^1 \int_0^1 h(x, y) I[\phi(x, y, E_x, E_y) < \varepsilon] dx dy ,$$

where ε is a constant. The identification function, then, measures the density of people who form the core of the group—*i.e.*, those within a radius ε of the group’s centre.

Together, the identification function and the social distance function shape a person’s degree of ‘alienation’ from the group in question. A simple alienation function would be multiplicative:

$$T(E, D) = t \cdot \phi(E, D) \cdot J(E), \tag{8}$$

where $t > 0$ normalizes the alienation function to range from 0 (not at all alienated) to 1 (most alienated).

As described before, an individual builds up little effective social capital, irrespective of time invested in the group, if she is deeply alienated from the group. This low level of achieved social capital means in turn that the individual acquires little of collateral value for time invested in social groups from which she is deeply alienated as there is little of value that the group can take away from the alienated individual should they decide to shun her.¹⁵

¹⁴ Theoretical and empirical work has established such a relationship between identity and population mass. For example, Bodenhorn (2003) finds that antebellum light-skinned African Americans were more likely to identify as “mulatto” (as opposed to identifying as “Blacks”) when there were already a substantial number (in absolute and relative terms) of other mulattos in the community. Yinger (1986) shows that individuals are more likely to adopt a racial identity the larger and the more racially concentrated it is.

¹⁵ As (8) is written, it is the intensity of the group’s identity that shapes the individual’s comfort and degree of alienation from the group. An alternative conceptualization would say that it is the intensity of the individual’s identity that determines the degree of alienation from any group. Under this conceptualization, the group would essentially itself be “color-blind,” but would understand that socially distant, strongly identified individuals would feel internally uncomfortable with the group and hence put little intrinsic value on the social relationships established with the group. The result would be the achievement of little social capital and collateral for any given time invested. A mixed bi directional measure—akin to the social polarization measure introduced below—is perhaps the more reasonable definition.

Section 3 Socio-economic Polarization and the Reproduction of Economic Inequality

The prior section has modeled individual choice in a world of social identity, alienation and missing capital markets. This section now embeds those individual features into a social model. In particular, we show how individual choices and income distribution will depend on the overall initial distribution of society over initial wealth and social characteristic space. To characterize any given society, we will first define a general measure of socio-economic polarization. Using that measure, we will then use numerical analysis to show how increasing socio-economic polarization leads to increased economic inequality, holding constant the initial levels of economic inequality and economic polarization.

3.1 A Measure of Socio-Economic Polarization

So far the discussion has been about the way in which identity may matter for economic behavior and outcomes. This micro-level analysis can be expanded in a macro perspective to an investigation of how the overall distribution of the population over social and economic categories may become important. In the conceptual framework to follow, we consider a particular aspect of distribution, namely ‘polarization’. Esteban and Ray (1994) formally develop a one-dimensional measure of economic polarization. What motivates Esteban and Ray to develop a measure of polarization is their contention that when societies are highly polarized, there is an increased potential for social conflict.¹⁶ Intuitively and generally, a society is highly polarized with respect to some characteristic D when the distribution of D is such that the population is grouped into a

¹⁶ It would be interesting to think more carefully about this idea which rests on the nature of the overall population distribution, in combination with Kuran’s model of the causes and consequences of ethnification.

few, significantly-sized clusters, where people in each cluster are very similar to each other in terms of their characteristic D and are very different from people in other clusters.¹⁷

We extend Esteban and Ray’s measure in two important ways pertinent to this model.

Given our conceptualization of identity as two- as opposed to one-dimensional, and as manifesting itself over a continuous range rather than distinct “classes”, the measure is:

$$P^{SE} = k \int_{z^1} \int_{z^2} h(z^1) J(z^1) h(z^2) \phi(z^1, z^2) dz^2 dz^1, \quad (9)$$

where, as before, $z = [x, y]$; $h(\cdot)$ is the population distribution; $J(z^l)$ the identification function for person z^l ; and $\phi(\cdot)$ the social distance function. In determining the degree of alienation between an individual and the group we had used the measure of group-identification explained in 3.2. Here, the identification function is used in order to measure overall polarization in the society, irrespective of where the group is located. For this purpose, we obtain the extent to which each type z feels strongly about his identity. A deeper treatment of the concept of socio-economic polarization and its measure is offered in Mogue (in progress).

We started out with the suggestion that the extent to which the economy in this model is polarized will have a bearing both on the decisions that the heterogeneous agents make — namely how they allocate their time between direct income earning activities and social activities that allow them to accumulate social capital — and on their material welfare, in part determined by their credit access. To investigate this, a specific set of changes in initial distribution will be considered, namely those that leave the marginal distribution over wealth range unchanged. The purpose of focusing on these types of changes in the joint distribution is to be able to assess the “pure” effect of *socio*-economic polarization in this model, effects that would not be captured by taking into account merely the economic dimension of distribution.

¹⁷ Esteban and Ray show interest in the characteristic ‘income’. Because polarization into income classes invokes the issue of income inequality, the authors show in great detail and formality why the concept of polarization is completely distinct from the concept of inequality.

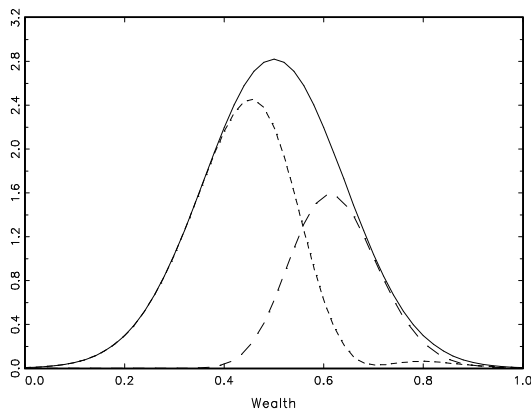
Consider then a normal marginal distribution over the wealth characteristic y , centered at the midpoint of the wealth index $h(y) \sim N(\frac{1}{2}, \theta^2)$. Two expansions of this marginal distribution over the social characteristic dimension x will be considered. The intention of these expansions is of course to preserve the marginal wealth distribution for all joint distribution such that initial economic characteristics (economic polarization and inequality) are invariant to the expansion used. The first expansion is simply the joint normal density over x and y , with varying degrees of correlation between these two dimensions, *i.e.* different levels of ρ . For simplicity this density will continue to be centered at the midpoint of the identity space, and variance of the two variables will be equal. So $h(x,y)$ is described by:

$$(x, y) \sim \begin{cases} k N\left(\frac{1}{2}, \frac{1}{2}, \theta^2, \theta^2, \rho\right) & \text{for } x, y \in [0, 1], \\ 0 & \text{otherwise} \end{cases}$$

Figures 2 a-c depict this distribution for three levels of correlation ($\rho = 0, 0.3, 0.6$).

Secondly, a more complex expansion of the normal marginal density will be examined, one that is bipolar. Such a distribution models more closely societies, such as South Africa, which have a significant population of economically disadvantaged and another (however smaller) mass of richer people, with race here as the critical social characteristic. To obtain such a bimodal

Figure 1: Partitioning of normal distribution



distribution, first the normal marginal distribution $h(y)$ is partitioned into two parts: $g(y)$ and $r(y) \equiv h(y) - g(y)$, where $g(y) < h(y) \forall x, y \in [0, 1]$ and $E(g(y)) > E[h(y) - g(y)]$. This is done numerically

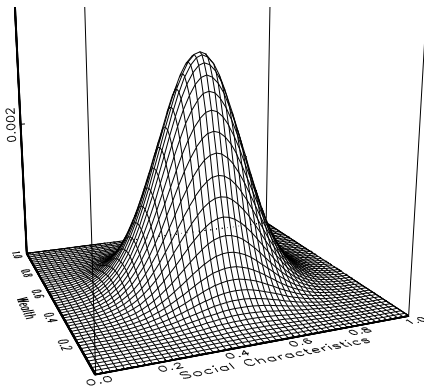
using a gamma function. The dashed, dotted and solid curves in Figure 1 show $g(y)$, $r(y)$ and $h(y)$, respectively. These two functions are expanded into two dimensions by multiplying them with a marginal normal distribution over x , $h^i(x)$, with means such that $h^g(x) > h^r(x)$. The resulting bivariate distribution, normalized so that it has the properties of a density function, is described by:

$$h(x, y) = \begin{cases} g(y) h^g(x) & \text{for } x + y > 1; x, y \in [0,1] \\ [h(y) - g(y)] h^r(x) & \text{for } x + y \leq 1; x, y \in [0,1] \\ 0 & \text{otherwise} \end{cases}$$

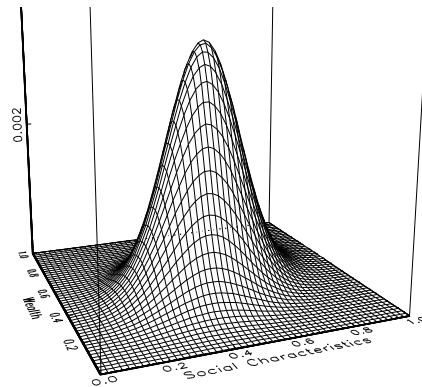
and is shown in Figure 2d.

Figure 2: Initial distribution

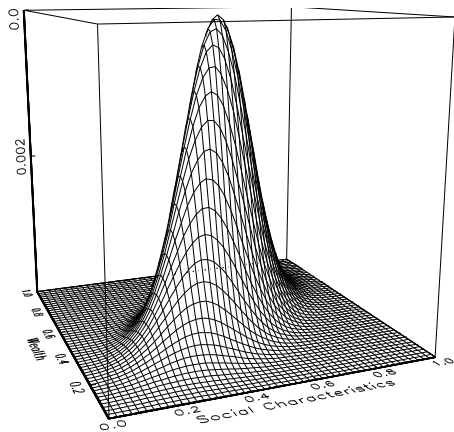
$\rho=0$



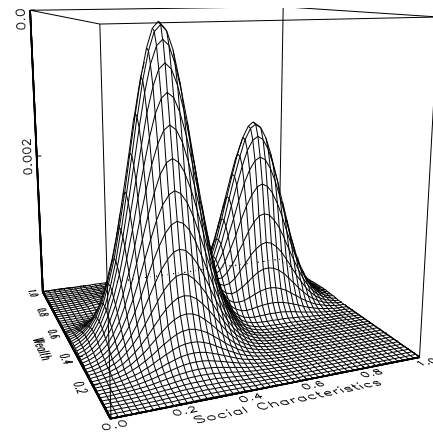
$\rho=0.3$



$\rho=0.6$



Bipolar distribution



The set of these four bivariate distributions in Figures 2a-d, then, all have in common the marginal distribution over wealth. As a result, any summary of their marginal distribution, such as the Gini coefficient over wealth space, or the degree of economic polarization, is equal for all of these four cases. What differs, however, is the degree of socio-economic polarization as defined in (9). Table 3 makes this clear. Columns 2 and 3 give the levels of initial economic polarization and initial inequality (relative to their levels for the distribution of Figure 2a). Both of these measures remain the same for all four initial distributions, since the marginal distribution does not change, as discussed above. On the other hand, the measure of socio-economic polarization in the 4th column of Table 3 rises as we consider distributions with increasingly greater correlation between social and economic characteristics, and finally a distribution that is bimodal, with large mass of people in the lower, and another mass in the upper socio-economic stratum. Note that these three measures all have in common that they describe features of the initial distribution. The next section will discuss implications for subsequent income inequality of changes in the initial distribution.

Table 3: Measures of distribution (relative to values for $\rho=0$):

		Initial Conditions			Earned (entrepreneurial & wage) Income
		P^E	Wealth Gini	P^{SE}	Gini
<i>Unimodal</i>	ρ 0.0	1.00	1.00	1.00	1.00
	0.3	1.00	1.00	1.03	1.13
	0.6	1.00	1.00	1.15	1.14
<i>Bimodal</i>		1.00	1.00	1.27	1.32

3.2 Numerical Analysis of Polarization and Economic Inequality

Suppose, then, that society becomes more polarized in this marginal-distribution-preserving way, i.e. either by exhibiting stronger correlation between social and economic attributes or by exhibiting a bimodal instead of a unimodal structure in the fashion described in the previous section. The consequence for income distribution of greater polarization becomes apparent in the

last column of Table 3, which shows the Gini coefficients for earned income (wage plus entrepreneurial) when agents optimally choose their group and act in accordance with maximization problem (2).¹⁸ These earned income Gini coefficients are again normalized relative to the base case of a unimodal uncorrelated distribution. We see that the relative Gini coefficient monotonically increases as one considers societies with higher socio-economic polarization. The degree of inequality arising from an initial condition of the highest socio-economic polarization case is about 30% larger than if the initial condition were the base case. Matching the insights of Stewart and Figueroa discussed earlier, we see that economic inequality is more durable when it is socially embedded, even controlling for the initial levels of economic polarization.

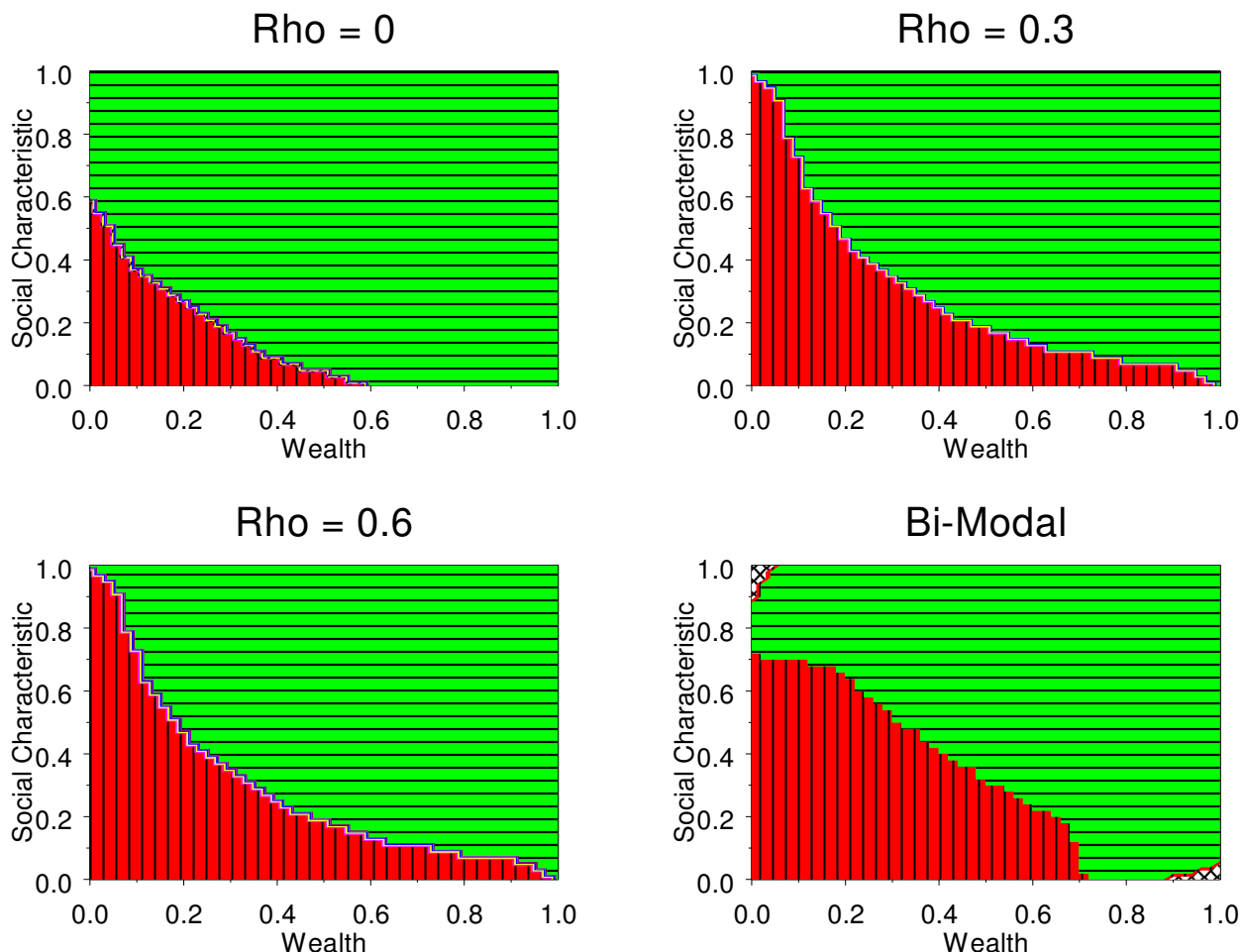
Viewing the equilibrium results on group affiliation and social investment provides some intuition on this rise in inequality when society is more polarized. Group membership choice is critically influenced by the extent of polarization. Figure 3 maps out the portions of initial endowment space in which agents choose to affiliate with the different groups. The portion of the space marked by vertical lines (and shown in red) shows those positions from which agents choose to invest time with the “low” group. The area marked by horizontal lines (and shown in green) is the area in which agents optimally invest in the high group. The cross-hatched area (which appears only in the corners of the group affiliation map for the bi-modal distribution) shows the portion of the space in which agents choose not to invest in any group.

As can be seen from Figure 3, membership in the ‘high’ group (shown declines significantly when society is more polarized. In particular, those who, for lower levels of polarization, just found it feasible to join the high group by investing some of their time into building relationships with others in this group, either switch to affiliation with the ‘low’ group—

¹⁸ Agents may of course to remain unattached to any group.

in which the constraint of the group's wealth is more likely to bind—or find it optimal to opt out of any group affiliation altogether.

Figure 3 Polarization and Group Formation



This is mainly driven by the fact that increased alienation toward the high group, which results as polarization concentrates more people around the group's centre, results for those who were on the periphery of the set of group members to become too alienated to find it still optimal to remain a group member: This alienation means that the marginal direct utility and indirect material gains from membership fall below what they could get by either switching to the low group or becoming autarchic.

Not only do socially more distant people tend to become excluded from the economically powerful group as a result of greater initial polarization, but those who are members allocate less time to the group, as can be seen in Figure 4. This is the case especially for the wealthy group,

Figure 4: Social investment

Figure 4 a: $\rho=0.0$

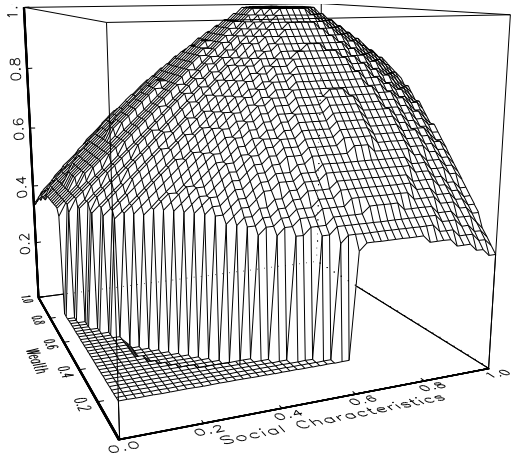


Figure 4 b: $\rho=0.3$

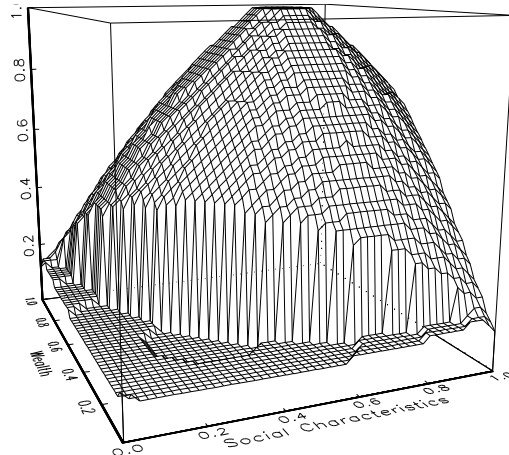


Figure 4 c: $\rho=0.6$

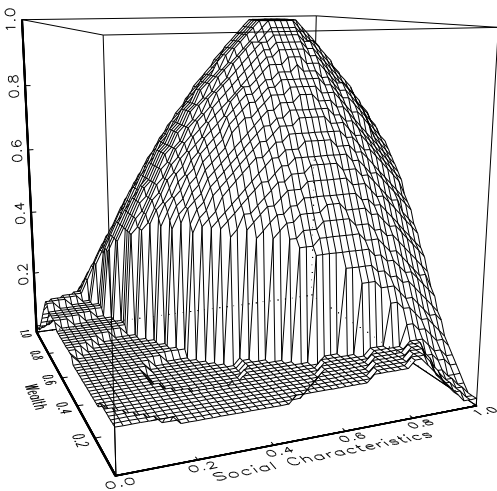
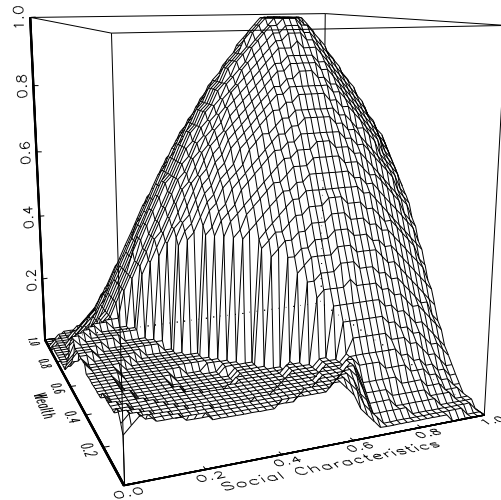


Figure 4 d: Bipolar distribution



whereas the low group hardly experiences any diminishing time investment. Analysis of the equilibrium social investment presented in Mogues (in process) suggests why this is so: In this analysis, the low group members are constrained in their credit access not by the incentive-

compatibility problem, but rather by the group's limited endowment. Therefore, the unique optimum group time allocation is not affected by the marginal changes in the degree of polarization reflected by Figures 2a to 2d. On the other hand, the high group's wealth is such that increased concentration of the population distribution affects equilibrium social investment for most members of this group.

Section 4 Conclusions and Moving Forward

This paper proposed a model of social capital as a collateralizable asset. It takes account of features that, while being referred to as important, are not well developed in the existing literature. These include the process of creating and accumulating social capital, and the costs associated with this process; an explicit framework showing what may be particular to the mechanism by which economic goods can be accessed through social relationships, namely the intrinsic value of this form of capital; and the role of identity in individuals' ability to realize economic value from social relationships.

We have explored how heterogeneous agents in this setting make choices about how to allocate their time between work and fostering social relationships, what determines their access to credit through social groups, and when they may opt out of group membership altogether. The limitation on credit access imposed by imperfect enforcement inherent in the social collateral mechanism interacts with the limitation imposed by the wealth of the group to effect nonlinearities in equilibrium social investment.

This paper then analyzed the implications of socio-economic polarization for economic inequality in a setting where getting ahead economically depends on one's ability to accumulate and collateralize social capital. Greater economic inequality results when, due to increased polarization, those in the initially low wealth- and social-ranks find their ability to successfully invest in the well-endowed group eroded. Their alienation from the highly endowed group

increases as society becomes more polarized, which disproportionately curbs the efficiency with which they can accumulate social capital with this group.

The stylized model of this paper may not do justice to representing all the factors that perpetuate inequality in actual economies, and it does not seek to do so. However, it does in our view provide a theoretical perspective to potentially important forces underlying the reproduction of inequality that has so far hardly been explored by economists. It speaks especially to developing economies in which economic status and social categories like race, skin color or ethnicity are strongly correlated and which can be described as polarized along these dimensions. Empirically, it suggests that analysts interested in the endogenous growth implications of inequality need to consider its broader social embeddedness, a point echoed by Stewart (2001) and Figueroa (2003). Finally, from a policy perspective, it suggests that there may be critical threshold levels of socio-economic polarization, beyond which decentralized social and economic processes are likely to preserve inequality and perhaps deepen social instability. In such environments, efforts to either deepen the reach of financial markets, or to pursue affirmative action, wealth transfer policies, would have particular salience.

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