VILLAGE VERSUS MARKET SOCIAL CAPITAL: AN APPROACH TO DEVELOPMENT *

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This paper presents a model of an economy in which traders use social capital to reduce transaction costs. A key assumption is that there are two types of social capital: "village" capital relies on personal networks and repeat play to guarantee contracts; "market" capital relies on third parties such as auditors and courts and is necessary for effective market institutions. Village capital is efficient for localized economies; market capital allows trade between strangers and greater specialization. The model shows how complementarity of social capital can prevent a village economy from transitioning to a market economy (industrializing) when market exchange becomes more efficient. The model helps understand persistent differences in wealth between countries and the reversal of economic fortune across countries in the last 500 years.

July 2004

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I. INTRODUCTION

It is increasingly clear that differences across countries in economic performance and development cannot be explained entirely by differences in capital and labor inputs, factor endowments, and technology. Recent evidence suggests that "social capital" is an important missing ingredient. Yet social capital remains an elusive concept, serving as an umbrella term for a variety of empirical variables, such as trust in others, density of social networks, and honesty of individuals. The process by which it is accumulated and put to work remains something of a mystery.[1]

The mystery deepens when viewed at the micro level. Social capital is generally assumed to reduce the cost of transacting or cooperating in the provision of public goods. The theory of repeated games suggests that cooperation is easiest to achieve in contexts where the parties are engaged in repeated interaction and are well informed about each other (Kandori, 1992; Moore, 1995). From this perspective, many developing nations would seem to be ideal environments for contracting, with their localized economies based on kinship and patron-client relations, repeated play, and transacting parties who know each other well. And indeed, there are many studies showing how parties in developing or transition economics are able to maintain an impressive amount of cooperation using sophisticated informal contracts supported by repeated play and personal networks.[2] Why are economies that seem to meet the conditions for efficient contracting so often poorer than other economies where transacting parties are strangers and do not transact repeatedly?

The idea we propose is that less developed economies may be well endowed with social capital, but it is the wrong kind of social capital. We distinguish two types of social capital. "Village" capital takes the form of social networks, kinship, patron-client

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[1] For evidence that the "standard" factors cannot explain income differences, see Engerman and Sokoloff (1997), Prescott (1998), and Hall and Jones (1999). On the ability of "social capital" (or "social infrastructure") to account for some of the otherwise unexplained variation see La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), Knack and Keefer (1997), and Hall and Jones (1999). For a survey of the social capital literature, see Durlauf and Fafchamps (2004).

[2] See Greif (1989), Ostrom (1990), and Besley (1995) to list only a few examples. Also see Section II.

relations, and in-depth knowledge about trading partners, and is effective in supporting transactions based on repeated play and full information about transacting parties. "Market" capital takes the form of knowledge about how to use third party enforcement institutions such as courts, auditors, standardized accounting procedures, and commercial law; it is effective in supporting transactions between strangers who may not trade again in the future. In our view, either type of capital can be optimal in the right environment. Village capital works best when economic activity is primarily local, what Besley (1995) calls a "village economy"; market capital is essential for transactions between strangers. However, only market capital can support the extensive markets, specialization, and division of labor that are prerequisites for industrialization.[3]

This paper develops a theory of economic exchange based on the idea that two types of social capital are available to reduce the cost of transacting. In our model, individuals choose where to trade—in the village with a known person or in the market with a stranger—as well as what type of social capital to accumulate. In addition to the benefits of social capital that the individual captures, there are externalities: trades between people with the same type of social capital are more efficient, and the aggregate level of social capital influences the type of social capital that the next generation of people will develop. Because of externalities, a society can end up investing in the wrong type of social capital or, to take the case we are particularly interested in, an economy based on village capital may fail to adopt market capital even when it would be more productive to have an economy based on transactions between strangers.

The model helps understand why some countries are wealthier than others, and why many countries that were prosperous in the pre-industrial age have found it difficult to develop modern industrial economies. A critical factor is the cost of trading with strangers. In pre-industrial times, transportation and communication costs were high, most economic activity was local, and societies that were able to accumulate significant amounts of village capital prospered. When technology improved so that trade between strangers was not prohibitively costly, it became optimal to develop market capital in

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[3] Here and throughout we use "village" to refer to local trades and "market" to refer to trades between strangers. This is a convenient shorthand even if not entirely accurate: there may be markets within villages, and some trades in villages may involve strangers.

order to take advantage of extensive markets and division of labor. Complementarities and externalities associated with social capital make it difficult for societies heavily invested in one type of social capital to change to the other. As a result, those societies *poorly* endowed with village capital were the fastest to adopt the market capital necessary to support market institutions, that is, to industrialize. In this respect, our model helps understand why European colonies in poor, sparsely populated areas (North America, Australia, Singapore) have been leaders in the development of market institutions while colonies in wealthy, densely populated areas (Mexico, Peru, India) have done poorly, and struggled to move beyond local economies (Acemoglu, Johnson, and Robinson, 2002). It also suggests why the relatively backward states of Western Europe were the pioneers in development of market institutions over the last 500 years instead of the relatively advanced states of the Islamic Middle East whose commercial relations were supported by sophisticated personal networks (Udovitch, 1970; Kuran 1997).

Our approach to development is driven by two key ideas. The first is that institutions are not self-executing—individuals must learn how to use them. It has long been recognized that economic development depends on the creation of institutions to support market transactions (North, 1990), and institutions play a central role in our analysis. However, in our view, pro-growth institutions are not established by adopting the right written documents or appointing honest judges and regulatory officials; market institutions become effective only when the population at large accumulates the human capital necessary to use the institutions. In this respect, we follow Weingast (1997), who argues that the rule of law is not self-executing, but requires complementary attitudes and actions of citizens. Institutions matter in our framework, but are themselves reliant on a society's social capital, as suggested by Glaeser et al. (2004).

The other critical idea in our analysis is that there are two kinds of social capital. The idea of different types of social capital has not been explored in the literature to date, although Krueger and Kumar (2004a, 2004b) use the idea of different types of (regular) human capital to explain growth differences between the United States and Europe. We came to this idea after puzzling for some time why people in developing countries did not have more of the social capital that the empirical literature suggested was so important for prosperity. Casual observation suggested that parents in poor countries spent at least as much time socializing their children and integrating them into family and community social networks—which should build social capital—as parents in wealthy economies. It occurred to us that although children do develop social capital in developing countries, it may be the wrong kind of social capital for market transactions. It is the assumption of two types of social capital that allows us to explain why some countries seem to have too little social capital without having to maintain that they are incapable of investing in it, lack the appropriate personal traits, or simply had the misfortune to be born into a dysfunctional culture.

The paper proceeds as follows. Section II describes the model and fleshes out our notion of two types of social capital, with some concrete examples and evidence. Section III analyzes the one-period problem in which the distribution of social capital types is given. Section IV adds transmission of social capital to the model, and studies the dynamic behavior of social capital. Section V discusses how the model can explain some important historical patterns. Section VI concludes.

II. THE ONE-PERIOD MODEL

The economy continues for an infinite number of periods, but we will begin by exploring equilibrium behavior within a single period. At each point of time, there is a measure one of agents. The agents are identical in all respects except for the type of social capital they have. There are two types of social capital: V-capital (for "village capital") that is useful for transactions between kin and other people who are known and will be encountered again, and M-capital (for "market capital") that is useful for trading with strangers who are unlikely to be encountered again. Social capital has no effect on productivity per se, but the right type of capital allows agents to transact at a lower cost.

At the start of each period, a measure *m* of the population has M-capital. The distribution of social capital can change over time but not within a period. We have in mind that a period represents a generation and social capital can only be changed across generations. As will be seen in Section IV, *m* is the state variable in this economy. Here we take *m* as given and analyze the equilibrium within a period.

A. *Trading Locations and Payoffs*

Agents independently choose a trading location ℓ, either their local village ($\ell = V$) or the market ($\ell = M$), which might be thought of as a distant city. Note that a person with V-capital can choose to trade in the market and vice versa. Once agents have decided where to trade, they are randomly matched with another agent and a trade takes place. The net payoff from trading for a person with I-capital who trades in location ℓ is denoted $\pi_I(\ell)$, where

$$\pi_I(\ell) = \text{Gross Payoff} - \text{Transaction Cost}.$$

The gross payoff from trading in a village is normalized to be 1 and the gross payoff from trading in the market is θ. This represents the production side of the model. We assume $\theta > 1$: a market provides more diversity of trading partners, which allows better matches between input suppliers, producers, and consumers, and more specialization.[4] Since we are primarily interested in the relation between social capital and transaction costs, we have left the production side of the model deliberately simple. In other words, we attempt to explain differences in economic performance that go beyond differences in productive factors.

We build in more structure for transaction costs. Our structure is motivated by the observation that many transactions have a sequential nature in which agents have to decide whether to "stand in line" or try to "cut ahead" to achieve a better position. Casual observation reveals dramatic differences in the orderliness of lines in developed and undeveloped countries: in the United States and other developed nations, people tend to stand in orderly lines while waiting for the bus, to buy a ticket, at the post office, etc., while in many developing countries lines quickly dissolve into crowding. We think standing in lines is an apt metaphor in two respects. First, it captures the idea that efficiency requires respect for the property rights of others. The person at the front of a line has a property right in that position that the people behind can choose to respect or try to abrogate. Crowding a line, in our view, is analogous to stealing an intellectual property right, refusing to repay trade credit, misusing borrowed funds, or failing to fulfill a contract that is ex post disadvantageous. Crowding causes both ex post inefficiencies (direct deadweight costs in the transaction) and ex ante inefficiencies (transactions are driven from the market by fear of crowding). A second and less obvious observation is that the integrity of lines in developed countries is the result of a fair amount of training. Children in the United States are drilled from the age of three or less to stand in lines when walking to the playground, to the water fountain, etc. Such training is often among the first social lessons for children in any day care or school. We believe this is an example of a more general phenomenon: people must develop social capital in order to effectively defend their "position in the line." Enforcement mechanisms—courts or kinship networks—are not self-executing; individuals must learn how to use them.

Instead of formulating the problem in terms of standing in lines, we could have formulated it in terms of whether one party is willing to make an investment. Much of our analysis would go through in this framework. However, the absence of social capital

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[4] Alternatively, traders could have a preference for diversity a la Dixit and Stiglitz (1977).

would cause a thinness of markets and an absence of transactions, whereas in our model an absence of social capital leads to crowding and market disruption. We believe both effects—market thinness and crowding—are important in practice, but crowding has not been previously explored, and we see it as a visible problem for many developing countries.

B. *Transaction Costs, Standing, and Crowding*

Transaction costs are expressed as the amount of time that has to be spent completing a trade. When trading partners are matched, they find themselves in a line, one person in the front and one in the back, with equal probability. The time required for the person at the front to trade is normalized to zero and the person at the back must pay a time cost of $t > 0$ if he waits for his turn. As will be described shortly, the person in the back can also try to cut in front of the other person.

Social capital influences these basic costs in two ways. First, the person at the back of the line can attempt to cut in front of the other person in order to avoid the time cost *t*. If the person at the back attempts to cut, the person at the front chooses whether to defend the line or he can also crowd. The first function of social capital is to allow a person to use social institutions to defend his position in the line. That is, a person with V-capital in a village can defend his position by turning to family connections or bringing about social pressure on the line-breaker using village social networks. A person with M-capital in the market can defend his position by turning to courts, regulators, and other impartial enforcers. However, a V-person trading in a market does not have the ability to call upon the enforcement mechanisms in the market; similarly, an M-person trading in a village does not know how to use social networks to defend his position.[5]

[5] The problem is isomorphic to an alternative scenario that does not involve lines: suppose two parties agree to supply inputs of a given quality for a joint venture and to share the returns in some way. When the time comes to provide the inputs, exogenous shifts in input prices might make the deal more beneficial to one of the two parties. The party in the disadvantageous position (at the back of the line) must decide whether to comply with the original agreement, or supply an alternative input of lower quality than the one he originally agreed to supply (cut in line). If he does supply a lower quality input, the other person (at the

Formally, the person at the front of the line may defend his position by paying an enforcement cost of $e > 0$ if his social capital is properly matched to the trading environment (that is, an M-person can defend in the market, and V-person can defend in the village.) Defense imposes a sanction on the line-breaker of $c > 0$. If the person in front chooses not to defend, then the two traders crowd and end up at the front with an equal probability. There is a deadweight cost of $x > 0$ associated with the crowding (yielding an expected transaction cost of $\frac{1}{2}t + x$ for each trader, all else equal.) We assume that the disruption cost is low enough so that crowding can be attractive, $x < \frac{1}{2}t$, and it is always worthwhile to defend the front of the line when possible instead of crowding, $e < \frac{1}{2}t + x$. Given these assumptions, the person at the back of the line would never knowingly crowd a person with the "right" type of social capital. We assume, however, that the trading partners do not know each other's type of capital, so inefficient crowding may occur.[6]

Second, regardless of a person's position in the line and whether there is standing or crowding, there is a fixed efficiency gain when traders have the "right" kind of capital. Specifically, we assume that transaction costs increase as the number of people with mismatched social capital increases. For example, in a market the lowest cost transaction is between two M-people, the intermediate cost is when there is one M-person and one V-person, and the highest cost is when there are no M-people (that is, when there are two V-people). Formally, if two people with M-capital trade in the market or two people with V-capital trade in the village there is a transaction cost *saving* of y for each person. If two people with M-capital trade in a village, or if two people with V-capital trade in a market, there is an additional transaction *cost* of z for each person. When two people with different types of social capital trade, there is no addition or subtraction from the time cost (that is, this is the benchmark case). We further assume that there is a nondecreasing

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front of the line) can try to enforce the original agreement using his social capital or switch to a lower quality input himself (crowd).

[6] This is stronger than necessary. Our main results would go through as long as there is some probability that the parties do not know each other's type.

return associated with having social capital that is matched to the institutions of the trading environment: $y \geq z$.

The feature that the return from one person's capital depends on the type of the other person's capital is one way we capture the idea that we are dealing with *social* capital and not plain human capital. The feature that social capital is specialized to a particular trading environment (that is, it is not enough for similar people to meet—they must meet in the correct place) distinguishes our approach from pure coordination models, like the culture model of Lazear (1995, 1999), and captures the idea that social capital is institution-specific.

C. *Motivation for Our Approach to Social Capital*

Our approach to social capital is different from what has been done before in several respects. Since the model is somewhat abstract, this section motivates our assumptions with real world examples and a brief discussion of related evidence from the theoretical and empirical literature. Since this section contains only motivation, the formal results of the next section can be understood without reading this section.

Social capital in our model facilitates exchange.[7] An example would be two people who meet and have the opportunity to trade, but one person's goods are not yet available. Will the person who does have the goods accept a promise from the other person to repay at a future date? For example, will a merchant loan seed to a farmer, will a bank loan money to an entrepreneur, will a supplier offer trade credit, etc.?

What we call "village capital" consists of social networks, especially kinship, patron-client relations, and informal agreements within small groups of people that are enforced by reciprocity and social sanctions. It can also include less savory practices such as contract enforcement by mafia and other protection rackets (Frye and Shleifer, 1997). Exchanges between agents with village capital will be less costly because of shared

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[7] There is a related segment of literature that focuses on how social capital can help solve collective action problems, see for example, Durlauf and Fafchamps (2004).

languages, customs, and business practices, and also because the network can be used to adjudicate disputes and punish transgressions.

There is abundant evidence that this kind of social capital is accumulated in localized economies and does improve productivity. To give just a few: Wade (1988) shows how villages in India are able cooperate to solve collective action problems having to do with water provision and grazing and fallowing of herd animals. Greif (1989) demonstrates how social networks allowed Maghribi traders to employ agents in order to conduct long distance trade in the Mediterranean in Medieval times. Fafchamps and Minten (1999, 2002) shows how traders in Madagascar and other parts of Africa earn more when they can tap social networks. Besley (1995) describes the use across Asia of rotating savings and credit associations that make use of local information and enforcement. More generally, Bates (1990) notes the importance of kinship networks in providing financial services in undeveloped economies, particularly banking, investment, and insurance.

In light of all this evidence, it is surprising to find that developing countries generally score low in measures of trust, one of the leading metrics of social capital (for example, Knack and Keefer (1997)). We believe the apparent contradiction arises because most empirical studies use a "market capital" measure of trust. For example, Knack and Keefer measure trust with the question: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" A better measure of village capital would ask how much people trust family members or people they interact with regularly. Knack and Keefer note that trust measured in this way is only modestly correlated with their general measure of trust. This is consistent with our view that there are two very different kinds of social capital, and countries with a lot of one type may have little of the other type.

Market capital consists of knowledge that facilitates transactions between potential strangers and parties who are unlikely to transact again in the future. It consists of common accounting practices, standardized data collection, use of impartial auditors, use of notaries, and reliance on third parties to resolve disputes and enforce contracts (courts, patent offices, etc.). Parties who use the same accounting principles, employ the same monitors, work from the same commercial law will find is less costly to strike deals, and easier to enforce their agreements. Contract compliance can be achieved by legal sanctions, and thus knowledge of commercial law and how to use courts and regulatory agencies is part of market social capital. However, market capital is more than just knowledge of how to use the power of government to enforce contracts. Much contract enforcement in markets takes place through impartial market forces (MacCaulay, 1963). An entrepreneur who invests unprofitably will be denied funds in the future by other investors after they examine his books; a firm that fails to repay its debts in a timely way will end up with a negative credit report from Dun & Bradstreet. To use these market mechanisms requires specialized knowledge (such as how to prepare financial statements).

A key distinction between village and market capital in our analysis is that village capital can only support local transactions because of its dependence on personal networks while market capital can support transaction between strangers. In support of this view, Fukuyama (1995) and La Porta et al. (1997) show that economies with high levels of family trust (which we regard as village capital) tend to have relatively small firms; large firms, which require contracting with people outside the family network, seem to require high levels of trust in strangers (market capital). In the same spirit, Johnson, MacMillan, and Woodruff (2002) find, for transition economies, that belief in the effectiveness of courts (which we view as part of market capital), makes firms and entrepreneurs more likely to try out relationships with new customers and suppliers, while having no effect on the willingness to transact with firms that are already known.

In our model, the process of industrialization is essentially the process of shifting the basis of the economy's social capital from village to market capital. Industrialization entails the development of appropriate capital among the population and the corresponding formal institutions, such as constitutions, commercial law, and so on. The process is well attested for the development of the Western World after the middle ages (North and Thomas, 1973; North 1990). As a more recent example, Besley (1995) discusses how informal credit arrangements (*hui*) were replaced rapidly by banks and other market financial institutions in Taiwan as those countries industrialized in the twentieth century.

An essential feature of social capital (as opposed to merely a personality trait such as honesty) is that it takes time to accumulate and is costly to create (Glaeser, Laibson, and Sacerdote, 2002). Village capital is created by individuals spending time developing personal relations. Much of this learning is passive, taking place while children spend time with their families or in the community. Village capital is also formed by marriage alliances (for example, in parts of rural India it was long the custom for a man to marry his niece.) Individuals also invest in village capital by giving gifts, which anthropological studies indicate is an important expenditure in my local economies (Bates, 1990). Market capital is typically accumulated more formally than village capital, and is more costly. Market capital is accumulated when students study accounting and law, and when formal market mechanisms are established that enforce trading rules, such as a formal stock exchange. Formal education in many countries also imparts a general familiarity with market institutions that creates trust in their effectiveness (Knack and Keefer, 1997).[8] The accumulation of both types of social capital also depends on the distribution of social capital in the economy: a child is more likely to accumulate village capital if he or she grows up in a community with dense personal networks than in a house on a desolate prairie.

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[8] As will be seen, we do not adopt the view of trust as a trait of individuals. Instead, we think of it as the expectation individuals have that others will fulfill their obligations. As such, trust in our model comes from the confidence individuals have in the enforcement mechanisms available to them. Trust is then an equilibrium phenomenon that emerges endogenously as a function of the type and amount of social capital accumulated throughout the economy. For a model in the same spirit as our Section V dynamic model except that it treats "trustworthiness" as a personal trait, see Francois and Zabojnik (2002).

III. EQUILIBRIUM IN THE ONE-PERIOD MODEL

This section studies equilibrium taking as given the measure of people with M-capital, *m*. In Section IV, we study how *m* evolves over time. The evolution of *m* turns out to be independent of the trading decisions of agents, so we can solve the one-period problem given *m* without explicitly considering the dynamics. The main result shows how the equilibrium depends on the stocks of the two types of social capital. One interesting feature of the model is that an increase in the productivity of market transactions can cause the market to collapse, reducing aggregate income.

A. *Standing or Crowding in the Market*

In equilibrium, all agents choose where to trade (village or market) and how to behave when trading (stand or crowd). We begin with the stand or crowd decision. Recall that the person in the back of the line does not know the type of capital of the person in front so he does not know if the person in front can defend his position in the line. Leaving aside the fixed cost of transacting, if the person in front has M-capital then a cutter will be punished and his wait time ends up $t+c$. If the person in front has V-capital, the two end up crowding, and the wait time is $\frac{1}{2}t+x$. Let *p* be the (endogenously determined) proportion of people in the market with M-capital. The person in back will stand if the time cost of crowding exceeds the time cost of standing, that is, if $\lambda \equiv p(t+c)+(1-p)(\frac{1}{2}t+x)-t>0$. Since λ is increasing in *p*, there is a unique $\hat{p}$ satisfying $\lambda(\hat{p})=0$.[9] Everyone in the market stands if $p>\hat{p}$ because the person is front is likely to have M-capital, and everyone in the market attempts to cut if $p<\hat{p}$ because the person in front is likely to have V-capital. We refer to the situation when everyone stands as "market standing" or a "standing equilibrium," and the situation when everyone tries to cut as "market crowding" or a "crowding equilibrium."

[9] Also $\hat{p}=(.5t-x)/(.5t-x+c)\in(0,1)$. When $p=\hat{p}$ agents are indifferent between standing and crowding. Their behavior in this case will be determined by other equilibrium conditions.

B. *Choice of Trading Location*

We first show that an M-person always trades in the market. There are four possible situations to consider according to whether the village stands or crowds and whether the market stands or crowds. Three of them are obvious: If there is standing in both the market and the village or if there is crowding in both the market and the village, the M-person is better off trading in the market because of the higher gross payoff in the market and because his social capital is better suited for the market. If the market stands and the village crowds, he prefers to trade in the market for the reasons just given, plus the fact that he avoids the crowding. The less obvious case is when the market crowds but the village stands. If the market crowds, then some V-people must be trading in the market, implying $\pi_V(M) \geq \pi_V(V)$. Now $\pi_M(M) > \pi_V(M)$ because the M-person's capital allows him to defend against a cutter in the market, and by a parallel argument $\pi_V(V) > \pi_M(V)$. The three inequalities together imply that $\pi_M(M) > \pi_M(V)$.

The fact that all M-people trade in the market implies that none of them trade in the village. Therefore, only V-people trade in the village and there is never cutting or crowding in the village (the person at the back of the line knows with certainty that the person at the front of the line can defend his position).

It remains to characterize the trading decision of a person with V-capital. Since only V-people trade in the village and it has a standing equilibrium. The payoff from trading in the village is equal to the gross payoff of 1 minus the average waiting time ($\frac{1}{2}t$) plus the efficiency gain from trades between correctly matched social capital (y): $\pi_V(V) = 1 - \frac{1}{2}t + y$. The payoff from trading in the market depends on whether the market stands or crowds. If the market stands, $\pi_V(M \mid \text{standing}) = \theta - \frac{1}{2}t - (1-p)z$. The market payoff provides a higher gross return than the village payoff ($\theta > 1$) but trading takes longer because V-capital is not suited for market transactions. Note that $d\pi_V / dp = z > 0$: the market is increasingly attractive as the number of people with M-capital increases because M-people make transactions more efficient. If the market crowds, the payoff is lower. With probability $\frac{1}{2}p$, the V-person is punished and forced to stand at the back at the back of the line (marginal cost $c + \frac{1}{2}t$). With probability $1 - \frac{1}{2}p$, the deadweight cost of crowding (x) is incurred. Therefore:

$$\pi_V(M \mid \text{crowding}) = \theta - \tfrac{1}{2}t - (1-p)z - \tfrac{1}{2}p(c + \tfrac{1}{2}t) - (1 - \tfrac{1}{2}p)x \,.$$

When the market crowds, $d\pi_V / dp = z - \frac{1}{2}(\frac{1}{2}t - x + c)$. An increase in p cuts both ways: with more M-people, transactions are more efficient on average, but the M-people impose sanctions when their position in the line is threatened. We assume that $z > \frac{1}{2}(\frac{1}{2}t - x + c)$ so that $d\pi_V / dp > 0$: the fixed efficiency effect dominates the sanction effect.[10]

The payoff for a V-person in the market can then be characterized as a function of p. It takes the form shown by the solid line segments in Figure 1. The payoff jumps at $\hat{p}$ when the market shifts from crowding to standing. The payoff to a V-person trading in the village is flat, indicated by the horizontal dashed line. For any given p, a V-person trades in the market if $\pi_V(M) > \pi_V(V)$, that is, if the solid segment is above the dashed line.

We now have enough information to characterize the equilibrium conditional on m, the fraction of people in the economy with M-capital:

PROPOSITION 1A. Suppose $\pi_V(V) < \pi_V(M \mid \text{crowding})$ when $p = \hat{p}$, and let $p_0 = (\theta - 1 - x + y - z)/(\frac{1}{2}c + \frac{1}{4}t - \frac{1}{2}x - z)$ (the solution to $\pi_V(V) = \pi_V(M \mid \text{crowding})$). Then equilibrium takes one of three forms:

- E1. If $m < p_0$, then $p = p_0$, the market crowds, and $\pi_V(V) = \pi_V(M)$. Some V-people trade in the village and some in the market.
- E2. If $p_0 < m < \hat{p}$, then $p = m$, the market crowds, and all V-people trade in the market.

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[10] With the reverse assumption, the agents will have to play mixed strategies for some parameter values and characterization of the equilibria becomes cumbersome.

- E3. If $\hat{p} < m$, then $p = m$, the market stands, and all V-people trade in the market.[11]

In all cases (E1-E3), all M-people trade in the market.

Proof: If $\hat{p} < m$ then even if all V-people trade in the market, the market has a standing equilibrium, and $\pi_V(M) > \pi_V(V)$. Therefore, all V-people do trade in the market. When $m < \hat{p}$, there are enough V-people to cause crowding if more than $1-\hat{p}$ of them go to the market. When $p_0 < m < \hat{p}$, even if all V-people trade in the market they do not drive the payoff below what they could receive by trading in the village. So they all trade in the market and there is crowding. If $m < p_0$, then enough V-people trade in the market to drive the payoff down to the payoff from trading in the village, that is, $p = p_0$ and $\pi_V(M) = \pi_V(V)$.

Proposition 1A shows that market performance depends on the stocks of the two types of social capital. As the number of people in the economy without M-capital increases, market transactions become increasingly costly, and at some point the market collapses into crowding. There are two types of externalities at work here. First, a person with V-capital imposes a time cost on his trading partner than an M-person. Second, when enough people with V-capital go to the market, they cause the market to collapse into crowding.

Figure 2 shows the relation between *p* and *m* that emerges from Proposition 1A. When there are relatively few V-people in the economy, all of them go to the market and $p = m$. When the number of V-people in the economy exceeds $1-p_0$, only enough of them trade in the market to bring $p = p_0$; the rest of them trade in the village. Given this mapping between *p* and *m*, the payoffs given earlier can be expressed in terms of the state variable *m*, a formulation we use in the next proposition.

[11] If $p = \hat{p}$, both standing and crowding equilibria are possible, in which all V-people trade in the market.

Proposition 1A shows how *market* performance depends on the distribution of social capital. The next proposition describes how *economic* performance—combined market and village outcomes—depends on social capital. The aggregate payoff in the economy is $\Pi(m) = m\pi_M(M) + (1-m)\pi_V(M)$, where we have used the fact that if there are any V-people trading in the market, $\pi_V(M) = \pi_V(V)$. Straightforward substitution gives the aggregate payoff in each equilibrium.

PROPOSITION 1B. Suppose the conditions of Proposition 1A hold. Then $d\Pi / dm > 0$ in each region E1, E2, E3.

Proof: $d\Pi / dm = \pi_M - \pi_V + m\dfrac{d\pi_M}{dm} + (1-m)\dfrac{d\pi_V}{dm}$. The equilibrium payoff to a V-person is always at least as high in the market as in the village, and the payoff to a V-person in the market is always less than the payoff to an M-person in the market. Therefore, $\pi_V(V) \le \pi_V(M) < \pi_M$ in each region, and $\pi_M - \pi_V > 0$. When the market stands (E3), an increase in *m* improves the efficiency of transactions for both type of agents: $d\pi_M / dm = y > 0$ and $d\pi_V / dm = z > 0$. When the market crowds in E2, an increase in *m* in addition increases the chance a cutter is punished and reduces the time spent crowding: $d\pi_M / dm = y - \frac{1}{2}(c+t) + \frac{1}{2}(\frac{1}{2}t + x) > 0$ and $d\pi_V / dm = z - \frac{1}{2}(c+t) + \frac{1}{2}(\frac{1}{2}t + x) > 0$, where the inequalities follow from the assumptions $z > \frac{1}{2}(\frac{1}{2}t - x + c)$ and $y \ge z$. In E1, $d\pi_M / dm = d\pi_V / dm = 0$ because the fraction of V-people in the market does not vary with *m*. Then $d\pi_M / dm \ge 0$ and $d\pi_V / dm \ge 0$ for E1, E2, and E3. Therefore, $d\Pi / dm > 0$.

Proposition 1B shows that the relation between Π and *m* is monotonic: an economy always performs better if the amount of M-capital is increased (leaving aside for now the costs of acquiring capital). Somewhat counterintuitively, it is not better to have more V-capital even when most trading takes place in the village. The reason is that village transactions are always fully efficient in equilibrium because only people with V-capital trade there. The only inefficient transactions are in the market, and a reduction in the number of people with the "wrong" type of capital there always improves the efficiency of exchange.[12]

The discussion to this point has focused on the parameter configuration in Figure 1 where the dotted line, $\pi_V(V)$, intersects the solid line, $\pi_V(M)$, to the left of $\hat{p}$. Another possibility is that the lines intersect to the right of $\hat{p}$. This would be the case if markets were not particularly valuable, that is, θ is relatively small. The next proposition characterizes the equilibria.[13]

PROPOSITION 2. Suppose $\pi_V(V) > \pi_V(M \mid \text{crowding})$ when $p = \hat{p}$, and let $p_1 = 1-(\theta-1-y)/z$ (the solution to $\pi_V(V) = \pi_V(M \mid \text{standing})$).

- E4. If $m < p_1$, then $p = p_1$, the market stands, and $\pi_V(V) = \pi_V(M \mid \text{standing})$. Some V-people trade in the market and some trade in the village.
- E5. If $m > p_1$, then $p = m$ and the market stands. All V-people trade in the market.

In both E4 and E5, all M-people trade in the market, and $d\Pi / dm > 0$.

Equilibrium E5 is essentially the same as equilibrium E3 in Proposition 1. Equilibrium E4 features V-people trading in both the market and village, in both of which there is standing. In E4, the market advantage over village production is so small that V-people lose interest in the market before there are enough of them to cause crowding. Otherwise, the qualitative features of the configuration in Proposition 2 are similar to those in Proposition 1.

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[12] The p that emerges endogenously in our model could be viewed as a theoretical analog of the measures of trust employed in the empirical literature. The increase of GDP with respect to p (= m) implied by our model is consistent with the empirical finding that GDP is increasing in market-based measures of trust.

[13] A third case is when the dashed line $\pi_V(V)$ intersects the solid line $\pi_V(M)$ at the break point $\hat{p}$. In this case, there is an equilibrium in which exactly $m(1-\hat{p})/\hat{p}$ V-people go to the market, and they crowd with a probability that equalizes the expected payoff in the village and market. The outcomes in this case are "in between" the cases in Propositions 1 and 2, but involve technical conditions that offer few insights.

C. *Effects of Parameter Changes*

Increase in θ. An increase in θ corresponds to an increase in the productivity of the market. It can also represent a reduction in transportation and communication costs associated with trades involving strangers.[14] Graphically, an increase in θ causes a vertical shift in $\pi_V(M)$, the solid segments in Figure 1; the cutoff between crowding and standing, $\hat{p}$, does not change. More V-people will choose to trade in the market if any are still trading in the village because p_0 shifts left. A marginal change in θ does not change the nature of the market (standing versus crowding) but does increase aggregate payoffs. Straightforward calculations show that $d\Pi / d\theta > 0$ for regions E1-E5. These effects are not surprising.

But there is a more interesting case. Suppose the increase in θ is large and discrete, say from θ to θ', such that the configuration changes from the one in Proposition 2 to the one in Proposition 1. Graphically, the dashed line initially (at θ) intercepts the solid segment to the right of $\hat{p}$; there is standing in the market. Then the market becomes more productive (θ') so that the dashed line intercepts the solid line to the left of $\hat{p}$. Furthermore, suppose that $m < \hat{p}$—there are sufficiently few people with M-capital. Then the productivity improvement will cause the market to collapse into crowding. Intuitively, an increase in θ of this magnitude makes the market so attractive that V-people flood into the market, causing crowding.

In this case, the improvement in market productivity may be entirely lost to crowding. Consider, for example, the case where $m < p_0$, so the productivity improvement moves the equilibrium from E4 to E1. The payoff to people with V-capital does not change because it is tied by the entry condition to the return in the village which is independent of θ. Then $\Pi(\theta') - \Pi(\theta) = m(\pi_M(\theta') - \pi_M(\theta))$, which leads to

[14] For example, suppose $\theta = \overline{\theta} - (\text{transportation costs})$, where $\overline{\theta}$ is the payoff from a trade in the market conditional on already being in the market. Then as the cost of traveling to the market falls, the net payoff from trading in the market (θ) rises.

$$\Pi(\theta') - \Pi(\theta) = m((\theta' - \theta) + y(p_0 - p_1) - \tfrac{1}{2}(e + p_0 c + (1 - p_0)(x - \tfrac{1}{2}t)) .$$

The first term represents the higher gross payoff for people with M-capital due to the productivity increase. The second term represents higher fixed transaction costs ($p_0 - p_1 < 0$) from having fewer M-people meet each other in the market. The last term represents costs associated with enforcement, punishment, and crowding. The aggregate payoff declines if the productivity gain is sufficiently small. Somewhat surprisingly, a higher quality market can reduce the aggregate payoff. This case suggests that investments designed to facilitate market exchanges (better roads, communications) can make the economy worse off and spoil the market if too few people are equipped with the social capital that allows them to trade efficiently in the market.

Changes in c and e. The parameters *c* and *e* reflect the effectiveness of enforcement institutions. An improvement in the ability of institutions to protect property rights can be represented by an increase in *c* (ability to deliver stronger punishments) or a decrease in *e* (lower cost of using institutions). In the village context, an improvement in institutions might include denser social networks and more interdependencies. In the market, it might include more competent and honest judicial systems, police, and so on. Although in principle it would be interesting to study changes in institutions in both villages and markets, in our model punishment only comes into play in market transactions in equilibrium so comparative static exercises involving *c* and *e* only shed light on changes in market institutions.

An increase in *c* has two effects in Figure 1. First it moves the crowding threshold $\hat{p}$ to the left; people are less willing to crowd and run the risk of punishment. Second, it shifts down the segment of the solid line $\pi_V(M)$ to the left of $\hat{p}$; a crowding market becomes less attractive to V-people. In equilibrium E2, a higher *c* reduces the aggregate payoff ($d\Pi / dc = -\frac{1}{2}m$) because crowding continues as before but punishments are now more severe. In equilibrium E1, aggregate payoffs are also reduced by the higher sanctions, but there is a potentially offsetting effect as more V-people stay in the village

($dp_0 / dc > 0$). The only case where an increase in c unambiguously increases payoffs is when it causes $\hat{p}$ to shift from the right to the left of m. In such a case, the market would switch from a crowding to a standing equilibrium. This case is more likely with a larger than a smaller m. This suggests that policies designed to make marginal improvements in the effectiveness of punishment institutions are unlikely to reduce the crowding problem, and will make the economy poorer, especially if the economy is primarily based on V-capital.

A reduction in e has no effect on $\hat{p}$ or the payoffs of a V-person, so does not affect whether the market stands or crowds. Its does affect aggregate payoffs through the payoff to M-people: aggregate payoffs increase in E1 and E2 when e falls. Here a marginal improvement in enforcement institutions leads to a welfare improvement, but does not solve the problem of market crowding.[15]

D. *Inefficiency 1: Too Many V-People in the Market*

Trading decisions in the one-period model are typically inefficient. Here we highlight the nature of the inefficiency and its cause. Consider a planner who chooses what fraction of each type trades in the market and what fraction trades in the village in order to maximize Π. Standing versus crowding decisions remain the province of the individual agents.

First, note that the planner will send all of the M-people to trade in the market. To see the intuition, consider a transfer of one M-person from the village to the market. A transfer that does not affect whether either location stands or crowds increases Π because market trades are more productive, and the M-agent is more efficient in the market. A transfer that does alter the behavior of the market can only cause a change from crowding to standing, which also increases Π.

[15] Our analysis is restricted to values of c and e that are already somewhat effective in enforcing property rights. If the economy began with institutions that were completely ineffective (c that was so small or e that was so large as to make defending the line uneconomic), then changes in c and e would be more valuable.

Since the planner assigns all M-people to the market, only V-people trade in the village, and the village equilibrium features standing. The planner's problem is then to choose the measure of V-people trading in the market, call it q, to solve

$$\max_q \{m\pi_M(M) + q\pi_V(M) + (1-m-q)\pi_V(V \mid \text{standing})\},$$

where $\pi_M(M)$ and $\pi_V(M)$ may involve standing or crowding, depending on q. The first order condition (excluding the two points where derivatives are undefined) is

$$\pi_V(M) - \pi_V(V \mid \text{standing}) + \frac{dp}{dq}\left(m\frac{d\pi_M(M)}{dp} + q\frac{d\pi_V(M)}{dp}\right) = 0.$$

The first two terms are the payoff for a V-person from trading in the market compared to trading in the village. Note that this is the only information used by the decentralized agents when they make their trading decisions. The planner's choice is different because it also considers the last term, which captures how additional V-people in the market affect the payoffs of other agents through a change in p. The term is negative: additional V-people in the market reduce p and therefore reduce the payoffs of other M-people and V-people trading in the market (regardless of whether the market stands or crowds). The point is even stronger at $\hat{p}$ where the economy shifts between crowding and standing, and the derivatives may not exist. Thus, the planning problem assigns fewer V-people to the market. Or put differently, in a decentralized equilibrium the number of V-people trading in the market is inefficiently high.

IV. THE DYNAMIC MODEL

A. *Social Capital Accumulation*

In the previous section, we explored the trading decision of adult agents given the types of social capital in the economy. We now turn to the evolution of social capital over time. We assume that each agent is an adult for one period, during which he trades and also guides the social capital accumulation of his single child. Social capital is accumulated by a child partly as a result of purposeful decisions of the parent, and partly as a result of prevailing social conditions. For example, parents can choose to send children to school, after-school tutoring, and other activities that might build M-capital, or keep them at home working, interacting with relatives, and engaged in community activities that would build V-capital. But parents can only influence the outcome: despite the efforts of parents, children may learn by observing others (Bisin and Topa (2003)).

Formally, the probability a person acquires type-I social capital is ϕ_I, where

(1) $$\phi_M = hf(m)$$
$$\phi_V = 1 - hf(m)$$

where $h \in [\underline{h}, \overline{h}]$ is the amount of "time" spent by the person attempting to learn M-capital. One interpretation is that *h* is the number of hours spent in formal schooling. The value of *h* is selected by a parent for the child, and we assume that $0 < \underline{h} < \overline{h} < 1$ so that parents cannot guarantee an outcome. Even if parents choose the maximum or minimum value of *h*, there is still a chance that the child will learn the "wrong" type of human capital. The function *f* captures the effect of society at large on the social capital accumulation process. We assume that *f* is increasing, weakly concave, and $0 < f(0) < f(1) < 1$, again so that there is a chance for a person to learn either type of social capital even when *m* takes on extreme values.

The social capital accumulation process is an adaptation of the cultural transmission model developed in a series of papers by Bisin, Topa, and Verdier (BTV).[16] The BTV approach assumes that a child is first matched to his parents with some probability, and otherwise is matched to a representative individual of the population. Our process can be expressed in a BTV form by defining $d = 1 - h$ to be the amount of time spent learning V-capital (chosen by the parent). The probability of accumulation is then $\phi_V = d + (1-d)(1 - f(m))$, where $1 - f$ captures the effect of the population at large when the child is not matched to the parent. The only difference from a standard BTV model is that we have damped the social effect with the concave function *f*.

Finally, we assume that M-capital is more expensive to acquire than V-capital. The per unit cost of *h* is $w > 0$, and the cost of V-capital is normalized to zero.[17] While *w* can be viewed as a direct resource cost, it also includes the opportunity cost of attending school instead of engaging in household production. When there are many employment opportunities for children or a scarcity of schools (as in many less developed economies), the value of *w* would then be high.

B. *Steady States*

Let $\pi_I(m)$ denote the one-period payoff of a parent with I-capital who optimally chooses a trading location as in the previous section, and let β be the intergenerational discount rate. The Bellman equation of a person with I-capital is:

$$u_I(m) = \max_h \{\pi_I(m) - hw + \phi_M u_M(m') + \phi_V u_V(m')\}, \tag{2}$$

[16] See Bisin and Verdier (2001), Bisin and Topa (2003), Bisin, Topa, and Verdier (2004), and the references therein.

[17] Note that while our agents influence what type of human capital their children have, the quantity is fixed and identical for all agents. See Glaeser, Laibson, and Sacerdote (2002) for an analysis of the quantity decision.

where m' is the posited value of m in the next period. The equilibrium law of motion for m, consistent with the behavior implied by the Bellman equation, is denoted Φ, so $m' = \Phi(m)$.

The first order condition for h in (2) is

$$\beta f(m)(u_M(m') - u_V(m')) \overset{>}{\underset{<}{=}} w. \tag{3}$$

The left hand side is the marginal benefit of schooling. It depends on the difference between the utility of having M-capital and V-capital in the next period, discounted by the intergenerational discount rate and the probability that social effects will reinforce the effect of schooling in forming M-capital. The right hand side is the marginal cost of schooling. The problem is linear in h so the solution is either $h = \underline{h}$ when the inequality is $<$, and $h = \overline{h}$ when the inequality is $>$.

Because we have assumed that the social capital accumulation process does not depend on the parent's type (except through social pressure in the aggregate), both types of parents choose the same h for their children. Therefore, the law of motion is simply $\Phi = hf(m)$. From (2), $u_M - u_V = \pi_M(m) - \pi_V(m) \equiv \Delta(m)$. Then the first order condition (3) can be rewritten in the convenient form

$$\beta f(m)\Delta(m') \overset{>}{\underset{<}{=}} w. \tag{3'}$$

We begin by characterizing the relatively simple case described in Proposition 2, in which $\pi_V(V) > \pi_V(M \mid \text{crowding})$ when $p = \hat{p}$. In this case, it is straightforward to show that Δ is continuous and nondecreasing in m, specifically, $\Delta = p_1 y + (1 - p_1)z$ in E4, and $\Delta = my + (1-m)z$ in E5. Intuitively, since the market always stands, the only advantage of M-capital over V-capital is that M-capital produces a transaction gain of y when trading with another M-person while V-capital produces a transaction cost of z when trading with another V-person, and the former effect is larger than the latter effect

($y \geq z$). Since Δ is nondecreasing and f is increasing, there is at most one value of m that solves $\beta f(m)\Delta(m) = w$. Define the critical value m^* as:

$$(4) \qquad m^* = \begin{cases} 0 & \text{if} \quad \beta f(0)\Delta(0) > w; \\ 1 & \text{if} \quad \beta f(1)\Delta(1) < w; \\ \mu & \text{otherwise} \quad \text{where } \beta f(\mu)\Delta(\mu) = w. \end{cases}$$

Observe that $h = \underline{h}$ if $m < m^*$, and $h = \overline{h}$ if $m > m^*$. Therefore, the equilibrium transition function is

$$\Phi = \begin{cases} \underline{h}f(m) & \text{if} \quad m < m^*; \\ \overline{h}f(m) & \text{if} \quad m > m^*. \end{cases}$$

Figure 3 illustrates one possibility. The lighter curves represent $\underline{h}f$ and $\overline{h}f$, while the dark curves represent the equilibrium Φ. It is clear that there can be one or two steady states, depending on the location of m^*. The next proposition characterizes the steady states.

PROPOSITION 3. Suppose $\pi_V(V) > \pi_V(M \mid \text{crowding})$ when $p = \hat{p}$. Define m_0 and m_1 to solve $\underline{h}f(m_0) = m_0$ and $\overline{h}f(m_1) = m_1$.

- If $m^* < m_0$ then there is a unique steady state with $m = m_1$. The steady state is stable and all parents choose $h = \overline{h}$ for their children.
- If $m_0 < m^* < m_1$ then there are two steady states. Both are stable. In one steady state, $m = m_0$ and all parents choose $h = \underline{h}$. In the other steady state, $m = m_1$ and all parents choose $h = \overline{h}$. The aggregate payoff Π is lower at m_0 than m_1.
- If $m_1 < m^*$ then there is a unique steady state with $m = m_0$. The steady state is stable and all parents choose $h = \underline{h}$ for their children.

Proposition 3 shows there are two qualitatively different steady states, m_0, in which no parents send their children to school, and m_1, in which all parents send their children to school. We call the first case a "V-capital equilibrium" and the second an "M-capital equilibrium." Regardless of the equilibrium, there will be agents with both types of social capital because the social capital transmission process is noisy.

A critical question is what determines which equilibrium prevails. One way to answer that question is to identify parameter configurations for which only m_0 or only m_1 are feasible. From Proposition 3, we see that there is a unique V-capital equilibrium for sufficiently high m^*, and a unique M-capital equilibrium for sufficiently low m^*. The definition of m^* and (3′) lead to the conclusion that an M-capital equilibrium prevails given a sufficiently large β or a sufficiently low w (and conversely for a unique V-capital equilibrium). As parents care more about their children and as the cost of schooling falls, parents are more likely to invest in M-capital. The possible equilibria are also affected by the underlying parameters of the one-period model through Δ. An increase in θ increases Δ, reducing m^*, making the M-capital equilibrium more likely.

The case where $m_0 < m^* < m_1$ is particularly interesting because when this holds, initial conditions matter. If the economy begins with $m < m^*$, it transitions to the V-capital equilibrium. If the economy begins with $m > m^*$, it transitions to the M-capital equilibrium. Thus, an economy that begins with abundant V-capital can be locked into that type of capital. The aggregate payoff is higher in the m_1 than the m_0 equilibrium, from Proposition 2.

There are two sources of dynamic "increasing returns" in this economy that give rise to multiple steady states. First, the likelihood that a child becomes an M-person is increasing in the fraction of M-people in the economy due to the possibility of outside socialization. Second, the one-period payoff to being an M-person instead of a V-person (Δ) is increasing in *m*. The more people in the economy with M-capital, the better it is to have M-capital because of social capital complementarity.

Proposition 3 and Figure 3 focus on the parameter configuration of Proposition 2, in which the one-period model has two possible equilibria. The configuration described in Proposition 1 (where there are three possible equilibria) is similar, but the transition dynamics can be jumpy because of the possibility of equilibrium crowding. The shift from crowding to standing at $\hat{p}$ causes $\Delta(m)$ to fall discretely—the advantage of being an M-person is high when the market crowds because the ability to enforce line position is valuable, but the advantage falls when the market stands because enforcement is never required. The discrete shift down in Δ implies that there is no longer a simple cutoff rule for the social capital investment decision. Instead, we have (potentially) three cutoffs: $h = \underline{h}$ when $m < m_a^*$, $h = \overline{h}$ when $m_a^* < m < \hat{p}$, $h = \underline{h}$ when $\hat{p} < m < m_b^*$, and $h = \overline{h}$ when $m_b^* < m$, where $\beta f(m_a^*)\Delta(m_a^*) = w$ and $\beta f(m_b^*)\Delta(m_b^*) = w$. The equilibrium transition function may jump back and forth between $\underline{h}f$ and $\overline{h}f$. Figure 4 illustrates one possibility. Proposition A1, stated and proved in the Appendix, characterizes the full set of possibilities.

Figure 4 displays some of the same broad features as Figure 3. Most important, there can be multiple steady states, and when this attains, the ultimate outcome is governed by the initial value of *m*. As before, there are many configurations where, for a sufficiently high value of *m*, the economy moves to m_1, or, for a sufficiently low value of *m*, the economy moves to m_0. However, it is also possible for the path to be disrupted by discrete jumps. When this happens, the economy will not move smoothly toward a particular equilibrium. There is also a cycling region for $m \in (m_a^*, m_b^*)$ in which generations bounce back and forth between investing in V-capital and M-capital. This happens when a generation with V-capital and market crowding produces a generation with M-capital in which the market stands. With a standing market, the net benefit from having M-capital falls, leading the new parents not to invest in M-capital for their children. Another interesting feature of Figure 4 is that the steady state can be non-monotonic in *m*. For example, an economy that starts with $m \in (\hat{p}, m_b^*)$ may transition "down" to m_0 while and economy that starts with less M-capital, $m \in (m_a^*, \hat{p})$, may transition "up" to m_1. These possibilities can occur if the economy begins with social capital close to $\hat{p}$.

C. *Development Paths: Industrial Revolution or Stagnation*

The pre-industrial revolution period can be characterized by localized production with little scope for trade between diverse agents. The main cause of localized production for most of human history was high transportation and communication costs. As discussed above, high transportation and communication costs can be represented by a "low" value of θ. In this section we study an economy that begins with $\theta \approx 1$, and explore how the economy reacts when θ increases. We are particularly interested in understanding the circumstances under which an economy transitions to market exchanges supported by M-capital—which we call an "industrial revolution"—and when it remains focused on less efficient village transactions ("stagnation").

To begin, observe that with $\theta \approx 1$, all V-people trade in the village, and the payoff from V-capital is approximately equal to the payoff from M-capital: $\Delta \approx 0$. Given that M-capital is costly, all parents seek to teach their children V-capital. The initial equilibrium is m_0, and $m_1 < m^*$.

Now suppose θ increases so that $\Delta > 0$. The higher productivity of market transactions increases the value of M-capital relative to V-capital, strengthening the incentive for parents to send their children to school to learn M-capital. For the moment, suppose the increase in θ is modest enough so that the configuration in Proposition 2 attains. Now some V-people choose to trade in the market, and but not enough to cause market crowding. Whether the economy develops or not depends on whether parents start to send their children to school. If they do, the economy will transition monotonically to m_1, what we call industrialization. If parents continue to emphasize V-capital, the economy will stagnate at m_0. Although the model is somewhat involved, the critical condition for development is fairly simple, giving one of our central results:

PROPOSITION 4. If the gross payoff from market transactions increases from $\theta \approx 1$ to $\theta' > 1$ so that the conditions of Proposition 2 hold, the economy industrializes if and only if $m^*(\theta') < m_0$.

Proof: Observe that m^* is decreasing in θ through Δ. From Proposition 3, there are three cases. First, if $m^*(\theta') > m_0$ then there is a unique steady state m_0. Second, if $m_0 < m^*(\theta') < m_1$, then there are two steady states. However, given that the economy begins at m_0, it will stay there. Third, when $m^*(\theta') < m_0$, the unique steady state is m_1. Only in the third case will the economy transition from m_0 to m_1.

Proposition 4 leads to two interesting implications. First, whether or not an economy develops depends on initial conditions. The lower is the initial fraction of M-capital, the less likely development will be triggered by any given increase in market technology. An economy heavily invested in V-capital (low *m*) that was prosperous when trading was local will find it the more difficult to industrialize than an economy with little V-capital. Why don't parents have their children learn M-capital when market transactions become more efficient? The main reason is that they are worried that not enough other children will acquire M-capital. This is a concern because socialization effects might prevent enough children from learning M-capital even if they are sent to school.

The other implication of note is that industrialization is easier for economies with low costs of schooling, *w* (a low value of *w* reduces m^*.) The cost of schooling may be high and development difficult, for example, if existing production arrangements provide ample opportunities for children to work. Initial conditions probably also influence development through *w*. If, as seems plausible, *w* is decreasing in *m* (personal relations are easier to build in a world with pre-existing dense social networks), high initial levels of V-capital will inhibit development by raising the relative price of M-capital.

The analysis so far assumes that the increase in θ is small enough so that the assumptions of Proposition 2 were met. Now suppose the increase is so large that the conditions of Proposition 1 hold. So many V-people are attracted to the market that crowding ensues. The economy can develop along several paths. One is a smooth transition to m_1: parents send their children to school, the M-capital in the population increases monotonically over time, and the market eventually shifts from crowding to standing. There is also a cycling path in which successive generations switch back and forth from V-capital to M-capital and the market alternates between crowding and standing. Finally, the economy can stagnate at m_0. The condition for development is stated and proved in Proposition A2 in the appendix. It is more complicated than the condition in Proposition 4, but maintains the same qualitative features that we emphasized above: stagnation if m_0 is sufficiently low or *w* is sufficiently high.

D. *Inefficiency 2: Too Little Investment in M-Capital*

Section III.D showed that given a distribution of social capital, too many V-people choose to trade in the market. Now we consider how the accumulation of social capital compares to the optimum. Suppose the planner cannot affect the trading location or behavior of individuals when they are trading (that is, whether they stand or crowd). The planner's Bellman equation is:

$$W(m) = \max_h \{m\pi_M(m) + (1-m)\pi_V(m) - hw + \beta W(m')\}.$$

The planner chooses the same amount of schooling for every person, and the transition function for an individual remains (1). Given the infinite number of people, the fraction of people with M-capital in the next period is the deterministic quantity $m' = hf(m)$. Therefore, the planner can control the evolution of *m* through the choice of *h*.

The planner's first order condition is

$$(5) \qquad \beta f W' \overset{>}{\underset{<}{=}} w,$$

when the derivative exists. Condition (5) differs from the private schooling decision $(3')$ only in the term W', which replaces Δ. The envelope condition is $W' = \Delta + m\pi_M' + (1-m)\pi_V' + \beta hf' W'(m') > \Delta$, using Proposition 1B. Thus, the planner perceives a higher marginal benefit from investing in M-capital than private individuals perceive. Put differently, investment in schooling is too low in the decentralized outcome.

There are two reasons why private investment in M-capital is inefficiently low. The first is that private individuals do not take into account that their M-children will provide a transaction cost saving to others (and possibly transform a crowding equilibrium into a standing equilibrium). Second, they ignore the fact that accumulation of M-capital by their children will make it easier for future generations to accumulate M-capital via socialization.

One implication is that subsidies to schooling can lead to more efficient development. Similarly, this suggests a rationale for compulsory education in developing countries.[18] However, the type of schooling matters: it has to be schooling that increases M-capital. Education that teaches how to use market institutions to enforce rights would be the right idea. Education in which students invest in community relations, say working on community projects, would be counterproductive if it facilitates accumulation of V-capital. A related implication is that attempts to foster development by encouraging development of V-capital (community projects, local governance and decisionmaking, etc.) may be counterproductive, particularly if they end up discouraging individuals from accumulating M-capital. Social capital based on interpersonal relations is productive, but development requires a different kind of social capital.

[18] Platteau (1994) argues that compulsory national education was key to Japanese industrialization.

V. HISTORICAL PATTERNS

A central message of our paper is that high levels of village social capital can be an impediment to modern development. Village capital—with its reliance on personal relations and social networks—cannot support the trade between strangers and the diversity of trading partners that is required for a modern industrialized economy. So industrialization ultimately depends on accumulation of market capital. Because of complementarities in social capital, however, it is difficult for an economy based on village capital to make the switch. Complementarities make people want to have the same type of social capital as their potential trading partners. In addition, there is a socialization effect: in an economy with dense social networks, children may end up accumulating village capital even if parents send them to school to learn market capital. So development presents more than a coordination problem. Even if all parents sent their children to school, too few students may accumulate market capital to support a market economy, making market capital a bad investment in the end. This possibility reinforces parents' hesitancy to send their children to school in a village economy.

The view of development that emerges from thinking about two types of social capital is the following. In pre-industrial times when transportation and communication costs are high, successful economies invest heavily in village capital to support their predominantly local exchanges. When transportation and communication costs fall and market exchanges become more productive, it becomes efficient to transition from village capital to market capital, that is, to industrialize by adopting the transaction institutions of markets. Economies that begin without dense social networks and other investments in village capital will be the first to develop. Economies with large investments in village capital will find it difficult to develop until the productivity of market exchanges becomes very large or the cost of acquiring market capital falls. Undeveloped or developing economies will appear to be excessively reliant on local transactions, and their markets will be plagued with crowding and a failure to support market institutions such as property rights.

A. *Reversal of Fortune in European Colonies*

Our model can help explain some of the broad stylized facts of economic development. One important pattern is the reversal of fortune amount European colonies over the last 500 years, documented by Acemoglu, Johnson, and Robinson (2002). Colonies established in areas that were prosperous circa 1500, such as the lands controlled by the Aztecs and Incas in the Americas, and India, failed to modernize and were relatively poor by the end of the twentieth century. In contrast, colonies established in poor and sparsely populated areas, such at North America, Australia, and Singapore, were among the first to industrialize and became some of the richest nations. In our view, the failure of the rich colonies to develop was partly a result of their pre-industrial reliance on village capital. Our model suggests that a dense village economy with a long history, such as might be found in India, for example, would find it difficult to accumulate market capital, while a sparse, relative new economy, such as scattered farms in the United States, would find the transition relatively easy.[19]

B. *Rise of the Western World*

Our model also suggests a way to understand another historical pattern. One of the biggest mysteries in economic development is why modern market institutions and industrialization emerged in the western world and not the Middle East. Modernization proceeded over several centuries and involved a variety of innovations in law, banking, finance, and corporate organization. When modern development began several centuries ago, the feudal states of Western Europe were much poorer and less developed than the Islamic Middle East, particularly the Ottoman Empire. Casual intuition suggests that the Islamic states would have been the more likely candidates to modernize.

[19] Acemoglu, Johnson, and Robinson (2002) suggest the reversal was caused by the adoption of different political institutions in rich and poor colonies, an explanation not inconsistent with ours. However, while they link the adoption of institutions to the availability of opportunities for colonists to extract wealth, we emphasize the difficulty of converting an large existing stock of village social capital.

In our view, it was the very success of the Islamic states in the Middle Age that made it difficult for them to modernize because economic success in pre-industrial times required significant investments in village capital. These large investments in village capital made it difficult to convert to market capital. Thus, our model provides a resolution to a "paradox" observed by a leading historian of medieval Islam (Udovitch, 1979, p. 273):

> "The very factors—status and personal-social relations—which assured the smooth and successful functioning of credit and merchant banking activities in the Islamic Mediterranean world during most of the medieval period, effectively prevented their growth, elaboration, and development into independent, stable organizational forms. Given the slowness and unpredictability of communications between geographically distant locations, and given the sheer physical and psychological limitations on individual social intercourse, the scale of economic activities was necessarily restricted to numerous small, even intimate, circles. The possibility of expansion into a larger, more cohesive structure was precluded by the comparatively narrow social basis on which economic life was conducted."

North (1998) argues that another factor responsible for the rise of Western Europe was the fragmentation of political power between numerous states.[20] Unlike the Islamic Middle East, which was dominated by the Ottoman Empire, European states were subject to a great deal of competition from other governments. This competitive environment

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[20] North (1988, pages 20-21) also observes the limitations arising from the institutions used to support Islamic trade: "The traders from the Islamic world developed in-group social communications networks to enforce collective action which, while effective in relatively small homogeneous ethnic groups, do not lend themselves to the impersonal exchange that arises from the growing size of markets and diverse ethnic traders." He suggests the institutions were driven by pre-existing "beliefs" regarding the role of individuals and groups, while we view them as the outcome of deliberate forward-looking human capital investment decisions.

brought forth a variety of institutional innovations, some of which were designed to allow the state to raise funds. Our model suggests that fragmentation may have had another benefit. It made it more likely that trade would take place with people of other cultures (different languages, different political systems, etc.) This may have led Western Europeans to begin with higher levels of M-capital, much like today Europeans may invest more in capital that allows them to trade with people outside their own country (say, by learning a second language). For example, Italian bankers developed skills that allowed them to move capital across national borders at relatively low cost. The same logic suggests that high levels of immigration in the late 19th and early 20th centuries may have aided development of market capital.

C. *Post-Communist Transition Economies*

Development is also a critical issue for the post-communist nations of Eastern Europe and Asia. Many of these nations are already industrialized but lack many of the institutions necessary to support market economies. In terms of our model, these economies began as primarily V-capital economies: personal relations were critical for economic exchange under communism, not knowledge of commercial law, courts, and the like. In the short run, the creation of relatively free markets would be expected to have two effects. First, it will cause "crowding" in the market as V-people enter market but do not know how to use market institutions. In practical terms, this means that property rights will be insecure and contracting will be cumbersome. Second, some V-agents will continue to trade using V-capital to support their transactions. One manifestation of this would be contract enforcement by organized crime groups. The use of V-capital by criminal groups to support exchanges can result in output increases and even the appearance of order in some cases (much like Chicago was seen by many to run efficiently under the patronage system of the first Mayor Daley). V-capital is ultimately limited in the amount of specialization it can support, however, because of its grounding in small, homogeneous groups. So while a transition economy can make initial progress based on its old V-capital, the largest gains will accrue in the longer run when people have invested in enough market capital to support market institutions. Our analysis thus agrees with the conventional view that transition economies must construct market institutions, except that we would add that functional market institutions will be difficult to sustain until enough M-capital has been accumulated. Moreover, our analysis points to education as a key part of this institution building.

VI. CONCLUSION

A flourishing empirical literature shows that economic development is related to social capital and adoption of market institutions such as rule of law. Yet the evidence raises the question why some countries and not others have managed to accumulate social capital and adopt the right institutions. Why do poor countries seem to have so little social capital in aggregate, even though theory suggests they are well-positioned to have it, and micro studies show they often do have it? Why have some countries been able to adopt the right institutions for industrialization while others seem trapped in village economies?

This paper provides a theory of development that offers an answer to these questions. The theory is grounded in two ideas that have not been emphasized in the literature. The first idea is that there are two types of social capital, and they tend to be substitutes for each other: "village" social capital takes the form of personal relations and social networks and is effective in supporting transactions between people in the same network; "market" social capital takes the form of knowledge about commercial law, courts, and other third party institutions, and is effective in supporting transactions between strangers. The second idea is that institutions are not self-enforcing—individuals must develop skills and knowledge to use them. Industrialization, in our view, requires the adoption of market institutions such as rule of law, but those institutions in turn can only be sustained if the population has acquired the requisite social capital.

Our answer for why poor countries seem to have so little social capital is that existing research tends to measure *market* social capital, such as trust in strangers. Our analysis and a great deal of micro evidence suggests that these countries would do much better if social capital were measured in terms of kinship and other personal networks, patron-client relations, and so on. The development challenge for these countries is to transition from village capital to market capital.

As for why some countries have been more successful than others at adopting market institutions, we suggest that part of the answer lies in understanding why some countries have been better at adopting market social capital—such capital is required to support market institutions. Our model shows that externalities in the accumulation and use of social capital make it difficult for economies to convert from one type of social capital to the other type. When transportation and communication costs fall, making industrialization an option, those countries well-endowed with village capital find it the hardest to adopt market institutions. Economies without dense social networks find it easiest to industrialize. This picture is consistent with evidence of a reversal of fortune among European colonies over the last 500 years, and suggests why market institutions and industrialization had their origins in the relatively backward states of medieval Europe instead of the initially more prosperous and advanced Islamic Middle East.

The desire to present our story in a fairly parsimonious way has led us to omit some factors that we think are important for development. Chief among them is politics. Acemoglu, Johnson, and Robinson (2002) and Glaeser et al. (2004) among others have argued persuasively that political decisions play a role in economic growth. One way to view our model is roughly along the lines suggested by Glaeser et al. (2004): social capital provides the opportunity set for development, but political leaders can choose a point in the interior of the set. It is also possible that the political decisions themselves are induced by social capital, that is, politics over the long run could be just a veil. Nevertheless, by providing a detailed theoretical framework incorporating social capital and institutions, we think our approach may be a useful addition to the toolkit used to study development problems.

APPENDIX

PROPOSITION A1. Suppose $\pi_V(V) < \pi_V(M \mid \text{crowding})$ when $p = \hat{p}$. Define m_0 and m_1 to solve $\underline{h}f(m_0) = m_0$ and $\overline{h}f(m_1) = m_1$, and assume $m_0 < \hat{p} < m_1$. Define m_a^* as $\beta f(m_a^*)\Delta(m_a^*) = w$ for $m < \hat{p}$, define m_b^* as $\beta f(m_b^*)\Delta(m_b^*) = w$ for $\hat{p} < m$, and assume that m_a^* and m_b^* exist.

- If $m_0 < m_a^* < \hat{p} < m_1 < m_b^*$ or $m_1 < m_a^*$, then there is a unique steady state with $m = m_0$. The steady state is stable and all parents choose $h = \underline{h}$.
- If $m_b^* < m_0$ or $m_a^* < m_0 < \hat{p} < m_b^* < m_1$ then there is a unique steady state with $m = m_1$. The steady state is stable and all parents choose $h = \overline{h}$.
- If $m_0 < m_a^* < m_b^* < m_1$ then there are two steady states. Both are stable. In one steady state, $m = m_0$ and all parents choose $h = \underline{h}$. In the other steady state, $m = m_1$ and all parents choose $h = \overline{h}$.
- If $m_a^* < m_0 < \hat{p} < m_1 < m_b^*$ there is no steady state.

Proof: Straightforward calculation reveals that $\Delta = \hat{p}y + (1-\hat{p})z + \frac{1}{2}(\frac{1}{2}t + x - e)$ when $m < p_0$ (E1), $\Delta = my + (1-m)z + \frac{1}{2}(\frac{1}{2}t + x - e)$ when $p_0 < m < \hat{p}$ (E2), and $\Delta = my + (1-m)z$ when $\hat{p} < m$. Then $\Delta(m)$ is continuous and nondecreasing, except at $\hat{p}$, where it discretely shifts down. Then there are possibly two solutions to $\beta f(m)\Delta(m) = w$, one lesser than and one greater than $\hat{p}$, that are defined as m_a^* and m_b^*, respectively. It follows by definition that $h = \underline{h}$ when $m < m_a^*$, $h = \overline{h}$ when $m_a^* < m < \hat{p}$, $h = \underline{h}$ when $\hat{p} < m < m_b^*$, and $h = \overline{h}$ when $m_b^* < m$. The nature of the steady states for each configuration can be seen immediately from a suitable variant of Figure 4.

PROPOSITION A2. If the gross payoff from market transactions increases from $\theta \approx 1$ to $\theta' > 1$ so that the conditions of Propositions 1 and A1 hold, the economy industrializes if and only if $m_b^*(\theta') < m_0$ or $m_a^*(\theta') < m_0 < \hat{p} < m_b^*(\theta') < m_1$.

Proof: From Proposition A1, if the conditions hold there is a unique steady state m_1. If neither of the conditions hold then either there is a unique steady state m_0, there are two steady states, or there is no steady state. If there are two steady states, the economy will remain at m_0 where is begins.

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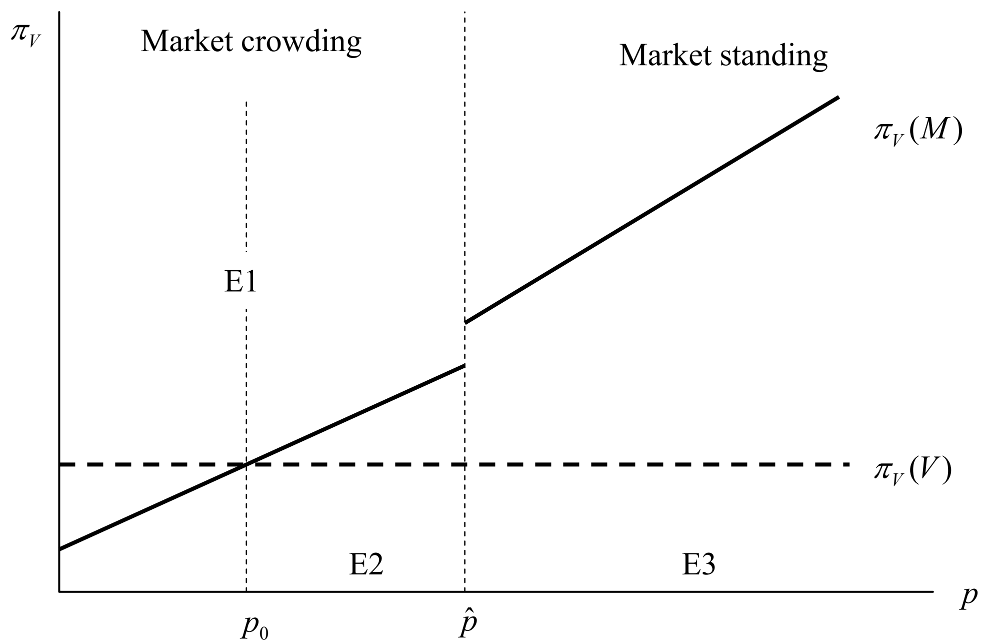

FIGURE 1. PAYOFF TO A PERSON WITH V-CAPITAL

The figure shows the payoff to a person with V-capital as a function of p, the fraction of people with M-capital in the market. The solid line segments show the payoff from trading in the market. The dashed line is the payoff from trading in the village. E1-E3 are the three equilibria described in Proposition 1A.

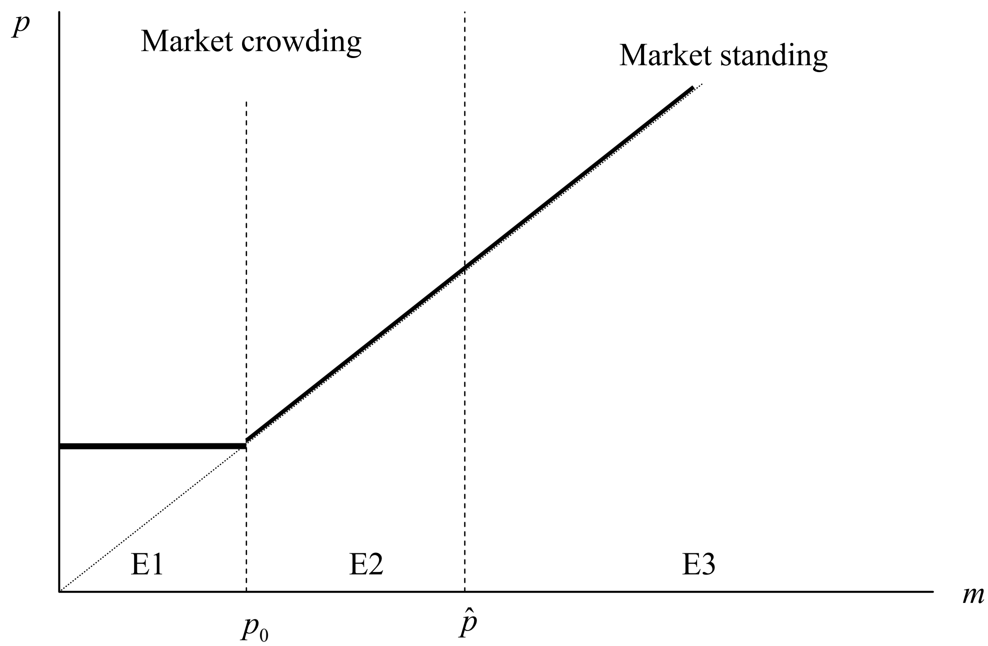

FIGURE 2. RELATION BETWEEN NUMBER OF PEOPLE WITH M-CAPITAL IN THE POPULATION (m) AND IN THE MARKET (p)

The figure shows the equilibrium relation between the fraction of people with M-capital in the economy and in the market for the parameter configuration of Figure 1 and Proposition 1. The 45 degree line is shown emanating from the origin.

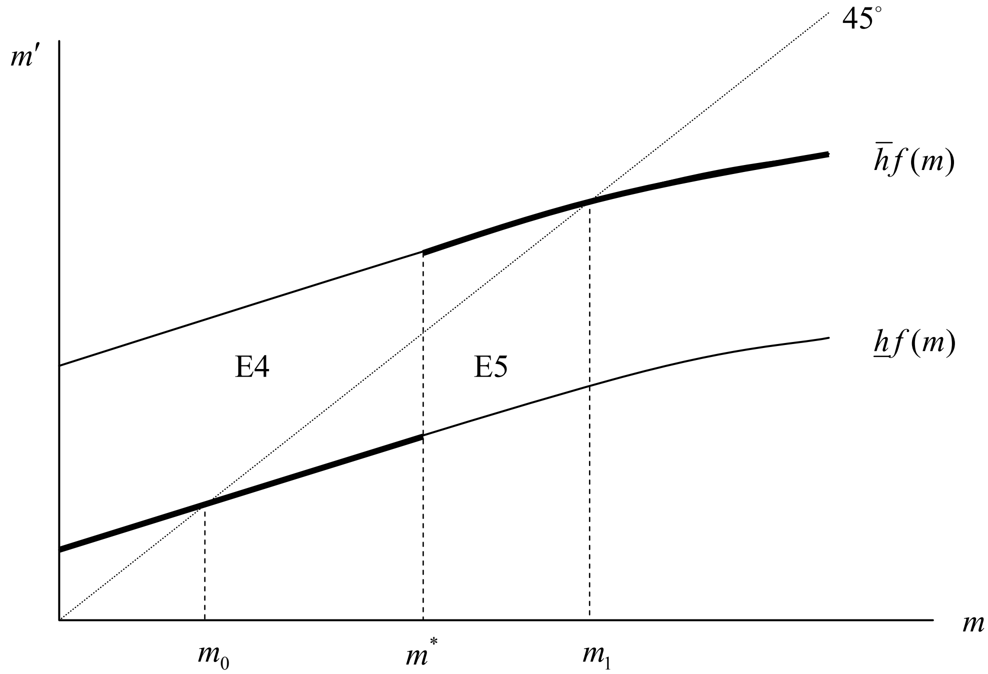

FIGURE 3. SOCIAL CAPITAL TRANSITION FUNCTION

The figure shows the transition function for social capital ($m \to m'$) for the parameter configuration described in Proposition 2. The two concave curves are the transition functions conditional on low ($\underline{h}f$) and high ($\bar{h}f$) social capital investment. The equilibrium transition function is shaded. The market equilibrium is E4 to the left of m^*, and E5 to the right of m^*, as defined in Proposition 3.

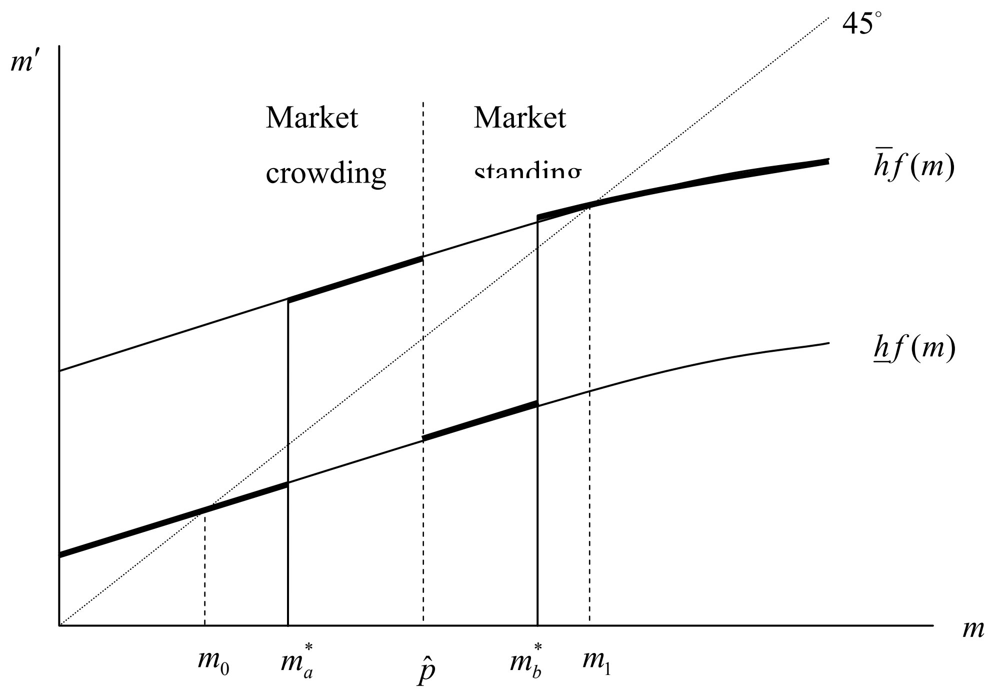

FIGURE 4. SOCIAL CAPITAL TRANSITION FUNCTION WHEN THE MARKET SOMETIMES CROWDS

The figure shows the transition function for social capital ($m \to m'$) for the parameter configuration described in Proposition 1. The two concave curves are the transition functions conditional on low ($\underline{h}f$) and high ($\overline{h}f$) social capital investment. The equilibrium transition function is shaded.