From families to formal contracts: An approach to development ☆

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A B S T R A C T

This paper develops a theory in which individuals can use one of two types of human/social capital to enforce contracts: "Local capital" relies on families and other personal networks; "market capital" relies on impersonal market institutions such as auditors and courts. Local capital is efficient when most trading is local, but only market capital can support trading between strangers that allows extensive division of labor and industrialization. We show that economies with a low cost of accumulating local capital (say, because people live close together) are richer than economies with a high cost of accumulation when long distance trade is difficult, but are slower to transition to impersonal market exchange (industrialize) when long distance trade becomes feasible. The model provides one way to understand why the wealthiest economies in 1600 AD, China, India, and the Islamic Middle East, industrialized more slowly than the West. We report an array of historical evidence documenting the pre-industrial importance of family and kinship networks in China, India, and the Islamic world compared to Europe, and the modernization problems linked to local capital.

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1. Introduction

It is now widely recognized that economic development depends not only on technological innovation, but also on the creation of social arrangements that facilitate cooperation and contracting. These social arrangements, often labeled "social capital," can take a variety of forms, including formal legal and political institutions, informal norms, culture, kinship, and other networks. It is less clear which of these arrangements are essential, and how the arrangements are created, persist, and evolve. Theory suggests that cooperation is easiest to achieve when parties are engaged in repeated transactions and well informed about each other (Kandori, 1992; Moore, 1995), conditions that would seem to be met by many of the world's poorest countries, with their localized economies based on kinship and patron–client relationships, repeated play, and transacting parties that know each other well. And there are many studies showing how parties in developing and transition economies are able to maintain an impressive amount of cooperation using sophisticated informal contracts supported by repeated play and personal networks.[1] Yet at the macro level, the world's richest countries generally score higher in "trust" and other measures of social capital than poorer countries, and trust seems to be an important factor in explaining economic growth over the last several decades.[2]

As a way to explain this disparity of outcomes, scholars have advanced the idea that there is more than one way to support cooperation and contracting, and the effectiveness of a particular arrangement depends on the context. For example, one stream of research distinguishes between "bonding" and "bridging" social capital, where bonding is networks within a primary social group and bridging is networks between primary social groups (Gittell and Vidal, 1998; Narayan, 1999). From this perspective, less developed economies may be well endowed with social capital, but it is the wrong kind of social capital.[3] But even this conceptual step leaves open the central question of why some societies have been able to accumulate the right type of social capital while others have not.

Our paper develops a dynamic model to study the evolution of arrangements for contracting and cooperation. In our view, the effectiveness of transacting arrangements depend on skills accumulated by individual traders (their human capital) as well the skills developed by other traders (social capital). The model revolves around the idea that there are two forms of capital that can be used to

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enforce contracts. "Local capital" takes the form of kinship, networks, patron–client relations, and in-depth knowledge about trading partners, encompassing a variety of arrangements that are often labeled "social capital." "Market capital" takes the form of knowledge about how to use third party enforcement institutions such as courts, auditors, standardized accounting procedures, credit ratings, and commercial law. The skills embodied in market capital usually are not considered social capital but we argue it is conceptually useful to think of them as social capital.

Local capital works best when economic activity is primarily local, involving transactions between members of the same social network, while market capital is effective for transactions between strangers who may not trade again in the future. Because local capital is inherently limited by the size of the social network, only market capital can support the extensive markets, specialization, and division of labor that are prerequisites for industrialization. Externalities in the accumulation of transacting capital can lead to a "development trap" where poor economies that rely on the wrong type of trading arrangements become locked into a low-income equilibrium that perpetuates production of that capital. More important and novel, the model displays a reversal of prosperity in the face of technological innovations – societies that are rich when communication and transportation technologies are primitive become relatively poor when technologies improve. This implication is significant because it provides a way to understand a central puzzle of economic development: why China, India, and the Islamic Middle East, the wealthiest and most advanced regions of the world in the late Middle Ages, were slower to industrialize than the relatively backward region of Europe.

In a preindustrial environment where transportation and communication costs are high, trading is overwhelmingly local (Crone, 1989), and those economies that are best at accumulating village capital become the wealthiest.[4] When new technologies are developed that significantly reduce transportation costs, it becomes optimal to trade with people who are not kin and belong to a different social network in order to take advantage of extensive markets and division of labor. But doing so requires development of what we call market capital to support exchanges between strangers. This process of replacing local capital with market capital is necessary for industrialization. We show that because of externalities, economies with a large initial stock of local capital find it more difficult to transition to a market economy than countries with a small stock of local capital. Thus, a reversal of prosperity in the face of technological change emerges naturally on the path to industrialization.

Existing explanations of the rise of the West tend to view the fact that Europe industrialized first and the fact that China, India, and the Middle East were more advanced initially as unconnected, but we view them as two sides of the same coin. In our view, the source of the preindustrial prosperity of China, India, and Islamic states – a large stock of local capital – was the critical reason for their failure to industrialize. In this way, our model offers a resolution to a "paradox" noted 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."

Our analysis embeds a notion of human and social capital that is connected to the existing literature but somewhat distinct. In our view, human/social capital is abilities and skills that enable individuals to tap into existing social structures to enforce contracts. Local capital is the ability to access kinship and other networks (learning how to resolve disputes using the village elders), while market capital is the ability to access third party institutions such as courts and mediators (learning about accounting systems and contract law). We think of these skills as "capital" because they are accumulated at a cost – sometimes joint with consumption and sometimes as a product of formal schooling – and "social" because their value depends on the institutional structures available in the society. "Trust" and cooperation emerge endogenously in our model as a result of social arrangements rather than as an inherited preference or personality trait.

In addition to developing a model, a central and novel contribution of our paper is a historical discussion of the role of local capital in the economic development of China, India, the Islamic Middle East, and Europe based an extensive consideration of the historical evidence. We show that China, India, and the Islamic Middle East entered the industrialization phase with better developed local capital than Europe, consistent with our modeling approach. Although statistical evidence is scarce, the historical record is replete with qualitative and anecdotal evidence of the importance of social networks in the preindustrial development of China, India, and the Middle East, while in contrast, Europe is often noted for its relative scarcity of this type of social capital. The historical evidence suggests Europe ended up in this position at the outset of industrialization largely because of geography. We believe ours is the first systematic attempt to document the importance of social capital in the pre- and postindustrial development of the world's major civilizations.

The literature on development and social capital is vast. Perhaps the closest papers to ours are Tabellini (2008), Guiso et al. (2008), and Francois and Zabojnik (2005), which develop models of cultural evolution to study economic development. Our paper shares with these models the assumption that accumulation of social capital depends on the actions of parents as well as the aggregate endowment of social capital, and because of the dynamic externality, our analysis generates the possibility of a development "trap" similar to those papers. One difference in our approach is that we do not treat social capital as a personal trait but rather a set of skills that are acquired at a cost. This difference is more apparent than real – we suspect our analysis could be recast in terms of a hard-wired preference. The more substantive difference is that we introduce the concept of two types of transacting capital, while these other papers consider the presence or absence of the trait. It is the availability of two distinct methods to support contracting and cooperation, each efficient in certain circumstances, that drives our central result of a reversal of prosperity, which does not appear in those models.

Our implication of a reversal of prosperity is consistent with evidence in Acemoglu et al. (2002) that the European colonies with the highest population density in 1500 were among the poorest countries in 1995. Their interpretation of this finding is that Europeans imposed "extractive institutions" based on forced labor and oppression of native populations when they conquered dense areas, and imposed "institutions of private property" that facilitated development when they occupied sparsely populated areas. Our approach shares the implication that population density influences institutional change, but we

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[4] "The fact that agriculture and manufacture alike produced little meant that all pre-industrial societies were dominated by scarcity. … At the same time, the inadequate nature of the means of transportation and communication meant that most people lived in very local worlds. These are the two fundamental features to which we shall return time and again." (p. 14) "The peasants were hampered by the fact that they could not profitably carry their goods for sale or exchange for more than 4-5 miles or so because the costs of transport were too high (unless they could send them by sea, or, in some unusual cases, via frozen rivers or snow-packed roads.) Hence, such trade as they engaged in tended to be extremely local or, as some would term it, cellular." (Crone, 1989, p. 23).

suggest that density matters by inducing social capital externalities rather than by providing exploitive opportunities for conquerors. By tying development to underlying social conditions rather than European occupation, our analysis can account for China and patterns in parts of the world where the impact of Europeans was marginal, and allows for different patterns of development within countries.[5] And as our historical evidence shows, there is good reason to believe that local capital was central in supporting economic transactions in preindustrial societies.

Scholars have observed that economic development depends on the establishment of institutions that support market transactions (North, 1990; Greif, 2006). Our paper follows in this tradition by emphasizing the importance of transaction efficiency for development rather than production efficiency. Yet simply adopting the "right" set of formal legal and political rules does not guarantee economic success (Berkowitz et al., 2003). Institutions are not self-executing – individuals must learn how and be willing to use them. As Greif (2006, p. 380) observes, "Whether a society's institutions achieve socially good or bad outcomes, they cannot be studied independently from the broader society of which they are an independent part. … Institutions are shaped by a society's social and cultural heritage" (See also Weingast, 1997). An example we discuss below is the British government's attempt to establish Western-style courts in India in the 19th century, an effort that was unsuccessful because of social pressure on individuals to avoid the courts and rely on village elders for dispute resolution. Institutions matter in our framework, but their effectiveness in inextricably linked to a society's social capital.[6]

The paper proceeds as follows. Section 2 develops the model and characterizes the equilibria. Section 3 derives the main results. Section 4 contains our discussion of the historical evidence on local capital in the preindustrial world, and its effect on industrialization. Section 5 discusses other implications for economic development. Section 6 concludes.

2. A model with two types of transacting capital

At each point of time, there is a measure one of agents who are identical in all respects except for the type of transacting skills they have, either L-capital ("local capital") that is useful for enforcing contracts between kin and other people who are known and will be encountered again, or M-capital ("market capital") that is useful for enforcing contracts with strangers who are unlikely to be encountered again. Each individual has only one type of capital, and neither type has a direct effect on production. At the start of each period, a measure m of the population has M-capital. The distribution of L-capital and M-capital can change over time but is fixed within a period. We have in mind that a period represents a generation and their transacting skills and supporting social institutions can only change across generations. As will be seen, m is the state variable in this economy. We first characterize

production decisions in a single period taking m as given, and then introduce dynamics that endogenize the capital stock.

2.1. Assumptions of the one-period model

2.1.1. Trading partner and locations

Agents independently choose between trading with a person inside or outside their social network. Trades between people in the same network are enforced using institutions that can be accessed with L-capital, and for short are said to take place in a "village" or "locally". Trades between people that do not belong to the same social network are enforced with institutions that can be accessed with M-capital and are said to take place in the "market." The terms "village" and "market" are meant to suggest that trades between people who are in the same social network often take place locally while trades between strangers can take place at distant trade centers (such as a medieval fair), but nothing in our model precludes people in a distant city from relying on their social networks (if they meet someone from the same network) or people in villages from trading with strangers who pass through.

2.1.2. Production

Once agents have decided whether to seek a trading partner in the village or market, each is randomly matched with another in the same location and the two have the opportunity to sign a contract and "go into business" together. The production environment is a symmetric holdup model along the lines of Hart and Moore (1990), in which each party can make a "reliance investment" (Shavell, 1998). The baseline output for a business is normalized to zero. Each agent can make a relationship-specific investment at a cost k that allows him to increase output to an amount $y > k$ when it is time to produce. For example, one party might invest in identifying a low cost group of suppliers and the other might develop of a list of customers.

The effective price per unit of output is $\theta_i = e_i - t_i$, where $i \in \{L, M\}$. The effective price is different for local and market businesses for two reasons. The parameter e captures differences in the efficiency of production: because personal networks are inherently limited in scope, local traders have less diversity of partners and division of labor is limited. Ben-Porath (1980, p. 14) observed, "The transactional advantages of the family cannot compensate for the fact that within its confines the returns from impersonal specialization and division of labor are not fully realizable." We incorporate this into the model by assuming $e_L < e_M$.[7] The parameter t captures transportation and communication costs associated with trading. Local transactions are less costly in this respect: $t_L < t_M$. Without loss of generality, we normalize $e_L = 1$ and $t_L = 0$ so that $\theta_L = 1$ and the effective price in the market is $\theta \equiv \theta_M = e_M - t_M$. The purpose of decomposing price in this way is to be able to study how the economy responds to technological innovations that reduce the cost of trading over distances in an environment where division of labor favors market exchange. In particular, we have in mind that $\theta < 1$ in preindustrial times because t_M is extremely large, but $\theta > 1$ after transportation and communication costs fall beginning around the 17th century.

2.1.3. Contracts and enforcement

Each period, a sequence of actions takes place. First, parties sign a contract that stipulates each person's required investment, damages for nonperformance, and a profit-sharing arrangement. After the contract is settled, each party independently does or does not make the reliance investment. When the time for production arrives, each

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party observes whether the other party invested. The parties can seek damages if the other party was required to invest but failed to do so, and also can attempt to renegotiate the original profit-sharing arrangement. If a person has the correct type of capital for his trading environment, he can appeal to external authorities to enforce the initial contract. Specifically, a seller with L-capital in a village can call on family connections, social pressure, patron–client relations, and so on, while a seller with M-capital in the market can turn to courts, regulators, escrow companies, credit bureaus and other third party mechanisms. However, an L-person in a market lacks the knowledge to call upon the enforcement mechanisms in the market, and an M-person trading in a village is unable to use social networks to defend the contract.[8] We assume that damages are large enough that a person would invest rather than pay damages if the contract can be enforced, and the cost of seeking damages is low enough that an aggrieved party would always seek damages if possible. Together, these assumptions imply that a party will honor his contractual commitments if his trading partner has the right type of capital. After possibly renegotiating the contract, production occurs, output is sold, and the partnership ends. We assume cash flow is apportioned by dividing the surplus equally (the Nash bargaining outcome with equal weights), and each party's reservation value is zero if negotiation breaks down.

2.1.4. Interpretation and terminology

At the core of our analysis is the idea that there are two alternative systems individuals can use to support contracting and cooperation. The first, which we call L-capital, is essentially what some observers have called "social capital." Unlike one branch of the social capital literature which views these skills as inherited or otherwise hard-wired cultural traits, we posit that individuals must acquire these skills at a cost. In our approach, L-capital must be paid for by socializing (spending time in the local church, mosque, synagogue, or temple), attending family gatherings, giving gifts, forming marriage alliances, and so on. The other contracting skill, which we call M-capital, is not typically viewed as social capital.[9] Much of the literature on contracting conceives of third-party institutions as equally accessible to all once they are established. In our approach, in contrast, individuals must acquire skills to use those institutions, learning how to deal with courts, write formal contracts, and so on; individuals cannot call on third party institutions without investment in the requisite skills.[10] It is unconventional to consider these skills as a form of social capital, but we believe there is a natural parallel between learning about how to use social networks and learning how to use formal institutions – both require investments of time and other resources, and the effectiveness of the investment depends on underlying institutions (how extensive is the existing network or legal system) as well as the investments of others. Although we believe the concepts of L-capital and M-capital fit the usual definitions of human capital (at the individual level) and social capital (at the aggregate level), to avoid terminological confusion, we often refer to these skills as "transacting" capital instead.

2.2. Equilibrium production

The production arrangement for any trading pair depends on their type of capital and where they trade. The first-best outcome is for both to invest because $y > k$. We are interested in the situation where hold-up can be a problem, which is possible when $y < \frac{4}{3}k$ and $\theta y < \frac{4}{3}k$, as

discussed below, so we maintain these parameter assumptions throughout. There are three possible market pairings to consider.

Case 1 M-person meets M-person in the market. Since both parties can enforce the contract, hold-up is not a danger and they achieve the first-best. Both parties invest, yielding a surplus of $2\theta y - 2k$, and each person earns $r_{MM} = \theta y - k$.

Case 2 L-person meets L-person in the market. Because neither person has the appropriate transacting skills, the initial contract cannot be enforced and the surplus is always apportioned by renegotiation. If both parties were to invest, each would earn $\theta y - k$, as in Case 1. If only one person were to invest, the post-investment surplus would be θy, giving a return of $.5\theta y - k$ to the person who invested and $.5\theta y$ to the person who did not invest. Because the investment k is sunk, it plays no role in ex post bargaining. The person who did not invest would be better off than if he had invested because $.5\theta y < k$ given our assumption that $\theta y < \frac{4}{3}k$. The same condition also makes it optimal not to invest if the other person does not invest. Therefore, neither person invests, and each person earns $r_{LL} = 0$.

Case 3 M-person meets L-person in the market. The L-person cannot be required to invest because he is vulnerable to being held up and, as shown in Case 2, the M-person would gain from holding him up in renegotiation. The M-person is willing to invest given a large enough share of revenue because he can defend the initial contract against hold up. The surplus when only the M-person invests is $\theta y - k$ so each person earns $r_{LM} = .5(\theta y - k)$ – revenue is divided $.5(\theta y + k)$ for the M-person and $.5(\theta y - k)$ for the L-person.[11]

The return from trading in the village is determined analogously. The differences are first, that L-capital and not M-capital can be used to enforce the initial contract, and second, that the value of the final good is 1 instead of θ. So when two L-persons meet in the village, each earns $y - k$; when an L-person meets an M-person each earns $.5(y - k)$, and two M-people earn zero.

All agents prefer to trade with people who have the skills to tap the enforcement institutions available at the trading location. Thus, there is an externality associated with transacting capital. A person's type of capital affects not only his own return but also the return of his trading partner: in the market, $r_{LL} < r_{LM} < r_{MM}$. This idea that L-capital and M-capital are institution-specific distinguishes our approach from pure coordination models, like the culture model of Lazear (1995, 1999).

2.3. Equilibrium trading locations and income

We can now characterize equilibrium trading locations and income for a given m. We begin by examining the case $\theta > 1$. Let $\pi_I(L)$ and $\pi_I(M)$ denote the expected payoff for a person with I-capital who trades in the village and market, respectively, and let x denote the endogenously determined fraction of people in the market with M-capital. The payoff for an M-person trading in the market is $\pi_M(M) = x r_{MM} + (1-x) r_{LM}$. Because the most an M-person could earn in the village is $.5(y - k)$, less than the smallest payoff he can earn in the market (r_{LM}), all M-people trade in the market. M-people prefer the market because of the higher effective price and their ability to enforce contracts there. Since all M-people trade in the market, all pairings in the village are between L-people, and the expected payoff in the village is $\pi_L(L) = y - k$. A person with L-capital chooses a trading location by comparing $\pi_L(L)$ with the

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[8] We assume that market institutions cannot be used in the village. That is, people who trade locally do not write formal contracts using language that would be enforceable in a court, but rather follow practices and customs (the proverbial "sealed with a handshake") that allow interpersonal institutions to be called on. Here again, "local/village" and "market" transactions should be understood as referring to the underlying enforcement institutions more than the physical location of the meeting.

[9] Traditionally, human capital represents skills that increase productivity rather than facilitate transacting. Also unlike conventional human capital, the value of M-capital depends on the transacting capital of trading partners.

[10] In the modern economy, for instance, attending a business school imparts many of these skills.

[11] A different contract would require both parties to invest, give the L-person a fixed payment F, and make the M-person the residual claimant. The L-person would agree to this contract if and only if $F \geq k$ The M-person then earns $2\theta y - k - F$ if he invests and $.5\theta y$ if he does not invest and renegotiates, so he would agree to this contract if and only if $F \leq 1.5\theta y - k$. Given our assumption $\theta y < (4/3)k$, there does not exist an F for which the contract acceptable to both parties. We make this assumption specifically to rule out achievement of the first-best outcome so we can study a situation where hold up is a potential problem and enforcement can be valuable.

payoff he would earn in the market, $\pi_L(M) = xr_{LM}$. Since $\pi_L(M)$ is increasing in x, L-people enter the market and drive down x until their payoff is equal in the village and the market. If there are too few L-people in the economy to equalize the payoffs to L-people in the village and market, then all L-people will trade in the market ($x = 1$). Let $x_0 \equiv 2(y - k)/(\theta y - k)$ denote the fraction of M-people in the market that solves $\pi_L(M) = \pi_L(L)$.[12]

Lemma 1 (Trading locations). *Suppose $\theta > 1$. If $1 \leq x_0$ then all L-people trade in the village. If $m \leq x_0 < 1$ then L-people comprise $1 - x_0$ of the traders in the market and the rest trade in the village. If $x_0 < m$ then all L-people trade in the market.*

Because x_0 is a function of θ, Lemma 1 links trading locations to the stock of transacting capital and the productivity of the market relative to the village. For sufficiently low θ, all L-people trade in the village. As θ rises, at some point L-people find the market attractive, and they flow into the market until the returns in the market and village are equal. For sufficiently high θ, all L-people are in the market. Lemma 1 also indicates that as the number of M-people in the economy increases, more L-people choose to trade in the market.

Aggregate income is $\Pi(m) = m\pi_M(M) + (1 - m) \max\{\pi_L(L), \pi_L(M)\}$. Given that we normalize the population size to 1, Π can also be interpreted as income per capita.

Lemma 2 (Aggregate income). *Suppose $\theta > 1$. If $1 \leq x_0$ then $\Pi = (\theta - 1)my + y - k$. If $m \leq x_0 < 1$ then $\Pi = .5m(\theta y - k) + y - k$. If $x_0 < m$ then $\Pi = m(\theta y - k)$.*

Lemma 2 yields comparative statics that are useful in the analysis of long run development. We are particularly interested in how the economy responds over time when θ increases (due to a fall in t_M), which is a trigger for industrialization. For now, we observe that in the one-period model, when θ is sufficiently low ($1 \leq x_0$), no L-people trade in the market and $d\Pi/d\theta = my$. When θ is in the intermediate range ($m \leq x_0 < 1$), L-people trade in the market and the village and $d\Pi/d\theta = .5my$. The presence of L-people in the market causes the average market transaction to become less efficient than when θ is low. Symptoms include fewer contracts and less investment. When θ is high enough ($x_0 < m$), all L-people participate in the market, and again $d\Pi/d\theta = my$. Even though all L-people are in the market, there are enough M-people to prevent the deterioration in trading efficiency seen in the previous case. Lemma 2 shows that aggregate income is increasing in m, as well as θ.

Trading decisions in the one-period model are inefficient because too many L-people trade in the market. A planner would take into account the reduction in earnings of the M-people when an L-person enters the market. Thus, there is a negative externality associated with people who have the wrong type of transacting capital. Kranton (1996) also develops a model in which there are two methods to support contracts: personalized long-term relationships or anonymous third parties. In her model, reciprocal exchange compared to market exchange allows parties to economize on search costs for a trading partner but restricts their choice of goods. A trading externality similar to ours arises in Kranton's model (because traders using one type of enforcement mechanism affect the search and enforcement costs of traders using the other mechanism) suggesting that our central result below on the evolution of transacting mechanisms is likely to be robust to alternative microfoundations of the one-period game.[13]

2.4. Capital accumulation process

Now we turn to the evolution of social capital over time. The economy continues for an infinite number of periods. Each agent is an adult for one period, during which he trades and also guides the social capital accumulation of his single child. Parents can choose to send children to school, tutors, and so on to learn accounting, law, and other skills that comprise M-capital, or keep them at home working, interacting with relatives, and engaged in community activities that build L-capital. Local capital can also be created through marriage alliances (for example, in parts of rural India it was long the custom for a man to marry his niece) and giving gifts (which anthropological studies indicate is an important expenditure in many local economies Bates, 1990). In addition to the deliberate choices of the parent, capital accumulation is influenced by prevailing social conditions since children learn from watching people around them (Bisin and Topa, 2003). All else equal, a child is more likely to accumulate L-capital if he or she grows up in a community with dense personal networks than in a house on a desolate prairie.

Our capital accumulation process is an adaptation of the cultural transmission model developed in a series of papers by Bisin, Topa, and Verdier (BTV).[14] The probability a child acquires I-capital is ϕ_I defined as

$$\phi_M = hf(m); \quad \phi_L = 1 - hf(m); \tag{1}$$

where $h \in [\underline{h}, \bar{h}]$ is the amount of "time" spent learning M-capital (formal schooling), chosen by the parent, and f is an increasing, weakly concave function. The term $f(m)$ captures the effect of the population at large on the accumulation process and plays a critical role in our analysis. A child is more likely to acquire M-capital when m is large than when it is small, holding constant time spent learning M-capital. We assume that $0 < \underline{h} < \bar{h} < 1$ and $0 < f(0) < f(1) < 1$ so that both outcomes are possible; there is always some chance a child will acquire transacting skills that do not reflect the parent's preference or the social norm.[15] The assumption that both parents and the community influence the human capital accumulation of children is conventional in the literature and well grounded empirically.[16] While we assume that children can only accumulate one type of capital, the important property is actually that the investments are substitutes in equilibrium. Intuitively, time spent attending social gatherings and networking is time that cannot be used study accounting and law. The idea that family-based trust leads to weaker ties between individuals who are not related to each other was proposed by Fukuyama (1995), and Beugelsdijk and Smulders (2003) provide some evidence.

Finally, we assume that the cost per unit of h is $w > 0$, normalizing the cost of L-capital to zero. We believe it is natural to assume that M-capital is more expensive to acquire than L-capital – investment in M-capital typically requires formal schooling with a direct cost (tuition, books, etc.) and an indirect cost (because children are unable to work), while L-capital can be accumulated passively during time spent at home, possibly in household production – but our main results on how

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[12] When $\theta < 1$, the outcomes are symmetric: since local trading is more productive, all L-people trade in the village and M-people flow from the market to the village to equalize their return in the two locations.

[13] See also Dixit (2003) and Tabellini (2008) for models in which there is a personal and impersonal method available for sustaining cooperation, and somewhat similar one-period behavior of the market.

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

[15] In the BTV approach, a child is matched to a role model/teacher chosen by parents with some probability, and otherwise is matched to a random adult in the population. Our process can be expressed in BTV terms by letting d be the probability (selected by the parent) that a child is matched to an L-capital role model and accumulates L-capital. With probability $1 - d$, the child is matched to a random adult who imparts M-capital with probability $f(m)$ and L-capital with probability $1 - f(m)$. Then the child learns L-capital with probability $\phi_L = d + (1 - d)(1 - f(m))$, which boils down to our formulation when $h = 1 - d$. Unlike a standard BTV model, we have damped the social effect with the concave function f.

[16] On the influence of parents see Becker (1981), Becker and Tomes (1986), and Oreopoulos et al. (2006). On the influence of community, see Borjas (1995) for example. Later, we also report some evidence from the World Values Surveys that supports the intergenerational human capital transmission we assume.

the economy responds to a change in productive opportunities are similar for the case $w<0$ (see below). When children have abundant productive opportunities at home or in the village, or schools are scarce (as in many less developed economies), the value of w is high.

Our capital accumulation process assumes that the skills required to effectively navigate in a system of kin-based networks (L-capital) or a system of third-party contracting institutions (M-capital) take significant time to acquire, on the order of a generation. As discussed above, we have in mind that M-capital is developed to a large extent through formal education and work experience, and can take decades to master, especially for individuals who choose to specialize in transaction and contracting skills, such as lawyers and accountants.[17] Similarly, we envision L-capital accumulating through a long process of socializing and integrating with social networks. A related strand of research focuses instead on the transmission of hard-wired personal traits such as a willingness to trust or cooperate (Francois and Zabojnik, 2005; Tabellini, 2008; Guiso et al., 2008). We find it more natural to think of trust and cooperation as arising endogenously from an individual's skills and economic conditions rather than as an immutable personal trait, but we suspect that much of our analysis could be recast in terms of a "traits" model, if one were willing to view local and market skills as arising from inherent traits rather than investment in capital.

2.5. Steady states

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

$$u_I(m) = \max_h \{\pi_I(m) - hw + \beta\phi_M u_M(m') + \beta\phi_L u_L(m')\}, \qquad (2)$$

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

$$\beta f(m)(u_M(m') - u_L(m')) \gtreqless w. \qquad (3)$$

The left hand side is the marginal benefit of schooling – the difference between the value of having M-capital and L-capital in the next period – discounted by the intergenerational discount rate and the probability that social effects 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 $h = \bar{h}$ when the inequality is $>$. Because the capital accumulation process does not depend on the parent's type (except in the aggregate, through social pressure), both types of parents choose the same h for their children.[18] Therefore, the law of motion is simply $\Phi = hf(m)$.

From (2), $u_M - u_L = \pi_M(m) - \pi_L(m) \equiv \Delta$. The first order condition (3) can be rewritten in the convenient form

$$\beta f(m)\Delta(\theta) \gtreqless w. \qquad (3')$$

Fig. 1. Capital transition function. The figure shows the transition function for the fraction of the population with M-capital ($m \rightarrow m'$). The two concave curves are the transition functions conditional on low ($\underline{h}f$) and high ($\bar{h}f$) investment. The equilibrium transition function is shaded.

For the case $\theta>1$, the payoffs calculated above imply that $\Delta=.5$ $(\theta y - k)$.[19] Therefore, Δ is continuous and increasing in θ and independent of m. Since f is increasing in m, there is at most one value of m that solves $\beta f(m)\Delta(\theta) = w$. Define the critical value μ as:

$$\mu = \begin{cases} 0 & \text{if} & \beta f(0)\Delta(\theta)>w; \\ 1 & \text{if} & \beta f(1)\Delta(\theta)<w; \\ z & \text{otherwise} & \text{where } \beta f(z)\Delta(\theta) = w. \end{cases}$$

Because $h = \underline{h}$ if $m<\mu$, and $h = \bar{h}$ if $m>\mu$, the equilibrium transition function is

$$\Phi = \begin{cases} \underline{h}f(m) & \text{if} & m<\mu; \\ \bar{h}f(m) & \text{if} & m>\mu. \end{cases}$$

Fig. 1 illustrates one possibility. The light curves represent $\underline{h}f$ and $\bar{h}f$, while the dark curves represent the equilibrium Φ. There can be one or two steady states, both or which are stable, depending on the location of μ:

Lemma 3. *Suppose $\theta>1$. Define m_0 and m_1 to solve $\underline{h}f(m_0) = m_0$ and $\bar{h}f(m_1) = m_1$.*

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

Lemma 3 identifies 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 an "L-capital equilibrium" and the second an "M-capital equilibrium," although there will be agents with both types of capital in any steady state because the capital transmission process is noisy. There is a unique L-capital equilibrium for a sufficiently high μ, and a unique M-capital equilibrium for a sufficiently low μ. The definition of μ and (3') imply that an M-capital equilibrium prevails given a sufficiently large β or a sufficiently low w (and conversely for a unique L-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 affected by the underlying parameters of the one-period model through Δ: an increase in θ increases Δ, reducing μ, making the M-capital equilibrium more likely.

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[17] Greif (2006, pp. 36-37) argues that individuals are guided not only by individualistic learning, but also by implicit and tacit cognitive understandings of concepts, rules, and the expectations of others. For example, businessmen are acutely aware that etiquette, negotiations, and other business practices can vary in subtle but important ways in different countries. These cognitive understandings are often acquired through experience and immersion and can take years to master.

[18] Our formulation also implies that the parent's type does not directly influence the child's type. The property of our model that aggregate capital influences accumulation and creates inertia would be amplified if parental type mattered.
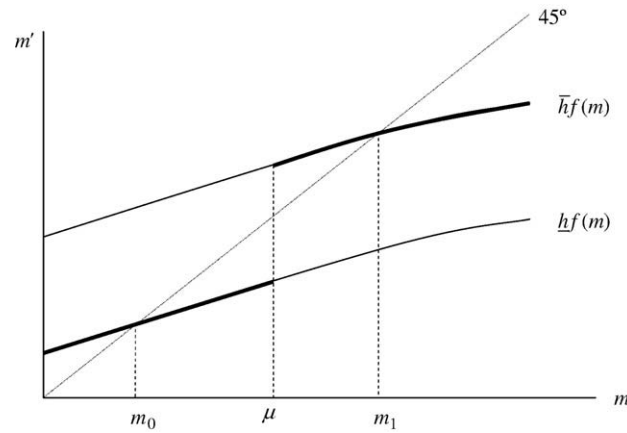
[19] For the case $\theta<1$, L-capital earns more than M-capital, so $\Delta<0$. Given the cost of accumulating M-capital, all parents choose $h = \underline{h}$

When $m_0 < \mu < m_1$, there are two equilibria. If the economy begins with $m < \mu$, it moves to the L-capital equilibrium. If the economy begins with $m > \mu$, it moves to the M-capital equilibrium. Thus, an economy that begins with abundant L-capital can be locked into the L-capital equilibrium. This economy has dynamic "increasing returns" that give rise to multiple steady states because 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). The possibility of multiple equilibria is not novel in the development literature, but seems an important feature for a model to display given growing evidence that history matters for development (Glaeser et al, 2004; Tabellini, 2007; Acemoglu and Robinson, 2006).[20]

In the multiple equilibrium case, countries in the M-capital equilibrium are richer than countries in the L-capital equilibrium. The richer M-capital countries also display greater trust in market transactions. Trust in our model is not a trait, but an equilibrium value that represents the effectiveness of capital in enforcing contracts, represented by x, the probability that a contract will be honored in the market.[21] Poor countries, on the other hand, because of their large stocks of L-capital, display a greater trust in family members and reliance on family and other local networks, a pattern that is consistent with a variety of evidence from the World Values Surveys.[22] Our emphasis on trust as an endogenous outcome of social capital conditions rather than an independent factor, is also consistent with evidence in Bertrand and Schoar (2006) that when a "family system" variable is included in national income regressions, trust is no longer a significant explanatory variable.

Lemma 3 only discusses the case where $\theta > 1$, which we view as the modern situation. When $\theta < 1$, which we view as the preindustrial situation, there is a unique L-capital equilibrium. All societies emphasize L-capital and those societies that are best at accumulating L-capital are the richest.

The analysis to this point has only characterized steady states, and therefore has little to say about development. In our view, industrialization is the process of transitioning from an L-capital equilibrium to an M-capital equilibrium, which can only happen in response to a change in parameters. We are particularly interested in how economies respond to a change in communication and transportation technologies that increase θ. Our main result, shown in the next section, is that if we begin in a world with all economies are in an L-capital equilibrium, those economies that are least prosperous initially will be the most likely to industrialize when θ increases.

3. Industrialization and stagnation

This section presents the main results by identifying the factors that determine whether an economy industrializes or stagnates when transportation and communication technology improves. We treat industrialization as the process of shifting the basis of transacting from L-capital to M-capital. We assume here that supporting market institutions develop if the individuals in the economy acquire the skills to use them, and discuss later an extension of the model where institutions must be provided at a cost.

The preindustrial period is characterized by localized production with little scope for trade between strangers. The main cause of localized production for most of human history was high transportation and communication costs, t. Since a high t implies a low θ, we study an economy that begins with $\theta < 1$ (local trade is efficient), and explore how the economy reacts when t exogenously declines, resulting in $\theta' > 1$ (market trade is efficient).[23] If the economy transitions to market exchange supported by M-capital we say it "industrializes" and if it remains focused on less efficient local transactions we say it "stagnates." We are interested in why some economies seem to take advantage of the new technologies and industrialize while others continue to operate economies based on L-capital. Although the model is somewhat involved, our first result establishes a simple necessary and sufficient condition for industrialization to follow in the wake of technological change.

Proposition 1 (Initial conditions). *Suppose initial market productivity is $\theta < 1$. If market productivity increases to $\theta' > 1$, the economy industrializes if and only if $\mu(\theta') < m_0$.*

Proof. Given that initial market productivity is $\theta < 1$, all parents choose $h = \underline{h}$, and the initial equilibrium is m_0. Observe that μ is decreasing in θ through Δ. From Lemma 3, there are three cases. First, if $\mu(\theta') > m_1$ then there is a unique steady state m_0. Second, if $m_0 < \mu(\theta') < m_1$, then there are two steady states. The economy will stay at m_0 because it begins there. Third, when $\mu(\theta') < m_0$, the unique steady state is m_1. Only in the third case will the economy jump at the point of impact to the higher transition function and transition over time from m_0 to m_1.

Proposition 1 implies that whether an economy develops depends on initial conditions. An economy heavily invested in L-capital (low m) initially will find it more difficult to industrialize in response to an improvement in market technology than an economy with little L-capital. Why don't parents teach their children M-capital when market transactions become more efficient? Mainly, because they are worried that social pressure will overwhelm their efforts and the cost of training will be wasted. Socialization effects might prevent children from learning M-capital even if they are sent to school.[24]

Proposition 1 is broadly consistent with a growing body of evidence that history matters for economic development (Glaeser et al, 2004; Tabellini, 2007; Acemoglu and Robinson, 2006). Initial conditions also matter in several other recent models, such as Francois and Zabojnik (2005), Tabellini (2008), and Guiso et al. (2008), which focus on the evolution of hard-wired individual or cultural traits. Our approach, in contrast, emphasizes schooling and the acquisition of skills (as opposed to inherited traits), and provides an explanation for Tabellini's (2007) finding that historical literacy levels (a proxy for past education) predict "culture" (measured as trust and individualism), which in turn predicts current output per capita, in a sample of European regions. In this sense, our model can be seen as providing a theory of the evolution of culture, where culture is the byproduct of the aggregate stock of L-capital and M-capital.[25]

It is interesting to note the path that a developing economy follows. Initially, all L-people trade locally. When θ increases and the country heads down the road to industrialization, L-people begin to enter the

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market. Previously, only (the few) M-people traded in the market and they were able to achieve first-best production outcomes. The entry of L-people disrupts the market, causing contracting to break down in some cases and reducing relationship-specific investment in the market. The market appears to be moving in the wrong direction and the gains from improved technology are dissipated in part by the contracting failures. Income nevertheless rises because of higher θ but not by as much as when all L-people have entered the market (Lemma 2).

Proposition 1 indicates that economies rich in L-capital will have difficulty developing, all else equal. This begs the question of why some countries would have higher levels of L-capital than others to begin with, and more subtly, whether the factor that caused the economy to be rich in L-capital might counteract the L-capital externality that inhibits development. The next result – a central implication of the paper – shows that if initial differences in the stock of L-capital are caused by differences in the transmission technology, it remains the case that economies rich in L-capital are slow to develop. The force that brings about preindustrial prosperity tends to reinforce the force that inhibits development.

Consider two economies that are identical in all respects except f. The "dense" country has f^D and the "sparse" country has f^S, where $f^D(m) < f^S(m)$ for all m: young people in the dense country are more likely to accumulate L-capital, all else equal.

Proposition 2 (Reversal). *Suppose initially $\theta < 1$ with equilibria m_0^D and m_0^S for the dense and sparse economies, respectively, and then θ increases to $\theta' > 1$. Then (a) the dense country is richer initially, and (b) the sparse country will industrialize for a lower θ' than the dense country.*

Proof. (a) From the definition, $m_0 = \underline{h} f(m_0)$, the dense economy begins with more L-capital than the sparse economy, $m_0^D < m_0^S$. With $\theta < 1$, all L-people trade in the village while M-people may trade in the market or the village. Regardless, the $\theta < 1$ analog of Lemma 2 implies that income is decreasing in m, so that $\Pi^D > \Pi^S$: the dense economy is richer initially.

(b) Now suppose θ rises to $\theta' > 1$. From Proposition 1, an economy industrializes if and only if $\mu(\theta') < m_0$. Define θ^D and θ^S to be the minimum θ' such that transition occurs in each economy. From the definition of μ, $\mu^D(\theta) \geq \mu^S(\theta)$ for all θ, and μ is nonincreasing in θ. Together with the fact that $m_0^D < m_0^S$, it follows that $\theta^D > \theta^S$.

Proposition 2 says that if countries differ in their transmission technologies, the ones that are best at transmitting L-capital are the most prosperous in preindustrial times, but the slowest to industrialize in response to technology improvements. Thus, Proposition 2 suggests that the industrialization of the West rather than China, India, and the Middle East was not an accident, but a consequence of the same factors that made the East prosperous in preindustrial times. This is a key implication of our model, and we do not believe it appears in any existing model of development. There are several alternative explanations for why some countries industrialize faster than others, but they do not typically predict a reversal of rich and poor.[26]

Proposition 2 is driven by two forces. First, people in the sparse economy are more willing to invest in M-capital since their investment is more likely to bear fruit, all else equal. Second, the sparse economy begins with more M-capital, which increases the chance that investment in M-capital will succeed. If we imagine θ gradually rising over time due to falling transportation costs, the sparse economy will transition before the dense economy. If two economies differ in their ability to accumulate L-capital, the economy with an advantage in L-capital accumulation is wealthier in preindustrial times, but requires a greater reduction in transportation costs (or, more generally, a greater efficiency gap between market and local transactions) before it will industrialize.

Our model does not explicitly consider formal legal institutions. In part this reflects space constraints, but we also believe that because institutions are not self-executing, it is as important to understand how people develop the skills to use institutions as it is to understand the processes that lead to adoption of the institutions in the first place. Simply adopting the "right" set of formal legal rules clearly does not guarantee economic success (Berkowitz et al., 2003) – individuals will not use the institutions if they lack the appropriate skills and incentives, as seen, for example, in 19th century India where natives preferred to rely on village elders instead of Western-style courts set up by the British in the 19th century.

We believe our main results would continue to appear in an extended model that incorporates endogenous institutions. We have not worked out a complete model, but to provide some intuition, consider this sketch of an extension inspired by Tabellini (2008). Suppose that each period the society can provide a legal institution, call it a court, at a per person tax cost of C. Availability of a court affects the cost of transacting in the market: without a court, the cost of enforcing a contract with M-capital is too high for contracting to occur; when a court is available, the cost of enforcement is low enough for contracting to occur (i.e. meets the assumptions in the rest of the paper). Each person favors the provision of a court if his benefit exceeds his tax liability. For example, if $\theta > 1$ and there are no courts, all trading would take place in the village. If a court was established, all M-people would trade in the market and suppose that (x_0 is such that) all L-people would remain in the village. The net gain from a court to an M-person would be $(\theta - .5)(y - k) - C$. In this case, each M-person's willingness to support provision of a court is increasing in θ, and the overall support for a court is increasing in m and θ. Following Becker (1983), political outcomes can be assumed to respond to "pressure" from the population so that the probability of a court being provided each period is also an increasing function of m and θ (a median voter model would behave in a qualitatively similar way). In this setup, formal legal institutions will tend to come about as technology improves and an economy accumulates M-capital, reinforcing the dynamics in our model without formal institutions.

4. Historical observations on the rise of the West

A central puzzle in development is why the West industrialized before China, India, or the Middle East, which were more advanced in the Middle Ages. The essence of industrialization was mechanization that allowed economies of scale in production, the replacement of human labor by inanimate energy sources, and extensive division of labor. As Adam Smith noted, division of labor is limited by the extent of the market, so a critical precondition for industrialization was improvements in transportation and communication technology that made it feasible to trade over distances. Beginning in the late Middle Ages, advances in navigation, shipbuilding, and then the steam engine allowed traders to cross oceans, sail against the wind, and travel along seas and rivers that were not previously navigable; construction of canals and railroads reduced transportation costs inland; and communication costs fell with cheaper transportation and later the spread of the telegraph.

Yet technology itself cannot easily explain why the West industrialized while the other regions stagnated. In the Middle Ages, Europe lagged China in technology (Needham, 1954–) and the Islamic Middle East in science and culture (Lewis, 1995; Greif, 2006). Moreover, technological innovations diffused across Eurasia (Needham, 1954–) so that even if one region was a leader in developing new technology, the others could have followed soon after. The question is why Europe alone was able to exploit the new technologies and reap the gains from mechanization, economies of scale, and specialization.[27]

[26] Acemoglu et al. (2002) suggest an explanation for a reversal of fortune among European colonies, but their mechanism revolves around European occupation and is not applicable to major preindustrial civilizations like China.

[27] For broad discussions of preindustrial societies and the transition to an industrialized economy see Crone (1989), North (1990), and Jones (2003). See Greif (2006) for the importance to development of formal enforcement mechanisms that support anonymous exchange.

The answer we advance here is that China, India, and the Middle East were inhibited from adopting market institutions by their heavy endowments of L-capital in the form of family and other local networks. Kinship and tribal organizations were so entrenched that incentives to develop formal, third-party enforcement mechanisms were weak. Europe left the Middle Ages with relatively less L-capital and more M-capital, making it easier to adopt market institutions. This section presents historical and anecdotal evidence in support of this hypothesis. Critically, we document the abundance of L-capital in preindustrial China, India, and the Middle East, the role of L-capital in their preindustrial prosperity, and the relative scarcity of L-capital in Europe. We then discuss how this initial distribution of L-capital and M-capital arose, highlighting the importance of geography and possibly religion.

4.1. L-capital in preindustrial societies

4.1.1. China

China in the late Middle Ages was probably the most technologically and economically advanced region of the world. Even as late as the rein of the Qianlong Emperor (1735–1796), China was able to impress the West – "China is a much richer country than any part of Europe," wrote Adam Smith (1776, Book I, Ch. XI) – and seemed to be laying the groundwork for industrialization, with growth of a merchant class, commercialization, and interregional trade. Fairbank (1992, p. 186), an eminent historian of China, wrote, "We are left with the impression that as of 1750 or so the preindustrial societies of China and Europe had much in common; indeed, they probably seemed in appearance to be more like each other than like the Western states that would emerge transformed by the Industrial Revolution."

Commercial activity in China was supported extensively by personal networks. For millennia, social relations in China revolved around the family, the defining unit of economic life. In some cases, one lineage might occupy an entire village. Much more so than in the West, joint families were common in which several sons and their wives lived together under the same roof, kinship relations were patriarchal, marriages were strictly arranged, and children were expected to respect their elders and define their interests in terms of the family rather than individually (Whyte, 1996). The dominance of the family and personal relations spilled over into commerce: "Business relations were not cold impersonal matters governed by the general principles of the law and of contract in a world apart from home and family. Business was a segment of the whole web of friendship, kinship obligations, and personal relations that supported Chinese life."[28]

Credit institutions provide an interesting example. During the Qing period (1644–1911), a variety of credit institutions flourished including silver shops that functioned as pawnbrokers, money shops engaged in the deposit and loan business, and draft banks engaged in the remittance business. In contrast to the modern banks that were forming at the time in Europe (for example, the Bank of Sweden in 1656, the Bank of England in 1694, and the Royal Bank of Berlin in 1765), the credit trade in China remained entirely in the hands of numerous traditional, small-scale financial businesses. The credit business was dominated by people from the Shanxi region. The author of a comprehensive monetary history of China notes that, "[w]hether in silver houses, pawn shops, or in making private loans, Shanxi people were numerous. So far as draft banks are concerned, 90% of them were run by people from Shanxi, and the personnel running them were also Shanxi people."[29] Credit activity was dominated by Shanxi people in part because local networks in the region provided a mechanism to prevent corruption: "Since most of their personnel were from Shanxi, if some corruption occurred, the owners (of the business) could very easily locate the malefactor's family to look into the matter."[30]

China had an impressive legal code by 1500 and the state created an empire-wide system of courts, "but it was only meant as a last resort, decent people being assembled to submit their disputes to arbitration by lineage heads, gentry, guilds, and the like."[31] Instead of courts,

"Resolution of conflicts among the people was ... achieved through various customary and nonofficial channels. Conflicts arising from business deals and contracts might be settled by craft or merchant guilds. Disputes between neighbors might be mediated by village elders, neighborhood associations, or gentry members. In particular, the heads of extended family (lineage) or clan organizations, in addition to maintaining the religious rituals of ancestor reverence, supporting schools for clan members' children, and arranging marriages, would make every effort to keep their members out of court by assuring their tax payments and settling disputes among them."[32]

Family networks served China well during the centuries when most economic activity was local. In the view of one historian (Crone, 1989, p. 173), "China is a star example of a successful civilization: the problems inherent in pre-industrial organization had here been solved with such expertise that people could do more thinking and accumulate more wealth than ever before without thereby undermining the prevailing order. China reached the pinnacle of economic development possible under pre-industrial conditions and stopped." It stopped, in our view, because the dense personal networks that kept the local economy running impeded adoption of market institutions. "China has been a stronghold of the family system and has derived both strength and inertia from it," concluded Fairbank (1992, p. 18).

4.1.2. India

India was another candidate for industrialization in the 18th century. Under the Great Mughal emperors from Akbar (1556–1605) to Aurangzeb (1658–1707), the population of the subcontinent reached 165 million (compared to 100 million in Europe, which had a greater area). India had a monetary economy in which bankers using sophisticated systems of double-entry book-keeping could move money across the subcontinent using *hundis* (bills of exchange).[33] Specialist weavers were organized into workshops that produced for export to Europe and other parts of Asia. Other exports included handicrafts and bulk grains like Bengal rice (sent to Java) and Keralan rice (sent to the Persian Gulf) (Bayly, 1985; Jones, 2003). The contrast between India under Akbar and England under Elizabeth I, whose reigns covered exactly the same years, is stark: "Akbar's empire was one of the most powerful in the world, his court one of the most sumptuous and he and his successors ruled over a civilization more glorious and spectacular than anything India had known since the Guptas, while Queen Elizabeth's kingdom, barely a great power, even in European terms, was crippled by debt and contained fewer people than modern Calcutta."[34]

Trade in India, like the other major Eastern civilizations, relied to a significant degree on social networks. Even though the central government tried to set up third party enforcement institutions, village institutions continued to dominate economic life:

"Even during the Mughal period, when the government was more centralized than at any other time before the British conquest, Mughal law enforcement seldom reached the village level. ... [T] here was little need for the Mughals to establish such a system, since more localized and customary structures for settling disputes and keeping the peace existed almost everywhere, and

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[28] Fairbank (1992, p. 186).
[29] Peng (1994, p. 832).
[30] Peng (1994, p. 837).

[31] Crone (1989, p. 158).
[32] Fairbank (1992, p. 185).
[33] For descriptions of banking and trade in Mughal India, see Habib (1964) and Mallick (1991).
[34] Roberts (1983, p. 42).

operated independently of the Mughals. Intravillage disputes and infractions of local rules would be settled within the village, and disputes among members of the same caste might be settled by the caste *panchayet* or by a member of the ruling group of the area, who might also be called upon to settle village disputes."[35]

Traditional ("indigenous") banking practices relied extensively on social networks:

"The borrowers in the informal market are 'known' parties – under continuous surveillance in the closely packed lanes of the urban wholesale markets. Each bale of cloth that goes in and out is observed by neighbors, the finance brokers and bankers among them; an expensive night on the town is reported and judged the next morning in market gossip. In contrast to the relatively anonymous world of Western businessmen, even in the larger metropolitan centers Indian businessmen live their lives in a narrow social ambit. … In fact, the people in the market not only have a 24-hour relationship, they typically have one that extends over generations. We asked one finance broker how he evaluated 'new borrowers' – he answered that he never took them. All his clients were children and grandchildren of businessmen with whom he and his father and grandfather had done business."[36]

Similarly, a detailed examination of the South Indian Chettiars during the colonial period emphasized that, "[t]he Chettiars built their commercial empire out of a complex network of interdependent family business firms. … This is not to say that their banking system resembled an economist's model of Western-style banking systems. In the Chettiar system, banking firms and other communal institutions, as well, were all tied together by relationships of territory, descent, marriage, and common cult membership."[37]

4.1.3. Islamic Middle East

Lewis (1995, pp. 177) notes that during the Middle Ages, "the commerce of the Islamic Middle East was in every way ahead of that of Europe – richer, larger, better organized, with more commodities to sell and more money to buy, and a vastly more sophisticated network of trading relations." At the apex of the Ottoman Empire, during the rule of Suleyman the Magnificent (1520–1566), the Ottoman army was better organized, equipped, and formidable than any in Europe, and European visitors were routinely impressed by the splendor of the sultan's court compared to courts of their home countries.

To a significant degree, it appears that the commerce of the Islamic states in the Middle Ages was grounded on relational transactions and enforcement mechanisms that worked through relatively small social networks. As Udovitch (1979) observed in the passage we cited in the introduction, social networks functioned well when most trade was localized, but seemed to impede the adoption of market institutions. North (1998, pp. 20–21) reached a similar conclusion: "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."[38] According to Greif (2006, p. 396), "[t]he collectivism of the [traders] reflects a broader cultural trait in Muslim society, in which large kin-based social units, such as clans, lineages, and tribes have remained central until today."

Greif offers marriage practices as evidence of the fundamentally different social structure of the Islamic world compared to Europe: "In general, consanguineous marriages – those among individuals of the same blood – constitute a means for preserving the clans, lineages, and the extended family. These marriages were and still are very common in the Muslim Middle East and North Africa. In this region, the number of marriages contracted between persons who are related as second cousins or closer is the highest in the world." Currently, such marriages account for 20 to 50% of the total in the region. In contrast, court rolls indicate that in medieval England, cousins were not even likely to interact much with each other.[39]

4.1.4. Europe

Historical accounts of Europe in the late Middle Ages, in contrast to China, India, and the Middle East, are notable for their lack of emphasis on family and tribes as frameworks for organizing society. "Tribes or clans were not central to European political and economic institutions after the late medieval period. Indeed, even by the late medieval period, Europe had already evolved toward a society with weak kin-based organizations. The tribes that had existed in the medieval period, for example, were no longer effective social structures."[40] Instead, histories emphasize the growth of proto-corporate structures such as guilds and communes:

"There is … a striking commonality between the economic and political institutions that were central to Europe's late medieval commercial expansion and those that currently prevail in its modern economy. In both periods … the basic social unit is the individual or nuclear family, rather than larger kin-based social structures, such as clans or tribes. The predominant social structure is the economic and political self-governing corporation with legitimate institutionalized processes for setting rules, laws, in which those governed by them have an influential voice. These institutional elements were and are central to the European institutions enabling impersonal exchange …"[41]

4.2. Initial stocks of L-capital

A question that naturally arises is why China, India, and the Middle East had larger investments in family and other local networks to begin with. One reason we suggest was a higher population density, which made accumulation and transmission of L-capital easier (Proposition 2). In 1600, for example, population density was 38 per square kilometer in China and 41 per square kilometer in India, compared to 22 per square kilometer in Europe.[42] Demographic evidence shows that preindustrial European households were less extensive than households in China and India (Hajnal, 1982). Europe's population density was constrained by the lower productivity of agriculture compared to China and India. Europe lacked the extensive alluvial deltas and river valleys of the East, and did not enjoy the high output per acre that came from rice culture (Bairoch, 1988).[43]

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[35] Calkins (1968-1969, p. 403).

[36] This quotation from Timberg and Aiyar (1984, p.45) describes traditional practice in the "indigenous" banking sector in the late 1970s, which still supplied about 20 percent of commercial credit at that time. The authors note that these traditional practices date back centuries in some cases.

[37] Rudner (1989, p. 428).

[38] For extended discussions of Islamic commerce, see Udovitch (1970) and Kuran (2003, 2004).

[39] The material in this paragraph is adapted from Greif (2006, p. 255 and footnote 54).

[40] Greif (2006, p. 251).

[41] Greif (2006, p. 393).

[42] Population for individual countries is from McEvedy and Jones (1978), and regional aggregates are from Klasen and Nestmann (2004). "China" is China proper, that is, excluding Mongolia, Turkestan, and Tibet. Density is harder to calculate for the Islamic Middle East. In 1600, the density was 142 per square kilometer in Egypt (using only the cultivated area of 35,000 km²), 30 per square kilometer in Iran, and 11 per square kilometer in Turkey.

[43] The idea that development is impeded by a dense population emerges from our model and the historical evidence. In contrast, an argument going back to Adam Smith suggests that density facilitates economic growth. Both views may correct: density hurts in the transition to market capital, but helps once the economy is industrialized.

Europe may have been more inclined to develop market capital in preindustrial times because of lower costs of long distance trade stemming from the geography of the region. The geography of Europe lent itself to long distance trade more than the other regions due to the unusually high ratio of navigable water routes caused by the long indented coastline and numerous navigable rivers (Jones, 2003) (although China came close, especially after completion of the Grand Canal system under the Yuan circa 1300 AD). In contrast, India was split into a large number of nearly separate markets by poor communications and the high cost of land carriage. Few navigable rivers were available and coastal shipping only connected the peripheral areas (Jones, 2003, p. 199).[44] Political and economic fragmentation is often considered the distinctive feature of Indian civilization before the British arrived (Morris, 1967).

Europeans may also have been encouraged to develop contract enforcement mechanisms that did not rely on kinship and personal networks by the fragmentation of the continent into competing states. With the exception of India before the Mughals, the other three regions were unified under a single political power for centuries preceding the Industrial Revolution. The competitive environment in Europe brought forth a variety of institutional innovations friendly to economic development as the states struggled to find revenue sources to fund their armies (North, 1998). Our model suggests that fragmentation may have had the benefit of forcing people to learn how to trade with people from different language, cultural, and political groups, much like Europeans today are likely to learn a second language.

In Europe, the formation of L-capital also may have been inhibited by the church. Greif (2006, p. 252) observes, "[f]or ideological or self-serving reasons, the church, from as early as the fourth century, weakened European kin-based social structures. This was achieved by such policies as prohibiting marriages among kin (sometimes up to the seventh degree), encouraging the donation of one's inheritance to the church, advocating consensual marriages, and condemning practices that enlarged the family, such as polygamy, divorce, and remarriage."[45] The church also fostered the development of individualistic cultural beliefs rather than the collectivist beliefs associated with Islam (Greif, 2006, section 9).

4.3. L-capital and development

Propositions 1 and 2 suggest that population density facilitates accumulation of L-capital, and regions with dense populations will be prosperous in preindustrial times but laggards in industrializing. As discussed above, this fits the general story of the world's major regions. It is also consistent with Bairoch's (1988, p. 436) observation that "[a]round 1500 the world appears to have had some fifty to sixty cities with populations of more than 100,000, and all but four lay in regions destined to become the Third World of today."

More generally, our analysis suggests that extensive kin-based social structures are likely to impede development. In this sense our model is consistent with evidence in Bertrand and Schoar (2006) that the presence of a strong family system in a country today is negatively correlated with its economic performance. According to Greif (2006, p. 253), "innate kin-based social structures larger than the nuclear family – such as ethnic groups, tribes, and clans – still dominate many countries in the Middle East." At a more micro level, there is abundant evidence that L-capital continues to cast a shadow over developing nations. For example, as much as 80% of agricultural credit in India was still provided by village moneylenders in 1950, and about 20% of

commercial credit was provided by so-called "indigenous bankers" (informal credit markets) in the late 1970s (Timberg and Aiyar, 1984; Dantwala, 1952).

5. Other implications for development

5.1. Education policy

Industrialization occurs less often than is socially optimal in our model because of an externality in the accumulation of M-capital. Consider a social planner choosing how to educate children, assuming that trading location and production decisions will be made optimally by individuals. The planner's Bellman equation is:

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

The planner chooses the same amount of schooling for each person, and the transition function for an individual remains (1). With an arbitrarily large population, the fraction of people with M-capital in the next period approaches a deterministic quantity $m' = hf(m)$ so the planner can control the evolution of m through the choice of h. The planner's first order condition is

$$\beta f W' \gtreqless w. \tag{4}$$

Condition (4) differs from the private schooling decision (3′) in the term W', which replaces Δ. Given that payoffs increase with the fraction of M-types in the market, the envelope condition is $W' = \Delta + m\pi'_M + (1-m)\pi'_L + \beta h f' W'(m') > \Delta$. The planner perceives a higher marginal benefit from investment in M-capital than private individuals perceive. Investment in schooling is too low in the decentralized outcome because private individuals do not take into account that their M-children will provide a transaction cost saving to others, and they ignore the fact that accumulation of M-capital by their children will make it easier for future generations to accumulate M-capital.

One implication is that subsidies to schooling can increase the efficiency of development. This provides a possible rationale for compulsory education in developing countries. However, the type of schooling matters: it has to be schooling that increases M-capital, education that teaches how to use market institutions. Education in which students invest in community relations, say working on community projects, would be counterproductive if it facilitates accumulation of L-capital. A related implication is that attempts to foster development by encouraging development of L-capital (community projects, local governance and decision making, etc.) may be counterproductive, particularly if they discourage individuals from accumulating M-capital.

At first glance, Japan appears to be a counterexample to our theory. The island's population was extremely dense in the preindustrial period – 49 per square kilometer in 1600, and 87 per square kilometer in the 18th century – and the importance of family there rivals China, suggesting Japan was richly endowed with L-capital. According to our model, this should have created a significant obstacle for development. Yet Japan was able to industrialize following the Meiji Restoration of 1868, joining the ranks of wealthiest Western nations in the second half of the 20th century.

We conjecture that Japan was able to industrialize despite having extensive L-capital because of its education policy. During the Meiji period, the state sought to overcome the overhang from extensive family and local networks by reducing the cost of acquiring market capital. A new Western-based education system was instituted that involved, among other things, sending thousands of students to the United States and hiring more than 3000 Westerners to teach science, mathematics, technology, and foreign languages. While education in the preindustrial period was reserved for the rich, during the Meiji period it became universal. Primary school attendance was 98% for

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[44] Until the late 1990s, when the Golden Quadrilateral expressway was constructed to link the country's four largest cities, India's most significant highway was the single-lane Grand Trunk Road that bisects the country from north to south, and rarely allowed speeds in excess of 30 miles an hour (Luce, 2007, p. 23).
[45] In contrast, Muslim inheritance law encouraged consanguineous marriages.

boys and 93% for girls in 1950. The system was also made compulsory, with a requirement of four years of schooling in 1872, six years in 1907, and 15 years by 1947.[46]

5.2. Resistance to development

Development in our approach is the replacement of L-capital with M-capital. Because L-capital is supported by and reinforces kinship, extended families, and respect for elders by the younger generation, development changes not only income but the nature of relations between parents, children, relatives, neighbors, and others in the community. Development requires unwinding the web of family and kin obligations that govern life in a traditional economy and replacing it with a social structure in which individuals have more autonomy. Individuals may fight this modernization in order to preserve their "way of life" – consumption benefits they receive from the existing structure of social relations, such as filial piety and extended families. If parents derive consumption benefits from their children investing in L-capital, the opportunity cost of accumulating M-capital in equation (3) is higher, raising the barrier for development.[47]

We believe the loss of consumption benefits from L-capital can explain part of the hostility toward "Westernization" in many traditional societies because modernization is inextricably linked to destruction of the "old ways" of life. In the 19th century, China tried without success to Westernize while at the same time preserving "Chinese values" (Fairbank, 1992). Modernization has been more successful in China recently, but it has been accompanied by complaints about the decline of filial piety among the younger generations.[48] A good illustration of resistance to modernization engendered by L-capital is the problems faced by the British when they set up Western-style courts in India in the 19th century. Individuals were pressured by village relations not to use the courts and when they did, kinship relations and the weakness of impersonal obligations of civic virtue led to pervasive problems of false witness (Rudolph and Rudolph, 1965). Even in the mid-20th century, "taking disputes to the local elders is considered to be better than taking them to the urban law courts. Disapproval attaches to the man who goes to the city for justice. Such a man is thought to be flouting the authority of the elders and therefore acting against the authority of the village."[49]

Not all L-capital generates consumption benefits, however. The Soviet Union and communist Eastern Europe industrialized using a command-and-control system that was based on L-capital in the form of personal relations with bureaucrats (Levin and Satarov, 2000, p. 120): "The system of total party control taught people to seek protection in party committees and not in courts: suing was considered to be almost an indecent act." Since people derive minimal consumption benefits from this type of village capital – indeed, it may even be disliked with its overtones of corruption – we would not expect deep-seated opposition to Westernization in post-communist states.

5.3. Other transition difficulties

Our theory also offers an explanation for some problems that arise in the transition from L-capital to M-capital. In the early stages of transition, people with L-capital enter the market. Because they do not

know how to use market institutions, the average market transaction becomes less efficient, contracting becomes cumbersome, parties avoid fixed investments and long term contracts, and property rights become less secure. In general, the market seems less efficient, which it is on average, even while it expands.

Second, although we do not model it, some L-agents will continue to trade using their L-capital to support their transactions. One manifestation of this would be contract enforcement by organized crime groups. Official corruption is another (Levin and Satarov, 2000, p. 117, 120): "It is important to note that the rapid and radical changes in Russia have occurred with the majority of state officials keeping their posts. Many of those who retain their former positions are not capable of adjusting to the new market conditions. … Not having found formal legal protection, entrepreneurs are obliged to seek special arrangements by buying unlawful services from state officials." The use of L-capital by criminal groups to support exchanges can be effective and even create the appearance of order, much like Chicago was seen by many to run efficiently under the patronage system of the first Mayor Daley. However, the scope of economic activity is limited when governed by L-capital. Economic progress will only pick up speed once transition economies shift to M-capital, which could take as long as a generation. 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.

6. Conclusion

At its core, our paper has a simple message. Kinship and other localized networks are an effective foundation for trade when most economic activity is local, and societies with advantages in forming such networks (due, for example, to geographical features that favored dense populations) were most prosperous in preindustrial times. When transportation and communication costs fell in the late Middle Ages, it became possible to trade over distances, and local networks were no longer the most effective foundation for trade. Because of externalities in the accumulation of transacting skills and institutions, those societies that were poorly endowed with networks found it the easiest to adopt organizations that allowed market transactions and thus were the first to develop. Thus, there is a natural reason for the reversal of prosperity that is at the heart of the puzzle of the rise of the West.

A central goal of our paper is to develop a model that captures these ideas. To do so, we introduce the idea that there are two alternative types of human or social capital that can be used to support contracts and cooperation: "local" capital takes the form of personal relations and social networks and is effective in supporting transactions between people in the same network; "market" capital takes the form of knowledge about commercial law, courts, and other third party institutions, and is effective in supporting transactions between strangers.[50] Both local and market capital require costly investment – in the form of time spent socializing, schooling, etc. – and take significant time to accumulate. Our model shows that externalities in the accumulation and use of this "transaction" capital make it difficult for economies to convert from one type of capital to the other type. As a result, history can matter in our model, and an economy can be "trapped" in a bad equilibrium and fail to adapt in response to exogenous technological innovation. Perhaps the strongest result that emerges from our analysis is a long run reversal of prosperity in the face of declining transportation and communication costs: those economies that were richest in preindustrial times are predicted to be the slowest to industrialize. Previous theories have suggested why initial conditions might matter for long run development, but we

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[46] *Japan: A Country Study* (1992), by the Federal Research Division of the Library of Congress, available at www.country-studies.com.

[47] In an explicit extension of the model to the case where parents prefer children to be their type, we found that Propositions 1 and 2 are preserved in spirit, except that it is even more difficult to transition from an L-capital to an M-capital equilibrium.

[48] Speaking of his 11-year-old son, a Chinese father worried, "If Huanbin receives too much Western culture, in the future he may not cherish family relations, forget his ancestors and not go back to our hometown." (Lee, 2005). See also Chen (2005).

[49] Attributed to M. N. Srinivas in Rudolph and Rudolph (1965, p. 30).

[50] Krueger and Kumar (2004a,b) use the idea of two types of (conventional) human capital to explain growth differences between Europe and the United States.

K.B. Kumar, J.G. Matsusaka / Journal of Development Economics 90 (2009) 106–119

believe reversal is a distinctive feature of our model: the very factors that lead to preindustrial prosperity hinder industrialization when technological conditions change.

Another important goal of our paper is to provide an empirical foundation for the idea that transacting capital is important for understanding the long run history of the world's major civilizations. For the most part, data to conduct statistical analyses are unavailable, but there is a huge historical literature that can be tapped and has not been mined by economics researchers. We discuss key findings from this literature and document the important of local networks for the preindustrial economies of China, India, and the Islamic Middle East, and the comparative unimportance of such networks in Europe.

The premise of our analysis is that development requires both institutions and the knowledge how to use the institutions; neither is effective on its own. This suggests that the debate over whether institutions or human capital cause growth (discussed in Glaeser et al., 2004) may be framed too restrictively. Our other premise – that there are two types of education and both must be considered to account for development – suggests that accounts of development that rely on unidimensional metrics of human capital may leave out an important part of the story.

In the service of parsimony we chose not to include in our model some factors that we think are important for development, chief among them politics. Our analysis assumes that market institutions are elastically supplied once the populace develops the skills required to use them. However, history is replete with examples where governments opposed the establishment of market institutions in order to curry favor with powerful interest groups. Our analysis suggests that members of the "older generation" may be one such group, opposing modernization in order to preserve consumption benefits from local capital, in which case politics might be driven by the stock of human and social capital itself, as in Tabellini (2007).

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