

Beyond Rosenstein-Rodan: The Modern Theory of Coordination Problems in Development

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Coordination problems—and solutions—help determine whether development occurs. More than 50 years ago Paul Rosenstein-Rodan pointed out that spillovers may cause the return to an activity to increase with the number of other actors undertaking the same or complementary activities. If such spillovers are strong enough, multiple equilibria may exist—some of them better for everyone than the alternatives, but with no tendency for market forces to lead to the better state of affairs. Modern economic theory has broadened our view of the sources of spillovers that could lead to underdevelopment as an equilibrium. This article argues for an “ecological” perspective on development, where the influences from others in one’s environment are a critical determinant of outcomes, and many interaction effects are not mediated by markets. This perspective distinguishes between deep interventions, which change underlying forces, and shallow interventions, which do not and may actually make things worse.

Paul Rosenstein-Rodan (1943) famously argued that at an early stage of development, the investments of industrializing firms in one sector may increase the profitability of other sectors throughout the economy. Simultaneous industrialization of many sectors could be profitable for all of them, but no sector would be profitable industrializing alone. As a result, an underdevelopment equilibrium was possible: even the market may not succeed in coordinating the activities needed to ensure development.

In modern terms there could be a *coordination failure*, where individuals’ failure to coordinate complementary changes in their actions leads to a state of affairs that is worse for everyone than some alternative state of affairs that is also an equilibrium.

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The obstacle to achieving the better state of affairs is not a matter of technological opportunities (or even knowledge of those opportunities), or of resources or preferences, but only of coordination.

In the 1950s the possibility of “underdevelopment equilibria” and “vicious circles of poverty” was elaborated on by many other authors (including Nurkse 1953; Leibenstein 1957; Myrdal 1957; and Hirschman 1958). But individuals are rarely convinced by those who do not address their concerns. Without a well-developed theory of the sources of spillover effects (externalities), the idea of an underdevelopment equilibrium had little influence on neoclassical economists of that period. They continued to argue that the market could coordinate the changes needed for development (Krugman 1993, 1995; Stiglitz 1993).

Advances in the past 30 years in the modeling of externalities, technological progress, and scale economies have made it possible to provide formal models that capture Rosenstein-Rodan’s insights. At the same time, information economics has shown that neoclassical theory is based on a special case—perfect, costless information—and that its implications for efficiency are no longer valid as soon as one departs in almost any respect from that special case.¹ Before these theoretical developments, most economists thought that the implication of externalities was that the economy would be slightly distorted. But we now understand that the interaction of slightly distorted behaviors of many different agents may produce very large distortions.²

Although it formalizes Rosenstein-Rodan’s basic insight, modern work on coordination problems is far from his original story in several respects:

- *Remedies through international trade.* Rosenstein-Rodan was particularly concerned with the demand effects associated with industries experiencing increasing returns. In some cases this argument loses its force when an economy is opened to international trade, as Tinbergen (1967) pointed out.
- *Other channels of spillovers.* Whereas Rosenstein-Rodan focused on demand effects, modern theory has identified many other channels of spillovers that can lead to coordination failures: spillovers in the technology of an individual agent, spillovers mediated by social or political interactions, information externalities, and spillovers when agents come together through a search process.³ The result can be coordination problems for a wide range of behaviors that matter for development. This article considers examples involving corruption, innovation, contract enforcement, and property rights.
- *Role of government.* Rosenstein-Rodan argued that there could be coordination “from above” when government planned the process of industrialization. In contrast, most recent scholars recognize that there is no such thing because government is part of the endogenous set of institutions to be explained (see Dixit 1996 and Basu 1997, 2000). Moreover, governments fail even in democracies, just as markets do.⁴ But a positive development of recent years, discussed below, is to try more limited interventions to harness the spillovers among agents, and to try to sequence policy reforms in a way that makes it more likely for good equilibria to emerge.

This article shows how developments in economic theory in the past 30 years have broadened our understanding of the channels of spillovers and made possible a new understanding—which I refer to as the “ecological perspective”—of pitfalls and opportunities in development.

The Place of Coordination Failures in Modern Economic Theory

Neoclassical Theory and the Coase Theorem

Neoclassical theory, as I use the term here, was the central economic paradigm until the mid-1970s. It studies price-mediated allocations in a setting of “complete” markets. There is a market for all commodities that are, or could be, produced. “Virtual” prices ensure that actions are taken if their social benefits exceed their opportunity costs.

Such models served as a benchmark. Neoclassical economists recognized that their models did not take into account direct interdependencies among individuals that were not mediated through markets (such as Pigou’s polluting factories). But by and large, neoclassical economists believed that these were relatively unimportant and that interdependencies that were mediated through markets (*pecuniary externalities*) did not have efficiency effects (Mishan 1971; Cheung 1973).⁵

In an extension of neoclassical economics, Coase (1960) argued that when an economy departed from the complete markets assumption of neoclassical theory, private agents would negotiate efficient outcomes (if there were no transaction costs). In that tradition, North and Thomas (1973) argued that the institutional changes in the West between 900 and 1700 were driven by changes in the scarcity values of products and factors. As with competition among firms in neoclassical economics, superior institutions ultimately eliminated inferior institutions.

Institutional Economics outside the “Straitjacket” of Neoclassical Economics

But another strand of the literature recognized that markets were inherently limited by problems of information and enforcement.⁶ There could never be the complete set of markets in goods, risks, and futures on which the efficiency results of neoclassical theory rest. And transaction costs are important, particularly in economic development. Nonmarket institutions arise in response to limits on markets, but there need not be forces that bring about efficiency.

This can be put another way. Individual actions that are privately rational need not be socially rational when the individual takes his environment as fixed. There might be another set of individual actions that would create a different environment in which a different set of actions would be an equilibrium, and that environment might be a better state of affairs. And there could be multiple equilibria in institutions, with no tendency for market forces to select the one that was best.

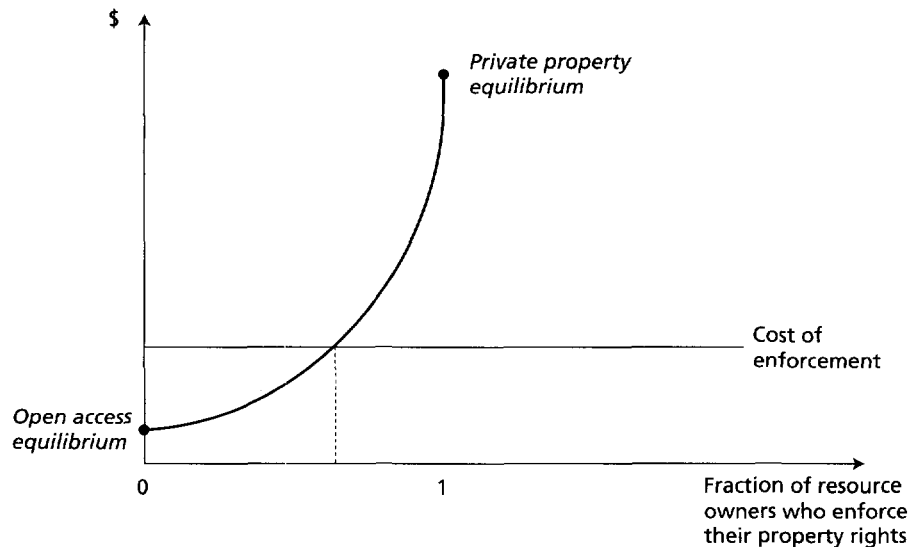
This can be illustrated in a simple way, following de Meza and Gould (1992). Suppose that property rights are well defined but that owners of forested land must incur a fixed cost—say, building a fence or hiring a patrol—to enforce their property rights over the forest. Without this private expenditure, workers will be free to use the private forests and extract income from them. By enforcing their property rights, owners can hire workers to exploit their forests and collect the resource rents.

In deciding whether to enforce their property rights, owners compare the potential rents and the enforcement cost. Rents will be larger if workers' reservation wage is lower. The reservation wage, in turn, depends on how many other owners are enforcing their property rights. As the number of owners who enforce their rights increases, the outside opportunities of workers fall, and so does the reservation wage. With lower wages, potential resource rents rise. Thus two stable equilibria may exist, indicated in figure 1. In the first, all owners enforce their property rights, wages are low, and rents are high. In the second, no one enforces, wages are high, foregone rents are low, and aggregate surplus is maximized.

As Coase (1937) emphasized, when the enforcement of property rights is costly, a market may or may not be the best allocation system. But as those working in the Coase tradition did not generally recognize, whatever the best allocation system is, a decentralized economy may not achieve it.

A general insight of recent theoretical work is that while institutions may be established to improve economic outcomes, there is no assurance that will happen. Institutions may be part of an equilibrium yet be dysfunctional. For example, Arnott and Stiglitz (1991) consider the consequences of the social institutions that arise as a result of the incomplete insurance provided by markets

Figure 1. Multiple Equilibria in the Level of Enforcement



Source: Author's illustration.

because of moral hazard. They show that informal social insurance may crowd out market insurance and lower welfare. More generally, developing countries may be caught in a vicious circle where limited market development results in large information imperfections, and these information imperfections give rise to institutions—such as informal, personalized networks of exchange (Kranton 1996)—that impede the development of markets. Banerjee and Newman (1998) show that an inefficient dualistic economic structure, where market forces govern economic exchange in one sector but not in another, can be explained as the consequence of a self-sustaining network in the informal sector. Dualism may be one equilibrium among several.

A further implication of the modern theory of coordination failures is that improvements in existing institutions—“good mutations”—may not survive if they require accompanying changes in other social institutions. For example, “if the institutional matrix rewards piracy, then [only] piratical organizations will come into existence” (North 1994, p. 361).

History Dependence and Poverty Traps

Recent historical accounts go beyond the observation that there are multiple equilibria and show that economic outcomes exhibit history dependence. History (or path) dependence means not just the obvious fact that past events may circumscribe current choices, but that past events determine and predict the decisions at all crossroads since some initial starting point. For example, after a wartime disruption of trade, an economy may undergo a structural change, develop a new system, and never return to the original one.

The distribution of wealth is one of the most important channels through which history can have potentially large, permanent effects. Here I summarize a few central ideas from a rapidly growing literature. One line of thought emphasizes political influences of wealth. Engerman and Sokoloff (1997) and Sokoloff and Engerman (2000), for example, find that the highly unequal distribution of wealth in the colonies of North and South America that practiced plantation agriculture had long-lasting effects on legal, educational, and political institutions. Another line of thought, discussed in Hoff (1994, 1996), Hoff and Lyon (1995), and Bardhan, Bowles, and Gintis (2000), emphasizes that with imperfect capital markets, poor people have limited access to credit and may be unable to enter into labor and land rental contracts that provide strong incentives for effort. For example, they may be sharecroppers instead of renters, and entrepreneurial activities may be foreclosed. Some initial distributions of wealth are associated with subsequent economic growth, but for others growth paths do not exist.⁷

History also affects outcomes by affecting beliefs. An obvious case is one where expectations are at least partly adaptive: people expect others to behave in the future as they have in the past. But even with fully rational expectations, history can cast a long shadow.

For example, an outbreak of corruption, or the revelation that some firms in an industry passed off shoddy goods as high-quality goods, can tarnish the reputation

of the whole industry and reduce the incentive of every member of the group to behave honestly in the future. Suppose that the reputation of a group member (such as an employee in an organization or a firm in an industry) depends on the member's past behavior and, because the member's track record is observed with noise, on the group's past behavior. As Tirole (1996) shows, the revelation that some group members were dishonest in the past will increase the time it takes for any agent to establish a reputation for honesty. This will reduce his incentives for honesty and may create a vicious circle of corruption: "the new members of an organization may suffer from the original sin of their elders long after the latter are gone" (p. 1).

A Radically Broadened View of Externalities and Public Goods

Coase recognized the limits imposed by transaction costs, but many of his followers did not. They tended to argue (counter to the view in Rosenstein-Rodan) that real-world externalities were hard to find. In the 1970s, the iconic example of externalities was still Meade's apple farmer and beekeeper, who each provide "unpaid factors" to the other. But Cheung (1973) found in the cases he investigated that contracts internalized these externalities. The iconic example of a public good was the lighthouse. But Coase (1974) argued that throughout much of British history, private arrangements had addressed this problem, too.⁸

Modern theory, in contrast, suggests that those working in the Coase tradition were looking for inefficiencies *in the wrong place*. The iconic examples of technological externalities—the pastoral examples and the lighthouse—are ones that contracts among the affected parties, or mergers among firms, may be able to internalize. But many other externalities are too diffuse to be amenable to private solution. They include information externalities, group reputation effects, agglomeration effects, and knowledge spillovers. They also include pecuniary externalities (Newbery and Stiglitz 1982, Greenwald and Stiglitz 1986). Pecuniary externalities often look analytically like externalities of the familiar technological sort. Recall the example above on property rights, where as more owners fenced in their forests, the return to fencing went up. In that example the spillover effects were transmitted only through the change in the wage rate.

Modern theory radically broadens our notion of spillover effects. It shows that in many cases even the set of equilibrium prices has public good properties. When spillover effects are sufficiently strong, there can exist multiple, Pareto-ranked equilibrium outcomes—each supported by some set of prices. Each individual's choices contribute to the selection of one of those equilibria, but he ignores his effect on the outcome.

"Ecological Economics"

Whereas neoclassical economics emphasizes the forces pulling toward equilibrium—and with similar forces working in all economies, all should be pulled toward the

same equilibrium—modern development economics focuses more on evolutionary processes, complex systems, and chance events that may cause systems to diverge. Thus modern theory tends to be influenced more by biological than physical models. Near the end of *The Origin of Species*, Darwin (1993 [1859]) wrote, in thinking about the Galapagos Islands:

[The plants and animals of the Galapagos differ radically among islands that have] the same geological nature, the same height, climate, etc. . . . This long appeared to me a great difficulty, but it arises in chief part from the deeply seated error of considering the physical conditions of a country as the most important for its inhabitants; whereas it cannot, I think, be disputed that the nature of the other inhabitants, with which each has to compete, is at least as important, and generally a far more important element of success. (p. 540)⁹

The economy is like an ecosystem, and Darwin was implicitly recognizing that ecosystems have multiple equilibria. Far more important in determining the evolution of the system than the fundamentals (weather, geography) are the endogenous variables, the ecological environment. Luck—accidents of history—may play a role in determining that and, thus, in the selection of the equilibrium.

The main differences between the old and new views of spillover effects are summarized in table 1. From these effects it is easy to formulate models with underdevelopment equilibria, as the next section illustrates.

Coordination Problems in Development

This section presents an overview of theories of development in which spillover effects exist and are so large that some societies may be characterized by a high

Table 1. Old and New Views of Externalities and Public Goods

	<i>Old view: Iconic examples</i>	<i>"Ecological" view</i>
Externalities	Beekeepers and apple farmers Polluting factories	Pecuniary externalities arising from: <ul style="list-style-type: none"> • Enforcement of property rights • Information spillovers • Ownership structures • Demand effects on nontradables produced with increasing returns Knowledge spillovers Externalities in contract enforcement Search externalities Social and political economy interactions The equilibrium set of prices
Public goods	Lighthouses	Group reputation Knowledge (say, that a certain technological result is feasible)

level of innovativeness, whereas others—which are intrinsically similar—are characterized by a low level. In these theories, an individual's behavior depends on the environment, and among the most important elements of the environment are the behaviors of others. If the incentive for agents to choose an action is sufficiently positively related to the number of agents who choose similar actions, then an economy can have multiple equilibria, some better for every agent than an alternative equilibrium.

Knowledge Spillovers

One way to conceptualize the research and development (R&D) that producers undertake is that it transforms known facts and accepted principles into potentially profitable new applications. In this view, the expected return to an investment in R&D increases with the stock of ideas in the public domain. If part of the outcome of private research seeps into the local public pool of knowledge, then the more research that is conducted, the larger the pool of ideas on which each producer in the community draws. (There is persuasive evidence that knowledge spillovers are strongest over short distances; see Jaffe, Trajtenberg, and Henderson 1993.) Thus one possible impact of expanded R&D is a greater incentive to invest in R&D (Romer 1986).

To analyze this situation, consider a simple model with a large number of identical producers. The profit (utility) of any producer depends on prices, the producer's level of R&D (denoted by a^i , which can be any value between 0 and 1), and the level of R&D of all others. Because I will focus on symmetric equilibria, I consider the case where all other producers choose the same level of R&D (denoted by a). Thus the profit function is written as

$$u^i = u^i[a^i; a, p(a)]$$

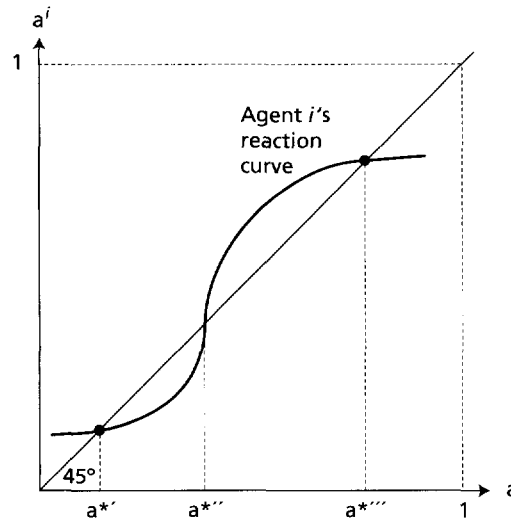
where p is the price vector (which depends on the agents' actions). Assume for each agent diminishing marginal returns to his action. Each agent chooses a level of action to maximize his utility given the actions of others. (Each agent is small enough that he ignores the direct effect of his actions on others and on p .)

Let u^i_1 represent the partial derivative of u^i with respect to the first argument (a^i). The reaction function,

$$u^i_1 [a^i; a, p(a)] = 0$$

characterizes the action that the representative agent i will take for all possible values of a selected by the remaining actors. The reaction function states that, given a , the agent cannot obtain a higher payoff by a marginal change in the level of his action. Figure 2 depicts the case where a higher action a by all other agents *will lead the remaining agent i to follow suit*. A higher action by other agents increases the marginal return to higher action by each. The actions of different agents are *strategic complements*.

Figure 2. Multiple Equilibria in a Model with Symmetric Agents



Source: Author's illustration.

The interior, symmetric equilibria are values of a^* that solve the equation

$$w_1^i [a^* ; a^*, p(a^*)] = 0.$$

Figure 2 illustrates a stable low-level equilibrium at $a^{*'}$ and a stable high-level equilibrium at $a^{*'''}$.¹⁰ By themselves, equilibrium prices do not provide the incentive needed to implement the efficient equilibrium ($a^{*''}$).

Externalities from Innovative Behavior

In some countries, individuals appear to be constantly looking around for new ideas. In other countries, they appear to resist them. These behaviors create externalities; each individual's choices may thus depend on the choices made by other people. Sah and Stiglitz (1989) formalize this idea. They construct a model of social equilibrium in which individuals can choose to behave bureaucratically or innovatively. Bureaucrats make life more difficult for innovators, and vice versa. Let x be the share of the population that chooses to be innovative. Let $U(I; x, p)$ be the utility associated with the innovative strategy, and let $U(B; x, p)$ be the utility associated with the bureaucratic strategy. Each individual chooses the activity that yields the greater utility, taking x and p as given, where p is a function of x : $p = p(x)$. Then it is easy to see that there may be multiple equilibria. If most people choose to behave bureaucratically, it may pay only a few people to behave innovatively, and vice versa. An interior equilibrium (where x is between 0 and 1) is a fraction x^* that solves the equation

$$U[I; x^*, p(x^*)] = U[B; x^*, p(x^*)].$$

Equilibria also may exist where all agents make the same choice, one entailing bureaucratic behavior if

$$U[I; 0, p(0)] < U[B; 0, p(0)]$$

and another entailing innovative behavior if

$$U[I; 1, p(1)] > U[B; 1, p(1)].$$

A slight variant of this model can be used to explore evolutionary dynamics. Assume that rather than the individual choosing to be innovative or bureaucratic, each individual has a certain fixed type that may reflect his upbringing, and agents live just one period. Different reproductive rates are a function of utility levels so that

$$d \ln x/dt = k [U(I; x, p) - U(B; x, p)]$$

for some positive constant k and time variable t . Then the set of equilibria will be the same as before, and the equilibrium on which the economy converges will depend on its history. Historical events—such as a country's opening to international competition that hurts bureaucratic firms—may move the economy from one equilibrium to the other, thereby affecting the long-run rate of technological progress.¹¹

Externalities from Rent-Seekers

A variant of the preceding model focuses on externalities from rent-seeking. Rent-seeking is broadly defined as unproductive activities that use resources and extract income from others—such as taking bribes, lobbying for preferences, and predation. For example, Murphy, Shleifer, and Vishny (1993) consider a farm economy where each individual chooses to engage in one of three activities:

- Producing a cash crop for the market, but with output from the activity vulnerable to rent-seeking.
- Producing a subsistence crop, with output not vulnerable to rent-seeking.
- Being a rent-seeker, and expropriating part of the output of cash crop producers.

An equilibrium is an allocation of the population among the three activities. Suppose that over some range, as more resources move into rent-seeking, returns to cash crop production fall faster than returns to rent-seeking. As a result, the returns to rent-seeking increase relative to production for the market. This can give rise to multiple equilibria. An economy can be in an equilibrium where the number of cash crop producers is low and returns to such production are low because the number of rent-seekers is high. But there is another equilibrium where the opposite is true. As Acemoglu (1995) emphasizes, this means that economies with the same initial opportunities may diverge over time—some towards a high growth path where

activities that increase aggregate output have high economic and social rewards, and others towards a low-growth path where they do not.

Externalities from Enforcement Mechanisms

Most development economists agree that among the most important institutions in an economy are those that enforce contracts. Greif (1994) examines cultural factors that might explain why two premodern societies—the Magribi in North Africa and the Genoese in Italy—evolved along different trajectories of social organization. To illustrate the main ideas, he presents a model with two kinds of actors: merchants and agents. Agents carry out overseas trade on behalf of the merchants and choose between two strategies: to be honest or to cheat. A merchant also chooses between two strategies: to rely on collectivist or individualist means to punish cheaters. Under *collectivist enforcement*, a merchant refuses to hire an agent known to have cheated any merchant in the collective group. Under *individualist enforcement*, a merchant punishes only agents who have cheated him. Greif shows that if a merchant believes that collectivist enforcement is likely, then it may not be in his interest to hire an agent known to have cheated other merchants. That makes such expectations self-fulfilling.

The intuition for this result is straightforward: an agent who has already damaged his reputation has little to lose by cheating again, and so will be more easily tempted to cheat his current employer than would an agent with an unblemished reputation. That makes the agent who has damaged his reputation an undesirable hiring prospect. But if the merchant believes that individualist enforcement will occur, the motive for collectivist enforcement is absent. Thus two equilibria may exist, one entailing collectivist enforcement and the other individualist enforcement. The equilibrium that is “selected” will depend on beliefs (culture).

In the short run, individualist enforcement will be more costly because it forgoes the stronger, group-level punishment mechanism. But in the long run, individualist enforcement will increase the likelihood that government takes on a role in enforcing contracts. By widening the scope of markets through which anonymous trading can occur, such institutions promote long-run growth. Greif (1994) interprets the history of the West in just such terms.

Local Externalities from Community Stakeholders

Civil society is an important vehicle for change in institutions and policies. Community participation is also a factor in the success of development projects (Isham, Narayan, and Pritchett 1995). There is persuasive evidence from developed countries that the individuals who are most likely to participate in community associations, respond to neighborhood problems, vote, and maintain their property are those with a secure property stake in their residence.¹² Since stakeholders create local spillovers, households’ decisions over stakeholding are interdependent. Hoff and Sen (2000) present a framework in which to examine the possible consequences of local spillovers from homeownership.¹³ They show that even if all households have identical preferences and

identical abilities to contribute to their communities, polarized cities can emerge—the rich in homeownership communities with high levels of civic engagement and home improvement effort, the poor in rental communities with low levels of both.

The basic story goes as follows. Every household desires to own its home because it realizes that then it will obtain a greater return on any effort it makes to improve its home and community (since it can “capitalize” the gains from these investments). However, because of capital market imperfections, a household can afford to buy its home only if its income is above a threshold. So the richer households buy their homes and expend more effort in improving their homes and communities than do the poorer households, who rent. It is in these effort choices that there exist community-wide interaction effects. The quality of a home and its future market value are higher when it is in a community where neighbors expend high effort (a spillover effect); and for an individual household, the marginal returns to effort are higher when neighbors expend high effort (a complementarity effect).

The interplay of these effects influences community formation. Compared to renters, homeowners take more out of the community and so may be willing to pay more for land in a community with a larger number of stakeholders. This case is depicted in figure 3A. A typical indifference curve of a homeowner (denoted by \bar{U}^e because he expends effort in home and community improvement) is steeper than the indifference curve of a renter (denoted by \bar{U}^n , because a renter expends negligible effort). Homeowners segregate in response to this complementarity relation, no matter how weak. (There cannot be a stable equilibrium where renters and homeowners live together in more than one community, for the homeowners would always be willing to bid more for a home in the high-home-owning community than the renter would. Homeowners and renters would continue to switch places until at least one community was completely segregated by tenure.) The outcome can be socially very inefficient. Figure 3B depicts the case where segregation of a community that was initially 50 percent homeowner results in a large loss in housing quality to renters that more than offsets homeowners’ small gains in housing quality. But land price differentials support the segregated equilibrium.

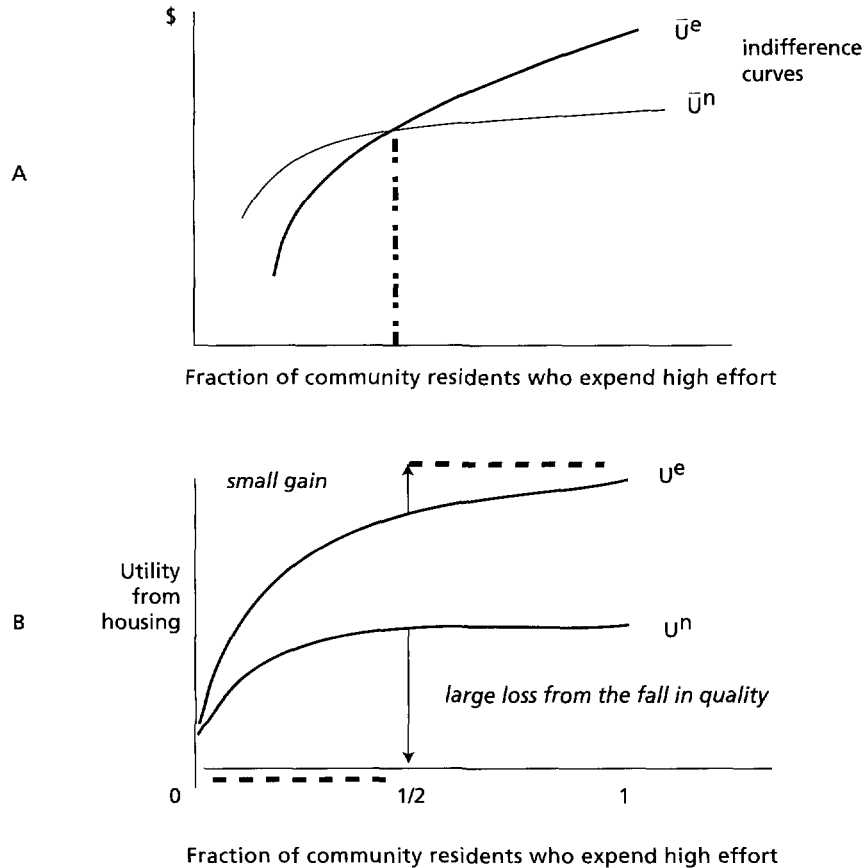
To summarize, interaction effects across community residents may cause households to self-organize into “good” and “bad” communities. The capital market frictions faced particularly by the poorer households induce in them choices over contracts and behaviors that make them less desirable as neighbors. This, in turn, induces a pattern of community formation where “bad behavior” is concentrated. The implication is that market forces together with social interaction effects can produce a class of communities that, for lack of local stakeholders, cannot respond to development opportunities.

“Big Push” Theories of Industrialization

Let us now return to the central concern of Rosenstein-Rodan: that an economy with all the preconditions for industrialization would fail to industrialize because of a failure to coordinate complementary investments. The relevance of models of

Figure 3. Stakeholding, Local Interactions, and Segregation

(A) Compared to renters, homeowners take more out of the community and so, as depicted in Panel A, they may be willing to pay more for land in a community with a larger fraction of residents who expend high effort. (B) This will lead to tenure-segregated communities, which may be socially very inefficient, as Panel B illustrates.



Source: Author's illustration.

coordination failures rests on diffuse externalities. If externalities were not diffuse, negotiation among the affected parties—or mergers among firms—should internalize them. Rosenstein-Rodan was particularly concerned with diffuse externalities through demand effects associated with industries experiencing increasing returns. But if all goods are tradable, this argument loses its force.

Thus the modern theory of underdevelopment equilibria based on demand effects focuses on nontradable inputs into production. Complicated technologies often require a variety of local inputs and producer services. Increasing returns in their production can generate external economies at the level of final (tradable) goods. An expansion of industry in an economy increases the demand for these nontradable

inputs, which lowers their costs and increases the available variety. With greater variety of intermediate inputs, production of final goods may be more efficient (for example, computer technicians who specialize in certain programs can troubleshoot those problems faster than can generalists). Thus it can be the case that when all other sectors industrialize, it pays the remaining sector to do so. But when all other sectors use a traditional technology that does not require intermediate inputs, it pays the remaining sector to do so too. An underdevelopment equilibrium can thus be sustained even when the economy is fully open to international trade (Helpman and Krugman 1985, ch. 11; Rodríguez-Clare 1996; Rodrik 1996).

There are a variety of ways to think of the nontradable inputs. One is that they represent different categories of specialized skilled labor, such as computer technicians and software designers. As Rodrik (1996, p. 2) argues, "A worker's decision to invest in a specialized skill depends both on the demand for the particular skill and the existence of complementary skills in the economy." But why can't a single firm train the labor force it needs and so internalize the externalities among the decisions of employees and between their decisions and those of the firm? Acemoglu (1997) suggests one reason. He shows that even perfect contracting within a firm and a perfect capital market may fail to internalize the social consequences of the decisions made by workers and firms. His explanation relies on search costs.

Suppose that there are two kinds of actors: firms that choose whether to adopt a new technology, and workers who choose whether to become trained to use the new technology. Training pays off only if the worker is employed by a firm that has innovated, and innovation pays off only if the firm employs a worker who has trained. There is a large and equal number of firms and workers. Each firm employs one worker and there are two time periods. In the first period, a firm is matched with one worker, they jointly make decisions on training and innovation, and there is complete contracting between them (that is, no information problems or transaction costs). At the end of the first period there is some risk of separation. If separation occurs, a firm has to find a new worker, and a worker has to find a new firm. In the second period, output is produced.

If there were no search costs in the labor market, separation between a firm and a worker would not create a loss. If separation occurred, the worker would simply move to another firm that had adopted the new technology, and all the surplus from training and investment would be captured by the firms and workers who made the investments. But suppose that search is costly. With costly search, matching will be imperfect. There is no guarantee that the firm with the investment in the new technology will be matched with the worker who has the training.

Multiple equilibria can occur because a firm's likelihood of finding the right worker depends on the thickness of the market (the number of trained workers). The worker's likelihood of finding the right employer also depends on the thickness of the market (the number of firms that have adopted the new technology). Without a risk of separation, there would be no inefficiencies because there would be no interactions with future employees or employers. The inefficiency arises because of an externality between workers and their future employers, and between firms and

their future employees, that cannot be internalized because the identity of the actor with whom one may be matched is unknown.

In contrast, Rosenstein-Rodan identified the obstacles to training with incomplete contracting between a given firm and its employee: “There are no mortgages on workers—an entrepreneur who invests in training workers may lose capital if these workers contract with another firm” (1943, p. 205). This imperfection is not necessary to generate inefficiency. Search costs create the possibility of multiple, Pareto-ranked equilibria, where some countries are characterized by a high level of innovativeness, and other countries by a low level. Training and innovation within any single firm may pay off only if a sufficiently large fraction of the population trains and innovates.

An Econometric Test of Spillovers and Local Poverty Traps in Rural China

Testing has become possible with the formalization of coordination problems and underdevelopment traps. It is beyond the scope of this article to review the empirical literature, which is still at an early stage.¹⁴ This section presents a promising line of investigation based on work using Chinese census data by Jalan and Ravallion (1998) and Ravallion and Jalan (1996, 1999).

China is a good place to examine the theory for several reasons. Because the government severely limits geographic mobility in China, and because capital mobility is also limited, factors move little in response to different opportunities across regions. Thus it may not be too unrealistic to treat the assignment of households to particular counties as random (and not the result of self-selection) and to view each household’s investment opportunities as a function of its local opportunities. Further, China exhibits remarkable regional differences in living standards and growth rates. For example, in 1990 rural poverty in the inland mountainous province of Guizhou was 7–10 times (depending on the poverty line) that in the neighboring coastal province of Guangdong—just a few hundred kilometers away.

The census data come from a 1985–90 panel of 5,600 farm households in southern China. Jalan and Ravallion estimate two models derived from optimizing behavior.¹⁵ The first is a simple expository model with just two explanatory variables for growth in household consumption (apart from household time-varying fixed effects): initial household wealth per capita (*HW*) and mean wealth per capita in the county of residence (*CW*). The equation for the growth rate, *g*, is (t-ratios in parentheses):

$$g = -0.143 - 0.0166 \ln HW + 0.0378 \ln CW$$

(5.61) (5.91) (8.13)

Counties with higher average wealth showed higher average growth in household consumption. Note also that the sum of the coefficients on *ln HW* and *ln CW* is positive, which implies that the effects are large enough to lead to divergence across counties, which is the aggregate pattern over the six-year period of the survey. Jalan and Ravallion interpret their results to mean that an increase in a county’s average wealth increases the marginal return to household wealth. This is due entirely to

geographic externalities rather than to increasing returns to wealth at the household level, since the negative coefficient on initial household wealth ($\ln HW$) implies that there are decreasing returns to capital within households.

I illustrate these results in figure 4. Let K denote the household's capital stock and \bar{K} denote the average household capital stock in the county. The econometric results suggest that the marginal productivity function is downward sloping with respect to household capital, and shifts up with an increase in the county's average level of capital. (Ignore points 1 and 2 in the figure for now.)

Figure 5 depicts the equation $g = 0$; that is:

$$g = -0.143 - 0.0166 \ln HW + 0.0378 \ln CW = 0$$

and plots the values of household wealth and county wealth from the survey. Note that every household is near the critical line. (Readers can check their understanding of the figure by noting that a typical household whose per capita wealth is $\ln 6$ yuan will enjoy rising or falling consumption over time as the household lives in a county with per capita wealth higher or lower than $\ln 6.5$ yuan.) For a large subset of the data county wealth is too low, given household wealth, to permit rising consumption. Spillover effects appear to be large enough to generate poverty traps.

Looking back at figure 4 makes it clear why a household in a poor county might have less incentive to accumulate capital than a household in a richer county. Suppose that all households in a county are identical, so $K = \bar{K}$. At point 1, household capital is low and the returns to new investment are low because other households' capital is low. But there is another equilibrium at point 2 where the reverse is true.

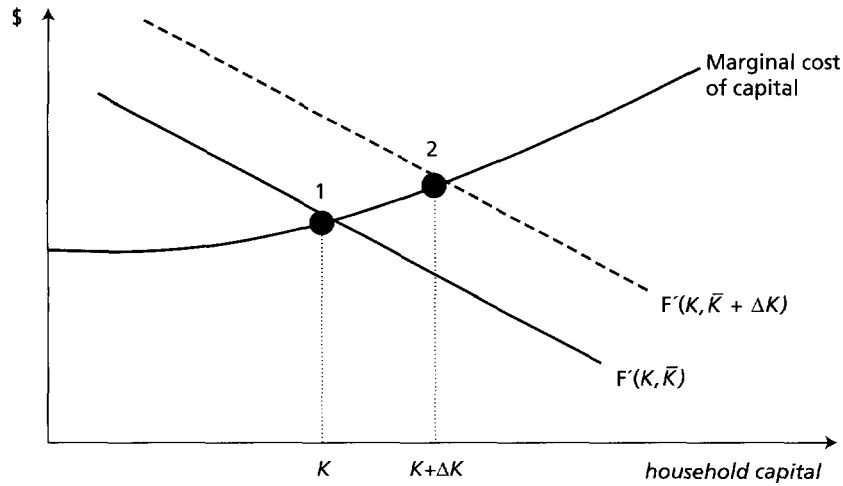
The second model that Jalan and Ravallion estimate does not use county wealth but instead the detailed county variables listed in table 2. The table shows the main results. (Dummies for county, period, mountains or plains, coast or inland, and the like have been deleted. All the regressions were run with household time-varying fixed effects.)

County-level variables related to agricultural modernization (farm machinery use per capita and fertilizer use per cultivated area) and to the share of the population employed in nonfarm commerce had highly significant positive effects on individual consumption growth rates. Holding all else constant, a one standard deviation increase in farm machinery use in an area adds 0.6 percentage points to annual consumption growth, and a one standard deviation increase in fertilizer use adds 1.5 points. By comparison, a one standard deviation increase in rural road density adds 0.7 points to annual consumption growth. Following the same basic procedure as above (setting $g = 0$ and evaluating all but one of the variables at its mean value), Jalan and Ravallion show that these spillovers are big enough to generate underdevelopment traps, consistent with the implication of their simple expository model.

Perspectives on Policy

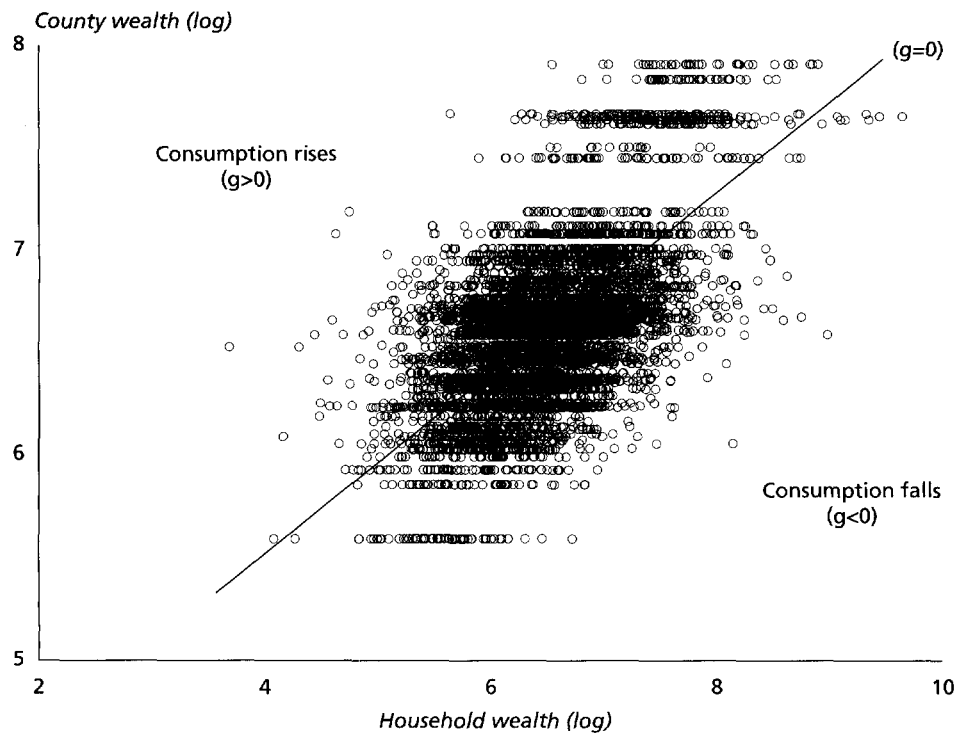
The literature on coordination problems and poverty traps suggests that development may be both easier and harder than was previously thought. Under the older

Figure 4. Marginal Productivity of Household Capital as a Decreasing Function of Household Capital and an Increasing Function of Average County Capital



Source: Author's illustration.

Figure 5. Minimum Levels of County Wealth Needed to Ensure Rising Household Consumption Given Household Wealth



Note: Wealth is measured in yuan per capita at 1985 prices.
 Source: Jalan and Ravallion 1998, figure1.

Table 2. Determinants of Local Opportunities in Rural China

Geographic variable	Coefficient estimate	t-ratio
Farm machinery use per capita (x 1,000)	0.0420 *	3.4328
Cultivated area per 10,000 people	0.0013	1.5013
Fertilizer used per cultivated area	0.0023 *	4.5678
Population density (log)	0.0160	1.6949
Illiteracy rate among people 15 and older (x 100)	0.0159	0.9000
Infant mortality rate (x 100)	-0.0313 *	-2.5295
Medical personnel per capita	0.0011 *	3.6882
Share of population employed in nonfarm commerce (x 100)	0.0067 *	2.1156
Kilometers of roads per capita (x 100)	0.0741 *	4.3033
Share of county population living in urban areas	-0.0228	-1.0254

* Significant at .05 level.

Source: Jalan and Ravallion 1998, table 2.

theory “all” one had to do to ensure development was transfer enough capital and remove government-imposed distortions. Under the new theories “all” one has to do is induce a movement out of the old equilibrium, sufficiently far and in the right direction that the economy will be drawn to a good equilibrium. While this may require fewer resources, it may require more skill. Some policies could lead the economy to a worse equilibrium. That is, even after the policies were removed, their ill effects would persist. And just as the equilibrium set of behaviors in a decentralized economy may not be Pareto efficient, one cannot assume that Pareto improvements are likely to emerge from the political process (see below).

One response to the modern literature on coordination problems has been to emphasize our limited knowledge of the activities that should be coordinated—and hence, the dangers of relying on the state to establish a coordination mechanism (Matsuyama 1995). The problem with highly centralized coordination of activities by government, as occurred in centrally planned economies, is not so much that they never experienced rapid growth but that they suffered from a lack of inventiveness and became “prematurely gray” (attributed to Jeffrey Sachs by Matsuyama 1995). For Matsuyama the problem of coordination is like “*the problem of hundreds of people, scattered in a dense, foggy forest, trying to locate one another*” (p. 134, emphasis added). Neither governments alone nor markets alone can solve it. Early writers who pointed out the right sources of coordination failures drew the wrong policy conclusions when they interpreted coordination failures as a call for a “big push” industrialization centrally planned by the state.

Another strand of the literature emphasizes the incompleteness of models of coordination failures. The selection of the equilibrium is determined outside the model by initial conditions. Making the analysis of intervention precise requires a dynamic framework. Only in a dynamic framework can one ask whether an initial coordination failure will transmit itself over time. Why wouldn’t forward-looking agents with sufficiently low discount rates adopt a path (which might include the option of changing their behavior several times) that would permit as an equilibrium a self-fulfilling move from a bad to a good equilibrium? Is there really any scope for policy?

Adsera and Ray (1998) address these questions in a setting where each agent chooses between two activities (which could be interpreted as entry into a high-technology sector that offers a high return in the long run if it obtains a critical mass, relative to the returns in a low-tech sector). They obtain a striking result: if the positive externalities from moving to the more favorable activities appear with a lag (which can be made arbitrarily short), then the final outcome depends entirely on initial conditions unless there is some gain to being the first to switch. Put another way, without some gain to being among the first to switch, each individual will rationally wait for others to switch first—so no one will switch at all! Thus initial conditions will determine the entire equilibrium outcome.

Interventions to Solve a Coordination Problem

Adsera and Ray show that there is a potential role for policy to enable an economy to break free of history. A temporary intervention can force an equilibrium—but once the equilibrium is attained, the intervention is no longer needed to support it. (This has the advantage that by the time agents have learned how to corrupt the rule-administering process, the rule may no longer be needed.) I consider four examples below.

ANTICORRUPTION PROGRAMS. As Tirole's (1996) model of group reputation, discussed above, suggests, it may be possible for a temporary anticorruption program to switch an economy from a high-corruption equilibrium (sustained by expectations of high corruption) to a low-corruption equilibrium (sustained by expectations of low corruption). An interesting historical case is the Republic of Korea in 1961. Park Chung Hee, president of South Korea from 1961 to 1979, inherited from Syngman Rhee a corrupt bureaucracy that chose policies based on self-enrichment. Within a month of seizing office, Park dismissed the top 10 percent of bureaucrats, jailed a number of the country's leading businessmen for corruption, and sent the rest of the bureaucracy to two-week training courses in management, efficiency, and public spiritedness. He then monitored the performance of economic bureaucrats and quickly shifted them from one bureau to another so that they could not develop corruption networks. These efforts transformed the government's functioning and shifted from soft to hard its interaction with the chaebols (conglomerates). Park then designed the development plan (Mason 1980).

AFFIRMATIVE ACTION. A change in a legal statute may be able to force a new equilibrium if the path to it involves revising beliefs and the revised beliefs sustain the new equilibrium. Stiglitz (1974) shows that affirmative action programs can eliminate equilibria in which productivity is unequal between groups (such as races or ethnic groups) with the same innate abilities but different histories. Productivity between groups may be unequal if, for example, individuals' preferences for education depend on their parents' education and if the resulting differences in education lead to different expectations by employers about the payoffs to training workers. Decisions by employers may then lock groups into different positions in the income

distribution. An affirmative action program changes the behavior of employers, the new behavior creates a new “history” and reveals information about the group that suffered from discrimination, and the revised information can lead to an equilibrium in which prospective employers no longer want to discriminate.

LAW BASED ON SOCIAL NORMS. The law can also serve as a coordination device by changing the extent to which individuals impose social sanctions on violators of a norm. Following Cooter (2000), suppose that a person who punishes someone for violating a social norm risks confrontation or revenge, but that this risk falls as the number of people willing to punish increases. Suppose too that enactment into statutory law of the social norm—say, to use generally accepted accounting standards—lowers the private cost of enforcement because it leads an individual to believe that other individuals will be more likely to impose social sanctions on those who violate the norm. That expectation can be self-fulfilling. There can be multiple equilibrium levels of private enforcement of social norms. Making the social norm into law can “pull in” private activity rather than crowding it out (as occurs in traditional analysis of government provision of public goods), and thus shift society from an equilibrium with little private enforcement of the norm to one with high private enforcement.

By extension, Cooter (1997) argues that a state governed by laws that mirror social norms (a rule of law state) tends to be hard to corrupt—whereas a state where laws are imposed and enforced from above (the rule-of-state law) tends to be costly, ineffective, and easily corrupted. A related view of statutory law comes from Basu (2000), who argues that the only way government-enacted law can influence an economy is to switch it from one equilibrium to another: if an outcome is not an equilibrium candidate absent the law, it is still not an equilibrium under any conceivable legal regime.

RESOURCE STOCKPILING TO DETER POACHING. It is sometimes suggested that the literature on coordination problems implies that progress is possible only if one changes a broad array of policies at the same time. But that is not the general message of the literature. The following example shows how a modest policy intervention—one well within the reach of most developing countries—can resolve a coordination problem in the exploitation of a storable open access resource, such as ivory from elephants.

Kremer and Morcom (2000) consider a setting where more intensive harvesting of open access resources leads to anticipated future scarcity of such resources, which leads to higher current prices, and so to more intensive current exploitation. In particular, elephant poaching can lead to expectations of ivory shortages and thus raise future ivory prices. Because ivory can be stored, the rise in future prices raises current prices, which increases incentives for poaching today. There may be multiple rational expectations of paths of ivory prices and of the elephant population. The paths along which extinction occurs are worse for everyone (not to mention the elephants). Government can eliminate the extinction equilibria by accumulating a sufficient stock of ivory—perhaps from sick elephants—and threatening to flood the market if the elephant population becomes dangerously low. That would drive down the price for ivory and

discourage poaching. In this way, stockpiling policy can change the anticipated price path of ivory and eliminate the extinction equilibria.

A Word of Caution: Deep versus Shallow Interventions

Public choice theory has provided considerable insights into political processes, including the problems associated with the formation of interest groups (Olson 1965, Becker 1983). For instance, free-rider problems help determine which interest groups form, just as they influence the provision of public goods more generally. Public actions affect the costs and benefits associated with interest group formation. Because the costs of forming an interest group are at least partly fixed, interventions that affect the dynamics of the political process—thereby affecting subsequent outcomes—can be thought of as “deep” interventions. They entail irreversibilities.

An example of the dynamics of the political process shows what I mean. Assume that the government is contemplating privatizing a monopoly. There are several potential buyers. All of them have an interest in ensuring that the regulations that prevail after privatization will allow them to enjoy the monopoly profits and perhaps even leverage the monopoly power further. But each, thinking that he has a small chance of winning, is unwilling to spend much to ensure this “collective” good (or bad, depending on one’s perspective). Moreover, each may face large costs in identifying the other potential buyers. Even if a potential buyer identifies the others, if they are numerous there would still be a free-rider problem, with each claiming that they will obtain high profits by increasing efficiency rather than by exploiting monopoly power.¹⁶

But once the privatization has occurred, a single party is the winner. There is no longer a collective action problem, and the winner has the incentive and resources to fight legislation imposing regulation or competition. Thus before the privatization it may be possible to pass rules that promote competition (since there is no organized resistance in the private sector) and there may be public interest groups pushing for it. The sequencing of reforms—that is, whether regulation precedes or follows privatization—matters. In one sequence, the result may be a competitive or regulated industry, with privatization leading to lower consumer prices. In another sequence, the result may be an unregulated monopoly. And the unregulated monopoly may be more efficient than it was as a public sector producer not only in producing goods, but also in exploiting consumers.

It is because history matters that interventions can be effective in the long run. A change (perturbation) to the system on one date can have permanent effects. By contrast, in neoclassical and related theories it is fundamentals—including those associated with the political process—that determine long-run outcomes.

Deep interventions need to be distinguished from shallow interventions that do not entail irreversibility. A deep reform effectively ties the hands of all parties by imposing a high fixed cost of undoing it. A shallow reform does not entail commitment and can make matters worse. Consider the unsuccessful agricultural privatization in Russia in 1991–99 (Amelina forthcoming). In 1991 Russia legalized individual farms and dismantled federal subsidies for cooperative farms. Every farmer gained the right to

become a private producer. Many analysts expected these farmers to exit the inefficient collective system in droves and produce for themselves. Yet the share of agricultural land used by cooperatives fell little: from 91 percent in 1991 to 80 percent in 1997.

When the Soviet system collapsed and cooperatives were left without federal support, district politicians had the incentive and the power to ensure a supply of inputs and subsidies to the cooperatives, just as the Soviet center had done.¹⁷ This support inhibited the potential demand for new market institutions and for suppliers capable of serving small producers. By 1997, there were still no market institutions providing farmers with storage, processing, transport, and insurance (and given the fixed costs of setting up those services, they could succeed only if the number of private farmers was high enough). But there had emerged district-level programs to sustain cooperative farms. Amelina (forthcoming) interviewed farmers to learn why they stayed within the cooperative system. Among the top two reasons in both districts she studied was that “there is no other place to work.”

The Rule of Law in the Transition Economies

Consider again privatization in the transition economies. Only under the rule of law can capitalism fully take root. But how does one establish the rule of law? Recent work suggests that coordination failures can block establishment of the rule of law. One coordination problem relates to financing the legal system (Johnson, Kaufmann, and Shleifer 1998; Roland and Verdier 1999). Another, perhaps more fundamental, coordination problem relates to political support for the rule of law. I discuss this problem here.

Many economists believed that transferring state property to private agents would automatically create strong incentives for investment and support for the rule of law. But this claim overlooked an alternative activity that might also be profitable in an environment where property rights were ill-defined—stripping assets.

Consider two contrasting images of the agents who received control of state assets after privatization:

Privatization offers an enormous political benefit for the creation of institutions supporting private property because it creates the very private owners who then begin lobbying the government . . . for institutions that support property rights. (Shleifer and Vishny 1998, p. 10)

[T]he efficient (responsible) owner . . . became one of the mythological figures of many official programs. . . . [The owner of a privatized firm] doesn't pay wages to the employees, doesn't pay taxes, is not interested in the enterprise's development, establishes subsidiaries in order to “pump out” the assets while leaving only the legal shell of the company, etc. (Radygin 1999, pp. 32–33).

Here I will sketch a model, based on Hoff and Stiglitz (2001b), that argues that the entrepreneur who builds up the value of his firm is not a mythological figure,

but rather a creature of a particular environment. He reflects the opportunities of his environment. As emphasized throughout this paper, an important part of that environment is the behavior of others. As in the case of enclosures of forests, there may be many property rights systems that are equilibria.

The easiest way to think about this problem is through a model that has a very limited set of issues associated with the definition of property rights. Consider a model where the agents are individuals with control rights over privatized property. And the conceivable set of actions is building value (entrepreneurship) or stripping assets, tunneling value out of the firm, and letting the capital stock wear out (stripping, for short). Entrepreneurs support reforms that lead to the rule of law, while asset strippers do not.¹⁹ The rule of law in this case is the enforcement of ownership rights (the most elemental property right). The probability π that the rule of law is enacted depends on the number of entrepreneurs. We assume that this probability is higher the larger the fraction of agents who support the rule of law. Then $\pi = \pi(x)$, where x denotes the share of agents who choose to strip assets, and π is a decreasing function of x .

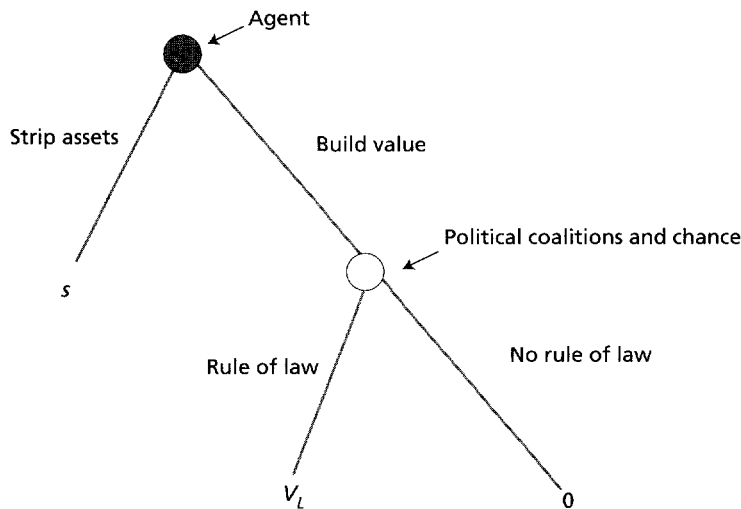
Time is divided into two periods. Asset strippers receive a payoff, denoted by s , in period 1 and nothing in period 2. Let F denote the distribution of the payoffs s across all agents.²⁰

The payoff to entrepreneurs comes in period 2. In present value terms it is V_L if the rule of law is in place and zero if it is not (figure 6). For simplicity, assume that V_L is constant and the same for all agents.

The expected payoff to building value is πV_L . Agents compare that value to their payoff from asset stripping. Thus, there is a threshold, denoted by s^* ,

$$s^* = \pi(x)V_L$$

Figure 6. Decision Tree of Agent with Ill-Defined Property Rights



Source: Author's illustration.

such that agents for whom $s > s^*$ choose to strip assets, and agents for whom $s < s^*$ choose to build value.

Any given value of the probability π maps into a unique value of the threshold s^* , and a unique fraction of agents, denoted x^* , for whom $s > s^*$:

$$x^* = 1 - F(s^*).$$

This model has elements of the entrepreneurship models discussed above. But now the spillovers are mediated *through the political process*. The higher the fraction of strippers, the smaller the support for the rule of law and therefore the higher the relative return to stripping. Thus, there can be multiple equilibria, as depicted in Figure 7.

Figure 7 is divided into two areas by the boldface curve, s^* . Below the curve, $s < s^*$ and so an agent with such a value of s is better off building value than stripping assets. Above the curve, the opposite is true. The curve $1 - x = F(s^*)$ is superimposed on the graph. These points are the payoffs to asset stripping of the $1 - x^{\text{th}}$ percentile of the population. The figure illustrates the special case where every individual would be better off as an entrepreneur under the rule of law than as an asset stripper. At $x = 0$, even the agent with the highest value of stripping assets, denoted \hat{s} , is better off building value than stripping assets: $\pi(0)V_L > \hat{s}$. Thus, if all controllers build value, the legal regime needed for investment is perceived as likely to emerge, $\pi(0)V_L$ is high, which makes $x = 0$ an equilibrium. However, at $x = 1$, even the agent with the lowest value of stripping assets, denoted \underline{s} , is better off stripping assets than building value. Thus, all controllers strip assets, the support for the rule of law is weak, $\pi(1)V_L$ is low, which makes $x = 1$ an equilibrium. In short, when few agents support the rule of law, the relative returns to building value *are* low and it *does* pay to strip assets.

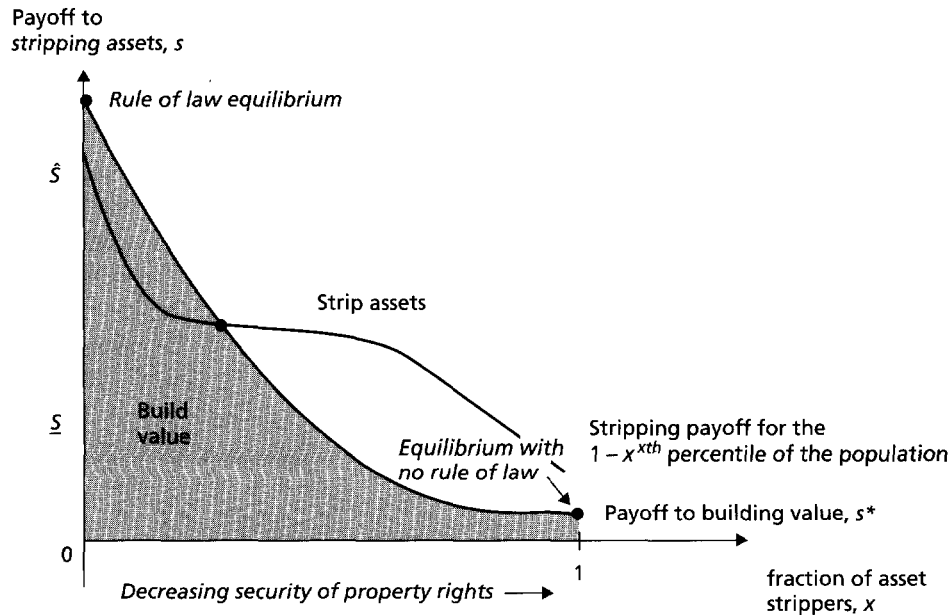
Some analysts have asked, “Why steal Gazprom (the giant Russian energy company) if you can make billions from it?” The model brings out the simple idea that if an agent’s current property rights to Gazprom are not respected in the future, then he cannot make billions from it (by normal business investments).

Conclusion

Developments in economics over the past 30 years have validated Rosenstein-Rodan’s basic intuition. A critical determinant of actions is one’s environment, one’s environment is endogenous, and an important aspect of the environment are the actions of other people. We used to believe that externalities would slightly distort the economy, but now we understand that the interaction of these slight distortions can produce large distortions. An economy may be in equilibrium in an environment with weak incentives for productivity, even though there is a better set of incentives for all individuals that would also be an equilibrium.

Modern theory has considerably extended Rosenstein-Rodan’s insight. We now see that some of the basic distinctions developed in neoclassical theory do not hold. There is no simple technology-based distinction between activities that produce externalities

Figure 7. Multiple Equilibria in Asset Stripping



Source: Author's illustration.

and those that do not, or between activities with public good properties and those with private good properties. The externalities that matter for welfare are not just direct interdependencies (Meade's beekeeper and apple farmer). There are many other classes of externalities with welfare consequences, an important example of which are those that arise in purely price-mediated interactions. Reflecting history, beliefs, and chance, certain behaviors are rewarded, others are not. Rewarded behaviors tend to increase relative to others, and that may further increase the rewards to those behaviors. Initial differences in circumstances or beliefs may not just persist, but be magnified over time.

In this view development policy is both easier and harder than before. It is easier because there is generally slack. A lack of resources need not be the fundamental constraint on development. A temporary policy intervention or seemingly minor shock may produce discontinuous change. But policy is harder because there is no single, easily identifiable source of failure waiting to be resolved.²¹ Development is not ensured by free markets and international trade, the transfer of capital, or the emergence of an entrepreneurial class. In some environments the entrepreneurial class becomes entrepreneurs to achieve predatory goals! Development requires complementary changes in the behavior of agents that not even the market can coordinate. Certain policies—policies that change beliefs, legal reforms, and the sequencing of policies—may contribute to coordinated changes to shift an economy to a better equilibrium.

Finally, there is an important difference between shallow interventions—which do not change the incentives of key players and so may fail to improve matters—and deep interventions—which entail irreversibilities. The sequencing of reforms

may make the difference between a deep intervention and a shallow one, as with privatization and anticorruption efforts.

Thus multiple equilibria, some with high incomes and others with low incomes, can result from strategic complementarities—an intellectually exciting idea with potentially enormous applications. Consider the simple adage, “If a man can . . . make a better mousetrap than his neighbor, though he builds his house in the woods, the world will make a beaten path to his door.”²² Can strategic complementarities matter even here? From the perspective of the literature reviewed in this article, the outcome predicted by the adage might still require that individuals expect that there will be enough users to make services in mousetrap repair affordable and search costs for those services low, that there be political support for property rights in mouse-traps, that infrastructure sufficiently restrict the free movement of mice so that individuals have an incentive to buy their own mousetraps, and that there be a means for the disposal of dead mice.

The basic lesson from this literature is that externalities arise in many economic and social interactions and can give rise to coordination failures. Neither the market alone nor government alone can solve them. There are many misguided incentives in the private sector. There are different misguided incentives in the public sector. But it need not be that the misguided government cannot correct the misguided private sector. There may be a social equilibrium in which forces are balanced in a way that is Pareto improving relative to one in which the government’s hands are completely tied—and certainly better than one in which the private sector’s hands are completely tied.

Notes

1. This article uses the term *neoclassical theory* as short-hand for models that postulate rational agents who interact through a complete set of perfectly competitive markets. This narrow definition is for convenience only. There is no consensus on the scope of this term, which is sometimes used broadly to include any “systematic exploration of the implications of rational behavior in economics” (Laffont 1989, p. 6). In that broad sense all the models discussed in this article, except for one evolutionary model, are neoclassical, and information economics represents an intellectual revolution within neoclassical theory (Stiglitz 2001).

2. This can occur if there are agents for whom the incentive to choose an action is positively related to the total number of agents who choose that action—formally, there are *strategic complementarities*. Hoff and Stiglitz (2001a, appendix B) provide a simple mathematical taxonomy of models with *strategic complementarities*. Haltiwanger and Waldman (1991) show that a variety of phenomena in industrial organization and macroeconomics can be understood in terms of a framework where some agents are responsive to others’ actions, and some are not. Cooper (1999) surveys macroeconomic models with strategic complementarities.

3. Another channel of spillovers, outside the scope of this article, arises when one person’s preferences depend on another person’s preferences, as in *role model* effects. These effects can also give rise to coordination failures: the value placed on conformity can lead each individual to choose an action because others do. Yet because of intragroup interactions, another group with identical intrinsic characteristics can exhibit different behaviors that make all individuals better off. Durlauf (1999) illustrates this idea formally.

4. Besley and Coate (1998, pp. 151–52) provide a definition of political failure that is parallel to that of market failure. One begins in each case by defining technologically feasible utility allocations. For political failure, this reflects available policy instruments such as taxes,

transfers, and investments. Political institutions are then modeled. By analogy with market failure, a political failure occurs when equilibrium policy choices result in an outcome where it is technologically feasible (given available tax and transfer instruments, information, and so on) to implement a Pareto-improving policy, but that policy will not be an equilibrium choice.

5. In an economy with complete markets, pecuniary externalities correspond only to a movement from one Pareto efficient outcome to another. Such externalities give rise to changes in distribution that net out: gains by agents whose prices increase are exactly offset by losses to agents who must pay higher prices. There are no efficiency consequences from the allocation effects of price changes because equilibrium prices are always equated to marginal costs and benefits. But in an economy with incomplete markets, pecuniary externalities generally do not net out. A general framework is provided in Greenwald and Stiglitz (1986). One application of that idea (Hoff 1998) shows that in an economy where lenders cannot distinguish among borrowers who differ in their probability of default, pecuniary externalities from an improvement in technology can dissipate some, all, or more than all of the gains from the technological change. This occurs if the marginal borrower produces negative expected value (getting an implicit subsidy from the lower-risk, higher-quality borrowers). As the technological change induces the entry of marginal borrowers, the interest rate rises to reflect the lower average borrower quality, which hurts all borrowers.

6. Whereas most authors are associated with one strand or the other, Douglass North's work helped advance both. North's early work was in the Coasean tradition and pioneered its application to economic history. North's later work disparages prospects for understanding economic history as a more or less inevitable movement toward more efficient institutions: "Throughout most of history, the experience of the agents and the ideologies of the actors do not combine to lead to efficient outcomes" (North 1990, p. 96; see also North 1994). I owe to North the metaphor of the straitjacket (from his unwritten comments at a May 1999 World Bank conference, "Frontiers of Development Economics").

7. The literature on the relationship between wealth distribution and growth in economies with imperfect credit markets includes Galor and Zeira (1993), Banerjee and Newman (1993), Aghion and Bolton (1997), Piketty (1997), and Mookherjee and Ray (1998, 1999).

8. In a rejoinder to Coase (1974), van Zandt (1993) notes that even the early lighthouses in Britain did not operate in the "pristine 'private' world," but relied on government intervention to fix rates, grant monopolies, and collect user fees (p. 56).

9. Darwin (1993 [1859]) devotes two chapters to this idea (chs. 12 and 13).

10. An unstable equilibrium is one where the reaction curve is steeper than the 45 degree line.

11. For recent examples of evolutionary approaches to individual characteristics, see Bowles (1998), Fershtman and Weiss (1998), and Francois and Zabojnik (2000).

12. Hoff and Sen (2000) survey the evidence.

13. We focus on the example of owning vs. renting, but other applications offer a choice between obtaining a formal ownership title vs. an informal one, or holding secure vs. insecure rights to property.

14. See, for example, Manski (2000), Azariadis and Drazen (1990), and Easterly and Levine (2000).

15. The key equilibrium condition equates the intertemporal marginal rate of substitution with the marginal product of household capital, which is a function of the initial endowment of household capital and the stock of capital in the county. The econometric analysis then tests the hypothesis that this function is decreasing in household capital and increasing in county capital.

16. Palfrey and Rosenthal (1984) present a model in which the larger is the number of potential beneficiaries of a discrete public good, the less likely the public good is to be supplied.

17. Amelina's comparison of two districts finds that this was more likely in the district where agriculture played a bigger role in the economy. In that district most politicians had risen through the ranks of the cooperative system. They had mastered the ability to transfer funds to and from the cooperatives and had a large political stake in meeting cooperatives' needs.

18. In practice a productive entrepreneur can always find ways of self-dealing. Even in developed economies there are well-known opportunities for tunneling (Johnson, La Porta, Lopez-de-Silanes, and Shleifer 2000). But there are tradeoffs between the two strategies: suppliers, minority shareholders, and employees will ultimately refuse to do business with a firm that defrauds them. Black, Kraakman, and Tarassova (2000) provide many examples of these tradeoffs faced by privatized Russian firms.

19. Black, Kraakman, and Tarassova (2000) provide extensive evidence for Russia of the asset strippers' flagrant use of the political process to undermine the rule of law.

20. There are many possible reasons for differences in s across agents who do not differ in terms of V_L . Asset stripping possibilities are greater in extractive sectors than in manufacturing. Among extractive industries, stripping possibilities are greater in firms where the capital investments needed for extraction are already in place. They are also greater where agents are able to collude with bureaucrats or to loot state banks, where the firms whose assets the agents control are highly leveraged, and where there is a ready market for the assets of the firm. So, agents who face the same rewards from entrepreneurship may face different rewards from asset stripping.

21. This despite a long history in development economics of arguing that there was such a source; see Adelman (2000).

22. Attributed to Ralph Waldo Emerson by Bartlett (1980). I consider the favorable case where people know about the invention.

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