The Institutions and Governance of Economic Development and Reform

Oliver E. Williamson

Why are the ambitions of economic development practitioners and reformers so often disappointed? One answer is that development policymakers and reformers are congenital optimists. Another answer is that good plans are regularly defeated by those who occupy strategic positions. An intermediate answer is that institutions are important, yet are persistently neglected in the planning process. The article takes a bottom-up, microanalytic approach to economic development and reform. It examines the governance of contract, investment, and private ordering through the lens of transaction-cost economizing. And it assesses the efficacy of the de facto (as against the de jure) institutional environment with respect to credible commitments. In effect, institutional economists are cast in the role of archaeologists of economic reform and development—with the task of unpacking the lessons of the past to inform choices and programs for the future.

The new institutional economics has recently been invited to speak to the issues of development and reform. As it turns out, the new institutional economics offers not one but several (related) perspectives. The main divide is between the institutional environment approach, a more macroanalytic perspective concerned with the political and legal rules of the game, and the institutions of governance, a more microanalytic perspective dealing with firm and market modes of contract and organization. Although many regard the first as the more pertinent for economic development and reform, I work predominantly from the governance perspective, adopting a bottom-up rather than top-down approach to economic organization. Three propositions inform the exercise:

1. Institutions are important, and they are susceptible to analysis.
2. The action resides in the details.
3. Positive analysis (with emphasis on private ordering and de facto organization) as against normative analysis (court ordering and de jure organization) is where the new institutional economics focuses attention.

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Getting the Institutions Right

Figure 1 sketches what I see to be the salient moves that have brought us to the point where institutional economics has been invited to enter the arena. The main divide is between macroanalytic and microanalytic approaches to development and reform. Because institutional economics is concerned mainly with microanalytic matters, that is the strand of principal interest. But there would be much less incentive to turn to the microanalytic side if the macroanalytic approach had been more successful.

Development economics and industrial organization have both undergone similar three-stage progressions. Stage 1 is the aggregative or macroanalytic approach (the Harvard tradition). The neoclassical approach (the Chicago tradition) is conspicuous in stage 2. The new institutional economics does not show up until stage 3. Because it is primitive and still growing, moreover, the new institutional economics is appealed to only as a last resort. The stages are overlapping: the appearance of a new stage does not annihilate its predecessors.

An extreme version of the macroanalytic approach is what Deepak Lal calls the dirigiste dogma. It called for governments to chart and implement “a strategy” for rapid and equitable growth which attaches prime importance to macro-economic accounting aggregates such as savings, the balance of payments, and the relative balance between broadly defined ‘sectors’ such as ‘industry’ and ‘agriculture’” (Lal 1985, p. 5; emphasis added). That prescription was disappointing, and the pendulum swung in the opposite direction. Many concluded that “the most important

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**Figure 1. From Harvard to Chicago to the New Institutional Economics**

- Macro
  - Get the prices right
- Micro
  - Neoclassical
    - Get the property rights right
  - Institutional
    - Institutions more generally
      - (General) theory
        - Direct
          - Get the institutions right
        - Indirect
          - Governance/mechanisms
advice that economists can...offer is that of...[the] so-called Price Mechanist: ‘Get the prices right’” (Lal 1985, p. 107). Although eliminating tariffs, quotas, and subsidies and making markets work have a lot to recommend them, that prescription too is oversimple and poorly suited to the needs of reforming (as against developing) economies. “Getting the property rights right” seemed to be more responsive to the pressing needs for reform in Eastern Europe and the former Soviet Union.

Privatization thus became the new prescription, but as Roman Frydman and Andrzej Rapacynski (1993) conclude: “the meaning of ‘privatization’ in Eastern Europe has turned out to be complex and ambiguous. Instead of the clarification of property rights and the introduction of incentives characteristic of a capitalist society, the privatization process has so far often led to a maze of complicated economic and legal relations that may even impede speedy transition to a system in which the rights of capital are clearly delineated and protected” (p. 13). One of the problems is that conflicts developed “between the interests of insiders, intent on retaining authority over their enterprises, and the right of outside investors to acquire control” (p. 13). But the deeper problem is that getting the property rights right is too narrow a conception of what institutional economics is all about. The more general need is to get the institutions right, of which property is only one part. What does this mean?

Both Ronald Coase and Douglass North, in their 1991 and 1993 Nobel Prize lectures, speak frankly to these issues. Coase (1992) observes: “The value of including...institutional factors in the corpus of mainstream economics is made clear by recent events in Eastern Europe. These ex-communist countries are advised to move to a market economy, and their leaders wish to do so, but without the appropriate institutions no market economy of any significance is possible. If we knew more about our own economy, we would be in a better position to advise them” (p. 714). And North (1994) remarks that “polities significantly shape economic performance because they define and enforce the economic rules. Therefore an essential part of development policy is the creation of polities that will create and enforce efficient property rights. However, we know very little about how to create such polities” (p. 366).

As shown in the last node of figure 1, the idea of getting the institutions right can be viewed as an exercise in (general) theory or an exercise in the mechanisms of governance. The first tends to be more ambitious and normative, the second more partial and positive. Gordon Rausser and Leo Simon’s (1992) prescription illustrates the first of these, where they aspire to provide:

a general conceptual framework that provides an overview of the entire transition process, viewing it through a wide-angled lens. An ideal formulation would provide an exhaustive, conceptual classification of the decisions that have to be made, the players that will have to make them, the institutional structures within which decision making will take place and a set of performance criteria against which the process can be evaluated. A particularly important requirement of the ideal formulation is that it be “logically complete,” in the sense of specifying an explicit decision-making
process for dealing with "residual contingencies" not dealt with elsewhere in the formulation. (p. 270)

The transaction cost economics approach to economic organization, however, looks to partial mechanisms and works out of variations on a few key, recurring themes. Elster (1994) advises that such a strategy applies more generally: "Explanations in the social sciences should be organized around (partial) mechanisms rather than (general) theories" (p. 75). The bottom-up approach to the study of development and reform is consonant with this more modest (but more operational) treatment of the issues.

The New Institutional Economics

The new institutional economics has developed in two complementary parts, the first dealing predominantly with background conditions, the second with the mechanisms of governance. The two-part definition proposed by Davis and North (1971) is pertinent:

The institutional environment is the set of fundamental political, social, and legal ground rules that establishes the basis for production, exchange and distribution. Rules governing elections, property rights, and the right of contract are examples....

An institutional arrangement is an arrangement between economic units that governs the ways in which these units can cooperate and/or compete. It [can] provide a structure within which its members can cooperate...or [it can] provide a mechanism that can effect a change in laws or property rights. (pp. 5–6; emphasis added)

The second is what I refer to as the institutions of governance and is what transaction cost economics has been predominantly concerned with. This is the bottom-up approach to economic organization.

As it turns out, individuals are also pertinent. The schema set out in figure 2 displays how these three levels—the individual, the governance structures, and the institutional environment—relate to each other. The main effects are shown by the solid arrows. The feedback effects are shown by the dashed arrows.

Institutional Environment

The institutional environment—comprising the rules of the game—is vital to the study of economic organization. But it is easy to assign too much weight to the institutional environment and too little to the institutions of governance. The exaggerated emphasis on court ordering (by the institutions of the state) over private ordering (by the immediate parties and affiliates to a transaction) is one illustration. The propensity to emphasize de jure constitutional arrangements over de facto governance is another.
Governance

Transaction cost economics—and this article—are concerned mainly with governance. By way of overview:

- Transaction cost economics is an interdisciplinary undertaking that joins law, economics, and organization. Law and the judiciary are reflected in the constraints that originate in the institutional environment, which define the rules of the game. Organization theory is implicated through behavioral assumptions (see subsection on individuals below) and by the arrow in the governance box (in figure 2) that turns back on itself. This arrow reflects the proposition that “organizations have a life of their own,” which is to say that organizations undergo intertemporal transformations that need to be identified and factored into the analysis. Economics provides the core logic, in that the analysis works out of the “rational spirit” to which Arrow (1974, p. 17) refers. The object is to examine “incomplete contracts in their entirety.”

- Transaction cost economics is an exercise in comparative institutional analysis. The efficacy of alternative modes of organization—markets, hybrids, hierarchies, public bureaus—is examined in relation to the attributes of transactions, with which the alternative modes are aligned.

- Adaptation is the central problem of economic organization, of which two kinds are distinguished—autonomous adaptation in the market in response to price signals (Hayek 1945) and cooperative adaptation in the firm with the
support of fiat (Barnard 1938). A high-performance system will align trans-
actions with governance structures in relation to their adaptive needs
(Williamson 1991). Both investment and contracting are implicated.

Individuals

The pressing need is to describe individuals in workably realistic terms. As Herbert
Simon (1985) puts it:

Nothing is more fundamental in setting our research agenda and informing
our research methods than our view of the nature of the human beings
whose behavior we are studying. It makes a difference, a very large differ-
ence, to our research strategy whether we are studying the nearly omniscient
Homo economicus of rational choice theory or the boundedly rational
Homo psychologicus of cognitive psychology. It makes a difference to
research, but it also makes a difference for the proper design of political
institutions. James Madison was well aware of that, and in the pages of the
Federalist Papers he opted for this view of the human condition (Federalist,
No. 55): “As there is a degree of depravity in mankind which requires a cer-
tain degree of circumspection and distrust, so there are other qualities in
human nature which justify a certain portion of esteem and confidence.” A
balanced and realistic view, we may concede, of bounded human rationality
and its accompanying frailties of motive and reason. (p. 303)

Transaction cost economics expressly adopts the proposition that human cognition
is subject to bounded rationality—where this is defined as behavior “intendedly
rational, but only limitedly so” (Simon 1957, p. xxiv)—but differs from Simon in its
interpretation of the “degree of depravity” to which Madison refers. Whereas
Simon regards the depravity in question as “frailties of motive and reason,” trans-
action cost economics describes it instead as opportunism—to include self-interest-
seeking with guile.

Institutions Matter

The new institutional economics maintains that institutions matter and that institu-
tions are susceptible to analysis (Matthews 1986). The first claim is easy to assert,
but convincing demonstrations of the second have been elusive. Partly because of
this elusiveness, but also because neoclassical economics appeared to be successful
in working out of noninstitutional or preinstitutional setups, economics for a long
time proceeded as if institutions could be ignored. That has changed.

Neoclassical economics describes the firm as a production function. Although useful
for studying price and output, that approach led to contrived or mistaken interpreta-
tions of nonstandard and unfamiliar forms of contracting and organization. Confronted
with puzzling irregularities, many economists invoked a monopoly explanation: “If an
economist finds something—a business practice of one sort or another—that he does not understand, he looks for a monopoly explanation. And as in this field we are very ignorant, the number of ununderstandable practices tends to be rather large, and the reliance on monopoly explanation, frequent" (Coase 1972, p. 67).

That propensity (and the mistaken public policy ramifications that it led to) was overcome only as an organizational rather than a technological conception of the firm—the firm as governance structure—progressively took shape. As David Kreps (1990) has put it: “The [neoclassical] firm is like individual agents in textbook economics.... Agents have a utility function, firms have a profit motive; agents have consumption sets, firms have production possibility sets. But in transaction cost economics, firms are more like markets—both are arenas in which individuals can transact” (p. 96). Without preexisting market power the presumption is that nonstandard and unfamiliar business and contracting practices have the purpose and effect of economizing on transaction costs.

More than a presumption was needed, however. What is the logic of organization that informs this perspective? What are the refutable implications? Do the data line up? This is the transaction cost economics project as it was successively developed over the past twenty-five years. Without a demonstration that institutions are susceptible to analysis, the proposition that institutions matter would still be ignored.

What transpired in the field of industrial organization has parallels in the fields of comparative economic systems and development. These disciplines, however, have only recently accepted the importance of organization and institutions. Yet Oskar Lange (1938) posed the key issues more than fifty years ago:

There is also the argument which might be raised against socialism with regard to the efficiency of public officials as compared with private entrepreneurs as managers of production. Strictly speaking, these public officials must be compared with corporate officials under capitalism, and not with private small-scale entrepreneurs. The argument thus loses much of its force. The discussion of this argument belongs to the field of sociology rather than of economic theory and must therefore be dispensed with here. By doing so we do not mean, however, to deny its great importance. It seems to us, indeed, that the real danger of socialism is that of a bureaucratization of economic life, and not the impossibility of coping with the problem of allocation of resources. Unfortunately, we do not see how the same, or even greater, danger can be averted under monopolistic capitalism. Officials subject to democratic control seem preferable to private corporation executives who practically are responsible to nobody. (pp. 109-110; emphasis in original)

Considering the study of bureaucracy beyond the reach of economics ("belonging" instead to sociology), Lange was content to dismiss the argument that the burdens of bureaucracy would spell the demise of socialism with an unproved claim that the bureaucratic problems of capitalism were even more severe. The "socialist
controversy" thus reverted to an abstract assessment of the allocative efficiency properties of the socialist system, and it was generally agreed that Lange and Abba Lerner had prevailed in their dispute with Friedrich Hayek and Ludwig von Mises on the efficacy of socialism (Schumpeter 1942, pp. 167, 172; Bergson 1948, pp. 424, 435). Indeed, Lerner reportedly went to Mexico to tell Trotsky that "all would be well in a communist state if only it reproduced the result of a competitive system and prices were set equal to marginal cost" (Coase 1988).

Later analysts held that a "preinstitutional" approach to the field of comparative economic systems was a virtue. Tjalling Koopmans (1977), for example, found that he could communicate easily and effectively with his counterparts in the former Soviet Union in the technical language of activity analysis without referring to political, legal, and organizational differences: "Technology and human needs are universal. To start with just these elements has facilitated and intensified professional contacts and interactions between market and socialist countries" (pp. 264–65).

The former Soviet Union was overcome not by failures of activity analysis, however, but by the cumulative burdens of bureaucracy. The propensity within the field of comparative economic systems to eschew institutions and ex post governance in favor of technology and ex ante incentive alignment thus turned out to be fateful. Secondary effects (of a marginal-analysis kind) were emphasized at the expense of primary effects (of a discrete-structural kind). As a consequence, the salient bureaucratic differences between capitalism and socialism were obscured.

The new institutional economics is predominantly an exercise in discrete structural analysis in which alternative modes of organization—markets, hybrids, hierarchies, bureaus—are described as syndromes of related attributes (Williamson 1991; Aoki 1994; and Milgrom and Roberts 1994). The exercise, developed mainly with reference to the traditional concerns of industrial organization, has relevance also to an understanding of the bureaucratic and incentive differences between comparative economic systems.

Institutions Are Susceptible to Analysis

The new institutional economics demonstrates that institutions are susceptible to analysis by focusing on the microanalytics of contract and organization. As Kenneth Arrow (1987) puts it: "the new institutional economics movement...does not consist primarily of giving answers to the traditional questions of economics—resource allocation and the degree of utilization. Rather it consists of answering new questions, why economic institutions have emerged the way they did and not otherwise; it merges with economic history, but brings sharper nanoeconomic... reasoning to bear than has been customary" (p. 734).

Firm and Market Organization

The microanalytics of firm and market organization is developed in three parts: the transaction is the basic unit of analysis and is given dimension, the attributes that describe and distinguish alternative modes of governance are set out, and
transactions and governance structures are aligned in relation to a transaction cost-economizing purpose.

Transactions. Transaction cost economics adopts Commons's proposal (1924, 1934) that the transaction be made the basic unit of analysis. That is a critical move because it shifts attention from the orthodox focus on price and output to consider the microanalytic attributes of transactions. But the move is completed only on identifying the critical dimensions in which transactions differ. Transaction cost economics avers that the key dimensions are the frequency with which transactions recur, the uncertainties they are subject to, the degree of asset specificity, and the ease of measurement. As it turns out, asset specificity—the degree to which transactions are supported by durable, nonredeployable assets—is especially important to the governance of contractual relations.

Governance Structures. Transaction cost economics maintains that each generic mode of organization—market, hybrid, public and private bureaus—is defined by a distinctive form of contract law. Each mode also differs with respect to incentives and controls. And each implements the mix of autonomous and cooperative adaptations differently. The upshot is that each generic mode of organization is defined by an internally consistent syndrome of attributes that gives rise to distinctive strengths and weaknesses.

Discriminating Alignment. The ideal organization adapts quickly and efficaciously to disturbances of all kinds, but actual organizations experience tradeoffs. More decentralized forms of organization (markets) support high-powered incentives and display outstanding adaptability to autonomous disturbances, but they are poorly suited to cooperative adaptation. Hierarchy, by contrast, has weaker incentives and is worse at autonomous adaptation but better at cooperative adaptation.

Which mode of organization is used to organize which transactions, and why? Asset specificity \((k)\) is especially important in this. The general argument is that simple transactions require only general-purpose investment (hence \(k = 0\), although the amount of capital \(K\) may be large) and pose predominantly autonomous adaptation needs. Because the assets can be productively redeployed to alternative uses and users if any contract breaks down and because markets excel at autonomous adaptation, the market-like option is efficacious. (So firms buy rather than make, use spot contracts for labor, use debt rather than equity, eschew regulation, and so on.) Problems with markets arise as bilateral dependencies—and the needs for cooperative adaptation—build up. Markets give way to hybrids, which in turn give way to hierarchies (the organizational form of last resort) as asset specificity increases \((k > 0)\) and the needs for cooperative adaptation build up.

Development and Reform

The lessons of firm and market organization carry over to the study of development and reform. Thus in response to the question, how does one describe a high-
performance economy, transaction cost economics answers that the nature and level of investment and the characteristics of contracting are crucial. Differences between nation-states in investment and contracting, moreover, are predicted.

**Investment.** As indicated, asset specificity is the transaction attribute that most determines the mode of economic organization—in intermediate product markets (make or buy), capital markets (debt or equity), labor markets (different governance supports), regulation or deregulation (with ramifications for privatization), and the like. Transactions that pose especially severe contractual hazards, because of bilateral dependency, will either be afforded added safeguards (unified ownership of the two trading stages is one possibility) or be reformed (by shifting from a specific to a more generic technology).

Similar reasoning carries over to the economy, though an added source of investment hazard appears: the state may be the source of investment uncertainty.

Consider the matter of “takings,” defined as “constitutional law’s expression for any sort of publicly inflicted private injury for which the constitution requires payment of compensation” (Michelman 1967, p. 1165). The question is how this provision, which is not self-enforcing, is to be implemented.

Among the principled ways to implement the constitution is to appeal to political theory, of which John Rawls’s treatment of “justice as fairness” is a candidate (Michelman 1967, pp. 1218–24). But that prescription is vague and difficult to operationalize. A second way to approach the issue is from the bottom up. Given the administrative costs of paying compensation and the disincentives that arise (for future investment) if injuries go uncompensated, what attributes of the transaction are responsible for high costs of both kinds?

Transaction cost economics relates easily to this exercise. Not only are the administrative costs of paying compensation a type of transaction cost, but the demoralization costs depend very much on the characteristics of the assets. In addition, the farsighted approach to investment and the idea of “security of expectations” to which Michelman appeals are very much in the spirit of credible commitments.

Michelman (1967) joins these several concepts. He argues that if administrative costs are great, because it is very costly to establish who was adversely affected and to what degree, and if neither those who bear the loss nor interested observers will change the amount (K) or composition (k) of future investments, it would be inefficient to compensate. Administrative costs would be incurred for which there would be little offsetting benefit. But if the failure to pay compensation to losers would “demoralize” investors (both those who bear the losses and interested observers), with the result that future investment is moved to safer but less productive uses, compensation may yield net social gains despite the administrative costs.

Especially critical to an assessment of demoralization is whether the loss is perceived to be strategic rather than adventitious. Investors who perceive themselves to be strategically expropriated will view the government as malevolent. Note, moreover, that assets can be devalued not merely by seizure but also by a variety of control mechanisms—including taxation; input controls; operating requirements;
reporting requirements; rate of return limitations; price, output, and effluent controls; and other bureaucratic and oversight practices.

Investors who realize that they are disadvantaged relative to other, more favored members of society can and will adapt in a variety of ways. Thus more-durable assets will be supplanted by less-durable assets. Nonmobile assets will be supplanted by more-mobile assets. Conspicuous assets will give way to those that can be sequestered. And assets may flee by relocating in more secure jurisdictions. More generally, nonredeployable investments \( (k > 0) \) that would be made in a secure investment regime will be supplanted by more redeployable assets and by capital flight and asset concealment. Productivity will be lost as a result.

Michelman sets out a series of criteria for assessing how administrative costs net out in relation to demoralization costs (1967, pp. 1217–18, 1223). Perceived opportunism of the government is a recurrent theme. The basic point is this: the quality of a compensation regime is to be inferred not by focusing mainly or exclusively on the de jure constitution (top down) but principally from a de facto, bottom-up examination of the mechanisms.

**Contracting.** The economywide concept that corresponds with governance is the distribution of transactions. Consider the three-part division of governance as between spot-market trading, long-term contracting, and hierarchy. Both spot-market and hierarchical transactions need little support from the judiciary. Disappointed spot-market traders can easily limit their exposure and can seek relief by terminating and turning to other traders. And internal organization is its own court of ultimate appeal (Williamson 1991). By contrast, transactions in the middle range can be difficult to stabilize.

Parties to such middle-range transactions can provide a variety of private-ordering supports. But when push comes to shove, middle-range transactions will benefit if they can be appealed to a principled authority. Karl Llewellyn's (1931) concept of contract as framework is pertinent here: "the major importance of legal contract is to provide a framework for well-nigh every type of group organization and for well-nigh every type of passing or permanent relation between individuals and groups...a framework highly adjustable, a framework which almost never accurately indicates real working relations, but which affords a rough indication around which such relations vary, an occasional guide in cases of doubt, and a norm of ultimate appeal when the relations cease in fact to work" (pp. 736–37). Unless the ultimate appeal stage works in an informed and uncorrupted manner, transactions in the middle range are in jeopardy.

Such jeopardy will lead to a reorganization of transactions—attended by a change in the degree of asset specificity (Riordan and Williamson 1985)—in which transactions in the middle range will be moved toward one or the other pole.

The upshot is that the quality of a judiciary can be inferred indirectly: a high-performance economy (expressed in governance terms) will support more transactions in the middle range than will an economy with a problematic judiciary. Put differently, in a low-performance economy the distribution of transactions will be more
bimodal—with more spot-market and hierarchical transactions and fewer middle-range transactions.

**Discriminating Alignment.** Discriminating alignments appear for nations as well as transactions. Nations that pose severe investment hazards will support smaller amounts of specialized, durable investment (low $k$ and low $K$) than will more credible investment regimes; nations with problematic judiciaries will be similarly disadvantaged. That will show up in the technology. Regimes that afford weak supports for investment and contracting will rarely be able to provide strong supports for intellectual property rights. High-technology industries or industries that benefit from specialized, durable investments will thus flee from regimes with great investment and contractual insecurities—for safer havens.  

**Private Ordering**

Compared with neoclassical economics, which presumes that court ordering is efficacious, transaction cost economics places much greater weight on private ordering. Issues of credible commitment and remediableness arise in conjunction with private ordering.

**Firm and Market Organization**

**Private Ordering versus Legal Centralism.** The legal centralism tradition presumes that efficacious rules of law regarding contract disputes are in place and are applied by the courts in an informed, sophisticated, and low-cost way. Those assumptions are convenient because they relieve lawyers and economists of the need to examine the variety of ways by which individual parties to an exchange contract out of or away from the governance structures of the state by devising private orderings. Thus arises a division of effort in which economists focus on the economic benefits that accrue to specialization and exchange and legal specialists on the technicalities of contract law.

This tradition maintains that “disputes require ‘access’ to a forum external to the original social setting of the dispute [and that] remedies will be provided as prescribed in some body of authoritative learning and dispensed by experts who operate under the auspices of the state” (Galanter 1981, p. 1). The facts, however, disclose otherwise. Most disputes—including many that under current rules could be brought to a court—are resolved by avoidance, self-help, and the like (Galanter 1981, p. 2).

The unreality of the assumptions of legal centralism can be defended by reference to the fruitfulness of the pure exchange model. That is not disputed here. Instead, the concern is that the law and economics of private ordering have been pushed into the background. That is unfortunate, since in “many instances the participants can devise more satisfactory solutions to their disputes than can professionals constrained to apply general rules on the basis of limited knowledge of the dispute” (Galanter 1981, p. 4).
Williamson

Clyde Summers's (1969) distinction between "black letter law" and a more circumstantial approach to law is pertinent. "The epitome of abstraction is the Restatement, which illustrates its black-letter rules by transactions suspended in midair, creating the illusion that contract rules can be stated without reference to surrounding circumstances and are therefore generally applicable to all contractual transactions." Such a conception does not and cannot provide a "framework for integrating rules and principles applicable to all contractual transactions" (p. 566).

A broader conception of contract, emphasizing the affirmative purposes of the law and effective governance relations, is needed if that framework is to be realized. Summers conjectured in this connection that "the principles common to the whole range of contractual transactions are relatively few and of such generality and competing character that they should not be stated as legal rules at all" (p. 527). The challenge to economic organization is to identify and explicate the key principles for assessing contracts of all kinds—in intermediate product markets, labor markets, finance, corporate governance, final product markets, and the like. That is what the governance branch of the new institutional economics aspires to do.

Credible Commitments. The concept of credible commitment is especially crucial to private ordering. It is useful in this connection to think of contracts as defined by a triple \((p, k, s)\)—where \(p\) denotes price, \(k\) denotes contractual hazards (asset specificity), and \(s\) denotes safeguards—all three of which are set simultaneously.

The issue of opportunism referred to earlier is usefully examined in this context. Recall that motivational hazards can be described in terms of either opportunism or "failties of motive." The second is a more benign construction and, for day-to-day affairs, is descriptively more accurate. Failties of motive do not, however, help to uncover the deep problems of contracting in the same way or in the same degree as does opportunism, which makes provision for self-interest-seeking with guile.

Robert Michel's (1962) concluding remarks about oligarchy are pertinent: "nothing but a serene and frank examination of the oligarchical dangers of democracy will enable us to minimize these dangers" (p. 370). If a serene and frank reference to opportunism alerts us to avoidable dangers that the more benign reference to failties of motive and reason would not, there are real hazards in adopting the more benevolent construction.

Indeed, although opportunism is a relatively unflattering behavioral assumption, the main lesson of opportunism, for purposes of economic organization, is not the Machiavellian message to breach agreements with impunity because that is what others will do (Machiavelli 1952, pp. 92-93). Instead, farsighted economic agents will ask what they can do to mitigate the hazards of opportunism. Because it is in their mutual interests to avoid ex post opportunism, farsighted parties to a contract will give and receive credible commitments ex ante. Attenuating contractual hazards that would otherwise preclude investments in transaction-specific assets will result in more productive investments and organization.

The simple contractual schema in figure 3 brings these ideas together. The assumption is that a transaction can be produced by either of two technologies and
that buyers are asking suppliers to bid on the contract. It will ease comparison to assume that suppliers are competitively organized and are risk-neutral. The prices at which products will be supplied therefore reflect an expected break-even condition. The break-even price associated with Node A is $p_1$. There being no hazards, $k = 0$. And since safeguards are unneeded, $s = 0$.

Node B is more interesting. The contractual hazard here is $\bar{k}$. If the buyer is unable or unwilling to provide a safeguard, then $s = 0$. The corresponding break-even price is $\bar{p}$.

Node C poses the same contractual hazard: $\bar{k}$. In this case, however, a safeguard in the amount $\hat{s}$ is provided. The break-even price projected under these conditions is $\hat{p}$. It is elementary that $\hat{p} < \bar{p}$.

Bradach and Eccles (1989) contend that “mutual dependence [$k > 0$] between exchange partners...[promotes] trust, [which] contrasts sharply with the argument central to transaction cost economics that...dependence...fosters opportunistic behavior” (p. 111). What transaction cost economics says, however, is that because opportunistic agents will not self-enforce open-ended promises to behave responsibly, efficient exchange will be realized only if dependencies are supported by credible commitments. How is trust implicated if parties to an exchange are farsighted and reflect the relevant hazards in terms of the exchange? A better price ($\hat{p} < \bar{p}$) will be offered if the hazards ($k > 0$) are mitigated by cost-effective contractual safeguards ($\hat{s} > 0$).

\textit{Remediableness.} The efficiency of a form of organization is customarily evaluated by comparing it with a hypothetical ideal. Although instructive, that can be a

\begin{figure}[h]
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\includegraphics{simple_contractual_schema}
\caption{Simple Contractual Schema}
\end{figure}

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<td>Node B</td>
<td>$\bar{p}$</td>
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<td>Node C</td>
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misleading or defective test in three respects. First, because all feasible forms of organization are flawed, the relevant comparison is between alternative feasible forms. Second, if one of the alternatives under comparison is in place, allowance needs to be made for incumbency advantages. Thus, even if node A is judged to be inefficient in relation to node B in a simple side-by-side comparison, if node A is in place and node B incurs setup costs, node A may prevail. Third, and related, it may not be possible to implement node B for lack of political support.

Accordingly, the appropriate test of failures of all kinds—markets, bureaucracies, redistribution—is remediableness: an outcome for which no feasible superior alternative can be described and implemented with net gains is presumed to be efficient. This comparative institutional test is widely resisted except in application to market failures.

Transaction cost economics is always and everywhere an exercise in comparative institutional analysis, comparing two or more feasible forms of organization. It views all cost differences on a parity, including those due to timing—one mode or technology got there first and does not, therefore, need to incur the start-up costs that a rival but later mode or technology does—provided only that the initial mover does not engage in entry-deterring strategic behavior. So many of the purported "inefficiencies" associated with path dependency (David 1985; Arthur 1989) vanish under the remediableness criterion.

**Development and Reform**

Much of the transaction cost reasoning developed with the microanalytics of economic organization carries over to the study of development and reform.

_De Facto Property Rights._ The distinction between legal centralism and private ordering helps to clarify the difference between de jure and de facto property rights. The conceptual hazard in both cases is to assign too much weight to the formal features (court ordering and de jure legal rights) at the expense of the unremarked and more subtle real features (private ordering and de facto economic rights). The issues are nicely posed by the puzzle of Chinese economic reform. As Montignola, Qian, and Weingast (1993) put it:

The remarkable success of China’s economic reforms—fostering economic growth averaging nine percent per year over the past fifteen years—seems to defy conventional wisdom. Consider:

- Economic reform appears to have been successfully pursued without any political reform.
- The central government seems to retain considerable political discretion, including the ability to reverse suddenly the reform process or to impose onerous exactions on successful enterprises.
- Finally, there has been little attempt to provide the central feature of private markets, a system of secure private property rights. Nor has an
attempt been made to develop a commercial law (e.g., property and contract law) or an independent court system for adjudication.

Each of these factors appears to bode ill for economic reform. Without political reform, economic returns remain at the mercy of politics. Political discretion, in turn, implies that there are no impediments to the government reversing the reforms. Leadership turnover, for example, might induce the new government to reverse the reforms, possibly confiscating considerable wealth and punishing those who were successful under the new system. Alternatively, problems may occur during unexpectedly hard times. With severe budget problems and a population clamoring for "solutions, now," the immediate need for revenue produces powerful pressure for a partial or wholesale reversal of the reforms.

(pp. 1–2)

Montignola, Qian, and Weingast respond to this puzzle by arguing, in effect, that the hazards are more apparent than real. What China has done is adopt a series of decentralizing reforms, the effect of which has been to introduce de facto federalism into China.

Consider in this connection a two by two matrix in which de jure federalism can be either present or absent and de facto federalism can be either present or absent (figure 4). The usual assumption is that de jure and de facto go together, but Montignola, Qian, and Weingast introduce the possibility that they need not correspond. Cell 2, where de jure federalism is absent but de facto decentralization is extensive, is what Montignola, Qian, and Weingast appeal to in explaining the unusual success of a Chinese economy in which formal legal protection of property rights is lacking. Although they make an interesting case for de facto federalism and
the effective safeguards accompanying it, two precautions are necessary. First, there is a chronic problem of ex post rationalization in explaining de facto successes. And second, without de jure property rights China is unlikely to be able to support highly specific investments in leading-edge technologies. That inability will pose a challenge to Chinese economic organization in the future.

**Credible Commitments.** Weingast (1993) addresses the correspondences between political and economic organization: "In important respects, the logic of political institutions parallels that of economic institutions. To borrow Williamson's phrase, the political institutions of society create a 'governance structure' that at once allows the society to deal with on-going problems as they arise and yet provides a degree of durability to economic and political rights. Importantly, these help limit the ability of the state to act opportunistically" (p. 288). A farsighted state will thus recognize that organization matters and that it can take actions that increase confidence in both contracting and investment. But because politics is different, credible commitments may fail to materialize because of ignorance, front-loading, or looting.

The ignorance argument is that long-run-efficiency reasoning does not come easily to politicians more familiar and comfortable with power reasoning. The "invitation" by Mikhail Gorbachev, advising U.S. companies to invest quickly in the Soviet Union rather than wait, is illustrative: "Those [companies] who are with us now have good prospects of participating in our great country...[whereas those who wait] will remain observers for years to come—we will see to it" (International Herald Tribune, June 5, 1990). That an experienced and sophisticated leader of a huge nation-state in the late twentieth century should choose carrot-and-stick reasoning rather than an offer of credible commitments to encourage investments suggests the counterintuitiveness of credibility.

What Gorbachev evidently failed to understand is that the ready exercise of administrative discretion is the source of contractual hazard. Ready recourse to discretion not only places those who have already invested at greater hazard, but it also drives those who are contemplating investment to think again. The paradox is that fewer degrees of freedom (rules) can have advantages over more (discretion) if they make commitments more credible (Kydland and Prescott 1977). That is not an obvious result.

The front-loading results from the weakness of political property rights: even if parties have the capacity to look ahead and factor future consequences into present policy choices, the political process poses hazards of its own. If current politicians cannot bind their successors, projects that are front-loaded will be preferred, *ceteris paribus* (Moe 1990a,b).

Looting is explained similarly. Thus, although a bigger pie is always better than a smaller pie, *ceteris paribus*, the *cetera* may not be *paria*. If politicians with short horizons can seize assets or otherwise reward favored constituencies now, and if a big (and certain) piece of a small pie is perceived to be better than a smaller (and uncertain) piece of a bigger but deferred pie, credibility may get short shrift.
In consideration of these disabilities, what is to be done? The action resides in the mechanisms of governance: find mechanisms that communicate credible commitments. Although there is growing agreement that credible commitments are the key (Shepsle 1992; North 1994), the need is to get beyond the agreement stage and engage the specifics. Otherwise, credible commitments will acquire the "well-deserved bad name" that Stanley Fischer (1977, p. 322, n. 5) once ascribed to transaction costs.

The problem with transaction costs in the early 1970s was that the concept was too elastic: anything could be explained by invoking suitable transaction costs after the fact. That tautological status was overcome by moving the analysis of transaction costs from (vague) generalities to the microanalytic particulars of transactions and governance: transactions were given dimension, the fundamental transformation was explicated, the discrete structural attributes of governance were displayed, and so on.

The concept of credible commitments in the 1990s (as employed at the level of the institutional environment, as against the level of governance) is similar: with so many degrees of freedom, any outcome can be rationalized in credible commitment terms after the fact. The parallel prescription for overcoming that tautological status is similarly to engage the relevant microanalyticsthis instance at the level of the mechanisms of the polity. That is an ambitious prescription, but it is beginning to take shape (Soskice, Bates, and Epstein 1992).

**Remediableness.** It was once customary, and is a continuing hazard, to regard the “government as a benevolent guardian, hampered only by ignorance of proper economic policy as it seeks disinterestedly to maximize a Benthamite social welfare function” (Krueger 1990, p. 172).

One justification for ascribing benevolent properties to the government is analytical convenience. Another is that some people really believe that “the most intractable problems [will] give way before the resolute assault of intelligent, committed people” (Morris 1980, p. 23). Analytical convenience is a poor excuse for bad public policy, however, and so is hubris. Intelligent people need to come to terms with their cognitive limitations, and committed people are rarely disinterested—most have an agenda. If all feasible forms of organization are flawed, references to benign government, costless regulation, omniscient courts, and the like are operationally irrelevant. Comparative institutional economics is always and everywhere beset with tradeoffs.

Lapses into ideal but operationally irrelevant reasoning will be avoided by recognizing that it is impossible to do better than one's best, insisting that all of the finalists in an organization-form competition meet the test of feasibility, symmetrically exposing the weaknesses as well as the strengths of all proposed feasible forms, and describing and costing-out the mechanisms of any proposed reorganization. To this list, moreover, there is a further consideration: making a place for and respecting politics (Stigler 1992). This last has been the most difficult for public policy analysts to concede.
Some Applications

How much support does the literature on economic development and reform provide for a bottom-up institutional economics approach that emphasizes investment, contracting, and the mechanisms of credible commitment? Not much, but that is not surprising. After all, little of this literature was written from an institutional economics perspective. It suffices for my purposes here to establish that there are hints in the literature for which institutional economics provides a useful lens.

The study of Chinese de facto federalism (Montignola, Qian, and Weingast 1993) is one example. The mistaken view of Gorbachev on credible commitments is another. I discuss here two further applications: the World Bank's recent Policy Research Report, The East Asian Miracle (World Bank 1993) and its five-nation study of privatization of telecommunications (Levy and Spiller forthcoming).

East Asia

On The East Asian Miracle, I begin with three observations. The report is an informative, thoughtful, and cautious treatment of the issues. It relies very little on institutional economics reasoning. Yet institutional economics is pertinent to some of the more interesting phenomena and practices that it reports.

The report interprets East Asian growth through neoclassical, revisionist, and market-friendly lenses (pp. 82-86). The neoclassical view is that growth is best ensured by allocating resources through markets in the context of macroeconomic stability and limited inflation. The revisionist view "sees market failures as pervasive and a justification for governments to lead the market in critical ways" (p. 83). The market-friendly view is that "the appropriate role of government...is to ensure adequate investments in people, provision of a competitive climate for enterprise, openness to international trade, and stable macroeconomic management" (p. 84). It recognizes both market failure and government failure (p. 84).

The institutional approach is closest to the market-friendly view, but it focuses on credible investment and credible contracting. It is also more expressly concerned with the attributes of human and physical assets.

Although readers are told on page 221 that "property rights...[are a] key element of the market-friendly institutional environment discussed in chapter 4," it takes an extraordinarily perceptive eye to ascertain how property rights figure into chapter 4. And while readers are also told that the enforcement of contracts is important (on page 221), that message is almost subliminal. Nowhere in the concluding discussion of the "Foundations of Rapid Growth—Getting the Fundamentals Right" (pp. 347-52) is there mention of either property or contracting. Instead, the "positive lessons" are listed as follows: "keep the macroeconomy stable; focus on early education; do not neglect agriculture; use banks to build a sound financial system; be open to foreign ideas and technology; and let prices reflect economic scarcity" (p. 367). Shift parameters from the institutional environment—culture, politics, and history—receive only limited treatment (p. vii).
Implicit reliance on institutional economics reasoning can nonetheless be inferred from the following:

**Investment**
- That the report attributes two-thirds of the growth of the eight East Asian economies to high rates of investment in physical and human capital speaks to the importance of credible investment conditions (p. 8).
- The allocation of capital to "high-yielding investments" (p. 8) can be interpreted in asset specificity \( k > 0 \) terms.
- The report discusses education mainly with reference to government support for education, especially at primary and secondary levels (pp. 193–203), because of concern with market failures (p. 197). But because it does not address the comparative failures of government symmetrically, it does not address remediability issues.
- Except for one passing reference (p. 188), the concept of credible commitment goes unremarked in the report. A variety of phenomena could be interpreted as indirect indicators of confidence, however. For example, an economy that infuses confidence will encourage more students to invest in education because they perceive that they will realize future gains. By contrast, secondary school students will bypass education in a predatory regime. Enrollment rates (p. 109) can thus be interpreted in credibility terms. Investments by the government in durable, complementary assets also signal credibility (pp. 16–17, 221–40, 366–67). Direct foreign investment is also a useful credibility signal, as is the government’s sharing information with business (pp. 183–85).
- The hurdle rate for investment is an indirect measure of credibility. Hurdle rates will be lower in countries where political hazards are perceived to be lower—or, put differently, the security of expectations is better (p. 221)—other things being equal.

**Contracting**
- Repeated reference to support for small and medium-size enterprises (pp. 161, 181, 223, 226) can be interpreted to mean support for contracting—although the report emphasizes credit and related supports rather than contracting. More subcontracting should be observed in regimes where contract laws and their enforcement are perceived to be credible.
- The emphasis on restructuring the labor sector “to suppress radical activity...[and] to ensure political stability” as well as to promote company- or enterprise-based unions (pp. 164–65) can be interpreted as efforts to infuse confidence into labor contracting (Williamson 1985, pp. 255–56). That will encourage greater investments in durable and specific physical assets \( (K, k) \).
- The idea that workers should be encouraged to organize cooperatives (p. 165) is followed by the example of organizing taxis (p. 166). There is no mention of the limits of the cooperative form of organization as firms become large and assets more specific (Williamson 1985, pp. 265–68). (Cooperative orga-
nization is limited because contracting for equity capital is problematic if a firm is organized as a cooperative, and debt capital is poorly suited to supporting firm-specific investments [Williamson 1988]. Taxis are highly redeployable assets ($k = 0$) and hence much more easily organized as cooperatives.

**Mechanisms**

- The report makes numerous references to mechanisms (pp. 168–85). Although many are macroeconomic, others implicate the government and business in more microanalytic ways. These matters need to be described more fully to be adequately interpreted.
- A complicating factor is that linkages sometimes work through “informal networks,” as in Indonesia (p. 185).
- Qualified technocrats running the bureaucracy and the suppression of lobbying (pp. 167–79) are important sources of credible commitment. Qualified bureaucrats with job security for whom the effects of reputation work well will have a long-run productivity orientation very different from that of politicians.
- Adaptation goes almost unmentioned, although the adaptability of labor gets a brief remark (p. 266).

Institutional economics can help to interpret what's going on out there. It could be used to even greater advantage if future reports focused on more microanalytic phenomena, emphasizing the institutional supports for contracting and investment.

**Telecommunications**

The World Bank study *Regulation, Institutions, and Commitment: Comparative Studies of Telecommunications* (Levy and Spiller forthcoming) is a more microanalytic undertaking—and a model of what needs to be done. The study deals with a well-defined purpose (telecommunications) for which governments differ in their perceptions and their abilities to communicate credible commitments. Issues of investment, contracting, and mechanisms are all posed.

The overview chapter by Levy and Spiller and the chapter on British telecommunications by Spiller and Vogelsang (forthcoming) are especially illuminating. The U.K. analysis observes that commitment is more difficult to provide in a parliamentary system than in a division-of-powers democracy. The reason: “The party in power controls both Parliament and the government, and there is no tradition of active judicial oversight of regulatory bodies. Thus governments and regulators cannot easily and credibly commit not to use administrative discretion to tighten the regulatory screws to expropriate a regulated firm’s specific assets. Even if the courts rejected a particular regulatory interference, the government could get its way just by introducing new legislation or procedures.”

Because the assets in question were durable and nonredeployable, it was vital that the United Kingdom develop mechanisms that infuse investment confidence. In part that entailed creating pricing formulas (of the “price cap” kind) to which both
telecommunications companies and regulators could refer with confidence. More important was creating the "regulatory game" in which privatized public utilities were embedded. As Spiller and Vogelsang (forthcoming) put it:

Built into the regulatory process is a strong commitment, though not unbreakable, to follow the regulatory bargain struck at the time of privatization. The nature of the country's institutions (particularly the courts and informal norms of government decisionmaking) further reduces the likelihood that major regulatory changes will be imposed without the consent of the regulated company. Among the key safeguards:

- To amend the license against the wishes of the company, the government must follow a complex and a precisely specified process. Failure to do so can be contested in courts.
- Amending the license requires the agreement of several agencies, further reducing the extent of regulatory discretion.
- Major regulatory powers are delegated to the head of the regulatory agency, limiting power at the ministry level.
- Use of a price-cap mechanism limits the price-setting powers of the regulator and, because price caps are part of the license, limits the regulator's ability to radically change the price-setting mechanism.

This telecommunications study supports the following: credibility is vital to support the requisite nonredeployable investments; the regulatory regime and the political context jointly determine credibility (or lack of credibility); and the mechanisms of bureaucracy can and, at least in the United Kingdom, do operate in the service of stability and credibility. Without the creation of mechanisms that communicate confidence (if not full credibility), the privatization of telecommunications (and gas, water, electricity, and airports) in the United Kingdom would have been much more problematic. As Newbery (1994) puts it, "The main case for investment in public enterprise is that it is necessary to make up for the lack of private sector confidence in the future rules of the game" (p. 3).

In figure 5, nodes 1 and 2 show why private confidence is lacking. More central to this article are nodes 3 and 4, which work out of a de facto judicial tradition, and node 6, which combines de jure and de facto judicial independence with a strong bureaucracy. Node 6 can be thought of as an ideal, but short of this ideal, privatization can work if it has the requisite supports.

Conclusion

Ronald Coase (1964) once remarked that "we have less to fear from institutionalists who are not theorists than from theorists who are not institutionalists" (p. 196). Not everyone would agree. But the following is (almost) uncontroversial: it is both possible and desirable to combine institutional economics with theory, and the time has come to do precisely that.
Many might nod in agreement, but then return to business as usual. That will not suffice. If the World Bank, OECD, U.S. Agency for International Development, and others are really persuaded that institutions are important, staffing changes are implied. Not only are institutional economists needed to do the archaeology of development and reform, but they should be expressly included in the planning and the oversight. Because this will “mess things up” for those with orthodox predilections, institutional economists will need the support of strong advocates.

Moving the new institutional economics into the study of economic development and reform has so far proved to be difficult. Taking institutions seriously is the first step. Working out the microanalytic logic of economic organization is the second. Explicating the mechanisms comes next. A successful project will feature variations on a few key themes—with adaptation, private ordering, ex post governance, and credible commitments as prominent candidates.

Because development and reform are inordinately complex, the study of these matters will benefit from combining several focused perspectives rather than working entirely out of one. My argument is that the institutional economics approach, especially of a bottom-up kind, helps inform the issues. One useful way to view institutional economists is as the counterpart to archaeologists in Diamond’s (1994) recent assessment of the grim state of ecology:

All over the world, we’re launching [projects] that have great potential for doing irreversible [ecological] damage.... We can’t afford the experiment of

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**Figure 5. Interpreting Levy and Spiller**

<table>
<thead>
<tr>
<th>Division of powers</th>
<th>Political level</th>
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<tbody>
<tr>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>De facto judicial tradition</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Judicial independence</td>
<td>Judicial level</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Bureaucracy</td>
<td>Bureaucracy</td>
</tr>
<tr>
<td>1. Nationalization</td>
<td>2. Nationalization</td>
</tr>
<tr>
<td>Weak</td>
<td>Strong</td>
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<tr>
<td>4. Workable</td>
<td>5. Workable</td>
</tr>
<tr>
<td>6. Most credible regime</td>
<td></td>
</tr>
</tbody>
</table>
developing five countries in five different ways and seeing which four countries get ruined. Instead, it will cost us much less in the long run if we hire archaeologists to find out what happened the last time. (p. 58; emphasis added)

Substituting “economic and political” for “ecological” and “institutional economists” for “archaeologists,” my prescription reads:

All over the world, we’re launching projects that have great potential for doing irreversible economic and political damage.... We can’t afford the experiment of developing five countries in five different ways and seeing which four countries get ruined. Instead, it will cost us much less in the long run if we hire institutional economists to find out what happened the last time.

Notes

1. For a discussion of this progression in antitrust, see Williamson (1985, chapter 14).
2. Disappointments with the Balcerowicz program in Poland—which made “macroeconomic measures such as credit restrictions, wage restraints, and reductions of subsidies” the centerpiece of reform—illustrate the limits of the standard prescription (Rausser 1992, p. 322).
3. Not only is defining property rights sometimes costly—consider the difficult problems of defining intellectual property rights—but court ordering can be a costly way to proceed. Thus, rather than a pure property rights approach, a comparative contractual approach—in which court ordering is often (but selectively) supplanted by private ordering for governing contractual relations (Macneil 1974, 1978; Williamson 1979, 1991)—has much to recommend it.
4. The rest of this subsection is based on Williamson (1985).
5. Although North avers that “we do not know how to create adaptive efficiency in the short run” (1994, p. 367), we know more about governance than we do about the institutional environment. Moreover, the logic and empirical analysis of the governance branch are much more advanced than the logic and empirical analysis of the institutional environment branch (Matthews 1986).
6. As discussed in the subsection below, the de facto property rights that appear to work well in a less-developed economy (such as China) may required additional de jure supports if a move into high technology is to succeed.
7. This subsection is based on Williamson (1985).
8. The obvious remedy is to demonstrate that the details of Chinese economic organization line up with the argument, which is what Montignola, Qian, and Weingast (1993) do.
9. For a discussion in the context of Western Europe, see Eichengreen (1994).
10. Quotes from Levy and Spiller (forthcoming) are from a prepublication draft.
11. Relevant institutionally informed work not referred to in the text that deals expressly with development includes Bates 1994; Ostrom, Schroeder, and Wynne 1993; and Nabi and Nugent 1989. North 1990 and Eggertsson 1990 are also pertinent. For an overview, see Furubotn and Richter 1991 (pp. 1–32).

References


