

Developing Economies as Toyoda Production Systems:
Why the Analogy Makes Sense,
How it Can Inform Industrial Policy

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1. Introduction¹

The current view of economic development is just that an economy grows if and only if it is endowed with those features that dispose economic actors to engage in market exchange, not least by protecting their interests when they do. In Max Weber's formulation of one of the earliest versions of this thesis the emphasis was famously on dispositions to entrepreneurialism thought to derive from uncertainties of personal salvation said to derive from certain Protestant theologies. The currently dominant institutional variant of the endowment notion shifts the emphasis from spiritual or psychological motivation to the general conditions facilitating market exchange, especially the presence of legal rules that help induce investment by protecting property rights broadly understood, and the availability of courts and regulatory bodies capable of adjusting the rules to serve this end when circumstances demand. But such differences aside this family of views shares the assumption that the features that favor or obstruct development are part of a society's fundamental constitution—its definitive endowments—and as such all but inaccessible to deliberate revision. Thus a society that has not spontaneously generated the growth-promoting endowments, or

¹ This paper has benefited greatly from continuing discussion with Robert Unger. It has been scooped by Dani Rodrik, to whose work it is plainly and deeply indebted. He began to see the implications of his research for a new, processual type of industrial policy in just the months that I began to realize the possibility of interpreting his findings as an economy-wide variant of the Toyota-inspired organizational changes I have been investigating in public and private institutions. His "Industrial Policy of the 21st Century" is a more compelling and authoritative statement of the emergent view than the first synthesis here.

acquired them as a historical legacy (for instance, through colonization by a society that is so endowed) is likely to come into possession of them only when continuing stagnation renders it unable to resist the conforming pressures of more successful competitors.

The official interpretation of this view—promulgated as the “Washington consensus” by the IMF and the World Bank—is that the only institutions favoring growth are those that directly prohibit market distortion or obstruct political manipulations with distortionary effects: import duties and export subsidies are to be eliminated (liberalization); state-owned firms, managed for the benefit of electoral clienteles and their elite patrons, sold off (privatization); public spending, with its continuing temptation to populist excess, reduced and redirected to debt service (stabilization). Courts and other rule interpreting and enforcing entities—together, the rule of law—are added, in the current, “second-generation” version of the Consensus, as indispensable market-making institutions, for without them, recent experience teaches, the prohibitions on and precautions against distortion have no effect.

Until recently the sharpest criticism of this consensus view was the heterodox interpretation of serviceable—growth-promoting—institutional endowments associated with the early work of Rodrik and his collaborators. While the heterodox view also assumes that participation in the world economy—openness—is indeed indispensable to growth, it finds that the most effective means for a particular economy to enter world competition depend on

idiosyncrasies of its context, and may well involve (temporary) institutional innovations disallowed by the Consensus. Thus, from the heterodox perspective, incentives to export (expeditious regulation for firms locating in export processing exclaves, provision of sector-specific research and physical infrastructure) can be judiciously combined with protection of the non-traded sector (tariffs and minimum wages laws) and with controls on capital flows to maximize the chances of effective opening while minimizing the chances of a sweeping domestic disruption through a flood of imports or an international financial shock.

More recently still the succession of failures of Consensus-based reform programs in countries as different as Russia, Bolivia, and East Germany, successful heterodox openings in China, India, Mauritius and Botswana (the last two being the post-War African success stories)², and detailed empirical results produced to evaluate the orthodox institutional view are moving proponents of the heterodox view to transform what began as an intra-mural challenge to the endowments school into an alternative to it. Where the Consensus view sees market-favoring institutions as a all-or-nothing proposition, with still-to-develop economies typically endowed with nothing, the emergent process or bootstrapping view of growth sees developing economies as often, perhaps nearly always, disposing of many of the institutions and capacities needed for growth. At any moment what obstructs growth in a particular, currently stagnating economy, on this view, is some combination of two kinds of constraints. The first kind

² Dani Rodrik, ed., *In Search of Prosperity*, 2003

are the direct obstacles to market exchange (though these tend to be less frequent and daunting than the Consensus holds). The second and often more important type of constraint is the absence of certain public goods: support institutions that help potential exporters determine where they should direct their efforts, and then provide the training, quality certification, physical infrastructure, and various stages of venture capital that new entrants to the export sector are unlikely to be able to provide themselves. Removal of the most pressing bundle of constraints, the argument continues, raises growth rates by several percentage points a year. Continued growth, and the gradual transformation of an economy into a reliably growing “tiger,” depends on relaxing successive (and successively different) bundles.

The focus on relaxing successive constraints corresponds to a re-interpretation of the kinds of institutions that favor growth; and this re-interpretation in turn undermines the claim that growth depends on institutional endowments in the familiar sense of a single, well defined set of mutually supportive institutions. As a reform program, the goal of the Consensus view is to create institutions that shape economic activity—directing it towards market transactions—yet are not shaped by it, except as may be required by (and limited through) the rule of law. Behind this idea of institutions as a kind of *deus absconditus* lies the economist’s inveterate fear, dating to Adam Smith and periodically refueled by failures of traditional government industrial policies for accelerating development, that the very possibility of changing the rules of the economic game provokes a power struggle

among economic actors determined to advance their interests by political manipulation rather than competition in the market place.

The process or bootstrapping view, in contrast, assumes that even in the absence of market distortions, growth requires continuing social learning. The goal therefore is to create institutions that can learn to identify and mitigate different, successive constraints on growth, including of course such constraints as arise from defects in the current organization of the learning institutions themselves. Insofar as these institutional interventions go beyond rescission of the market-obstructing rules and aim to shape entrepreneurial behavior (if only by helping potential entrepreneurs clarify what their choices might be) they resemble the traditional industrial policies—the state picking winners—which the Consensus vehemently rejects. But that is as far as the similarity between industrial policy in the traditional sense and the process view goes. Traditional industrial policy assumes that the state has a panoramic view of the economy, enabling it reliably to provide incentives, information and services that less knowledgeable private actors cannot. There are no actors in the process or bootstrapping view with this kind of overarching vision. All vantage points are partial. So just as private actors typically need public help in overcoming information limits and coordination problems, the public actors who provide that help themselves routinely need assistance from other actors, private and public, in overcoming limitations of their own. Instead of trying to build inviolate public institutions whose perfection guarantees, once and for all, an equally inviolate, but wholly private, market order, the process view

aims for corrigibility: institutions which, acknowledging the vanity of perfectibility the from the beginning on can be rebuilt, again and again, by changing combinations of public and private actors, in light of the changing social constraints on market activity that their activity helps bring to notice.

If growth-favoring institutions are indeed built by a bootstrapping process where each move suggests the next, then such institutions are as much the outcome as the starting point of development. They cannot, in other words, be as the endowments view portrays them: a foundation upon which a market order must be built if it is to stand at all.

The only exception is when the rules, institutions and distribution of political power in a particular economy all interlock in ways that make it impossible to identify and mitigate current constraints. When there are such infernal traps—market failures aggravating and aggravated by government failures aggravating and aggravated by political failures and failures of civil society—bootstrapping is stopped before it gets off to a (potentially self-re-enforcing) start. This can be the case, for example, when political elites seize control of oil or other natural resources and prefer to live by predation and terror rather than allowing domestic development to create alternative centers of power. If such lock ins are common, then the process view is just wrong as a general characterization of the circumstances of economic development; and the Consensus emphasis on uprooting

market-obstructing institutions (even perhaps some of its disdain for heterodox solutions) is at least understandable.

Subject to this limitation the process view's program of institutional investigation and reform differs sharply from that of the endowment school. Where the latter tries to offer reformers a more and more precise idea of the background institutions—the common law, specific rules protecting minority shareholders—that do the real work of making markets, the former challenges itself and urges reformers to provide a deeper and more general view of how to organize social learning, especially as it bears on detecting and correcting constraints on development.

This essay aims to contribute to the emerging process agenda by reviewing the new stylized facts of development that point to it and specifying the key organizational features of, and open questions regarding the corrigible, learning institutions at its core. Part 2 marshals the growing body of evidence weighing against the endowment view and for the bootstrapping alternative. Part 3 presents the Toyota production system as the model of the type of institution with precisely the constraint identifying and mitigating capacities taken to be necessary for development in the process view. The argument is that such organizations, increasingly central to the private and public sectors of the advanced democracies, and even to regulatory regimes nationally and globally, are coming to shape development policy. Assuming that such shaping influence will continue Part 4 explores the governance mechanisms by which an

industrial policy based on Toyoda production-system principles can learn from, collaborate with and ultimately help transform the context of the economic actors without being captured by them.

Though the tone here is matter of fact, and the matters presented are as factual as such things tend to be, this is an exploratory essay. I am reasonably confident of the process view of development, and that any measures that can systematically guide the process will have to be informed by Toyoda-style principles. But in underscoring this theoretical possibility, and introducing some empirical hints of its feasibility, I mean to provide clues to guide the search for a development policy suited to our times, not suggest that the search has already succeeded.

2. The New Stylized Facts of Economic Development

The Consensus view holds, we saw, that stagnating economies are enduringly and pervasively corrupted. That is why growth can not begin without external intervention to remove the institutional, cultural or political sources of the corruption. But there is compelling evidence that, with the exception of infernally trapped countries, less developed economies are on many dimensions internally differentiated and rapidly changing—too heterogeneous and mutable to be any one thing—to have an essence—at all, let alone to be essentially and enduringly corrupted. There is strong evidence, furthermore, that the institutions of developing economies are highly differentiated as well. Far from forming indissoluble wholes, they exist

as connected but often detachable pieces, some performing well, or easily reformable, others badly broken and hard to repair. Because at least some parts of a developing economy are likely to be (on the verge of) doing well much of the time, and some of its surrounding institutions are likely to be serviceable, the problem of development is not starting growth, but using the functioning institutions to relax obstacles to the growth likely to be under way. In the most dramatic cases—of which China is the best current example—the outcome of this piecemeal reform is a thoroughgoing transformation of the economy and the institutions of development. But even when the outcome is far less transformative, the new facts of economic growth—heterogeneity of economic performance and institutions-- suggest a new way of thinking of economic development, and corresponding strategies for encouraging it.

To begin with, the growth rates of individual less developed economies vary widely and abruptly, so that it is often misleading to classify such economies as either stagnant or growing: they are both in turn. More exactly, as Hausmann, Pritchett and Rodrik have recently shown, spells of accelerated development often occur spontaneously, or with only marginal reforms. Counting conservatively,³ they identified more than 80 episodes since 1950 in which a country's growth rate increased by at least 2 percentage points for at least seven years—the “vast majority” of these occurring the absence of consensus-driven liberalization or opening. To the

³ Excluding, that is, very small countries, those with less than two decades of data, rebounds from crises, and accelerations that peaked at annual growth rates of less than 3.5 percent.

extent that acceleration was connected to reform, the latter was hesitant and often literally marginal: the introduction of market prices at the margins of Chinese agriculture in the late 1970s; an increase in interest rates and a currency devaluation that helped close the gap between the private and social returns on investment in South Korea in the early 1960s, and so on. (Hausmann et al., 2004; Rodrik and Subramanian 2004). A first and fundamental new stylized fact of development, then, is that economic growth, while not ubiquitous and self-perpetuating, is not hard to start—and thus not as dependent on the “right” macroeconomic or institutional setting as the endowment view makes them out to be.

Just as the performance of less developed economies is heterogeneous over time, so is it heterogeneous geographically, with some areas growing with occasional interruptions while others stagnate. It is a familiar fact that large developing countries such as Brazil, India and China contain highly developed, “first-world” provinces (São Paulo in Brazil, Bangalore in India) along with backward ones. Because development is uneven in space as well as time, and occurs more frequently in general, and more nearly consistently in some place places than normally supposed, there is a highly likelihood that at least some parts of most developing societies will be growing, or on the verge of growth, much of the time. If national institutions, or endowments generally, had the preponderant effect attributed to them in the standard view such start regional disparities should be rare exceptions, not commonplace.

At higher degrees of resolution, moreover, the spatial differentiation of development becomes still more evident, and some of its underpinnings at least partly intelligible. Growth in less developed economies, as in advanced ones, often occurs in clusters: geographically compact agglomerations of firms, many small and medium sized, cooperating directly or otherwise drawing on common resources in one or several closely related areas of economic activity. By spontaneously recombining and augmenting fragmented specialized, and at least partly tacit knowledge—know-how embedded in a way of life—a cooperative multiplicity of clustered firms adapts rapidly to changes in the economic environment. As the gains from these externalities are, within broad limits, self-reinforcing—the more firms with complementary specializations, the greater the advantage to each from the presence of the others—spontaneous, accidental clustering will be self-perpetuating. Insofar as it benefits from such network effects, economic activity will thus be by nature geographically lumpy. Since the turbulent, continuing transformation of products and markets now called globalization began to put a premium on such robustness in the mid 1980s, clusters have been widely regarded as a model, microcosm, or key component of the “new” economy, able to prosper in much more volatile conditions than the traditional, hierarchically organized large corporation. A good deal of the recent, detailed literature describing such growth as is actually occurring in developing economies (as opposed to accounts of aggregate performance and its supposed determinants) focuses on successes and difficulties of clusters of this kind: footwear in the Sinos Valley of Rio Grande do Sul and

aerospace in São José dos Campos, in Brazil, wine growing in the province of Mendoza, in Argentina, or the Colchagu valley in Chile, computer components in Hinchu, Taiwan, garments in various locations in Vietnam, soccer balls in Sialkot, Pakistan, are prominent examples. That such clusters can prosper at all in countries (once) thought to be obstructive, if not inimical to development underscores that national institutions are less determinative than conventionally thought. Conversely, the frequently counter-intuitive distribution of clusters within in each country—the Mendoza wine industry has captured 2 percent of the \$12 billion global market through continuing improvements in grape growing and wine making; the industry in the neighboring province of San Juan, with similar *terroire* and micro climates, has until recently scarcely advanced—suggests that subtle variations in sub-national institutions and arrangements count for more than the standard view allows.

At still higher degrees of resolution it becomes clear that even *within* particular, geographically concentrated clusters there is great variability as well. For one thing, extremely careful studies of rates of return among “like” firms reveals great variability, not the convergence that conventional theory would predict. (Banerjee) Part of this dispersion is likely to be due to the differences in the firms’ strategies and the capabilities which these suppose. Many of the cluster firms in less developed economies are performing routine operations according to detailed instructions from, and under the close supervision of multinational clients. Competition is on cost, and more exactly low costs of labor. Informal capacities for local

adjustment are likely to be indispensable to survival, but occasions to develop the skills on which they rest are limited. But it is also a common finding of current writing on these clusters that alongside such firms there exist more capable ones. These more capable industrial firms, farms, fisheries and forest producers have mastered various combinations of the just-in-time disciplines of quality control, continuous improvement and co-design—about which more below. In so doing they learn to complement and transform their tacit skills and take on more and more demanding tasks within the global supply chains of multinational customers. Some gain access to final markets (first regional, then global) of their own.

Pressure on developing economy suppliers to adapt the more advanced methods is by all accounts increasing, and the ability to do so will plainly have an important bearing on success in the global economy. At the limit, mastery of these co-production disciplines will be a precondition for any but the most subaltern participation in world markets. Just as plainly that ability varies from firm to firm, cluster to cluster and country to country in ways that have little direct connection to the general conditions thought to encourage international competitiveness on the standard view. For instance, El Salvador and Bangladesh rapidly expanded their garment industries to supply multinational customers with cheap, standard products such as t-shirts. But they find that this success does not automatically prepare small and medium sized firms to respond to customers' demands for specialization and rapid changeover from one fashion-sensitive product to another, including the ability to correct the

customers' design errors and suggest improvements and source fabric and trim locally to avoid long production delays without paying high inventory costs. Many electronics and metalworking clusters in Mexican maquiladoras or export zones are having trouble with an analogous transition, even though some of their constituent firms have been working with just-in-time methods for a decade or more. On the other hand, some clusters (such as Mendoza) have successfully pursued "upgrading" strategies, involving hundreds of firms and novel associations among them and between them and state service providers, to meet the more stringent requirements. Again the upshot is that developing economy institutions or endowments are more varied and, at least within some ranges of the variation, more permissive or less constraining than the standard view supposes.

We come, unsurprisingly, to a convergent conclusion if we shift the focus from the variation of the developing economy performance in time and space to general features of developing economy institutions themselves. On the standard view, we saw, these institutions are thought to have essences—being market sustaining or not—which, as it were, create their own context, determining, once and for all, the impact of any of their parts on the course of development. But on closer inspection these institutions prove to be as context-dependent as context-determining: their effects arise in interaction with other institutions, not independent of them. Moreover, the institutions of developing economies are not integral wholes, but rather heterogeneous assemblies: layered, composite or otherwise

decomposable into (re-combinable) pieces, at least some of which function well, or at least better enough relative to others to serve as the starting points of reform. Comprehensive evidence of this heterogeneity is hard to come by: Responding to the evidentiary burdens assumed by the standard view, investigations of institutional performance typically take the form of league tables, ranking the aggregate ability of all government institutions in each country to deliver the rule of law (by, for example, eliminating corruption) and meet deregulatory goals. Reports of state entities that perform well in particular functional domains or regions can be dismissed as anecdotal exceptions, if they are noted at all. Still, some of the cases of institutional variety and transformation are so substantial that they compel the kind of attention due when an exception may be swallowing a rule; other, more contained instances are linked to broader, underlying changes in ways that suggest that they, too, may have general significance.

Take first the evidence of the contextuality of institutional operation. As we will see momentarily, this is hardly a new stylized fact of development. But it has been forgotten or ignored so often, and rediscovered recently with such elegance and pertinence that for purposes of this discussion we may accord it novelty value.

The contextuality of institutions—of endowments—generally was, it will be recalled, the major finding of investigation of Weber's original assertion of a connection between certain, sectarian variants of the Protestant ethic and the emergence of capitalism. If Weber was right

to think that unlimited but calculating individual striving was the key to growth, and religious questing key to this motivation, then there must be in all growing, non-Protestant economies some theological mechanism with motivational effects equivalent to those produced by Calvinist doubts about personal salvation. In Asia, to take the case that most directly influenced the debate relevant here, such analogues abounded. Japan had Jodo and Zen Buddhists as well as the Hotoku and Shingaku movements; Java the Santri Muslims; India the Jains, Parsis and various business or merchant castes.² David C. McClelland grouped all those sects into a general category of “positive mysticisms,” which included Weber’s Protestant ethic.³

But (as economic historians have found in the case of Puritanism in colonial America) the “positive mysticisms” or “achievement orientation” of Asian sects and social groups yielded capitalist

² “The influence of Jodo Buddhism and the Hotoku and Shingaku movements in Japan was discussed by Robert N. Bellah in *Tokugawa Religion*, Glencoe, Ill.: Free Press, 1957, Chapter 5. The Zen case in Japan was discussed by David C. McClelland, *op. cit.*, pp. 369-370 under the mistaken impression that the samurai in the Meiji Period were devotees of Zen Buddhism. The Santri Muslims of Java were treated by Clifford Geertz in *The Religion of Java*, Glencoe, Ill.: Free Press, 1960 and more especially in terms of the present context in “Religious Belief and Economic Behavior in a Central Javanese Town: Some Preliminary Considerations,” *Economic Development and Cultural Change*, Volume IV, number 2, 1956. McClelland has discussed the Jains and the Parsis in *op. cit.*, pp. 368-369 and Milton Singer has discussed several Indian examples in “Cultural Values in India’s Economic Development,” *The Annals*, Volume 305, May, 1956, pp. 81-91. The latter article received further comment from John Goheen, M. N. Srinivas, D.G. Karve and Mr. Singer in “India’s Cultural Values and Economic Development: A Discussion,” *Economic Development and Cultural Change*, Volume VII, Number 1, 1958, pp. 1-12. Nakamura Hajime in a brief article entitled “The Vitality of Religion in Asia” which appeared in *Cultural Freedom in Asia*, Herbert Passin, Ed., Rutland Vt.: Tuttle, 1956, pp. 53-66 argued for the positive influence of a number of Asian religious currents on economic development. In his more comprehensive *The Ways of Thinking of Eastern Peoples*, Tokyo: Unesco, 1956 (An inadequate and partial translation of *Toyojin no Shii Hoho*, Tokyo: Misuzu Shobo, 1949, 2 vols.) Nakamura takes a position very close to that of Weber. The types of argument put forward in the above very partial listing of work on this problem are quite various. In particular Clifford Geertz was careful to point out that the Santri religious ethic seemed suited to a specifically pre-capitalist small trader mentality which Weber argued was very different from the spirit of capitalism. This distinction could perhaps be usefully applied to many of the above cases of traditional merchant groups which seem to have some special religious orientation supporting their occupational motivations.”

³ *Op. cit.*, pp. 367-373, 391.

economic development only in the context of supporting institutions which did not arise directly from their behavior, no matter how much religious conviction or social orientation might incline individual members of these groupings to enact capitalism in their own lives. Thus the Japanese samurai, prominent from the 16th century on, became paladins of capitalist enterprise only after the Meiji restoration freed them of their political obligations and removed legal barriers to their exercise of certain trades. Chinese merchants had limited success within the structure of Imperial China but became redoubtable capitalists in Southeast Asia. The Muslim Santri merchants of Java were becoming vigorous entrepreneurs in the early 20th century, but relapsed into a more traditional trader role as institutional conditions became less favorable during the great Depression.

More recently, but just as this classic discussion would lead us to expect, careful investigation supports the view that the economic import of particular families of legal institutions that diffused at the time of the great waves of European colonization—common law or the civil code and its analogues—depends largely on the local context in which they operate, and not, the endowment school would have it, on intrinsic pro- or anti-growth features of the institutions themselves. In the light of elegant recent studies by Acemoglu, Johnson and Robinson it seems that the hospitability of particular locations to European colonists shaped the colonists' economic strategies and choice of institutions. The institutions thus established influenced subsequent development. Where, for instance, high mortality rates

from malaria or dense population by first peoples made a territory relatively inhospitable to colonists, the latter minimized settlement by pursuing extractive strategies based on plantations and mining, and selected institutions matched to the resulting concentration of property and power. Where conditions for settlement were more favorable, the Europeans colonized in larger numbers, and replicated home-country institutions favoring dispersed property. The outcome as reflected in the long-term growth rate of the developing economy is thus not the result of an initial endowment with favorable or unfavorable, “natural” or “unnatural” institutions, but rather the interaction between the original setting, the strategic choice of development model, and the fixation of that choice in particular institutional arrangements.⁴

Similarly Berglof and Bolton, in a recent review of economic outcomes in the transition economies find that “the reason why some ... were able to cross the Great Divide [separating self-reinforcing prosperity from poverty traps, cfs] while others did not must be sought to a large extent outside their financial and legal systems.” Among the heterogeneous factors explaining success they list: prior relations with and proximity to Western markets, democratic traditions, candidacy for EU membership, and low levels of integration into the Soviet plan economy with its huge factory towns and complex, fragile supply chains.⁵ Again a particular institution—

⁴ Acemoglu, Daron, Simon Johnson and James A. Robinson (2001). “The Colonial Origins of Comparative Development: An Empirical Investigation.” *American Economic Review* 91: 1369-1401

⁵ Berglof and Bolton, 2002, p 94-74, citation from p. 94.

for instance, the common law—does not by itself decide outcomes any more than the Protestant ethic or any of its spiritual affines does.

Even this contextualization of the endowments view does not go far enough. For growth in different periods requires social mastery of new technologies and organizational forms; and the collective learning this supposes is unlikely to be an automatic by-product of the institutions that facilitate accumulation. In other words, whether market-making institutions actually produce growth in any particular epoch depends on the context of other learning-related institutions in which they operate. A recent survey of growth theory that makes of institutions a key but ill-understood variable, Helpman puts the point this way:

Major technological developments have taken place in countries that protected private property from infringement by individuals and the state. A legal system that facilitates transactions and a political system that constrains the executive are needed for this purpose. But these institutions are not sufficient for growth. The reason is that major changes in technology always induce major changes in economic organizations. The centralized factory in the late eighteenth century, the large business corporation in the late nineteenth century, the process of vertical integration at the beginning of the twentieth century, and the recent trend toward greater fragmentation of production exemplify organizational responses to technological change. As a result, the ability of a country to grow also depends on its ability to accommodate such changes, and the ability to accommodate change depends in turn on a country's economic and political institutions. (Helpman, p. 140)

And these latter institutions, Helpman concludes, are still so poorly understood as to count as the “mystery” of economic growth.

Beyond even this contextualization of the endowment view lies the limit case of its polar opposite, where the institutions of growth are created through growing. This brings us to China, which has manifestly grown institutions in just this way. The cascade of institutional changes begins with in the 1970s with an agricultural reform recognizing the peasants’ control over the plots they are currently working, and permitting them to sell, at market prices and for their own account, surplus above target levels. The result is a sustained increase in agricultural productivity and a rise in rural incomes. In the 1980s another wave of reform allows for the investment of the proceeds of agricultural improvement in Town and Village Enterprises (TVEs): manufacturing firms, owned by municipalities or co-owned by them and private parties, and producing for both domestic and export markets. Again proceeds in excess of tax obligations to higher authorities are retained by the enterprise and available to its stakeholders. The TVE’s continue to expand through the mid 1990s, competing with state-owned firms and adding to the modest pressure for their reform exerted by the central state. The changes are accompanied and accelerated by partial reforms of the financial system and the opening of export-processing enclaves to foreign firms and joint ventures. The upshot is a profusion of new institutions that create incentives for investment and efficiency-enhancing behavior in domain after domain without ever creating what, on the consensus, view, seem to be the essentials of a

capitalist economy: China is very haltingly privatizing state firms, only recently recognized private corporate property as a distinct legal category, and makes little pretense of an independent judiciary.

An incomparably smaller, but still arguably revealing instance of piecemeal institutional change concerns reform of the institutions responsible for assuring hygiene and food safety of the Nile perch fishery on Kenya's portion of Lake Victoria. Exports of the fish, predominantly to the European Union, increased from under barely \$100,000 in 1985 to just under \$44 million in 1996 (perch 35). Starting in that year, however, the EU and various member states began to restrict perch imports from Kenya because of concerns about pathogens and pesticide residues, and, more generally, concerns that Kenyan producers could not assure food safety and hygiene by meeting EU regulations based on Hazard Analysis of Critical Control Points (HACCPs). Under this form of regulation producers identify the production steps where pathogens are most likely to be introduced; devise remedial measures; test to verify that these measures produce outcomes within parameters fixed by the regulator for the relevant class of product; correct remaining shortfalls; and regularly verify, by routine tests, the effectiveness of the eventual methods. A competent public authority in turn periodically verifies the reliability of this self-monitoring.

An EU technical assistance mission inspected the fishery with Kenyan counterparts and documented problems ranging from unhygienic storage of fish on the fishing vessels to spotty record

keeping, especially of “own checks” and inadequate vermin control at processing facilities, to insufficient training of fisheries inspectors. (perch 42) to a wide variety of deficiencies in testing laboratory organization, maintenance, and equipment. In response, the Kenyan government concentrated oversight authority for the fisheries industry from three entities to one, and the fisheries producers formed themselves into a single association to treat with the government. The World Bank study on which this account draws noted substantial improvements not just in compliance with HACCP regulation, but also in the organization of many links in the supply chain and the public sector infrastructure (though the landings often fell short). Neither the foreign experts nor the domestic ones would alone have been able to identify the complex of problems and solutions. The additional resources mustered to pay for the remedies might well have been wasted, and perhaps would not have been forthcoming at all in the absence of a report detailing the precise purposes to which they would be dedicated. During the period of these reforms Kenya ranked around 80 of 117 countries on the World Economic Forum’s competitiveness index: a poor enough showing in the league tables of institutional adequacy to cast doubt on its ability to accomplish any reform, let alone to effect, in a short period, a coordinated series of demanding changes within the public sector and between it and private firms. Again, aggregate assessments obscure the internal differentiation which is both a product of and creates the possibility for reform.

Despite its marginal economic significance—in good years Nile perch accounts for only 2.5 percent of Kenyan exports—the regulatory reform of the fishery reflects broad trends in development. The introduction of HACCPs is of piece with the shift to just-in-time production noted above: the regulatory authorities in effect are requiring firms to demonstrate the same general capacities to detect and correct problems their customers require of them as well. Because they accord local actors great autonomy in determining how to meet general goals, rather than setting out universal and detailed rules for compliance, such regulatory systems are well suited to ensure product safety when—as now—product life-cycles are short, precise production arrangements vary greatly from place to place, and judgments regarding the acceptability of particular risks are frequently revised. Partial reform, domain by domain, or, as in this case, one cluster at a time, also appears to be commonplace: the accounts of cluster development referred to above almost invariably interweave discussion of restructuring of firms, and the relation among them, with re-organization in that particular cluster of the public infrastructure for verifying compliance with standards set both by public authorities and private buyers of the cluster’s products. Likewise the EU’s technical mission to Kenya to investigate problems and propose changes is part of broader pattern. Because developing country institutions are changed domain by domain and leading professionals in each domain are likely to participate from their student days on in international communities of interest, it is often opportune to create teams of local and foreign experts to address problems in context, and propose correspondingly specific solutions.

Thus the EU routinely insists that candidate members create committees to review key governance domains with qualified EU counterpart teams of their own choosing; and close observers of such collaboration, among them the World Bank, judge it to be one of the most reliably effective means of securing governance reform. From this vantage point the EU and Kenya were applying to the reorganization of the Nile perch fishery a tested method of piecemeal or place-by-place reform of the new, just-in-time type.

A further and important tile in the mosaic of evidence suggesting the pervasiveness of step-by-step institutional reform (and the decomposability and adaptability of the ensemble of national institutions which diffusion of this type of reform supposes) is the frequency of heterodox adjustment. As noted at the outset, Rodrik, Hausmann and others have shown that successful openings of developing economies to the discipline of world markets tend to violate consensus expectation. Three, closely related kinds of deviation are especially salient.

First, successful openings are generally partial in the straightforward sense that they are not comprehensive: in the successful cases openness in (aspects of) some markets goes hand in hand with continued closure of non-exporting sectors of the economy, and of the financial system against external shocks. There is, conversely, little evidence that by themselves reduction of tariffs, non-tariff

barriers, and capital controls—the deregulatory reforms at the core of the traditional understanding of free trade—raises growth rates.⁶

Second, successful openings are deviantly partial in the sense that they tend to include what are, from the consensus perspective, impermissibly selective, and therefore inherently biased interventions in the economy. These interventions are typically in the form of public provision of infrastructure and other subsidies to exporters of just the kind the Kenyan government provided the Nile perch fishery, or, on a grander scale, Japan, South Korea and Taiwan provided sectors of their economies. Underscoring the pervasiveness of such selective interventions Rodrik finds in addition that, of the top five exports, excluding commodities, from Brazil, Chile and Mexico to the United States, all benefited from such public support, as well as export subsidies, preferential tariffs, and the like:

In the case of Brazil, the steel, aircraft, and (to an important extent) shoe industries are all the creation of import substitution policies of the past. High levels of protection (steel and shoes) and public ownership, public R&D, and subsidized credit (aircraft) were deliberately used to generate rents for entrepreneurs investing in new areas and to build up industrial clusters. In the case of Chile, industrial policies played a huge role in grapes, forestry, and salmon. ... In grapes, there was significant public R&D in the 1960s that transformed an industry that was primarily oriented to the local market into a global powerhouse And in forestry, there is a history of at least 60 years of subsidizing plantations ... as well as a big push since 1974 to turn the wood, pulp and paper,

⁶ Rodrik, *The New Global Economy and Developing Countries: Making Openness Work*

and furniture cluster into a major export industry ... In Mexico, the motor vehicles and computer industries are the creation of import-substitution policies (initially), followed by preferential tariff policies under NAFTA. None of these are the result of hands-off policies, or of level playing fields and unadulterated market forces.⁷

Third, successful openings tend to be deviant in pursuing indubitably important ends—assuring the security of investment—by what seem, from the consensus perspective, dubious or even impermissible institutional means. In China, we saw, some combination of bureaucratic tutelage or protection and a tiered system of tax targets with local retention of the surplus has substantially substituted for private property rights and courts as an instrument for encouraging investors. Taken together the tax and corporate law aligned the incentives of local and regional officials with those who invested in Town and Village Enterprises. Both prospered when the TVE did, and through the mid 1990s the bulk of investment in China was made in this form. (Development in South Korea, Taiwan, and, more recently, Vietnam has arguably followed an analogous, if less conspicuously unconventional course, though I will not make the case for this view here.)

But this outcome is, at best, counter-intuitive from the consensus or common-law view of institutions, according to which the key role of property law and courts is precisely to protect investors against bureaucrats. More vexing still to the consensus position, just as the

⁷ Rodrik, *Industrial Policy for the 21st Century* (2004), p.

classic measures of free trade do not, by themselves, increase growth, so mass privatizations and the introduction of sophisticated corporate law enforced by a nominally independent judiciary have produced mediocre results in Russia and many other transition economies which derived policy from the assumption of clear rights to private property as the foundation of growth.

Of course the partiality, selectivity and institutional unconventionality of heterodox reforms is only deviant from the standpoint of the consensus assumption that the institutions of growth are by nature self-contained totalities with the special property of facilitating trade by restraining all interference with it, including interference resulting from the institutional restraints themselves. Indeed from this perspective reform that leaves anything essential unchanged, or tries to vary interventions to take account of the particularities of the economic and institutional situation, raises the suspicion of being more of the usual self-interested meddling, or simply no reform at all. If heterodox reforms do from time to time succeed, it is only, on the standard view, by a lucky accident that mitigates the normally disastrous effects of their limits.

But on the evidence just canvassed this get things exactly backward. If developing economies and their institutions lack essences, and are as internally differentiated and context-dependent in their effects as the new stylized facts show them to be, omnibus reforms that ignore this heterogeneity will likely fail by treating very different economic contexts as though they were all alike, and always applying the same

institutional instruments to the same problems, even when the effect of those instruments varies because of their local interaction with other elements of the setting. In contrast, reforms that somehow attend to local constraints by devising sequences of changes that extend the patches of growth almost always occurring, without thereby opening the door to political predation, will be likely to succeed. Thus, in the really existing, new stylized facts world, successful reform is *normally* “heterodox” and heterodox adjustment succeeds *because* of, not despite its partiality, selectivity and contextuality. On this processual view of development the fundamental conceptual problem is not specifying with more and more precision the foundations of growth, for the process creates its own “foundations,” but rather clarifying in what sense, and by what general means developing economies can influence this process to their advantage.

4. Developing Economies as Toyoda Production Systems

On the new stylized facts of development growth is not hard to start—the lesson of the frequent growth accelerations and the geographic dispersion of growth centers in clusters. But neither on these facts is growth self-perpetuating—the lesson of the decelerations that follow the growth spurts and the clusters’ frequent difficulties with “upgrading.” In addition institutions on the new facts are de- and re-composable, and that their effects depend on their context, including the context of other institutions—the lesson of the successes of heterodox reform and the failures of orthodoxy. The problem of

development, given this much, is literally to institutionalize these results: to build institutions that can identify and relax the constraints on growth. What is needed, in still other words, are institutions that do not supplant their context, but rather use the growth-promoting strengths of the latter to overcome its growth-retarding weaknesses.

To get from a general understanding of the relevant institutional innovations to their application to the problem of development we proceed in three steps. The first is to set out the class of especially context-sensitive and context-modifying organizations that improve outcomes by routinely identifying and overcoming limits posed by current operating procedures or routines. The growth-promoting institutions have to be a member of this class, if they exist at all, and the distinguishing features of their operation are most conspicuous at this highest level of generality. The next step is to illustrate the operation of this class in the domain of new public services, whose novelty consists precisely in their ability to provide customized or contextualized bundles of educational and other services to heterogeneous groups: just the kind of contextual adjustment of complex goals, in other words, required for the new institutions of development. The last step is to suggest, by a Chilean illustration, how similar principles are indeed already informing economic policy making in developing economies.

As you will have surmised from innumerable hints along the way or a nodding acquaintance with the business pages of the newspaper, constraint-relaxing institutions have become broadly familiar (though

not necessarily in economics or even the sociology of organization) under the name of the Toyoda production system. The specificity of the name notwithstanding, they have diffused vastly beyond the Japanese firms, the automobile industry, and the production-line settings in which they arose. Indeed it is almost impossible to survey recent writings about the new economy or reform of public administration—ranging from the re-organization public schooling to the provision of child protective services—without stumbling across extended reference to them. For present purposes three features of the Toyoda system are especially important.⁸

First, they identify constraints by stressing existing arrangements until (successive) weaknesses are revealed. A famous example is just-in-time production, in which all work-in-progress inventories are stripped away and parts are produced, at the limit, one at a time. Since defective work pieces can not be replaced with good ones from inventory, a breakdown at any station disrupts all downstream production. The only way to resume production is to correct the problem causing the disruption. Continuous improvement in the sense of the elimination of successive sources of disruption becomes in this deliberately fragile or lean environment a by-product of producing any output at all.

In the design of new products disruption of current expectations and routines is produced by benchmarking: an exacting comparison of

⁸For extended discussion see Charles F. Sabel, "Theory of a Real-Time Revolution," forthcoming in *Collaborative Community*, Charles Heckscher and Paul Adler, eds., Oxford University Press, 2005.

current products and processes “like” the currently employed ones, but with some attractive features current choices lack. The provisional design resulting from this first survey is refined by application of the same technique to its parts: The initial design is chunked into its major components—transmission, engine, and so on for automobiles. Each chunk is then benchmarked against alternatives by an appropriate specialist, and adjusted to take account of changes produced by the benchmarking of the others—a process often called simultaneous engineering.

Once detected by this deliberate stressing, constraints in current arrangements are relaxed by problem-solving techniques that direct searches for solutions beyond the boundaries normally established by routine, yet limit them sufficiently to return useful results in the allowable time. In production such problem-solving disciplines often go by the general name of root-cause analysis, to underscore their common assumption that the source of a disruption may not be palpably linked to the breakdown it provokes. A familiar example of such root-cause analysis are the five-why’s:

Why is machine A broken? No preventive maintenance was performed.

Why was the maintenance crew derelict? It is always repairing machine B.

Why is machine B always broken? The part it machines
always jams.

Why does the jam recur? The part warps from heat
stress.

Why does the part overheat? A design flaw. (MacDuffie,
1997, p 494)

In design an analogous routine breaking but self-limiting search for solutions is entailed by benchmarking itself. The evaluation of which products are enough “like” the target design to count in comparison directs attention away from habitual preferences and towards a broad consideration of just what that target should be. But the strengths and weakness of competing solutions are mutually illuminating, so that detailed consideration of the alternatives judged to be alike enough for comparison clarifies the currently feasible choices, producing a serviceable map of the available solution space.

Finally, the search for constraint-relaxing solutions beyond the confines of routine continuously re-organizes the institutions which undertake them. In traditional, hierarchical organizations, complex problems are solved by reducing them to simple tasks, and then aggregating the results of the simplified operations. In the Toyoda production system, in contrast, complex problems are in effect solved by finding someone who is already solving (part of) them.

Benchmarking and simultaneous engineering do this explicitly by

identifying pieces of the target design puzzle originally produced for other, perhaps (once) distantly related purposes. The organization of root-cause problem solving does this by effectively declaring each piece of the organization potentially relevant to the solution of the problems of any of the others. In an important sense the institution becomes an instrument for searching for solutions, and changing its own organization to better do this as it: a search network, rather than a fixed hierarchy.⁹

Although these features of the Toyoda production system bear on problem solving in general, the origin of these institutional innovations in the private sector may incorrectly suggest that they can only be applied to that domain, and are thus irrelevant to public sector policies, including of course those fomenting growth. To better see the full generality of problem-solving by search, consider the application of this model of to the organization of the new public services that provide customized (combinations) of services to help individuals and families mitigate life risks. What makes these services new in contrast to familiar public services is that defining and redefining what they should be is anything but straightforward. In economic theory the purpose and value of a public service is self-evident enough to give rise to a characteristic free rider problem: each citizen assumes all the others will want such public goods, and

⁹ In a fuller discussion I would show that the links among firms established by these collaborative disciplines do a better job of accounting for the widely noted vertical disintegration of production than two alternative explanations: informal co-operation among repeat players or the thoroughgoing modularization of products. See Charles F. Sabel and Jonathan Zeitlin, "Neither Modularity Nor Relational Contracting: Inter-Firm Collaboration in the New Economy. A Response to Langlois and Lamoreaux, Raff, and Temin", with Jonathan Zeitlin, in *Enterprise and Society* 5, 3

that she can free ride on their willingness to pay for their provision. The result is that no one pays for traditional public goods unless all are obliged by joint decision to pay together. New public services, in contrast, are so idiosyncratic and mutable that they have to be in effect co-designed by client users if they are to be useful at all. Financing for new public services is not, of course, automatic. The defining difference is simply that the free-rider problem in new public goods is no more important than the problem of specifying the service in the first place. The problem of effectively contextualizing general goals such as providing educational or health services is thus comparable—“like” in the benchmarking sense introduced above—the problem of identifying and relaxing constraints on growth.

School reform in the US is a well studied example of the routine invocation of the Toyoda production principles to address the new public service problem of determining what service to provide, and how to provide it. The example is especially well suited to establishing the continuity in the use of the model across the public and private sectors because the traditional school in the US (and of course not only there) was consciously patterned on the mass-production factory. Men in teacher's colleges designed curricula, which were then translated into textbooks. Women teachers in classrooms read the texts to students who moved from classroom seat to classroom seat, like pieces on an assembly line that advanced one position in a year.

To respond to the needs of heterogeneous classes, with many

students arriving without the whole panoply of middle-class family support, required a thorough re-organization of the school: a re-organization aimed at teaching pupils complex skills regardless of their starting point, rather than communicating information to them on the assumption that they started with the knowledge of how to use what was communicated. After more than two decades of desperate experimentation, reformers settled in the mid 1990s on a variant of root cause analysis that, fully in the spirit of the new stylized facts of development, allows effective reorganization to proceed by using partial solutions, and without presupposing any definitive model of the ultimate goal: Use standard tests not only to reveal shortcomings in pupils' learning strategies the staff's teaching strategies, but also the defects in the organization of schools and school districts that are the root cause of these shortcomings.

To see more concretely how this discipline might operate in school reform, consider the problem of teaching literacy. Learning to read, like mastering any complex task, requires each learner to assemble her own idiosyncratic bundles of general skills. So in learning to read each kid must decode phoneme streams (phonics) with/while inferring the meaning of words in context (holistic semantics, or, if you read philosophy, semantic holism)--in her own way, which is to say with her own strengths and weaknesses in both skill areas. Thus some kids will use the meaning to guess sounds, while others will sound their way to the meaning. Many will have troubles doing either, but could benefit greatly if strengths in one area could be used to bootstrap them past difficulties in the other (by, say, learning to

decode a proper name that reveals a context, that then prompts more sounding out.) Standard tests can be used to diagnose individual learning problems, but also the systematic difficulties of some teachers, relative to others, in helping students overcome their particular blockages. The aim of the institutional reform is to rebuild classes, schools and school systems so that these individual “defects” can be identified and remedied systematically.

Thus the job of the teacher in this new public service is to organize the classroom to identify and remediate each pupil’s difficulties. The job of the principal or school master is to organize the school so that teams of teachers within and across grade levels help each other achieve this goal (new search networks). And the job of the district or system head is to organize the system so that principals have the authority and autonomy to do this (more search networks). At each step some variant of root-cause analysis is used to move from the diagnosis of an organizational problem revealed by poor test results to a specific “treatment” that address the cause of the difficulty.

Reform by these means give rise almost naturally to new forms of school accountability. Teachers and school officials are accountable to each other through the performance measures that make diagnosis of problems possible in the first place. They are also accountable to the public. Thus in many states in the US parents can compare the extent to which demographically comparable schools close the achievement gap between rich whites and other groups. This allows them to put pressure on school authorities, on politicians.

It also allows them to take action as families: school rankings have demonstrable effects on real estate prices. To the extent that reduction of the achievement gap results from more and more effective responses to more and more precise self-diagnosis of problems under pressure of such accountability systems, re-organization of public schools in the US is an instance of the HACCP family of reform.

There is, so far as I know, no strictly comparable institution routinely identifying and relaxing growth constraints in developing economies by such well honed and formalized routines. To note only one conspicuously missing piece of such an institution: Data on economic performance in developing economies, as we saw, is still collected at such levels of aggregation, and in such form, as to make it next to useless as a source of information for diagnosing the difficulties of—locating the constraints on—growth. Whereas the data on student performance on standard tests can be used to pick out districts, schools, classrooms and student sub groups that are doing well or poorly, and so direct attention to what is working and what needs improvement, the league tables of competitiveness and other such rankings report national results and call for national action. This is not inadvertent. The league tables are conceived as an incentive system, with bad performers paying such a high price in forgone foreign investment and costly conditionality on borrowings that they are motivated to improve their showing by reform. (Standard tests of educational attainment were initially viewed the same way in the US, and in some quarters they still are.)

In the light of the new stylized facts of development it is easy to see that such incentive devices are at best incomplete, at worst seriously misleading. They suppose, among other things, that the leaders of a low ranking country almost already want to improve conditions (the incentives provide the last bit of necessary motivation), and know just what to do to get results when they have been prompted to want them. The same stylized facts suggest the need for diagnostic indicators; and Rodrik and other have begun to call for such growth diagnostics, and given experience in many other domains there is no reason in principle to think they will not be forthcoming. Nonetheless, the call for such diagnostics by persons who would use them if they could is as good an indication as any that the new institutions of development are still a long ways from the routine context changing operation documented in other, arguably related settings.

All this notwithstanding there is good circumstantial evidence from, for instance, Chile, that in the current cohort of developing economies the ensemble of growth-promoting institutions works jointly as an economy wide Toyota production system—partially, selectively and unconventionally locating and reducing one constraint after another on exports—and that at least some of these institutions more and more explicitly apply the principles of such organizations. Thus the Chilean fruit industry—today country's second largest exporter, after copper mining—traces back to the creation in the early 1960s of the Corporacion de Fomento (CORFO) and the National Institute of Agricultural Research (INIA) and their ensuing cooperation with the

University of Chile. Together these institutions (linked through the University of Chile with the University of California) developed the skills to identify exportable plant varieties and adapt them to local growing conditions. Beyond that they helped survey fruit orchards to assess their possibilities, analyze potential export demand and elaborate production goals, establish nurseries to propagate healthy plants, construct facilities for phytosanitary inspection of the harvest, and establish favorable credit lines and working capital for exports.

But of the Chilean development institutions it is the Fundación Chile whose evolution approximates it more and closely and explicitly to the Toyoda model. The Fundación was created as a non-profit corporation by the Chilean government in 1976 with a \$50 million payment by ITT as part of an agreement indemnifying the conglomerate for expropriation of its national telephone subsidiary. Under the agreement ITT was to manage the new facility for ten years. Its initial efforts were bumbling: the first director general, a semi-retired ITT food research scientist, wanted the new institution to provide social services such as school lunches and nutrition for infants. His replacement, the former head of ITT's Spanish telecommunications laboratories, helped the Fundación master project-management skills, but wanted to develop telecommunications equipment for which there was no foreseeable market, and foodstuffs, for which the markets were incipient. Criticism of his suggestions, however, drew attention to prospects in renewable resources—principally forestry, aquaculture, and horticulture—which became the foundations enduring focus.

Only in the aftermath of the economic shock of 1982 did the foundation develop the activities that have defined its strategy. A combination of sharp devaluation, low domestic interest rates and high uncertainty produced a situation favorable to domestic investment but too risky for domestic investors. Seeing an opportunity in salmon farming the Fundación launched firms itself, hoping that success would lead to imitation and complementary activities. It acquired the necessary technology, free, from specialist public agencies in the US Pacific Northwest, and founded one firm to produce smelts, another to develop hatching and ranching technology for Chilean waters and a third for smoking fish. From these firms grew the Chilean salmon industry, which now produces \$600 million in exports annually.

In the next two decades the Fundación's model of supporting development was refined in three crucial ways.¹⁰ First the foundation shifted from creating start-ups itself to co-venturing with outside partners. Between 1985 and 1993 eighty-seven percent of the foundation's start-ups were wholly owned by the foundation itself (and only one of the joint ventures involved a foreign partner). But between 1994 to 2004 seventy-five percent of the start ups were joint ventures, and 6 of these were with foreign firms. Thus the foundation went from spinning out projects developed internally to networking with outsiders to create projects. Second, the technological

¹⁰ This account follows Fundación Chile, "Una oportunidad para Promover la Creación de Negocios Innovadores en Clusters Claves," Santiago, nd.

complexity of projects increased, with biotechnology in particular become more and more important. Since projects in this area—new vaccines, development of pest-resistant fruit varieties—often required integration of scattered intellectual property and diverse technical tools for genetic manipulation many of the external partners had to construct networks of their own to serve the specific needs of the emergent companies. Thus the Fundación went from building networks to building and re-building networks of networks: it became, that is, a search network.

Third, the Fundación's own project-selection and review mechanism became more explicitly comparative or competitive: Staff members, hired on the basis of demonstrated technical knowledge and familiarity with the markets and business practices in a particular sector, apply for internal grants to develop a case for launching a new venture in some general area. The projects born of the winning proposals become the basis for applications for a second, longer term grant to develop a business plan for a new venture, typically in partnership with outsiders. The contests continue until the proto-venture becomes a candidate for seed capital and enters the familiar sequence of venture capital financing. Thus, as the Toyoda model would suggest, at every stage projects are benchmarked against internal and external alternatives, and the start ups that result are the institutionalized expression of the searches provoked by that benchmarking. The start ups fill gaps in, extend the reach of and otherwise relax constraints on the formation and growth of the clusters whose growth propels the Chilean economy. They are thus

a m So far, at least, the transparency inherent in the broad and continual benchmarking of projects at every stage has also functioned as an effective governance mechanism, assuring that public funds are indeed directed towards public purposes, as best these can be defined at any moment. Here, then is a concrete intimation of the possibility of institutionalizing the idea of a developing economy as a Toyoda production system.

To review the essentials of the argument thus far and underscore the novelty of Toyoda-inspired industrial policy it is useful to compare it with a related, though as we will see fundamentally distinct notion of encouraging development: Hirschman's view of un-balanced growth.

Hirschman's model address two closely related, perennial problems—touched on repeatedly above—of market failure typical of (though not limited to) developing economies.¹¹ The first is identification of potential markets, especially for exports, in the turbid and turbulent conditions of economic life distressingly close to subsistence levels. In a general equilibrium world there would be markets for all possible products (sold at all possible dates). Investors in developing economies could thus easily determine the costs of producing and the revenues from selling potential products, and choose the most profitable lines of business. In the real world of course it is very difficult for the first potential investor in some sector either to estimate the costs of adapting available technology to local

¹¹ The problems of market identification and assurance of complementarities to be discussed next are of course in a different form familiar to high-tech venture capitalists in the advanced economies.

conditions or to gauge the size of the market accessible to domestic producers, except by going some way towards actually realizing the project.¹² The second problem of market failure concerns the coordination of complimentary investments. Potential producers of table grapes or stone fruits will hesitate to invest unless they can count on help with pest control, logistics, and compliance with phytosanitary regulations that they cannot provide themselves. But firms that could provide these services will not unless there is some assurance of local demand.

In the 1950s “big bang” theories of economic development argued that planned, simultaneous investment in all the key complements of a production process solved both problems. Massive joint investment—the big bang—created effective demand for all the goods to be supplied while simultaneously resolving all questions of complementarity. The insurmountable problem, of course, was that this solution to the problem of development supposed that developing countries had precisely what they lacked: sufficiently abundant resources to plan and execute the massive intervention.

Hirschman’s alternative was to address these problems by the mechanisms of *unbalanced* growth: If a large (say state) investor committed funds to a grand, indubitably useful project (say a steel mill), then the resulting backward and forward linkages (backward to the capital goods for making steel; forwards to fabrication of steel

¹² Hausman and Rodrik call this the problem of self identification—potential investors have to discover, by reference to their particular circumstances, that they are indeed entrepreneurs

girders or rails) would create easily identified local demand that could be met without undue risk by domestic entrepreneurs. A cascade of imbalances would thus create a sequence of opportunities motivating investors to fill in the missing pieces of the economic structure. This kind of solution lost its appeal as it became clear that public investors could all too easily be captured by selfish interests, and that many projects that seemed indubitably good proved very dubious indeed. We will come to such governance issues in a moment. But our concern here is with the similarities and, above all the differences between the unbalanced approach and the idea of developing economies as Toyoda production systems.

A key similarity of course is incrementalism. In both cases one of many possible initial disruptions of an equilibrium suggests another, and the cumulative effect of moving from disequilibrium to disequilibrium is a comprehensive transformation that could not have been achieved of a piece. A corollary is that there is, as Hirschman writes, no "*primum mobile*," no "pre-requisite" to growth: no necessary and sufficient endowment, as has been argued here. All the familiar preconditions of development are endogenous to the process of development. Hirschman recites the list current in his day: Skills needed for new industries can be learned; savings for investment can result from growth itself; entrepreneurship can emerge when purposive behavior, ingredient in the most diverse value systems, is

no longer diverted by short time horizons into trade and real estate speculation.¹³

The key difference between the views has to do with their respective assumptions about the organization of firms and the relations among them. In unbalanced growth both are taken to be fixed. For Hirschman, as for most of the leading development economists of his day, the core of these relations can be captured in input/output tables, which show how each stage of production of each good in the economy is linked to the others. What is not known is the efficient sequence for building, in any particular national setting, the structure captured in the input/output table. Having rejected the *primum mobile* or endowments view, Hirschman's insight is that the efficient sequence in any locale can be determined by accidental, or artfully induced perturbations.

His example is fitting pieces to a jigsaw puzzle. Assuming that the time needed to fit each piece is inversely related to the number of adjacent pieces already placed, each fit of course attracts further, faster ones in the same neighborhood. Central neighborhoods can be identified by looking at the input/output table pictured as it were on the puzzle box. Taking advantage of knowledge of the overall picture and cues provided by local clustering of pieces the player completes the puzzle as quickly as possible.¹⁴

¹³ Hirschman, *Strategy of Economic Development*, pp. 1-7.

¹⁴ *Ibid.*, pp. 80-82. But see also his later qualification of this reliance on input/output tables in Albert O. Hirschman,

In the Toyoda production system view, in contrast, both the internal organization of firms and the relations among them are continuously redefined by on-going searches for (partial) solutions to emergent problems. Firms, singly and together, form search networks whose nodes are routinely reconnected by the searches they enable. The jigsaw analogy to the world of the Toyoda model would be game in which players have to fit pieces together without having any clear, box-top image as an initial guide—indeed without knowing whether the heap of pieces before them are drawn from several different puzzles rather than one. In this game the challenge is not getting to a known result in the shortest possible time, but determining what the outcome(s) will be. Of course making sense of multiple, conflicting but related outcomes, puzzling out what the puzzle is—benchmarking likes—is precisely what the Toyoda system is designed to do. Thus, whereas, unbalanced growth assumes disequilibrium in the execution of a known task, the Toyoda model assumes disequilibrium in design, and the all the way down: in the organization of industrial policy, but also in the government itself (new public services), in regulation (HACCPs) and the organization of the firm.

4. Governance in Toyoda Production Model Institution

Principal-agent models and why they can not work in a world where Toyoda Production Model institutions are indispensable.

Governance in search networks: Disentrenchment through peer review.

Some private and public sector examples.

Can these examples be transferred to industrial policy? Have they already been>

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