

“Sources of Institutional Variation in Global Development and Order Building: A Complex Systems Approach”

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Abstract: Popular globalization narratives predict the diffusion of liberal values and link a nation’s economic development with its receptivity to liberal democracy. This view of modernization, often backed by microeconomic analysis, suggests that setbacks along the path toward liberal convergence are temporary. This paper employs a different perspective to survey change processes observed in political and economic systems that account for the historical variations in development paths among nations. It applies the lens of complex adaptive systems to interactions among political, economic, and technological development that cause the larger system of international relations itself to undergo change. From this lens, we observe globalization to be an evolutionary process of differentiation, selection, and amplification. Rather than leading toward liberal convergence, different initial conditions can produce behaviors and institutions that operate far from the optimum, and that can persist for decades and centuries.

1. Introduction

The model for global stability that encompasses market economics and democratic governance is in trouble. Social institutions in developing regions are not emerging in accordance with the familiar sequence of modernization theory, which holds that as societies experience economic convergence—as they industrialize,

urbanize, and prosper—they will also converge to optimal forms of governance. Their growing middle classes, it is assumed, will respond to a universal urge for recognition and self-expression, for democracy itself, and will act as catalysts for policy change.

Modernization theory bolsters the liberal internationalism that is the West's longstanding global development and foreign policy agenda. Modern liberal internationalism emerged after World War I and refashioned itself again after failure to avoid the Second World War led the victorious, liberal West to seek more interventionist and complex forms of international cooperation. Such notions of what a core liberal order should look like included limits to sovereignty and standards of domestic political authority, including accountability, participation, and transparency. Then in the late 1970s, a group of social scientists and economists began an inquiry into the structure of social institutions that form the building blocks of long-term economic growth. Their program, known as the new institutional economics (NIE), aligned easily with modernization theory, enabling NIE to be subsumed into the broader agenda of liberal internationalism. Its influence in development policy circles encouraged a major shift in policy focus, from getting the prices right to getting the institutions right. Liberal internationalism and NIE are significant contributors of the current global development agenda.

Among public intellectuals, Francis Fukuyama stands as one of the most influential proponents of modernization theory. His *End of History* (1989) thesis, which he reasserted twenty-five years later in a 2014 essay written for *The Wall Street Journal*, maintains that when societies “get up the escalator of industrialization,” they will all reach the global optimum of liberal values, which represents the end of history. The inevitable end point of social development is a common organizational framework that represents “some version of liberal democracy.” If it isn’t being followed it is not because there is a better model out there. Even autocrats might argue that in an idealized world, liberal values would be the “higher, better model” – but as a model only, idealized, not applied because it makes a difference where populations began their trajectory. Moreover, the rise of the middle class in numerous developing countries has become neither the precursor nor predictor of convergence in political and social organization. Among the many countervailing trends, six are particularly troubling:

(1) Many young democracies are hybrid forms whose underlying societal dynamics remain closer to the autocracies they once were than to the liberal states it was hoped they would become.

(2) Even when identical formal institutions are “transplanted,” homegrown solutions to local governance problems arise within pre-existing social contexts.

Suffrage does not create the social conditions of democracy, nor does it alter the underlying sources of beliefs, preferences, and interests.

(3) Income convergence in autocracies now equals or surpasses that of emerging democracies, which weakens the attraction of democratic/market liberalism. Income convergence allows China and Russia, for example, to project their national interests globally, while gratifying demands for cultural authenticity at home.

(4) In many of the fastest-growing economies, the process of rapid income catch-up has not prompted the middle classes to become the “indispensable” advocates of liberal economic and political reforms.

(5) Despite the spectacular increase in the size of the global middle class, few new democracies have emerged since the mid-1990s. During the unprecedented prosperity of emerging markets between 2005 and 2014, which produced the highest income convergence ever recorded, global democracy indicators actually receded, according to the two most frequently used indexes to track it.

(6) The divergence between traditional and emerging powers is reflected in conflicting engagement strategies for building global order (Kupchan). Instead of adhering to a liberal system based on universal values of democracy, labor and human rights, and an open domestic economy, the rising powers contest the very

legitimacy of liberal internationalism. They eschew good-governance initiatives and view the promotion of democracy and civil society-building as interference in state sovereignty. In global forums they challenge the universal legitimacy of a rule of law bound to Western norms. Meanwhile, they hold important trade, investment, and diplomatic interests, and exercise influence on other, more fragile states.

The degree of divergence from Western norms is also surprisingly variable—compounded by the significant differences among the emerging powers themselves, especially among those that have become systemically important—Brazil, China, India, Iran, Russia, Saudi Arabia, South Korea, and Turkey.

China's admission into the system of global trade and open markets was widely recognized as a litmus test. Yet it is a test China has failed repeatedly. Once China was allowed to engage in globalism, said modernization theory, its growing middle classes would push the regime in more liberal directions. A wealthier China would evolve into a responsible stakeholder, seeking compacts with other liberal nations. Indeed, integration into the framework of liberal internationalism would lead other emerging powers to follow its example.

Globalization certainly helped China build itself into the world's second-largest economy, but it did not fashion a China that modernization theory or globalization optimists anticipated. China (along with Brazil, Russia, India, and other systemically significant players) enjoys the advantages of international law

and organization, but it contests the legitimacy of liberal internationalism's core values—democracy, labor and human rights, an open domestic economy—as the systemwide ethos. As such, China stands as a rebuke to those who believe Western liberalism is the only means to achieve economic power. And as the carrier of an alternative model to the other developing nations, China turns state-controlled financing, the repression of individual rights, and other illiberal behaviors into acceptable development models.

Yet the supporters of modernization theory have not blinked. They now put forth the argument that China's implosion is inevitable if it does not adapt pluralistic ideas of good governance and a property rights regime grounded in an independent system of enforcement. In 2014, Fukuyama still assures readers that liberal democracy will prevail on the world stage. He concedes that the reality we observe, even in economies dominated by market rules and competition, does not yet fit the modernization sequence he predicted. Convergence may slow to a multigenerational pace; nevertheless, he maintains, models of national development whose focus is strictly materialist will lose their appeal because they fail to address inherent drives for recognition and self-expression (2011). Only democracy gratifies this universal urge.

“The emergence of a market-based global economic order and the spread of democracy are clearly linked,” he writes, “and the ranks of prosperous, property-

holding citizens have ballooned everywhere in the past generation.” There is no reason to worry about China becoming the new global norm-setter, no matter how effectively it fulfills materialistic needs. If it will fail to satisfy other universal needs, it will succumb.

But are these setbacks merely provisional? Who failed the litmus test, China or modernization theory? Is the global convergence toward liberal polities a knottier process than its planners anticipated? This paper argues that convergence is overestimated in the conceptual framework of positive political economy that molds most interpretations of transition, state-building, and democracy. It argues that the problem-solving strategies are erroneous, built on ill-conceived conceptions of cognition, behavior, and dynamics. It concludes that increasing interdependence generates heterogeneity rather than convergence.

2. Evolutionary Dynamics of Global Development and the Complexity Agenda

This paper contends that convergence is but one of many global trends defining the political economy of the future. It maintains that a complex systems approach can counterbalance the emphasis on convergence in global development policy, and argues that a complexity approach offers far more robust descriptions of the properties, behaviour, interactions, and dynamics shaping the evolving system of global society. It asserts that this approach identifies the justified and falsifiable behavioral foundations of policy diffusion and collective learning; that complexity

thinking offers insights consistent with observed trends and developments; and that it opens topics to scientific exploration that have been largely ignored. It will show the weaknesses of modernization theory and how practitioners of new institutional economics may actually introduce harm. At the same time it opens many new vistas to practitioners of comparative politics that have demonstrated the many diversities that persist among countries despite the pressures of globalization.

The remainder of this paper is set out as follows: Section 3 looks at behaviors and interactions at the micro level, among individuals and societies. Liberal theories of global political economy stress the importance of rational decision makers in free markets and presume global competition will ensue that the most successful models are the ones most likely to be copied. Actors within this framework are utility maximizers, they try to improve their situation by calculating costs and benefits in order to determine the course of action that maximizes gains and minimizes losses. Yet individuals often choose the most satisfactory option, rather than the optimal one and tend to copy others, which underscore the role that networks play in determining the choices people and societies make. Belief diffusion can be traced to the density and extent of an individual's or a group's network connections rather than the intrinsic virtues of a particular model or institution.

In contrast to the core claims liberal political economy, it matters a great deal in complexity science where an agent (an individual or other component) is situated

within the system it “inhabits.” Its position within its “landscape,” the height and range of the local peaks it must climb to peer into the future, and the interactions of its landscape with neighboring landscapes will determine the options and strategies it elects to pursue in order to preserve self-interest and survival.

Section 4 contains a discussion of the limits of new institutional economics; it is not enough to identify the structural components of social institutions or to classify the building blocks of economic growth. No matter how deeply the institutionalists delve into function and structure, the answers to “how” development happens will always elude their grasp. It is not the parts by themselves, but their complex aggregate behavior, that must be understood.

Complexity science is the driver of this understanding. Equilibrium does not exist in any complex system, be it ecology, the financial markets, neural networks, the Internet, or any social system. Interactions *among* the parts—not just the actions of the individual parts—drive the system-level behaviors. A change at one level alters the opportunities, risks, options, and strategies for change at another, making it difficult to predict the behaviors of individuals in constantly shifting environments and organizational formations. (The term “punctuated equilibrium,” from evolutionary biology, refers to changes to the global ecology characterized by the sudden disappearance of one set of dominant species and their replacement by another. History is replete with instances of punctuated equilibrium arising from

innovations in military technology that resulted in novel social structures.)

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Section 5 looks to contemporary evolutionary biology and ideas concerning niche construction that modify the Darwinian concept of adaptation. These hold significant implications for understanding the processes of growth and change and are applicable to economic and social systems, not solely to natural environments. Microeconomics postulates, for example, that competition in a market of many players will promote convergence toward the most efficient technologies, firms, institutions, or regulations. This does not occur in a complex system, where the competition among many players for resources drives adaptation toward specialization and variation.

These interacting and interdependent components don't just influence each other; their linked responses spread across the networked environment and alter the larger system. As the ecosystem grows increasingly specialized, varied, interconnected, and interdependent, the cumulative effects of behavior at the

individual level can cause “emergent” behavior of the system as a whole. In other words, the system itself experiences a massive transformation of its own properties from a huge combinatorial “explosion of possibilities.” Biological evolution, in contrast, takes place primarily in genes and their lineages, and such “phase transitions”—as when water becomes ice—are rare. They are much more common in societies, resulting from the purposeful actions of agents. Consider the Arab Spring, stemming unpredictably from the influence of social networks and causing an abrupt change in the social environment.

Section 6 establishes a framework for visualizing the topographical features—the “fitness landscape”—within the network of global interactions. In evolutionary biology, fitness landscapes show how the reproductive success, or fitness, of a population evolves according to the “topography” of its environment, depicted as valleys, hills, and “rugged” ranges and peaks. But fitness landscapes also help to illustrate a key concept related to complex systems: success depends less on the attributes of an individual agent (or population) than on the landscape it inhabits. Local fitness peaks are smallest and easiest to scale, but they rarely produce optimal, or “global,” fitness. Nonetheless, because a population will adopt survival strategies based on its position within its landscape, it will most often move uphill only toward its own, local fitness levels.

Section 7 then examines the role of the middle classes in social change.

Liberal internationalists presume that a growing roster of middle-class countries will bolster system stability, and that the rising middle classes will champion liberal values, further stabilizing the global system by changing countries from within. This paper offers arguments in contrast to the view (also a tenet of new institutional economics and the conviction of Fukuyama's) that the role of the middle classes is either a necessary condition for modernization or a sufficient condition for democratic pluralism to flourish.

Following the discussion of great transitions past, the final two sections try to bridge the gap between comparative politics and international relations theory.

Section 8, summarizes what comparativists can take away from complexity, namely the need to be more explicit about behavioral mechanisms, such as how social networks work and influence how the choices of one actor will shape and is shaped by the choices and behavior of others. It reviews how the self-reinforcing mechanisms of complexity transform patterns of contemporary global development. Finally, section 9, the conclusion, returns to international relations theory and using a complexity framework, the speculates on how the collective action of networked populations within and among nations affects system stability.

3. Using Complexity to Explain Imitation, Cognition, Belief Diffusion, and Global Development

To construct plausible explanations for the variation we observe in global political economy is the work of comparative politics. Much of that work consists of small-scale country studies in which scholars typically attempt to sort out to what extent country strategies are the deliberate outcomes of choices grounded in historical sources of identity. The analysis generally begins with an assessment of the global context in which the particular configuration of domestic interests, identities and institutions must adapt. The feedback effects from actions taken domestically on the global context are usually treated as critical components of the analysis. Thus comparative politics shares with complexity the notion that nation-states are highly interdependent, populations are adaptive and do not exist in isolation and that their actions have feedback effects that resonate globally. Both acknowledge the profound affects of change from below. Both concede that the comparative advantage of any particular national fitness strategy must be understood in the context of the wider global system.

Complexity brings a system-level perspective to the questions that are the core concern of comparative politics and allows us to observe and categorize those interdependencies in ways that a case-by-case analysis will not permit. Whereas comparative politics seeks to determine how national identity and culture endow each country with an intrinsic fitness, complexity approaches stress the importance of the entire network of interactions that produces the evolutionary dynamics

responsible for the structural pattern. The individual parts do not have an intrinsic fitness; webs of interactions determine their different strategies. What we want to understand is how and why a particular set of national institutions or behaviors expresses a specific instance of system-level properties.

A complexity frame will provide information about how individual traits -- a particular set of national institutions or political economy is embedded in an environment comprised of all other coexisting nations—and this enables us to describe how a system may exhibit relative stability at the macro level, despite, or perhaps because of, a constant flux at the micro level. Comparativists give us a framework that links the paradox of increasing global heterogeneity to increasing global interdependency. Complexity goes further and offers tools and perspectives to understand the subtle behavioral mechanisms underlying the dramatic patterns of global divergence. For example social movements within nations often come in waves, complexity allows generalizing about why interdependent systems produce change in the form of cascades.

3.1 Complexity on the Micro Level: The Persistence of Objectively Inferior Choices and China's Success

In their most stripped-down forms, the three principal streams of positive political economy—rational choice, modernization theory, and new institutional economics—assume that social institutions and policies come into being because

the individuals who introduced them applied relevant information to fixed preferences, weighed the alternatives, and then selected optimal choices, calculating the future course of their actions with full cognizance of costs and benefits. In other words, policymaking involves a search for a single solution that is objectively better than its alternatives.

The optimal choice, however, may not be the one chosen. An important reason, cited by Noble laureate and organizational theorist Herbert Simon is that in the process of decision-making, human rationality is bounded: individuals are limited by the quantity of information they can gather, their finite information-processing capacity, and the amount of time they have before a decision must be made.

Therefore it becomes too costly, in terms of cognitive effort and time, to seek the best possible solution. To avoid information overload, people seek solutions that are satisfactory rather than optimal—they *satisfice* rather than optimize.

Modernization theory also presumes that the human impulse to imitate will ensure that the norms and institutions of the most successful nations are the most likely to be copied. This idea forms the core of the Enlightenment and is often associated with the writings of Immanuel Kant. On these grounds, it follows that the quest for advanced technologies will lead aspiring nations to copy the administrative and political structures of those countries whose advanced technologies and manufacturing capabilities they seek to emulate. Thus the

“attraction” of the top performers will play an important role in the diffusion of global norms.

But the idea that countries mimic the most successful examples oversimplifies the mechanisms by which collective *learning* transfers to collective *behavior*. Learning by imitation has many psychological motivations, of which top-down emulation is but one. In choosing to copy, people may also decide to *satisfice* and remove the burden of basing their choices on a thoughtful assessment and a comparison of options.

In *Positive Linking*, the British economist Paul Ormerod makes the original proposition that whenever social copying intervenes to shape individual behavior, inferior models—those least consistent with objective measures of performance—are increasingly likely to be copied. According to Ormerod, copying is the way individuals in social networks gain confidence in their decisions. People may imitate the behavior of others when they obtain a direct benefit by aligning with them, regardless of whether they are making the best decision. But copying in fact removes the likelihood that a qualitatively better model will result. When individuals or groups copy, they are most likely going to copy familiar examples, those closest to their own circumstances, rather than highly successful models. Alternatives that are substantially inferior are also less likely to be selected, but only up to a point—beyond a certain quality threshold (which may be quite low),

any alternative can become the most popular. Thus over time and as more individuals copy, the range of available options narrows and the likelihood increases that they will (1) select objectively inferior alternatives and (2) increase the probability that bad choices will proliferate.

Copying explains why conventional modernization theory underestimates the pull of China. It is not because China is the ideal end point that it is more likely to be copied by many emerging nations. It is because China is the most familiar starting point. In order to obtain resources, China has had to develop trade policies and relationships with regimes that, not unlike itself, have often been censured by the West. And like individuals who will more readily acquire beliefs from those closest to them, the emerging countries look to China and see possibilities for themselves.

Copying also ensures that China's success with developmental authoritarianism will transfer to its network of trade partners, enabling it to shape new group norms and alter the behavior of other nations. Countries around the world look at China and assume that they too can achieve economic growth without engaging in the messiness of democracy, making the good governance agenda of liberal nations seem far less relevant.

Copying then can help explain why high income need not promote democracy, and why democracy might not be in China's future. So long as

economic performance is sustained, it enables groups with self-interest in the status quo to become entrenched.

Complexity science also helps to explain another essential aspect of development: belief diffusion, how people learn from those around them. Cognition is bounded, and so is trust. Thresholds of confidence must be surmounted—whether agents deem each other to be from the same group, whether they value what the other does, and whether they feel sufficiently similar—before groups or individuals accept the opinion of others.

Thus the development of norms and preferences through interactions is far more complex than liberal institutionalism allows. It renders convergence a challenge far greater than just the correction of inferior choices (“digressions from optimality”) or the supplementing of incomplete information. Influencing behavior depends not just on demonstrating the most effective of several solutions. It depends also on the choices made by other actors with whom one may interact.

4. NIE, DNA, and How Complexity Science Works

New institutional economics rose to prominence in the 1980s, after the fall of the Berlin Wall. Its ascendance in academic circles is related to the expansion of the “good governance agenda” in policy circles. By counting and classifying the changing properties of particular social constructs, regimes, institutions, political parties, or households it contributes significant insights and adds to the depth of

liberal theories of global political economy. But the behavior of these social institutions is rarely reducible to the sum of the behaviors of their components. And finding a common institutional framework that overcomes ideological and cultural barriers seems much less likely than anticipated. Even the derivations and use of such terms as “transparency” and “accountability” are culturally and historically specific. Thus, the efforts of NIE to discover and classify the “building blocks” of economic development have not translated into successful implementation strategies, leading Princeton Economist Dani Rodrik to conclude that it offers policymakers little in the way of programmatic guidance. Its predictive capacity is also weak. Wealth is spreading rapidly to cultural zones where underlying beliefs and institutions diverge from the institutional models that propelled the success of the first generation of nations to escape mass poverty.

Yet when faced with its failures to predict the course of global development or to enable policy practitioners to accelerate the pace of development in emerging countries, NIE merely continues to add more qualifications to its indexes. The lists of necessary governance reforms grows constantly—land titling and formal registration of property rights, independent government auditors, ombudsman offices, procurement protocols, presidential term limits, multiparty elections, strengthening of political parties, monitoring election results, payroll reforms, leadership training for officers who serve the heads of state, results-based

management, tax identification of entire populations, and civilian control of the army. But no matter how exhaustive the list becomes, the problem remains that development is neither additive—the sum of all inputs—nor linear.

As the lists of essential institutions grow, it becomes obvious that even if the one could determine the institutional equivalent of chromosomal analogues or code scripts of growth, the agents in the global economy simply will not interact according to NIE predictions. China, Russia, and Saudi Arabia, to name a few, see new opportunities to exploit in the global economy, and they ignore the institutional foundations inculcated by liberalism and the NIE.

It is interesting to note that these new institutional economists, who pin their hopes for finding the key to global development by identifying the structural origins of capitalism in the blueprint of the institutions that nurtured it, are following a similar intellectual path taken by molecular biologists in the 1950s. Scientists then had pinned their hopes for understanding the processes of evolution by studying DNA to find the mystery of life.

Identifying the structure of DNA was vaunted as the triumph of the century, but it is now clear that the DNA project was deficient in determining the *mechanisms* of evolution's dynamics; the process of change cannot be deduced solely from knowledge of the structure of the components. Knowing the complete set of genes encoded in DNA does not track the self-organizing dynamics that arise

as a result of evolutionary pressures. In order to understand this shortcoming, research in evolutionary biology now places natural selection in the broader context of population history and ecology. Scientists from fields as diverse as neurology, ecology, and physics have developed a new understanding of networks as complex integrated systems, with useful applications for the study of social organization.

4.1. Defining Complexity: From Self-Organization to Emergence

To decrease the gaps between good intentions and failed outcomes in large-scale social problems, a burgeoning literature in the social sciences is applying complexity approaches to avoid the unrealistic view of a society or economy as a system in equilibrium. Complexity science is a cross-disciplinary enterprise that seeks to understand how order emerges in complex adaptive nonlinear systems—how environments and their constituent parts continuously adapt to and transform one another. Complex systems are found everywhere in nature, from rain forests to ant colonies to birds in flight. In the social ecosystem, complex systems include families, neighborhoods, cities, markets, political parties, social institutions, the state itself. A change at one level alters the options for change at another. The agents adapt; they acquire new identities and adjust their behaviors to new sets of rules and to the expected reactions of others, making it difficult to predict the behavior of individuals in constantly shifting environments and organizational formations. At each level, the constituents are likely to exhibit new behaviors, and how they adapt

and act together creates the behavior of the whole. (In a system that is merely complicated, such as a pendulum, a watch, a sewing machine, the removal of one part means that other parts will no longer respond. In a complex adaptive system, a change to one of the parts will change the behaviors of the remaining components.)

Complexity science has identified several characteristics that distinguish these systems:

- *Complex systems are comprised of autonomous, heterogeneous agents that make choices based on information available in their local environments.*

Different agents make decisions simultaneously, both influencing and limiting others' actions. It is not possible to isolate the effect of one variable on another. That is why the system is defined as "adaptive," and not "reactive."

- *These systems have networked structures:* There is no real distinction between the component and its environment (system). Networks are not only the aggregates of components but are also themselves interactive agents that create a shared ecology of the macro system. Thus agents don't behave randomly. They share common decision-making and behavioral rules that connect them via networks of interactions and allow the emergence of a global coherence, despite the absence of a central source of direction.
- *Their adaptive capacity derives from the ability to self-organize* into new forms, more compatible with their changing environments.
- *They exhibit sensitivity to initial conditions:* small changes in the system can push it over to another state in a way that is similar to phase transitions, like the melting of ice.

- *Non-linear dynamics can cause the system to react to small changes in the environment* by rapid and unpredictable shifts in shape and direction.

Chris Langton, a pioneer in artificial intelligence, has observed that complex systems are bounded by both chaos and dissipation, and thus exhibit both divergent and convergent behaviors. It is at the edge of chaos where diversity, complexity, self-organization, and adaptation occur to create the continuous variety of our world. This is the system's "in-between," according to Langton, where "a few things interacting produce tremendous divergent behavior." This "deterministic chaos," he explains, "looks random but is not." Convergence arises *only* at the macro level, as the system's energy or interconnectedness transitions—emerges—to either a new chaotic or dissipated state. Applying Langton's reasoning to political economy analysis we can infer that either catastrophe and dissolution of global connectivity or its massive expansion can accelerate the rate of convergence.

4. Niche Construction

Niche construction theory explores how local resource distribution in an ecosystem alters subsequent evolution. This field of study enables researchers to describe how developmental processes within a population (micro-evolution) can influence evolutionary change at a system level (macro-evolution). By creating or defending niches to suite to its own culturally specific requirements, a human

population can both form and prevent novelty, and either redesign or protect its local environment.

The role that niche construction plays in evolutionary change confirms the presumption of economics that the size of the market (which grows by increasing the number of interactions) can accelerate growth—but with a substantial caveat. Heightened interconnectivity offers many different species the opportunity to develop a range of variations that ensure survival in a shared environment.

Intensified competition in an ecosystem can cause an individual population to adjust its fitness, but its survival is more easily attained by protecting its niche more easily than by copying the strategy of another successful species. Thus, competition for resources in a highly interdependent environment prompts many strategies, multiplying the existence of groups with well-separated traits.

This elaboration on how ecological systems evolve by self-organization, rather than top-down control or bottom-up mimicry, has significant implications for understanding the probability of convergence toward optimal designs in human societies. For example, microeconomics postulates that competition in a market with many players will promote convergence toward the same single set of optimized goods, that growth occurs as more efficient social technology, institutions, regulations, or firms supplant variations that are less efficient at providing the market with the optimized products it demands. Taking this theory forward and

applying it to characterize competition among nations, many economists predict that as less developed countries grow faster than more developed ones, the catching-up process will lead all societies toward the same end point, or fitness peak. The race to catch up to a technological leader will delete deviations from ‘best practice.’”

Yet niche construction theory lends a very different understanding to how larger markets can intensify the rate of growth. The optimal strategy for evolution is not to delete variety, but to increase it. Instead of convergence toward an optimal set of goods, each species that secures a niche creates evolutionary space for others to find new strategies for their own survival. Thus, in nature-made environments, wasteful or suboptimal strategies are actually viable, and may even stabilize the larger system. As connectivity increases, adaptations multiply, and each new niche that is created can foster the possibility of a new set of interactions and exchanges that encourage new specializations and refinement of existing strategies, organizations and institutions. As market size increases, niche construction by one population seeking to alter its environment to its own specification creates new adaptive possibilities; each niche can foster a new set of interactions, triggering new specializations along with the refinement of existing strategies, organizations and institutions.

Complexity theorists like John Holland a computer scientist, and Stuart Kauffman, an evolutionary biologist, explain growth and change in social systems

by elaborating on how niche construction, starting as a developmental process for an organism, can trigger macroeconomic change, such as the industrial revolution.

They contend that a global economy powered by accelerated interconnectivity will not drive all societies to an optimum value or set of structures. Instead, the “nodes” of interconnectivity foster an increasing number of intersections with the potential to create a similar huge combinatorial explosion of possibilities.

5. Optimization constrained by topology: how ecology affects decision-making

It is unreasonable to assume that every population has the same number of good designs or policy choices from which it can select to maximize its fitness. To further understand why this is so, fitness landscapes, widely used in evolutionary biology, can help us visualize how the reproductive success of various populations depends on the properties of their respective environments. Fitness landscapes are a metaphor for the spatial dimension of decision-making. They vary from being either smooth or extremely rugged. The rugged peaks represent highest fitness levels, and valleys the lowest. On a smooth landscape, with a flat open view of the horizon, all paths lead to the highest peak (this view is expressed in Thomas Friedman’s proverbial “flat world”). There are no obstacles on the flat landscape so the adaptive walks of all populations that inhabit the environment will conclude at the same end point, or global peak, regardless of their selected path.

Rugged landscapes, however, have many local peaks, and only some paths lead to the highest fitness. The local peaks may even conceal the highest peaks, so that once having embarked on a path that leads to a local peak, a population may get stuck. Retracing their steps is not an option, yet they cannot move forward to another point. Therefore predicting an attainable evolutionary outcome for populations on rugged landscapes is far more difficult than predicting outcomes on flat or smooth landscapes.

Differences in how far a population can peer into the future will determine the time horizons of their decisions (their fitness strategies), and can cause perspectives on security and stability to vary. Since no two landscapes are rugged in the same way, and no two landscapes provide the same views of the horizon, outcomes on different landscapes will not produce convergent behavior.

Langton's experiments with artificial intelligence reveal that the interconnectivity and interdependency on rugged landscapes will lead to non-convergent variation. Populations facing different landscapes are unlikely to evolve the same way, since adaptive climbs on local peaks involve different degrees of difficulty and offer different perspectives of the wider landscape.

This discussion of why evolutionary outcomes on different landscapes will not produce convergent outlooks can be applied to international relations to illustrate why different perspectives exist among nations concerning global

security. As fitness landscapes illustrate, emerging nations do not begin their fitness walks from the same starting points as did the West. Their adaptive walks will end in dissimilar perspectives and disparate time horizons on which to base their decisions about security and stability. Consequently, these nations are ineffective as receptors and inefficient as transmitters of liberal internationalist values, and since Western solidarity no longer suffices to push the liberal agenda forward as a basis for effective global cooperation, both the nature of the rules and the location of authority within the international system remain unresolved. Different perspectives on the future often situate developed and newly emerging powers on opposing sides.

Not For Distribution

6. Barrington Moore and the Middle-Class Conundrum

The work of historical sociologist Barrington Moore illustrate how complexity and comparative political economy often share the same fundamental objectives. In an attempt to understand the multiple paths to modernity taken by the agrarian societies of the past, Moore (1996) finds the same regularity that exists in the self-organizing dynamics of all complex natural systems: “structure governs their possibilities of transformation.” His research exemplifies how the paradigm of gradualism fails to define or conceptualize the major transitions to modernity that are often episodic, sometimes violent, and occur in the midst of a sudden collapse of the old regime. In transitions to industrialization, the traditional agrarian order rarely

just ends by the incremental rise of bureaucratic rationality and freedom. Yet even when major societal changes are explosive, taking the form of violent social revolutions that eliminate traditional social structures and replace them with new hierarchies and classifications of social order, they are seldom random, and generally follow long periods of stasis. Most importantly, they exemplify how self-organization in complex systems can cause change to arise endogenously.

Moore is known for strongly supporting the idea that the middle classes are pivotal actors in democratization, but he also acknowledges that their main characteristic is heterogeneity. His historical reconstructions advance a logic parallels to that of fitness landscapes discussed earlier and illustrate how divergent origins produce divergent outcomes. The role of the middle classes will always reflect the different initial conditions they face in different countries, and accordingly their influence in any two nations will always differ. They are indeed indispensable to the advancement of liberal values, but only in those limited circumstances in which they can find the right coalitional partners, as their strength alone is never sufficient to affect a social revolution.

Moore's principle claim is that disruption of existing social networks is necessary so that new connections can arise and drive rapid evolutionary change. A society cannot take large steps toward freedom, democracy, and rational public administration, he says, without changing the networks of social relations and

dismantling the old power structures. As a counterfactual, he cites India's incomplete transition since independence in 1947. It has paid the "cost of peaceful transition" in lost opportunities to modernize. The same enigma of peaceful transitions arises in the transition economies of the former Soviet Union. They transitioned, but without transformation, in a repeat of the South Asia pattern: the pre-existing authority structures and social networks of the old order are preserved, making structural reforms difficult to undertake. "Weak political institutions and entrenched interest groups can cause countries to become 'stuck' in transition," concludes the EDRB's 2013 transition report (EBRD 2013, 9).

The transition of the former Soviet Union occurred without social transformation, devolving the power and resources of the new system to the elites of the old. A simple belief in the power of elites to select the institutions that maximize their extractive capacity hardly does justice to this process. India's bottlenecks, like those of the former Soviet Union, suggest rich and poor alike can be vested in the corruption of social institutions.

6.1 The heterogeneous middle classes

Modernization theory looks to the progressive aspirations of the middle classes to promote the process of integration into an open capitalist system that will drive convergence toward political advancement. As noted, however, Moore suggests that the role of the middle classes is neither a necessary condition for

modernization nor a sufficient condition for democratic pluralism to flourish. Their influence in any two nations will not be the same, due to initial conditions, the different landscapes they face and their strength depends on forming alliances with other social forces.

Moore described three pathways to modernity outcomes according to the role played by the middle classes. In his North Atlantic model, with modernity ending in democracy, a transition started with a pre-existing, independent, and well-resourced middle class possessing an autonomous economic base in trade, manufacturing, and commerce. If it had significant resources of its own to protect, acquired before the transition from a predominantly agricultural order, it was likely to defend those interests from state discretion and populist redistribution. In England, for example, the middle class was an ideal partner for the landholding elites since both agreed on the need for governmental constraints and protection of property rights. But where the middle classes did not pre-exist the transition, democracy was an unlikely outcome.

Rapid, top-down modernization occurred in Imperial Germany and Japan, where reforms from above created many opportunities for social mobility. A middle class that owed its status to the state became a pillar of state militarism and state nationalism. The illiberal routes these countries followed to modernity had strong middle-class support. This pattern has been repeated after independence in

many former European colonies, whose colonial rulers did not build up a middle class with either managerial capacity or with independent resources. In these former colonies, middle-class status depends on state-protected enterprises or monopolies and loans from the state. A middle class formed as a result of state power is unlikely to champion constraints on governmental discretion.

The peasant-based bottom-up revolution in China was a third pathway to the modern world, and again liberal democracy did not result. Much of China's middle class fled with the defeated armies of Chang Kai-shek to Taiwan. The new middle class, formed after opening the economy, identifies China's prosperity with protected state-owned enterprises and state-led economic development. Not surprisingly, then, it places a premium on absorption into the one-party state. Yet the tradition of incorporating the most talented managers into the state structure goes back more than a thousand years, to the bureaucratic exam system of imperial times. Hence, increasing the supply of elite positions within the one-party state is essential to China's stability, which makes state-based development the local optimum of its managerial class, although this is not the global optimum propagated by liberal development theories.

Chinese history has taught the Communist Party to prioritize bureaucratic inclusiveness, and that middle-class absorption is the best way to avoid the sources of past regime failures. Much of current Chinese political philosophy is about

constraining the ego-centric values of the middle classes from intruding into the ideological leadership of the polity. Chinese history books frequently attribute the collapse of the Ch'ing Dynasty to its fiscal base, which prevented it from expanding the bureaucracy beyond Ming Dynasty levels. The frustrated middle-class office-seekers, guided by the egotism of their class, served as the agents of foreign powers and foreign ideas. Communist Party leaders do not want to find themselves similarly unable, due to shrinking resources, to absorb the rising numbers of educated seekers of government jobs, making state capitalism a preferred way of organizing the economy and an optimal means of controlling middle-class mobility.

Russia is another example of the peasant-led revolution that fails to bring about convergence to liberal values. Ironically, in both peasant revolutions and in top-down, elite-driven development, social mobility is derived from the same source: state power. And both peasant revolutions and the rapid, top-down modernization found in Imperial Germany or in Japan after the Meiji Restoration (1867–1912) can culminate in illiberal governance and militant nationalism.

China's modernization without middle-class leadership, and its subsequent absorption of the middle class into the state, illustrates that a middle class is neither a necessary condition for modernization to occur nor a sufficient condition for democratic pluralism to flourish. The stability of India's democracy, established

before it had a broad, independently resourced middle class (its middle classes prior to independence were composed of state bureaucrats or hereditary merchant classes from distinctive ethnic minorities) implies it is not a necessary condition either. These variations all support Barrington Moore's insight that divergent origins produce divergent outcomes that even violent upheavals cannot alter, and demonstrate why common material aspirations are not sufficient to build a consensual platform for a rights-based, liberal, political culture among the middle classes.

Even where material and technological capability have already converged, the receptivity of the middle class toward liberalism seems to be surprisingly variable. Powerful sources of ideological divergence remain in matters like individual rights or the role of the state, many of which can be traced to the different starting points of the middle class. Moreover, as wealth increases, the middle classes are just as likely to feud over how to spend the surpluses as to agree on the underlying institutions most conducive to affirming sovereignty and national development. The emerging middle class polities are as different as China, India, Russia, Saudi Arabia, or South Africa, and it is easy to speculate that it requires more than rising standards of living to create a common middle-class culture across these regions.

7. Convergence Is Just One Option

Our objective is to understand the macro-level patterns of divergence, summarized in Part One, from Western/liberal ideals of optimality. We have no intention to draw any normative conclusions about whether these patterns of divergence are lamentable or commendable. The hope is that since both comparativists and complexity theorists share fundamental ideas and common analytical themes that they will together produce a synthesis that is capable of providing deeper insights into the evolutionary forces of divergence in global political economy. In the following section we conclude by summarizing what comparativists can take away from complexity.

Our analysis explores whether evolutionary mechanisms, such as niche construction, lock-in, sensitivity to initial conditions, path dependency that appear in natural systems, also play a role in highly interactive social ecologies.

We observe that in both social and natural systems, diversity results from the coevolutionary interaction and increased connectivity in global networks. This insight runs contrary to conventional models of modernization in theories of global political economy, which presume that the competitive pressures of globalization and the race for technological progress it inspires will eliminate deviations from “best practice,” driving all polities to adapt to the same optimized rules and regulations, all economies to produce the same optimized sets of goods, and all populations to prefer individual over collective values.

Our understanding of the rules that govern evolutionary change in complex systems has alerted us to the wide range of events, behaviors, and relationships in global political economy that are not falling in line with widely accepted ways of thinking about social change processes. The popular models of globalization, such as Thomas Friedman's "flat world," and scholarly models of institutional transition, such as modernization theory and NIE, put forward mechanisms of behavior that underestimate or ignore the network effects that underlie divergence. Instead, this paper has identified how the density of global connectivity enables the construction of many coevolutionary niches that form networks of interactions, allowing diverse populations to succeed because they are well adapted to an environment rather than because they represent the most optimized or best set of institutional arrangements. At the same time, this increasing density of ties diffuses the centrality and importance of any one node in the global system.

Due to the different topological impediments that arise from fitness landscapes of differing degrees of ruggedness, not all leaders will see the same sets of alternatives. Policies made "in the moment," to surmount immediate challenges of ungovernability, may comply with the imperatives of ethno-nationalism or patron-clientelism, but could affect the costs of governing later. Powerful self-reinforcing processes—"path dependencies" or "sensitivity to initial conditions"—will result that can make it difficult to surmount previous choices and cause

objectively inferior options to persist. With these inevitable consequences of “lock-in” shaping their local trajectories and simultaneously transmitting strong network effects globally, what began as a myopic response to a local stimulus can end up reinforcing an evolutionary process of differentiation, selection, and amplification that can persist for long periods of time.

Consider that the long-term goal of India’s first prime minister, Jawaharlal Nehru, was to make India the democratic example for other aspiring nations. Yet this was compromised by his shorter-term goal of ensuring a Congress Party victory over its political rivals. He understood that the existing patron-client system would offer immediate payoffs to Congress over trying to create a new concept of social affiliation based on citizenship. This led Congress to ally with local “big men,” “locking in” the preexisting social inequities and patron-clientelism of an earlier time. Even today, basic rights and responsibilities of citizenship are unfamiliar to large segments of India’s population.

Economist Brian Arthur’s insights on increasing returns illustrate the evolutionary dynamics that can cause lock-in to occur. Small changes at nascent stages can have more substantial impacts than larger changes attempted at later stages because once an institutional adaption occurs, the increase of utility that its benefactors derive creates strong vested interests, deeply ingrained habits, and a tendency to seek salvation in the solutions of the past.

The evolutionary dynamics of lock-in can also explain why sequence, or history, is critical and why being the “Last Man” to modernize matters. If values and institutions do not converge quickly during the early stages of transition, the differences between the late-comers and the first-movers may be irreversible. Yet complexity sciences gives us a framework to remain universalists concerning the nature of human development because it offers a deep understanding of the mechanisms of historical transitions that can be applied to all epochs and cultures.

8. Conclusion

A few principles that relate the evolutionary dynamics identified in complex adaptive systems to global political economy summarize our findings:

(1) Diversions from liberalism may not be temporary: The distinctively illiberal choices elites make locally have dynamic effects globally; once enough countries have adapted these choices, they will be much harder to reverse. These countries will exert strong pressures for conformity among peers and similarly situated nations.

(2) Modernization does not produce convergence or continuity: Complex systems experience episodic upheavals of their own accord; change is discontinuous and radical discontinuity and sudden transitions can result even from what initially seems like an insignificant reorganization.

(3) Discontinuous change is not random: Complex systems often fail to re-

stabilize after an initial input is altered. Each successive fork makes the future more unpredictable. Even without the linear dynamics of cause and effect, the outcome is not random. The patterns and dynamics of change will be constrained by prior choices, and by both internal and external stimulus, but not by predictability.

(4) *Liberalism may be but one of many possible modernities: Mix, mingle, and become more diverse is a primary lesson of globalization. We should be prepared to feel less at home in a world of multiple modernities that does not follow the top-down emulation and inculcation of norms in Kantian fashion. Instead, self-reinforcing micro-level change processes—sensitivity to initial conditions, network effects, scale effects, and phase transitions and emergence that result in explosions of growth—may combine, hastening vastly different political outcomes among already developed and emerging economies, and among old and new nations.*

Relating the evolutionary dynamics of complex systems to contemporary political economy analysis will enable us to gain a better grasp of the historical evolution of society, to better apprehend the tangled web of culture, trade, and governance we are weaving, and to grasp the waves of self-affirming ideas and cascades of future growth that lie ahead.

-Footnotes available upon request