

Economic Performance Through Time: The Limits to Knowledge*

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In this essay I propose to explore what we can and cannot learn about the way economies evolve over time. The focus of the essay is on the dynamics of change--political, social, and of course economic; and therefore the key word is time. In section I I outline the process of economic change as I understand it; in section II I specify the questions we must answer in order to understand that process; in the final section I tentatively identify which of those questions I believe are amenable to being answered with sufficient research and which I believe to be beyond our ability to answer. I need hardly add that my conclusions are highly speculative.

I

A theory of economic performance through time would entail an integration of theories of institutional change, demographic change, and change in the stock of knowledge. We do not have well defined theories of any one of these areas and certainly do not have any integrated theory of the combined strands. While I shall discuss all three strands, my primary focus is on institutions

because economic change--like all change--is a process and the carriers of that particular process are the institutions of the society. Institutions are created by humans to structure human interaction in order to reduce uncertainty in pursuit of their goals (of those making the rules) in social, political, and economic exchange. I define institutions as the formal rules (constitutions, statute and common law, regulations, etc.), the informal constraints (norms of behavior, conventions, and internally imposed codes of conduct), and the enforcement characteristics of each. Because they make up the incentive structure of a society they define the way the game is played and the way they evolve determines the way the game is played through time.

Before going on it is useful to distinguish institutions from organizations. Institutions are the rules of the game; organizations are the players. The latter are made up of groups of individuals bound together by some common objective--for example firms are economic organizations, political parties or legislatures are political organizations, universities are educational organizations.

In broad outline the process of economic change is as follows. Organizations and their entrepreneurs are the actors; they will introduce new institutions or technology when they perceive that they can improve their competitive position by such innovation. Their perceptions are a function of the belief systems they possess.

Let me put some flesh on this bare bones statement.¹ The institutional structure defines the organizations that will be viable at any moment of time. Organizations exist in the economic world of scarcity and hence competition. The degree of competition will be the primary determinant of the incentives of organizational entrepreneurs to innovate new institutional rules.

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¹ The following paragraphs in section 1 summarize a much longer discussion in North "Five Propositions about Institutional Change" in Knight and Sened, eds. 1995

Secure monopolies will have little incentive; competitive markets will produce more incentive to innovate, although it is not the competitive conditions of the economic theory of perfect competition but rather the institutional environment of the organizations--the framework of rules and norms--which determines the incentives for innovative activities. The existing institutional structure is the source of the existence of the organization and also determines the competitive conditions. Innovation as used here simply means a change in technology or institution that is perceived to improve the competitive position of the organization. There is no implication that the improvement of the organization's competitive position is also an improvement in productivity--it could be, but also it could be the result of restricting entry or creating a monopoly or redistributing income in some fashion. Organizational innovation sometimes occurs within the existing institutional framework but sometimes entails altering, incrementally, that institutional framework. Sometimes the innovation involves a change in the formal institutional structure, which entails specifying the structure of the polity. Therefore a theory of institutional change must embody a theory of the political process as an integral part since it is the polity that specifies and enforces the formal economic rules. Sometimes institutional change involves a (usually gradual) change in informal norms of exchange.

Whether the organization will improve its competitive position by improving productivity or broadly engaging in redistributive institutional policies depends on the incentive structure built into the institutional structure. If the institutional structure rewards piracy then piratical organizations will spring up and in competition with each other will innovate technology or institutions to make themselves more effective pirates. Conversely if the institutional structure rewards productive activity then organizations will evolve to undertake productive activity and will innovate technology or institutions to improve productivity. The implicit relative prices of

the two alternatives shape the direction of change and as that ratio changes so will the direction of the economy change.

If institutions and the way they evolve are the key to economic performance through time what determines the way they evolve? The immediate answer is that individual entrepreneurs who are in the position of modifying the rules of the game in political or economic markets and have implicit or explicit theories about the consequences of policies act upon those theories to modify the rules to improve their competitive position; the perceptions of entrepreneurs shape their policies and over time it is the way these perceptions evolve that determines the way institutions evolve. There is no implication that results of the choices that are made will coincide with intentions; indeed more often than not the belief systems that underlie perceptions produce unintended and unanticipated results.

II

This approach to understanding economic performance through time is at odds with the mainstream literature in both economic history and economic growth. I shall, therefore, justify this approach.

Ever since Arnold Toynbee popularized the term “industrial revolution” in a series of lecture in 1880-81 most economic historians have implicitly, and sometimes explicitly, considered technological change to be the mainspring of economic performance. Walt Rostow formalized this perception with his influential argument about the “takeoff.” But, while technology may determine the upper bound of economic performance, theories of technological change do not tell us why this bound is seldom if ever achieved.

If technology has traditionally determined the upper bound, the Malthusian spectre of population pressing on resources has determined the gloomy lower bound. However the mortality/fertility revolution of the past century has led to substantial modification of Malthusian models and the lower bound also is seldom if ever realized.

The economic growth literature has also seldom posed the issue of this essay; but when it has the answer has been framed in terms of the growth accounting literature which assigns various weights to human capital, physical capital, increasing returns, or technology as sources of growth. Much of this literature is captured in the new growth economics literature, which has illuminated certain features about economic growth. The problem with this approach is that we are left to ask why, if there is such a high payoff to investment in human or physical capital, don't third world or transition economies undertake those investments. It is a puzzling feature of the new growth theory that there is an implicit assumption that the incentives either don't matter or are already in place when even the most casual knowledge of third world or transition economies makes it glaringly apparent that the incentives for redistributive activities are more powerful than those for productive activity. The failure of human beings to organize themselves to provide the incentives for productive/creative activity must be at the center of inquiry.

Economic performance through time suggests a fundamental change in approach. The implicit or explicit theory in cliometric history and in development economics is static; the theory we need must explore change through time and therefore be dynamic. From Veblen and Marshall onward there have been repeated calls to make economics an evolutionary discipline drawing its inspiration from evolutionary biology rather than from classical mechanics. In the last dozen years a spate of books and even a journal have responded to this appeal. The inspiration for a dynamic model must come from some variant of evolutionary reasoning.

We are now in a position to specify the questions that must be answered to understand the process of economic change.

The first question to be answered is: are institutions really the carriers of the process of economic change and if so what are institutions?

A second question is: if institutions play such a role how do they interact with the other key actors in the process of economic change, demographic change, and changes in the stock of knowledge?

Three: what are the sources of institutional change?

Four: what is the process of economic change? How useful are models drawn from evolutionary biology?

Five: how can we explain the diversity of economic performance through time?

Six: how far can we go in constructing a framework that can provide guidelines to improving the performance of third world and transition economies? Can we construct a dynamic theory of change?

Seven: where are we going?

III

Let me begin this section by sidestepping an important issue that I shall leave to others-- issues of measurement. I do not plan to deal with such fundamental aspects of historical methodology as issues of evidence. My focus is on the process of change--past, present, and future. I shall simply assert that by economic performance I include not only the standard quantitative measures: changes in the size and composition of population, aggregate income, income per capita, and the distribution of income; but also other less measurable but important characteristics of well-being such as the quality of the physical and social environment. But measurement issues do directly influence economic performance through time. Our improved ability to more precisely measure the multiple valuable dimensions of goods and services and the performance of agents has been a critical historical source of improved performance. And future learning may change our perception about costs and benefits of present policies on the future environmental landscape (see below).

Let me now turn to the questions to be answered.

1) The fact that most of the economics profession including those in the fields of history and development typically pay only lip service to institutions in their analysis suggests that the role of institutions as the carriers of change is far from settled despite an evergrowing body of empirical evidence supporting this claim.² Even the rise and decline of communist states in this century has not been a sufficient bit of evidence to persuade economists to take seriously the study of institutions and their change as the immediate source of performance and change in

performance. I believe that the intentionality of humans is the distinguishing feature of human evolution and therefore the structure humans create to order human interaction and the belief systems that they develop that underlie that structure must be at the center of our inquiry.

While mainstream economists do not incorporate institutions into their theory, when they concern themselves with public policy they do so in the context of discussing the impact of changes in laws, rules, regulations-- ie formal institutions. In consequence modeling the political process is an integral part of explaining economic change and in the last few years the study of political economy has begun to attract the attention of mainstream economists. We are far from any model of political-economic change although I believe a transaction cost approach to politics has equal promise with a transaction cost model of economic markets in improving our understanding of political economy.³

What are institutions? I have opted for a comprehensive definition: the humanly devised constraints that structure human interaction--the "rules of the game." The definition is designed to be complementary to the choice-theoretic framework of economic theory and to incorporate the overall function of institutions--which is to provide the underlying structure to exchange and human organization. But the inclusion of hard to measure informal constraints makes empirical tests of those aspects of choices shaped by informal constraints difficult and sometimes impossible. But excluding them means giving up on analyzing what I have come to believe are the most fundamental source of economic performance.

² See for example Alston, Eggertsson, and North, (1996), Gwartney, Lawson, and Block, (1996), Knack and Keefer, (1995)

³ An interesting recent study is Avinash Dixit, The Making of Economic Policy: A Transaction Cost Politics Perspective,(1996)

2) A comprehensive understanding of economic performance through time requires a melding of theories of institutional, demographic, and stock-of-knowledge changes in order to have an overall approach to the issues. We have only begun to explore the interaction between these three sources of economic performance but I believe we can go far in developing useful models of the interaction between them not only in terms of institutions providing the incentive structure for demographic and technological change but also in terms of the way in which demographic-and stock-of-knowledge-perceived “imperatives” have in turn shaped the change in institutions.

For example modern economic growth had as its source the growth in the stock of knowledge that is associated with the scientific revolution of the sixteenth and seventeenth centuries. What is the source of the attitudes, procedures, and experimental methods that characterized this revolution? It was a western phenomenon and obviously related to the institutional developments that led to the rise of the western world from a relatively backward part of the world in the tenth century to its worldwide preeminence by the eighteenth century. The institutional developments--political, economic, and social--in turn reflected the development of a belief system. Where did the belief system come from? I have argued elsewhere (North, in Davis 1995) that its origins are in the way religious beliefs (and reaction to those beliefs) evolved in medieval-early modern Europe and the way those beliefs in turn were heavily influenced by the unique experiences that characterized that part of the world.

Whatever the sources, the scientific revolution ultimately spawned both the technological revolution which wedded science and technology and the demographic revolution ushered in by the revolutionary decline in mortality in the past century. An adequate account of modern

economic growth would entail an understanding of the interplay between institutional, stock-of-knowledge, and demographic factors in this still incompletely understood process.

3) The immediate source of institutional change is choices reflecting changes in the perceptions of those entrepreneurs, political and economic, who can alter the rules because they perceive opportunities to improve their competitive position. We are far from understanding this process since it entails an understanding not only of how beliefs and preferences evolve but also of how humans make decisions in the face of the uncertainty that has characterized and does characterize the political and economic choices that shape the evolution of political and economic systems.

We can begin an understanding by seeing just how this approach differs from the standard economic approach to making choices. The neo-classical approach to analyzing the performance of an economy assumes that in the face of pervasive scarcity individuals make choices reflecting a set of desires, wants, or preferences. The theory is constructed by aggregating those preferences in the context of fixed resources, private goods, and given technology. The result has been a powerful set of tools to analyze resource allocation at a moment of time in developed economies under the assumption that the markets being modeled are governed by impersonal forces of supply and demand. The competitive model enshrined in general equilibrium theory makes a major contribution to economic understanding by demonstrating that a decentralized system of market forces would generate an efficient system of resource allocation. In this framework beliefs played no role in decision making.

But valuable as this approach has been for the development of an elegant body of theory, it is a very imperfect tool for solving economic problems both at a moment of time and

particularly over time. Frictions—read transaction costs—arise from imperfect information and imperfect enforcement of agreements, and markets are the creatures of political forces. In the real world of imperfectly competitive markets, beliefs determine the choices of the actors. Their motivation is derived from their private information and expectations about price movements. Moreover since some goods and services are public goods and services—not only the traditional ones of national defense and public security but in particular property rights and the rule of law—they are traditionally created through the political system, which entails knowledge not only about the preferences for such goods but about the incentives to produce them, given people's beliefs about others' willingness to pay for them. Preference-based models of either markets or elections are relatively simple. Beliefs, on the other hand, are anything but simple since they involve some description of how people learn, update, and model the world they live in. And it is modeling beliefs that is at the heart of all theorizing in the social sciences.

Let us begin by modeling situations in which the substantive rationality assumption of the economist works well: consider choices in competitive posted-price markets. The chooser need only select the quantity to buy or sell as the competitive environment so structures the situation that price can effectively be viewed as a parameter and only the quantity need be chosen. If all choices were simple, made frequently with substantial and rapid feedback, and involved substantial motivation, then substantive rationality would suffice for all purposes. It would be both a predictive and a descriptive model of equilibrium settings, and learning models based upon it could be used to describe the dynamics out of equilibrium. But as soon as we move away from this simple competitive model and the price depends on the behavior of other buyers and sellers the complexity of the decision increases. Indeed, the interesting issues that require resolution come from the interaction of human beings in economic, political, and social markets.

Knowledge of other people's actions and beliefs is an essential prerequisite to constructing useful models. But so too is a knowledge of their preferences since it is some melding of preferences and beliefs that determines choices. The strategic interaction of human beings is the subject of game theory and the vast literature on the subject that has evolved is a testimonial to its current appeal in the social sciences. But the current status of game theory itself makes clear that what has been missing in most game theoretic models is "a description of the players' reasoning processes and capacities as well as a specification of their knowledge of the game situation" (Bicchieri, 1993, p 127). What is missing, that is, is a theory of how human beings learn that entails cognitive activities of construction and modification of mental models and behavioral patterns.

But the puzzle I seek to unravel is still deeper than how people learn. It is how do humans evolve and believe in theories in the face of uncertainty. Frank Knight made a fundamental distinction between risk and uncertainty. In the case of risk, probability distributions of outcomes could be derived with sufficient information and therefore choices made on the basis of that probability distribution (the basis of insurance). But in the case of uncertainty, no such probability distribution is possible and in consequence, economists have held that it is impossible to develop a body of economic theory in such a case and economic reasoning will be of little value. But human beings do construct theories all the time in conditions of pure uncertainty—and indeed act on them and sometimes die for them. Communism is the most famous modern secular example, but all religions are based on faith. But it is not just overall ideologies like communism or complete religions that concerns us. It is the widespread existence of myths, taboos, prejudices, and simply half baked ideas that serve as the basis of decision making. Indeed most of the fundamental economic and political decisions that shape

the direction of polities and economies are made in the face of uncertainty. You have only to open a newspaper and read the headlines to observe such decisions every day.

Therefore the central questions that confront us in modeling economic performance through time are not only how do human beings learn and meld beliefs and preferences to reach decisions and hence choices, but also how and why they do develop theories in the face of pure uncertainty, what makes those theories spread amongst a population or die out, and why do human beings believe in them and act upon them. Below I shall advance a very general approach to learning and belief systems. Economists have just begun to explore these issues and it is too early to tell how far we can go.

4) What analogies and insights about this process can we derive from evolutionary biology? Are the essential conditions of Darwinian evolution--variation, continuity, and natural selection--paralleled in institutional change? Yes there are parallels; but how close are they and do the “processes” work in the same way? Institutional change is largely Lamarckian, and the change is for the most part intentional and as noted above created to enhance the (largely) short run competitive positions of entrepreneurs. How comparable is the learning embodied in intentional choice to the selection mechanisms in evolutionary theory? The latter are not informed by beliefs about the eventual consequences; the former, erroneous though it may be, is driven by perceptions of downstream consequences.

The quest for order leads humans to construct elaborate forms of social and political structure which then inform their collective problem-solving behavior: they scaffold both the mental models they possess—ie belief systems—and the external environment—ie institutions.

Part of the scaffolding is an evolutionary consequence of successful mutations and is therefore a part of the genetic architecture of humans; part is a consequence of cultural evolution. Just what the mix is between the genetic architecture and the cultural heritage is in dispute. Evolutionary psychologists have stressed the genetic architecture in the scaffolding process at the expense of the role of the cultural heritage. In particular they have stressed the genetic component underlying cooperative behavior.

Recent research by experimental economists lends some support to the evolutionary psychologists' position. In a recent paper by Elizabeth Hoffman, Kevin McCabe, and Vernon Smith summarizing a large number of experimental game results they report:

“...people invoke reward/punishment strategies in a wide variety of small group interactive contexts. These strategies are generally inconsistent with, but more profitable than, the noncooperative strategies predicted by game theory. There is, however, consistency with the game theoretic folk theorem which asserts that repetition favors cooperation, although we observe a substantial use of reward/punishment strategies and some achievement of cooperative outcomes even in single play games.

Non-cooperative outcomes are favored, however, where it is very costly to coordinate a cooperative outcome, in larger groups, and even in smaller groups under private information. In large groups interacting through markets using property rights and a medium of exchange, and with dispersed private information, non cooperative interaction supports the achievement of socially desirable outcomes. Experimental studies have long supported this fundamental theorem of markets. This theorem does not generally fail, however, in small group interactions because people modify their strict self-interest behavior, using reward/punishment strategies that enable

some approximation of surplus maximizing outcomes. Seen in the light of evolutionary psychology, such behavior is not a puzzle, but a natural product of our mental evolution and social adaptation.” (1995)

Others such as Stephen J. Gould have suggested that there is a lot of slack in the genetic architecture, which gives greater scope to cultural evolution. Gould has maintained not only that the selection environment changes but that in many cases it is relatively “loose,” resulting in survival in which chance and breeding capabilities rather than competitive pressures may play a major role. The immense variation in the performance characteristics of political/economic units makes clear that the cultural component of the scaffolding that humans erect is central to understanding the performance of economies over time.

The cultural component of the scaffolding consists of multi-generational evolution in a society of language, rules, norms, tools, and behavioral patterns that not only are fundamental constraints on choices at a moment of time but also underlie path dependence--the way in which the past influences the present and future direction of choices. The intimate connection between the evolution of beliefs and the evolution of institutions is captured in Edwin Hutchins, Cognition In The Wild, which argues that a theory of cognition must come after, rather than before, a description of the cultural world in which human cognitive behavior is embedded.

Let me tentatively suggest a general approach to learning and belief systems derived from cognitive science in order to focus on the issues of this paper.⁴ Learning entails developing a structure by which to make sense out of the varied signals received by the senses. The initial architecture of the structure is genetic but its subsequent development is a result of the

experiences of the individual. The architecture can be thought of as generating an event space which gets used to interpret the data provided by the world. The experiences can be classified into two kinds--those from the physical environment and those from the socio-cultural linguistic environment. The event space structure consists of categories--classifications that gradually evolve from earliest childhood on in order to organize our perceptions and keep track of our memory of analytic results and experiences. Building on these categories we form mental models to explain and interpret the environment, typically in ways relevant to some goal. Both the categories and the mental models will evolve to reflect the feedback derived from new experiences--feedback that may strengthen and confirm our initial categories and models or may lead to modifications: in short learning.

The world is too complex for a single individual to learn directly how it all works. Each individual's mental models are derived from experiences--experiences that are specific to that individual and accordingly, give him/her, to some degree, unique perceptions of the world. The mental models would tend to diverge for this reason if there were not ongoing communication with other individuals with a similar cultural background. The cultural heritage--the socio-cultural linguistic background--provides a means of reducing the divergence in the mental models that people in a society have and for the intergenerational transfer of unifying perceptions. This cultural learning not only provides a means of internal communication but also provides shared explanations for phenomena outside the immediate experiences of the members of the society in the form of belief systems to explain the larger world around us. The ubiquitous existence of "beyond rationality" beliefs in all organized belief systems suggests that it may be a

⁴ The rest of this section draws on Denzau and North, (1994), Holland et al, (1986), Dosi, Marengo, and Fagiolo, (1996)

superior survival trait to possess some explanation rather than no explanation for phenomena beyond our scientific reach. Such belief systems, both religious and secular, provide explanations in the face of uncertainty and ambiguity and are the source of decision making.

The foregoing oversimplified account of learning and belief systems raises three fundamental issues for the study of economic performance through time, all related to the “bounded” nature of the rationality of the actors and particularly as a consequence of the imperfect feedback that the actors receive as a result of their choices:

The first, in the tradition of Simon, is what difference does it make that the agents fall far short of substantively rational behavior (full knowledge of all possible contingencies, exhaustive exploration of the decision tree, and a correct mapping between actions, events, and outcomes)?

Second is it possible that the agents simply get it wrong in terms of modeling the process of change or representations of the environment?

Third it may be that the past experiences of the actors lock them in to a belief system and institutional framework that however well they have solved previous problems are strikingly bad at solving new problems.

Below I shall argue that all three of these failings of human decision making have characterized our historical experience and there is no reason to believe that they are not equally operative today and tomorrow.

5) History is a record of unanticipated consequences and outcomes of decisions made in the face of uncertainty. It could hardly be otherwise. The knowledge required to deal “effectively” with the problems humans have faced has vastly exceeded humans’ competence. We may write economic history as a great success story of the enormous increase of material

well-being. But it is also a vast panorama of decisions that have produced death, famine, starvation, defeat in warfare, economic decline and stagnation, and indeed the total disappearance of civilizations. And even the decisions made in the success stories have typically been a mixture of luck intermingled with shrewd judgements and unanticipated outcomes. Take American economic history. From the earliest attempts at settlement, through the colonial era, to the perceptions leading to the revolutionary war the colonists had it, at best, half right. The Constitution, surely a classic of shrewd judgement, was aided by chance (the events of the 1780s), luck (the boycott of the Convention by the anti-federalists), and unanticipated decisions (the development of the independent Judiciary and the Marshall court).

While the rise (and demise) of communism, which has dominated much of twentieth century history, is the most recent example of agents getting it wrong it is only one among many examples. Such choices made throughout history have sometimes been “ad-hoc” rather than derived from organized belief systems but the latter have played a key role. Religious dogma has dominated such organized perceptions from the medieval Church to Shiite fundamentalism in our age. And indeed religious beliefs have played (and continue to play) an important role throughout our history.⁵ Frequently the sources of decisions have been incomplete rather than comprehensive ideologies, such as the conservative and liberal ideological stereotypes in current decision making.

A major historical obstacle to economic growth has been the inability of societies to move from personal to impersonal exchange--a necessary condition to realize the gains from trade of larger markets. In both historical and contemporary societies the inability to create economic and political institutions that would undergird efficient political and economic markets

has been and continues to be the fundamental impediment. This inability has had as its source a set of institutions and beliefs that however well they lent themselves to solving past problems did not adapt themselves to solving new problems. Avner Greif (1994) recently compared Genoese traders with traders who had adopted the cultural and social attributes of Islamic society in the Mediterranean trade of the eleventh and twelfth centuries. He detected systematic differences in their organizational structure traceable to contrasting individualistic versus collectivist behavioral beliefs. The traders from the Islamic world developed in-group social communication networks to enforce collective action which, while effective in relatively small homogeneous ethnic groups, did not lend themselves to the impersonal exchange that arises with the growing size of markets and diverse ethnic traders. In contrast the Genoese developed bilateral enforcement mechanisms which entailed the creation of formal legal and political organizations for monitoring and enforcing agreements--an institutional/organizational path that permitted and led to more complex trade and exchange. Path dependence is still an incompletely understood phenomenon that constrains the choice set over time. It is clearly related to the receptivity of a belief system to institutional and technological innovation.

The foregoing emphasis on the limited capacity of humans to solve the complex problems we have faced throughout history can explain the diversity of economic performance in the past (and present) but there is the dynamic history to be written of the process of change which, while it must include our very imperfect perceptions as a part of that process, must explain the phenomenal growth that has occurred. This story must incorporate the interplay between the three strands of economic history--institutional, demographic, and stock of knowledge--over time. It has been a dynamic process in which changes in one strand --technology for example--

⁵ See Robert Fogel, The Fourth Great Awakening, forthcoming 1997

not only led to further changes in that strand in the tradition of Schumpeter but also induced changes in the other strands--institutional and demographic--mediated by the way in which perceptions evolved. It is doubtful if we can ever put it altogether or even agree on one unified explanation but we can go much further in understanding this historical process and it must be the greatest challenge confronting economic history scholars.

6) It is easier to answer the second question than the first. I do not believe that a dynamic theory of change comparable to general equilibrium theory is possible. Humans by their actions are altering the future landscape and therefore the conditions for survival and economic performance. Our ability to predict that landscape very far down the road would require that we could predict what we will learn in the future. It also entails predicting the way non-human factors may alter that landscape in the future. Our laboratory is our past experience which, while it can provide some "lessons from history," is equally prone to intellectual path dependence. What worked in the past may not work in the future with the changes in the environmental landscape.

However we can do better than we have done to date. We can learn what has worked in the past, what works today and therefore probably will work tomorrow. We can develop some limited generalizations about economic change that will take us much further than our current status. In particular we can accumulate sufficient evidence to develop some limited generalizations about political and economic change that will allow us to understand the immediate process better and therefore immensely increase our ability to improve performance.

For example:

While we know something about the way the formal institutional rules change we know all too little about the way the informal constraints of norms and conventions evolve. Since they

are the key to cultural evolution, an understanding of the way they evolve would be a major step forward.

A more general theory of the political process is, I believe, possible and should enable us to make political markets more efficient.

We need to discover what is happening to transaction costs. Historically their growth in developed economies was a necessary accompaniment to realizing the productivity gains of the second economic revolution. Is that still the case? Or is their current growth a reflection of the increasing costs of coordinating ever more complex political-economic societies and therefore a source of the modern productivity slowdown?

We need to understand path dependence and its implications because it plays a major role in constraining change. As yet we know only that it is a fundamental regularity that makes clear that history matters. But the gradual accretion of empirical evidence should enable us to understand exactly what are the sources of path dependence. We would then be in a position to know what and when changes can be undertaken to improve performance.

7) The foregoing discussion suggests that our potential foresight is relatively limited. Forecasting what humans will learn and how the human environmental landscape will change in consequence of that learning and non-human alterations is beyond our capacity and in consequence imposes severe temporal limits on our understanding of economic performance in the future.

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