

Toward an Entrepreneurial Society

Why Measurement Matters

This historic and irreversible change in the way of doing things we call “innovation” and we define: innovations are changes in production functions which cannot be decomposed into infinitesimal steps. Add as many mail-coaches as you please; you will never get a railroad by so doing.

— *Joseph Schumpeter*

Entrepreneurship and innovation are everywhere. Even in the world’s most remote and impoverished places, the fabric of daily life is today continually being rewoven by gradual improvements in existing goods and services and by radically new inventions, unimaginable but a few years or even months before their sudden appearance. From “Moore’s Law” to gene therapies, technological advance combined with entrepreneurial initiative continues to deliver on the promise of “better, faster, cheaper.” Such changes enhance the human experience directly, and also drive sustained economic growth that improves lives further.

Given the importance of innovation to individuals and societies everywhere, the global inadequacy of tools—even a rigorous vocabulary—to measure innovation and trace its effects is striking. Yet, considered in a historical context, the shortcomings of current systems of measurement are also not surprising.

The puzzle of sustained growth, and its relationship to entrepreneurship and innovation, is a fairly new one. Prior to the Industrial Revolution, growth was an unknown dimension of human experience. For millennia, mankind experienced little substantive change in the flow of goods and services; accordingly, centuries came and went with lives changing little. Even more importantly, global wealth remained stagnant—few people became richer and few poorer. If there appeared to be an expansion of wealth in one locale, it usually entailed armed conflict in which static goods or precious metals were wrested away from another family, city, or nation.

The dominant tools for understanding economic life—those associated directly with the “marginalist revolution” of the late 19th and early 20th centuries—are

Carl J. Schramm is president and chief executive officer of the Ewing Marion Kauffman Foundation.

well suited for the study of individual consumption decisions or the behavior of existing firms in stable markets; they are, however, very poorly suited to studying the relationship between economic growth and economic knowledge.

The framework of data infrastructures employed today to track economic performance in developed countries as well as developing ones is similarly ill-suited to tracking change in today's dynamic economy. The core systems on which we depend were conceived largely in response to the Great Depression. Somewhat

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later, in the mid-1950s, Robert Solow pioneered a field of study and inspired a generation of his peers with the finding that 87% of U.S. economic growth in the first half of the 20th century could not be explained by the accumulation of capital and labor, the conventional “factors of production.”¹ Solow attributed this unexplained “residual” in economic growth accounting to technical change.

Subsequent generations of economists, including Arnold Harberger, Paul Romber, and

Elhanan Helpman, have looked closely at innovation and how it drives growth in different sectors of the economy.² At the same time, our statistical agencies have been remarkably competent at maintaining and refining public data series.

Yet neither models nor methods of data collection have kept pace with the rapid pace of change in today's world. Whatever innovation is (and the concept does present significant definitional problems), its force in the economy continues to be captured mostly indirectly. As a consequence, though macroeconomists and statistical agencies have made progress in establishing a link between innovation and growth at the scale of entire national economies, the lack of systems to measure and track innovation at a more fine-grained level has developed into a fundamental challenge to the formation of public policy.

MEASURING INNOVATION

There is today no single approach to measuring innovation that dominates the rest. Perhaps this will always be the case. The very nature of innovation suggests that it will never yield to a tidy and static metric. An enormously complex economy produces millions of ways in which “better, faster, cheaper” comes into play every single day.

An obvious alternative to a single measure would be an aggregate measure of an entire economy's innovation capabilities—a universally adopted “innovation index.” This approach was one of a number recently considered by the Advisory

Committee on Measuring Innovation in the 21st Century Economy, of which I served as the Chair, and from whose report the material in the first part of this paper derives.³ The conclusion of the Committee was that, given the current state of research on innovation and economic growth, the creation and implementation of such a single index would be unwise. A single index would be hard to construct and harder still to defend. Innovation being innovation, it would hardly be established before it would have to be changed. Moreover, the economy does not innovate evenly: there will always be some firms and sectors that innovate at a greater pace than others. Creating a single index that treats innovation as a single phenomenon might lend itself to policy distortions. It would be used immediately in discussions of what policy steps might be appropriate to stimulate innovation, and an error in the construction of such a unitary index could play through to disastrous consequences.

Yet, while definitive answers are not attainable, it is possible to establish initial signposts to direct what will necessarily be a very long, maybe never-ending journey of inquiry and measurement.

To begin to zero in on the contribution of innovation, better measures of the growth in “total factor productivity”—the change in productivity left over after taking account of the growth of capital and labor—are required. But, total factor productivity is a surrogate approach. Such a measure only accounts for a portion, albeit a large portion, of the change in the economy’s performance that might be said to be innovation. There are other measures that add more texture to the task but make any approach to an inclusive measure that much more difficult.

The improvement, integration, and expansion of current data collection efforts is certainly an attainable goal. Statistical systems in OECD countries, and increasingly in newly developed and developing countries, capture two of the major inputs that are linked to the innovation process: research and development spending, and the number of engineers, scientists, and technicians employed. In addition, data are collected on some other categories of investments, such as expenditures on information technology equipment, which is certainly a factor in expanding innovation. National systems of innovation also measure the number of innovations that are protected by newly-issued patents each year. But, in many firms and industries, significant amounts of investments in innovation are made outside of these categories and are consistently unaccounted for by current statistical system. Indeed, even for the variables we measure, such as research and development, a need exists to update the way in which these measurements are quantified, the frequency of our measurement, and the coverage of younger firms and emerging industries. Also of value would be a more finely calibrated measure of how firms invest in the inputs that become innovation, especially human capital.

In the absence of common public measures of the scope of innovation, many surrogates have sprung up in the private sector. Numerous interest groups, industry associations, and think tanks produce indices of innovation that should be considered as part of the expanding mosaic of data sources. In fact, one of the innovations resulting from this report might be that the government absorbs several of

the most statistically valid private sector data series into its own overall measures of innovation.

LINKING INNOVATION TO GROWTH IN ADVANCED ECONOMIES

How can improvements in measurement assist in the design and implementation of public policies conducive to continuous and sustained growth in advanced economies, including those of OECD countries? Improvements in innovation measurements will only result in better policies if such improvements are paired

with a better understanding of the pathways that connect innovation to growth. Indeed, growth should be the touchstone of policy, and in the case of innovation, it is important to understand its role. Without improved understanding of innovation processes, policy interventions, either to quicken innovation or to shift its course, may well be ineffective or even counter-productive.

Yet, in the absence of the enhanced data systems and improved understanding for

which I have advocated, it is difficult to say what policy should be; some things are understood and should inform policy considerations. Most notable among these is the role of entrepreneurs in motivating innovations and magnifying their impact.

Innovation propels growth by pushing existing companies to real cost reductions and new firms toward growth. In the United States, every year, roughly thirty-one firms achieve “top line” revenue in excess of \$1 billion.⁴ Each one of the firms that experiences this kind of growth takes as its basis some innovation in the nature of its products or in the nature of its approach to marketing. Entrepreneurial activity, both in start-ups and in existing large-scale companies, is critical to success at this level. Every entrepreneur is a party to innovation; in fact, it could be said that entrepreneurs are to our economy as the marines are to our armed forces. Calculated risk taking, with a goal that is often only defined as “let’s win,” is the mindset of entrepreneurs, both those working on their own and those who shoulder the path-breaking and often risky task of changing the culture and identity of mature firms. To make the economy more congenial to innovation is to construct an economic culture that appreciates what entrepreneurs do.

Our economic “ecosystem” can be helpful to innovation and its ability to flourish. Policy thus should first focus on putting in place improvements to our measurement of innovation and then focus on factors already understood to be key factors for innovation. Without doubt, it is critical for economies everywhere to have

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people who are skilled and trained to see opportunities where “better, faster, cheaper” can be realized. This means in real terms that schools, community colleges, and university-level institutions must prepare more of our young citizens to be better able to advance technical insights such that innovative products and services continue to flow into our economy.

If countries—rich and poor alike—are to grow and benefit from inexorable processes of globalization, they need more and more citizens ready to take entrepreneurial risk. Such individuals must flow from institutions attuned to producing particularly creative people for the new economy. If such institutions do not abound “at home,” then processes must be in place to incentivize those who leave for training abroad to return for innovation at home.

Individuals able to work across, as well as within, existing bodies of knowledge will continue to be particularly prized. Recent economic and psychological research has confirmed what scientists and entrepreneurs have known for decades: innovative breakthroughs frequently come at the estuary region where different fields, not necessarily related, intersect. This means that much more cross-disciplinary training is needed, where the edge between fields can be developed for the innovations that lie within.

ENTREPRENEURSHIP, INNOVATION, AND DEVELOPMENT

Distinct challenges face developing countries—both rapidly industrializing large nations (Brazil, China, and India in particular) and the more slowly developing nations burdened by persistent poverty. In places where the institutions that enable an entrepreneurial society are weak or absent, the priorities for innovation measurement are not on science-based innovation but rather on such fundamentals as the time and cost required to start a business.

In many developing countries, starting a business is fraught with expensive and time-consuming red tape. While all the paperwork for starting a corporation in the United States can be complete in a day, according to the World Bank it takes 153 days in Mozambique to incorporate and register a firm, 151 days in Indonesia, and 40 days in El Salvador. That must change. Understanding and, importantly, measuring the challenges that face entrepreneurs in different parts of the world is a start.

Often, governments only know of such problems when they are not just identified, but measured. So the real questions for developing economies are: What aren't you measuring? How efficient is my nation's adjudication of property and contract disputes? Is human capital—literacy and numeracy—improving? Fast enough? How responsive is the financial system to new businesses?

Many of us have by now heard of the World Bank's *Doing Business* report, and its impact on development is impressive. But even more impressive is that these measures were first published in 2004. In less than half a decade, these simple but powerful numbers have created transparency into national growth barriers, where before there was only general agreement that such barriers existed. Likewise, sim-

ilar measures of national economic institutions such as the *Index of Economic Freedom* published annually by the Heritage Foundation and the *Wall Street Journal* have been in existence for just over a decade. These indices are widely cited and provide powerful support for reform, and the lesson to be drawn from their relatively recent introduction and quick impact is that the winds of reform have just begun to blow. Which nations catch those winds, or better, are inspired to cre-

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ate their own internal winds of reform, will determine which nations grow fastest in the 21st century.

Nations aiming to accelerate their economic growth will not wait for the World Bank to update its annual metrics. Instead, they will challenge themselves to create new accounts and metrics of economic efficiency, entrepreneurship, and innovation. Those that measure first will have a head start on improving their eco-system and be most likely to yield greater growth in the decades ahead.

More also must be done overseas to promote a real symbiosis between established firms and entrepreneurs. Above all, developing countries must ensure that there is a level playing field between old and new firms. The OECD countries generally try to achieve this in a variety of ways, such as by protecting intellectual property and discouraging monopolies and unfair trade practices. Developed and developing nations alike must resist pressures from existing businesses to preserve markets and prevent innovation.

The most promising entrepreneurs should be helpful in finding big corporations as partners, which in today’s global economy can include corporations based in the United States or elsewhere. Developing countries’ own large firms and government agencies also could be given incentives to support employees who have good ideas for spin-off companies. To understand success along these vital dimensions, developing nations need to go beyond aggregate export statistics to gather data on the extent to which local entrepreneurs are integrating into global supply chains and knowledge networks.

In the government sector, nations should do as much as possible to invest in infrastructure that supports entrepreneurship. South Korea offers a good example, with its efforts to promote end-user connectivity to the Internet. An estimated 60

to 70 percent of the country already has high-speed broadband access. One rationale for this investment has been to make government more efficient and responsive by moving citizens' interactions online. But the policy is also helping to build a countrywide platform for entrepreneurship: every South Korean will soon be linked to massive online flows of knowledge and to online markets. Local and regional measures of the extent of the "digital divide" need to reflect new realities by taking into account rapidly expanding cell phone usage. Public policies should support—or at a minimum, not obstruct—new and existing information and communications services that offer customers new tools for doing business.

High-impact entrepreneurship will thrive most in countries that pay proper attention to all four sectors of the entrepreneurial system. China is an example of a developing nation that does. While adopting policies that actively encourage entrepreneurship, Beijing is pushing to have 20 percent more of its college-age population enrolled in higher education, for example. And it is developing high-skill, high-tech business in tandem with low-wage contract manufacturing, steel-making, and other basic industries. China seems to understand that the commodities it currently manufactures can be obtained from less developed countries and that many of the world's highly sought-after goods will come from laboratories, skilled people, and entrepreneurs. Investment guided by measurement is an important element in its strategy. As a result, China may well arrive in the post industrial age very quickly.

TOWARD AN ENTREPRENEURIAL SOCIETY

It is better to travel an illuminated path toward future economic progress than to stumble in an unlit direction. Measuring innovation is central to understanding economies everywhere as they evolve and adapt in the face of globalization. Improvements to our measurement of innovation will help to ensure sustained economic strength and improvements in human well-being.

Decades of disappointing development will not be reversed unless indicators of societal advancement keep pace with changes in the way society functions. For emerging economies as well as established ones, national income accounts developed three generations ago to measure macroeconomic performance need to be complemented by "national opportunity accounts" tracking the leading indicators of change in the 21st century.

To be sure, updated approaches to measurement will not create an entrepreneurial society. However, measurement is a first step toward accountability, which in turn is an essential element of good government. Countries that—whether through private initiative or government action—create conditions favorable to entrepreneurship merit the recognition that can come with appropriate measurement. Where opportunity is present and widely perceived, investment and future growth may then follow naturally.

Past experience indicates that movement toward an entrepreneurial society will have profound and lasting effects that go beyond economics. As individuals

step into the market, assume risk, and work to turn their aspirations into businesses, they will insist on political as well as economic liberalization. In this manner the expansion of entrepreneurship is linked to the development of freedoms. Ironically, entrepreneurs, who are by nature agents of change, may prove in the coming century to be among the most important forces of global stability.

For those who worry about questions related to expanding human welfare through technical change and economic growth, the systematic measurement of innovation and its impact is, for all of the reasons sketched above, arguably the most important social science challenge of our times. Without effective measurement and assessment, poor decisions will follow. This is no small matter. As Lawrence Summers has observed in the pages of this journal, “It is a tragedy—it is, in a sense, killing people—when resources are poorly allocated.”⁵

If history has any global lessons, one is that valuable public resources that are taken for granted soon become scarce or disappear. The institutions that underlie the prosperous economic system we all share—what I have referred to as “entrepreneurial capitalism”⁶—are no different. Accountability for the future means accounting for the present.

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1. See in particular Robert Solow, “A Contribution to the Theory of Economic Growth.” *Quarterly Journal of Economics* 70:65-94 (1956); see also Edward F. Denison, “Sources of Economic Growth in the United States and the Alternatives before Us.” (New York: Committee for Economic Development, 1962). For a more recent treatment, see William Baumol, David S. Landes and Joel Mokyr (2008), *Entrepreneurship and Economic History*. Princeton, NJ: Princeton University Press.
 2. Notable in this context has been the work of Dale Jorgenson, spanning over thirty years. See, most recently, Dale Jorgenson, Mun Ho, and Kevin Stiroh (2005), *Information Technology and the American Growth Resurgence*, Cambridge, MA: MIT Press.
 3. Schramm, Carl J., “Why Innovation Matters,” in *Innovation Measurement: Tracking the State of Innovation in the American Economy, A Report to the Secretary of Commerce by The Advisory Committee on Measuring Innovation in the 21st Century Economy* (Carl Schramm Chair); January, 2008.
 4. Thomson, David G. 2006. *Blueprint to a Billion: 7 Essentials to Achieve Exponential Growth*. New York: John Wiley & Sons,
 5. Lawrence Summers (2007). “Solutions Within Reach.” *Innovations* 2:4; p. 13.
 6. Carl J. Schramm (2006). *The Entrepreneurial Imperative*. New York, NY: Harper Collins.