Introduction

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The single most important measure of an economy's success over the long run is its record on growth, for it is only through the production of more goods and services with a given labor force that residents will be able to enjoy continued improvements in their standard of living. Rapid growth, in turn, requires not only high rates of saving and investment, but most importantly, continued innovation: new products and services, and new ways and methods of producing and delivering them.

But inventions alone do not generate innovation. Only when inventions are commercialized – bought by willing buyers – are they diffused throughout an entire economy, thereby raising output. Entrepreneurs, those who launch new enterprises, have proven to be vital to this commercialization process, at least in the United States. Whereas existing firms with well-established products and customer bases may concentrate on incremental improvements of what they already offer, entrepreneurs who have no stake in the status quo may be willing to take bigger risks with untested, or even 'radical' ideas. It should not be surprising, therefore, that some of the more important 'radical' inventions of the past two centuries have been brought to the marketplace by one or more entrepreneurs rather than by existing firms. Prominent examples include the telegraph, telephone, radio and television; railroads, airplanes and automobiles; computers and the software that runs on them; and air conditioning (Baumol, 2002).

Entrepreneurial activity can thrive, however, only in 'open' settings in which consumers and firms are free to transact with one another. Without such freedom, few would rationally take the risk of launching an enterprise that can only succeed by persuading customers to freely enter into new transactions by purchasing new goods or services, or if the entrepreneur is selling something that is already found in the marketplace, to switch from existing suppliers to a new one. By the same reasoning, the more customers who have the ability to make these choices, the greater the potential rewards that entrepreneurial success can bring, which in turn should

encourage more entrepreneurial risk taking. Openness and entrepreneurship, therefore, should be mutually self-reinforcing.

In fact, economies around the world have become much more open in the post-World War II era. Governments have lowered or erased legal barriers to trade and the movement of capital and people, both within and across national boundaries. Continued advances in communications and transportation also have sharply reduced the costs of search and transacting. Not coincidentally, living standards for billions of people, in developed and less-developed economies alike, have risen dramatically.

The rapid changes that openness has facilitated also can be threatening. Firms that are not equipped to respond to shifts in customer tastes or to adopt new modes of production, and workers who have difficulty adapting to new job requirements, can find themselves worse off in the highly competitive environment of an open economy. Some may be displaced for lengthy periods of time. Many who promptly find alternative lines of business to pursue or jobs to take may take a cut in income. Others who are not immediately affected by the competition may still fear the worst. For all of these individuals, openness is likely to be viewed more as a curse than a blessing.

Through most of the post-World War II period, in much of the world, the beneficiaries of growth and change, including those who have expected to benefit, have outnumbered or have exerted more political influence then those who have been hurt or feared a loss in economic position. How else can one explain the successive multilateral trade agreements that have lowered the barriers to commerce between countries?

But attitudes toward openness – especially to flows of goods, services and people across national borders – have been shifting in recent years. The chaos of the anti-globalization demonstrations of the late 1990s and the early 2000s may have receded, but significant segments of developed country populations have become anxious about the perceived threat to their jobs and wages posed by the willingness of able workers in less-developed countries to work for much lower wages. So far, this anxiety has made governments more hesitant to pursue new trade agreements. Whether it will induce governments also to backtrack from earlier deals and/or encourage them to regulate domestic economic activity in ways that slow the pace of change within their countries remains to be seen.

Given this apparent shift in attitudes toward openness, the Kauffman Foundation and the Max Planck Institute believed it appropriate to bring together a group of leading scholars in July 2007 to reconsider various ways in which openness is connected to entrepreneurship, innovation and economic growth. This volume contains the papers presented at this conference.

To be sure, the skeptics thus far have focused their critiques on 'external' openness – or the ease of transacting with parties from other countries. For this reason, the next three chapters following this introduction concentrate on the linkages between this type of openness and entrepreneurship. Less noticed, but potentially just as important, is the linkage between 'internal' openness – that is, culture or the ease of transacting and/or moving within countries – and entrepreneurial activity. The last three chapters of this volume focus on these aspects of openness and entrepreneurship. Taken together, the various chapters paint a complex, though clearly positive, portrait of the ways in which open economies lead to more entrepreneurial activity, which augments growth.

The positive relationship between growth in international trade and economic growth has been well established. Over the past two centuries, world economic output (GDP) has increased by a factor of 40, while the share of exports in world GDP – a measure of the importance of trade – has multiplied by a factor of 13. Together, these two statistics imply that world trade has increased in volume during the past two centuries by 54 000 per cent!

In Chapter 1, William Baumol of New York University explores how entrepreneurship has been critical to the growth of trade, and why it will continue to be important in the years ahead. We have just noted in this introduction the contribution of entrepreneurs toward the continued innovations in transportation and communications that are very much responsible for the growth of trade. To these innovations Baumol adds another, less obvious but no less important advance: the introduction and now widespread use of the giant shipping container, which has dramatically lowered the costs of moving items between and within countries. He further highlights the role that trade and the entrepreneurs who made it possible played in the economic development of the Netherlands, a tiny country without natural resources but which nonetheless enjoyed the most rapid growth in Europe and indeed the world over a span of four hundred years, from roughly the year 1400 to the year 1820.

It is not only goods and services that cross national boundaries and thereby enhance economic welfare, but also technology. Baumol notes the transformative impact that the importation of railroad technology from Great Britain had on the United States in the 18th century. More recently, he observes that while the United States and Japan currently each account for about 30 per cent of the world's patents, even these shares are so small that both countries must continue to import advanced technologies developed elsewhere in order to remain economic leaders.

Yet as we have just noted, trade creates losers as well as winners, especially when skills and technologies exist in many countries to make or

deliver the same products. Baumol argues that in such a circumstance, workers in these countries compete with one another, and thus low wages in one location can exert downward pressure on wages in other, richer societies.

More broadly and controversially, however, Baumol further argues that the outsourcing of some production from high-income to low-income countries can raise productivity and wages in low-income countries and thereby cause the price of other products they export (and which are not beneficiaries of outsourcing) to rise. This price increase may result in greater consumer costs than the consumer benefits from the outsourcing. As Baumol sums it up:

> It still will *usually* remain true that trade will yield benefits to both trading countries, and that the country with the enhanced productivity will increase its gains from trade. But the law of comparative advantage, itself, *says nothing about how the total gains from trade will be shared between the countries at issue* (emphasis added).

Entrepreneurship, however, offers a way out of this dilemma. Open trade has been opposed throughout much of US history, in part, out of a fear of 'cheap foreign labor'. The United States nonetheless has profited from its dealings with the rest of the world by continuing to innovate, thus producing unique products that are desired at home and elsewhere in the world. Given the central role that entrepreneurs have played in this innovation process, Baumol argues that entrepreneurs are key to ensuring that open trade in the future translates into gains rather than pains for the United States.

Given the linkages between entrepreneurs and the global economy, it is natural to ask how innovations (many of them commercialized by entrepreneurs) diffuse throughout the global economy. In Chapter 2, Catherine Mann of Brandeis University and the Petersen Institute for International Economics uses data on venture-backed deals in the information technology (IT) sector to examine how the US venture capital industry itself is globalizing.

Mann begins by briefly summarizing the two classic discussions of the innovation cycle, the 1967 product cycle model developed by Raymond Vernon and the 1976 paradigm of foreign direct investment developed by John H. Dunning. Vernon posited that rich countries, with the most sophisticated tastes, drive innovation. Once new products are introduced in these economies, they are standardized and exported, and eventually manufactured abroad in lower-wage economies and shipped back to the originating country. Vernon did not focus on ownership links between firms in home and foreign economies. In Dunning's paradigm, firms weigh

three factors when deciding to produce abroad: the benefits of the foreign location (such as lower wage costs, transportation costs and communications facilities), the firm's own advantages, and the relative costs and benefits of various forms of contracting out (such as through licensing). Dunning originally analyzed patterns of innovation between firms in the home country and foreign economies.

Mann offers her 'globalization of venture capital model' as a synthesis of the Vernon and Dunning models. In particular, in Mann's model, venture funds an innovative product, whether produced at home or abroad. The conventional wisdom has been that venture firms require geographic proximity to the companies they invest in and thus invest only close to home. That venture is going global may reflect either or both of two considerations: the opening of once-closed foreign markets to foreign direct investment, or greater demand abroad for venture financing.

For insight on what may be driving the globalization of venture finance, Mann uses a database compiled by Thomson Financial on venture-backed deals by US venture firms in IT from 1980 to 2005. Mann focuses on IT because of rapid innovation in that sector and the high share of IT in venture capital investment over the past two decades.

First, how important are foreign firms as portfolio investments for venture firms? In absolute dollars, such investments peaked in 2000 at $13 billion, and since then have fallen back to roughly $3 billion annually.

Second, what countries do venture firms seem especially interested in? The top two destinations have been the United Kingdom and Canada, both developed economies. Only three of the top fifteen destination countries can be characterized as low-wage economies: Brazil, China and India. This broad geographical pattern is inconsistent with the view that venture firms investing abroad seek out portfolio companies that have the advantage of lower wages, either at the start-up stage or in later rounds of financing. However, when Mann disaggregates the data by type of IT company, she finds that venture financing of portfolio firms in China in particular has been concentrated in the hardware segment, which is consistent with the low-wage thesis.

Third, Mann investigates the extent to which patterns of demand have affected foreign direct investment by venture firms. In particular, she notes that whereas demand in industrial countries has been strong for the past decade in all segments of the IT sector – software, IT services, hardware and communications – spending in developing countries on IT has been much greater on IT hardware and communications than software. Might this have influenced the type of foreign firms in which venture firms have invested? Mann presents data that is consistent with this 'demand pull' hypothesis.

Fourth, Mann notes that venture firm investments in U.S. IT companies has followed a predictable pattern, initially concentrating on operating systems and specialized tools controlling the 'inside' of the computer, and then moving to support effective use of the computer through more innovative applications software. Mann doesn't find this pattern being replicated in venture investments in foreign portfolio companies. There the investment has remained concentrated on operating systems and specialized tools, but has not gravitated toward business applications. Mann suggests a reason: that applications in foreign markets require localized knowledge that is not well suited for financing by US-based venture firms. The exception is venture investment in foreign firms specializing in entertainment, gaming and scientific software, where the markets are more global.

Finally, Mann reports that venture firms have been moving away from financing start-ups in India and China, and instead concentrating on acquisitions and firms engaged in later-stage development. Foreign start-up investment is concentrated on more developed economies – Sweden, Israel and the United Kingdom, in particular.

Whereas Baumol examines whether 'offshoring' helps or hurts the economies of firms engaging in the practice and Mann looks to the foreign activities of US-based venture firms, Amar Bhidé of Columbia Business School in Chapter 3 examines why venture-backed U.S. firms have engaged in offshoring – outsourcing some of their functions to foreign firms. His findings are based on surveys of roughly 100 chief executive officers of such venture-backed companies.

Bhidé reports that the firms in his survey used offshoring only to a limited extent. They generally were reluctant to develop their core products or services in far-off locations, even if labor costs there were much lower than at home. Other factors which limited offshoring included the firms' managerial inexperience in such matters, the limited supply of capable workers in offshore sites coupled with the strong demand for them from larger companies engaged in offshoring, difficulties in communications across multiple time zones (despite the Internet) and cultural differences.

Nonetheless, among those venture-backed entrepreneurs who engaged in some kind of offshoring, why did they do it? Some of Bhidé's interviewees suggested that they had 'no choice' – because no domestic supplier of a critical input or component was available, or because the idea or product behind their business initially was developed abroad. Others who offshored by choice cited the advantage that overseas sourcing provided because their founding team had experience with such practices, or because they were encouraged to do so by their investors. Although the general impression is that firms offshore because of cost, the respondents to Bhidé's survey offered more nuanced explanations: costs did matter for some, but

others stressed that offshoring enabled them to circumvent tight local labor markets or speed their product development.

One function that most venture capital (VC)-backed companies had not offshored was research and development, at least thus far. The respondents cited the need to keep their R&D staff close to home and thus close to customers. Some companies reported that it was difficult to partition R&D activities, with some pursued on-shore, others at a distant location. Others who kept their R&D functions at home also pointed to cultural differences that would pose coordination and management problems if all or a portion of their research and development were offshored.

Respondents singled out the development of cutting-edge software, which typically requires small groups of highly motivated, highly skilled programmers. Given the high stakes involved, companies deciding not to offshore software development reported that the relatively small savings in labor costs weren't worth the benefits of finding and using such talented individuals at home. The CEO respondents were more comfortable, however, offshoring more routine functions, such as data entry and call centers and some routine manufacturing activities, a finding that accords with popular perceptions about offshoring.

Another factor that mitigated the desire of CEOs to offshore was a concern that valuable intellectual property could leak abroad, to the long-run detriment of their companies. This concern was voiced more strongly about China than about India, however. A related concern about offshoring was the weak enforceability of contracts in foreign locales, again especially with respect to activities in China.

Bhidé devotes special attention to attitudes toward offshoring of CEOs of companies engaged in the development of pharmaceuticals and medical devices. Here, too, the popular perception is that such companies want to offshore clinical trials to low-wage countries to save on testing costs. But the pharmaceuticals developers in Bhidé's survey were more circumspect. Some reported concern that the large 'contract research organizations' (CROs) that engaged in such testing would not give sufficient attention to start-up companies. Others reported that patients for testing were more available in Europe, not in low-income countries such as India. Manufacturers of medical devices, however, had more favorable attitudes toward offshoring, but only for clinical trials and not for other R&D functions.

Bhidé concludes by contrasting the responses of the VC-backed companies with much larger enterprises, those on the Fortune 100. The larger companies were more active in offshoring, and Bhidé offers several reasons for this. Large companies have more financial resources, more experienced global managers and greater experience conducting business abroad than

the start-ups. Also, larger companies have more routine activities that are suitable for offshoring.

As we suggested at the outset of this chapter, the ultimate aim for all economies is rapid growth, which in turn is driven by continued innovation or what some economists call 'dynamism'. But what determines dynamism, and is openness one of those driving forces? What role, if any, do national culture and values play in a country's record for innovation? Edmund Phelps and Gylfi Zoega address these questions in Chapter 4.

The authors begin by suggesting that measures of job satisfaction are better indicators of dynamism than one traditional measure, labor productivity. Individuals who are happy with their jobs are likely to be employed in endeavors that are mentally stimulating and creative, which are factors essential for innovation. What, therefore, can explain job satisfaction or overall happiness?

Economists often presume that happiness is highly correlated with income. Yet time series survey evidence does not support such a linkage: levels of reported happiness do not appear to rise over time, despite rising incomes. Phelps and Zoega conduct a different test: to see whether a positive relationship exists between the two variables on a cross-sectional basis, using job satisfaction responses in 2000 from the *World Values Survey* for 22 OECD countries. In fact, they find that happiness and per capita GDP are positively related, and in statistically significant fashion, but only up to a per capita GDP level of 70 per cent of the US level. Beyond that point, they find that reported happiness and GDP per capita are not statistically linked.

Phelps and Zoega use the same cross-sectional data to document that several other variables are positively related to reported happiness: an index of economic freedom (measuring among other things, the cost of establishing and closing a business, public spending and taxes), external openness (the ratio of the sum of imports and exports to GDP) and average hours of work. The trade variable, in particular, suggests a positive relationship between openness and the authors' measure of dynamism (reported happiness). A series of other variables, such as the unemployment rate and inflation, are not statistically significant.

The authors postulate that culture and values are important determinants of each of the variables found to be related to happiness, drawing on earlier work of Phelps, who found cultural characteristics to explain recent European economic performance (unemployment, labor force participation and productivity growth). To test this proposition, the authors again look to the responses to various questions in the *World Values Survey* as proxies for culture and values. These responses display marked differences between the English-speaking countries of the OECD and the Continental

European countries. In the former group, people report greater emphasis on achieving on the job, showing initiative, having an interesting job and having a favorable view of competition than in the latter countries. The Nordic countries fall in between the English-speaking and Continental countries in their views on competition. Japanese respondents place greater emphasis on job security than those in other countries, but otherwise the Japanese are similar to Continental Europeans on all other dimensions. The authors also consider questions and responses that measure the degree of trust people have for one another (a measure of social capital), attitudes toward the government's civil service and the strength of people's religious views.

Do these cultural variables help explain any of the happiness-related variables the authors previously identify? Broadly speaking, the answer is yes. Trust positively affects GDP per capita. Confidence in the civil service is positively related to GDP per capita, economic freedom and openness to trade. Good work ethics are positively related to economic freedom and hours of work, but negatively related to openness. And work initiative is positively related to openness. The authors do not indicate, however, which way the causation runs in their statistical work: that is, it is not clear whether culture affects the various happiness-related variables, or whether the variables drive culture.

In sum, Phelps and Zoega demonstrate that it is not just income that generates happiness, and thus presumably innovation and dynamism. Other variables, including measures of economic freedom and openness, as well as culture, all appear to play an important role. Furthermore, there are clear differences in culture between English-speaking countries, on the one hand, and Continental European countries, on the other – and these differences seem to help explain differences in economic performance between the two.

The chapters up to this point are concerned with the role that openness plays in the economic performance of entire countries, at one extreme, or in the performance of entrepreneurial firms, at the other. Chapter 5, authored by Edward Glaeser of Harvard University, turns the spotlight on the forces that influence the economic performance of particular regions or cities, paying particular attention to the role of entrepreneurship.

Glaeser measures entrepreneurship by two admittedly less than ideal indicators – the self-employment rate and average firm size. He reports considerable variation in the self-employment rate across all these groups, although there is less variation across metropolitan areas than across industries or income groups. Notably, all but eight of the metro areas for which Glaeser reports data have self-employment rates that lie between 3.2 per cent and 7.8 per cent, a relatively narrow range. Interestingly,

Silicon Valley has one of the lowest self-employment rates of any of the metro areas, while cities in Florida rank at the top (rankings which should highlight the limitations of the self-employment rate as a measure of entrepreneurship).

Glaeser posits that average firm size should be inversely correlated with entrepreneurship: the smaller this average, presumably the more entrepreneurial firms there must be within any grouping. In addition, Glaeser reports significant negative correlations between average firm size and the self-employment rate, which helps confirm the usefulness of average firm size as an indicator of entrepreneurial activity.

Are either or both of these measures of entrepreneurship related to measures of metropolitan growth, such as employment growth by industry sector? Glaeser reports statistical evidence of such a linkage, finding that both entrepreneurship measures predict future employment growth. He then posits four possible variables that may drive local entrepreneurial activity: educational levels; the impact of being surrounded by other entrepreneurs or an 'entrepreneurial culture'; the availability of key inputs (proxied by local area venture capital, the number of firms capable of supplying local firms in a given industry and the concentration of employees in occupations useful to particular local industries); and measures of local customer demand. What does the available statistical evidence say about these alternative hypotheses?

Glaeser reports the results of regressions using both of his measures of entrepreneurship, together with a third entrepreneurship variable, the birth rate of new firms. He confirms that more highly educated individuals are more likely to be entrepreneurs, but this variable only explains a small share (7 per cent) of the variance in self-employment rates across metro areas. Self-employment rates are also correlated with age. Another set of regressions suggests a modest linkage between city size and entrepreneurial activity, but little connection between venture capital and self-employment. Glaeser's regressions relating to the importance of local entrepreneurial culture are mixed: self-employment rates increase among individuals living in metropolitan areas with higher concentrations of 'entrepreneurial industries', but this effect does not hold within industrial sectors.

Glaeser confirms that the presence of an appropriate workforce – individuals in occupations fitting the industrial mix – has an important effect on entrepreneurship, when it is measured by firm birth rates. He finds no such linkage, however, when entrepreneurship is measured by the self-employment rate. However, the self-employment rate is positively linked with a measure of local area input suppliers. None of the regressions show any relationship between the various entrepreneurship indicators and indicators of local customer demand.

Glaeser concludes by cautioning that his statistical work is only suggestive of the importance of entrepreneurship to metro area growth and the factors that seem to drive entrepreneurship at the local level. The most powerful results indicate that labor supply – in particular, educated workers – drive entrepreneurship. Local areas that wish to have entrepreneurial growth should focus, therefore, on basic policies that can attract and retain such individuals.

While college-educated people seem to be essential for any region's economic success, are any other factors relevant? In the final chapter of the volume, Lynne Zucker and Michael Darby of UCLA suggest that one such additional, important determinant is the presence of individuals they call 'star scientists' – individuals who not only excel at scientific research but also have demonstrated entrepreneurial skills.

Zucker and Darby begin their analysis by drawing upon previous scholarship demonstrating that basic science developed at universities has been key to the successful commercialization of scientific discoveries. This occurs through the entrepreneurial endeavors of the professors themselves, through the licensing of inventions developed by university faculty to established companies, and through the employment of 'star scientists' by commercial enterprises. In short, of the three channels by which university inventions find their way to the marketplace, the mobility of the discovering scientist accounts for two (through entrepreneurship or employment).

To gain further understanding of the career paths and importance of these star scientists, the authors have constructed a database of 5400 such individuals around the world who were reported by their peers to be the most highly cited scientists in their fields. This database draws on information from the Institute for Scientific Information (ISI), which among other things, contains citations of scientists' published work in professional journals. Zucker and Darby report numerous findings from this database in their chapter, several of which we highlight here.

First, while the involvement of a star scientist with a firm has not been a sufficient condition to make that firm commercially successful, it seems to dramatically increase the likelihood of that success. For example, of 38 publicly traded pharmaceutical companies in business as of 1975, 15 had established working relationships with star scientists by 1990, and of these, 80 per cent had survived by 1999. In contrast, only 17 per cent of the other 23 firms, which had no such relationships, were still in business in 1999.

Second, the authors use their database to investigate whether and to what extent star scientists have been important to the entry of firms in different regions throughout the United States and in countries around the world in six specific technology-related sectors (nanotechnology is excluded from the analysis here, but will be the subject of future study, after the authors

complete a database specific to this field). The authors' findings are clear: regions or countries with more star scientists in these particular industry sectors exhibit significantly more firm entry. This conclusion holds both for locations within the United States and for 24 other countries outside the United States.

The authors also report a significant amount of immigration of star scientists through the last year of their data, 2004, into the United States, the United Kingdom and Germany. Furthermore, so-called 'round-trip' immigration –a star scientist moves to a country for at least two years then later leaves – accounts for anywhere from one-third to nearly 80 per cent of all star scientists who were ever resident in six key developing countries.

The lesson for policy makers from the authors' database is thus clear: an important key to promoting entrepreneurial growth in technology-related fields is to find ways of attracting and retaining scientific superstars. This requires, in turn, an 'open' labor market, one in which people are mobile within and across countries.

In sum, the papers in this volume suggest a positive relationship between various indicators of 'openness' and entrepreneurship. Openness to competition, domestic and international, seems to facilitate growth and innovation. In a world of open labor markets, in particular, entrepreneurship is most likely to be stimulated by policies that can attract individuals most likely to be successful entrepreneurs – individuals with skills, especially those with strong scientific backgrounds.

A clear lesson from the research reported here, therefore, is that entrepreneurial success requires the right people – both the entrepreneurs and skilled individuals who want to work for them. The more freedom these individuals have to interact with each other, and with their suppliers and customers, the more successful their entrepreneurial endeavors are likely to be. Greater entrepreneurial success, in turn, should lead to faster growth, a central goal of all economies.

REFERENCE

Baumol, William J. (2002), *The Free Market Innovation Machine*. Princeton, NJ: Princeton University Press.