

Innovations to Foster Risk-Taking and Entrepreneurship¹

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Entrepreneurship is a delicate organism. It needs the right environment to flourish. There are significant differences across countries in the entrepreneurial environment, and these differences ought to have a lot to do with their economic success.

I wish to argue in this paper that while cultural differences across countries have something to do with the differences in entrepreneurship, there is evidence that these cultural differences may be overstated as determining the degree of entrepreneurship of a country. More important are the factors of economic situation within a country that strengthen or inhibit entrepreneurship.

High on the list of such factors is the perception of risk to entrepreneurs and investors in them. Thus, developing new institutions that manage the risk of entrepreneurship is central (indeed, risk taking is what entrepreneurship is all about).

There has been great progress in the development of institutions to manage entrepreneurial risk in recent years, the advent of more sophisticated methods of private

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equity and venture capital. In the future, there ought to be further development of risk management institutions that encourage entrepreneurs, and we are in the process of seeing this happen. The further development of risk management contracts that settle on economic indices will help promote entrepreneurship by allowing entrepreneurs to protect themselves against more and more of the risks of doing business.

Also on the list for promoting the kind of entrepreneurship for promoting economic growth is to develop better institutions for encouraging basic scientific research. Successful basic scientific research is an enterprise much like any business enterprise. We have to construct as well as we can a marketplace where scientific research can compete, and to provide risk management solutions to scientific research insofar as is possible.

Cultural Differences that Affect Innovation and Entrepreneurship

There is a lot of popular talk about differences across countries in their attitudes towards business. For example, it is widely alleged that U.S. Americans, British, Armenians, Chinese, and Japanese have unusually strong traditions of entrepreneurship, that are inhibited by historical forces from time to time, but that nonetheless provide a sound base for these countries to build upon

There are of course many cultural differences between countries. The difficult question is how important are these differences in promoting entrepreneurship. Cultural differences take many forms. For example, it is commonly alleged that some countries are more intellectual and some more practical in their orientation.

Countries that have a practical orientation, it is alleged, are more successful in business. In fact, however, promoting highly successful entrepreneurship, the kind that leads to major new forces in the economy, depends on a good balance between the intellectual and practical: a strong interest in deep pursuits coupled with a practical interest in finding applications of these pursuits. Our modern era of rapid economic growth seems to derive from a better recognition of this fact. Until two centuries ago, universities around the world were focused largely on theology and the study of Greek and Latin classics. These were gentlemanly pursuits. Scientists—doing experiments in their laboratories to learn some practical facts about how things work—were often considered too mundane for the university, until modern times.

Aristocratic tendencies have provided an obstacle to effective practices that might foster pathbreaking innovations for business. The French Revolution represented a historic break with this aristocratic past, but did not unequivocally succeed in improving the atmosphere for innovation. Some drastic steps were taken: in 1793, all French universities were abolished. They were replaced by professional schools for teachers, doctors, and engineers. But the resulting schools were perhaps a little too practical to be optimal. The French university was eventually restored in 1896.

It was not until well into the 19th century that a more practical focus, that would spur expansive and productive scientific research, began in Europe, in the German universities. The principle of “*Einheit von Forschung und Lehre*,” “unity of research and education,” championed by Alexander von Humboldt (1767-1835), bringing practical and implementable scientific research into contact with deep intellectual discourse, became the hallmark of the German universities, which, as their strengths came to be appreciated,

were imitated around the world, with greater or lesser success depending on the national culture.³

The United States from its beginnings had a general contempt for aristocratic privilege, and at the same time an admiration of practical people. This was long ago noted by Benjamin Franklin (1706-90). In a 1784 article “Information to those who would remove to America” he wrote:

“The natural geniuses that have arisen in America have uniformly quitted that country for Europe, where they can be more suitably rewarded. . . . “[in America] people do not enquire concerning a stranger, what is he? but what can he do? If he has any useful art he is welcome; and if he exercises it, and behaves well, he will be respected by all that know him; but a mere man of quality, who on that account wants to live upon the public, by some office or salary, will be despised and disregarded.”

But, this practical orientation did not make the U.S. an innovator, not until it learned from Germany about how to restructure its educational system. In one of the earliest imitations of the German university model, in 1864, the Massachusetts Institute of Technology adopted a seal that showed as its motto *Mens et Manus*, “Mind and Hand,” and showed a scholar and a laborer with a hammer and anvil standing together.

The German university model eventually found an even more conducive environment in the U.S. than it did in Germany. With their emphasis on the practical, and with no aristocratic traditions that would interfere with the promotion of business-oriented research at the universities, the U.S. eventually promoted such research institutions far beyond Germany did. This evidence suggests that the cultural differences between the United States and Europe make the U.S. possibly a more fertile ground for practical businesses, less fertile for great works of art and treatises on philosophy.

³ See Ben-David, 1977.

There are indisputably cultural differences that relate to business. But there appears to have been relatively little research on how pervasive and how serious they are, and that they really are meaningful in understanding differences in success of economies.

A number of researchers have attempted to relate differences in entrepreneurial success across countries with differences in attitudes. David McClelland and his colleagues [1961] devised measures of achievement motivation, and compared these across countries. Geert Hofstede [1980] measured differences across countries in uncertainty avoidance. Fritz Gaenslen [1986] measured individualism in various countries. There are varying opinions about how successful their measures of human attitudes explain differences across countries in entrepreneurial success; my reading is that their successes are only modest.⁴

When I attended a conference on the U.S. economy in Moscow in 1989, in the last years of the Soviet Union, when a transition to a market economy was heatedly discussed, at the Institute of World Economics and International Relations (IMEMO), I found that there was much talk about the differences between Russians' attitudes towards business and entrepreneurship with western countries. The Soviet economists I met seemed generally to have a poor opinion of their own people's ability to promote successful business dealings. But, when I questioned them, none of them had any solid evidence about the difference in attitudes between Russians and people of other countries.

⁴ Comparing *national* indicators of attitudes mislead us in evaluating the prospects of entrepreneurial success of nations. Lamont [1992] and Giannetti and Simonson [2003] have found evidence of major variations across regions within European countries in attitudes relating to entrepreneurial spirit. Regional or cultural pockets of entrepreneurial zeal may serve to supply a country with many entrepreneurs if economic conditions favor entrepreneurship.

At this conference I met a young economist, Maxim Boycko of IMEMO, and we, together with the Ukrainian sociologist Vladimir Korobov, decided to do a study comparing attitudes between Russians and people of other countries. Our method was to write questionnaires about business attitudes, translate these into various languages as well as Russian, and try the questionnaires in various countries. We were thus able to compare attitudes towards business across Russia, United States, Ukraine, East Germany, West Germany, and Japan [Shiller, Boycko and Korobov 1991, 1992].

We found a number of differences in attitudes that relate to business across these countries, but not as sharp and significant as the idle discussions of the Soviet economists would suggest. Our overall conclusion was that the differences across countries were more situational (reflecting the constraints and opportunities in the local economy) than attitudinal (reflecting attitudes towards business).

Evidence on Differences in Attitudes Towards Risk

One important factor that the Russian economists mentioned to me when I visited Moscow in 1989 is that they feared that Russians had lost their risk-taking instinct, after years of living under a communist regime that managed everything for them. But, in my international surveys with Boycko and Korobov, we were unable to find any significant difference between Russia, Ukraine and the United States in fundamental attitudes towards risk taking.

Our method was to ask about both *attitudinal* and *situational* factors related to business in questionnaires that were identical (except for translation into the local language) across countries. Attitudinal factors relate to the individual's psychology,

situational factors are aspects of the individual's perceived economic environment.

Risk aversion, if measured clearly as a taste for risk, is attitudinal. We asked:

Imagine you are suddenly ill. Your illness generally does not interfere with your work and does not prevent you from leading a normal life, but you always feel tired, go to bed early, and you are often in a bad mood because of that. The doctors tell you that this tiredness will continue your whole life unless you decide to undergo a surgical operation. (Imagine that you have complete trust in the doctors and you doubt neither their diagnosis, nor the proposed method of treatment.) The operation will completely cure you, but it is risky: there is one chance in four that you will die. Would you decide to undergo this operation?

	Yes, take risk	No, avoid risk	Survey size
Russia	58	42	105
Ukraine	61	39	97
United States	59	41	119

People in all these countries seem virtually identical in how they would deal with such a personal problem. The evidence here suggests no difference across countries in fundamental risk aversion.

An example of a question that probed situational (as well as attitudinal) factors is the following:

Suppose that a group of your friends is starting a business that you think is very risky and could fail—but that might also make investors in that business rich. Would you be tempted to invest a substantial portion of your savings in it?"

	Yes	No	Survey Size
West Germany	14	86	132
East Germany	28	72	127
Russia (Moscow)	51	49	122
Russia (Omsk)	42	58	103
Ukraine	44	56	215

U.S. (New York)	33	67	117
U.S. (Continental)	30	70	122

Here we see some significant differences across countries. Notably, the West Germans were the least likely to want to take on entrepreneurial risks, a conclusion that accords with some popular characterizations of them. But the differences were not always the ones we expected based on conventional stereotypes. The Moscow Russians, not the Americans, were the most likely to say they would take the risks. East Germans (at the time of this questionnaire just emerging from a socialist dictatorship) were more likely to want to take business risks than the West Germans.

The differences across countries appear by these measures, as well as other measures in our study, to relate to perceived risks, rather than attitudes towards risks. Why the Russians or East Germans felt the perceived business risks less at the time of the breakup of the Soviet Union is a mystery that we may never be able to unravel. But, the general principle here is that perceived risks appears to be a significant barrier to entrepreneurship, and that if we overcome these barriers, there may be no difference in willingness to take business risks.

Promoting Management of Business Risks: Venture Capital

The development of our financial institutions over the centuries has made it increasingly easy for people to take business risks with a hope of reward and yet not subject themselves to excessive risk. There has been important progress over the last half century in the way entrepreneurship is financed.

The world's first venture capital firm, American Research and Development, was established in 1946 by Massachusetts Institute of Technology president Karl Compton, along with Georges F. Doriot, a professor at the Harvard Business School. Their revolutionary idea was to set up a publicly traded company that invested in a lot of very high risk high tech startups, expecting most to fail, but benefiting from the long right tail of the distribution, the enormous success of the small number that succeed. This was a fundamentally different method than that which commercial banks use in their dealings with entrepreneurs. The venture capital firms could offer terms to the firms that they invested in that would protect the entrepreneurs from much of the enormous risk that such ventures entail.

In the sixty years since their inceptions, venture capital firms have gradually learned how to manage the risks of their companies and to deal with the agency problems that may be very strong since the success of high-tech ventures may be so hard to judge. They have invented staged financing that keeps venture capitalists on a leash whose length is accurately controlled, they have developed syndication methods that allow the venture capitalist to get second and third opinions about the success of their investments, they learned through time how to participate in the boards of directors of the companies in such a way as use their more general knowledge to help pursue opportunities for the businesses they have invested in, they learned how to award equity or options grants to managers to better align the interests of employees and investors, they developed gradual vesting programs to control the time pattern of managerial loyalty to the firm, they learned techniques to facilitate the weaning of the invested firms from the venture

capitalist and placing of them into public markets without generating adverse selection problems [See Gompers and Lerner 2001].

The development of private equity and venture capital has been mostly associated with the United States. Though these institutions have been growing in Europe, they have not had as strong an impact there. The performance of European venture capital firms 1993-2003 has been disappointing, and the performance has been particularly bad for the critically important early-stage venture investments [Machado Rosa and Raade 2006]. Some of this disappointment is due, perhaps, to errors in judging the high-tech bubble of the 1990s, but that memory lingers on and inhibits venture capital even today.

Laura Bottazzi and Marco Da Rin [2002] have argued that the quality of European venture capital, overall, is not yet equal to that in the United States. They conclude that European venture capital firms have produced fewer “superstar” companies, and, more generally, are not systematically associated with more dynamic companies. Not only is the total quantity of venture capital less, but the venture capital tends to be spread out much more across firms in Europe, much smaller amounts invested per company. They speculate that, despite its rapid growth, European venture capital suffers from a relative shortage of qualified experienced professionals.

The European Commission has noted the importance of venture capital, and has as a result transformed the European Investment Fund (EIF) into a major investor in venture capital. The EIF is a public-private partnership owned by the European Investment Bank (62%), the European Union (30%) and European banks and financial institutions (8%). This is a laudable effort to promote venture capital in Europe. But, the total portfolio of the EIF as of 2005 was only €3.2 billion. In contrast, the total amount of

venture capital investments in the United States made in 2005 alone was \$22.2 billion.⁵ Creating a quasi-government fund may not be in the true spirit of venture capital, and perhaps other ways of promoting venture capital in Europe should be pursued.

Promoting Management of Business Risks: Index-Based Derivatives

Other developments in capital markets in recent decades have been the rapid development of derivatives markets. The development of the first financial futures and options markets, as well as swaps began in the 1970s and 1980s.

We are seeing now the development of index-based derivatives, and the proliferation of these derivatives is something that can help entrepreneurship by promoting hedging against a multitude of specific risks that impinge on the specifics of the venture. Any index of the outcome of an economic risk can be the basis of settlement of risk management contracts. Any time the uncertainty related to pursuing innovation is reduced, it becomes easier for entrepreneurship to proceed.

I will give one example of the effects of the development of a new risk market on entrepreneurship that I am particularly involved in: the development of derivative products for real estate risks, particularly risks to the value of owner-occupied homes.

Owner-occupied homes are arguably the biggest asset class of all. In the United States, currently, real estate owned by households amounts to about \$20 trillion. This is larger than the stock market. The risks to this asset class appear substantial. The market value of homes has certainly been volatile in recent years. And yet, there has been virtually no issuance of derivative products that would hedge the risks of these. It is true that in 1991 the London Futures and Options Exchange attempted to create futures

⁵ PricewaterhouseCoopers / National Venture Capital Association Money Tree™ Report, 12/31/2005.

markets for these, but that effort quickly failed. It is true that in the United Kingdom derivative products for commercial real estate have begun to proliferate in the past few years, and there are Goldman Sachs covered warrants traded on the London Stock Exchange, but these are still quite small in total value.

In the late 1980s my colleague Karl Case and I thought that the obstacle to developing good derivative markets for single family homes was that there was no good measure of their value. We then developed a weighted-repeat-sales methodology and began producing home price indices that were far better any other available. The indices we created were specifically designed for contract settlement [see Shiller 1993, 2003] and have been improved over the years and are now produced in collaboration with Fiserv, Inc. (a financial services firm) and Standard & Poor's (a financial index provider and rating agency).

The firm that I co-founded with Allan Weiss, and Sam Masucci, MacroMarkets LLC, has teamed up with the Chicago Mercantile Exchange, Fiserv, Inc., and Standard & Poor's to create futures and options markets for single-family homes on each of ten United States metro areas. These are cash settled based on the S&P/Case Shiller Home Price Indices. These began trading May 22 2006 (see <http://housing.cme.com>) and as of August 2006 the futures open interest totaled \$67 million dollars, and, including the underlying value represented by the options, the combined contracts stood at over \$100 million dollars. The next stage in this enterprise, to be promoted by MacroMarkets LLC and others, is to develop real estate index-linked notes (including the ETF-like Macro Securities that Weiss and I invented), as well as swaps and other over-the-counter products.

We do not yet know how successful these new risk management devices will be, but the kinds of interest and explorations that these new markets have stimulated suggest that the ability to manage real estate risk could ultimately create a multitude of new enterprises. We expect to see new kinds of mortgage lenders, who provide downpayment insurance to home buyers worried about the value of their homes, and hedge the risks that they incur in writing the mortgages on the new derivative markets. We expect to see new kinds of homeowners insurance providers, who protect homeowners against risks to the value of their homes and not just against physical damage to their homes, and then hedge the risks that they incur in writing the policies in the new derivative markets. We expect to see a proliferation of home builder activities, spurred by such new concepts as a homebuyer price warranty, activities that will then be hedged in the new derivative markets. We even expect someday to see that those individuals who buy and fix up homes for resale (a very popular form of micro entrepreneurship) will get a shot in the arm when it becomes possible for these people to pursue their business in a manner that is hedged against aggregate real estate risk. In all these cases entrepreneurship is facilitated by dealing anew with risks that had inhibited action before.

Promoting Scientific Enterprise

Scientific enterprise, if it is going to continue to push back the frontiers of knowledge, requires a kind of entrepreneurship that is not dissimilar from that of business. Technological progress is the main driver of economic growth, and this progress is the outcome of enterprise just as much as progress in building automobiles is.

Major breakthroughs in basic science may require expenditures of many hundreds of millions of euros over a period of many years to achieve an important mission. The projects may involve the coordination of large teams of researchers. Scientific research requires long time periods to come to fruition.

Moreover, scientific research thrives on competition, just as do businesses. The competition allows the most capable to survive, and attract further funds to allow the research to function. Highly risky ventures need to get funding, and the funding needs to take account of the nature of the risks, to consider the possibility of diversifying risks by investing in many small projects.

There is, however, an important obstacle to the development of markets for scientific research: Scientific research, particularly basic science research, functions substantially as a public good. The direct returns to the individual researcher, if any, are often dwarfed by the externalities that the research generates. Researchers have to be willing to share their results freely if science is to progress, and doing so inhibits their ability to profit from it. For this reason, the research requires government funding.

Government funding is most effective if it can somehow create the semblance of a market for scientific research, allowing scientists to run their enterprises as if they were collecting the profits that accrue to their discoveries. The system that has to be constructed is one that allows researchers to compete and be rewarded for major new ideas.

In the 19th century, Germany led the way in effectively sponsoring scientific research, with the invention there of the graduate school, which was an academic research organization built around the training of young researchers. This gave Germany

an intellectual edge for some time. It is significant, for example, that the field of economics was substantially dominated by Germany during that period, and that most of the founders of the American Economic Association were trained in Germany. However, the advantage that Germany had was lost sometime in the twentieth century. Sinn [2003] points out that Germans were prominent on the list of Nobel prize winners in science in the early 20th century, and that their numbers dropped sharply by the late twentieth century.

The system that is in place in the United States has been a model for much of the world. The United States National Science Foundation was founded on the advice of Vannevar Bush in his famous 1947 book *Science, the Endless Frontier*. The most basic idea in his book was that the funding of science should create a mechanism—I would say a marketplace—for shifting government funds to the most successful scientific researchers. There would be no government scientific agenda beyond rewarding the most fruitful research.

How to create such a marketplace for ideas? Bush's invention was to create committees of the most successful scientists who would anonymously review proposals submitted to them by individual scientists (not scientific organizations). In this environment top scientists are able to let their creative spirits run unrestricted by institutional or political restraints and reward those who pique their imagination and only those. Moreover, Bush stressed, the reward should be relatively long-term and stable funding, and large enough for serious enterprise, today we might say it is like the funding that commercial enterprises routinely receive from their venture capitalists.

The U.S. National Science Foundation was highly successful in stimulating important research. Freed from linking their research to government or business agendas, researchers produced quality research that ultimately promoted business interests.

The U.S. National Science Foundation was imitated by many other countries, and these national science foundations typically follow the same pattern of peer review that the U.S. NSF does. These have of course had many successes.

But many of these national science foundations have a problem inherent in the fact that they are organized by countries much smaller than the United States: it is difficult to maintain anonymity in the peer review process. Knowing the topic of the proposal and the fact that it probably comes from within the country, the peer reviewer of the proposal probably knows the proposer, and cannot make a politically unconstrained judgment. Moreover, the proposer is more likely to be able to guess the name of the reviewer. With the loss of anonymity, the process of candid assessment of scientific contribution breaks down.

Owen-Smith et al., in a study of life sciences research comparing the U.S. and Europe, concluded that the tendency for funding sources in Europe to be national rather than European has led to national clusters of specialists in Europe that have tended to evolve in such a way as to deepen already narrow competencies rather than broad exploration. In contrast, in the United States, the regional clusters tended to develop in more generalist directions, pursuing multiple therapeutic areas, more integrative of “goal-oriented therapeutic research with fundamental biological investigation.” They concluded that the latter kind of research that is more conducive to cooperation with commercial ventures.

The solution for Europe is to create a national science foundation of sufficient scale, functioning like the U.S. National Science Foundation for all of Europe. The European Unions is about to do this, but the scale is not large enough. The Council of the European Union reached an agreement, pending the European Parliament's opinion, that, as part of the Seventh Framework Program (FP7) a new European Research Council (ERC) will be created.

But, the ERC that is being created is too small. The U.S. National Science Foundation had a budget of \$5.480 billion in fiscal year 2005, of which \$4.234 billion went to research and related activities. In contrast, the ERC would receive a total of €7.5 billion, for 2007-13, or, on an annual basis, about one quarter the size of the U.S. National Science Foundation budget. Even after the establishment of the ERC, the bulk of scientific research in Europe will be handled by regional national science foundations. For example, the Deutsche Forschungsgemeinschaft (DFG) had a 2005 budget of €1.390 billion, the Max Planck-Gesellschaft in 2003 had a budget of €1.234 million. The Hermann von Helmholtz-Gemeinschaft Deutscher Forschungszentren e. V. has a recent annual budget of €2.2 billion. In Italy, the Consiglio Nazionale delle Ricerche (CNR) had a 2002 budget of €980 million. Obviously, the national research institutions dwarf the European Research Council.

Conclusion

It is naturally hard for any country to control the level of entrepreneurship within its borders. Entrepreneurship relies on the “animal spirits” of its inhabitants, which is impossible to legislate. But, I have argued that there is a lot involved in the economic

environment that can make or break entrepreneurship independent of the natural attitudes of the population.

Notably, the revolution that has been occurring over recent decades in venture capital and private equity needs to continue. These institutions are innovating rapidly in the provision of risk management, as well as sophisticated incentive packages. For entrepreneurs, this is a fundamental development that needs to be promoted in every country.

The development of derivative markets, which has been proceeding at a rapid pace, helps promote business activities at all stages, including the beginning stages of entrepreneurship. Of particular interest going forward is the proliferation of markets for economic indices, that will allow individual entrepreneurs to limit the specific risks that their venture entails.

The development of institutions for scientific research that in effect create an anonymous marketplace for funds supporting genuine basic research needs to be pursued further. Basic scientific research is the ultimate source of much of our economic growth.

All these things are already happening. But, progress could be much faster if governments recognized their significance and promoted them more.

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