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Entrepreneurship, Innovation and Growth: The David-Goliath Symbiosis

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Investment in innovation in industrialized economies increasingly is taken over by large firms that operate their own R&D divisions and transform technological change into a routine bureaucratized process. Powerful competitive forces require firms to do this for survival. But such routinized innovation has not replaced the individual independent innovator, the traditional source of technical change. The latter have tended to provide the more revolutionary breakthroughs, to which corporate research has added reliability, enhanced power and ease of utilization. Thus, both make a vital contribution to growth. While the results of big business research are often less spectacular, they have typically added up to very substantial improvements.

I. The Great Puzzle: The Source of the Capitalist Growth Miracle

It is to innovation, and not to invention alone, that we must look for answers to the great puzzle -- the explanation of the free market's unmatched and unprecedented growth performance. Here, I use the term "innovation" in Schumpeter's sense, as the entire process, from the birth of the new idea to the bringing to market of the new product or process. Earlier societies have had a spectacular invention record. The Chinese are the outstanding example. Centuries before Columbus they had invented printing, the compass, complex (water) clockwork, gunpowder, spinning machinery, a cotton gin, porcelain, matches, toothbrushes, playing cards and much more. There have been other countries in history with a considerable record of new products and new technology. Yet these inventions never produced economic growth anything like that in the modern market economies.

Observation and consideration of the matter suggest that what was missing in all economies other than those like our own is the pressure to innovate that derives from the powerful mechanism of the competitive market. It is true, of course, that markets of substantial importance exist in virtually every economy of the world and have existed throughout recorded history. What, then, is the difference of modern markets that gives them the capacity to produce growth miracles? There can be no simple answer; indeed, any proposed answer is bound to leave out key features, ranging from political changes, evolution of religious beliefs and even historical accident. However, here it will be

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argued that two features of our economy have played a crucial role. The first is free competition, that is, competition not handicapped by severe government regulations or tightly enforced customary rules, like those of the medieval guilds, which prevented gloves-off combat among rival firms. Of particular significance here is rivalry among oligopolistic firms. The second crucial development is the fact that in today's economy many rival oligopolistic firms use innovation as the main battle weapon with which they protect themselves from competitors and with which they seek to beat those competitors out. The result is precisely analogous to an arm's race -- to the case of two countries, each of which fears that the other will attack it militarily and therefore feels it necessary always at least to match the other country's military spending. Similarly, either of two competing firms will feel it to be foolhardy to let its competitor outspend it on the development and acquisition of *its* battle weapons. Each is driven to conclude that at least matching effort and spending on the innovation process is a matter of life and death. Naturally, in an economy in which this is so, a constant stream of innovations can be expected to appear, because firms do not dare to relax their innovation activities.

II. Routine vs. Independent Endogenous Innovation

A major consequence of the innovation arms race is the emergence of routinized innovation processes – those on which the level of spending is determined by business firms as part of their regular planning of competitive strategy. Routine innovation processes – those guided by standard-business decision principles -- are, indeed, of great and probably of growing importance, with 70 percent of U.S. R&D expenditure channeled through business firms.

The pressures of the competitive market force firms to systematize the innovation process and to seek so far as possible, particularly in the high-tech sectors of the economy, to protect themselves from the risks just described. For this purpose, business enterprises have found it necessary to incorporate innovative activity into their routine operations. Such innovation activity is no longer a largely unpredictable process, in which changes in social psychology control the fortuitous appearance of individuals who possess the determination and inspiration needed for innovation.

Business firms systematically determine the amounts they will invest in the R&D process, systematically decide on the ways in which they will interact with their rivals in this area, who and how many will be employed for the purpose and even select what it is that the company's laboratories should invent. In sum, competition makes it too risky for firms to depend primarily for their new products and processes on the unpredictable efforts of independent inventors. Instead they have changed much of the economy's R&D into an internal, bureaucratically controlled process. They have routinized it.

III. The Revolutionary Contributions of Innovators Outside the Established Firm

Routinized innovation is important for our discussion because it is an activity that was, for all practical purposes, never undertaken in any pre-capitalist economy and that patently contributes considerably to growth in the free-market economies. However, this does not mean that the entrepreneurial independent innovator no longer plays a significant role. Scherer provides a long list of major technical inventions introduced by entrant firms and consequently not subject to the pressures for routinization in established enterprises. His examples include the incandescent lamp, alternating current, radio

telegraph and telephony, the dial telephone, the synchronous orbit communications satellite, the turbojet engine, the sound motion picture, self-developing photography, the electronic calculator, among many others [1980 p.438].

Indeed, one can offer the plausible conjecture that most of the revolutionary new ideas are, and are likely to continue to be, provided more heavily by independent innovators. In turn, these innovators, once successful, often establish firms of their own, joining the large enterprises that engage preponderantly in routine innovation. This type of innovation is primarily devoted to product improvement, increased reliability and enhanced user friendliness of products and the finding of new uses for those products. Both the independent and the routinized innovation activities undoubtedly contribute significantly to economic growth, as Rosenberg has emphasized (see, e.g., [1976 p.66]). These two types of activity are complementary. Together they contribute more to growth than either could by itself. One dreams up and inaugurates the breakthroughs, the other improves on the performance. In this one should not undervalue the incremental contribution of the routine activity that at least sometimes arguably adds more to growth than do the more revolutionary prototype innovations. Thus, consider how little computing power the first clumsy and enormously expensive computers provided, and what huge multiples of such power have been added by the many subsequent incremental improvements.

In this process there is no reason to expect independent inventors or innovators to become obsolete any time in the foreseeable future. It is more plausible that this division of the work of technical progress will continue, with the independent entrepreneur providing many if not most of the more revolutionary and heterodox contributions, while the routine innovation activities of the oligopoly corporations take those contributions and improve and extend them, often well beyond what their capabilities could have been imagined to be.

IV. On the Significance of the Entrepreneur

The place of entrepreneurs as the generic contributor to independent innovation and in the process of growth more generally is well recognized and widely accepted, though their general absence from the theoretical literature is noteworthy. Here, I use the word “entrepreneur” in what is also the Schumpeterian sense to mean the bold and imaginative deviator from established business patterns and practices, who constantly seeks the opportunity to introduce new products and new procedures, to invade new markets, and to create new organizational forms.[1] In short, the entrepreneur is the *independent innovator*, in the broadest sense, meaning that the activities of this individual include, but go considerably beyond, technical inventions and their utilization.

Yet it is important to recognize that the innovating entrepreneur often makes no productive contribution at all, and in some cases even plays a destructive role, engaging in what Thorstein Veblen described as "systematic sabotage" of production (for example, coming up with a new way to enforce output restrictions upon the members of a cartel in order to keep prices high). This does not happen fortuitously, but occurs when the

[1] Thus, I do not use the term to refer to anyone who creates a new firm, however conventional and insignificant. This more common usage, incidentally, is probably closer to the original interpretation of the term when it was introduced into English in the nineteenth century.

structure of payoffs in an economy is such as to make unproductive activities such as rent-seeking (and worse) more profitable than activities that are productive.

The literature of development policy has also emphasized the importance of the entrepreneur, both in the Schumpeterian sense and as the creator of new enterprises of any sort. Discussions seeking to explain the success of some economies and the failure of others emphasize differences in the availability of entrepreneurial talent and in their motivational mechanisms. Plans to stimulate development include provisions for the training of entrepreneurs and for the encouragement of their activities. The absence of entrepreneurs is sometimes cited as a significant obstacle to growth. Whether or not they are assigned the starring role, they are clearly not considered minor characters.

V. The Entrepreneur as Allocated Resource

In line with these views, it is sometimes asserted, as an explanation for the slowdown of growth of an economy, that, for some mysterious reason, the spirit of entrepreneurship and with it the entrepreneurs themselves have disappeared. Or when an economy takes off, the (unexplained) emergence of a cadre of entrepreneurs is given at least part of the credit. My position, in contrast, is that this is implausible. Entrepreneurs are not suddenly created in profusion by spontaneous generation and their ranks are not suddenly decimated by some undescribed plague. Rather, it is my belief that the explanation for this rise and fall of entrepreneurial activity is grounded in simple dollars and cents—in the changes in the economy's structure of payoffs. Baldly put, the activities that promise the greatest monetary (or other) returns lead to a reallocation of entrepreneurs from one sector of the economy to another, and this reallocation can take forms that give the appearance of the vanishing or emergence of entrepreneurs as a group. This is important for understanding of their role in the capitalist economy.

As an input, entrepreneurship, like any other input, can be reallocated from one task to another by a change in the relative profit prospects offered by the available alternative uses to which entrepreneurship can be put. The efforts of entrepreneurs are reallocated by shifts in the sectors of the economy and the lines of activity where profit seems most easily to be earned. Perhaps not for all entrepreneurs, but surely for many of them, the identity of the line of endeavor that offers the most promising prospect of profits is a matter of great moment. Toward the beginning of his *Capital*, Marx suggests that, in the profit-making production process, chairs and tables lose their distinctive attributes as usable items of furniture. Rather, both are transformed into abstract embodiments of value, into prospective sources of financial gain, and are in that sense homogenized. The same is true of the alternative occupations available for the efforts of the entrepreneur. All become homogenized into abstract opportunities for the acquisition of wealth, power, or prestige, and the pricing arrangements that determine prospective profitability therefore can have a profound influence on the pattern of allocation of the economy's entrepreneurial resources. When an industry reaches a stage at which the opportunities for further innovation seem, perhaps temporarily, to be exhausted, it is not surprising to find entrepreneurial effort flowing out of that field and into others where the opportunities for the profitable introduction of change seem brighter. The propensity of entrepreneurs to redirect their efforts in this way has long been recognized and its contribution to the dynamism of the economy accepted.

However, sometimes the productivity consequences of such a reallocation are more questionable. For example, a change in the laws in a less developed country that greatly increases the hazards faced by entrepreneurs in directly *productive* lines of activity may induce them to turn their efforts to activities such as accumulation of land or advance in the government bureaucracy. And that may not just change the directions of the economy's productive efforts, but can also reduce its output and impede its growth. This sort of reallocation of entrepreneurial effort, too, can be induced by changes affecting the relative returns to more productive and less productive exercises of entrepreneurship.

Thus, there is a variety of roles among which entrepreneurs' efforts can be reallocated. And some of those roles do not follow the constructive and innovative script that is conventionally attributed to them. How entrepreneurs act at a given time and place depends heavily on the prevailing "rules of the game," i.e., the reward structure in the economy. I contend that it is this set of rules, and not the supply of entrepreneurs, that undergoes significant changes from one period to another, and helps to dictate the ultimate effect on the economy via the allocation of entrepreneurial resources.

VI. Unproductive, Rent-Seeking, and Destructive Entrepreneurship

A key part of my story is the contention that the entrepreneur's activity can be, and as a matter of fact sometimes is, innovative and yet nevertheless makes little or no contribution to the real output of the economy. The activity can sometimes even reduce output or restrain its growth. "Rent-seeking," a concept introduced by Gordon Tullock, refers, of course, to any activity whose objective is the acquisition of some of the monopoly profit or the other economic rents currently generated or potentially available in the economy. For example, consider a regulated industry that is a bilateral monopoly. Suppose one of the monopolists finds a new way to persuade the regulatory agency to readjust prices so that a larger share of the industry's total monopoly profits flows into the coffers of its enterprise. Then it will have engaged in a successful act of rent- seeking. Such an activity can clearly be innovative. A novel legal principle may, for example, be thought of and used by the rent seeker to persuade the regulatory agency to intervene in its favor. But the activity need not contribute anything at all to economic production or productivity. Indeed, it can constitute an effective impediment to both of these, through misallocation of valuable resources into pursuits that, from the viewpoint of the economy, are useless and by forcing the targeted firm to redirect its activities into unproductive directions for the sake of self-defense.

At the extreme end of the spectrum, enterprising violence has also occurred throughout history, and continues today. The leaders of medieval mercenary armies and the early twentieth-century warlords in China were clearly businesspeople, engaged in the sale of a service as a final product or an intermediate good. Their activities were marked by innovations in strategy and technology. In short, some of them were undoubtedly entrepreneurs. But it is at least arguable that their activities reduced production and even destroyed some of the economy's capacity to produce. So, too, modern organized crime can be businesslike or entrepreneurial. Thus, unlike rent seeking, which may merely contribute nothing to production but not actually harm it except in the sense of the opportunity cost of such activity, there is entrepreneurship whose result is substantial *destruction* of both output and the capacity to produce.

It is clear, then, that entrepreneurship should not be taken as a synonym for virtuous behavior that always contributes to productivity and growth. I will argue, next, that the free-market economy does a far from perfect job of attracting entrepreneurial activity into productive channels. Nevertheless, it appears to have performed far better in this role than any other type of economy.

Thus, it is noteworthy how different from capitalism's incentives for productive entrepreneurial behavior was the incentive structure facing the entrepreneur in the former Soviet economies. In the controlled economies of the old Soviet Union, entrepreneurship was driven back to its rent-seeking orientation, with gains to be sought by becoming bureaucrats and Communist Party officials. Managers of economic enterprises were in effect actually penalized for undertaking any innovative steps that increased productivity. This happened in at least two ways. First, a manager's reward depended on the firm's success in meeting an assigned "production norm" for the year. But any disruption caused by the retooling necessary to carry out an innovation would threaten failure to meet that current production target. Second, if an innovation were carried out and promised to increase productivity, that was all too likely to lead to the assignment of a higher production target in future years, making the manager's task that much more difficult. These were just two of the obstacles to the exercise of productive entrepreneurship in the Soviet economies.[2]

These are handicaps generally absent from the free-market economies. It is true that in market economies there remains an abundance of opportunities for profit through legal rent seeking or through outright criminal activity, much of it an impediment to growth. But the free market also offers rich rewards to the entrepreneur who successfully introduces productive innovation.

VII. Entrepreneurship Under Capitalism and Alternative Systems: How Productive Activity Became Respectable

Capitalism also changes the standards of commendable behavior, making a role model of billionaire innovators, particularly if their earnings stem from contributions to production. For the rising wealth and power of the capitalist entrepreneurs enable them to purchase respectability, both through their impressive productive and accumulative accomplishments, and via good works they subsequently undertake with their wealth. In short, the free-market economy offers encouragement to productive entrepreneurship such as no other form of economy has ever provided. This is, then, plausibly, another crucial component underlying the dramatic growth performance of capitalism.

In contrast, many relevant activities that today would be considered beyond the pale in terms of their ethics may in an earlier time have been accepted as normal and even commendable (and vice versa). In ancient Rome and medieval China, with their abundance of military and nonmilitary inventions, the pursuit of wealth and power was considered as acceptable, and even as desirable, as it is in the most greed-driven of capitalist societies. But the ideas about the means that were proper for attainment of these

[2] After this passage was written I saw a much more careful and detailed analysis by Maurizio Iacopetta, a PhD student at New York University ("Technological Diffusion in Market vs Planned Economies," unpublished) that reaches essentially the same conclusion, but based on far more sophisticated analysis than mine. Iacopetta provides clear evidence that *invention* was quite abundant in the Soviet Union, but what was missing was *innovation*, that is, the dissemination and widespread utilization of the inventions.

goals were very different from today's. Methods of wealth accumulation that were considered laudable in one or both of these societies included military aggression, ransom, bribery, and usury. Some of the great figures of Roman history, for example, were respected for having acquired vast riches by these means. The Chinese mandarins, having been appointed to powerful positions, were expected to recoup in the form of bribes the heavy expenses they incurred in preparing for the difficult imperial examinations that were requisites for such positions. No hint of scandal or disapproval attached to these means of accumulation.

But in both Roman and Chinese societies there were two types of activity that incurred unambiguous disgrace: participation in commerce or in productive activity (with the possible exception of some gentlemanly agricultural undertakings). In Rome, for example, such disgraceful endeavors were left to freedmen—to manumitted slaves and their sons. It is little wonder, then, that there was not much productive entrepreneurship in these societies. Even though the Chinese, in particular, produced an astonishing abundance of inventions, there was little innovation, in the sense of the application and distribution of the inventions. Most such inventions were put to little productive use and often soon disappeared and were completely forgotten.

It is arguably capitalism itself and its financial lures even for money-strapped kings and nobles that brought with it the respectability of the entrepreneur's productive activity. Marx observed that it imparted an aura of virtue to the capitalist's saving: "he thus forces the development of the productive powers of society. . . . Only as personified capital is the capitalist respectable. As such, he shares with the miser the passion for wealth as wealth. But that which in the miser is a mere idiosyncrasy, is, in the capitalist, the effect of the social mechanism, of which he is but one of the wheels" ([1867] 1906, p. 649).

An additional implication of this passage should be noted. Marx asserts that the capitalist form of economy leaves no choice to the entrepreneur. He is *required* by social forces to expand the productive powers of society and is driven, moreover, "ruthlessly [to force] the human race to produce for production's sake" ([1867] 1906, p. 649). Thus, "[t]he bourgeoisie cannot exist without constantly revolutionizing the instruments of production, and thereby the relations of production . . . . Conservation of the old modes of production in unaltered form, was, on the contrary, the first condition of existence of all earlier industrial classes" (Marx and Engels, 1847).

Part of the mechanism was the adoption of the rule of law as an accompaniment, or indeed as an essential feature of the free-market economy. A strong case can be made for the conclusion that without the rule of law, including the rights of property and the enforceability of contracts, the growth miracle of capitalism, indeed capitalism itself, might not have been possible.[3] To indicate the significance of the rule of law and provide some indications of its origins, it is appropriate to return, once again, to the bit of history that has just been discussed. In many earlier societies there was no such thing as the right of private property. At least in theory, all property belonged to the monarch, who was entitled to requisition any of it whenever it suited his purposes. This was notably true in ancient China, where not only money and physical property were subject to expropriation, but even innovations themselves were likely to be taken over by the state. For example, it is reported that "frequently . . . during the course of Chinese history . . .

[3] See Rosenberg and Birdzell (1986) and de Soto (2001) on this subject.

the scholar officials . . . gathered in the fruits of other people's ingenuity. . . . Three examples of innovations that met that fate [are] paper, invented by a eunuch; printing, used by Buddhists as a medium for religious propaganda; and the bill of exchange, an expedient of private businessmen" (Balaszs, 1964, p. 18). Even the Church was not immune from royal takings, sometimes on a massive scale, as in the expropriation of the Templars by Philip IV of France (Philip the Fair) in 1307 or that of the monasteries by Henry VIII of England, more than two centuries later.

The resulting uncertainty was surely a major discouragement to saving and to innovative activity alike. Wealth was best rapidly consumed, lest it serve as a temptation to government acquisitiveness, and it may be conjectured that this contributed to the propensity of the nobility in a number of societies to be perpetually in debt. Productive innovation, aside from receiving little recognition much less admiration, was rarely worth the required effort. Without the rule of law, clearly, enormous obstacles prevented economic growth of any substantial magnitude.

Capitalism itself, even more clearly, was precluded by absence of the rule of law. Capitalism requires markets in which the participants can have confidence in any agreements arrived at. It is driven by the pursuit of accumulated and retainable wealth and opportunities to expand that wealth by devoting it to the production process. Sanctity of property and contract, and institutions that can be relied upon to enforce them both, are necessary conditions for the creation of capitalists and for effective execution of their role.

VIII. Capitalism and Independent Innovation: Outline of the Sequence of Developments

The conclusion of this discussion is that entrepreneurs—that is, independent innovators—have played a critical role in the growth performance of the capitalist economy. They were indispensable at its inception, introducing new business methods and other innovations without which the free-enterprise system could not have prospered. They adopted new processes, ranging from the use of better ships provided by the Venetians, the Genoese, and the Dutch, to innovations in financial procedures such as the introduction of equity as a supplement to debt in the financing of business ventures, and double-entry bookkeeping.

The conditions for the rise to economic importance of the independent entrepreneur can perhaps be ascribed to historical accident. But once the conditions that nurtured capitalist entrepreneurship emerged, economic forces took over. The success of earlier innovators in commercial and productive activities encouraged other innovators to follow their lead, both by showing how it could be done and by publicizing the rewards. But it also brought political power to this class and to the capitalists who helped to finance their activities. This power was used to strengthen the rule of law and the rights of property, and to encourage other governmental measures that solidified and improved the environment's hospitality to productive entrepreneurial activity.

At the same time, in a number of industries, innovation expanded the scale of the firm required for economic efficiency. Canal building, railroad construction, steel manufacturing, and other such activities could not be carried out efficiently by the minuscule enterprises of an earlier era. These large enterprises evolved into oligopolies and their rivalry forced them to employ whatever weapons promised to preserve and

perhaps enhance their market position. New products and processes were obvious tools for the purpose. Then, as described earlier, the pressures of competition forced these firms to do what they could to reduce the uncertainties of innovation. They did so by taking over much of the process as part of the routine operation of the firm.

IX. Conclusion

Today we are left with an economy that derives innovations from both sources—from the routine activities of giant firms and from independent inventors and their entrepreneur partners (who are sometimes the same person).[4] But, as already observed, these are not purely substitute activities. Rather, there has been a predictable tendency toward specialization: the entrepreneurs providing the more heterodox, breakthrough innovations, and the R&D establishments of the larger firms creating the enhancements to those breakthroughs that contribute considerably to their usefulness. These goliath innovators have not eliminated the role of the entrepreneurial Davids; instead, the two have tended to specialize and, together, they have enhanced the process beyond what either type of innovator might have been able to achieve by itself. Thus, there is superadditive complementarity between the roles of the two types of innovating enterprise, and growth is arguably enhanced by this division of their labor.

Growth in the free-market economy, from its inception (and still today), has served as a stimulus to entrepreneurship. But entrepreneurship has returned the favor, making a constant and major contribution to capitalist growth. Routine innovation processes – those guided by standard-business decision principles -- are, indeed, of great and probably of growing importance. However, the entrepreneurial independent innovator continues to play a critical role. Revolutionary breakthroughs continue to be provided to a considerable degree by independent innovators, who can avoid the conservative propensities of the giant firm. Without the revolutionary entrepreneurial contributions there would be much less for the large firms to develop further. It is indeed fortunate that there is no reason to expect the independent inventor or the entrepreneurial innovator, with their more-radical contributions, to become obsolete or to disappear any time in the foreseeable future.

[4] Of course, the universities and the government also make very substantial contributions.

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