ENTREPRENEURSHIP, INNOVATION AND GROWTH: THE DAVID-GOLIATH SYMBIOSIS[1]

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The central contention of this paper is that the small firm, home of the independent entrepreneur and the independent inventor, has been the primary source of the technical ideas and innovations that serve as the foundation for the unprecedented growth performance of the world's industrial economies. Yet the bulk of expenditure on R&D and related innovative activities today, at least in the US, is not carried out by small enterprises but is, rather, to be found inside the large oligopoly firms. This is not meant to suggest that those large enterprises are inefficient or ineffective innovators, spending large quantities of resources to produce minor results. Rather, it is my contention that the difference in performance is the result of the different roles taken by the large and small firms, and that this very desirable specialization has yielded superadditive results. It supplies technical progress more effectively than the more specialized efforts of the types each of the two groups of firms focuses upon could have provided by itself. For the innovative activities characteristic of the firms from one of the groups constitute a critical supplement to those of the other's. In this scenario, then, David and Goliath no longer meet in enmity – they are promoters of the same cause.

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

[1] This talk is based on materials in my forthcoming book *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism,* Princeton: Princeton University Press, 2002

growth performance. Here, I use the term "innovation" in Schumpeter's sense, as *the entire process*, from the birth of a new technological idea to the bringing to market of the resulting novel product or procedure. 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,* including active dissemination and promotion of usage, 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, I have argued in my recent book 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 to defend themselves from being outstripped by their competitors. Particularly in the high-tech sectors of the economy, to protect themselves from the risks just described, business enterprises have incorporated 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 innovators housed in their small firms no longer play a significant role. On the contrary, I will indicate that their contribution has grown even more critical. 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]. The U.S.

(Government) Small Business Administration has provided an even longer and more startling list, including the airplane, FM radio, helicopter, personal computer, pacemaker, safety razor and zipper (see Table 1)[2]

Table 1. Some Important Innovations by U.S. Small Firms in the Twentieth Century

Air Conditioning	Heart Valve	Portable Computer
Air Passenger Service	Heat Sensor	Prestressed Concrete
Airplane	Helicopter	Prefabricated Housing
Articulated Tractor Chassis	High Resolution CAT Scanner	Pressure Sensitive Tape
Cellophane Artificial Skin	High Resolution Digital X-Ray	Programmable Computer
Assembly Line	High Resolution X-Ray Microscope	Quick-Frozen Food
Audio Tape Recorder	Human Growth Hormone	Reading Machine
Bakelite	Hydraulic Brake	Rotary Oil Drilling Bit
Biomagnetic Imaging	Integrated Circuit	Safety Razor
Biosynthetic Insulin	Kidney Stone Laser	Six-Axis Robot Arm
Catalytic Petroleum Cracking	Large Computer	Soft Contact Lens
Computerized Blood Pressure Controller	Link Trainer	Solid Fuel Rocket Engine
Continuous Casting	Microprocessor	Stereoscopic Map
Scanner Cotton Picker	Nuclear Magnetic Resonance Scanner	Strain Gauge
Defibrillator	Optical Scanner	Strobe Lights
DNA Fingerprinting	Oral Contraceptives	Supercomputer
Double-Knit Fabric	Outboard Engine	Two-Armed Mobile
Robot Electronic Spreadsheet	Overnight National Delivery	Vacuum Tube
Freewing Aircraft	Pacemaker	Variable Output Transformer
FM Radio	Personal Computer	Vascular Lesion Laser
Front-End Loader	Photo Typesetting	Xerography
Geodesic Dome	Polaroid Camera	X-Ray Telescope
Gyrocompass		Zipper

Source: Compiled by the U.S. Small Business Administration, Office of Advocacy.

A very recent study sponsored by the Small Business Administration provides more systematic and powerful evidence to similar effect.[3] This report examines technical

[2] See U. S. Small Business Administration, *The State of Small Business: a Report of the President,1994*, Washington, D.C.: U.S. Government Printing Office, 1995, p. 114.

[3] CHI Research, Inc., "Small Serial Innovators: The Small Firm Contribution to Technical Change," Haddon Heights, NJ 08035, 2002, 32 pages. Written under contract no. SBAHQ-01-C-0149. Quoting the release describing the study, "A total of 1,071 firms with 15 or more patents issued between 1996 and 2000 were examined. A total of 193,976 patents were analyzed. CHI created a data-base of these firms and

change through patenting and defines "small firms" as "businesses with fewer than 500 employees." Perhaps most notably, the study finds that "… a small firm patent is more likely than a large firm patent to be among the top 1 percent of most frequently cited patents."

Among other conclusions, in the words of its authors, this study reports that

> • Small firms represent one-third of the most prolific patenting companies that have 15 or more U.S. patents.
> • Small firm innovation is twice as closely linked to scientific research as large firm innovation on average, and so substantially more high-tech or leading edge.
> • Small firms are more effective in producing high-value innovations—the citation index for small firm patents averaged 1.53 compared to 1.19 for large firms.
> • Small patenting firms are roughly 13 times more innovative per employee than large patenting firms.
> • A small firm patent is at least twice as likely to be found among the top 1 percent of highest-impact patents as a patent from a large firm.

Indeed, one can offer the plausible conjecture that most of the revolutionary new ideas of the past two centuries have been, and are likely to continue to be, provided more heavily by independent innovators who, essentially, operate small business enterprises. In turn, these innovators, once successful, often establish firms of their own, joining the large enterprises that engage preponderantly in routine innovation.

III. Characteristic Innovative Contributions of the Large Enterprises

The type of innovation in which the giant enterprises tend to specialize is primarily devoted to product improvement, increased reliability and enhanced user

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their patents. This list excluded foreign-owned firms, universities, government laboratories, and nonprofit institutions."

friendliness of products and the finding of new uses for those products. The approach tends to be conservative, seeking products whose applicability is clear and whose markets are relatively not speculative. The bureaucratic control typical of innovative activity in the large firm serves to ensure that the resulting changes will be modest, predictable and incremental. These firms are not predisposed to welcome the romantic flights of the imagination, the leaps of faith and plummets into the unknown that often lead only to disaster but which alone are likely to open up new worlds.

In this, having recognized the critical role of the smaller enterprises, one should not go to the other extreme and undervalue the incremental contribution of the routine activity that at least sometimes arguably adds more to growth than do the more revolutionary prototype innovations. Though each such small improvement may be relatively unspectacular, added together they can become very significant indeed. 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.

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 contributes crucial improvements to the performance.

In this process there is no reason to expect independent inventors or innovators to become obsolete any time in the foreseeable future, or for the small firms to become minor contributors to innovation. 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 Entrepreneurship as Allocated Resource and Variation in its Benefits

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.

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

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'decimated' – do you mean something stronger than 'reduced by one-tenth'?

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.

V. 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. 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 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.

"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.[4]

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.

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

It is desirable to explore the historical origins of the productively entrepreneurial small firm not only because of inherent interest, but also because of its lessons for policy, both in economies where the goal is to initiate vigorous growth and in those where the pertinent concern is to ensure that it continues.

We may begin by noting that a prime contribution of capitalism to growth was a profound change in the psychological climate, via an upheaval in the standards of commendable behavior, making a role model of billionaire innovators, with their contributions to *production*. The rising wealth and power of the capitalist entrepreneurs

[4] 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.

enabled 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 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).

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Marx and Engels, 1847 – 1948 in the Biblio. Page ref for quote?

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 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.

VII. Capitalism, Entrepreneurship and the Rule of Law

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.[5] 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 . . . 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,

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

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. Conclusion

Our economy derives its 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).[6] 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 a critical 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 in his small business enterprise continues to play a critical role. Revolutionary breakthroughs continue to be provided to a considerable degree by small enterprises that can avoid the conservative propensities of the giant firm. Without their revolutionary entrepreneurial contributions there would be much less for the large firms to develop further. It is indeed fortunate for the U.S. economy that its institutions and arrangements are such as to facilitate and stimulate profuse formation of small firms and to encourage their more-radical innovative contributions.

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

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