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The Demise of US Dynamism Is Vastly Exaggerated – But Not All Is Well

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Abstract:

Estimates of total factor productivity are based on assumptions that preclude the decentralized, broad-based innovation that undergirds the dynamism of capitalist economies. Thus the decline in standard measures of productivity – which fly in the face of most everyday experience – is not a cause for alarm. We should however be concerned by the declining numbers of improvised but promising new businesses.

This paper is forthcoming in a book comprising selected papers given at conference on The Future of Economic Growth organized by the Cato Institute on December 4, 2014. It draws heavily on my earlier work on entrepreneurship and innovation, most notably *The Origin and Evolution of New Businesses* (Oxford 2000) and *The Venturesome Economy* (Princeton 2008)

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The demise of US dynamism is vastly exaggerated – but not all is well

The good tidings: discouraging estimates of slowing productivity growth should not be a cause for alarm; the venturesome foundations of our economy seem largely intact. But the skies are not cloudless: while opportunities to innovate and to enjoy the fruits of innovations remain abundant for most, they may have diminished for more than a few.

My guardedly optimistic assessment derives from numerous but potentially unrepresentative observations. I study the anatomy and physiology of enterprise, not its epidemiology and focus more on healthy specimens than on pathologies. But while we should always treat generalizations inferred from particular observations as provisional we can legitimately question statistics that conflict sharply with such generalizations. Health authorities don't track the number of people running a temperature. Unlike some ancient Greeks, we don't confound fever as a symptom with a disease in itself or attribute the condition to overheated or putrefied humors, as did Hippocrates and Galen.¹ Similarly, an appreciation of the complexity of enterprise predisposes me to discount estimates of productivity derived from reductive models akin to the four humor theories of disease. Data on new business formation and growth seem more troubling however.

My argument proceeds in the following sequence. I first discuss how innovation became more broad based (and less destructive) during the 20th century as more diverse organizations harnessed the increased enthusiasm and capacity of more individuals to engage in innovative activity. I then critique the utility of productivity estimates because they assume a monolithic, mechanistic process of innovation that is fundamentally incompatible with the widespread exercise of human agency and imagination. Finally I discuss why data indicating the deteriorating performance of what I have called "promising" new businesses (Bhidé 2000) and Birch had previously called "gazelles" warrants real concern.

I will avoid debating whether we are on the verge of new technological and scientific breakthroughs.² I have no capacity for such prognostication. And, my observations suggest there are ample opportunities to innovate using the existing stock of scientific and technological knowledge.

Broad-based innovation

Capitalism has long been technologically progressive, as Marx put it. But, in the 19th and early 20th century, contributions to advances were not broad-based. Although many revolutionary products were invented between 1850 and 1900 the new artifacts were usually developed by a small number of inventors and sold to a few wealthy buyers. Alexander Graham Bell invented the telephone with one assistant. Automobile pioneers were one- or two-man shows—Karl Benz and Gottlieb Daimler in Germany, Armand Peugeot in France, and the Duryea brothers of Springfield, Massachusetts. And small outfits couldn't develop products for mass consumption. The early automobiles were expensive contraptions that couldn't be used for day-to-day transportation because they broke down frequently and lacked a supporting network of service stations and paved roads. One or two brilliant inventors couldn't solve these problems on their own.

Innovation became more broad-based in the 20th century. The Internet does not have a solitary Alexander Graham Bell. Innumerable entrepreneurs, financiers, executives of large companies, members of standard-setting institutions, researchers at universities and commercial and state-sponsored laboratories, programmers who have written and tested untold millions of lines of code, and even investment bankers and politicians, and not just a few visionaries or researchers have turned the Internet into a revolutionary medium of communication and commerce. Steve Jobs, often portrayed as a brilliant solitary inventor relied on the contributions of tens of thousands of individuals working at Apple and its network of suppliers. And harnessing the creativity and enterprise of the many rather than a few results in more, better and faster innovation.

The democratization of what I have called venturesome consumption also now plays a critical role. Unlike the rich hobbyists who bought the early automobiles, millions of the not-so-well to do scoop up products such as Apple's iPad and Microsoft's Kinect (the fastest selling consumer device ever) from the get go. And, while consumers get the lion's share of the value created by new products – more than 95% according to Nordhaus's (2005) estimates³ -- they are not passive beneficiaries of a windfall as Romer (2007) claims.⁴ Buying a new product involves a leap of faith and using it effectively often requires resourceful effort: we cannot know in advance whether a new product is safe and worth the price; and few products, iPads and iPods included, "just work" out of the box; we have to learn about their quirks and features and adapt them to our particular needs. In fact the total time and money users invest in selecting, installing, learning about and tweaking new products may well swamp the labor and investment of the developers of the products. But, without consumers willing to try and learn how to use new things, few new things would be developed, produced and used.

Non-destructive creation.*

Innovation has also become more balanced between its destructive and non-destructive manifestations and therefore more economically sustainable. "Creative destruction" may well have dominated in the 19th century as tractors displaced ploughs, steamships displaced sailboats and railroads displaced stagecoaches. But, while creative destruction continued through the 20th century a significant proportion of 20th century innovations did not displace existing products -- rather, they created new markets and satisfied new wants. Air-conditioners reduced temperatures in previously uncooled factories, stores, and office buildings. Airplanes did not reduce the demand for automobiles -- people flew when they would not have driven. New drugs and vaccines offered cures for diseases for which treatments did not previously exist. In 1938, The New York Times lamented that the typewriter was "driving out writing with one's own hand," yet global consumers continue to buy some fourteen billion pencils annually, enough to circle the world sixty-two times.⁵

Moreover, even those apparently destructive new products also created new markets because of features that satisfied a different set of wants than did the products they made obsolete. For instance, mass-produced automobiles provided not only cheaper but much faster transportation than did horse

* This section summarizes a lecture I gave at the Royal Society of Arts (RSA) in London on 17 November 2004. See also Chapter 13 of Bhidé (2008)

carriages, so people could live in spacious houses located at some distance from their workplace. Automobiles thus helped create a market for commuting (and suburban housing) that did not previously exist.

The symbiotic relationship between creative destruction and non-destructive creation has helped sustain the pace of innovation. We could not continue to increase living standards simply through new products or technologies that satisfy existing wants at lower cost. Sure, as costs decline, people will consume more of the good or service. But eventually, the law of diminishing returns will set in and sated consumers will refuse to buy more even if prices continue to decline. And once demand for goods levels off, further increases in production efficiencies will reduce the demand for labor.

Creative destruction has not unleashed mass-unemployment – or provided the mass leisure predicted by Keynes –because of non-destructive innovation. Creating and satisfying new wants uses the labor and purchasing power released by increased efficiency in the satisfaction of old wants. It also stimulates increases in efficiencies even after demand for old wants has been fully satisfied: Producers who satisfy old wants have to keep economizing on their use of labor, because they must compete for employees (and share of consumers' wallets) against innovators who satisfy new wants.⁶

Organizational Diversity and Techniques

More broad-based (and less destructive) innovation was helped along by diverse forms of organization. In the nineteenth century, exceptional individuals with all-round talent undertook innovations through simple partnerships or small firms. The more diverse organizations that emerged in the 20th century could harness the collective efforts of individuals with more specialized or less exceptional talent.*

As business historian Alfred Chandler has shown, large, professionally managed corporations which appeared in the last half of the nineteenth century,⁷ became a major force for developing and deploying innovative products in the twentieth century. Companies such as DuPont, for instance, developed new materials, such as nylon, in their research labs, produced them on a mass scale at low cost, and created large markets for their use. In other words, large corporations were adept at orchestrating innovations by the many and for the many.

By the 1960s, large corporations became ubiquitous, producing nearly half the goods and services annually available in the United States.⁸ This more oligopolistic structure favored less destructive innovation. Many behemoths had come to dominate their markets by exploiting economies of scale and scope to displace small businesses. These economies then became formidable barriers to their own displacement. Creating and serving new wants provided offered better prospects to the innovator except in markets (such as retailing) that remained fragmented. In some instances, innovators who initially satisfied new wants and underserved customer segment later became threats to large incumbents.⁹ Entrepreneurial Davids successfully hurling slingshots at Goliaths from the get-go were virtually unknown.

* I discussed the comparative advantages of different organizational forms in considerable detail in Bhidé (2000) and Bhidé (2008)

Nonetheless opportunities for non-destructive innovation and transformation of the still sizable fragmented markets allowed classic entrepreneurship to continue to flourish. Great enterprises such as Hewlett-Packard, Xerox, Polaroid, McDonalds and Walmart were started in an era when large incumbents were considered omnipotent.

By the early 1980s, professionally managed venture-capital funds began to see explosive growth, and the firms they invested in came to be regarded as the new standard-bearers of innovation. The once-hot large corporation was regarded as passé and on the path to eventual extinction. In fact, the emergence of VC-backed businesses also represented an increase in the diversity of organizational forms rather than creative destruction. Just as large corporations did not make the classic self-financed entrepreneur obsolete, VC-backed businesses did not knock out large corporations. Rather, different types of organizations specialized in different innovative activities and complemented each other's capabilities.

The new organizations that emerged in the 20th century developed new management techniques to help them develop, make and sell new products and services. In the first half of the century, as Alfred Chandler has documented, top managers of large companies such as General Motors evolved a systematic approach to decide what innovations to undertake. The development of wide range of management techniques that followed further increased the efficiency and scope of broad-based innovation. Project and supply chain management techniques for instance facilitate the integration of large teams of individuals with specialized expertise within and across organizations. Continuous improvement and "six sigma" techniques harness the creativity and initiative of rank-and-file employees – in complete repudiation of the Fordist principle of specifying the tasks of assembly line workers in the minutest possible detail.

Consumer surveys, focus groups and now design thinking tools seek to anticipate the nature and extent of new wants to reduce the incidence of failed product launches and the iterations necessary to satisfy customers. And new marketing and sales techniques help stimulate latent or inchoate wants – and this is particularly important as products and features proliferate – help match buyers with products and educate them in their effective use.¹⁰

Individual will and capacities

A greater willingness – and capacity – of individuals to help develop and deploy innovations has complemented the ability of organizations to undertake innovations. Besides the traditional regard for qualities such as self-improvement and a can-do spirit, other attitudes and beliefs that now undergird innovation have a distinctively modern, late twentieth century character¹¹ including:

Expectations of rapid technological change have become widespread. In earlier times, a relatively small number of people—mostly visionary inventors and scientists—believed in the inevitability and desirability of technological progress. Now many believe they can prosper by pursuing the new New

Thing, and that if they don't, they will fall behind. And the widespread expectation of the inevitability of rapid scientific and technological progress helps make it a self-fulfilling prophecy.*

Gratification from early adoption. Consumers who often aren't flush with cash rush to buy expensive new gizmos, like 3-D TVs, knowing prices will soon drop and reliability will increase because they derive utility from early adoption. The gratification that many modern consumers enjoy may be contrasted with the "conspicuous consumption" undertaken in the Gilded Age according to Thorstein Veblen to demonstrate wealth: today's early purchasers seek to display technological sophistication rather than wealth (which they may not even pretend to have).

Reduced regard for thrift has supported the more democratized buying of cutting edge products. Through the end of the nineteenth century, according to Max Weber's thesis, religious convictions about thrift sustained the "spirit of capitalism."¹² But today, because venturesome production requires venturesome consumption, excessive thrift can injure rather than help capitalism. As it happens, modern consumers have been more inclined to keep up with (if not stay ahead of) the recently acquired baubles of their neighbors than to display excessive thrift.

Eroding aspirations for long-term employment. Although relatively few people actually enjoyed lifelong employment at high wages, many once hoped to; starting and retiring at IBM or General Motors was a considered a good thing. Now employees often regard job hopping as necessary for getting ahead and employers don't look down on well-traveled résumés or reward extended loyalty. Job hopping can in turn lubricate innovation by improving the matching and rematching of individual talents and teams¹³ and by helping to disseminate knowledge of innovative techniques. Job hopping helps disseminate the know-how necessary to effectively use new technologies. Wal-Mart, for instance, has been a leader in using technology to manage its supply chain. Its alumni have helped propagate Wal-Mart's expertise not only to its direct competitors, but also to online retailers such as Amazon.¹⁴

The expansion of tertiary education ("attending college"), especially after World War II, has given more individuals a greater capacity to innovate. Some argue college educations are a waste for many who attend. Charles Murray for instance claims that only a minority whose intelligence is well above average benefit from higher education."¹⁵ In my view (Bhidé 2008 398-402), the democratization of higher education has provided subtle advantages. College graduates may not retain much of what they learn and technical knowledge now often becomes quickly obsolete. But college curricula, which are invariably more kaleidoscopic than those at vocational schools or technical apprenticeships offer benefits: they require students to quickly familiarize themselves with a wide range of often unrelated subjects. This can improve both the ability—and equally importantly the confidence—to learn new things. And, college students generally have to communicate and cooperate with a more diverse set of fellow students than they had previously encountered in their high schools or who they might encounter

* Consider Intel cofounder Gordon Moore's famous observation that the number of transistors built on a chip doubles every 18 months. Semiconductor companies who believe in this so-called law invest the resources needed to make it come true. Device and software producers design products in anticipation of the 18-month cycle. So when new chips arrive, they find a ready market, which in turn validates beliefs in Moore's law and encourages even more investment in building and using new chips.

in a vocational school. This kind of socialization can also help individuals participate in teams comprising a diverse and unfamiliar characters assembled to undertake innovative projects.

Conflicting evidence

Views from the coalface and from up high provide strikingly different assessments of the state of dynamism. The former suggests that the underpinnings and pace of innovation have not weakened. Many of the enabling factors I have discussed above gathered speed long after the 1970s when pessimists say economic sclerosis set in. As mentioned, professional venture capital became a force after the early 1980s. Harnessing the creativity and enterprise of rank and file employees caught on in the 1980s when managers of struggling US companies sought to emulate their Japanese rivals competitors and books like *In Search of Excellence* (1982) and *Theory Z: How American Business Can Meet the Japanese Challenge* (1981) became best-sellers. The participative ethos was systematized through quality circles and six sigma programs during and after the 1990s. The declining aspiration for secure jobs and a corresponding increase in free agency is also of recent vintage. The wrenching recession of the early 1980s was a turning point in making life-time employment a matter of short-term convenience. Continuing pressure from Wall Street and global competitors, especially from Asia, intensified the trend. And although the building blocks of professional sales and marketing date back to the 1940s, the use of design thinking, which seeks to more effectively connect users and developers is said to have entered the business world with the founding of IDEO in 1991.

Concrete outcomes also suggest the pace of innovation has not abated. Any number of today's quotidian artifacts would have been unrecognizable, perhaps unimaginable, a decade ago. Routine dealings with supposedly hidebound government agencies, from paying tolls and taxes to renewing drivers' licenses have been transformed by digital technologies. Professors may receive life sentences but students look forward to many twists and turns in their careers. And marquee employers shine and fade. Digital Equipment, Compaq, Sun Microsystems, Netscape are gone. Linked-in is in, as are Amazon, Google and Facebook.

The pessimistic claim that our best days are behind us derives from macro-data, primarily on estimates of labor and total factor productivity. According to Gordon (2014a), "epochal" inventions of the Second Industrial Revolution, which continued to bear fruit through the first six decades of the 20th century, sustained a 2.36% growth rate of labor productivity growth (output per hour worked) between 1891 and 1972. Growth in output per hours hour worked slumped to 1.38% per year from 1972 to 1996, and after accelerating briefly (to 2.54% per year from 1996-2004) fell back to growing at just 1.33% per year from 2004-2013.

Estimates of the growth of total factor productivity (TFP) – intended to reflect the efficiency of converting both labor and capital into goods and services – reinforce the pessimistic view. According to estimates reported by Gordon (2014 b) the rate of growth of TFP fell even more sharply than labor productivity after 1970.

Period	Annual Growth Rate (per cent)	
	Labor Productivity	Total Factor Productivity
1890-1920	1.50	0.59
1920-1970	2.82	1.84
1970-2014	1.68	0.63

Source: Gordon (2014b)

On the surface, the doleful macro evidence appears more credible. Inferences derived from stories of successful innovations are subject to confirmation and vividness biases. Productivity estimates should in principle provide more objective markers. We should particularly privilege TFP, which according to Gordon and many other economists, represents the best possible measure of innovation: if the same capital and labor inputs produce more goods and services we may plausibly credit innovation. But as we will see next, how inputs and outputs are measured and productivity is actually estimated undermines the inferences we can draw.

Implausible indicators

The myriad problems of estimating productivity are well known.* I will highlight three ways in which productivity estimates ignore basic features of modern innovation that I described earlier.

First, measures of outputs and inputs disregard much of what users get and give. As is well known, using market prices to measure outputs (GDP) eliminates consideration of the value consumers derive in excess of what they pay for their purchases. If typical estimates of the consumer surplus generated by innovations are right, conventional measures of output growth fail to capture possibly 90 percent or more of the value of innovations. The undercounting is particularly extreme in the Internet era when consumers receive so much information for free, as Brynjolfsson and McAfee, and Mokyr have pointed out. Symmetrically, input measures ignore the money and virtually all the labor invested by venturesome consumers. As mentioned, the uncertain utility of new products makes their acquisition a risky outlay, and the effective deployment of many new products can require considerable effort. But user investment isn't counted at all (because it is an opportunity cost) or recorded as consumption or current expenditure.

Second, estimates of the "real" or inflation adjusted changes in inputs and outputs ignore innovations that change what we consume. Non-destructive innovation that satisfies completely new wants clearly precludes comparing the prices of identical consumption baskets over time.† Innovation muddles price comparisons even of goods and services that satisfy existing wants. Consider the case of Craig Zucker who in 2008 began selling New York city tap water under the name Tap'd NY, charging \$1.50 for a 20oz bottle.¹⁶ The steep price charged did not mean that price of water has increased, since consumers didn't think tap (available for about a cent a glass) and Tap'd NY water were identical.

* Coyle's 2014 book provides a comprehensive review of the limitations of using inflation-adjusted GDP as a measure of economic output.

† We can compare "costs of living," and as new goods improve standards of living improve the monetary cost of living, without any actual inflation.

And, efforts by new and existing businesses to differentiate and improve their offerings and the eagerness of consumers to favor the new are routine. In some instances, new products offer measurable improvements (such as the clock speed of microprocessors) allowing price comparisons through so-called hedonic adjustments. But these are exceptions. Continuous, often non-destructive, and unmeasurable changes have become the rule, especially in services. Checking accounts now provide daily alerts and apps that allow us to deposit scanned images of checks. We can examine restaurant menus and book tables over the web and avoid lines at the airport by checking in at home. But this getting more for our money does not and cannot be counted as price cut or a real increase in the output of services that now comprise two thirds or more of economic activity.

Third, TFP estimates assume away the heterogeneity and dynamism that define the modern economy. Estimating the efficiency of converting inputs to outputs requires models to control for variations in the inputs, with the model of choice being the mathematically convenient Cobb-Douglas production function. But while convention and convenience favor this procedure, it is impossible to verify whether the Cobb-Douglas equation – or any other equation for that matter -- properly represents how inputs are converted into outputs. Worse, the estimation procedures assume that all producers operate in perfectly competitive markets and that they convert inputs into unchanging outputs (save for measurable changes in quality) in a manner that conforms to a single formula. In other words, unvarying uniformity is assumed to deliver the innovation that TFP is claimed to measure.

Broad based, unregimented innovation makes this virtually unthinkable. How plausible is it that Wal Mart's mega outlets, Apple's retail stores (replete with genius bars), traditional supermarkets and small grocery stores that use different processes to provide different shopping experiences can be modeled with the same Cobb-Douglas equation, even if they all fall under the rubric of retailing? Imagine using a single formula – say for a cone – to estimate the ratio of surface area to volume for objects designed to have idiosyncratic and changing shapes. The assumption of perfect competition likewise challenges belief when large oligopolistic companies undertake about half of business investment and when even smaller companies strive to escape the profit depressing forces of competition.

Jarring disjunctions

It is conceivable that productivity measures may, in spite of the implausible assumptions, somehow track the overall changes in the efficiency of converting inputs to outputs. Perhaps uncounted consumer investment offsets the uncounted consumer surplus or new uncounted inconveniences of such as less leg-room on airplanes offsets the benefits such as on-line check ins. Or the ratios of uncounted inputs to counted inputs and of the uncounted outputs to the counted outputs might never change.* Or maybe models (with arbitrary, unverifiable structures) that assume identical production functions somehow correctly average out the great variety of ways in which different businesses convert

* Gordon (2014a) implicitly makes this assumption when he dismisses the undercounting of the consumer surplus. He writes that “real GDP measures have always missed vast amounts of consumer surplus since the dawn of the first industrial revolution almost three centuries ago” but provides no evidence for why this vast miss should be constant over time.

inputs into outputs – and that this average does not change over time. But the coincidences would have to be remarkable.

More likely, implausible assumptions produce palpably implausible results. Consider, as an important case in point, the supposed slump in productivity growth of IT using industries, claimed to be a major reason for the overall decline in productivity growth after 1972.

In 1987, Robert Solow (who, according to Robert Gordon, was instrumental in establishing TFP as the main measure of technological change) wrote: “We see the computer age everywhere, except in the productivity statistics.” The following year, Steven Roach of Morgan Stanley dubbed this the “productivity paradox.” By 1996, annual IT spending by U.S. firms had crossed the half-trillion-dollar level; yet in 1999 Robert Gordon -- and in 2000 Jorgenson and Stiroh -- suggested this was nearly for naught so far as productivity was concerned. Major IT-using sectors, wrote Jorgenson and Stiroh (2000 6-7), “continued to lag in productivity growth. Reconciliation of massive high-tech investment and relatively slow productivity growth in service industries remains an important task for proponents of the new economy position.”*

But reconciling the Jorgensen and Stiroh result with the radical transformation of IT-using industries is even more challenging. By the year 2000, expanding big-box retailers, most notably Wal-Mart, had wiped out tens of thousands of small merchants. Similarly, small regional banks had been merged into mega sized national institutions such as Citicorp and the Bank of America or had disappeared. With the new players came new ways of doing business—Wal-Mart established global supply chains, for instance. The old players and ways of doing business didn’t fall like trees stricken with Dutch elm disease. The old order was forced out. How could this have happened unless the new order was in some way more productive than the old?

Or, could IT-using businesses simply have thrown away the greater part of half a trillion dollars in IT spending a year? Competition certainly can induce unprofitable investment: if one bank builds ATMs that customers value, others soon will as well making everyone’s investment unprofitable.¹⁷ But this simply means that customers, not banks, derive most of the benefit from the technological “arms race.” And, as mentioned, productivity estimates ignore consumer surplus derived from more convenient banking or more efficient global supply chains.

Putting aside the significant – and uncounted – consumer benefits, the plausibility of Jorgensen and Stiroh’s finding is undermined by their assumption of perfectly competitive markets. This assumption is both completely unrealistic and virtually precludes the very phenomenon that their research purports to assess. Perfect competition may be a fair approximation for neighborhood florists or laundries. But the main IT-using and producing industries are clearly oligopolistic. Moreover, if IT using industries were in fact nearly perfectly competitive, how could IT-using businesses have had the capital needed to make large investments in IT? Similarly, if the IT production was perfectly competitive, why or how could the producers have made the investments necessary to develop and market new IT products?

* On the other side, Brynjolfsson (1993), Griliches (1994), and others also suggested that the productivity paradox reflected deficiencies in measurements and methodological tool kits.

The acceleration of TFP in the Great Depression is even more surreal. The economy of the 1930s is said to have experienced “the most rapid TFP growth of any comparable period in American history” Shackleton (2013 p.9). Estimated TFP growth in the Depression decade was **50% higher** than the estimated TFP growth in the 1920s – a decade that with reason has been called roaring. According to Mintz and McNeil:

“Americans in the 1920s were the first to wear ready-made, exact-size clothing. They were the first to play electric phonographs, to use electric vacuum cleaners, to listen to commercial radio broadcasts, and to drink fresh orange juice year round. In countless ways, large and small, American life was transformed during the 1920s, at least in urban areas. Cigarettes, cosmetics, and synthetic fabrics such as rayon became staples of American life. Newspaper gossip columns, illuminated billboards, and commercial airplane flights were novelties during the 1920s. The United States became a consumer society”(Mintz and McNeil (2013).

Sprouting shanty towns and soup kitchens was emblematic of the sharp turn for the worse in the 1930s. With soaring unemployment sharply reducing the number of Americans who could contribute or benefit, it is hard to imagine how innovation could have been broad-based. If a scale shows that someone visibly wasting away has gained weight, we would think that the scale is defective, not that the person’s bones became denser. But, the acceleration of TFP while employment, consumption and investment slumped does not faze those who don’t question its assumptions.

Shackleton (2013 p.9) claims for instance that TFP was more “widely diffused” in the 1930s because of “strong growth in private investment in research and development” and “increased regulation of housing and land use” easing constraints that had “dramatically limited the growth of real housing services” Field (2012 19,1) who deems the 1930s “the most technologically progressive decade of the century” likewise points to the narrowness of advances in the 1920s. He grants “transformative” advances involving “new products (especially the automobile and electrical appliances)” occurred in the 1920s, but “outside of manufacturing, there was little progress.”

Certainly manufacturing advances helped enable the 1920s consumer boom. Henry Ford for instance “revolutionized American manufacturing ... By using conveyor belts to bring automobile parts to workers, he reduced the assembly time for a Ford car from 12 ½ hours in 1912 to just 1 ½ hours in 1914. Declining production costs allowed Ford to cut automobile prices six times between 1921 and 1925. The cost of a new Ford was reduced to just \$290. This amount was less than three months wages for an average American worker.” (Mintz and McNeil (2013).

But, as is typical of broad based, multifaceted innovation – think of the synergies between Apple’s signature products and retail stores -- the boom required advances far from the factory floor. New distribution channels and methods had to be created. Horse traders and broom merchants could not sell cars and automobiles. Henry Ford didn’t just transform manufacturing. By 1925 his company had established, virtually from scratch, a distribution system comprising 6,400 dealers that sold and serviced more than a million cars. Likewise the consumer boom of the 1920s was financed through a vast expansion of credit, with personal debt nearly doubling as a proportion of income. And since banks did

not make consumer loans, new lending channels had to be created. These included installment sales finance companies (such as the General Motors Finance Company founded in 1919), retail installment lenders (particularly department stores), licensed consumer finance companies (such as the Beneficial Loan Company)¹⁸ and Morris Plan industrial banks (Calder 1999 p. 19).

Rather than signifying more narrow advances in the 1920s, the acceleration of TFP from the 1920s to 1930s shows how poorly TFP reflects broad-based innovation. TFP estimates give the 1920s get no credit for a soaring consumer surplus as mass markets were created. Nor does TFP penalize the 1930s for the subsequent stall in surplus. The new goods problem confounds the proper counting of gains from the production efficiencies that created mass markets in the 1920s. For instance automobiles were not included in the price index till the mid-1930s. And, transformative changes in retailing and consumer finance are unlikely to be properly accounted for when the same Cobb-Douglas production functions are used for both buggy merchants and automobile dealers.

While TFP seems superior to piecemeal observation therefore, it cannot reliably track widespread enterprise because it ignores differences in a manner that is not for purpose. While little is lost for in treating all births and deaths as identical occurrences in estimating trends in life expectancy, innovation entails an idiosyncratic quest of the new and different. Moreover, unlike births and deaths innovative efforts and outcomes cannot be observed or unambiguously recorded. Nor can we rely on invariant, one-size fit all models to estimate the magnitudes; the course of human enterprise isn't like the motion of planets or of gas molecules predestined by discoverable laws of nature. At best we can examine multiple plausible correlates to form a judgment about the overall state of innovation. And, returning to the present, although many signs reassure, data about the formation and growth of promising business is alarming as we will now see.

Warranted concerns

A simple taxonomy. To understand why their debility matters, it is helpful to contrast promising new businesses with two other kinds of startups. One comprises new businesses backed by professional VCs that have been at the forefront of IT, bio-tech and social media development. Outsized returns earned by the winners in this category have helped attract more funds and attention but actual numbers of VC-backed startups is small. In the best of times, each year fewer than a thousand new ventures receive seed or early-stage financing from venture capitalists; in lean times only a few hundred receive such financing. In contrast, the total number of new businesses started in the United States every year ranges from half a million to two million.¹⁹

A second kind comprises the numerous startups in mature, small scale businesses such as beauty salons, auto-repair shops, and house-painting and house-cleaning services. Their contribution to the dynamism of the economy is limited. They start small and stay small, without hiring many employees or trying to change existing practices and industry structures. Their role is mainly to follow changes in the economy: as the auto industry struggles and fracking booms, beauty salons close in Michigan and open in North Dakota.

“Promising” startups have more potential than these popular mundane startups. They enter markets that offer greater opportunities for growth and profit and their founders are better educated than the workforce at large. Successful ventures in this category can evolve into so-called gazelles a few of which may then become multi-billion-dollar public companies such as Microsoft and Dell. At the outset however the promise of promising businesses isn’t enough to meet the exacting standards of professional VCs. They often target small niches, albeit in high growth sectors. They don’t have technologies or insights that could potentially create sustainable advantages, whereas many VC-backed businesses build on inventions or ideas previously developed in a lab or tinkerer’s home. And, founders of promising businesses usually lack the deep experience that VC regard as necessary to manage rapid growth, although most do have college degrees. In lieu of venture capital therefore, founders of promising businesses therefore “bootstrap” their ventures with personal funds or funds raised from relatives, friends, and individual investors.*

Narrowing Innovation. While the funds raised and disbursed by VCs remains high, more capital has not materially increased the proportion of startups funded with professional venture capital.²⁰ As VCs raise more capital, they tend to pay higher prices for “good” deals rather than lower eligibility standards to fund more startups. At the same time, recent papers – for instance by Hathaway and Litan and especially by Haltiwanger (with various associates) – suggests that promising startups may have become a beleaguered species. For instance, Decker, Haltiwanger, Jarmin and Miranda (2014) report a “marked decline” in the rate at which new businesses have been started in the US in recent decades. And, this decline seems especially pronounced in startups that then grow rapidly and in the industry sectors where promising businesses have previously flourished.

Some researchers attribute VC-backed businesses with an exceptional capacity for efficient innovation²¹, so small increases in their numbers might compensate for fewer promising startups. I am however skeptical of the research results. Returns on VC investment do not corroborate claims of exceptional innovation efficiency: While some VCs have earned consistently high returns, the average for the industry has been unremarkable. More importantly, comparisons of innovation efficiency are unreliable because, like macro-estimates of productivity, they rely on one-size-fit-all measures of outputs (such as patent counts) and models to control for variations in inputs. In reality, as at least from my bottoms-up view, different organizations use different inputs and processes to produce different (and often complementary) innovations. There are good and bad trumpet players and flautists; but to say that trumpet players as a class are more productive because they blow more wind through their instruments misses the point. Just as symphonies require many instruments—replacing flautists with trumpeters doesn’t improve a performance— VC-backed businesses, which clearly have an edge in securing and exploiting patents, cannot substitute for the innovative contributions of promising startups.

Promising startups have an advantage over VC-backed startups (and large companies) in pursuing small, highly uncertain opportunities. VCs have a strong preference for ventures where there is an objective basis for expecting large payoffs quickly, typically five- to seven-years.²² In contrast, self-financed entrepreneurs are more willing to act on hunches (or difficult to communicate personal experience), and

* Chapters 1 through 6 of Bhidé (2000) provide a detailed comparative analysis of the three types of startups

to pursue opportunities where there is no clear prospect for large payoffs. Low cost ventures started by such entrepreneurs can help products and technologies that have no compelling use at the outset find a foothold. For instance, a self-financed entrepreneur, Ed Roberts, introduced the Altair, the first personal computer in 1975 and Paul Allen and Bill Gates – also self-financed – soon developed its early software. Later, when technological and market uncertainties had been reduced, VCs such as Arthur Rock and large companies such as IBM financed or undertook initiatives that helped create a huge market.

An even larger number of promising startups facilitate the diffusion of new technologies after they have gained traction by providing goods and services whose revenue potential is too small or uncertain to interest VCs or large companies. After IBM's entry in 1981 legitimized PCs as a mainstream product, a swarm of self-financed startups provided installation and maintenance services, "add-on" hardware and software, and educational books and videos that both took advantage of and helped advance burgeoning micro-computer sales. A similar pattern is now being repeated with tablets and mobile phones. Self-financed entrepreneurs have capitalized on and increased the popularity of mobile devices by producing hundreds of thousands of apps and peripherals such as cases and screen protectors. The revenues and profits realized by most entrepreneurs are small but the availability of a wide selection of complements promotes the increasing use of mobile devices.

More modest prospects and paltry resources also encourage promising businesses to harness the contributions of individuals that VC-backed businesses and large companies tend to avoid. VC-backed businesses favor proven expertise because they have to show quick results before the money runs out.* And because of the glamour and upside of their stock options, VC-backed startups can attract hot shots and rising stars without having to pay high salaries.

Large companies can afford to train entry-level employees who don't have job specific skills. Unfortunately, such employers can also be picky, hiring individuals with good educational qualifications and famously, in cases such as Google and Microsoft, individuals with exceptional intelligence and talent. Inflexible HR policies and concerns about legal liability preclude hiring the hard cases, such as high school dropouts, individuals with spotty job histories, or ex-felons who now comprise about one-eighth of the US male working age population.²³

Concerns about over qualification can work against applicants seeking positions they are more than qualified to fill in established or VC-backed companies: employers worry that a desperate individual who takes an unsatisfactory job now will always be looking for a better opportunity. Employers also worry that there is a reason why an applicant might be unemployed: it's safer to fill a position by poaching an already employed individual even if it means paying a premium wage.

* "Even though we are located in Austin, we haven't hired a lot of University of Texas graduates," the founder of one high-tech company told me. "In fact, we rarely hire people directly out of any college. We have a saying around here: 'There are only so many people we can have on our staff with learner's permits.'" Similarly, the CEO of a bio-tech startup observed: "When you develop a pharmaceutical product, you can't make it up as you go along. You have to know what the next step is. You can't conduct a clinical trial unless you have people who have conducted clinical trials before."

In contrast, promising businesses provide a natural home for those with limited skills or derailed careers. "We were careful to make sure that we only employed people who were unemployed" one founder I interviewed said. "We were cheap. And if we went under and it didn't work out for them, we wouldn't feel so bad." Another recalled how his "scruffy business" couldn't have functioned without "burly, tattooed, illegals and felons."²⁴

Arguably the thinning ranks of promising ventures helped maintain chronic joblessness (unemployment for six months or longer) at near record levels in 2014, whereas short-term unemployment and postings of job vacancies recovered to about what was considered "normal" before the 2008 crisis. Forecasts that the expiration of long-term unemployment benefits at the end of 2013 would reduce chronic joblessness turned out to be incorrect.²⁵

Keeping it broad

According to Schumpeter, economically significant innovations are "large" and "spontaneous" rather than "small" and "adaptive." They so displace the "equilibrium point" that "the new one cannot be reached from the old one by infinitesimal steps. Add as many mail coaches as you please, you will never get a railway thereby." And, according to Schumpeter, only exceptional individuals undertake such innovations. "To act with confidence beyond the range of familiar beacons", wrote Schumpeter "requires aptitudes that are present only in a small fraction of the population."²⁶

Like Schumpeter's sweeping rhetoric about creative destruction being "the essential fact about capitalism" this characterization of innovation and innovators is at best partially true. As Nate Rosenberg and other economic historians have documented (and my own field-based research corroborates*) revolutionary technological change, like the evolution of humans from primordial microorganisms, is the accretive result of innumerable small changes. And while even small changes require acting beyond the range of familiar beacons, such an aptitude is widely distributed in the population.

Harnessing the aptitudes of the many to make change routine and ubiquitous has been a signal achievement. As Phelps's *Mass Flourishing* (and his prior writings) emphasize, the measure of a good economy lies in the satisfaction it provides to the many, not in the success of a few. And these satisfactions go beyond material rewards: they include, for instance, the exhilaration of overcoming challenges. Indeed they go hand in hand: a good economy cannot provide widespread material prosperity without harnessing the creativity and enterprise of the many. All must have the opportunity to innovate, to try out new things: not just scientists and engineers but also graphic artists, shop floor workers, salespersons and advertising agencies; not just the developers of new products but their venturesome consumers.

But as less glamorous ventures struggle while VCs race to fund elite entrepreneurs, opportunities to contribute and benefit from a dynamic economy may be narrowing. Worse yet, we don't know why unglamorous entrepreneurship has been in steady decline. Opinions range from growing health care

* Chapter 13 of Bhidé (2000) reviews Rosenberg's 1976 critique of Schumpeter's theories and my extensions to this critique.

costs to excessive regulation. My own analysis (Bhidé 2010) suggests that diversion of credit – and more importantly of specialized lending capacity -- from small businesses loans to consumer and mortgage loans has played a significant role. In truth however reformers, politicians and academics know little of how a netherworld they rarely encounter works, and which statistics cannot illuminate. Like collapsing bee populations, the beleaguered state of less visible entrepreneurs is a mystery that badly needs investigation.

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Notes

¹ According to Sajadi et al (2012 p. 976), “Early Greek texts did not distinguish between fever as a sign and fever as a symptom. Likewise, early on, there was an overlap between the sign or symptom of fever and Fever the disease. They notes that Galen did later clearly distinguish between the symptom of fever and its underlying diseases but continued to rely humor based explanations.

² Erik Brynjolfsson and Andrew McAfee (2013) and Joel Mokyr (2013) take optimistic side of this debate. Gordon (2014a) offers the pessimistic view.

³ Other studies reporting (or implying) large consumer surpluses include Mansfield et al. 1977, Bresnahan 1986, Trajtenberg 1989, Hausman 1997, and Baumol 2002.

⁴ According to Romer innovators “have brought the cost of a transistor down to less than a millionth of its former level. Yet, most of the benefits from those discoveries have been reaped not by the innovating firms, but by the users of the transistors. In 1985, I paid a thousand dollars per million transistors for memory in my computer. In 2005, I paid less than ten dollars per million, and yet I did nothing to deserve or help pay for this windfall.”

⁵ Petroski 1990

⁶ Even if new products are manufactured abroad, non-destructive innovation helps maintain employment by creating new domestic jobs to transport, advertise, market, install, and maintain the new products. In many cases, the value-added and employment generated through these activities generates more economic value and employment than does making products themselves. For instance, although computers are now largely produced abroad, their sales, marketing, transportation and installation account for about half the purchase price. Expenditures on the staff necessary to support the computers can amount six times the purchase price. Arguably, the growth in the range of products we consume has been an important contributor to the growth in the proportion of service sector employment.

⁷ Chandler 1990, 1.

⁸ Galbraith 1967, 1.

⁹ As Clay Christenson’s work shows

¹⁰ Many of these techniques were developed by large companies. IBM pioneered a systematic approach to selling large ticket systems. Six Sigma was first implemented in the US by Motorola and popularized by General Electric. Large companies are also the most strongly wedded to their use, creating the impression that these techniques hinder innovation. In fact, however development projects that use large teams simply cannot be undertaken without rules and organization. Nor can complex systems be sold without the sort of sales process pioneered by IBM. Below the apparently freewheeling open-source development of Linux lie elaborate processes and rules and, yes, a hierarchy. To play in the big leagues, even companies that start off with no management to speak of, such as Microsoft, have to routinize their approach—and hire managers from large companies to oversee the new routines. Venture capital-backed companies hire executives from large companies to implement (albeit with suitable adaptation) systematic managerial processes from the get-go. And thanks to the acceptance of job-hopping, high potential startups can attract the experienced executives they need.

¹¹ See Bhidé (2008) p 389-392 for a more complete discussion.

¹² Weber argued that merchants and industrialists accumulated capital in the belief that they had a moral duty to strive for wealth as well as to lead austere lives.

¹³ According to AnnaLee Saxenian, for instance the high propensity of employees in Silicon Valley to change jobs results in “spontaneous regroupings of skill” that place high quality employees in high potential ventures (Saxenian 1994, cited in Postrel 2005).

¹⁴ Footloose employees are also more likely to support the purchase of unproven new products (for their private gratification or otherwise), because they don’t expect to be around if it ultimately fails.

¹⁵ A college education “makes sense for only about 15% of the population,” or at a stretch 25 percent, Murray (2007 A19) states. “For learning many technical specialties,” writes Murray, “four years is unnecessarily long.

¹⁶ See <http://www.tapdny.com/> or <http://articles.latimes.com/2009/feb/25/nation/na-tapwater25>

¹⁷ As I argued in Bhidé (1986). Carr’s 2004 book also makes this point.

¹⁸ Calder 1999 p. 19

¹⁹ The number of new businesses with employees started every year is, however, lower. In 2005, for instance, an estimated 653,100 “employer” firms were started in the United States (Source: Office of Advocacy, U.S. Small Business Administration, from data provided by the U.S. Bureau of the Census, Statistics of U.S. Business).

²⁰ Gompers and Lerner (1998) estimate that a doubling of capital available to venture funds leads to a 7% to 21% increase in the prices they pay for their stakes.

²¹ The best-known example is a paper by Kortum and Lerner (2000). Using a variety of methods, but then “focusing on a conservative middle ground,” they estimate that “a dollar of venture capital appears to be three times more potent in stimulating patenting than a dollar of traditional corporate R&D.” They then suggest that “venture capital, even though it averaged less than 3 percent of corporate R&D from 1983 to 1992, is responsible for a much greater share—about 8 percent—of U.S. industrial innovations during this decade.”

²² I provided a detailed “Knightian” explanation for the nature and underpinnings of VC investment criteria in my 2000 book and in a follow-up article. “How Novelty Aversion Affects Financing Options” (Bhidé 2006). Mainstream finance theories ignore Knightian uncertainty and focus on information asymmetries—the so-called lemon problem that my fieldwork suggests is of less concern to real-world investors and entrepreneurs than the contracting problems that arise because of Knightian uncertainty.

²³ See <http://www.cepr.net/documents/publications/ex-offenders-2010-11.pdf>. And, nearly one third of adult Americans have an arrest or conviction record (Emshwiller and Fields 2014 p A4

²⁴ Every hard case that gets a job doesn’t get to keep it of course. “We had to fire many employees,” one entrepreneur told me “because to get hired was a joke. If you came in and we needed a warm body, you were hired. Literally for any position.” But improvised startups do give a chance to people who large companies or glamorous startups wouldn’t touch.

²⁵ Furth, Salim “What’s causing the Increase in Long-Term Unemployment, December 3, 2014 <http://blogs.wsj.com/washwire/2014/12/03/whats-causing-the-increase-in-long-term-unemployment/>

²⁶ Capitalism, Socialism, and Democracy, New York: Harper and Row, 1942, page 132.