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HARDHEADED OPTIMISM ABOUT GLOBALIZATION

Be careful what you wish for. For many decades, policy makers urged Communist China and Socialist India to adopt market friendly policies. But as the two countries put this advice into effect, the results have evoked widespread alarm. Since 2000, China has added nearly 2.5 million manufacturing jobs, and Indian software companies have added programmers at unprecedented rates. Allegedly, this growth has come at the expense of U.S. jobs, and imports of manufactured goods from China and software and services from India have been widely blamed for the so-called jobless recovery from the 2001 recession.

From this diagnosis follow two different prescriptions. One aims to limit outsourcing through measures such as imposing import tariffs, forcing China to revalue its currency, and reducing the number of visas for Indian programmers. The other aims to get China and India to reduce their trade barriers and import more goods and services produced by U.S. workers.

This article provides a different perspective: I argue that the long run prosperity of the U.S. (and other developed economies) depends on the capacity of its entrepreneurial individuals and firms to create and satisfy new consumer wants. When this capacity is in good repair, job "losses" – through improvements in the efficiency of domestic production or through outsourcing to low wage countries – enhance standards of living. But, if this capacity is impaired, neither the low road of protection nor the high road of free trade does much good. And fortunately, although the new want apparatus may have temporarily stalled, it doesn't seem to have broken down.

Symbiotic relationships

At least in the U.S., most policy makers understand that in the long run, economic growth requires productivity growth – for per capita living standards to increase, so must per capita output. But we often mistakenly believe that productivity growth comes just from improved efficiency – using fewer resources to satisfy our current wants. We fail to recognize that the creation and satisfaction of new wants can also increase per capita output. For instance, an artist may increase her productivity by developing new techniques that speed up her output of paintings. Alternatively, she may develop a new oeuvre that commands higher prices. She may produce exactly the same number of canvases as before, but, provided her work sells at higher prices, her economic output and productivity increases. Moreover, the new oeuvre may serve as a substitute for more traditional paintings, so innovator's productivity gain comes at the expense of the productivity of artists' who face reduced demand. But it doesn't have to: the new oeuvre may

appeal to completely new sensibilities and find a place on walls that otherwise would have remained bare.

In fact, economies cannot sustain increases in productivity and living standards simply through increasing efficiencies in the satisfaction of existing wants. In the short run, increased efficiencies reduce costs and as costs decline, people consume more of the good or service. But eventually, the law of diminishing utilities sets in. Sated consumers refuse to buy more even if prices continue to decline. After that, further increases in efficiencies reduce the demand for labor.

In principle, societies could accommodate the reduction in the demand for labor by increasing everyone's leisure. Over the last century, economic growth has helped reduce working hours and increase vacations. But somehow, beyond a certain point, societies seem unable to accommodate reductions in the demand for labor by spreading the work around. Efforts to control unemployment by mandating reductions in work weeks or increasing the number of holidays don't seem to work.

Rather, it is the entrepreneurial activity of creating and satisfying new wants that keeps the system humming. It employs the labor and purchasing power released by increased efficiencies in the satisfaction of old wants. It also creates incentives for continued 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) with innovators who satisfy new wants.

Outsourcing to low wage countries resembles efficiency improvement in its symbiotic relationship to the satisfaction of new wants. It improves living standards in wealthy countries, provided the human capital released can be used to make new goods and services. Otherwise, like improvements in efficiency, outsourcing can reduce the demand for domestic labor.

The historical record

Improvements in efficiency as well as the satisfaction of new wants played significant roles in the economic growth the U.S. enjoyed in the 20th century. As is well known, per capita incomes grew at unprecedented rates after the industrial revolution: According to Bradford DeLong (2000), world GDP growth per capita was virtually zero until the 18th century. In the 19th century, world per capita income more than doubled and then in the 20th century increased more than eightfold. And, according to DeLong, although virtually all of human kind saw improvements in its material well being, growth rates were strongest in the industrial nations of

the West. For the U.S. DeLong estimates a ten and a half-fold increase in real per capita GDP in the 20th century.

In part the growth that occurred during the industrial revolution resulted from more efficient methods of production of existing goods. For instance innovations such as tractors, threshing machines, fertilizers, pesticides and hybrid seeds led to vast improvements in agricultural productivity. As productivity increases reduced costs and increased the affordability of food, per capita consumption grew. But the increase in the consumption of food or other existing goods doesn't come close to accounting for the ten-and-a-half-fold increase in overall per capita G.D.P. According to William Nordhaus's (1997) estimate less than 30% of the goods and services consumed in 1991 bear much resemblance to the goods and services of the late 19th century. "Most of the goods we consume today" Nordhaus writes, "were not produced a century ago. We travel in vehicles that were not yet invented that are powered by fuels not yet produced, communicate through devices not yet manufactured, enjoy cool air on the hottest days, are entertained by electronic wizardry that was not dreamed of and receive medical treatments that were unheard of."

Some of the new goods replaced the goods consumed by our forebears. Cars and buses replaced horses and stagecoaches. Steamships grounded sailing ships and Ready to Eat cereal pushed homemade porridge off breakfast tables. Like the improvements in agricultural productivity, many of the new products reduced prices and costs. For instance candles provided the primary source of artificial light till about the early 1800s. These were followed by lamps that used whale oil, sperm oil, town gas, kerosene and electricity. Nordhaus calculates that these innovations reduced the price of light by 99 percent – from 40 cents per 1,000 lumen hours in 1800 to a tenth of a cent today.

According to Schumpeter (1934), this "creative destruction" of stagecoaches and candles is an "essential fact about capitalism." But in fact, many new 20th century products did not displace existing products – rather they created new markets and satisfied new wants. Air-conditioners reduced temperatures in previously un-cooled 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 observed that the typewriter was "driving out writing with one's own hand," yet Petroski reports the sale of 14 billion pencils in 1990.

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 much faster and not just cheaper

transportation than did horse carriages, so people could live in spacious houses located at some distance from their workplace. This helped create demand for suburban housing that did not previously exist. Similarly incandescent lamps didn't merely replace candles and kerosene lamps: their intense luminosity helped create a market for baseball played at night.

The innovations in information technology of the late 20th century have followed the same pattern as the electro-mechanical innovations of earlier decades. According to a U.S Department of Commerce (1998) report, the share of the Information Technology (IT) sector (computing and communications) grew from 4.2% of the gross domestic product of the United States in 1977 to 6.1% in 1990 to 8.2% in 1998. This is not because computers have displaced traditional goods and services. Rather, IT has accounted for a disproportionate share of growth: according to the Department of Commerce IT industries have been responsible for more than one quarter of real economic growth that is, about three times their share of the economy.

The digital revolution has certainly involved some substitution. For instance, calculators displaced slide rules, micro-processor based workstations displaced mini-computers and CDs displaced cassette tape recorders. But, there has also been at least as much non-destructive creation. Consider for instance the now ubiquitous personal computer. More than 70 million U.S. workers and nearly 80 percent of managerial and professional staff now use a PC at work. Sixty four percent of households also have PCs.

PCs and other new computer architectures did not blow away the traditional mainframe computer in a gale of creative destruction. The PC's killer application, the spreadsheet, did not displace any existing mainframe based applications. Rather it allowed users, many of whom had not previously used computers extensively, to perform analyses and simulations which they would not have otherwise performed. Similarly the enormous growth of the home market for PCs did not reduce the demand for mainframe computers.

Over 30 years after the introduction of minicomputers and more than 20 years after the introduction of microcomputers, the mainframe remains an important category. Total worldwide revenues of large-scale computer processors (or mainframes) amounted to $16 billion in 1997 compared to $16.2 billion in 1982. But because total demand grew from $38 billion to $183 billion, mainframes' *share* of the total computer market dropped considerably, from 42% to about 9%.

The role of PCs in expanding the pie rather than destroying existing markets apparently represents a common feature of the digital revolution. New communications services – E-mail, newsgroups, and "chat" – provided a critical mass of users for the Internet and on-line services such as AOL. These services do not however seem to have abated the demand for traditional

phone lines –cities continue to require new area codes. And those new products that have displaced old products, have often done so *after* they have created a new market. For instance as I discovered in the course of a consulting study for a now defunct typewriter manufacturer, shipments of word processing units increased fourteen-fold growth between 1977 and 1981. But because word processors increased primary demand by satisfying some hitherto unmet want, the sales for typewriters in the United States remained steady at around a million units a year during this period. Similarly, one day (after standards and coverage issues have been resolved), cell phones may make land line phones obsolete. But not before consumers have purchased hundreds of millions of units in applications where land line phones had not been used.

Innovations that created markets for new goods and services gave lie to predictions that mechanization and mass production would create mass unemployment. Productivity improvements on the farm, which would ultimately allow about 2 percent of the workforce to feed the entire population, reduced agricultural employment in the U.S. from 11.7 million in 1900 to 5.9 million in 1960. Changes in production technologies also put many highly skilled artisans out of work. But, total employment more than doubled – from 29 million in 1900 to 68 million in 1960. The labor released by the farm and workshop was quickly absorbed by factories established to serve new markets. And, the assembly line worker earned more than the farmer or skilled artisan. For instance by 1900, the average annual manufacturing wage was more than twice the agricultural wage. This gap continued to widen, as real wages in manufacturing increased at 1.7 percent per year through the first seven decades of the 20th century.

Products that satisfied new wants also created jobs in new service industries. Refrigerators and air-conditioners had to be transported, advertised, sold by a new kind of retailer, installed and periodically serviced. The transportation, advertising, retailing and other such 'service' industries in fact created more jobs than the manufacturing sector. As early as 1920 – long before the term the 'service economy' had been coined – employment in trade, transportation and other private service providing sectors was 15% greater than in the manufacturing. By the end of the 1960s, employment was nearly 70% greater.

Although wages in the manufacturing sector stagnated after the 1970s, and jobs topped out at about 20 million in 1980, overall employment and incomes in the U.S. continued to rise. The number of gainfully employed Americans in 2000, for instance, was 135 million – a nearly 35% increase over the 99 employed individuals in 1980. Real U.S. GDP per capita during this period rose by 57%, and disposable personal incomes by nearly 50%, maintaining the position of the U.S as the most prosperous of all large industrialized nations. Apparently the growth of businesses in sectors such as information technology that satisfied new wants more than

compensated for the lack of growth in manufacturing. For instance, the production of computers, semiconductors and communications equipment increased 13-fold between 1992 and 2000. Employment in IT services nearly doubled in this period from just over 2 million to 3.6 million. Wages in this sector are about 85 per cent higher than in the economy as a whole. The growth in IT wages has likewise been about 1.6 times faster.

The expansion of markets for new goods and services has facilitated and been facilitated by imports from low wage countries. According to Edward Leamer's (2001) calculations, merchandise imports amounted to about 20% of U.S. production between 1900 and 1930. This number then fell to less than 10% after the Hawley-Smoot Act which imposed tariffs on imports from 15% to 60% and the outbreak of the Second World War. U.S. imports revived slowly in the 1950s and 1960s before accelerating in the 1970s. Today in 2003, more than half of manufactured goods consumed in the U.S. are made abroad. The share of imports is particularly high in low technology, mass produced labor-intensive products. For instance, virtually all the toys and shoes sold in the U.S. are made in the Far East. China alone accounts for about 86 per cent of the bicycles purchased by U.S. consumers.

The resources released by imports have fostered the growth of industries that satisfy new needs in the United States. Cheap TV sets from the Far East allowed U.S. households the wherewithal to purchase PCs powered by Intel microprocessors and Microsoft software. Similarly engineering graduates who would have otherwise been employed by U.S. TV manufacturers were available for employment by U.S. I.T. companies. Conversely the growth in incomes and employment in the new industries helped U.S. consumers pay for the goods produced overseas.

Recessionary anxieties

The producers of new goods and services do not however create jobs at exactly the same rate as efficiency increases (or imports) reduce the demand for labor. In the Internet boom of the late 1990s, new markets created jobs at a rapid rate, and so contributed to historically low unemployment and tight labor markets. In the subsequent economic slowdown, job creation apparently slowed whereas efficiency improvements continued to reduce the labor required to produce the 'old' goods and services. In the last two years for instance the output per worker in the manufacturing sector increased by over 3 percent while total output declined a little, so over two million workers lost their jobs.

No one can predict when new industries will start adding jobs faster than old industries shed them. Public policies cannot speed things up. Tax cuts and easy money might stimulate

'old' economy demand for automobiles and housing, but they cannot overcome the unwillingness of U.S. consumers to use Short Messaging Services on their cell phones. Nor can powerful private sector patrons ensure success. In the early 1980s for instance, venture capitalists and entrepreneurs were much taken by the promise of artificial intelligence. They started so many companies around M.I.T. that a portion of East Cambridge came to be known as Intelligence Alley. To my knowledge, none of these companies survive. Apple's introduction of the Newton earned it ridicule in the Doonesbury comic strip, but no profit. Microsoft bet big and wrong on proprietary on-line services instead on the Internet. Kleiner Perkins, the venture capital firm that counts Sun Microsystems among its many successes invested in the Segway Human Transporter. A senior partner, John Doerr, said that the Segway would be "as big as the Internet." It isn't yet.

Conversely, as is well known, in the early 1950s IBM turned down the opportunity to purchase the patents for xerography after the consulting firm Arthur D. Little reported that the market for copiers was not large enough to justify the investment. Decades later executives of Xerox failed to appreciate the potential of computer mice and local area networks. In 1977 Ken Olson, chairman and founder of Digital Equipment Corporation declared, "there is no reason anyone would want a computer in their home." Around1980, after consulting with established computer makers, Stanford University concluded that the workstation technology developed by a graduate student, Andy Bechtholsheim, had little commercial value. Stanford therefore assigned the technology to Bechtholsheim who then co-founded Sun Microsystems.

Uncertainty about new jobs breeds anxiety and anxiety stokes protectionist sentiments. In truth, apart from a few specific industries such as toys and bicycles far fewer jobs are lost to imports than to efficiency improvements. As Gene Epstein notes, manufacturing employment in 2003 fell to its lowest level since 1964, but, thanks to a tripling in the output per worker over this period, total manufacturing output was roughly three times larger in 2002 than in 1964. The pressure to reduce costs in the recent downturn may have accelerated the movement of jobs to low wage locations. But even according to high end estimates, the jobs lost overseas represent 35 percent of the decline in employment since the downturn began. Other estimates put the percentage loss at about 15 per cent.

But vivid examples of specific plants shutting down and announcements by companies like IBM that they are going to hire more programmers in Bangalore while they lay off staff in the U.S., not dry statistics about the labor market, shape the popular psyche. And to the extent aggregate data about what has happened are ho hum, experts can conjure up sensational forecasts. In the current slowdown, even according to high estimates, only about 150,000 out of 30 million college educated employees have lost their jobs to outsourcing. But, this trickle some experts

claim, will soon turn into a flood. Graphs from a few years ago that used to predict explosive growth in e-commerce have apparently been relabeled to show hyperbolic increases in the migration of professional jobs. For instance Forester Research predicts that in the next 15 years, Americans employers are going to move about 3.3 million white collar jobs abroad.

The usual argument for free trade does little to soothe anxieties about outsourcing from low wage countries. According to classical theory, because Britain has a comparative advantage in rearing sheep and Portugal in growing grapes, Britain should focus on wool and import Port. But, the low costs of operating call centers in India or making bicycles in China, do not reflect any 'natural' comparative advantage. Indeed, U.S employers of workers in low wage regions often regard them as less productive than their U.S. workers. Rather, costs are low in these countries because for almost two centuries colonial powers and then domestic governments hobbled markets and restricted international trade. The legacy of these policies is wages that are so low that they can more than offset lower output per worker.

Exports to low wage countries cannot compensate for the migration of jobs to these regions. A Chinese worker earning 40 cents an hour simply cannot buy the same goods and services as someone earning just the legal minimum wage of $5.15 in the United States. Moreover workers in low wage countries spend only a small portion of their incomes on products made in the United States. As incomes in China grow, imports of goods from other low or middle income countries increase faster than imports from countries with high wages. So whereas China's trade surplus with the U.S. exceeds $100 billion, its trade with India (where per capita GDP is now about half of China's) shows a deficit. And even in those products, such as washing machines and automobiles where foreign companies dominate the Chinese market, labor and transportation costs often favor local manufacture in China.

Robert Blackwill who recently stepped down as U.S. ambassador to India advised Indians to eliminate the country's trade surplus with the U.S. by removing trade barriers. This would, according to Ambassador Blackwell, defuse tensions about the outsourcing of white collar jobs. In fact, the opening of the Indian economy in 1991 has already led to a surge in imports. And, in contrast to China's large overall trade surplus, India runs a small trade deficit. But apart from a few exceptions such as G.E. and Microsoft, U.S. exporters have not been the main beneficiaries: India's software exports help pay for the growing import of – fresh vegetables. Further liberalization may well increase Indian imports, but is unlikely to create many new jobs in companies that export goods and services from the United States

And trade with India and China conforms to a long standing pattern. Growth in U.S. exports has consistently lagged the growth of imports that started in the 1970s. The U.S. trade

balance has been in deficit since 1976. Over these two and a half decades, U.S. exporters have faced more open markets abroad, not less. It is unlikely that any further reductions in tariff and non-tariff barriers are going to lead to an upsurge in export related jobs. 'New' jobs in 'new' industries have to replace the old jobs lost to efficiency gains and outsourcing.

Distinctive Features

Schumpeter attributed the booms and depressions of the 19th century to periodic bursts of creative destruction followed by lulls in innovative activity. In the 20th century, economic activity was less volatile, and apart from the Great Depression, downturns were relatively mild and short-lived. Now it is possible that the more effective use of counter-cyclical fiscal and monetary policies eliminated booms and busts in the 20th century; but, such policies cannot explain why productivity and per capita incomes also grew so much more rapidly than in the 19th century. Nor can standard supply side arguments – after all tax rates were higher in the 20th century and regulation more extensive. A more plausible case can be made instead that the U.S. developed a more effective system during the 20th century for creating and satisfying new wants that helped reduce volatility and increase economic growth. The system has three noteworthy features.

Broad Participation

Participation in the process of creating and satisfying new wants become more broad-based and inclusive. In the 19th century, inventions of new products were made by a few individuals. Edison brought forth a remarkable cornucopia including incandescent bulbs, motion pictures, and gramophones, from a small facility in Menlo Park (New Jersey, not California) with fewer employees than the typical Silicon Valley startup. Alexander Graham Bell had 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.

But small outfits couldn't develop products for mass consumption. The early automobiles were expensive contraptions, owned according to Nathan Rosenberg (1976) by a few buffs who rode around the countryside terrifying horses. They 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.

In the 20th century the tasks of converting inventions into mass-market products pervaded society. As often as not, the pioneers paved the way for followers who built on and

refined the first offerings. Planned and unwitting collaborations, taking place simultaneously and in sequence made products that initially only kind of, sort of worked commercially viable. For instance, when the first personal computer, the Altair, was introduced in 1975, its aficionados derived less practical use from their machines than did the turn-of-the century automobile buffs. Lacking basic input or output devices (such as keyboards and printers) Altairs could not even scare horses. Numerous innovations -- such as electronic spreadsheets, the mouse, graphical user interfaces, and local area networks turned this oddity into a ubiquitous artifact. A procession of individuals – Ed Roberts, Gates and Allen, Jobs and Wozniak, Bricklin and Frankston, Mitch Kapor, and Robert Metcalf – to name just a few, made all this happen. Only a few of their individual contributions represented breakthroughs, but collectively they created an industry that changed the world.

Similarly the Internet does not have a solitary Alexander Graham Bell. Rather, many entrepreneurs, venture capitalists, executives of large companies, members of standard setting institutions, researchers in university, commercial and state-sponsored laboratories, and even investment bankers and politicians have revolutionized the way we communicate. Some participants in the revolution have acquired considerable wealth but not fame. Mention of Sir Timothy Berners-Lee's name for instance often evokes puzzled looks.

Many consumers – and not just a few well-to-do buffs – have taken chances on products intended to satisfy wants they didn't realize they ever had. Although its importance is often overlooked, this 'venturesome consumption' has played a critical a role. The success of the Japanese consumer electronics industry, I once wrote (Bhide 1983), has as much to do with the spirited purchasing habits of Japanese consumers as it does of the innovativeness of Japanese producers. But while Japanese consumers have been venturesome in just a few spheres, U.S. consumers have been willing to try all sorts of novelties. And with many willing subjects, U.S. entrepreneurs have been able to conduct a large number of experiments.

In turn extensive experimentation, in conjunction with improved monetary and fiscal tools, may have helped eliminate the booms and busts that Schumpeter attributed to innovative activity. When entrepreneurs conduct many different experiments, the probability that at all times some new industry will boom increases. Thus in the midst of a deep recession in 1982 the PC industry took off and in the current downturn, WiFi sales have surged.

Broad participation in the entrepreneurial system, in turn, was facilitated by an educational system that made literacy nearly universal and provided college educations to about 30 million members of the U.S. workforce. The belief that change is desirable and inevitable also

grew beyond a few visionaries. Many came to believe that they could prosper by pursuing the New, New Thing, and if they didn't, they risked falling behind.

Their growing acceptance turned such beliefs into self-fulfilling prophecies. Consider for instance Gordon Moore's famous observation that the number of transistors that built on a chip doubles every eighteen month. Semi-conductor companies, who believe in this so-called "law", invest the resources needed to make it come true. Downstream customers, (such as PC manufacturers) and providers of complementary goods to their customers (such as applications software companies) design products in anticipation of the eighteen months cycle. So when the 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.

Similarly, the propensity of consumers to open their hearts and wallets to new offerings has involved the dilution of prior beliefs in the moral and economic value of thrift. Through the end of the 19th century, according to Max Weber's thesis, religious convictions about thrift sustained the 'spirit of capitalism'. Weber argued that merchants and industrialists accumulated capital believed they had a moral duty to strive for wealth as well as to lead austere lives. In fact, because venturesome production requires venturesome consumption, excessive thrift injures rather than helps modern capitalism. As it happens, U.S. consumers have been more inclined to keeping up with the recently acquired baubles of their neighbors than towards excessive thrift. Their venturesome spending has also been sustained by an efficient marketing and distributions system and by a financial system that provides credit to the young and penurious.

Diversity of the entrepreneurial species

A diverse set of organizational forms evolved in the 20th century system that specialized in different kinds of innovation. As mentioned, in the 19th century innovation was undertaken by individuals or very small firms. The large professionally managed corporation became an important contributor to innovation in the first half of the 20th century. In the second half of the century, the diversity of the entrepreneurial species further increased. Researcher laboratories in universities that had hitherto focused just on creating knowledge began to develop commercially useful technologies. Similarly, professionally managed venture capital funds saw explosive growth.

The emergence of new organizations did not make individual entrepreneur extinct. Rather the old and new entrepreneurial species complemented each other's contributions. The big publicly traded corporation for instance has the capacity to undertake very large initiatives that require the advance coordination of many individuals and the pooling of the capital of many

investors. Individual entrepreneurs face capital constraints and the coordination of their efforts occurs more through after the fact mutual reaction rather than through conscious planning. But, the same governance mechanisms that give big corporations an advantage in pooling capital and labor also discourages them from undertaking novel initiatives where it is difficult to reach a consensus about likely outcomes. Individual entrepreneurs in contrast can freely pursue novel projects because they aren't answerable to anyone.

Therefore swarms of individuals often conduct the early experiments from which new industries emerge. Then, after the early uncertainties have been resolved, organizations which can mobilize resources on a larger scale help bring the new products and services into the mainstream. For instance, between 1975 and 1980 individual entrepreneurs, rather than large companies tried to create useful applications for personal computers when they were quirky toys. But after these efforts had borne fruit it was the launch of IBM's PC in 1981(when IBM accounted for more than 60 percent of the world wide sales of mainframe computers) that 'legitimized' the personal computer with data processing managers of large companies. The multi-billion dollar investments that Intel and Microsoft made after that helped carry the PC into virtually every home and office.

Similarly talk about the potential of nano-technology dates back to at least the early 1990s; but, actual investment by public companies and venture capitalists has been small. Much of the action has come from individual entrepreneurs and university researchers who have been following their dreams and hunches. If and when their efforts succeed, we can expect to see the large capital providers to jump in.

Incentives for 'non-destructive' creation

Entrepreneurial individuals and firms don't have any altruistic concern about the instability of a system that relies just on creative destruction; rather, they undertake non-destructive innovations because creating and satisfying new wants often provides more attractive opportunities. The early technical deficiencies of new products like automobiles and personal computers make them unsuitable substitutes for existing tried and tested substitutes. Therefore, as Clay Christenson (1997) has pointed out, innovative products usually start up serving a function that existing products do not.

Even when a new product is technically superior, displacing an existing product is expensive. The innovator has to overcome resistance from the businesses that face the threat of substitution as well as from users who have invested in the old regime. For instance, theatres which now use projectors for celluloid film have been unwilling to incur the costs of switching

over to higher quality digital projection systems. Overcoming this resistance reduces the profitability of the enterprise and makes the funding requirements prohibitive for many entrepreneurs.

For large companies, the incentive to favor non-creative destruction is weaker but not absent. They do have the resources to overcome the unwillingness of consumers to incur switching costs. And, where they are the incumbent oligopolists, the issue of competitive retaliation does not arise. But large companies also face pressure from stock-markets and employees to keep increasing their revenues. This encourages large companies to develop new sources of revenues rather that substitutes for their existing revenues. For instance, Robert Cringely (1996) suggests that IBM executives backed its PC initiative in 1980 because they thought personal computers would not reduce the demand for IBM's other products, so "every sales dollar brought in to buy a microcomputer would be a dollar that would not otherwise have come to IBM." Similarly the "rational drug discovery approach" established by Roy Vagelos at Merck stipulated that the company would focus on areas "where there were no therapies or drugs available" (Nichols 1994)

Reasons for optimism

Bresnahan and Gordon (1997) speculate that because we may have run out of "stomach space", new food products must replace old food products. We may also have exhausted our 'free' time – cellular phones that may not displace land lines, do absorb the time that we might otherwise devote to quiet reverie. But, although it would be foolhardy to make predictions about what great new markets lurk around the corner, opportunities for satisfying new wants do not appear to have been exhausted.

Expenditures on health care for instance are almost certain to expand. Modern medicine found cures for many diseases in the 20th century and increased life expectancies in the U.S. for 47 years in 1900 to 77 today. No treatments exist however for a great many other diseases and current life expectancies are well below any theoretical limit for the human lifespan. The aging of the population similarly provides ample opportunities for goods and services that enhance the quality of the lives of older citizens. Among the young (or would be young), the desire to look and feel good has sustained many new businesses. The number of health clubs in the United States has tripled in the last 20 years and now have 13% of Americans enrolled as members. Cool new ways for altering body parts continue to be found: a doctor in L.A. has apparently just pioneered the implantation of tiny platinum jewels, shaped like a star into the corner of the whites of the eye (Rundle 2004). Businesses have created non-destructive sales by finding new ways to

tickle the senses – for instance by selling ringer tones and face plates for cellular phones. Such consumption might not please all tastes, but they have maintained the growth of the modern shopping basket in the past and in all likelihood will continue to do so in the future.

The system for discovering and exploiting these opportunities is in excellent shape; its crucial elements have become stronger over the years, not weaker. The desire to participate in innovative activities is more widespread and the diversity of organizations that harness such desires is greater than ever before. All this is good news for the integration of nearly a billion Chinese and Indian workers into the labor markets of the developed world. To be sure the speed and magnitude of this integration is unprecedented and will hurt some U.S. workers and communities. But, on balance it represents an opportunity for continued prosperity on both sides of the trade rather than a threat to American livelihoods.

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