

# **Creative Destruction: The Essential Fact about Capitalism**

Short running title: Creative Destruction

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## Abstract

In their research, teaching, and policy making, economists usually act as though the essential fact about capitalism is price competition. Schumpeter, to the contrary, claimed that the essential fact about capitalism is innovation through the process of Creative Destruction. I present arguments and evidence that Schumpeter was right, and that a growing number of academics, and practitioners in business, are recognizing the importance of the process Creative Destruction. The adoption of policies that open the economy more to the process of creative destruction, has the potential of increasing the rate of economic growth, and the length and quality of human life.

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**Key words:** technology, growth, productivity, Schumpeter

Addendum: The full project is intended to be a book with the title *Openness to Creative Destruction*. This paper, drafted November 2, 2005, is the last coherent version of the whole project. However, several parts of the project have been developed more fully since then in papers that can be downloaded from either my academic web site (see above for the URL), or from [artdiamond.com](http://artdiamond.com).

## Introduction

Capitalism is by nature a form of economic change and not only never is but never can be stationary. The process of Creative Destruction is the essential fact about capitalism. . . . To ignore this central fact is like *Hamlet* without the Danish prince. **Schumpeter** as quoted in p. 2 of Max Page, *The Creative Destruction of Manhattan, 1900-1940*, p. 2.

But in capitalist reality, as distinguished from its textbook picture, it is not (price) competition which counts but the competition from the new commodity, the new technology, the source of supply, the new type of organization . . . competition which . . . strikes not at the margins . . . of the existing firms but at their foundations and their very lives. **Schumpeter** as quoted in Andy Grove, *Only the Paranoid Survive*, p. iii.

As respect for and understanding of the importance of innovation have grown, so too have the number of economists who think of themselves as Schumpeterians. **Stiglitz and Walsh**, p. 411.

. . . , if we call the economy of the last two centuries primarily “Smithian,” the economy of the future is likely to be primarily “Schumpeterian”. **DeLong and Summers**, p. 33.

Thoughtful scholars from Adam Smith to Jared Diamond, have asked the same life-and-death question: why do some societies succeed, and others fail, in producing the goods that make life long, healthy and prosperous? Smith's answer was basically that when societies adopt the rules of market capitalism, their economies grow, and when they do not adopt the rules of market capitalism, their economies do not. Since Smith, other economists have developed more formal models of economic growth. The classic "Solow growth model" emphasized the investment of capital. Romer's "New Growth Theory," includes knowledge as a variable. What is mainly missing from both the new and the old growth theories is a useful discussion of incentives and entrepreneurship.<sup>1</sup>

The theories are not just academic abstractions. Policy makers, wanting to improve the world, sometimes act in part on the basis of the best theories they can find. For example, Jeffrey Sachs, who has been an active advisor to many governments, has recently published (2005) a well-publicized monograph arguing that what is mainly needed to improve living standards in Africa is the investment of large amounts of capital.

An alternative view can be found in *The Elusive Quest for Growth* by William Easterly, who has looked at the track-record of efforts to achieve economic growth through capital investment, and finds that the record is dismal. It is high praise for the character of the founders of the "classic" and "new" growth theories, that both Robert Solow and Paul Romer have words of high praise on the back cover of *The Elusive Quest for Growth*. In the form both of true stories, and more systematic evidence, the

book documents the failure of past efforts to help the poor economies grow. It also contains a chapter arguing for the truth and importance of Joseph Schumpeter's account of capitalist economic growth.

Schumpeter's central message is that the process of Creative Destruction describes the form of competition in capitalism that is capable of dramatic improvements in the quantity and quality of our lives. Many have noted a recent Schumpeter renaissance (e.g., DeLong and Summers, 2001; Friedman, 1999; Rosenberg, 2000; Samuelson, 2003, p. 467; Useem, 2001). In addition, Schumpeter's message is being illustrated, rigorously documented, extended and elaborated by a group of important business practitioners and academics, notably including monographs by Foster & Kaplan; Christensen; Christensen & Raynor; and Zook & Allen.

In *Capitalism, Socialism, and Democracy*, Schumpeter had a lot to say about his process of Creative Destruction, not all of which is given equal emphasis by those using the phrase today. Here, I will distinguish two accounts of the process of Creative Destruction: Schumpeter's original 'big-is-better' account, and a more recent 'small-is-better' account. The process of Creative Destruction, in both Schumpeter's original, and in the more recent account, is a process in which technological advance is the main source of economic growth and improvements in the quality of life. In both accounts, a significant part of the incentive to produce leapfrogging innovations is the prospect of achieving monopoly profits. Traditionally the main source of monopoly profits would have been through patent rights. But currently a full account of monopoly profits would also include network externalities as a source (as with eBay and Microsoft).

Beyond what the two accounts share, Schumpeter's original 'big-is-better' account also claimed that large, monopoly firms are the most able and the most likely to produce new, leapfrogging innovations. This version is the one usually, but not always<sup>2</sup>, associated with Schumpeter's own views. The 'small-is-better' account identifies smaller, often start-up, firms as the most likely source of new leapfrog innovation.

Schumpeter's claim was that the new process or product that results from a dynamic leapfrogging innovative competition, is more important in understanding capitalism, than the static standard model of price competition that emphasizes unconcentrated markets as the means to lowering prices, where the goods and the technologies are assumed constant. If one set of rules (standard price competition) maximized one good result (lower prices for consumers); and another set of rules (Creative Destruction) maximized another good result (new products), then we would have to measure the utility produced by each of the good results, which is very hard to do.<sup>3</sup> What if the Creative Destruction is not only best at producing new products, but also, in creating new processes, is also best at lowering prices for consumers? Then we would know the essential fact about capitalism, without having to decide whether consumers benefit more from lower prices for a constant set of goods, or from a set of goods of higher price, but of increasing variety and quality.

In what follows, I begin by briefly discussing some evidence against the standard price competition model. I then proceed to discuss the benefits of the leapfrogging innovation competition. I next discuss the evidence against the 'big-is-

better' account of creative destruction and in favor of the 'small is better' account. The increasing relevance and pace of creative destruction is briefly discussed, as a lead-in to some specific examples, and some more systematic citation evidence, for the increasing attention being given to creative destruction by academics. In the following section, data from Amazon.com is explored as a new source of evidence indicating that creative destruction is also receiving increased attention from both academic and practitioner-oriented authors of books. After making the case for the importance and increasing attention to creative destruction, I explore the treatment given to creative destruction in textbooks used for principles of microeconomics. I conclude with some preliminary evidence that Schumpeter is not much attended to in Supreme Court antitrust decisions.

## **Evidence Against the Standard Model of Price Competition**

Schumpeter famously claimed that to discuss capitalism without mentioning the process of Creative Destruction would be like discussing the play Hamlet, without mentioning the Danish prince (1950, pp. 83-85). But, in fact, the most common way to discuss capitalism, in Schumpeter's day and our own, is to omit Creative Destruction, and focus instead on price competition as the essential element.

The standard model of price competition that is presented in almost all principles of microeconomics texts, tells us that in an unconcentrated market with many small suppliers, the consumer will pay lower prices than she would if the same market were more concentrated. The case is strongest when comparing "pure" competition with monopoly. But even there, it rests on assumptions that are not necessarily true,

such as that costs would be the same under either market structure. It thus rules out the possibility that monopolies may have lower costs, either through technological improvements, or through economies of scale.

If a large, or monopoly, firm has either sufficiently better technological processes, or economies of scale, then the firm may be earning substantial monopoly profits at the same time that it both lowers prices to the consumer, and introduces important process and product innovations.<sup>4</sup> This is what happened in the famous case of Standard Oil.<sup>5</sup> At the beginning of its ascent in 1870, the price of refined kerosene was 26 cents a gallon, and Standard Oil's cost to produce it was 3 cents a gallon. At the height of its market power in 1885, the price of refined kerosene was 8 cents a gallon, and Standard Oil's cost to produce it was .452 cents a gallon (Armentano, p. 70). The evidence on Standard Oil suggests that Rockefeller was able to greatly improve the production process<sup>6</sup>, allowing both great profits for himself, and substantially lower prices for consumers.

In more recent times, many analysts (e.g., Simchi-Levi, et al, 2003, pp. 63-64) have painted a similar picture of Wal-Mart. The company has leapfrogged other retailers in the use of information technology to manage the logistics of the supply chain, and to understand patterns of consumer demand. As a result, the company has both been highly profitable, and provided the consumer with lower prices.

Another case where the firm may have earned substantial profits at the same time that it lowered prices for the consumer may have been what happened with Microsoft. For example, in the early days one reason that Microsoft's DOS became

dominant was that it was priced significantly lower than Gary Kildahl's CP/M operating system (Carroll, 1993, p. 41). For the later period of Microsoft market share dominance, Schmalensee has presented plausible calculations that Microsoft was charging much less than what would be expected from the theory of monopoly-pricing (see Gilbert and Katz, p. 29).<sup>7</sup>

## **Evidence that Innovation Competition Matters**

Although we are still an early stage of understanding, some progress has recently been made in measuring the benefits to consumers of new product innovation through the process of Creative Destruction. I will summarize here a couple of papers that illustrate the progress. One particularly illuminating paper is Nordhaus (1997), in which the author compares changes in the true price of light, with changes as measured by traditional price indexes. Traditional price indexes would be based on changes in the price of the good that produces the light (e.g., the bulb) rather than changes in the price of the service being produced, in this case illumination. One advantage of the case of light is that measures of illumination for various light-producing goods are readily obtainable and do not require the estimation of hedonic price functions, as is required, for instance, in obtaining a price index for the services from computers. For his case, Nordhaus concludes that “*traditional price indexes of lighting vastly overstate the increase in lighting prices over the last two centuries, and the true rise in living standards in this sector has consequently been vastly understated.*” (p. 30, italics in original)

In order to understand how representative the lighting sector is of the economy as a whole, Nordhaus classifies (pp. 58-60) sectors of the economy into one of three categories: “run-of-the-mill,” “seismically active,” and “tectonically active.” The run-of-the-mill sectors are ones in which either products have changed relatively little since 1800, or else ones for which current price indexes will likely be able to capture most of the changes in quality. The seismically active sectors are those in which the products are still recognizable from 1800, but the quality and characteristics have changed so substantially that current indexes do a poor job of measuring changes. The tectonically active sectors are those in which the changes in product and production process are so large that the current price indexes do not begin to capture the gains.

Of total consumption dollars in 1991 in the U.S., the run-of-the-mill sector was 27.7%, the seismically active sector was 35.8%, and the tectonically active sector was 36.6%. The bias in the current price indexes would thus be expected to be quite large. To illustrate how large, Nordhaus estimates how much the change in real wages from 1800-1992 would be if we make reasonable assumptions about the size of the bias. Using current price indexes, the real wage in 1992 was 13 times the real wage in 1800. By the lowest reasonable estimate of the bias, the real wage in 1992 was 40 times the real wage in 1800. By the highest reasonable estimate of the bias, the real wage in 1992 was 190 times the real wage in 1800.

Another paper that illustrates the progress that is being made in measuring the consumers’ gain from leapfrogging technological innovation, is a paper by Brynjolfsson, Hu, and Smith (2003). Gates (1995) and others had argued that the

primary benefit of the internet to consumers was that it would result in lower prices for goods and services. This would occur primarily through quicker, more accurate, and cheaper information about the products and services. In the Brynjolfsson et al paper they measure the gains in consumer surplus for one sector of the internet: online booksellers. They then use techniques recently developed by Hausman and others, to measure the gain to consumers from the greater variety of books made available through internet booksellers. For the single year 2000, they estimate that the increased consumer surplus from increased price competition from internet booksellers falls in a range between \$100.5 million and \$103.3 million (p. 1591). But for the same period, they estimate that the increased consumer surplus from an increase in variety of books from internet booksellers falls in a range between \$731 million and \$1.03 billion (p. 1590). These results imply that at a minimum the internet's contribution to leapfrogging innovation is 7.3 times as large as the internet's contribution to lower prices.

Notice that the internet is a general purpose technology, whose applications have resulted in new innovations (e.g., online travel services, online brokers) that have leapfrogged older services. And notice that this leapfrog-enabling technology has **both** resulted in lower consumer prices, and resulted in new products and services.

We have examined two types of technological advance, and discussed the evidence of the magnitude of the benefits to consumers in each case. The advances in lighting represented a series of leapfrog innovations, the main effect of which was to enormously reduce the price of lighting to consumers (as measured in labor time

required per unit of illumination). The advances in book-retailing, enabled by the internet, occurred through a new online retailer (Amazon) developing processes that benefited consumers in terms of price, but also, and even more dramatically, in terms of the variety of the product available.

Individual cases can be suggestive, but the importance of Creative Destruction through leapfrogging competition would be strengthened if a broader case could be made. For example, if Creative Destruction is the essential fact about capitalism, we would expect that the more open the economy is to Creative Destruction, the faster will be the rate of technological advance, and the greater will be the improvements in longevity, health and quality of life. It is plausible to argue that the United States during the twentieth century was a notable exemplar of openness to Creative Destruction.<sup>8</sup> If so, then evidence for substantial technological advance, and improvements in longevity, health and quality of life, would create a strong presumption for creative destruction indeed being the essential fact about capitalism. In the paragraphs that follow, I will present some such evidence, first in the form of a vivid story from the life of John D. Rockefeller, and then in the form of summarizing some of the findings of economists DeLong, Gordon, and Fogel.

In the year 1900, John D. Rockefeller was the richest person on the face of the earth.<sup>9</sup> Besides what it tells us about medical progress in the 20<sup>th</sup> century, the following episode in Rockefeller's long life may also help us answer the question of which levels of society benefit most from Creative Destruction.

Rockefeller's daughter Edith had two sons, Jack and Fowler, whom Rockefeller

“doted” on. In late 1900, at roughly the age of four, both boys came down with scarlet fever. Rockefeller was devastated and offered a New York physician a half a million dollars if he could cure the boys. If we correct for inflation over the past 105 years, that would be over \$11 million, in 2005 dollars.<sup>10</sup>

Edith’s relationship with her father frequently had been strained: she was a free spirit, and he was not. But at the end of this episode, she wrote a letter to John D. Rockefeller, saying:

“As long as I live I shall never forget the great love and the untiring effort which you put forth to save dear Jack’s life.” . . . “Absolutely forgetful of self and showing a love much like the Christ love.” (Edith Rockefeller McCormick as quoted in Chernow, 1998, pp. 417-418)

Jack died of scarlet fever on January 2, 1901.

*The Merck Manual*, a leading physicians’ medical desk reference, says: “Scarlet fever (scarlatina) is uncommon today, presumably because antibiotic therapy prevents the infection from progressing or causing epidemics.” (Beers and Berkow, 1999, p. 1152) The “drug of choice” for scarlet fever is penicillin (p. 1153). Although “discovered” by Fleming in 1928, penicillin only became broadly useful after 1940, when Florey, Chain and Heatley discovered a practical way to extract penicillin from mold (see: Lax, 2004).

In 1900, many came down with scarlet fever, and there was a significant risk of death from the disease, even if you were the grandson of the richest person on earth. In 2000, in the West, few come down with scarlet fever, and there is no significant risk

of death from the disease, even if you are living at the official U.S. poverty threshold.

Although this sort of evidence is not ubiquitous in the mainstream economics literature, it is also not totally without precedent (Adam Smith, 1937, p. 12; Schumpeter, 1950, p. 67; DeLong, 2000; Gordon, 2000; Fogel, 2004, 2005). The most ambitious recent version, in both form and substance has been presented (2000, pp. 21-23) in a draft chapter of Bradford DeLong's long-awaited economic history of the United States. DeLong's version begins with the question (p. 21): "What multiple of average income per capita a century ago would be required for that household to feel equally well-off in a material sense, if it were transported back in time?" His first answer (p. 22) is that the multiple would have to be "very large indeed." Personalizing the question, he suggests (p. 23) that even with a very large multiple, "we would *not* be happy."<sup>11</sup> He explains:

I would want, first, health insurance: the ability to go to the doctor and be treated with late-twentieth-century medicines. Franklin Delano Roosevelt was crippled by polio. Nathan Meyer Rothschild—the richest man in the world in the first half of the nineteenth century—died of an infected abscess. Without antibiotic and adrenaline shots I would now be dead of childhood pneumonia. The second thing I would want would be utility hookups: electricity and gas, central heating, and consumer appliances. The third thing I want to buy is access to information: audio and video broadcasts, recorded music, computing power, and access to databases. **None of these were available *at any price***

**back in 1890.** (p. 23, bold added by Diamond; on the Rothschild information, DeLong cites Landes 1998 citing Wilson 1994)

The rest of DeLong's chapter is full of details about how improvements in technology over the century improved the length and quality of life.

Under a paper heading entitled "How the Great Inventions Helped Us Escape from the Bad Old Days" (p. 57), Robert Gordon devotes several paragraphs to summarizing some of the key findings in Otto Bettmann's *The Good Old Days—They Were Terrible* (1974). The book is richly illustrated from Bettmann's own archive<sup>12</sup> of historical photographs and illustrations from the period 1860-1900. He highlights the stench and disease resulting from the filth of garbage and manure-filled city streets—manure from the horses used for transportation, and from the pigs allowed to roam free to eat the garbage. He highlights the isolation of rural life, the tedium and physical exhaustion from cooking in fireplaces, and cleaning clothes by muscle power. He highlights, the long hours, dangerous, and unhealthy working conditions of many workers.

He also highlights five "great inventions" that he argues vastly improved the ordinary person's length and quality of life: 1. electricity, 2. the internal combustion engine, 3. chemical engineering (leading, e.g., to plastics and medicines), 4. communications inventions (including the telegraph, telephone, and radio), and 5. running water and indoor plumbing. He finally appeals to our subjective judgment of the significance of these great inventions to support his conclusion that the internet is a less important innovation in improving our lives. (This latter part of his argument can

be rebutted, if we accept Paul David's (1990) account, based on the history of the electric engine, that with general purpose technologies, the main benefits may not be foreseen in the early years or decades of the innovation--we are still learning the uses of computers and the internet, and some of the greatest gains may still lie ahead.<sup>13)</sup>

Nobel-prize winner Robert Fogel has systematically summarized the improvements in longevity and health over the last three centuries, and forecast the possibilities for the century to come, in his 2004 monograph *The Escape from Hunger and Premature Death, 1700-2100*. More recently (2005), he has presented some of the main messages of the book in a briefer, more accessible, and more vivid form. In his 2005 essay he compares the health experiences of three cohorts, those born between 1835-1845, 1920-1930, and 1980-1990. The first cohort was roughly the cohort that fought the Civil War, the second cohort was roughly the cohort that fought World War II and the third cohort was roughly the cohort of today's college-aged students. Roughly 40% of the Civil War cohort died before the age of 15, compared with roughly 11% of the World War II cohort and roughly 1% of the college-aged cohort. Fogel describes life for the Civil War cohort as being not only short, but also nasty, as compared with the World War II cohort. Even when they survived, the cohort suffered from a variety of chronic and debilitating illnesses and conditions. Of those who survived to their late 30s, more than half were disabled. Large numbers suffered and died from malaria in the South and from tuberculosis in the cities. Chronic malnutrition was common.

Many more of the World War II cohort survived to old age, and of those, "the

overwhelming majority have good to excellent health, live independent lives, and are socially active.” (p. 7) Fogel attributes the improvements to what he (and Dora Costa) call “technophysio evolution,” which has resulted from “a synergism between technological advances and physiological improvements” (p. 7). Some examples he emphasizes include the chlorination of water, the pasteurization of milk, and the elimination in cities of diseases spread by pulverized horse manure.

Extrapolating current trends, Fogel forecasts that the median life span for the current college-aged cohort will be roughly 100 years. But there is nothing inevitable in this; if institutions change to slow or quicken the rate of technophysio evolution, progress in increasing the lifespan will likewise slow or quicken.

There have been substantial improvements in the variety and characteristics of goods available in the last 100 years, as illustrated by the Rockefeller story, as sketched by DeLong, and as elaborated by Fogel. The most basic change has been in health, but there have been other basic changes as well, e.g., the richest person on earth could not have bought an air conditioned home in 1900.

## **Evidence for the ‘Small-is-Better’ Account of Creative Destruction**

The ‘big-is-better’ account has been shown to not generally be true. Referring to this version, Scherer reports that in his substantial 1965 empirical study:

The results suggested that Schumpeter’s assertions in *Capitalism, Socialism, and Democracy* were more wrong than right. Giant monopolistic corporations were

not uniquely efficacious engines of technological advance. (2005, p. 394)

Also relevant is the Acs and Audresch (1990) research showing that optimal firm size for innovation significantly varied by industry. Most notably, Christensen and his co-authors (2000, 2003, 2004) have presented substantial theory and evidence of how hard it is for an incumbent firm to successfully introduce a disruptive innovation.

The evidence of rapid and increasing turnover among the largest, most powerful, firms, by various measures, is evidence that supports the ‘small-is-better’ account of Creative Destruction. This evidence would include that discussed in Foster and Kaplan’s *Creative Destruction*, in Zook and Allen’s *Profit from the Core*, and in *Stall Points*. Also, and perhaps most powerfully, the evidence and theories in a variety of books, articles and case studies by Christensen and co-authors, support the ‘small-is-better’ account.

A common form of evidence for the small-is-better account consists of data showing how hard it is for large dominant firms to remain large and dominant for an extended period. One good source for this sort of data is Foster and Kaplan’s *Creative Destruction*. For example, they examine the fate of the firm’s in *Forbes*’ 1917 list of 100 largest firms. By 1987, 61 of these firms no longer even existed. And of the 39 that still existed, only 18 were still among the largest 100. Of the 18, only two had a growth rate in 1987 that was higher than the average for U.S. firms.

Foster and Kaplan also present evidence in their book (p. 11) that in 1998 the turnover rate of the S&P 500 was approximately 10%, implying that the average firm could expect to remain in the S&P 500 for only approximately 10 years. This contrasts

with a turnover rate of about 1.5% in the 1920s and 1930s---a rate that implies an expectation of a roughly 65 year average tenure in the S&P 500. The declining length of tenure in the S&P 500 might be evidence to support the claim of some (e.g., Greenspan; see Useem, 2001) that the process of Creative Destruction has been speeding up in the United States. The increasing pace of Creative Destruction is also independently supported in Chun, Kim, Lee and Morck, 2004.

Other sources confirm the general findings of Foster and Kaplan. For example, the Corporate Strategy Board has presented an extensive report its large-scale corporate clients, documenting how hard it has been for large companies to maintain credible growth records. Zook and Allen (2001, p. 12) also provide additional evidence of how hard it is for large firms to sustain growth.

Besides evidence of the frequency and speed with which firms grow, and decline, another sort of evidence for the growing ubiquity of Creative Destruction in the United States economy is provided by the growing list of well-documented, or at least plausible, recent examples. One of the richest sources of such recent examples would be a set of three recent books authored, or co-authored, by Clayton Christensen (2000, 2003, 2004).

On May 11, 2004 among the 2,866 books on Amazon.com's "Search Inside the Book" feature that reference Schumpeter, the number-one bestselling book was Christensen and Raynor's *Innovator's Solution*. Like Schumpeter, Christensen had early experience in business, serving as chairman and president of Ceramics Process Systems Corporation. His earlier book, *The Innovator's Dilemma*, was widely

acclaimed, receiving the *Financial Times*' Global Business Award for being the "best business book" for 1998.

The "dilemma" in Christensen's *Innovator's Dilemma* belongs to the incumbent firm.<sup>14</sup> Christensen distinguishes between two sorts of innovations. Sustaining innovations are innovations that will be valued by the incumbent firm's mainstream customers. The incumbent firm will pursue sustaining innovations, generally with success. The dilemma arises with the disruptive innovations. Disruptive innovations initially do not appeal to the mainstream customers of the incumbent firm. They frequently are too small, or too slow, or otherwise underperform what the mainstream customers want.

Christensen's most extensive example in the first book discusses successive generations of hard drives. The initial 5.25-inch hard drives did not have the capacity that mini-computer users wanted, so they had no interest in them. When the 8-inch drive companies listened to their mini-computer manufacturer customers, they saw no reason to develop the 5.25-inch drives. But there was a small niche market among personal computer users, who valued the 5.25-inch drives because of their small size. Start-up firms pursued this niche market and improved the technology over time, until it was increasingly competitive along all dimensions, with the 8-inch drives. By then it was too late for the incumbent firms to master the technology fast enough and well-enough to compete with the start-ups. The same story was repeated with successive generations of hard drive technology.

The first book provides extensive documentation of the hard drive example, and

significant documentation on a second example: mechanical excavators. Much briefer discussion of other examples is also included. In the second book, *Innovator's Solution*, written with Raynor, Christensen lengthens the list of examples, and elaborates the theory of how hard it is for incumbent firms to survive in the face of disruptive innovations. Although good examples occur throughout the book, a particularly efficient compilation of many examples occurs in the table on pages 56-65. Some of the cases in the table that seem good candidates to be major examples of successful leapfrogging competition, would include the following. Minicomputer makers such as Digital Equipment, leapfrogged mainframe makers such as IBM. PC makers such as Apple and Compaq, leapfrogged minicomputer makers such as Digital Equipment. Dell's direct retailing model, leapfrogged the previously leading PC retailers, Compaq, HP, and IBM. Online brokers such as Ameritrade and Schwab leapfrogged traditional brokerages such as Merrill Lynch. Online travel agencies such as Expedia, leapfrogged bricks-and-mortar agencies such as American Express. Department stores such as Macy's and Marshall Fields, leapfrogged small shopkeepers. Discount stores such as Kmart and Wal-Mart, leapfrogged department stores such as Macy's and Marshall Fields.

### **Increasing Relevance of Creative Destruction**

[the] evident acceleration of the process of creative destruction, which has accompanied these expanding innovations and which has been reflected in the shifting of capital from failing technologies into those technologies at the cutting

edge, has been remarkable. **Alan Greenspan** (as quoted by Useem, 2001)

Not only is Creative Destruction the central process of capitalism, but there are plausible arguments and credible evidence suggesting that the process is speeding up. We have already mentioned the shortening of the number of years the average firm lasts in the S&P 500. In addition, credible business books, such as Andy Grove's *Only the Paranoid Survive*, are rife with claims that the pace of change is quickening.

Often, the quickening pace is connected with the rise of information technology and the internet. Alan Greenspan has suggested a plausible account of what is going on:

. . . a firm is inherently fragile if its value-added emanates more from conceptual as distinct from physical assets. . . . Trust and reputation can vanish overnight. A factory cannot. (Alan Greenspan as quoted in Ip, p. A1)

## **Growing Acceptance Among Academics of Creative Destruction**

Now, at the turn of the millennia, when total-factor-productivity has remarkably soared in America and abroad, both fools and sages sing Schumpeter's praise. That would have amused and pleased this worldly scholar who in some dark hours of the night used to despair in his German-shorthand diaries of justly deserved praises passing him by. So Keynes was wrong: in the long run not all of us are dead.

**Paul Samuelson**, 2003, p. 467.

Some subgroups of academic economists have continued to value the contributions of Schumpeter in the 50 years since his passing. In particular, those who study the History of Economic Thought still value Schumpeter's *History of Economic Analysis* as a major source in field. The work serves both as a reference unrivaled in its comprehensiveness, and also as a continuing source of research questions.

Similarly, those who study the Economics of Technology, view Schumpeter as a founder of their field, and as the source of several important research hypotheses.<sup>15</sup>

But when we detect a growing acceptance of Schumpeter's central message, we are not primarily referring to either of these two groups. Rather we mainly intend a broader group, of otherwise more mainstream economists who believe the broad features of Schumpeter's account of competition capture the kind of competition that is most important for understanding economic growth.

One economist often identified as solidly in the mainstream is Nobel-prize winner George Stigler. As in his note against Liebenstein, "The Existence of X-efficiency," Stigler often defended the neo-classical, partial-equilibrium framework from heterodox criticism. His mid-career "Perfect Competition, Historically Contemplated" (1957) is devoted to an historical account of some of the main ways in which competition has been defined and discussed in economics through the mid-1950's. A secondary aim of the article is to argue for the usefulness and robustness of the competition concept, both in economic theory, and as a policy tool. Stigler does, however, grant that the concept will need to continue to evolve with the advance of economic theory. In particular, he suggests (p. 282) that the concept of competition's

“natural affinity to the static economy” will require modification in order to apply competition to a dynamic economy. This discussion calls Schumpeter to mind, but Stigler does not mention him.

Early in his career, Stigler advocated government antitrust action to make industry less concentrated, and more competitive. Later, he became much less supportive of antitrust. He claims that the main reason for his change of position was the work McGee at the University of Chicago law school, under Aaron Director, demonstrating that the paradigm case of antitrust action, the Standard Oil case, had been ill-founded in the sense that the greater efficiencies of the Standard Oil trust had benefited consumers.

But Stigler admitted that reading Schumpeter had provided a second reason for his change of position:

. . . , Schumpeter painted an unconventional picture of the capitalistic process. The competition between the Pennsylvania and New York Central Railroads, he argued, might be sporadic and even trifling, but the competition to railroads provided by new transportation media such as trucks, automobiles, and airplanes really mattered. . . . We economists mostly rebelled against such heresy, but it left its mark. (Stigler, 1985, p. 101.)

A mainstream economist who has acknowledged the importance of Creative Destruction in even stronger terms is William Baumol, who has been described by Mokyr as “one of our most influential, original, and eminent economists for over half a century.” In his essay on “Innovation and Creative Destruction,” Baumol states (2001, p. 21) that

the “clear message” of Creative Destruction “is that innovation and growth force obsolete technical configurations to be swept away without hesitation or remorse.” He further acknowledges (2001, p. 21) that “Schumpeter surely does imply that without creative destruction we would be condemned to stagnation and forced to forgo the improvements of living standards offered by technical progress.” His book *The Free-Market Innovation Machine* (2002) consists largely of a discussion and formal modeling of aspects of Schumpeter’s process of Creative Destruction.

Several younger economists loosely in the ‘mainstream’ have also recently argued for the importance of the process of Creative Destruction in understanding economic growth and productivity. Among these economists, all of whom have been mentioned earlier in the paper, are: Bradford DeLong, Larry Summers, Martin Neil Baily, and Martin Feldstein.

Several important examples may establish a presumption, but a larger sample of academics would strengthen the case. To provide such a sample, I decided to use the *Social Sciences Citation Index* to examine the citations over time to Schumpeter and to *Capitalism, Socialism and Democracy*. The book versions of the data only go back through 1966, so I used the online Web of Science version, which has been extended back through 1956.

Because Schumpeter is so often compared to Keynes, I collected comparable citation data for John Maynard Keynes and for *The General Theory of Employment, Interest, and Money*. (Some of the details of the citation analysis are discussed in the Appendix on Citation Issues that is located after the tables and graphs near the end of

the paper.)

Figure 1 reports total citations per year to Schumpeter and to Keynes. What is most important for our purposes is Schumpeter's continuing increase in annual citations, even more than 50 years after his death. As far as the Keynes/Schumpeter comparison, the numbers are remarkably close from 1956 through about 1974. From 1975 through 1986, the advantage is Keynes'. From 1987 through 2003, the advantage is Schumpeter's---dramatically so from 1994 onwards.

In Figure 2, we can compare the major works of each author. The *General Theory* dominates from 1956 through 1990, dramatically so from the mid-1970s through the mid-1980s. *Capitalism, Socialism and Democracy* dominates from 1994 onwards, with the gap growing.

Figure 3 shows the proportion of Schumpeter's citations that are citations of *Capitalism, Socialism and Democracy*. A couple of generalizations are suggested by the graph. The proportion seems generally to fall from 1956 through 1964, and generally to increase from 1970 onwards. Since we associate Creative Destruction mainly with *Capitalism, Socialism and Democracy*, the increasing proportion of citations to that book, might be interpreted as consistent with our claim that Creative Destruction is increasingly viewed as Schumpeter's central message.

## **Growing Acceptance Among Book Authors (Including Academics, Business Analysts, and Policy Analysts)**

No one in the interwar years was more brilliant, more clever than Keynes.

Schumpeter, by contrast, appeared pedestrian---but he had wisdom. Cleverness carries the day. But wisdom endureth. **Peter Drucker**, 1986, p. 115.

The phrase “Creative Destruction” has stimulated a wide audience of thinkers and doers. No less than five books have appeared in recent years with “creative destruction” in the title (Cowan, 2002; Page, 2000; Foster & Kaplan, 2001; Nolan & Croson, 1995; McKnight, Vaaler & Katz, 2001). Three of these books are aimed squarely at effecting business practice, while the other two apply “Creative Destruction” to issues outside the usual concerns of economists.

Peter Drucker, who is often identified as the most respected management guru, has frequently praised Schumpeter’s insights into entrepreneurship and Creative Destruction.<sup>16</sup> Andy Grove, the former CEO of Intel who also sometimes teaches at the Stanford business school, has paid homage to Schumpeter in his business best-seller *Only the Paranoid Survive*.

Thomas Friedman, three-time Pulitzer-Prize-winning foreign affairs columnist for the *New York Times*, has written a best-selling book on globalization entitled *The Lexus and the Olive Tree*. He identifies Schumpeter as the most important academic economist for understanding the modern global economy:

If the defining economists of the Cold War system were Karl Marx and John Maynard Keynes, who each in his own way wanted to tame capitalism, the defining economists of the globalization system are Joseph Schumpeter and former Intel CEO Andy Grove, who prefer to unleash capitalism. (p. 11)

For Friedman, the main central message of Schumpeter is the concept of Creative Destruction:

If your company or country, for social, cultural or political reasons, is not willing to let Schumpeter's creative destruction work as fast as today's turbomarkets, it will fall behind. (p. 213)

The example of Thomas Friedman, along with those mentioned earlier, increase the plausibility of the claim that there is a growing acceptance of Schumpeter's central message among intellectuals and practitioners. But it would be desirable to have a broader source of evidence on which to base the conclusion. In what follows in this section, I submit for your consideration, a new data source that may allow us to gather broader data on this issue.

On 10/23/03, Amazon introduced a new feature called "Search Inside the Book" (Wolf). *Wired* journalist Gary Wolf reported that as of that date, Amazon had over 120,000 books available through the feature. That amounted to more than 33 million pages, from more than 190 publishers, "including Wiley, Time Warner Book Group, Simon & Schuster, Inc., Random House, Inc., and many others" (Price). If a publisher submits a book to the "Search Inside" feature, then Amazon customers are able to search the entire contents of the book for pages where any word appears. The customers can then read the pages where the word appears, as well as the preceding two pages, and the following two pages. Since its debut, not much additional information has become available in the press about the coverage of the feature.<sup>17</sup>

Because the Amazon.com "Search Inside" resource is new, and relatively

unexplored<sup>18</sup>, the results reported here will be tentative, and subject to improvement. Since there would be many more books that mention Schumpeter than could be examined in a first effort, it was necessary to select a sample.<sup>19</sup>

Selecting Amazon's "bestselling" criterion, on 2/29/04, a "Search Inside the Book" search for 'Schumpeter' yielded 2,692 hits. On 5/11/04, a "Search Inside the Book" search for 'Schumpeter' yielded 2,866 hits, when ranked by the "bestselling" criterion. So over a period of about 10 weeks, 174 Schumpeter-referencing books were added to the "Search Inside the Book" feature. This represents a 6.5% increase over the period.

If Schumpeter was mentioned on several pages of a connected discussion, then that was counted as one reference. Only if mentions of Schumpeter were in separate sections, or chapters, or were at least separated by several pages, were they counted as multiple references. In cases where there were 10 or fewer pages with mentions of Schumpeter, all of these pages were examined. In cases where there were more than 10 pages with mentions of Schumpeter, a sample of the pages was examined from each connected collection of mentions. Three examples: Foster and Kaplan's *Creative Destruction* with 26 pages of mentions, Heilbroner's *The Worldly Philosophers* with 38 pages of mentions, and Muller's *The Mind and the Market* with 67 pages of mentions. In the infrequent cases where a reference could be placed in more than one category, a judgment was made of which category was the main one. Endnotes were not counted as separate references except in the infrequent cases where they included a discussion of Schumpeter that did not correspond to a Schumpeter reference in the main text.

Mentions in bibliographies or in indexes, were not counted.

In order to save space, Table 1 has been omitted from this draft. The Table provided the author, title, and brief content analysis for each of the first 204 books that were analyzed in this study.<sup>20</sup>

We currently have names and titles of 3,719 books in the Schumpeter Amazon database. Of these we have done content-analysis for 1,176 books. Table 2 provides the preliminary results of the Amazon data analysis. The main result is that a significant number of the references to Schumpeter are on issues related to Creative Destruction. Many of the references are from academics, but another large set are from practitioners---those who provide guidance for better governing, managing, and investing. Although many in the economics profession might disagree, I would argue that, *ceteris paribus*, it speaks well of an economist if practitioners find something in the economist's work that is useful to them.

## **What Economists Teach**

Twenty-six recent introductory principles of microeconomics texts, with publication dates between 2001 and 2006, were examined to see how often, and in what context, they made reference to Schumpeter. As far as I am aware, these 26 represent nearly all of the principles of microeconomics texts published recently by major United States publishers.

We examined the indices of each text, recording all entries of the names of "economists" and on how many pages the economists were mentioned in the text.

Table 3 presents the top 28 economists, ordered first by the number of texts that referred to them, and then within groups of equal number of texts, ordered by the total number of pages referring to them. We count a person as being an “economist” if the person either held an academic position as an economist, or is commonly identified as an economist in texts in the history of economics. The 28 economists include all of those who were referred to by six or more of the 26 texts in the sample.

The results of our analysis of textbooks appear in Table 3. Schumpeter is mentioned in only three out of the 18 microeconomics principles texts that were examined.<sup>21</sup> 32 economists were mentioned in more texts than was Schumpeter. The three texts where Schumpeter was mentioned were: Case & Fair; Gottheil; and McConnell & Brue. Case & Fair (p. 299) link Schumpeter to Galbraith, in believing that higher levels of market concentration may lead to faster technological innovation. The discussion is very brief and does not provide an account of the process of Creative Destruction. The main Gottheil account is longer (pp. 262-265), but also focuses on the concentration issue, implying that Schumpeter favored monopolies mainly because he thought they would result in lower prices. Later in the book (p. 312), and more briefly, Gottheil does summarize the theory of Creative Destruction. The best treatment of Schumpeter, though brief, occurs in the McConnell & Brue text. They provide a good discussion of the process of Creative Destruction, in a separate (non-core) chapter on “Technology, R&D, and Efficiency.”<sup>22</sup> One may hope that their treatment of Schumpeter helps explain why McConnell & Brue is “the nation’s best-selling economics textbook.” (p. ix)<sup>23</sup>

## Schumpeter's Impact on Antitrust

The process of Creative Destruction, as elaborated by Christensen, implies a much more laissez-faire policy on antitrust. Christensen has developed evidence and arguments about why it will be hard for large firms to continue to be innovative. As long as coercion is not used to restrict entry, the small firms do not need any assistance from the government in order to succeed.

At least since the Brown Shoe case, the antitrust policy of the United States has been to support small firms, even in the face of evidence suggesting that larger firms (more market concentration) would better serve the interests of the consumer (Bork, pp. 210-216). This dominant policy has been supported by the standard economic analysis that says that lower prices are the outcome of price competition in an (unconcentrated) market of many sellers.

Although Christensen is so far mainly aiming to influence business practice, he is aware that his arguments and evidence have implications for government policy as well. (Christensen and Raynor, pp. 135-136 & 145, note 14.)

Farrell points out (p. 106) how Schumpeterian competition, rather than maintaining many small competitors, has been the key in explaining why the growth in European mobile-telecom labor productivity has been substantially higher than in the United States. German banks are shielded from some of the demands of the capital market, and so are smaller scale, with less gains in productivity (pp. 106-107). French zoning laws reduced competition in retailing, resulting in smaller productivity gains than in the United States (p. 107).

To more systematically test the hypothesis of Schumpeter's absence from the debate, we made use of the Lexis-Nexis reference tool includes a searchable database of all Supreme Court Decisions.<sup>24</sup> Of those decisions, 804 are classified under the keyword "antitrust." Antitrust economist George Bittlingmayer suggested to us the names of 7 economists who were likely candidates to have been mentioned in antitrust decisions. We searched for mentions of them, and eliminated mentions that appeared to be to others who shared the same names. Table 7 presents the results. Most dramatically, Schumpeter is never mentioned in any of the 804 cases.<sup>25</sup>

## **Conclusions and Implications for Action**

Schumpeter claims that the process of Creative Destruction is the essential fact about capitalism; a fact that explains how capitalism produces innovations that provide longer lives and increasing goods and services to the average consumer. The main alternative candidate to being the "essential fact" is the standard textbook account of price competition. I compare the two candidates, and tentatively argue that the process of Creative Destruction creates new goods that improve and lengthen our lives; and moreover, the process of Creative Destruction also often creates new processes and modes of operation that reduce costs sufficiently to lower prices to consumers.

Schumpeter's process of Creative Destruction states that technological advance is the main source of economic growth and improvements in the length and quality of life. It further states that a significant part of the incentive to produce leapfrogging innovations is the prospect of achieving monopoly profits. The original 'big-is-better'

account adds the view that large incumbent firms are most likely to be the source of leapfrogging innovations. In contrast, the new ‘small-is-better’ account adds the view that small, new firms are most likely to be the source of leapfrogging innovations.

I have argued that the benefits of leapfrogging innovations are difficult to measure, but that recently progress is being made, mainly through the careful examination of particular cases, such as advances in lighting and the introduction of the internet. While case studies are accumulated and generalized, I argue that the openness of the American economy to Creative Destruction, and the associated high levels of economic growth, and living standards, support a presumption in favor of Creative Destruction as the essential fact about capitalism. It is highly plausible that our rate of economic growth would increase if we adopted policies making our economy more open to Creative Destruction.<sup>26</sup>

I also have discussed the evidence against the old ‘big-is-better’ version of Creative Destruction and in favor of the new ‘small-is-better’ version. I find that there is substantial and growing evidence that leapfrogging innovations are at least as likely to arise from small, new firms, as from old, large firms.

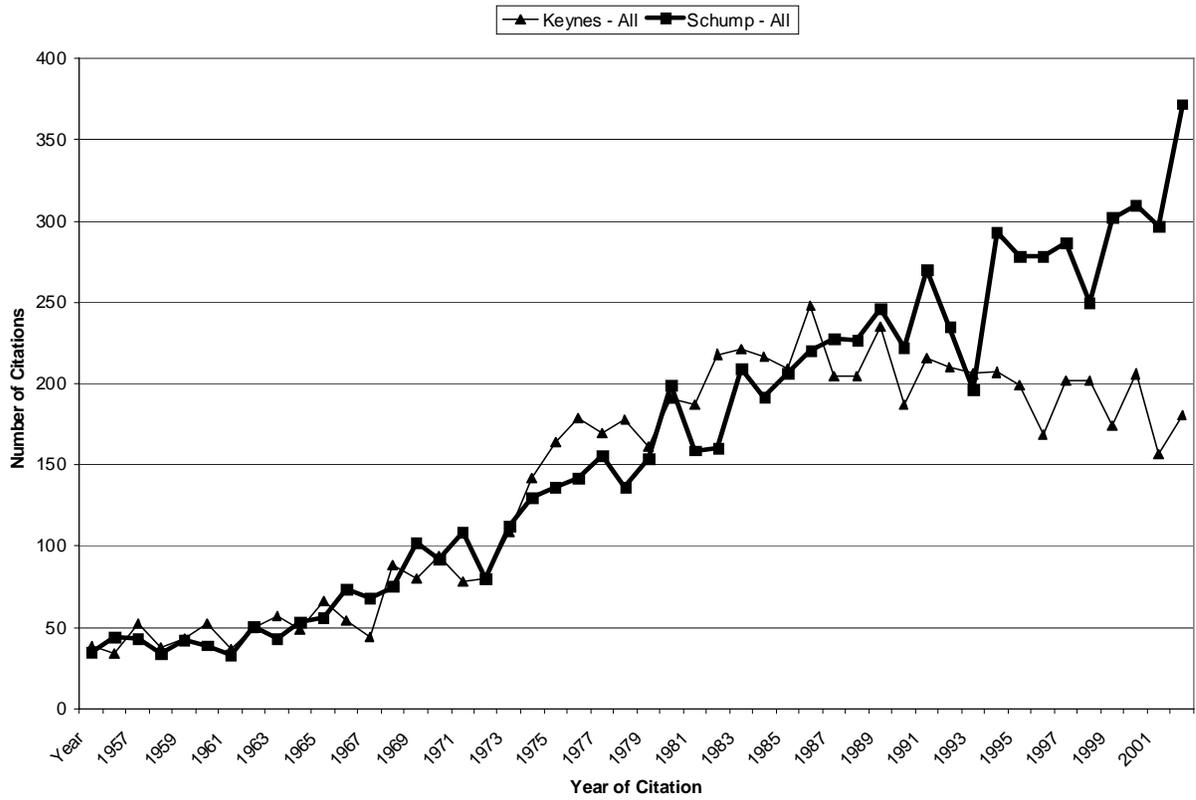
More broadly, Creative Destruction is being recognized as true and important by a growing number of academics and practitioners. Evidence has also been presented to show the broader, and increasing, influence of Schumpeter among academics and practitioners. For academics, we show that annual citations to Schumpeter have continued to increase more than 50 years after his death. (Since the mid-1990s annual citations to *Capitalism, Socialism and Democracy* have even exceeded annual citations

to Keynes's *General Theory*.) For a combination of academics and practitioners, we document the variety, and large number, of recent books that refer to Schumpeter; references that are often related to some aspect of Creative Destruction.

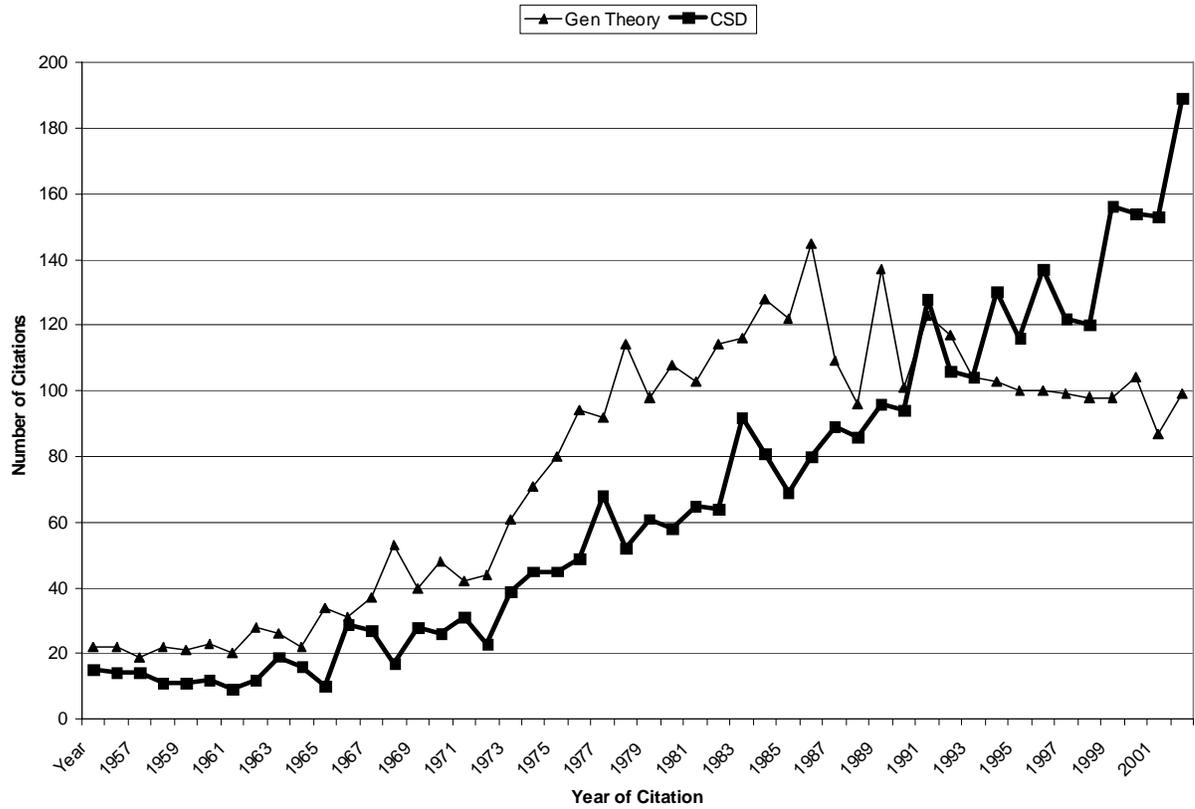
Although the evidence for the importance of Creative Destruction is being increasingly recognized, the importance of Creative Destruction is not being very effectively communicated to a wider audience, nor is it being applied to relevant policy issues, such as antitrust. Only three out of 18 principles of microeconomics texts mention Schumpeter, and of those three, only one does a moderately good job of summarizing the process of Creative Destruction. Out of 804 Supreme Court decisions searched on Lexis-Nexis, Schumpeter receives zero mentions.

In future work, I plan to answer an important question that is neglected in the current paper: how big is the destructive part of Creative Destruction? Or put differently: how much are workers hurt? Cox and Alm (2003, and 2004 with Holmes) show some evidence that workers may actually benefit from Creative Destruction, in the sense that the jobs created are better jobs than jobs destroyed. But this evidence needs to be further analyzed. In the more distant future, an important extension of the current research would be to construct an index of the economy's "openness to Creative Destruction," and then to empirically examine the relationship of such an index to measures of technological innovation and economic growth.

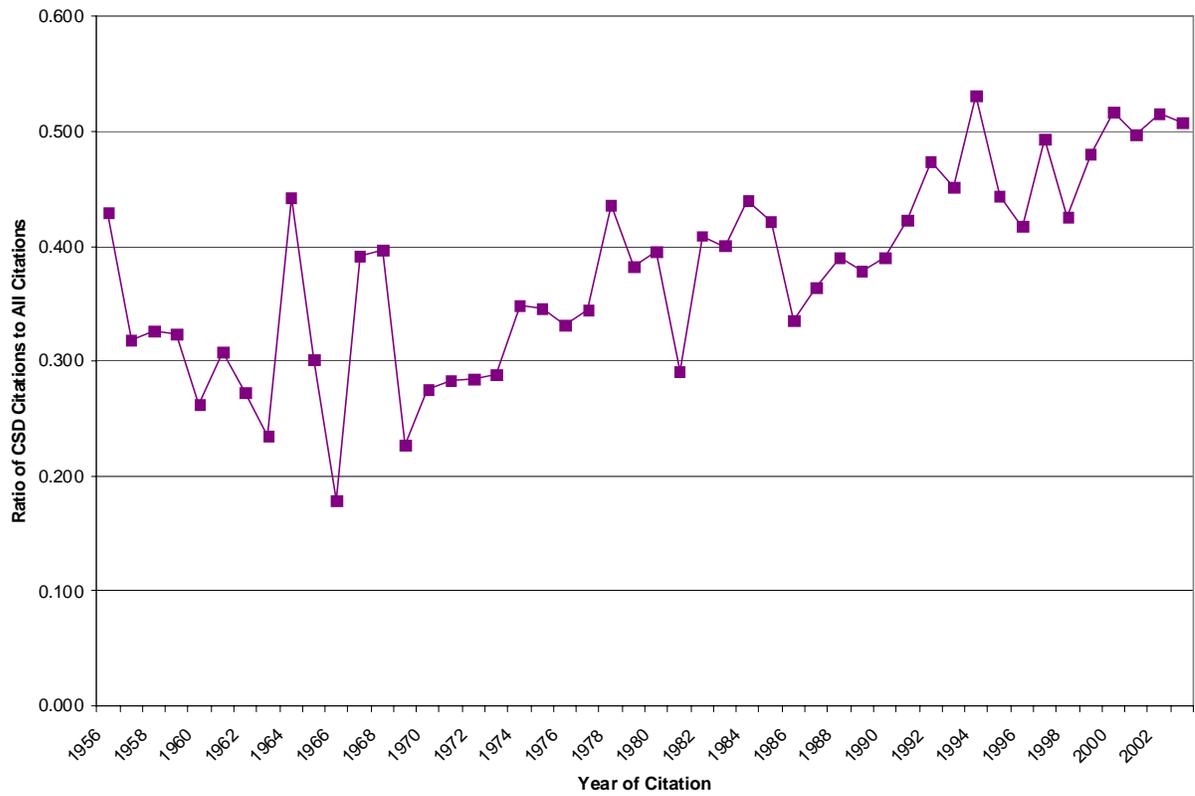
**Figure 1: Schumpeter Versus Keynes: Total Citations Per Year to All Publications**



**Figure 2: Schumpeter Versus Keynes: Citations Per Year to *Capitalism, Socialism* and Democracy Versus Citations Per Year to *The General Theory***



**Figure 3: Proportion of All of Schumpeter's Citations that Are Citations to  
*Capitalism, Socialism and Democracy***



**Table 2: Summary Statistics from Content Analysis of Amazon Book References to Schumpeter for 1176 Books Currently Analyzed**

<b>Type of Reference</b>	<b>Counts (# of books making reference)</b>	<b>Sum (# of references-- -may be more than one from same book, if separated)</b>
Creative Destruction	365	443
Views on Democracy	145	197
In Role as Historian of Economic Thought	118	163
Long Cycles	50	59
Prediction of Capitalism's Demise	43	47
Theory of Imperialism	38	47
Evolutionary Method in Economics	27	30
Dynamic (Leap-frogging) Competition	22	29
Hypothesis that Large Firms Innovate More	13	13
Miscellaneous	608	825

**Table 3: References to Schumpeter in U.S. Microeconomic Principles Textbooks**

Rank	Economist	# of Texts	Sum of Pages
1	Smith, Adam	26	175
2	Coase, Ronald	20	34
3	Ricardo, David	18	50
4	Marx, Karl	16	30
5	Keynes, John Maynard	16	29
6	Friedman, Milton	15	27
7	Nash, John	13	16
8	Stigler, George	12	15
9	Krueger, Alan B.	12	14
10	Marshall, Alfred	11	26
<b>11</b>	<b>Schumpeter, Joseph A.</b>	<b>11</b>	<b>23</b>
12	Bentham, Jeremy	10	15
13	Malthus, Thomas Robert	10	14
14	Buchanan, James	10	13
15	Chamberlin, Edward	9	10
16	Becker, Gary	8	20
17	Pareto, Wilfredo	8	10
18	Card, David	8	9
19	Hamermesh, Daniel	8	8
20	Arrow, Kenneth J.	7	10
21	George, Henry	7	10
22	Pigou, Arthur Cecil	7	10
23	Frank, Robert H.	7	8
24	Jevons, William Stanley	7	7
25	Mill, John Stuart	6	9
26	Neumann, John von	6	9
27	Robinson, Joan	6	9
28	Akerlof, George	6	7

**Table 4: The 15 U.S. Microeconomic Principles Textbooks that  
Do Not Mention Schumpeter**

<b>Author(s)</b>	<b>Edition</b>	<b>Year</b>	<b>Publisher</b>
Arnold	5	2001	Thomson South-Western
Ayers and Collinge	Enhanced	2005	Pearson Addison-Wesley
Bade and Parkin	2	2004	Pearson Addison-Wesley
Baumol and Blinder	9	2003	Thomson South-Western
Boyes and Melvin	6	2005	Houghton Mifflin
Frank and Bernanke	2	2004	McGraw-Hill/Irwin
Goodwin, Nelson, et al	1	2005	Houghton Mifflin
Hall and Lieberman	3	2005	Thomson South-Western
Mankiw	3	2004	Thomson South-Western
Miller	12	2004	Pearson Addison-Wesley
O'Sullivan and Sheffrin	3	2003	Pearson Addison-Wesley
O'Sullivan and Sheffrin <i>Activebook</i>	1	2003	Pearson Addison-Wesley
Parkin	7	2005	Pearson Addison-Wesley
Sexton	3	2005	Thomson South-Western
Taylor	4	2004	Houghton Mifflin

**Table 5: The 11 U.S. Microeconomic Principles Textbooks that  
Do Mention Schumpeter**

<b>Author(s)</b>	<b>Edition</b>	<b>Year</b>	<b>Publisher</b>
Case and Fair	7	2004	Pearson Addison-Wesley
Colander	6	2006	McGraw-Hill/Irwin
Gottheil	4	2005	Thomson South-Western
Gwartney, Stroup, et al	10	2003	Thomson South-Western
Hubbard and O'Brien	1	2006	Prentice Hall
McConnell and Brue	16	2005	McGraw-Hill/Irwin
McEachern	6	2003	Thomson South-Western
Samuelson and Nordhaus	18	2005	McGraw-Hill/Irwin
Schiller	9	2003	McGraw-Hill/Irwin
Stiglitz and Walsh	3	2002	W.W. Norton
Tucker	3	2003	Thomson South-Western

**Table 6a: Analysis of the 11 U.S. Microeconomic Principles Textbooks that  
Do Mention Schumpeter**

<b>Six state, or come close to stating, Schumpeter's "essential fact" about capitalism:</b>
<b>Stiglitz and Walsh</b> have a good account "Schumpeterian competition." They describe "creative destruction," and point out it can result in new products, or lower costs. Also note that the dominant position would eventually be destroyed by a new competitor.
<b>Gwartney, Stroup, et al</b> discuss "creative destruction" and mention both the new products and new processes. They also call the process "dynamic competition."
<b>McConnell and Brue</b> discuss "creative destruction," emphasizing the new product aspect. Points out that the process can destroy old monopolies. But also suggests that old monopolies can build storm shelters.
<b>McEachern</b> mentions "creative destruction." Mentions "dynamic" competition. Mentions new product innovation (but not new process that lowers costs).
<b>Hubbard and O'Brien</b> discuss "creative destruction" in terms just of new products. Says that higher prices will result, but these are less important than the value of innovations.
<b>Samuelson and Nordhaus</b> have a variety of references to Schumpeter, but I never find them actually using the phrase "creative destruction." They do talk about dynamic competition and about innovation. Also mention the big is better hypothesis, his prediction about the decline of capitalism, his views about entrepreneurship, his view of the importance of fiscal policy, and his importance as a historian of economic thought.

**Table 6b: Analysis of the 11 U.S. Microeconomic Principles Textbooks that  
Do Mention Schumpeter**

<p><b>Five do not even come close to stating Schumpeter's "essential fact" about capitalism:</b></p>
<p><b>Schiller</b> mentions only that Schumpeter thought "animal spirits" of entrepreneurs were unleashed under free markets to result in innovation.</p>
<p><b>Case and Fair</b> quote Schumpeter as believing that big firms are more likely to produce technological innovation. Seems to be implying as "source" but brief and fuzzy.</p>
<p><b>Gottheil</b> focuses on lower prices through process innovation. Co-mingles this with claim that monopolies are the source of innovation. No mention of "creative destruction."</p>
<p><b>Colander</b> only has an obscure reference in a couple of "Problems and Exercises" questions. The reference is to the "size" issue, but Colander suggests that Schumpeter believed the opposite of what is usually claimed: ". . . predicted that as firms in capitalist societies grew in size they would innovate less." (p. 82)</p>
<p><b>Tucker</b> mentions only that Schumpeter thought monopoly was good because monopolies would have the financial resources to invest in R&amp;D. So this is mainly a monopoly as source of innovation argument.</p>

**Table 7: Number of Supreme Court Antitrust Decisions that Refer to Selected Economists**

<b>Search Term(s)</b>	<b>Number of Decisions</b>
Stigler	8
Scherer	8
Bain	5
Adam Smith	3
Stiglitz	2
Carlton	1
<b>Schumpeter</b>	<b>0</b>

## Appendix

### on Citation Issues

Our source for citations is primarily the “Web of Science” (WoS) database published by the Institute for Scientific Information, incorporating citations in the sciences, social sciences, arts, and humanities. For the present research, the primary advantage of the Web of Science version of the database is that it has been extended back through 1956 for the social sciences, in contrast to the 1966 starting date for the *Social Sciences Citation Index (SSCI)*, which is the book version. Citation counts were available through the year 2003, and approximately the first three months of the year 2004. (The reported counts are through the end of 2003.)

For Schumpeter, I used the search term “Schumpeter, J\*” in order to capture both citations using only his first name, and citations using both his first and middle initials. (The asterisk stands for ‘wildcard’ which is necessary because citers, and ISI data-entry persons, sometimes record the same author, or publication in differing forms.) For *Capitalism, Socialism and Democracy*, I used the search term “Cap\* Soc\*” which I judged would capture almost all, but not all of the citations to the book. (This method would miss, for example, citations to the German translation of the book, where the title begins with the letter “K”.)

The search term for Keynes used was “Keynes, J\*”. For each year, I looked for, and excluded the small number of citations to J.M. Keynes’ father: John Neville Keynes. For the *General Theory*, I searched under the search terms “Gen\* The\*”.

Although it is well-known that citations are highly correlated with other

measures of intellectual distinction and productivity (e.g., Diamond 1986), it is also well-known that they are not a perfect measure.

Another potential imperfection in the citation data results from what is sometimes described as citation inflation: that the secular trend has been for the average citations per article to rise. But it is difficult to distinguish whether a general secular increase in citations represents a decline in the average value of a citation, or an increase in the average quality of an article. In this paper we concur with Hall et al (2000, p. 36) who suggest that taking out time effects “. . . would drastically reduce the variance in the data, probably throwing out a good part of the baby with the bathwater.”

## Footnotes

\*I first encountered Schumpeter at Wabash College in a wonderful course on *Capitalism, Socialism and Democracy* taught by Ben Rogge. George Bittlingmayer provided a gold mine of ideas, sources, and information on Schumpeter's non-role in antitrust policy. I have received useful comments from Catherine Co, Chris Decker, and Campbell McConnell. I am grateful for excellent and substantial research assistance on this project from Angela Kuhlmann. More recently, I have also received substantial, able research assistance from Molly McGrath. Able assistance has also been provided by Miaomiao Yu. I received assistance on Excel issues from Jeanette Medewitz. A couple of lines of one of the footnotes have been adapted from Diamond, 2004 & 2005. An earlier version of the current paper was presented at the biennial meetings of the International Schumpeter Society in Milan, Italy on June 12, 2004.

<sup>1</sup> Some highly aggregated and abstract growth models have been developed that capture some aspects of Schumpeter's process of creative destruction. The best known of these is probably Aghion and Howitt's 'quality ladder' model, summarized, for instance in Aghion and Howitt, 1998. Such models assume that innovation arrives stochastically as an automatic result of R&D investment. As such they have little to tell us about why some entrepreneurs, and some countries, are more successful at transforming R&D into profitable products (e.g., Wieser, p. 616). And the high degree of aggregation of the models do not easily provide insight a variety of policy-relevant micro issues, such as how to understand a variety of industry specific aspects of innovation. For example, Why in some industries do the leading innovators tend to be large firms, while in other

industries, the leading innovators tend to be small firms? (see: Acs and Audretsch, 1990)

<sup>2</sup> Anne Mayhew has argued (1980) that Schumpeter did not believe that larger firms were necessarily more likely to innovate than smaller firms.

<sup>3</sup> Comparing the benefits from lower prices with those from new products, would not be easy. We have highly mathematical models of price competition, and widely understood graphical approximations of these models. Of related and perhaps equal importance, we have well-understood and frequently applied methods for measuring the benefits from static competition (notably the consumer surplus concept). In contrast we do not have any widely-accepted mathematical models, or graphical approximations, explaining the process of creative destruction. And even more importantly, we have found it extremely difficult to measure the benefits of the new product or the new process.

<sup>4</sup> It is not clear that we should care how rich some short-term near-monopolists get, as long as the consumer benefits with lower prices and better products. But for those who do care, it may be reassuring that William Nordhaus has found that for the economy as a whole, the size of monopoly profits due to Schumpeterian monopolies is fairly small.

<sup>5</sup> For a careful and sophisticated analysis of the price of oil, kerosene, and gasoline during the period of Standard Oil's prime, see Crandall, 2001, pp. 15-31.

<sup>6</sup> Ron Chernow in his massive biography of Rockefeller, provides extensive discussions of how production processes improved under Rockefeller (e.g., pp. 79, 100, and esp. 179-181).

<sup>7</sup> Besides the empirical evidence sketched here, both Demsetz and Baumol et al, have

presented theoretical arguments to suggest that highly concentrated markets may often offer the consumer prices that are as low as those offered in unconcentrated markets. These arguments assume the barriers are not too high to potential competition, and that the incumbents in the market lower their prices to deter entry. Observations of the price competitiveness of many highly concentrated, oligopolistic markets (e.g., airlines since deregulation, breakfast cereals, satellite radio), also challenges the usual conclusion that low prices are more likely in an unconcentrated market structure of many small firms.

<sup>8</sup> Nicholas has argued (2003, p. 1025) that the United States was especially open to creative destruction in the decade of the 1920s.

<sup>9</sup> Klepper and Gunther's *The Wealthy 100* (1996) ranks Rockefeller as the richest American in the history of the United States, based on estimated total wealth at the time of death, as a percentage of GNP at the time of death. See also: "Rockefeller, you know, is reputed the richest man in the world, . . ." (William James in letter to Henry James, Jan. 29, 1904, quoted in Chernow, p. ix) Chernow himself describes Rockefeller as the ". . . world's richest investor . . ." (Chernow, p. 373)

<sup>10</sup> To make this calculation, I used historical data from pp. 210-211, of Part 1 of Bureau of the Census 1975, for the years from 1900 through 1967. For the years 1967 through February 2005, I used data from the Bureau of Labor Statistics, reported online by the St. Louis Federal Reserve at: <http://research.stlouisfed.org/fred2/data/CPIAUCNS.txt>.

<sup>11</sup> The sort of argument sketched by DeLong could be objected to on the grounds that it seems to ignore the problem of interpersonal utility comparisons. Sen (1976) and

others, have noted that one can only rank changing consumption bundles, for the same group of consumers.

<sup>12</sup> The archive has been acquired by Bill Gates.

<sup>13</sup> This case has been made, in Thomas Friedman's *The World is Flat*, and in several papers co-authored by Brynjolfsson, e.g., Brynjolfsson and Hitt (2000).

<sup>14</sup> An extensive literature exists suggesting that large firms may have problems innovating, due to inertia, and problems with their internal incentive structure. See, e.g, Berle and Means (1932); Henderson (1993).

<sup>15</sup> Mansfield credits Schumpeter with founding the field (1995, I, p. ix) Rosenberg has gone so far as to say: ". . . the study of technological innovation . . . still consists of a series of footnotes upon Schumpeter." (Rosenberg 1982, p. 106) Griliches (R&D, ..., 2000, p. 45) lists Schumpeter with four other "major" early economists who recognized the importance of technological innovation. Granstrand notes that "J. Schumpeter is without doubt the father of the field in terms of citation appearance and influence upon others, as is widely acknowledged." (Granstrand, 1994, p. 19)

<sup>16</sup> Steve Forbes attributes the increased attention to Schumpeter, largely to Drucker's article:

Almost everyone today is aware of the phrase of another Austrian-born economist, Joseph Schumpeter: "creative destruction," which describes the process in a capitalist economy whereby new technology and new companies messily supplant the old. Nearly 20 years ago Laury realized that 1983 would mark the centennial birthday of not only the towering John Maynard Keynes but also the obscure Joseph Schumpeter. The result was FORBES' commissioning

Peter Drucker to write about these two extraordinary men. The landmark cover story started the process of bringing Schumpeter out of the shadows. (Forbes, 2001)

Drucker himself seems to share Forbes' view of the article's impact:

Of all my essays this may have had the greatest impact---and where I least expected it, that is among economists. Schumpeter was of course, all along a very big name in economics. Economists bowed their heads when his name was mentioned. But few actually read him. This essay touched off a "Schumpeter boom." (Drucker, 1986b, p. ix)

<sup>17</sup> Since not much is known about the characteristics of the books that are included, we attempted to gauge the current breadth of inclusion. On 4/23/04 we downloaded the *New York Times* nonfiction hardcover and paperback best-seller lists that were to be published in the paper on 4/25/04. Of the 35 books listed under "hardcover" only one could be used with the "Search Inside" feature. Of the 35 books listed under "paperback" 13 could be used with the "Search Inside" feature. Not much information is yet available from Amazon itself on the "Search Inside" feature. For reasons not entirely clear, Amazon's policy has been not to allow publishers to submit books electronically, instead requiring that publishers submit a physical copy of the book, that is then scanned in by Amazon. ("Frequently Asked Questions About Search Inside the Book")<sup>17</sup> This policy is puzzling because it would seem to gratuitously increase, though only slightly, the cost to the publisher to participate in the program. What is even more puzzling is that it also would seem to increase Amazon's costs to process the book, and to delay the book's appearance with the "Search Inside" feature. In the long-run, the

continued growth (and existence) of the feature would depend either on its increasing sales of the books, or on Amazon being able to charge for the feature's use, and pass some of the revenue on to publishers and authors. Apparently based on preliminary evidence, Amazon has claimed that, *ceteris paribus*, books with the "Search Inside" feature sell 9% more copies than books that lack the feature (Parsons).

<sup>18</sup> Although the customers who bought this book also bought" feature has been used to compile evidence that politically the United States is polarized into two distinct groups (see: Eakin).

<sup>19</sup> Amazon permits the "hits" from a search to be ordered in a variety of ways, which as of 5/12/04 consist of: Featured Items; Bestselling; Avg. Customer Review; Price: Low to High; Price: High to Low; Publication Date; Alphabetical: A-Z; and Alphabetical: Z-A. Given limited time, we wanted to examine books that by some measure were either influential or of high quality, so we rejected the alphabetical ordering.

When Amazon accidentally released the identity of anonymous readers submitting book rankings, it was revealed that many authors were ranking their own books (see: CNN.com, 2004). This naturally reduces the credibility of the "Avg. Reader Review" ordering. In addition there are often only a few or even zero readers who have ranked a given book. So we also rejected the "Avg. Reader Review" ordering.

We sought to learn from Amazon, what the ranking procedure was for the "Featured Items" ranking. But after a frustrating exchange of email, the Amazon customer service representative finally admitted that they would not share any information on this for competitive reasons.<sup>19</sup> So we settled upon the "bestselling"

ranking. We do not put a high degree of confidence in this ranking either, since we were unable to learn much about it. We would have liked to have known how often it is updated, whether it includes all editions of a book, and the like. From our limited experience, we conclude that the “bestselling” ranking can change quite substantially over a period of as short as 10 weeks. (We suspect that the variability is greater than for other bestseller lists, such as the *New York Times*, but we have not checked this.)

<sup>20</sup> Table 1 lists the 204 books whose content was first evaluated. Rank1 indicates the rank as of 3/2/04 on the Amazon “Bestsellers” ordering of books with “Search Inside” that referenced Schumpeter. On 3/2/04 we recorded the top 100 such books. If a book appears in Table 1 with no entry under Rank1, that means either that the book did have the “Search Inside” feature on 3/2/04, or else that it was ranked lower than the top 100 on 3/2/04. Rank2 indicates the rank as of 4/30/04, on the Amazon “Bestsellers” ordering of books with “Search Inside” that referenced Schumpeter. Generally, any book was included in Table 1, if it either was among the 100 top-ranked books on 3/2/04, or was among the 200 top-ranked books on 4/30/04. About 15 books were eliminated from the initial table for one of the following reasons: they referred to some other Schumpeter besides Joseph (3 cases), they included Schumpeter in the bibliography without mentioning him in the text (7 cases), Amazon consistently displayed a “PAGES UNAVAILABLE - TRY LATER” error message during attempts to view the pages that referenced Schumpeter (4 cases), and there were no references to be found anywhere in the text (1 case).

<sup>21</sup> I accidentally noticed that one textbook, Mankiw, included (p. 368) a brief mention of Creative Destruction in the context of a quote from Larry Summers, though

Schumpeter is not mentioned and the phrase “creative destruction” does not appear in the index. I am also aware that one of the textbooks that I have not yet obtained to examine, viz., Samuelson and Nordhaus, does include several pages that mention Schumpeter.

<sup>22</sup> By “non-core” I mean outside of those chapters that would be thought mandatory for a professor to teach by most economics departments. This is my judgment.

<sup>23</sup> After some search, and consultation with a senior reference librarian, I was unable to find published statistics on economics textbook market shares. (In the future, it may be possible to obtain some information on this issue from the sales rank among textbooks on Amazon.com).

<sup>24</sup> We are grateful to George Bittlingmayer for suggesting the use of this resource. In the future I would like to explore whether there exists a similar database of Mario Monti’s European Commission antitrust decisions to search for references to economists.

<sup>25</sup> George Bittlingmayer directed us to a speech by an antitrust official, that refers to Schumpeter in order to dismiss his relevance to antitrust policy:

As Joseph Schumpeter first taught us, productive and dynamic efficiencies are at least as important as static allocative efficiency in promoting economic growth. These efficiencies are often hard to measure; placing too high a burden on the parties to quantify these efficiencies and to show that they are merger-specific therefore risks prohibiting transactions that would be efficiency-enhancing. At the same time, it often said that more than two-thirds of all mergers fail so we should also be careful not to accept efficiencies claims on faith alone. This is why

in the United States, we don't count efficiencies "if they are vague or speculative or otherwise cannot be verified by reasonable means." (Kolasky)

<sup>26</sup> As part of an argument that we can significantly increase the rate of economic growth through institutional change, Romer makes the case for optimism: "Given the limited state of our knowledge of the process of technological change, we have no way to estimate what the upper bound on the feasible rate of growth for an economy might be. If economists had tried to make a judgment at the end of the 19th century, they would have been correct to argue that there was no historical precedent that could justify the possibility of an increase in the trend rate of growth of income per capita to 1.8% per year. Yet this increase is what we achieved in the 20th century." (Romer, p. 226)

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