The Impact of Nobel Prize Winners in Economics: Mainline vs. Mainstream*

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ABSTRACT. We assess the impact of two groups of economists: *mainline* economists, who regard economics primarily as the science of exchange and *mainstream* economists, who perceive economics primarily as the science of choice. To control for scholarly quality we investigate the citation impact of Nobel Prize winning economists, who we break up into the two groups, mainline and mainstream. We find that over the period from 1970 to 2007 mainline economists had more of an impact than mainstream economists.

> *Contemporary fame does not ensure lasting fame—the leaders of what prove to be scientific fads recede from even the histories of the science . . . This series of lectures is presented by economists [Nobel Laureates] who have met at least the requirement that their work has been recognized by contemporaries. A later age will separate the fundamental from the faddish contributions.*
>
> —George J. Stigler ([1985] 2009: 79)

> *But it is not the popular movement, but the traveling of the minds of men who sit in the seat of Adam Smith that is really serious and worthy of all attention.*
>
> —Lord Acton (1904: 212)

Introduction

Economics is a burgeoning field. The *Journal of Economic Literature* classification system has expanded from 10 general economic catego-

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ries and 45 subcategories in 1969, the year the first Nobel Prize in Economics was awarded, to 21 general economic categories and 132 subcategories in 2010. The average number of economic journals has expanded from 214 for the period from 1970 to 1979 to 824 journals for the years 2000 to 2007 (Kelly and Bruestle 2010). Despite the increase in quantity and diversity in scholarly output, we divide economists into two broad categories introduced by Boettke (2007, 2011)—*mainline* and *mainstream*—and analyze their respective impact on the discipline.

We understand mainline economists to work in the tradition of Adam Smith. They start with the postulate that shortsighted, cognitively limited individuals pursue their own self-interest.[1]

They focus their scholarly efforts on studying how these individuals, acting in their own self-interest, create complex social arrangements under the division of labor that align individual interest with the social interest. Thus, they tend to rely on invisible-hand theorizing to analyze how individuals coordinate individual plans in an orderly decentralized fashion (Ullmann-Margalit 1978; Nozick 1974: 18–22). Accordingly, mainline economists, tend to view economics primarily as the science of exchange, or *catallactics*. In slightly different words, based on the postulate of human purposefulness, they study exchange phenomena and the institutions within which exchanges take place in various social contexts. Following Adam Smith, mainline economists recognize the limits of economics as a tool for social control. Perhaps summed up best by Hayek (1988: 76), "[t]he curious task of economics is to demonstrate to men how little they really know about what they imagine they can design."

In contrast, we understand mainstream economists to tend to follow the scientific trends of their days and, at times, to be taken far afield from the mainline of economics by the pursuit of current fashions. For example, Boettke, Leeson, and Smith (2008) and Kreps (1997) argue that, in the 1930s, mainstream economists moved away from the advancement of the propositions explored by mainline economists. Instead of viewing economics primarily as the science of exchange, economics became a science of choice.[2] Rather than focusing their scholarly efforts towards studying the social arrangements that emerge to align individual and social interest, mainstream economists focused

their attention on modeling the choice of cognitively perfect individuals in ideal situations, leaving no room for institutional analysis and operative mechanisms to explain how markets work given behavioral deviations from the hypothesized ideal man. In society, institutions emerge to cope with fallible men, and imperfect and incomplete information. Assuming these complexities away precludes the analysis of the institutions that emerge to overcome these barriers. The appreciation for complex and intricate social orders created through the invisible-hand of the market was gradually lost, opening the door to the use of economics as a tool of social control that dominated mainstream economic thinking in the 20th century.

This is not to say that mainstream and mainline economics are always diametrically opposed to each other. Influential intellectual entrepreneurs can swing avenues of fashionable inquiry found to be barren back to advancing the more fecund core propositions of the discipline. While analyses of exchange phenomena and the institutions that shape exchange took a back seat in the 1930s, the discipline was broadened again during the 1980s, as scholars like North (1994) and Ostrom (2010) brought the attention of the discipline back to advancing the mainline of economic inquiry.

We aim to assess the relative impact of mainline and mainstream economists on the advancement of economic inquiry. We do this by using the citation counts of the Nobel Prize Laureates—arguably the leaders of the economics profession—from 1969 to 2009.[3] We find that measured by annual citations, Nobel Laureates working in the mainline of economics have had a more enduring impact on the social science profession than those working in the mainstream of economics. Our conjecture is that while mainstream economists engage in fashionable scholarly pursuits, these pursuits over the long run tend to have a relative weak enduring influence on the economics profession. Alternatively, contributors to the mainline of economic thought focus their scholarly efforts on advancing core propositions of economics and have a relatively strong enduring impact on the profession.

We built two separate data sets. One, from 1970 to 2007, is based on the paper version of the Social Science Citation Index (SSCI),[4] which we refer to as the "non-electronic SSCI" database throughout the paper. The other dataset, from 1980 to 2007, is based on the electronic

version of the SSCI provided by Thompson ISI, referred to as the "electronic SSCI" database throughout.

While our article is unique in its classification, the date range, and the nature of its data set, our article does build on previous work on the citation impact of Nobel Laureates. There has been previous work using citation counts of the Nobel Laureates to understand the characteristics of Nobel Prize winners, as well as their influence. Diamond (1988) gathered the citation counts for the 24 Nobel Laureates in economics from 1966–1980 and found that by working in the U.S., economists increased their chances of winning the Prize.[5] Skarbek (2009) examined the references of Nobel Laureates to other Nobel Laureates in the Prize Lectures given upon receipt of the Nobel. He found that Arrow, Hayek, Samuelson, Friedman, Lucas, and Phelps were the most cited by their Nobel peers in their Prize lectures.

There has also been work attempting to classify Nobel Laureates into different categories. Weinberg and Galenson (2005) classified the Nobel Laureates as either experimental, moderate conceptual, or extreme conceptual economists; experimental economists being those working inductively and conceptual economists being those working deductively. They found conceptual Noble Laureates to have made their most important contributions earlier in their careers, while experimental Laureates did so later in life.[6] Lindbeck (1985) split up Nobel Laureates into five categories, those who worked in general economic theory, made theoretical contributions concerning specific aspects or sectors of the economy, developed powerful new methods of economic analysis, conducted more "pure" empirical research, and those engaged in non-formalized innovative thinking. Lindbeck did not measure the citation impact of these groups.[7] Karier (2010) also broke down Nobel Laureates into several categories, including behaviorists, free market economists, number guys, and Keynesians, but did not measure the citation impact of the Laureates in these separate categories.[8] We contribute to this literature by offering a new categorization of economists—mainline vs. mainstream—and examining the citation impact of the Nobel Laureates belonging to these two groups.

The second section discusses differences in the perspectives of mainline and mainstream economists. The third section discusses the

citation data. We present our results in the fourth section and conclude in the fifth.

Two Views of Economics: Mainline and Mainstream

The mainstream of the economics profession in the 20th century predominantly advanced economics as a science of choice (Williamson 2002: 172). Robbins (1932: 16) provided the according definition of economics that dominated the discipline, especially during the second part of the 20th century, by characterizing economics as "the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses."[9] Accordingly, the majority of economists concentrated their effort on the advancement of theories of resource allocation instead of theories of market exchange and social cooperation under the division of labor (Buchanan 1964: 214). The focus on a narrow concept of choice as a solution to a given means-ends framework gave rise to the prevalent formulations of the theory of consumer behavior, the theory of the firm as a production function, and the theory of the benevolent social planner (Buchanan 2001; Williamson 2002: 172). Economic agents are assumed to "choose" to maximize, subject to constraints. Given that the means and ends are known to the chooser, the optimal choice is already implicit in the maximization problem under investigation. Economics then becomes a science devoted to solving given sets of problems and is more accurately regarded as a branch of applied mathematics (Buchanan 1964: 214). Market prices, which are an outcome of the market process, enter the problem as given parameters, and the coordination of plans, rather than being investigated as a process worthy of the attention of economists, is simply assumed by resort to a non-existent, and costless, auctioneer. These assumptions drain the prevailing equilibrium models of the very social elements that were at the core of Adam Smith's analysis, and assume away the very processes that economists should be attempting to understand (Buchanan 1964: 218).

While mathematical articulation of equilibrium, which the economy is constantly moving towards, was an important development in economics, exclusive focus on this static and never-realized end state

pushes the examination of the very processes that tend the economy towards equilibrium to the periphery of scholarly attention. While, arguably, the initial formalizers of mathematical equilibrium understood it in the context of their training as invisible-hand theorizers, generations of scholars received their training and tenure by working exclusively in an institutionally sterile depiction of the world. This has produced a cadre of economic scholars who have failed to understand or appreciate the market as a process or the world in all of its complexity (Boettke 2012: 266). Mathematical formulations of the economy, unless a scholar is careful to contextualize his or her results, tend to assume away the complexity of the world, rather than focusing attention on the rich historical and institutional details of the world that warranted the most scholarly attention from Adam Smith. For example, while the first and second welfare theorem are held to prove that Adam Smith's theories were right, the strict conditions necessary for these mathematical articulations to hold necessitate corrective government action for those scholars who fail to appreciate the invisible-hand processes operative in the exchanges taking place in society.

It is important to note that the distinguishing factor between mainline and mainstream economists does not hinge on the use of mathematics. In fact, many of the economists we classify as contributors to the mainline of economic thought regularly employ mathematics. Rather, mathematics is a useful tool for economists, but can lead to an under appreciation of the invisible-hand processes of the world when the particularly human subject matter of economics is allowed to be marginalized or lost. In addition, the exclusive focus on mathematical representations of the economy may attract and encourage an engineering attitude among economists; precisely the "man of the system" attitude that Adam Smith warned about.

Alternatively, understanding economics as a science of mutually beneficial exchange opens the door for "invisible-hand explanations" of social phenomena (Nozick 1974: 18–22). Mainline economists consider economics primarily as a *social* science devoted to the analysis of the mutually advantageous interactions among individuals in the market. For mainline economists, "trade" and "agreement" (Buchanan 1964: 218) or "contract" (Williamson 2002: 172) take

center stage, not socially isolated utility maximization. This is not to say that there is no place for what Hayek (1937: 46) coined "the pure logic of choice" in mainline theorizing. Some human behavior is devoted to the self-interested allocation of scarce resources among alternative ends. However, mainline economists eschew the sole reliance on this thin model of human behavior, but regard humans as capable, but "complex, fallible learners" (Ostrom 1997: 9). For mainline economists the theory of choice is at the Lakatosian "hard core" of economic theory,[10] but they consider uniquely economic problems to arise when exchanges enter the picture—when Friday arrives on the island—and institutions become necessary to structure human interaction.

Economists who perceive economics primarily as the science of exchange therefore concern themselves with understanding the impact of alternative institutional arrangements on human behavior and with the evolution of institutions. Their investigations comprise the evolution of legal, political, and other social institutions as they make up the set of relationships that is referred to as "the market" as well as organizations that populate the marketplace and the political sphere. In Coase's (1978: 206–207) words, "what economists study is the working of the social institutions which bind together the economic system: firms, markets for goods and services, labour markets, capital markets, the banking system, international trade, and so on." Thereby the sources of change are not limited to exogenous factors, as change can also emerge from within the institutional structures. Buchanan (1964: 218) provides an example of the explicit consideration of institutions as contingent to social interaction,

> A market becomes competitive, and competitive rules come to be established as institutions emerge to place limits on individual behavior patterns. It is this becoming process, brought about by the continuous pressure of human behavior in exchange, that is the central part of our discipline, if we have one, not the dry-rot of postulated perfection.

North (1994: 213) points out that the mainstream approach misses the significant role of different institutional regimes that characterized the rise of the developed western world. In contrast, besides trying to understand the formation of institutions better, mainline economists

Table 1

Classification of Mainline and Mainstream Nobel Laureates

Mainline	Mainstream			
Becker	Akerlof	Kahneman	Mirrlees	Simon
Buchanan	Allais	Kantorovich	Modigliani	Solow
Coase	Arrow	Klein	Mundell	Spence
Friedman	Aumann	Koopmans	Myerson	Stiglitz
Hayek	Debreu	Krugman	Myrdal	Stone
Kydland	Engle	Kuznets	Nash	Tinbergen
Lucas	Fogel	Leontief	Ohlin	Tobin
North	Frisch	Lewis	Phelps	Vickrey
Ostrom	Granger	Markowitz	Samuelson	
Prescott	Haavelmo	Maskin	Scholes	
Schelling	Harsanyi	Meade	Schultz	
Smith	Heckman	McFadden	Selten	
Stigler	Hicks	Merton	Sen	
Williamson	Hurwicz	Miller	Sharpe	

devote efforts to a better understanding of the functioning of alternative institutional regimes.

We expect the impact of the work of mainline economists to depend less on its conformity with contemporary conventions than the impact of the work by mainstream economists. We therefore expect mainline economists who work on the advancement of the core propositions of the discipline to have a more significant long-run impact on the social science profession than mainstream economists. To measure this, we use citation data of the Nobel Laureates in economics to measure the relative impact of these scholars on the profession. We split Nobel Laureates into mainline and mainstream categories based upon their adherence to the above outlined distinctions in Table 1.

Citation Data

We measure a scholar's success by the number of annual Social Science Citation Index citation counts. We focus on Nobel Laureates

because at some point in time their work is considered to be of high scientific value independent of their mainline or mainstream orientation. Comparing Nobel Prize winners who belong in either one of the two groups allows us to control for scholarly quality.

We use the number of annual citations a scholar receives as a proxy for his impact on the social science profession. Vernon Smith (1974: 320) asserts that if a scholarly direction "leads to something insightful, it will command a respectable following." And followers generate references. The number of references to an economist's work is therefore one available measure of a scholar's impact. According to Landes and Posner (1976: 251) citations are an appropriate measure of a scholar's impact because "the normal function of the scholarly citation is . . . to give credit for prior original work, to refer the reader to corroborative or collateral findings by other scholars, and as a method of incorporating by reference, relevant theorems, proofs, etc."[11]

The SSCI has been published annually since 1966 (Diamond 1988). We collected the data at the Library of Congress, where annual citation counts are available from 1970 onwards for the non-electronic SSCI. The electronic SSCI only includes articles published after 1980. We collected citation count data from both databases up to the year 2007.

Both the non-electronic and the electronic SSCI databases suffer from several shortcomings. First, the SSCI does not distinguish between authors who share the same name. Therefore, it is difficult to determine the citation impact of an author who has a popular last name. This is especially true when the citing author does not include any middle initials (Klein and Chiang 2004: 137). Second, the SSCI database includes self-citations, skewing the record in favor of those who are the most self-promoting (Klein and Chiang 2004: 138). Third, the electronic Thompson ISI SSCI database gives a citation count to each author of a published work. Co-authored work counts as much as an individually crafted work (Klein and Chiang 2004). In contrast, the non-electronic database only reports the first listed author from an article, and not any co-authors (Alexander and Mabry 1994; Chung, Cox, and Okunade 1993; Diamond 1988; Medoff 1989). Cole and Cole (1973) argue that, empirically, this does not appear to have a substantial effect on the rankings. Since the vast majority of Noble Prize

winners' major works are solo endeavors (van Dalen 1999), we believe this will only have a minor effect on the enduring citation impact of a Nobel Prize laureate. Fourth, various fields have different citation practices, leading to double counting in some instances (Klein and Chiang 2004).[12] Fifth, while the non-electronic SSCI database counts citations to books, manuscripts, and journals, the electronic Thompson ISI database counts only citations in articles published in its 1,950 (as of November 12, 2009) selected journals (Klein and Chiang 2004: 136). Klein and Chiang (2004: 136) argue that the selection of included journals is ideologically biased against classical liberalism. Davis (1998) shows that journals that share content with other academic fields are underrepresented in the Thompson ISI database.

In addition to the above difficulties, we observed further problems. First, we did not attempt to include references to Nobel Prize winners who misspelled their names because the number of misspelled names in academic publications is likely to be minor. In determining the citation counts for Nobel Laureates who share names with other researchers in the social sciences, we judged according to the citing articles and the cited articles to the best of our knowledge to minimize miscounts. Second, the electronic SSCI is skewed in favor of more recent scholars because it only counts citations for articles included in the Thompson ISI database published after 1980. For instance, Friedrich A. Hayek who did not publish any articles in Thompson ISI approved journals after 1980 shows zero citations from 1980–2008 in the electronic database, yet he receives 7,645 since 1980 in the non-electronic database over those dates. Therefore, even though Hayek received citations to his earlier work, the electronic database did not register them.

Results

Individually, mainline Nobel Laureates were cited more often than mainstream Laureates. In terms of electronic and non-electronic SSCI citations mainline Nobel Prize winners are more successful in maintaining an enduring impact on the social science profession than mainstream Nobel Prize winners. Table 2 presents the core results. On

Table 2

Descriptive Statistics

Non-electronic SSCI 1970–2007					
	Mean	Min	Max	Obs	Description
Mainline annual citations	287	0	1370	527	Annual citations of a mainline Nobel Prize winning economist
Mainstream annual citations	159	0	1643	1877	Annual citations of a mainstream Nobel Prize winning economist
Electronic SSCI 1980–2007					
	Mean	Min	Max	Obs	Description
Mainline annual citations	66	0	595	392	Annual citations of a mainline Nobel Prize winning economist
Mainstream annual citations	52	0	1178	1400	Annual citations of a mainstream Nobel Prize winning economist
General information					
	Mean	Min	Max	Obs	Description
Mainline year Nobel awarded	1994	1974	2009	14	Year in which the Nobel Prize was awarded to a mainline economist
Mainstream year Nobel awarded	1989	1969	2008	50	Year in which the Nobel Prize was awarded to a mainstream economist
Mainline shared Nobel	0.57	0	1	14	Dummy that takes on the value 1 if a mainline economist shared the Nobel Prize

Table 2 *Continued*

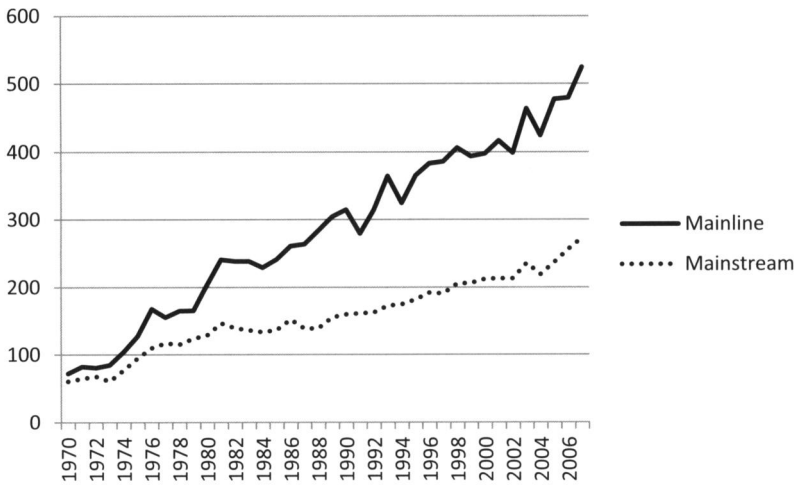
General information					
	Mean	Min	Max	Obs	Description
Mainstream shared Nobel	0.68	0	1	50	Dummy that takes on the value 1 if a mainstream economist shared the Nobel Prize
Mainline alphabetical rank	12	2	22	14	Number of the family name's first letter of a mainline economist in the Latin alphabet
Mainstream alphabetical rank	12.47	1	22	50	Number of the family name's first letter of a mainstream economist in the Latin alphabet

average, each mainline Nobel Laureate received 287 citations annually in the non-electronic SSCI over the period from 1970 to 2007. Over the same period, each mainstream Nobel Laureate received on average 159 citations per annum. Figure 1 compares the average annual non-electronic SSCI citations of mainline and mainstream Nobel Laureates from 1970 to 2007. Mainline economists also received more average annual citations in the electronic SSCI over the period from 1980 to 2007, shown in Figure 2. Mainline economists were on average cited 66 times, whereas mainstream economists were on average cited 52 times per year.

The non-electronic SSCI covers a broader range of outlets than the electronic SSCI does. It is therefore not surprising that both mainline and mainstream economists received more citations in the non-electronic than in the electronic SSCI. However, although on average mainline economists received more citations than mainstream economists in the non-electronic and the electronic SSCI, the relative gap is larger in the case of the non-electronic SSCI.[13] Per person, mainline economists received about 80 percent more average annual citations according to the non-electronic SSCI, whereas they only received

Figure 1

Mainline vs. Mainstream:
Nobel Laureates' Average Annual Non-Electronic SSCI Citations
1970–2007

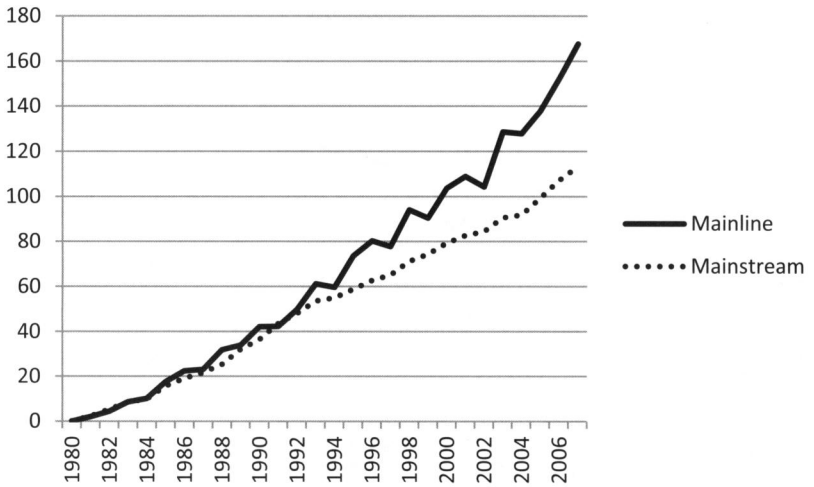


about 27 percent more annual citations according to the electronic SSCI. The results suggest that the impact of mainline Nobel Laureates is broader among the social sciences than the impact of mainstream Laureates.[14] Not only does the non-electronic SSCI cover references to books, whereas the electronic SSCI only covers references to journal articles, but the non-electronic SSCI also takes into account journals from a broader array of the social sciences. Although the effects are not separable, mainline economists seem to have received more references to their books and/or have been referred to by scholars from their own discipline of economics or bordering disciplines who publish in outlets that are not accounted for by the electronic SSCI.

We take a closer look at the citations of Nobel Prize winning economists and separate financial economists as well as economists whose major contributions lie in the field of econometrics. We illustrate the results in Figures 3 and 4. Figure 3 depicts the development of average annual non-electronic citations of the four identified groups

Figure 2

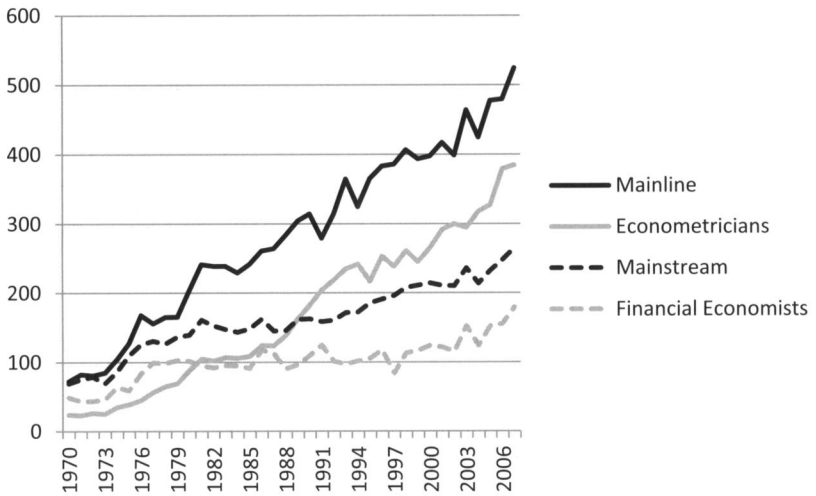
Mainline vs. Mainstream:
Nobel Laureates' Average Annual Electronic SSCI Citations
1980–2007



of economists—mainline, mainstream, financial economists—and econometricians. An individual member of the group of mainline economists over the period from 1970 to 2007 on average in each year received more citations than a member of any of the other three groups did. Figure 4 tells a different story. In Figure 4, the average annual electronic SSCI citations are depicted for the four groups. From the late 1980s onwards a member of the econometrician group on average received more citations than a member of any other group. Over the period from 1980 to 2007, mainline economists come in second. From this exhibition, we can conclude that the smaller gap between mainline and mainstream economists in the case of the electronic SSCI citations is driven by the members of the group of mainstream economists who received the Nobel Prize for their contributions in econometrics. It is not surprising that the econometricians' share of the total electronic SSCI citations is larger than their share of the total non-electronic SSCI citations. Econometricians are less likely to publish their findings in book form than other economists

Figure 3

Alternative Categorization
Nobel Laureates' Average Annual Non-Electronic SSCI Citations
1970–2007



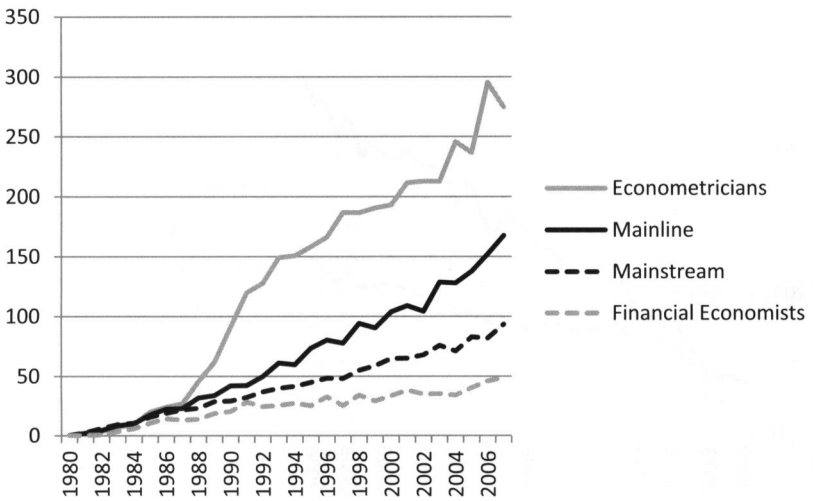
and members of other social science disciplines are less likely to refer to their work because in their work they rely less on quantitative empirical methods than economists.

According to the Nobel Prize rules, a Nobel Price may be granted to up to three persons. The Nobel Prize Committee states that shared Prizes are just as honorable as a single prize. Shared prizes are awarded "when the contributions are the results of actual cooperative work," *or* when the contributors are so closely related that a sharing is important to demonstrate the connection and to be "'fair' to contributors" (Lindbeck 2007). Yet, historically, the profession and the recipients regard single Prizes to be more prestigious than shared Prizes. Table 2 shows that the percentage of mainline shared Nobel prizes, 57, was very similar to the number of shared prizes for mainstream economists, 68, suggesting that our results are not driven by these factors.

As mentioned in the third section of this article, the non-electronic SSCI only reports the first-mentioned author of an article. It is,

Figure 4

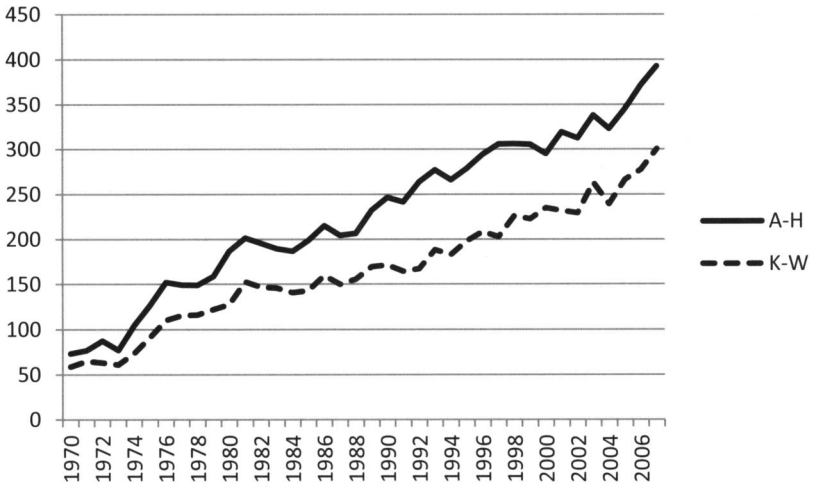
Alternative Categorization
Nobel Laureates' Average Annual Electronic SSCI Citations
1980–2007



however, not the case that the large number of citations going to mainline economists in the non-electronic SSCI relative to the electronic SSCI, which credits all co-authors for an article, is owed to relatively many mainline economists with family names starting with letters that appear early in the alphabet. Figure 5 shows that over the period from 1970 to 2007 the average number of annual non-electronic SSCI citations was larger for a member of the group whose family names started with a letter between A and H than for a member of the remaining group of Laureates. However, there is no systematic difference between mainline and mainstream economists with respect to their family names' first letter's position in the alphabet. We attached numbers from 1 to 24 to letters from A to W and built the average for mainline and mainstream economists. Table 2 shows that the average is 12 for mainline economists and 12.42 for mainstream economists. This difference most likely did not cause the observed difference in the citation pattern between the two groups.

Figure 5

Nobel Laureates' Average Annual Non-Electronic SSCI Citations
Names starting with A-H vs. names starting with K-W
1970–2007



Conclusion

The expanding field of economics into many subfields may be considered a positive development for a maturing science. Yet, the close connection between economics and politics presents a temptation to alter the allocation of scholarly efforts to fashionable areas that tend to bring fame and prominence over scholarly pursuits that bring less personal accolades but advance the core propositions of the discipline.

We find that those Nobel Laureates who allocated their scholarly activities to advancing our understanding of the core ideas of the discipline, first advanced by Adam Smith and David Hume, are the scholars who have maintained the largest enduring impact on the social science profession as measured by the annual number of citations received.

Notes

1. Hayek (1948: 11) argues that it is a misconception to ascribe to Adam Smith and mainline scholars who have built upon his work the assumption that economic man is perfectly rational. In fact, it is quite the opposite, as Smith ([1759] 1976: 184; [1776] 1976: 456) stresses man in his very nature is self-interested, lazy, wasteful, and short-sighted. Hume ([1742] 1987: Part I, Essay VI) goes so far as to assume all men are knaves. As Hayek (1948: 11) describes it, ". . .the main point about which there can be little doubt is that [Adam] Smith's chief concern was not so much with what man might occasionally achieve when he was at his best but that he should have as little opportunity as possible to do harm when he was at his worst. It would scarcely be too much to claim that the main merit of the individualism which he and his contemporaries advocated is that is a system under which bad men can do least harm. It is a social system which does not depend for its functioning on our finding good men for running it, or on all men becoming better than they now are, but which makes use of men in all their given variety and complexity, sometimes good and sometimes bad, sometimes intelligent and more often stupid."

2. The focus of 20th-century mainstream economists on choice rather than exchange was accompanied by the convention to follow the examples set by Samuelson with respect to the acceptable form of theorizing—formal mathematics—and by Friedman with respect to the testing of economic hypotheses by using statistical techniques, instead of basing economic methodology on a philosophy of science (Boettke 2010).

3. Throughout the article, winners of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel are referred to simply as "Nobel Laureates."

4. The Social Science Citation Index is a citation indexing service product of Thomas ISI. We used the annual paper editions from 1970–2007 in the Library of Congress.

5. Appendix 1 uses our data set to compare the relative contributions of Nobel Prize Laureates who were at institutions in the U.S. vs. foreign institutions.

6. Appendix 2 uses our data set to compare the relative contributions of extreme conceptual, moderate conceptual, and experimental Nobel Laureates according to Weinberg and Galenson's (2005) categorization.

7. Appendix 3 uses our data set to compare the relative contributions of Lindbeck's (1985) categories.

8. Appendix 4 uses our data set to compare the relative contributions of Karier's (2010) categories.

9. Kirzner (1965) argues that it was not Robbins' intention to place resource allocation decisions at the core of economics. Robbins (1932: 17–19) argues that essentially economics is not just the study of nonsocial behavior.

Robbins posits that "economic analysis has most utility in the exchange economy. It is unnecessary in the isolated economy."

10. For a general overview of Lakatos' work and its relation to economics, see Rizzo (1982).

11. For further support of the use of citations to measure a scholar's influence on the profession, see Downing and Stafford (1981: 220), who note that "while one might argue that citations from publications would also be biased, the bias is that of the profession and its journal editors and referees rather than of the investigator." Arguments in favor of citations as a measure of scholarly influence can also be found in Cole and Cole (1973), Laband and Sophocleus (1985), Davis and Papanek (1984), and Stigler, Stigler, and Friedland (1995). For a critical voice, see, for instance, Klein and Chiang (2004) and Medoff (1989), who argue that citations might be critical of the referenced work, either correcting errors or doubting the accuracy of the work, and therefore should not be included as positive citations. On the other hand, citation counts are possibly biased against important contribution that are incorporated into the profession and for which the originators of the idea are no longer cited (Stigler, Stigler, and Friedland 1995; Anderson, Levy, and Tollison 1989).

12. This is true of law reviews, meaning that economists that are cited heavily in law review journals may have inflated citations over economists cited in economic journals. Like many of the problems listed here, when dealing with a hand-counted citation database, or even the electronic database, attempting to adjust for citations in law reviews would require extensive efforts. Since the SSCI citations counts are the accepted measure of a scholar's impact in the profession, we merely adopt the standard practice for our analysis.

13. Appendix 5 provides the total non-electronic citations for the Nobel Laureates; Appendix 6 does the same for the electronic citations.

14. The graph presented in Appendix 7 suggests that the relative impact of mainline Nobel Laureates has been growing over the last decades. The share of annual total non-electronic and electronic citations received by mainline Nobel Laureates has been growing from roughly 25 percent to 35 percent since 1970 and from roughly 20 percent to 30 percent since 1981, respectively. Using OLS to regress the share of citations for mainline Laureates on the time trend suggests that the time trend is statistically significant at the 1 percent percent level for electronic and non-electronic citations. The same holds true when the share of mainline citations is transformed into logit form to account for the boundedness between 0 and 1 of the fraction. The regression results are not reported here. They can be provided by the authors upon request.

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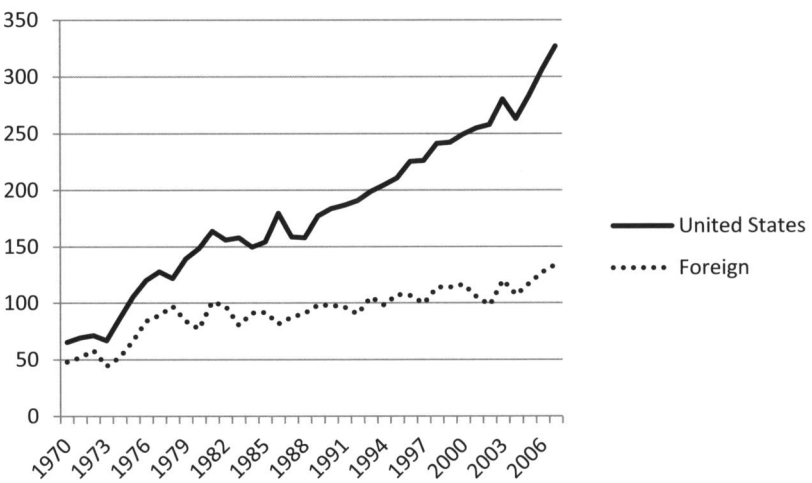
Appendix 1:
Citation Impact of Nobel Laureates in Economics at United States Institutions vs. Foreign Institutions (Non-Electronic SSCI Database)

United States				Foreign
Akerlof	Kahneman	Modigliani	Smith	Allais
Arrow	Klein	Mundell	Solow	Aumann
Becker	Koopmans	Myerson	Spence	Frisch
Buchanan	Krugman	Nash	Stigler	Haavelmo
Coase	Kuznets	North	Stiglitz	Hicks
Debreu	Kydland	Ostrom	Tobin	Kantorovich
Engle	Leontief	Phelps	Vickrey	Meade
Fogel	Lewis	Prescott	Williamson	Mirrlees
Friedman	Lucas	Samuelson		Myrdal
Granger	Markowitz	Schelling		Ohlin
Harsanyi	Maskin	Scholes		Selten
Hayek	McFadden	Schultz		Sen
Heckman	Merton	Sharpe		Stone
Hurwicz	Miller	Simon		Tinbergen

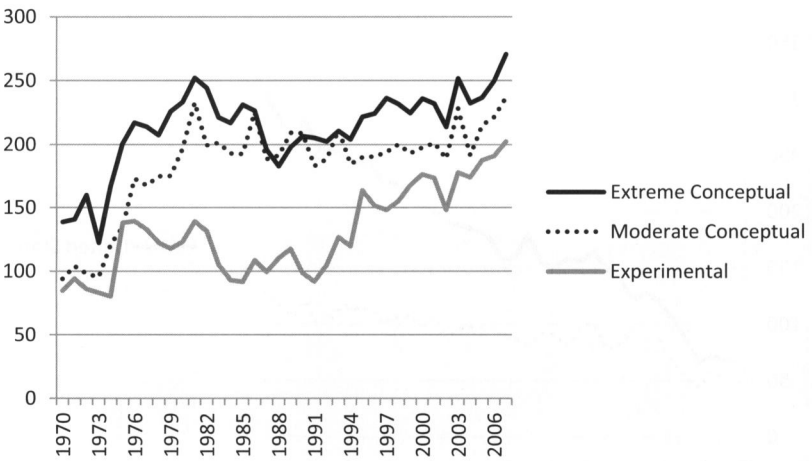
Note: We classify an economist as working in the United States if, at the time of being awarded the Nobel Prize, he or she was working at an institution in the United States.



Appendix 2:
Weinberg and Galenson's Categorization
(Non-Electronic SSCI Database)

Extreme Conceptual	Moderate Conceptual		Experimental
Arrow	Buchanan	Miller	Fogel
Debreu	Coase	Modigliani	Kuznets
Frisch	Friedman	Ohlin	Myrdal
Haavelmo	Hayek	Simon	North
Harsanyi	Klein	Stigler	Schultz
Hicks	Leontief	Stone	
Samuelson	Lewis	Tinbergen	
Solow	Markowitz	Tobin	
	Meade	Vickrey	

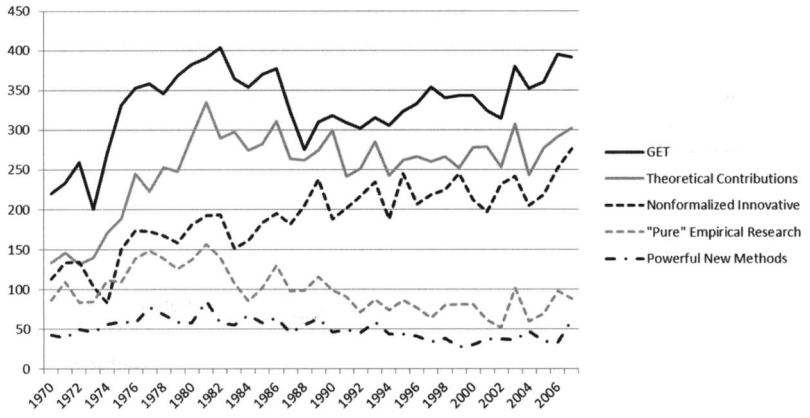
Note: We use our non-electronic SSCI database to compare the relative citation impact of Galenson and Weinberg's (2005) classification of economists into three groups, extreme conceptual, moderate conceptual, and experimental. They classify economists who work inductively as experimental economists and those who work deductively as conceptual economists. Their classification of Nobel Prize winning economists is reproduced below. The chart below shows that inductive economists, on average, have had less of a citation impact on the profession than deductive economists.



Appendix 3:
Lindbeck's Categorization (Non-Electronic SSCI Database)

Theoretical Contributions Concerning Specific Aspects or Sectors of the Economy	Development and Application of Powerful New Methods of Economic Analysis
Friedman	Frisch
Lewis	Kantorovich
Meade	Koopmans
Ohlin	Leontief
Schultz	Stone
Simon	Tinbergen
Stigler	
Tobin	
Non-Formalized Innovative Thinking	**More Nearly "Pure" Empirical Research**
Hayek	Klein
Myrdal	Kuznets
General Economic Theory	
Arrow	
Debreu	
Hicks	
Samuelson	

Note: We use the non-electronic SSCI database to examine the relative citation impact of Lindbeck's (1985) classification of Nobel Prize winning economists into five groups, those who made contributions to general economic theory, theoretical contributions concerning specific aspects or sectors of the economy, powerful new methods of economic analysis, pure empirical research, and non-formalized innovative thinking. The chart below shows that those economists that Lindbeck classifies as working in general economic theory, theoretical contributions, and non-formalized innovative thinking have a greater citation impact than those working in pure empirical methods or powerful new methods of economic analysis.



Appendix 4:
Karier's Categorization (Non-Electronic SSCI Database)

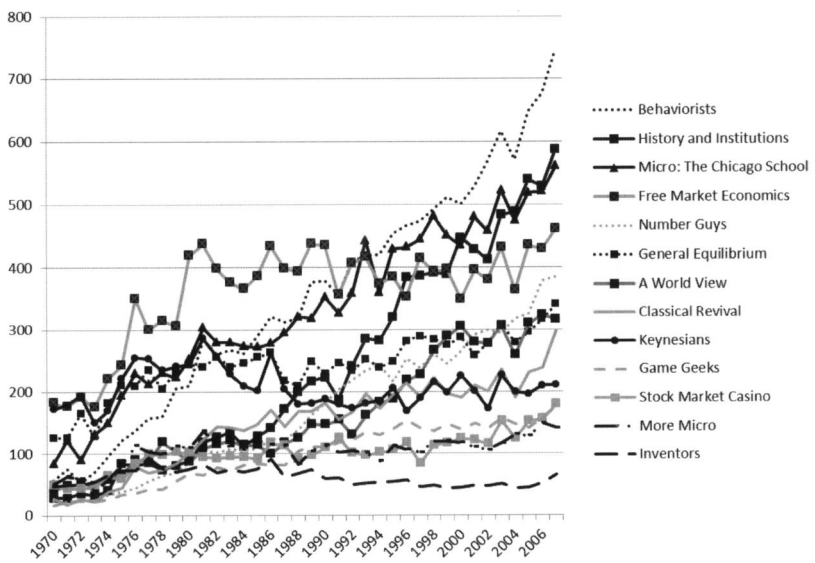
Classical Revival	History and Institutions	Micro: The Chicago School	Free Market Economics
Kydland	Fogel	Becker	Buchanan
Lucas	North	Coase	Friedman
Phelps	Ostrom	Schultz	Hayek
Prescott	Williamson	Stigler	
More Micro	**A World View**	**Game Geeks**	**Number Guys**
Hicks	Krugman	Aumann	Engle
Mirrlees	Lewis	Harsanyi	Frisch
Smith	Meade	Hurwicz	Granger
Vickrey	Mundell	Maskin	Haavelmo
	Ohlin	Myerson	Heckman
	Sen	Nash	McFadden
		Schelling	Tinbergen
		Selten	

Appendix 4 *Continued*

Behaviorists	Inventors	Stock Market Casino	Keynesians
Kahneman	Kantorovich	Markowitz	Klein
Simon	Koopmans	Merton	Modigliani
Spence	Kuznets	Miller	Myrdal
Stiglitz	Leontief	Scholes	Samuelson
	Stone	Sharpe	Solow
			Tobin

General Equilibrium
Allais
Arrow
Debreu

Note: We use our non-electronic SSCI database of Nobel Prize winners to compare the citation impact of the 13 groups that Karier (2010) split economists into: behaviorists, history and institutions, micro: the Chicago School, free market economics, number guys, general equilibrium, a world view, classical revival, Keynesians, game geeks, stock market casino, more micro, and inventors.



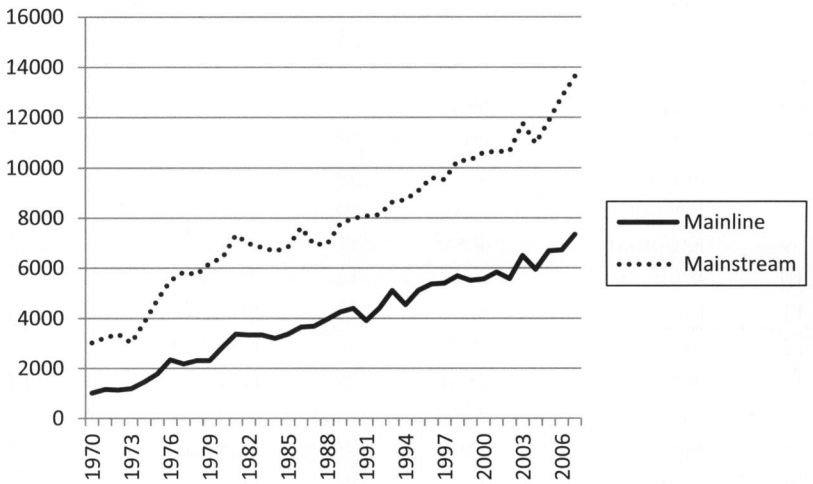
Appendix 5:
Nobel Laureates' Total Non-Electronic SSCI Citations
1970–2007

1	Becker	24148	33	Sharpe	4519
2	Kahneman	23865	34	Debreu	4468
3	Simon	23198	35	Nash	4018
4	Friedman	22649	36	Aumann	3911
5	Arrow	21512	37	Phelps	3868
6	Williamson	20675	38	Markowitz	3466
7	Samuelson	17221	39	Leontief	3422
8	Sen	16575	40	Schultz	3412
9	Lucas	14101	41	Miller	3307
10	Heckman	13421	42	Mundell	3042
11	Stigler	13205	43	Lewis	3039
12	Krugman	11070	44	Myerson	3025
13	Engle	10993	45	Tinbergen	2887
14	Stiglitz	10642	46	Kydland	2788
15	Buchanan	10003	47	Klein	2762
16	Coase	9563	48	Fogel	2724
17	Granger	8848	49	Koopmans	2704
18	Hayek	8382	50	Selten	2636
19	Tobin	7954	51	Spence	2619
20	North	7790	52	Meade	2560
21	Hicks	7183	53	Maskin	2368
22	Solow	7105	54	Vickrey	2123
23	Schelling	6852	55	Mirrlees	1967
24	Merton	6659	56	Hurwicz	1760
25	McFadden	6623	57	Prescott	1729
26	Myrdal	6153	58	Frisch	1597
27	Akerlof	6026	59	Allais	1592
28	Modigliani	5953	60	Scholes	1377
29	Harsanyi	5014	61	Ohlin	927
30	Ostrom	4914	62	Haavelmo	581
31	Smith	4690	63	Stone	414
32	Kuznets	4682	64	Kantorovich	380

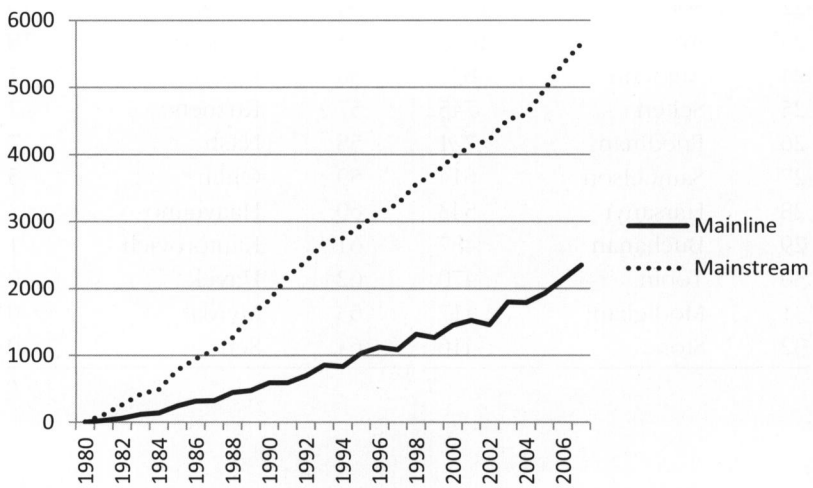
Appendix 6:
Nobel Laureates' Total Electronic SSCI Citations
1980–2007

1	Kahneman	12570	33	Fogel	412
2	Engle	10731	34	Spence	380
3	Granger	7725	35	Schelling	357
4	Stiglitz	7470	36	Stigler	329
5	Lucas	5849	37	Scholes	312
6	Heckman	4867	38	Coase	283
7	Simon	4335	39	Klein	250
8	Becker	4119	40	Markowitz	197
9	Krugman	4099	41	Sharpe	145
10	Williamson	3311	42	Allais	139
11	Prescott	3202	43	Phelps	124
12	Maskin	2979	44	Leontief	115
13	Smith	2581	45	Lewis	112
14	Akerlof	2417	46	Mirrlees	100
15	Myerson	2269	47	Debreu	91
16	Ostrom	2151	48	Hurwicz	64
17	McFadden	1876	49	Vickrey	63
18	Merton	1601	50	Tinbergen	61
19	Kydland	1423	51	Schultz	51
20	North	1161	52	Meade	36
21	Miller	1072	53	Mundell	27
22	Solow	1025	54	Hicks	19
23	Arrow	1009	55	Koopmans	18
24	Aumann	837	56	Frisch	7
25	Selten	745	57	Kuznets	7
26	Friedman	721	58	Nash	7
27	Samuelson	614	59	Ohlin	5
28	Harsanyi	543	60	Haavelmo	3
29	Buchanan	487	61	Kantorovich	1
30	Tobin	470	62	Hayek	0
31	Modigliani	417	63	Myrdal	0
32	Stone	416	64	Sen	0

Appendix 7:
Mainline vs. Mainstream
Nobel Laureates' Total Annual Non-Electronic SSCI Citations
1970–2007



Appendix 8:
Mainline vs. Mainstream
Nobel Laureates' Total Annual Electronic SSCI Citations
1980–2007



Appendix 9:
Mainline vs. Mainstream
Mainline Share of Total Electronic and Non-Electronic Citations
1970–2007