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## **Measuring Coase's Influence**

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### **I. INTRODUCTION**

Citations measure a scholar's influence. That Ronald Coase is among the most influential and best-cited economists in the past fifty years is not debatable.<sup>1</sup> Two of his articles --"The Nature of the Firm", published in 1937, and "The Problem of Social Cost", published in 1960-- are among the most-cited articles in both economics and law and continue to be widely cited. And the "Coase theorem", first set out in his paper on the Federal Communications Commission<sup>2</sup> and later elaborated in "The Problem of Social Cost", has become so much a part of the standard vocabulary of both economics and law that the theorem is often discussed without an accompanying citation. As Coase himself noted:

"Of course, once these ideas in my article (to the extent that they come to be seen as correct) become part and parcel of legal thought, it will no longer be thought necessary to cite my article. And in consequence, at the stage when the influence of my article may be said to be most profound, the

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<sup>1</sup> See Arthur M. Diamond, "Most-Cited Economics Papers and Current Research Fronts." 12 *Current Contents* 2 (1989), pp. 3-8; David J. Hoaas and Lauren J. Madigan, "A Citation Analysis of Economists in Principles of Economics Textbooks." 36 *Social Science Journal* 3 (1999), pp. 525-532; Ronald H. Coase, "The Problem of Social Cost: The Citations". 71 *Chicago-Kent Law Review* (1995-1996), pp. 809-812.

<sup>2</sup> See Ronald Coase, "The Federal Communications Commission," 2 *J.Law & Econ.* 1 (1959)

study of citations will cease to reveal it." (71 Chicago-Kent Law Review 809 (1996))

This paper considers Coase's legacy using citation analysis. Our goal, however, is not simply to confirm that Coase is highly cited, but to examine other aspects of Coase's influence that can be revealed by citation analysis. For example, we look at the durability of his work; the highly concentrated nature of his influence (as evidenced by the fact that his two best known articles account for more than 70 percent of his citations); his influence in economics as opposed to law; and how Coase has fared in economics textbooks and judicial opinions. We also compare Coase to two groups of scholars: other Nobel Prize winners in economics, and highly cited law and economics scholars.

The source for most of our analysis is data from Web of Science, the online version of the Social Science Citation Index (SSCI)<sup>3</sup>. The SSCI tabulates citation data from articles in over 1,950 journals in 50 social science disciplines plus "relevant items" in an additional 3300 scientific and technical journals.<sup>4</sup> Over time, the

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<sup>3</sup> Web of Science actually includes all of the following databases: the SSCI, the Science Citation Index (SCI), the Arts and Humanities Citation Index (AHCI), and some chemistry citation indices which were excluded from our searches. We did not exclude the SCI or AHCI from our searches because of the potential for Coase and others to be cited in scientific or humanities publications. However, because the largest and primary database searched by Web of Science is the SSCI, we will refer to this aggregate database as the SSCI throughout. For a detailed description of the coverage and limits of each of these sub-databases, see the Appendix.

<sup>4</sup> The SSCI counts citations in two ways: computerized counts calculated by Web of Science, and manual counts defined by the researcher. The computerized counts tend to provide lower values than manual counts because they are more selective in counting citations. Additionally, the SSCI has two ways of defining what constitutes a citation to a work: in some circumstances it simply counts citing articles, while in others it counts the total number of citations to a work, counting multiple citations appearing in the same article as distinct citations. Because the SSCI's primary coverage is limited to citations, from 1956 to the present, in post-1956 articles to other post-1956 articles, calculating citations

SSCI has expanded the number of covered journals. However, this does not create an upward bias over time in citations because when the SSCI adds a journal it then adds all back issues of that journal.

## II. CITATION ANALYSIS

### *A. Coase's Citations*

The most striking feature of Table 1 is that citations to Coase's works have continued to grow at a substantial rate in each successive decade even though Coase has published very few works in the past 15 years. Overall, Coase received 468 citations in the 1935–1979 period, 949 citations in the 1979–1988 period, 2631 in the 1989–1998 period and 3688 in the 1999–2008 period—an annual growth rate of 6.8 percent from 1979 to 2008.<sup>5</sup> Equally striking, there is no sign that this trend is slowing down or turning negative. For example, citations to Coase in the last five years (we exclude 2009 because the data for the year are incomplete) are greater than in any other five year period—for example, 389 cites per year in the 2004–2008 period; 349 per year in the 1999–2003

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to pre-1956 articles or citations to books requires a different method than calculating citations to post-1956 articles. The Appendix includes a detailed discussion of these issues, as well as explaining the circumstances under which the SSCI follows a particular method. Note that, regardless of the search method employed, the SSCI only surveys journals and not books, so citations contained in a book are not counted, but citations to a book in a covered journal will be counted.

<sup>5</sup> We have incomplete data for 2009 so we have excluded this year from much of the analysis. We also note that citation counts before 1956 are probably unreliable because the SSCI began counting citations for all then-covered journals in 1956. The citation data available before 1956 seems to come from back-issues of journals that the SSCI has added to its coverage. Beyond these select journals, however, no systematic effort has been made to completely cover citations before 1956.

period; 316 per year in the in the 1994–1998 period; and 210 per year in the 1989–1993 period.

**Table 1**

It is instructive to compare Coase's citations with a few other Nobel Prize winners in economics. If we just look at citations to articles, we find that in the 1971 to 1985 period, Coase accumulated 942 citations, Samuelson 3181 citations, Stigler 2116 citations, Becker 1883 citations and Arrow 1831 citations. By 2009, however, the positions of Coase, Samuelson, Stigler, Becker and Arrow have reversed. In the period 1986–2008, Becker received 10,097 citations, Coase 6644, Stigler 5970, Samuelson 5472 and Arrow 5629<sup>6</sup>. It is not surprising that Becker has the greatest number of citations in the 1986–2008 period because he has produced and continues to produce a substantial number of new and highly cited articles since 1985. What may be surprising is the sharp increase in citations to Coase's works (primarily to his nature of the firm and social cost articles) so that his citations are greater than Samuelson, Stigler and Arrow in the 1986–2008 period. We add an important caveat. We derived the number of citations to Coase and the other Nobel Prize winners from a computerized count that tends to yield fewer citations than the manual count. We discuss the difference between computerized and manual counts in the appendix.

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<sup>6</sup> These figures exclude citations to books including collections of previously published articles such as Coase's *The Firm, the Market and the Law*. This exclusion would probably have had a bigger negative impact on Samuelson, Stigler, Becker and Arrow than Coase's citations. None of Coase's books received many citations except for *"The Firm, The Market and Law"* (less than 600 citations). On the other hand, Samuelson's *"Foundations"* and his introductory economic principles text, Stigler's *"The Theory of Price"* and Arrows *"Social Choice and Individual Values"* are all well cited. Becker's books on discrimination and human capital are also heavily cited..

At the outset, it is worth noting a point Coase mentions in the above quotation. Because Coase's ideas have become so much a part of the economics and law/economics literature, it is no longer necessary to cite his work when discussing his ideas. However, unlike other innovators in economics whose ideas continue to influence the existing literature but whose names are rarely mentioned, Coase's central contribution will always be known as "The Coase Theorem." George Stigler refers to this phenomenon as "a substantial illusion in the disappearance of famous ancestors..."<sup>7</sup> and illustrates it with "Marshallian concepts as 'the short run, elasticity of demand, quasi-rents, and external and internal economies,'" Friedman's concepts of permanent and transitory incomes, and Muth's rational expectations."

As a rough test of this phenomenon in the field of law and economics, we surveyed the author and subject indices in Posner's *Economic Analysis of Law* (6<sup>th</sup> Edition). The author index lists more than 750 names. Only about 40 names (including Coase) have references that cover two or more lines, which partly reflects Posner's judgment that these authors have had a greater impact in law and economics. When we turn to the subject index, there are roughly 2000 entries but only 12 names. That is, only 12 people in the index are considered to be Subjects.<sup>8</sup> Here, names are like trademarks. The name, attached to another word, becomes the most economical way to describe the idea that underlies the author's contribution. Posner includes the following names in the

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<sup>7</sup> See p.11 of G.J. Stigler and C. Friedland, *History of Political Economy* 1 (1979).

<sup>8</sup> Of these 12 people, however, only 9 appear in both the Author and Subject indices. That is, only 9 people are considered to be important both as Authors and Subjects. These people are: Areeda, Coase, Hand, Hicks, Keeton, Miller, Modigliani, O'Connell, and Turner. So, of 750 authors included in the Author Index, only 9 (including Coase) are also considered subjects. It is interesting that Giffen, Kaldor, and Pareto are considered Subjects, but not Authors. Perhaps, as Coase wrote, their ideas have become so central to law and economics that, while their ideas remain, they themselves have faded into the background.

subject index: the Coase Theorem; Giffen good; Hand Formula; Kaldor-Hicks efficiency; Keeton-O'Connell plan (a no fault insurance plan); Modigliani-Miller thesis; Pareto concept; and the Areeda-Turner test (a test for predatory pricing).<sup>9</sup>

### *B. Durability and Obsolescence*

Figure 1 depicts annual SSCI citations to Coase works (both articles and books) from 1960 to 2009 and separate data for the social cost and nature of the firm articles. As we noted earlier, there appears to be no slowdown in Coase's citations (excluding the partial year 2009). Figure 1 also suggests a "Nobel Prize" effect. Coase was awarded the Nobel Prize in 1991 and his citations nearly doubled in the next two years.

### **Figure 1**

We can examine the time path of Coase's citations more rigorously using regression analysis. We estimated the following equation for the period 1960–2008:

$$(1) \quad \ln \text{Cites} = b_0 + b_1T + b_2T^2 + b_3N + u$$

where  $\ln \text{Cites}$  denotes the logarithm of citations,  $T$  equals time (1960 =1, 1961=2 and so forth),  $T^2$  equals time-squared,  $N$  is a Nobel Prize dummy variable (=1 for the years after the Nobel Prize was awarded and 0 otherwise) and  $u$  is the residual.

Equation (1) borrows from the human capital literature which relates the log of earnings to experience, experience-squared and other variables. The theory predicts that earnings will increase with experience at a decreasing rate (i.e., the coefficient on  $T$  is

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<sup>9</sup> We have not yet completed a survey of author/subject indices of leading economic principles books to check if Coase shows up in both indices.

positive and on  $T^2$  is negative) but eventually, the negative effects of depreciation tend to dominate so earnings begin to fall. Citations to a scholars work should take a similar time path. As a scholar adds to his stock of publications (as proxied by  $T$ ), citations should increase. As his scholarly output begins to decline (either because of age or death) and his earlier works depreciate, his annual citations are likely to start falling off. In terms of equation (1), the negative coefficient on  $T^2$  will begin to dominate the positive coefficient on  $T$ .<sup>10</sup>

Table 2 presents the regression results for Coase's citations (and a sample of other economists and law professors which we discuss shortly). All variables in the Coase regression are significant ( $T$  and  $T^2$  at the .001 level and  $N$  at the .01 level).<sup>11</sup> The coefficients on  $T$  and  $T^2$  indicate that Coase's citations increased initially at about 22 percent per year and that rate has been declining by about 1 percent every 4 years. The regression predicts that citations to Coase would peak in 2003 (see the 'Fitted Values' trend line in Figure 1, which plots the predicted value of citations from the regression) and then begin declining. Contrary to the predictions of the regression model, however, Figure 1 shows that the actual values of Coase's citations continue to increase through 2008. Put differently, although the rate of increase of Coase's citations is declining in recent years, we find no evidence of an actual decline.<sup>12</sup>

Turning to the Nobel Prize variable in the regression, we find a positive and highly significant effect on citations equivalent to

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<sup>10</sup> For a detailed discussion of the application of the human capital model to citations see W. Landes & R.A. Posner, *The Influence of Economics on Law: A Quantitative Study*, J. Law & Econ. (April 1993)

<sup>11</sup> We estimated the regression using robust standard errors.

<sup>12</sup> We note an important qualification, although one not likely to apply to Coase. If a scholar continues to produce new works, the older works may depreciate but total citations may continue to rise if citations to the newer works more than offset the depreciation of older works.

about a 30 percent increase in the year following the award of the prize. This jump in citations is also observable in Figure 1 where the vertical line indicates the Nobel Prize year.<sup>13</sup>

## Table 2

### *C. Comparing Coase to Other Nobel Prize Winners*

Figure 2 presents data on annual citations —to articles only— for Coase plus four Nobel Prize winners—three who were awarded the prize before Coase (Samuelson in 1970, Arrow in 1972 and Stigler in 1982) and one (Becker in 1992) who was awarded the prize the year after Coase.<sup>14</sup> Becker is the clear citation leader among the group, although it is probably not a fair comparison because Becker has continued to write a large number of articles in recent years, that add to his citation count, whereas Coase, Samuelson and Stigler (who died in 1991) have produced few articles in the last 15 years or so. (Arrow is somewhere in between since he continues to write and publish, but his publications per year have declined much more steeply in recent years than is the case for Becker, who continues to publish as much as ever.) The Becker effect is readily observable in Figure 2 where the gap between Becker and the other economists has widened considerably in the last years. Although citations to all the economists in Figure 2 have increased, Coase's has increased more rapidly

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<sup>13</sup> A Nobel Prize effect on citations has been found in several citation studies. See

<sup>14</sup> Figure 2 covers citations to articles only. We plan to revise Figure 2 to include citations to books. Note that Figure 1 shows citations to books and articles and there is virtually no difference for Coase when books are included.



than the other economists (excluding Becker) since the mid-1970s.<sup>15</sup>

## Figure 2

Turning to the regressions results in Table 2 for the other economists, the coefficients on  $T$  and  $T^2$  are statistically significant (except for Samuelson and Arrow for  $T^2$ )<sup>16</sup> and in the predicted direction. The other findings include the following.

1. The model predicts a peak citation year of 2005 for Coase, 2002 for Becker and Samuelson, 2004 for Stigler and beyond 2009 for Arrow; yet, the actual number of citations are greater in 2008 for all economists than in any prior year.<sup>17</sup> Stigler had two peaks. The first occurred in 1990, the year before his death. Mysteriously, his citations fell by 16 percent from 1990 to 1992 (see the regression coefficient on this variable in Table 2). Then his citations began increasing again and by 2002 they were slightly greater than they had been in 1991.

2. The rate of increase in citations (the regression coefficient on  $T$ ) is significantly lower for Arrow and Samuelson than for Becker, Coase and Stigler. One possible explanation is that Arrow and Samuelson's work focused on more traditional and highly technical aspects of economic theory. This led to more immediate acceptance of their work and a substantial number of citations early in their careers. This was followed by a continued growth in citations that was roughly in step with the overall growth in the economics profession. In contrast, the impact on the profession of

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<sup>15</sup> The latter is partially explained by the continued scholarly production of Arrow which operates to offset the depreciation of earlier works.

<sup>16</sup> Note, however, that  $T$  and  $T^2$  are jointly significant for both Arrow and Samuelson.

<sup>17</sup> As noted earlier, the increase over time in citations is not the result of greater journal coverage because when the SSCI adds a journal to its database, it adds all previous issues of that journal.

Becker, Coase and even Stigler was less immediate. Stigler reinvented the largely dormant field of industrial organization, and his best known paper on the economics of information was not published until he was 50 years old; Becker applied economics to a wide variety of subjects outside the traditional purview of economics, starting with his book on discrimination in 1955; and Coase had a major impact (after the age of 50) on the modern field of law and economics, which has always been centered at law schools, not economics departments. In other words, the work of all three was centered on unconventional topics, meaning that it took longer for their contributions to be recognized and cited in mainstream economics articles.<sup>18</sup>

3. Although the Nobel Prize had a significant positive impact on citations to Coase and Samuelson, this is not the case for the other Nobel Prize winners. The regressions in Table 2 indicate no significant effect on citations of the Nobel Prize for Arrow and Becker and a (surprisingly) negative and significant effect on Stigler's citations. We have no explanation for this finding.

#### *D. Coase and Other "Founders" of Law & Economics*

At the inaugural meeting of the American Law and Economics Association in 1990, Coase, Calabresi, Manne and Posner were honored as "founders of law and economics." Figure 3 compares Coase's article and book citations to those of the other "founders."<sup>19</sup> Not surprisingly, Posner is the overall citation winner.

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<sup>18</sup> In Arthur M. Diamond's 1989 ranking of the most-cited economics articles published in core journals, he finds that Coase is "the citation superstar of the list." However, he continues, "for most of his career [Coase] taught in the law and economics program at the University of Chicago Law School. Coase's work is unusual because it contains almost no mathematics or sophisticated statistical analysis. This may explain why economists seldom mention Coase as a candidate for the Nobel Prize when they speculate on future winners," despite his very high citation counts. (Arthur M. Diamond, "Most-Cited Economics Papers and Current Research Fronts." 12 *Current Contents* 2 (1989), p. 11.)

Unlike the others in the sample, he continues to produce scholarship at an undiminished rate and his citations exceed any of economists in our sample. But in terms of durability, Coase is the clear winner: the number of his citations to his work continues to increase throughout the entire 1965–2008 period. In contrast, citations to Posner peak in 2000 although they stay at a very high level after 2000; whereas citations to Calabresi and Manne peak much earlier in 1992.

### Figure 3

Table 2 also contains regression estimates for Posner, Manne and Calabresi. In all regressions, the coefficients on  $T$  and  $T^2$  are significant and in the predicted direction. We can use the coefficients to calculate the predicted peak citations period for each individual—i.e., the year in which the negative effect of depreciation just offsets the positive effects of new works or greater for existing works. The predicted peaks are 1993 for Calabresi, and 1997 for both Posner and Manne. We also find that the appointment of both Posner (1981) and Calabresi (1994) as federal court of appeals judges had a negative and significant effect on their citations. This is understandable for Calabresi but not Posner. At the time of Calabresi's appointment to the appellate court in 1994, he had been Dean of Yale Law School for 9 years and his academic publications had significantly slowed down. Posner remains a mystery since his academic and related output did not slow down after his appointment of a judge in 1982.<sup>20</sup>

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<sup>19</sup> Landes and Posner also examined the influence of the founders on law in their earlier paper (see *The Influence of Economics on Law*, *J. Law & Econ.* (April 1993))

<sup>20</sup> Although our paper is mainly about Coase, we intend to do further empirical work on this issue.

### III. FURTHER EMPIRICAL RESULTS

#### *A. The Superstar Phenomenon*

In assessing Coase's influence, one is struck by the fact that two early works, "The Nature of the Firm" and "The Problem of Social Cost", account for more than 85 percent of total citations to Coase's articles.<sup>21</sup> In comparison, the top two articles account for between 20 percent (Samuelson) and 36 percent (Stigler) for the other Nobel Prize winners (see Table 4). Posner is at the opposite pole from Coase. His top two articles account for less than 12 percent of his article citations (and, if one adds his books, the top two articles account for less than 5 percent of his total citations). Calabresi and Manne are closer to Coase in the relative influence of their top two articles. On the other hand, it is not entirely clear (particularly for Manne) that they should be included in Table 4 because their aggregate citations are so much lower than that of the other scholars.

**Table 4**

One reason that Coase's articles and older articles in general receive more citations is that they have more years to accumulate citations than more recent articles. Even if depreciation is substantial, the worst that can happen to an old article is that it will no longer be cited. Until that point is reached, the older the article, the more citations it will receive. To test this hypothesis, we estimated the following regression for 39 top-cited articles (the five highest for Arrow, Stigler, Becker, Samuelson, Posner, Calabresi and Manne, and the four highest for Coase):

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<sup>21</sup> That percent dips to 72 percent (see Table 1) if citations to Coase's books are included. The most heavily cited book, however, is *The Firm, The Market and The Law* (1988), which mainly reprints articles published earlier, including "The Nature of the Firm" and "The Problem of Social Cost".

$$(2) \quad \ln Cites_i = b_0 + b_1 Age_i + b_j IND_j + u$$

where  $\ln Cites$  is the logarithm of total citations for article  $i$ ,  $AGE_i$  is the age of the article (=2009 minus date of publication<sup>22</sup>),  $IND_j$  is a set of dummy variables for each of the scholars in the sample, and  $u$  is the residual. As expected, the regression coefficient of age was positive (.029) and significant (a t-ratio of 2.33) indicating the number of citations increases about 3 percent per year. With respect to the dummy individual variables (the left-out variable was Manne) all the coefficients were positive and significant except for Calabresi. Stated differently, Manne and Calabresi's articles were cited significantly less than the other authors in our sample, holding constant the age of the article.

### *B. Influence on Legal Scholarship*

Table 5 separates citations to our Nobel Prize winners and the "founders" by whether the citing journal is an economics or law journal.<sup>23</sup> It is no surprise that the fraction of citations in econom-

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<sup>22</sup> For articles published before 1960 we set Age equal to 2009 minus 1960 since very few citations were recorded before 1960. That change, however, does not change the regression coefficient on the age variable.

<sup>23</sup> We divided citations into law and economics by restricting our citing articles to articles classified by the SSCI as belonging to either 'law' for legal articles, or 'economics', 'business', 'finance', and/or 'management', for economics articles. This means that our total citations are counted slightly differently from citations in law and economics: the total citations count each citing instance separately, while the citations in law and economics only count citing articles. So, a legal article with two citations to a person will count as only one citing article in law, but two citations in the total citation count. Additionally, the SSCI can classify an article as belonging to multiple subject areas; for example, articles in the Journal of Law and Economics are classified as belonging to 'law' and to 'economics'. So, these citations by subject area can (and do) double-count some

ics journals is substantially greater for economists than the lawyers. Among the economists, Samuelson and Arrow have the greatest fraction of economic journal citations which, no doubt, reflects the highly formal nature of their work. Coase has the smallest fraction of economic cites of all economists, because of his impact on legal scholarship. Notice that Manne has roughly the same fraction of citations in economics as law journals. This is explained because more than 80 percent of Manne's citations are to his single path-breaking article on insider trading which has equal appeal to both economists and legal scholars.

### Table 5

Although Coase's contribution in academic law is greater than that of the other economists (see Table 5), Figure 4 indicates that Coase's influence in economics has been growing relative to law over the past two decades. For example, the fraction of economic citations ( $\text{=economic citations}/(\text{economic plus law citations})$ ) increased from an average of .63 in the 1991–1995 period to .75 in the 2004–2008 period. Conversely, the fraction of citations in law journals fell from .37 to .25 during this period. One possible reason for the shift is the increasing attention in the economic literature to Coase's 1937 paper on the nature of the firm. But this does not appear to be the case (see Figure 1), since citations to both the firm and social cost articles have increased at about the same rate over the past 25 years. Another possible reason for the increase is the growth in economic relative to legal scholarship. This also is not the case, however, because the relative number of economics and law journals surveyed by SSCI has been roughly constant over the past 25 years.

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articles which are considered to belong to both subject areas. See the Appendix for a more detailed explanation of these differences.

**Figure 4**

No doubt that Coase will be greatly pleased by his increasing influence in economics relative to law. It is no secret that Coase was never a big fan of using economics to analyze legal rules and doctrines. Coase's interest in law was in understanding how the legal system impacts the economic system. Consider Coase's own words on the subject in a letter he sent to Landes in October 1981.

Now that I'm giving up the editorship (although you have been doing the bulk of the work for some time) I thought I should send you (and Dennis (Carlton)) my very best wishes. Editorship of the *Journal of Law and Economics* has always been dear to my heart. I would not have come to Chicago were it not for the *Journal*. I saw it playing an important role in changing the views of economists and in establishing and developing certain types of study. But, of course, my interest has always been in the economics profession—and it was the views of economists not lawyers that I wanted to change. When I said at the California meeting that I was uninterested in legal education, I did not mean that I was uninterested in law but simply that the education of lawyers did not interest me. What I wanted to do in the *Journal* was to make economists see that the legal system had a great influence on the working of the economic system. And in this I feel I succeeded.

*C. Coase's Influence on the Law*

Has Coase's work influenced the development of the law, as opposed to academic law or law and economics? A very rough proxy for measuring this influence is to count citations to his work in judicial opinions. We say "very rough" because citations will substantially understate Coase's influence on the law, for the very reason that Coase identified in his remarks on citations. As a central contributor to the law and economics movement, Coase has

helped create a climate where economic analysis has become more and more commonplace in law and no longer requires an explicit citation in judicial opinions. Federal judges (and even some state court judges) appointed since the 1980s are increasingly receptive to economic reasoning, partly because many of them had a heavy dose of economics (and the Coase Theorem) in law school and in continuing education programs for judges.<sup>24</sup> Other judges like Posner and Easterbrook were academic practitioners of economic analysis of law before they became judges, and regularly use economics in deciding cases and writing opinions. As a result, Coase's influence on the practice of law could be substantial, and yet direct citations to his work in judicial opinions could be negligible. Subject to this important qualification, we look at judicial citations to the five economists.<sup>25</sup>

Table 6 presents the citation data. Coase and Stigler are cited the most, followed by Samuelson, Becker and Arrow. It is not clear, however, whether Samuelson's judicial citations should even be counted since all are to his introductory economics textbook and not to original work. In any case, it is pretty clear from Table 6 that the number of judicial citations to the five Nobel Prize winners is paltry.

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<sup>24</sup> Two examples of recent programs are those run by the law and economics center at George Mason Law School and the Searle Center at Northwestern law School.

<sup>25</sup> Another implication of law students' extensive exposure to economic analysis of law is that lawyers are probably more comfortable making arguments that stem from the economic analysis of law in their briefs than they were in the past. So, judges are more comfortable with these arguments both because of training and because of necessity.



An interesting but not surprising result is that Posner and Easterbrook account for over 47 percent of the total citations to the economist (excluding Samuelson). If we add to this total, the citations of six other judges who are practitioners of economic analysis of law, we are up to 56 percent. For Coase alone, Posner and Easterbrook account for 40 percent of his citations. If we include the other six “law and economics” judges, we are up to 51 percent.

Another reason we are hesitant to conclude from the citation data that Coase has only a minor influence on the practice of law is that Posner and Easterbrook are among the top five most influential judges on the court of appeals, as measured by citations to their opinions from court of appeals judges outside the 7<sup>th</sup> circuit.<sup>26</sup> This implies that Coase’s influence is understated and not easily quantifiable because it shows up in judicial citations to Posner and Easterbrook opinions (and the other well-cited “law and economics” judges) but not as citations to Coase. In short, Coase, and also Becker and Stigler have probably had a substantially greater (but indirect) influence on the law than is shown by citations to their works in judicial opinions.

#### IV. CONCLUDING REMARKS

In assessing Coase’s legacy, one is struck by the fact that two works, “The Nature of the Firm” and “The Problem of Social Cost”, published 72 and 49 years ago respectively account for 72 percent of Coase’s total citations.<sup>27</sup> This is truly an example of a durable good—here intangible property—with a very long life that appears to appreciate rather than depreciate in value. What lesson this has for the intellectual history of law and economics is

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<sup>26</sup> See Landes, Lessig and Solimine

<sup>27</sup> This percentage would be higher if one includes citations to the two articles that were reproduced in his book “The Firm, the Market and the Law.” If we counted all citations to the book as citations to the two articles, Coase’s two articles would account for 79 percent of total citations.

unclear. Still, it does suggest a trade-off between quantity and quality. And in Coase's case, quality wins.

## TABLES AND FIGURES

Table 1 SSCI Citations to Coase's Publications: 1935–2008						
<i>Cited Publication (date)</i>	1935-1968	1969-1978	1979-1988	1989-1998	1999-2008	<i>All Years</i>
<i>All Publications</i>	53	416	949	2631	3688	8129
<i>Nature of the Firm (1937)</i>	15	90	424	940	1364	2984
<i>Problem of Social Cost (1960)</i>	11	227	340	925	1265	2904
<i>Durability and Monopoly (1972)</i>	–	6	29	104	149	309
<i>The Firm, the Market, and the Law (1988)</i>	–	–	4	242	263	527
<i>Other Works</i>	27	93	152	420	647	1405
<i>No. Articles Published</i>	35	20	14	20	5	94
<i>No. Books Published</i>	4	0	1	2	0	7

Figure 1  
Citations to Coase's Publications: 1960–2009

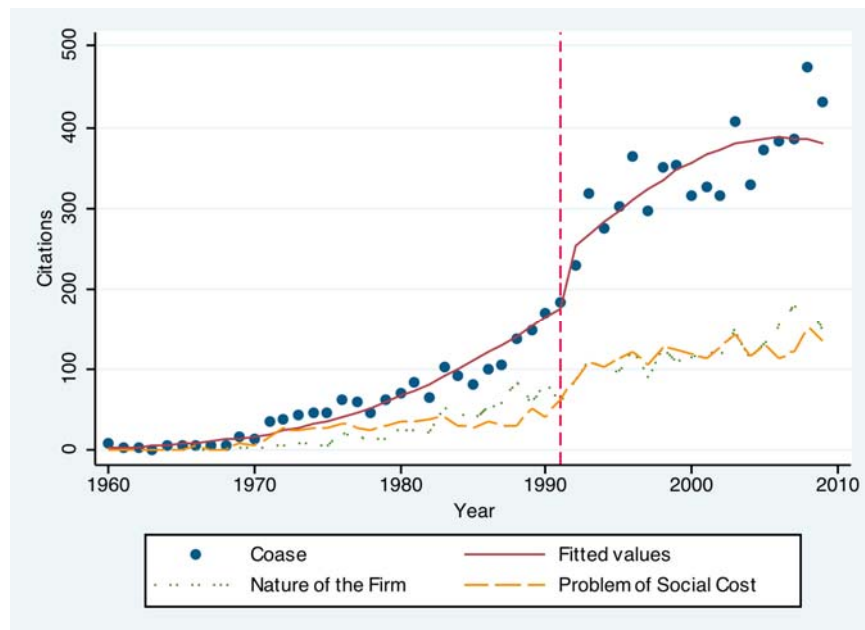


Table 2  
Regression Analysis of Citations to a Sample of Nobel Prize Winners  
and "Founders of Law & Economics"

	<i>Con- stant</i>	<i>T</i>	<i>T</i> <sup>2</sup>	<i>Nobel</i>	<i>Death</i>	<i>Judge</i>	<i>R</i> <sup>2</sup>
Coase	.844*** (3.41)	.208*** (11.25)	-.002*** (7.12)	.315** (3.61)	-	-	.96
Arrow	3.41*** (18.11)	.069** (2.79)	-.0004 (1.11)	.086 (0.36)	-	-	.89
Becker	-.151 (0.74)	.293*** (17.54)	-.003*** (9.83)	-.106 (0.61)	-	-	.96
Samuel- son	3.67*** (25.24)	.043 (1.71)	-.0005 (1.20)	.955*** (3.51)		-	.87
Stigler	.962*** (4.28)	.183*** (15.03)	-.002*** (11.27)	-.202** (2.30)	-.295*** (3.46)	-	.96
Calabresi	.597 (1.69)	.222*** (10.05)	-.003*** (8.98)	-	-	-.213** (2.73)	.88
Manne	.054 (0.13)	.187*** (6.70)	-.003*** (5.80)	-	-		.77
Posner	-5.05*** (4.49)	.690*** (7.94)	-.009*** (7.48)	-	-	-1.131* (2.25)	.91

Notes: (1) For Arrow, Becker, Samuelson and Stigler, citations are to articles only; (2) For Coase, Calabresi, Manne and Posner, citations are to books and articles; (3) The number of observations (N) equals 49 for Arrow, Coase, Samuelson and Stigler, 48 for Becker, 39 for Calabresi, 44 for Manne and 40 for Posner. (4) The ending year in all regressions is 2008 and the starting year depends on the first year of continuous recorded citations; (5) All regressions are estimated using robust standard errors; (6)\* denotes significant at the .05 level, \*\* at the .01 level and \*\*\* at the .001 level.

Figure 2  
Citations to Articles Only: Arrow, Becker, Coase, Samuelson &  
Stigler: 1960–2009

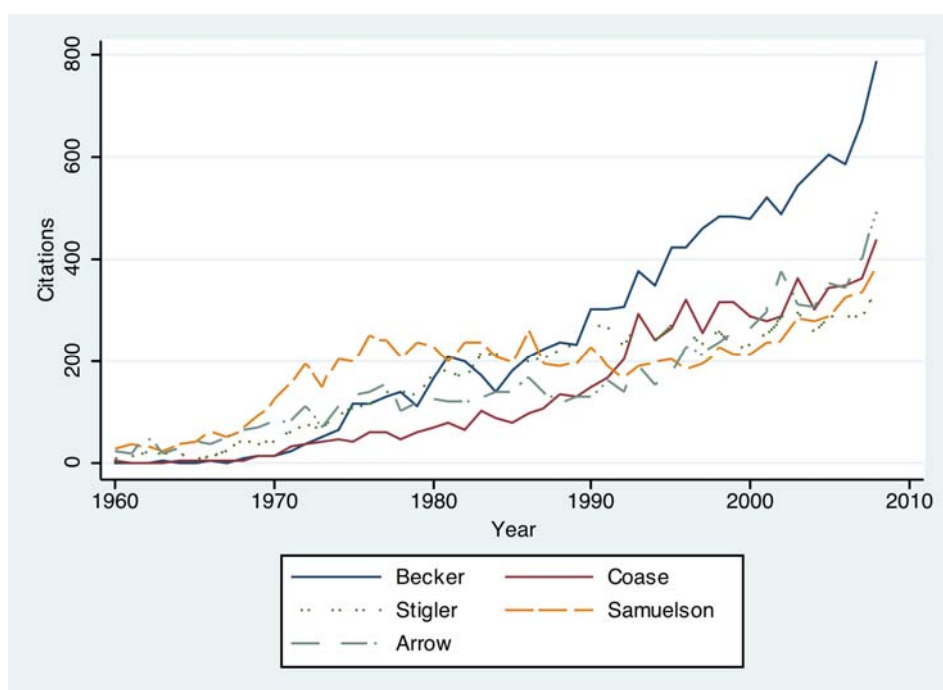


Figure 3  
Citations to Coase, Calabresi, Manne and Posner: 1965–2009

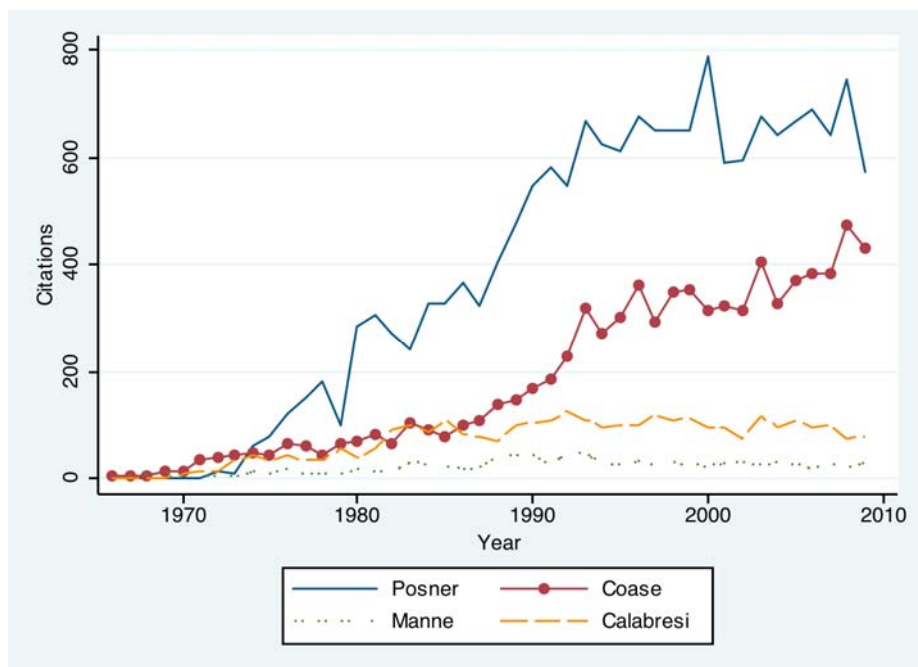


Table 4 Citations to First, Second and Third Most Cited Articles				
	1st	2nd	3rd	Total
Coase	3079 (44.2%)	2909 (41.8%)	310 (4.4%)	6954
Arrow	1191 (14.0%)	1042 (12.3%)	598 (7.0%)	8497
Stigler	1633 (18.8%)	1514 (17.4%)	764 (8.8%)	8680
Samuelson	1240 (12.7%)	758 (7.7%)	467 (4.8%)	9792
Becker	1775 (13.8%)	1746 (13.6%)	1060 (8.3%)	12838
Posner	476 (6.5%)	391 (5.3%)	296 (4.0%)	7320
Calabresi	802 (52.5%)	119 (7.8%)	114 (7.5%)	1529
Manne	507 (75.1%)	57 (8.4%)	42 (62.1%)	676



Table 5 Citations in Law and Economic Journals			
	<i>Total</i>	<i>Law</i>	<i>Economics</i>
Coase	6213	.28	.72
Arrow	5152	.05	.95
Becker	7635	.13	.86
Samuelson	6936	.03	.97
Stigler	6666	.16	.84
Calabresi	2835	.90	.10
Manne	926	.49	.51
Posner	14,305	.80	.20
Notes: (1) Coase, the economists, and the “founding fathers” are all cited in many academic areas. So, the actual total citations for all persons are higher than the sum of their citations in law and their citations in economics. However, in this table, ‘Total’ is the sum of law citations and economics citations, so that we can see the relative proportion of citations in these two fields.			

Figure 4  
Coase Citations in Economic and Law Journals

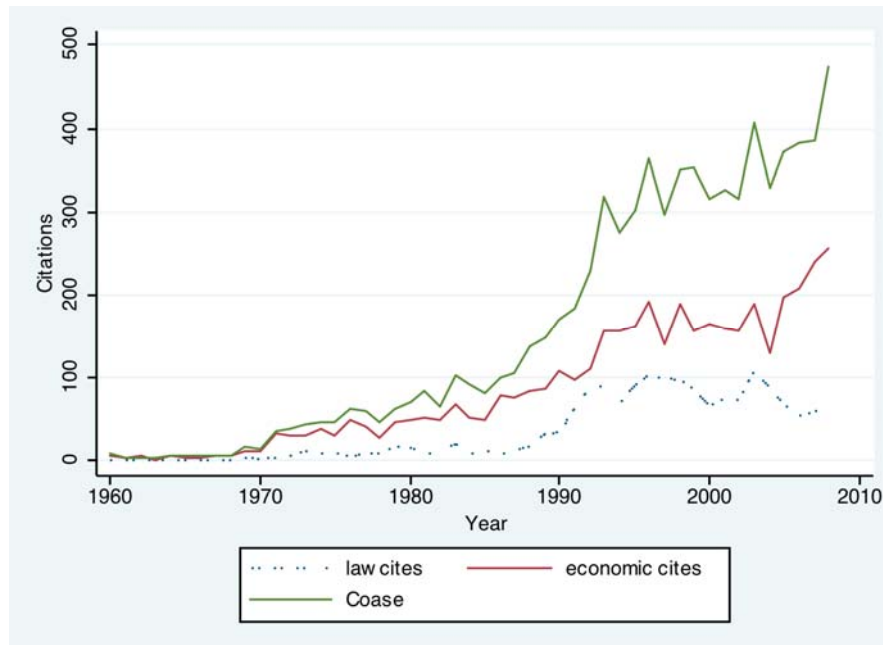


Table 6 Citations in Judicial Opinions in Federal Court					
	<i>Citations</i>	<i>Supreme Ct.</i>	<i>Ct. of Appeals</i>	<i>Easterbrook &amp; Posner</i>	<i>Other L &amp; E Judges</i>
Coase	51	4	47	20	6
Arrow	4	1	3	1	
Becker	20	2	18	13	4
Samuelson	39	8	31	0	6
Stigler	49	8	40	24	3
Note: The other "law and economics" judges are Ginsburg (D.C. Circuit), Williams (D.C. Circuit), Calabresi (2 <sup>nd</sup> Cir.), Winter (2 <sup>nd</sup> Cir.), Wood (7 <sup>th</sup> Cir.) and Kozinski (9 <sup>th</sup> Cir.)					