

JRI, JF, AND THE INTERNET: COAUTHORS, NEW AUTHORS, AND EMPIRICAL RESEARCH

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ABSTRACT

This article examines how the Internet has changed the work of academic researchers and addresses the question of how expanded Internet usage has affected *Journal of Risk and Insurance* (JRI) and *Journal of Finance* (JF) articles, including the shift to empirical research, joint authorship, and new authorship. Internet availability significantly increased joint authorship overall (more for JF than for JRI), shifting upwards a strong secular trend toward working with other researchers. Another big impact of the Internet has been to increase the number of new authors (more for JRI than for JF).

THE INTERNET AND INSURANCE ACADEMICS

Although the Internet is changing modern life, its quantitative importance in the labor market is just now beginning to be established. This is somewhat surprising, as more than half of the working population of the United States used a computer at work in September 2001. Furthermore, 42 percent used e-mail or the Internet while working. The fact that computer and Internet usage has been uneven across occupations—81 percent of professionals and managers use computers at work, whereas only 21 percent of those classified as operators use computers—suggests that gains from computer use may be task specific. One type of task, team collaboration, may have especially benefited from the diffusion of the Internet and the massive reductions in the real costs of computing and information sharing, more likely affecting professionals than operators. The reduction of location-specific knowledge externalities across employers and work groups suggests, for example, that in science it's no longer necessary to be a top research lab or university department to be able to collaborate with the best intellects in a given field.

Indeed, recent research shows that the Internet has had a profound impact on collaboration between faculties in different departments. Using information on spatial-temporal Bitnet connections, Agrawal and Goldfarb (2006) find that Internet connectivity increased collaboration between those connected universities by 85 percent. Extensively analyzing faculty productivity at the top 25 universities during the last three decades, Kim, Morse, and Zingales (2006) report that the Internet has

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lowered department-specific research externalities in economics and finance by giving those outside of the top schools physical access to productive research colleagues within the top schools. Concomitant with this decline in location-specific externalities, they also report an increase in salaries at those top universities. Walsh and Maloney (2003), using survey information from four fields (experimental biology, mathematics, physics, and sociology) find that e-mail has significantly reduced coordination problems in research collaborations. In this article, I examine similar issues for research in insurance and finance. If the access to knowledge hypothesis is correct, then the Internet may be expected to increase the rate of coauthorship and the opportunities for researchers outside of the top universities.

This article focuses on a very narrow range of insurance-related business: academic insurance and finance researchers. It develops a simple model of coauthorship for insurance research, testing it first on data from the *Journal of Risk and Insurance (JRI)* from 1980 through 2003, and then on data from the *Journal of Finance (JF)* from 1980 to 2000. Personal computers were introduced into the U.S. market before 1980, and I wanted to separate the impact of the personal computer as a computing device from the effect of information sharing between computers. The end dates were determined by data availability. The results reported here were robust to longer and shorter periods chosen: in particular, the results restricting the data to post-1990 data are presented in the Appendix Tables A2–A7 and are virtually the same as the results discussed in the body of this article (indeed, the only change was a shift in the signs of a few of the issue-dummy variables).

My model suggests as the Internet reduced coordination costs of working with others, the number of coauthored papers (as broadly defined later) and the number of papers by new authors should increase. The empirical research supports these hypotheses. I develop the model in the next section, then provide estimates on coauthorship and new authorship in later sections.

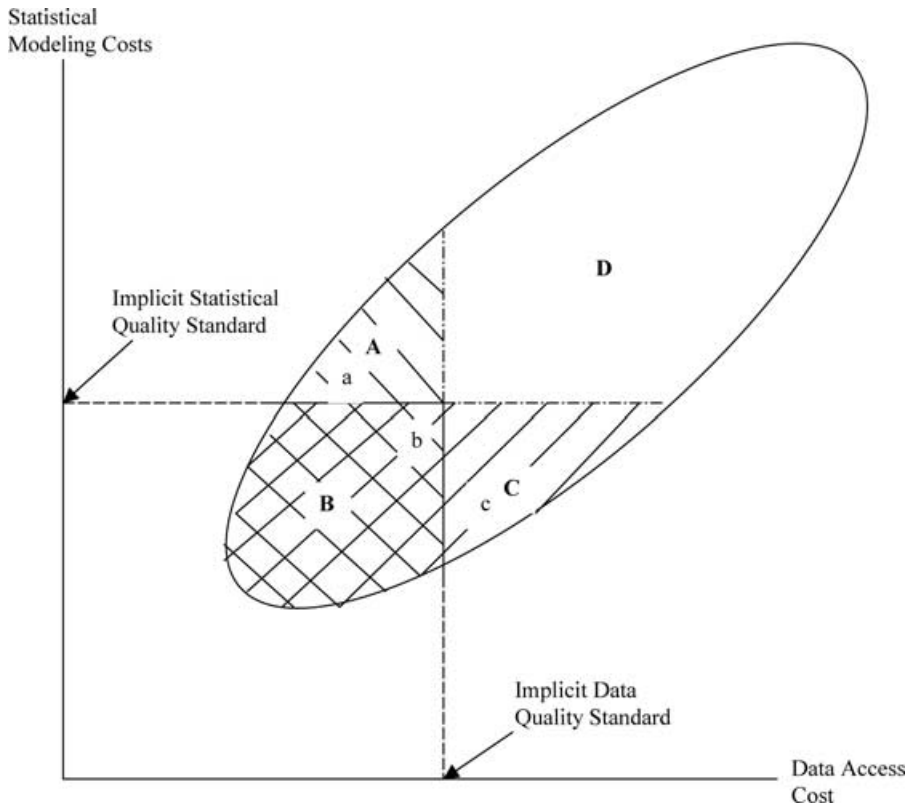
INFORMATION SHARING AND JOINT AUTHORSHIP

At a given point in time, the incentive to jointly author an article can be illustrated by the simple model in Figure 1. Think of every *JRI* empirical article as having two dimensions: in my illustration here, these are a data-specific component and a statistical modeling component. The editors of *JRI* set minimum quality standards for both dimensions, these standards being endogenously raised and lowered so as to fill out a standard page count each year, given the number of submissions and expected rejection rates.

Some potential authors, by innate or acquired human capital, are able to meet these standards at a lower cost. For example, more skilled authors have lower time-costs in that they might complete an acceptable article in a couple of months, whereas others might struggle for a couple of years to meet the minimal *JRI* standards. A hypothetical distribution of these costs is given by the ellipse in Figure 1. Those in the southwest quadrant of Figure 1 are the especially low-cost, high-productivity producers of *JRI* articles, whereas those at the northeast quadrant of the distribution have higher costs—take a lot more time—to meet either the statistical modeling or data quality standards demanded at *JRI*.

FIGURE 1

Coordination Costs and Joint Authorship for Empirical Papers: Distribution of Costs to Potential Authors of Meeting the Journal's Implicit Quality Standard



Suppose the equilibrium costs are given initially by the two dashed lines drawn on both axis of Figure 1: all those in the cross-hatched area labeled B are the lowest cost producers of both the acceptable statistical modeling and the acceptable data quality standard. B researchers are more likely to produce solely authored articles for *JRI*. (I assume preferences are lexicographic in the sense that researchers would, *ceteris paribus*, prefer to produce solely authored papers for tenure and advancement reasons, if not vanity considerations.) Those in area A are capable of producing an acceptable statistical model for a paper, but do not have access to the data that are needed to complete the project (or who have access but would have to spend an inordinate amount of time figuring out the intricacies of variables, sample selection issues, peculiar coding, etc.). Those in C understand all these data issues, know exactly what data manipulations are necessary to get meaningful variables assembled, but do not know how to do the statistical modeling for the paper. Note that the small-letter a, b, and c individuals represent particular draws from the distribution in these respective areas.

D researchers find it too expensive (it takes too long) to either learn how to do the appropriate statistical analysis or learn about the potential data sources. Those in area

D rarely publish, either by themselves or with other coauthors. By the time they could get around to writing a *JRI* paper on a subject of interest, someone else would have already done it.

However, those in A and C can get together to coauthor articles: the statistical modelers in A can get together with the C data people to produce an acceptable *JRI* empirical paper, as each plays to his or her comparative advantage. "Coordination" costs associated with joint authorship efforts, however, work against the completion of jointly authored research. Such costs generally include exchanging essential ideas about the basic variables and their treatment in the models, developing a consensus on the correct approach to the problem, determining what are the testable implications of the theory being empirically examined, and how exactly to convincingly test those implications, doing the estimation and writing up of the results, motivating coauthors to do some of these things in a timely fashion, etc. Before the Internet, these costs increased with the distance between the cooperating A and C researchers (such as a and c individuals depicted in Figure 1). Such coordination costs ensure that only some of those in A and C will actually end up working on a paper that eventually will be published.

The Internet lowered the coordination costs between potential coauthors (including "Internet site virtual coauthors" with data access). As a result of the lowered coordination costs, more jointly authored works became feasible after the wide availability of the Internet, where joint authorship now also includes access to data on the Internet that was formally nearly monopolized by the data experts in area C. Another implication of the model is that the fraction of new authors increases as well, as previously excluded researchers in areas A and C now find it feasible to work together to publish their research.

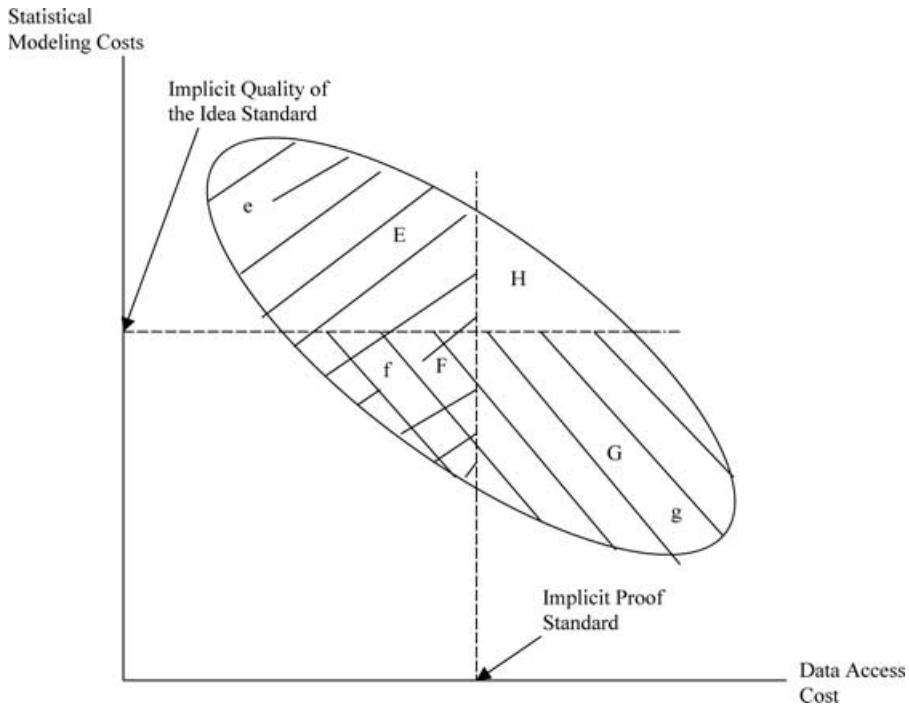
If the Internet itself acts as the data expert (a c-type individual), then the Internet would be a substitute for a flesh-and-bones data specialist, thus lowering the cost of empirical research and increasing the quantity of empirical research by individual authors. That is, there may be more solely authored empirical research, research formerly done by an a and c person, but now the Internet itself is a c person. In this broad sense, joint authorship has increased as one of the coauthors has become the Internet.

In fact the effect of the Internet on empirical research is ambiguous, because there are really two margins to consider. One margin is the substitution of the Internet for c-type individuals in Figure 1, increasing empirical research because it makes it easier for a-type individuals to meet the quality standard without having to hook up with a flesh-and-bones c-type person. But another margin is the possible substitution between research genres: the Internet may actually enable more theoretical research than it does empirical research. To see this possibility, consider Figure 2 for theoretical papers written for *JRI*. I assume here that one quality standard is the originality of the theoretical issue being addressed, and the other standard is the proof that solves this issue. That is, one is a conception dimension, the other perhaps a mathematical expertise (at providing an elegant proof) dimension.

Figure 2 is analogous to Figure 1: those in region H will not produce acceptable theoretical papers, whereas those in region F initially can produce acceptable theoretical articles without coauthors. But with a negative correlation between these abilities,

FIGURE 2

Coordination Costs and Joint Authorship for Theoretical Papers: Distribution of Costs to Potential Authors of Meeting the Journal's Implicit Quality Standard

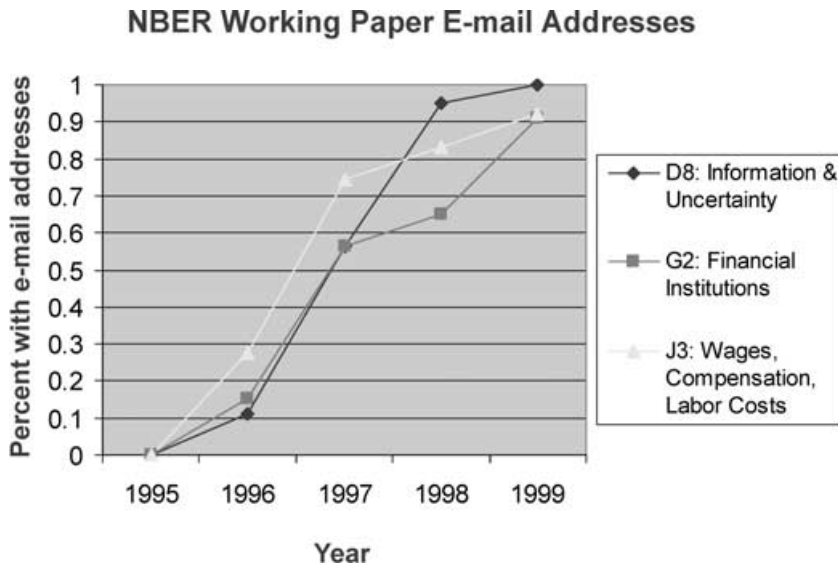


it is clear that the gains to specialization may be immense, in that individual e and individual g can coauthor a paper that is so good that perhaps it will raise the bar for quality, driving out not only by papers written by f but also many of the empirical papers as well. That is, there is a potential substitution between research genres as well as within them.

Still, my model suggests the Internet should have lead to more jointly authored research, and more new researchers publishing in *JRI*. These predictions from my simple model hold generally even when the correlation between the two research dimensions become negative as in Figure 2 rather than the positive correlation pictured in Figure 1. Only the extreme cases are exceptional: if bivariate abilities are perfectly positively correlated (equal to one) and the joint distribution is degenerate, a straight line going northeast from the origin, then all research is solely authored and new authors enter only as the implicit quality standards change. At the other extreme of a perfect negative correlation between abilities (so the bivariate correlation coefficient is minus one and a straight line running from southeast to northwest), then there are no solely authored research papers. In this case all work is joint, and new researchers enter only when the implicit standards change. In all other cases, with nondegenerate joint distributions, with either positive or negative correlation between abilities, the reduction in coordination costs increases joint research and the number of new authors.

FIGURE 3

The Expansion of the Internet Among Insurance Economists



Measuring the influence of the Internet is the first difficulty. I choose to use the percentage of authors who list their Internet addresses on National Bureau of Economic Research (NBER) working papers (<http://www.nber.org/papers/>). These are a natural metric. These working papers are posted in real time by researchers who are generally sophisticated consumers of computer and Internet software, and who want immediate feedback on their research—under the competitive pressures to publish their work in the best journals as quickly as possible. To measure adoption of Internet addresses specific to researchers who typically write for the *JRI*, I used three *Journal of Economic Literature* (JEL) classifications: D8 (Information and Uncertainty), G2 (Financial Institutions and Uncertainty), and J3 (Wages, Compensation, and Labor Costs). Articles on insurance and risk are found in all three classifications.

Figure 3 indicates a fairly rapid assimilation of the Internet among insurance economists. Up to, and including, 1995 no e-mail addresses were listed on any NBER working paper in my three groups. Through most of the first half of 1996, there were still no e-mail addresses given. A few “bitnet” addresses were listed in mid 1996 before Internet addresses started to appear in the second half of 1996. In JEL category D8, 11.1 percent of the authors gave an Internet address during 1996. In JEL category G2, 15.2 percent; in J3, 27.5 percent. These percentages increased, respectively, to 56.3, 56.3, and 74.5 percent in 1997. By 1999, virtually all authors were listing their Internet addresses on their papers, and many of those who were not (such as the editor of the *American Economic Review*) obviously had e-mail addresses but simply did not want to be bothered by unsolicited contacts.

Hence, in my empirical research, I model the Internet effect as a distribution with a value of 0 up to and including 1995, then as a power function from 1995 to 1999, where it takes a value of 1 thereafter. Most often, I will assume the power function

distribution has a unit exponent, so the distribution is uniform and my Internet effect is a spline function. I mention other results in my empirical discussion later.

COAUTHORS, NEW AUTHORS, AND EMPIRICAL PAPERS: TRENDS AT JRI

The data for *JRI* articles (including authors, pages, title, type of article, and publication date) were retrieved from JSTOR electronic files, available over the Internet (<http://www.jstor.org/journals/00224367.html>) and for the most recent years, from Blackwell Publishing, 2004, and transferred into SAS data files. In this article, I focus on feature articles of *JRI*, omitting shorter articles, notes, communications, etc. I do this partially because the number of shorter articles and communications have been practically eliminated from *JRI* in recent years (at the same time the use of the Internet expanded), and I do not want to confound these two, possibly unrelated, trends. Moreover, feature articles are the "meat" of the journal, representing *JRI* research most frequently cited.

Three key variables of interest are coauthors, empirical papers, and new authors; their means are presented in Table 1, both for the overall sample period as well as the period before the Internet was "in place" (from 1980 to the end of 1995) and after it was "fully operational" (after 1998). The coauthor dummy variable takes a value of 1 if two or more individuals are listed as authors for an article. As predicted by my simple theory, coauthorship rates are up from 51.75 percent before to 75 percent after the establishment of the Internet.

As evident in Table 1, the proportion of empirical articles in *JRI* has increased as well (from 52.6 to 54.3 percent). The empirical variable equals 1 if the article includes a regression (or its stepchildren: *t*-tests, chi-square tests, *F*-tests or log-likelihood ratio tests) using "real-world data." Mostly excluded (the empirical dummy takes a value

TABLE 1
Means for *Journal of Risk and Insurance* Analyses

Variables	Overall Means		Means Until December 1995		Means After December 1998	
	Means	Std. Dev	Means	Std. Dev.	Means	Std. Dev.
Coauthor	0.5989	0.4905	0.5175	0.5004	0.7500	0.4345
Empirical	0.5372	0.4990	0.5263	0.5000	0.5428	0.4999
Internet	0.3188	0.4411	0	0	1.0	0
Internet lagged	0.2747	0.4180	0	0	0.9615	0.0863
Issue2	0.2395	0.4272	0.2397	0.4275	0.2357	0.4259
Issue3	0.2540	0.4357	0.2602	0.4394	0.2571	0.4386
Issue4	0.2577	0.4377	0.2514	0.4344	0.2571	0.4386
Symposium	0.0762	0.2655	0.0467	0.2114	0.0428	0.2032
Pages	20.0000	7.0600	19.2514	6.4685	20.9500	8.1154
New*	0.2374	0.4256	0.1833	0.3872	0.2644	0.4411

*The new-author averages come from a different base than the previous statistics, since coauthored articles generate more than one observation for the new-author counts, but the statistics above only generate one observation per article (and some articles may be written by both old and new authors).

of zero) are purely theoretical papers, of the type containing proofs or simulations. Also, lab experiments in which participants' responses are monitored in controlled environments are not counted as empirical papers, even when regressions are used to examine the experimental outcomes. The empirical variable was constructed on the basis of paper abstracts available on the JSTOR data from 1980 to 1982, and based on inspection of each article from 1983 to 2003.

I create the "new" author dummy variable (the dependent variable in this logistic regression) by generating an array of those authors who published in the last 10 years, and then flag anyone who hasn't published in *JRI* as new if they are not found in the array of published names. That is, a "new" author is one who hasn't published in *JRI* during the 10 years prior to the publication of the respective issue. The fraction of new authors is determined by the number of new authors each issue, divided by the total number of authors (including those who have published jointly). As can be seen from the last line of Table 1, as my theory predicts, the number of new authors has increased from 18.3 percent before the Internet to 26.4 percent after the Internet.

Table 1 indicates that only 4 percent of *JRI* issues were symposium issues (and those, mostly in the last 15 years). The average *JRI* feature article rose from 19 pages before to 20 pages after the Internet.

However, comparing the coauthor, empirical, and new author means before and after the installation of the Internet may be deceptive as all have exhibited generally increasing secular trends. The annual rate of coauthorship from 1981 to 2001, based on the estimated year effects (the coefficients on dummy variables) from a logistic regression of coauthored papers is given in Figure 4. The control variables in the specification include dummy variables for the issue during the year, whether or not it was a symposium issue, and number of pages in each respective article. I have set the 1980 year effect equal to 0 for normalization. The last year in the sample is 2001, since that is the last year data is available from JSTOR for *JRI* (the last year available for *JF* was 2000).

FIGURE 4

Trends in Coauthorship at the *Journal of Risk and Insurance*

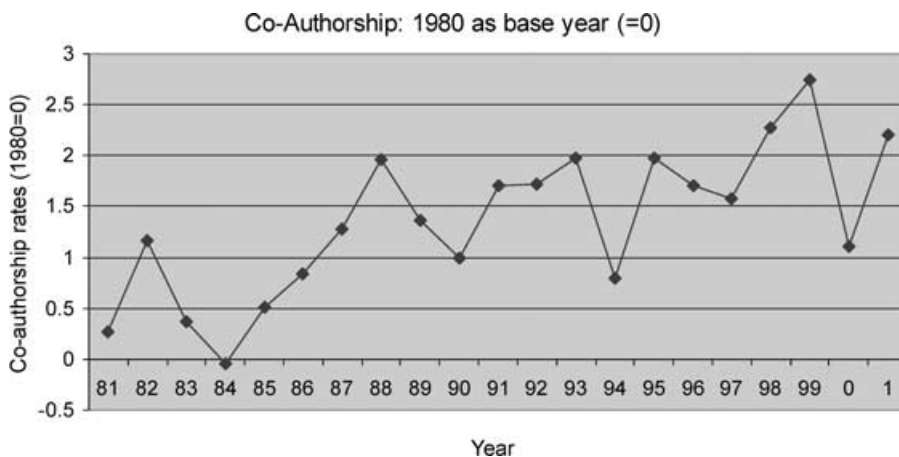
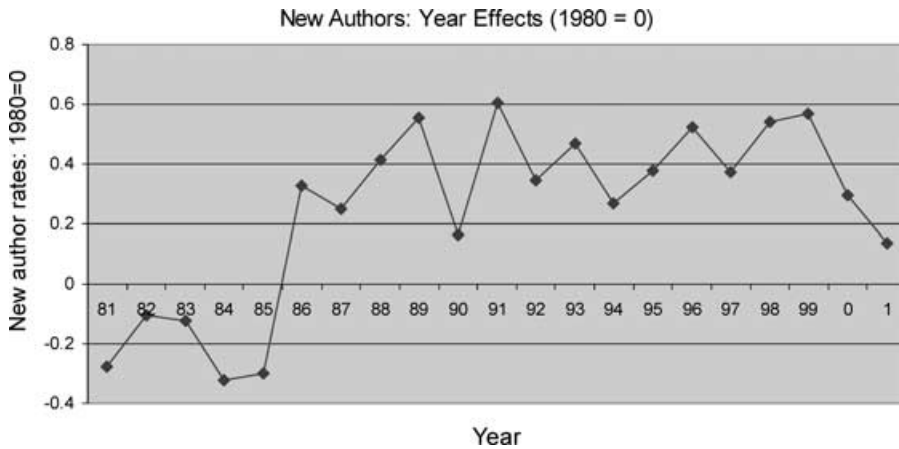


FIGURE 5Trends in New Authors at the *Journal of Risk and Insurance*

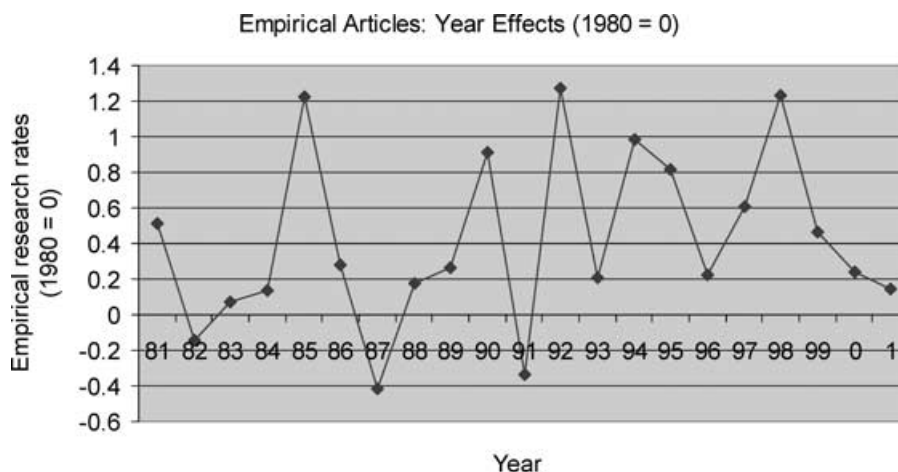
Hence, controlling for issue during the year (March, June, September, or December), number of pages, and special symposiums, Figure 4 indicates there is still a lot of volatility in joint authorship in *JRI*, with cycles of approximately 6–7 years and an overall increasing trend in the number of coauthored articles. As the data exhibit this cyclical activity, my main results come from models with fixed year effects included.

When I graph the same data by monthly issues of *JRI* (instead of annually)—graphs not given here but available from me on request—I find seasonal effects: March issues tend to have fewer coauthored articles, forming frequent local minimum coauthor values in the graph during the last 20 years, whereas there are no March issues that are locally maximums. December issues have a disproportionate number of locally maximums of coauthored articles. Hence, in all the empirical work reported in this article, I also include dummy variables for the respective seasonal issues of *JRI*, as well as year dummies.

The trends for new authors in Figure 5 are calculated like the coauthorship rates in Figure 4, representing the year coefficients from a logistic regression of new authors on dummy variables for season, for symposium issues, and the number of pages for the respective article. Again, 1980 is normalized to be 0, and the coefficients plotted are for the year dummy variables from 1981 through 2001.

Unlike coauthorship trends, there appears to be no particular upward trend in the new author effects, except for the large shift from 1985 through 1986. However, the new author series tends to peak and trough at about the same time the coauthorship series does (as my simple theory suggests that they should). Indeed, the Pearson correlation between the two series pictured in Figures 4 and 5 is .79, significant at the 1 percent level.

Figure 6 gives the same sort of normalized trend for empirical papers in *JRI* as Figure 4 did for coauthorship trends, and Figure 5 for new author trends. Again, because of potentially offsetting substitution and output effects, my theory makes no prediction on how the Internet has affected the trend in empirical research. Indeed, there seems

FIGURE 6Trends in Empirical Research at the *Journal of Risk and Insurance*

to be no correlation between the fraction of empirical papers year to year and number of new-authored papers or coauthored papers. This absence of correlation is visually apparent between Figures 4 and 5, and Figure 6, and holds statistically as well: the Pearson correlation between empirical research effects (Figure 5) and coauthor effects (Figure 4) is .04; the Pearson correlation between empirical research effects (Figure 6) and new-author effects (Figure 5) is $-.02$.

I examine correlates of coauthorship and new authors in the next section, controlling for type of issue and empirical content of each article, as well as season and year effects. Then in a following section, I examine coauthorship and new authors for roughly the same period for *JF*. The effect of the Internet on coauthorship and new authors in *JRI* and *JF* are qualitatively the same, although the interaction of empirical research with new authors and coauthors differs by journal.

THE *JOURNAL OF RISK AND INSURANCE* AND THE INTERNET

The simple model presented in Figures 1 and 2 suggests not only increased specialization with the Internet within research genre, it also suggests possible substitution between research genres (i.e., empirical vs. theoretical articles). With respect to specialization, for example, there may be comparative advantage for coauthors working on a theoretical paper. One coauthor may be good at coming up with a good theoretical question, another coauthor with putting the paper in the context of the literature, and a third coauthor with doing proofs. To the extent possible, it would be nice to separate this increased specialization from a shift between theoretical and empirical papers. To provide some control for research genre, I control for whether a paper was empirical in nature as discussed earlier. A second control is whether a paper was part of a symposium. In *JRI*, these symposium papers were built around a central theme, always on a topic of recent insurance industry interest. Because these papers are usually invited studies of topical issues, built around a central theme that is explored in some

TABLE 2*Journal of Risk and Insurance* Coauthor Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-2.0617	0.8086**	-3.9841	0.7996***
Internet	2.8235	0.8096***	4.7145	0.8008***
Internet × empirical	0.3000	0.1067***	0.4651	0.1136***
Issue2	0.4328	0.0638***	0.4033	0.0639***
Issue3	-0.0434	0.0621	-0.0837	0.0621
Issue4	0.4455	0.0649***	0.3800	0.0654***
Symposium	0.7357	0.1103***	0.7227	0.1078***
Empirical	0.8430	0.0543***	0.8200	0.0527***
Year effects	Included		Included	
-2 * Log likelihood	12,495.756		12,462.537	

Note: Sample period: 1980 through 2003.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

detail, these papers potentially represent a different product than papers randomly submitted for editorial review.

To control cyclical and secular changes, I also included dummy variables for each year in my sample, as well as dummy variables for the June (issue 2), September (issue 3), and December (issue 4) issues of *JRI*. March is the excluded category. "Internet" in Table 2 is measured as described earlier: 0 until December 1995, 1 after December 1998, and a spline function between those dates. Since year and issue effects are included, only the specific year × issue variation implied in Figure 2 is being examined as the Internet effect in my estimates.

Recall the Internet variable was constructed on the basis of working papers, reflecting the state of technology at the time the paper was written. However, papers have a long gestation period, and changes in authorship may be reflected with a lag. This suggests also estimating the effect of the Internet using a lagged Internet variable. Hence, each of my regressions is presented with the Internet variable, and—in the right-hand column—the Internet variable lagged 1 year. Whether the lagged Internet variable fits better than the Internet variable in the regressions partially depends on the speed of the review process. Consistent with a lengthy review process, the lagged variable specification tends to have a larger Internet effect and exhibit a higher level of statistical significance than the unlagged variable specification, although the inferences are quite close. I focus on the unlagged Internet effect in my discussion of the results, taking a conservative view of the estimates.

My theory suggests that there should be more coauthored works after the Internet expanded, hence a positive coefficient. Moreover, it further predicts—if the specialization effect within a research genre outweighs the shift between genres, as discussed in the last section—that there should be a positive empirical × Internet interaction. My dependent variable does not directly test this assertion since coauthorship should

conceptually include solely authored research in which the data expert in Figure 1 is replaced with the Internet. However, when controlling for research genre (empirical or theoretical), a dominate specialization effect within the empirical research genre implies a positive empirical $\times$ Internet coefficient.

All of my statistical analyses are weighted by the number of pages in each article. This is equivalent to arguing that the relative “informational quark” of *JRI* physics is the page rather than the article. I believe this is the case, as editors of *JRI* (and referees) frequently ask that papers be expanded or contracted (usually the latter), either to add more useful information or to get rid of extraneous information. That is, papers are edited so the information content of each page—rather than each article—is made roughly equivalent. Results with unweighted regressions exhibit the same sign and magnitude, though not necessarily the same levels of statistical significance.

Coauthorship

Table 2 indicates important seasonable variations in the number of coauthored regressions—March has significantly fewer coauthored papers on average than either June or December (during which the chance of a coauthored article increases by 10.4 percent, calculated as the logit coefficient multiplied by $\bar{P} * (1 - \bar{P})$, where $\bar{P}$ is the average likelihood of coauthorship). The chance of the paper being coauthored increases by 15.5 percent if the paper comes from a symposium issue, perhaps a reflection that “academic stars” are tapped to write symposium issue papers, and they tend to farm out some of the research to their students and other colleagues. Also, empirical papers are about 18 percent more likely to have a coauthor than papers without regressions.

The Internet’s effect on coauthorship is large: papers written after 1998 have about a 70 percent higher chance of being coauthored than those written before 1996, other things equal, with an additional 7.2 percent increase if the paper is empirical. This suggests the Internet has had a profound effect on the way *JRI* articles are produced, consistent with the predictions of my model.

What impact did the Internet have on the opportunities for new researchers? Before addressing this question in the following section, I discuss some robust checks for the coauthorship analyses. On the chance that my Internet variable is picking up a vague shift in coauthorship during the 1990s, not necessarily associated with the expansion of the Internet, I also included lead values of my Internet in the same specification as given in Table 1. That is, instead of current (starting in 1996) or lagged values (starting in 1997) for the Internet, I reran the regressions with a one-period lead (starting in 1995) and reran the same specification again with a two-period lead (starting in 1994). In the model with a one-period lead, the Internet coefficient was positive but statistically insignificant. In the model with a two-period lead, the Internet coefficient was negative and statistically significant at the 10 percent level. In both cases, the log-likelihood value fell when starting the Internet variable earlier than 1996. This adds credence to the interpretation of the Internet variable as truly representative of changes in coordination costs associated with Internet expansion, rather than some arbitrary shift during the 1990s.

Furthermore, instead of the spline function given in Table 1, I also let the value of the Internet variable be determined empirically, as a power function, $(y/b)^a$, where y equals the months since December 1995 and $b = 13$, where March 1999 and thereafter is forced to take a value of 1 (see Figure 2). When $a = 1$, I get a uniform distribution for y , and the spline function that I employ in the estimates of Table 1. Empirically, I determined the value of the a parameter along with the coefficients on the other variables. When I use current Internet time frame (so the power function is being fit from March 1996 to December 1998), a is greater than 1, suggesting a jump up in the Internet effect more toward 1997 than 1996. On the other hand, when I use the lagged Internet time frame (so the power function is being fit from March 1997 to December 1999), the “ a ” value is estimated to be less than one, again suggesting a jump up in the Internet effect more toward 1997 than 1999. Unfortunately, with all the parameters in the model, the maximum-likelihood estimates with the power function embedded in the model were relatively imprecise, and I cannot reject the null that the uniform distribution describes the Internet process. Hence, I give those results in Table 1 and the tables presented later.

One final concern with the analysis would be the omission of a computer capacity variable, as computing capacity seemed to increase roughly at the same time the Internet expanded. There appear to be no consistently reported data on computing capacity per se, but the Census Bureau has constructed a monthly computer technology price index, starting at the end of 1988, the longest series on computing pricing available (<http://data.bls.gov/labjava/outside.jsp?survey=cu>). Since this measures the price of a composite basket of computing hardware and services, the inverse of this “computer price” is a measure of the computing power per dollar of expenditure. By assuming that computer costs varied only year by year before 1988, I was able to transform these monthly variables into a quarterly “computing power” variable and match it with the rest of the data in my sample. Including it in the analysis had no impact on any of the results reported in Tables 2, 3, or 4, largely because it was highly collinear with the other regressors included there (including the year and quarter effects).

New Authors

The simple model in the section on “Information Sharing and Joint Authorship” suggests the main conduit through which new authors get published is by coauthorship, including the possibility that one of the coauthors is the Internet itself, acting as a virtual data-expert (c-type individual in Figure 1), yielding more solely authored empirical papers with new authors. This latter effect arises as the Internet lowers the cost of doing empirical research to those in region A, who no longer need the data access people in region C. If the Internet serves as a sort of coauthor in this way, the interaction of Internet, empirical research, and sole authorship should be positive in an analysis of new authors. In particular, the internet $\times$ empirical $\times$ coauthor variable will be negative (since *coauthor* means “not solely authored”) in the specification of what determines new authors.

Table 3 provides evidence that the Internet has increased new authors, and new authors doing empirical research, at JRI. The implied increase in new authors (using all the interactions, calculated at the overall sample means from Table 1, and

TABLE 3*Journal of Risk and Insurance* New Author Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-3.8372	0.3505***	-3.4553	0.3212***
Internet	1.8335	0.3567***	1.5058	0.3295***
Internet $\times$ coauthor	0.0911	0.0880	0.0215	0.0951
Coauthor	1.1003	0.0299***	1.1011	0.0291***
Empirical	0.0704	0.0276**	0.0322	0.0266
Internet $\times$ empirical	0.1180	0.1076	0.1765	0.1174
Internet $\times$ coauthor $\times$ empirical	-0.7199	0.1149***	-0.7305	0.1282***
Issue2	-0.0556	0.0320*	-0.0625	0.0321*
Issue3	-0.1672	0.0322***	-0.1656	0.0325***
Issue4	-0.0167	0.0331	-0.0174	0.0338
Symposium	-0.2263	0.0514***	-0.1716	0.0499***
Year effects	Included		Included	
-2 * Log likelihood	51,402.242		51,433.087	

Note: Sample period: 1980 through 2001.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

*Coefficient significance, two-tailed tests = 10%.

scaled through by $\bar{P}^*(1 - \bar{P})$) is 31.1 percent after the implementation of the Internet. Holding constant the impact on solely authored empirical research (discussed later), the Internet increased coauthorship opportunities and empirical research opportunities for new authors, although neither effect is statistically significant. The insignificance of these results (particularly of the Internet $\times$ empirical interaction) may be partially driven by substitution between research genres: if the correlation between specialization costs are negatively correlated as shown in Figure 2, or if the coordination costs have been differentially lowered for theoretical papers, empirical research may have been driven out as quality standards increased. I examine this issue at the end of this section by restricting my analysis to empirical papers only.

Before looking at the sample of just empirical articles in Table 4, I again conducted the same robustness tests of my Internet variable for Table 3 as I did for Table 2, with much the same results. The log-likelihood value fell when the Internet variable leads by 1 or 2 years. The Internet coefficients also diminish in statistical significance the main Internet effect reversing in sign. Again, the Internet variable seems to pass the robustness test.

There has been a differential increase in solely authored empirical research over jointly authored empirical research, after the Internet expanded. One of the most important secular trends in *JRI* has been the expansion of the number of empirical papers published in the journal. In 1967 less than 10 percent of the papers were empirical; since the Internet has been in place, more than 50 percent of *JRI*'s papers are empirical (see Table 1). So if the Internet has had a large impact, this is one trend likely to be affected. The coauthor $\times$ empirical interaction has fallen sharply in the post-Internet period:

TABLE 4

Journal of Risk and Insurance New Authors and the Internet: The Empirical Papers Sample (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-3.3744	0.4478***	-2.5841	0.4243***
Internet	1.8317	0.4680***	1.0960	0.4483**
Internet $\times$ coauthored	-0.5038	0.0975***	-0.5642	0.1082***
Coauthored	0.9423	0.0408***	0.9281	0.0396***
Issue2	0.0209	0.0419	0.0257	0.0420
Issue3	-0.0887	0.0433**	-0.0730	0.0442*
Issue4	0.0227	0.0455	0.0457	0.0461
Symposium	-0.4232	0.0663***	-0.4029	0.0658***
Year effects	Included		Included	
-2 * Log likelihood	29,829.355		29,834.247	

Note: Sample period: 1980 through 2001.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

*Coefficient significance, two-tailed tests = 10%.

the -0.7199 coefficient implies solely authored empirical research by new authors increased 13 percent more than jointly authored empirical research by new authors. This is consistent with the story in Figure 1. Although it is consistent, a more convincing story is told by restricting the analysis to empirical papers only, eliminating genre effects that come from shifting between types of research, so that only the specialization effect remains. This is the analysis of Table 4.

Table 4 is much the same as Table 3, except that I have restricted the sample to those papers that are empirical only. Thus eliminating the genre effect, the Internet $\times$ coauthor interaction represents the impact of the Internet on solely authored research: a significant, negative coefficient on the interaction indicating more solely authored empirical research after the implementation of the Internet. That is exactly what is found; the -0.5038 indicates that solely authored empirical articles rose by 9 percent after the Internet.

THE JOURNAL OF FINANCE AND THE INTERNET

To examine whether my results generalize to another, related journal, Tables 5, 6, and 7 replicate for *JF* the results in Tables 2, 3, and 4 for *JRI*. *JF* was chosen not only because it publishes papers in risk and insurance, providing an alternative outlet for *JRI*-type articles, but also because it differs from *JRI* in a number of significant ways. Up to 1997, *JF* published five issues each year; thereafter, it published six issues (with publication months differing from those when it was a five-issue journal). This provides additional variation in the construction of the Internet effect, breaking apart traditional seasonality (winter, spring, summer, and fall) from "journal issue" effects. In addition—as can be seen from the descriptive means given in Table A1—*JF* has traditionally published more empirical papers than *JRI*. *JRI* published 52.6 percent empirical papers from 1980 through 1995, whereas *JF* published 60.4 percent.

TABLE 5*Journal of Finance* Coauthor Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-3.6683	0.4053***	-2.6738	0.4656***
Internet	4.7747	0.4212***	3.7678	0.5007***
Internet $\times$ empirical	-1.1403	0.0931***	-0.9543	0.1008***
Issue2	-0.0322	0.0511	-0.0116	0.0509
Issue3	0.2069	0.1039**	0.2513	0.1035**
Issue4	-0.1985	0.0487***	-0.1324	0.0476***
Issue5	-0.1571	0.0502***	-0.0720	0.0485
New issue2	0.1880	0.1078*	0.1448	0.1081
New issue3	0.0825	0.1081	0.00199	0.1114
New issue4	-0.2378	0.1507	-0.3133	0.1559**
New issue5	0.2362	0.1108**	0.0939	0.1232
New issue6	-0.3029	0.1093***	-0.4329	0.1289***
Proceedings	-0.3547	0.1086***	-0.3579	0.1084***
Empirical	0.3736	0.0337***	0.3062	0.0327***
Year effects	Included		Included	
-2 * Log likelihood	30,711.490		30,819.933	

Note: Sample period: 1980 through 2000.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

*Coefficient significance, two-tailed tests = 10%.

Moreover, *JF* experienced a greater jump in the level of empirical research after the spread of the Internet: almost 77 percent of the *JF* articles were empirical after 1998 as opposed to only 54 percent for *JRI* articles. Trends in coauthorship also varied by journal, with a smaller jump exhibited in *JF* (from 55 to 64 percent) than in *JRI* (from 52 percent to 75 percent). Part of these differences may be due to the relatively abbreviated post-Internet data available from *JF*, a full year's less data (in Tables 6, 7 relative to Tables 3, 4) and 3 years' less data for Table 5 (relative to Table 2). This is why the descriptive mean for the Internet variable is so much lower in the *JF* sample than the *JRI* sample. Some differences in the descriptive means may be the result of editorial discretion; others, to differences in emphasis in the two fields.

Whatever the sources of these significant differences, it provides the chance to test my model in a different setting. To control cyclical and secular changes, I again included dummy variables for issues (two sets corresponding to the 1998 shift in journal issues) and year effects in all specifications. (Again, results replacing year effects with a time trend yields quantitatively similar results.) "Internet" in Tables 5, 6, and 7 is measured as described earlier: 0 until December 1995, 1 after December 1998, and a spline function between those dates, although the specific value of this variable, issue by issue from 1996 through 1998, differs from *JRI* values because of differences in the number of issues published and the timing of these issues throughout the year.

Each of my regressions is again presented with the Internet variable, and the Internet variable lagged 1 year (in the right-hand column). The results are generally the same,

TABLE 6*Journal of Finance* New Author Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-2.9337	0.1986***	-3.1636	0.2293***
Internet	1.1264	0.2114***	1.3528	0.2550***
Internet $\times$ coauthor	-0.9092	0.0862***	-0.9561	0.0959***
Coauthor	0.6900	0.0197***	0.6890	0.0190***
Empirical	0.2975	0.0184***	0.2825	0.0179***
Internet $\times$ empirical	-0.8351	0.0844***	-0.7637	0.0937***
Internet $\times$ coauthor $\times$ empirical	1.0208	0.0942***	1.0826	0.1070***
Issue2	-0.0771	0.0261***	-0.0743	0.0261***
Issue3	0.1367	0.0552**	0.1379	0.0551**
Issue4	0.0558	0.0248**	0.0567	0.0244**
Issue5	0.0278	0.0255	0.0317	0.0248
New issue2	0.0305	0.0503**	0.0214	0.0509
New issue3	-0.1149	0.0522	-0.1559	0.0547***
New issue4	-0.1015	0.0807	-0.1541	0.0844*
New issue5	0.0257	0.0504	-0.0496	0.0598
New issue6	-0.2080	0.0552***	-0.2775	0.0693***
Proceedings	-0.2340	0.0577***	-0.2348	0.0577***
Year effects	Included		Included	
-2 * Log likelihood	13,7930.06		13,7938.97	

Note: Sample period: 1980 through 2000.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

*Coefficient significance, two-tailed tests = 10%.

although unlike Tables 2, 3, and 4 for *JRI*, where the lagged value fits better, in Tables 5, 6, and 7, the unlagged-value specifications for the Internet variable generally fit better in the *JF* models than the lagged-value specifications. One other major difference between *JRI* and *JF* is that *JF* published in one issue each year the proceedings (papers given at) of their annual meetings. Over the sample period, the proceedings issue varied (from the second to third issue before the move to the six-issue format). I include a dummy variable for the proceedings issue to capture possible differences in the types of articles submitted.

Coauthorship

Table 5 indicates important seasonal variations in the number of coauthored regressions, with the end-of-the-year issues exhibiting fewer coauthored papers than other issues during the year (unlike *JRI*, which had more coauthored papers in its year-end issues). The chance of the paper being coauthored decreases by 8.7 percent if the paper comes from a proceedings issue. Also, empirical papers are about 9.2 percent more likely to have coauthors than papers without regressions before the Internet, but the effect of empirical papers on coauthorship fell to 5.1 percent after the Internet was in place. By contrast, for *JRI*, the effect of empirical papers on coauthorship rose from 20.3 percent before the Internet to 22.5 percent after the Internet.

TABLE 7

Journal of Finance New Authors and the Internet: The Empirical Papers Sample
(Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-2.8602	0.2197***	-2.8143	0.2540***
Internet	0.6369	0.2288***	0.6128	0.2799**
Internet × coauthored	0.0813	0.0522	0.0945	0.0588*
Coauthored	0.7344	0.0249***	0.7387	0.0237***
Issue2	-0.1864	0.0308***	-0.1818	0.0308***
Issue3	0.3223	0.0682***	0.3318	0.0681***
Issue4	0.0730	0.0295**	0.0862	0.0289***
Issue5	-0.0531	0.0301*	-0.0362	0.0290
New issue2	0.00304	0.0565	-0.0161	0.0571
New issue3	-0.1107	0.0564**	-0.1434	0.0595**
New issue4	0.00586	0.0968	-0.0361	0.1010
New issue5	-0.0803	0.0550	-0.1330	0.0655**
New issue6	-0.0835	0.0607	-0.1480	0.0769*
Proceedings	-0.4919	0.0715***	-0.4929	0.0715***
Year effects	Included		Included	
-2 * Log likelihood	99,119.874		99,123.439	

Note: Sample period: 1980 through 2000.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

*Coefficient significance, two-tailed tests = 10%.

The Internet's effect on coauthorship is larger for *JF* than it was for *JRI*: papers written after 1998 have almost a 98.8 percent higher chance of being coauthored than those written before 1996, with an addition reduction of 28 percent increase if the paper is empirical. This suggests the Internet has had a profound effect on the way *JF* articles are produced, consistent with the predictions of my model. (Although the Internet × empirical interaction moves in the opposite directions for *JF* as it does for *JRI*.)

New Authors

Table 6 provides evidence that the Internet has increased new authors at *JF*. The implied increase in new authors (using all the interactions, calculated at the overall sample means from Table A1) is 5 percent after the implementation of the Internet. This is as predicted, although the effect of the Internet on new authors is considerably smaller than for *JRI*.

Table 7 is much the same as Table 6, except that I have restricted the sample to those papers that are empirical only. Thus eliminating the genre effect, the Internet × co-author interaction represents the impact of the Internet on solely authored research just through the specialization effect: a significant, negative coefficient on the interaction indicating more solely authored empirical research after the implementation of the Internet (as was the case for *JRI*); a positive coefficient, the opposite. Although the coefficient is positive, it is statistically insignificant. Again, the response of empirical research to the expansion of the Internet was different for *JRI* than for *JF*.

CONCLUDING OBSERVATIONS AND FUTURE DIRECTIONS

Trends in *JRI* and *JF* research articles indicate the Internet has increased the number of coauthored articles and increased the number of new authors. In this sense, it has democratized research. This is consistent with the work of Kim, Morse, and Zingales (2006), indicating that department-specific research externalities in the top 25 schools in economics and finance have diminished since the advent of the Internet. Former site-specific externalities have been internalized over the Internet as communication and coordination costs have been drastically lowered. This has increased the quantity of research, but raised its quality as well, holding the number of new journals constant. It is easier to do good research because of the Internet, but as a result, it may be harder to get tenure.

Although Kim, Morse, and Zingales (2006) used departmental decade-specific fixed effects in various productivity regressions to proxy the effect of the Internet, I have used e-mail notations in the NBER working paper series to construct my proxy. I have considered how the expansion of the Internet might affect coauthors and new authors through two margins: one margin is the substitution of theoretical and empirical work as the Internet might differentially affect the cost of producing research in each of these genres. I called this the genre affect. There is also the effect of specialization within genre, where a's and c's get together to do empirical research (Figure 1), or e's and g's get together to do theoretical research (Figure 2). There is another dimension I have not discussed but which may be as large as these other two margins (I am grateful to the *JRI* editors for pointing this out to me): submissions by authors outside of North America, that is, foreign submissions. The Internet may not only have changed the way academic articles are produced by changing production costs, but it may have also changed the way these articles get to the editorial wholesalers by changing transportation costs as well. If the Internet increased access to the publication market from foreign authors, it would reinforce predictions of the model with respect to new authors—the Internet will increase the number of new authors getting published. But the effect of reducing the costs of foreign submissions on coauthored work is ambiguous, possibly offsetting the predicted effect that the Internet will increase coauthorship.

Nonetheless, the effect of the Internet on coauthored articles appears to be substantial, as summarized in Table 8: the Internet is associated with a 72 percent increase in coauthored *JRI* articles and a 99 percent increase in coauthored *JF* articles. New authorship also increased with the expansion of the Internet, though the effect was much larger for *JRI* than *JF*, 31 percent for *JRI* versus 5 percent for *JF*. Since the new author effect in Tables 3 and 6 confound the influence of switching between genres, as well as specialization within genre, in Tables 4 and 7 I replicated the empirical analysis of new authors but restricted the analysis to empirical papers. This means that the specialization effect for new authors recorded in the right hand column of Table 8 accounts for most of the change, as the difference between the right-hand column (specialization) and the middle column (specialization and genre effects) are virtually the same.

This implies that academic publication technology has changed: the Internet has made specialization increasingly important for meeting the quality standards of journals. It is increasingly difficult for solely authored articles to be published, suggesting that historical standards for tenure (which frequently expect a certain minimal number of

TABLE 8

Estimated Partial Derivatives for Coauthors and New Authors

	$y = 1$ if Coauthor Full Sample		$y = 1$ if New Author Full Sample		$y = 1$ if New Author Empirical Sample	
	JRI (2)	JF (5)	JRI (3)	JF (6)	JRI (4)	JF (7)
$\frac{\partial \text{prob}(y=1)}{\partial \text{Internet}} =$	.7174	.9883	.3114	.0504	.2770	.0776
$\frac{\partial \text{prob}(y=1)}{\partial \text{empirical}} =$	.2255	.0562	-.0053	.0302	—	—
$\frac{\partial \text{prob}(y=1)}{\partial \text{coauthor}} =$	—	—	.1821	.0748	.1415	.0846

Notes: Calculated from the table indicated in parentheses in the third row, using mean values of the respective variables for the derivatives involving interactions.

solely authored articles) need to be reevaluated. This also suggests that solely authored research is even more impressive than it used to be.

This supposes that quality standards have increased with the expansion of the Internet. Future research ought to consider testing this possibility. One difficulty with testing it is that the number of journal pages devoted to insurance-related research has not been held constant. In 1993, the *Journal of Actuarial Practice* started publication, whereas in 1997, in the midst of the expansion of the Internet, two new journals were started: *North American Actuarial Journal* and *Risk Management and Insurance Review*. Another problem in testing the effect of the Internet on article quality is the difficulty of getting a good proxy for article quality. Several come to mind. Suppose we are thinking of evaluating an article by Joe Smith. Then citations within the last X years to his article would be counted if made by other authors (i.e., the citation of Joe Smith in an article by Brigham Young would be counted, but not the self-citations that Joe Smith makes of his own work in future articles).

Choosing the citation X-window is difficult: articles published in the more distant past always get cited more frequently because they have been around the longest, so the researcher would want to make citation window the same length for all articles to avoid this “duration” bias. If the citation window is too long (say 7 years in our JRI sample or 4 years for the JF sample), then there will not be any post-Internet observations (observations from 1996 and later). On the other hand, using any shorter window, such as the number of citations to Joe Smith’s article 2 years after its publication runs the risk that its true impact will not be measured. Moreover, the Internet itself would be expected to change the speed of article impact—through the Internet, on such sites as JSTOR, an electronic depository of research journals, or working papers now more readily available on various Web sites. More articles should be cited because more researchers know about them after the Internet.

Other proxies for article quality might include the number of rejected manuscripts, the institutional ranking of the submitting author (i.e., is it a top 10 school?), or simply the citations of Joe Smith’s article in the top-rated journals. Whatever choice is made and however future researchers approach these problems, the one thing that is certain is that the Internet will play an important role in that research.

APPENDIX**TABLE A1**Means for *Journal of Finance* (JF) Analyses

Variables	Overall Means		Means Until December 1995		Means After December 1998	
	Means	Std. Dev.	Means	Std. Dev.	Means	Std. Dev.
Coauthor	0.5713	0.4950	0.5494	0.4977	0.6396	0.4822
Empirical	0.6485	0.4776	0.6044	0.4892	0.7692	0.4233
Internet	0.1264	0.3022	0	0	1.0	0
Internet lagged	0.0915	0.2562	0	0	0.9139	0.1140
Issue2	0.2303	0.4211	0.2640	0.4410	0	0
Issue3	0.2150	0.4109	0.2470	0.4314	0	0
Issue4	0.1475	0.3547	0.1601	0.3668	0	0
Issue5	0.1503	0.3575	0.1652	0.3715	0	0
New issue2	0.0173	0.1307	0	0	0.1531	0.3617
New issue3	0.0173	0.1307	0	0	0.1621	0.3702
New issue4	0.0208	0.1430	0	0	0.2072	0.4071
New issue5	0.0167	0.1281	0	0	0.1531	0.3617
New issue6	0.0180	0.1333	0	0	0.1621	0.3702
Proceedings	0.3291	0.5454	0.3611	0.5698	0.2072	0.4071
Pages	19.7049	10.9931	16.9132	9.2787	34.0270	10.6099
New ^a	0.1306	0.3370	0.1280	0.3341	0.1428	0.3501

^aThe new-author averages come from a different base than the previous statistics, since coauthored articles generate more than one observation for the new-author counts, but the statistics above only generate one observation per article (and some articles may be written by both old and new authors).

TABLE A2*Journal of Risk Insurance* (JRI) Coauthor Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-1.0411	0.8520	-3.0510	0.8406***
Internet	1.6706	0.8600*	3.6752	0.8496***
Internet × empirical	0.2596	0.1340*	0.4548	0.1358***
Issue2	0.6836	0.0883***	0.6343	0.0887***
Issue3	0.0504	0.0817	-0.0197	0.0820
Issue4	0.8554	0.0946***	0.7293	0.0958***
Symposium	0.6554	0.1120***	0.6340	0.1100***

(continued)

TABLE A2
(Continued)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Empirical	0.8581	0.0917***	0.7993	0.0847***
Year effects	Included		Included	
–2 * Log likelihood	7096.997		7073.429	

Note: Sample period: 1990 through 2003.

***Coefficient significance, two-tailed tests = 1%.

*Coefficient significance, two-tailed tests = 10%.

TABLE A3
JRI New Author Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	–3.7988	0.3737***	–3.2306	0.3438***
Internet	1.8202	0.3834***	1.3002	0.3559***
Internet × coauthor	–0.1961	0.0997**	–0.2257	0.1041**
Coauthor	1.3433	0.0520***	1.3052	0.0479***
Empirical	0.0634	0.0438	–0.0197	0.0399
Internet × empirical	0.1265	0.1137	0.2268	0.1218*
Internet × coauthor × empirical	–0.7160	0.1147***	–0.7171	0.1281***
Issue2	–0.0699	0.0427	–0.0818	0.0430*
Issue3	–0.2041	0.0428***	–0.1891	0.0434***
Issue4	0.0519	0.0457	0.0538	0.0476
Symposium	–0.2612	0.0526***	–0.2156	0.0513***
Year effects	Included		Included	
–2 * Log likelihood	30,563.499		30,597.158	

Note: Sample period: 1990 through 2001.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

*Coefficient significance, two-tailed tests = 10%.

TABLE A4*JRI* New Authors and the Internet: The Empirical Papers Sample (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	−4.5714	0.4760***	−3.5283	0.4532***
Internet	3.1935	0.5002***	2.1982	0.4814***
Internet × coauthored	−0.8564	0.1151***	−0.8438	0.1214***
Coauthored	1.2702	0.0676***	1.1849	0.0625***
Issue2	−0.1292	0.0542**	−0.1248	0.0545**
Issue3	−0.2892	0.0538***	−0.2684	0.0556***
Issue4	−0.2411	0.0624***	−0.2030	0.0637***
Symposium	−0.4198	0.0679***	−0.3742	0.0678***
Year effects	Included		Included	
−2 * Log likelihood	18628.497		18646.684	

Note: Sample period: 1990 through 2001.

***Coefficient significance, two-tailed tests = 1%.

**Coefficient significance, two-tailed tests = 5%.

TABLE A5*JF* Coauthor Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	−4.9213	0.4353***	−3.1254	0.4747***
Internet	6.0951	0.4532***	4.2562	0.5111***
Internet × empirical	−1.3050	0.1037***	−0.9950	0.1087***
Issue2	−0.4190	0.0701***	−0.3503	0.0690***
Issue3	−0.4712	0.0711***	−0.3484	0.0690***
Issue4	−0.6826	0.0718***	−0.5053	0.0679***
Issue5	−0.5809	0.0749***	−0.3354	0.0695***
New issue2	0.1673	0.1079	0.1291	0.1081
New issue3	0.0398	0.1084	−0.0287	0.1116
New issue4	−0.6517	0.1050***	−0.7137	0.1125***
New issue5	0.1650	0.1116	0.0389	0.1240
New issue6	−0.3960	0.1104***	−0.5022	0.1300***
Proceedings	—	—	—	—
Empirical	0.5132	0.0508***	0.3457	0.0476***
Year effects	Included		Included	
−2 * Log likelihood	18920.977		19073.336	

Note: Sample period: 1990 through 2000.

***Coefficient significance, two-tailed tests = 1%.

TABLE A6*JF* New Author Logit Regressions (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-2.9791	0.2065***	-3.0982	0.2317***
Internet	1.1691	0.2193***	1.2842	0.2575***
Internet × coauthor	-0.6856	0.0890***	-0.7725	0.0979***
Coauthor	0.4976	0.0280***	0.5268	0.0259***
Empirical	0.3973	0.0278***	0.3481	0.0259***
Internet × empirical	-0.9535	0.0878***	-0.8524	0.0962***
Internet × coauthor × empirical	1.0209	0.0943***	1.0966	0.1071***
Issue2	-0.0877	0.0337***	-0.0785	0.0335**
Issue3	-0.1647	0.0347***	-0.1571	0.0343***
Issue4	-0.0252	0.0342	-0.0183	0.0331
Issue5	0.0270	0.0342	0.0455	0.0324
New issue2	0.0273	0.0503	0.0188	0.0509
New issue3	-0.1223	0.0523**	-0.1640	0.0548***
New issue4	-0.3398	0.0563***	-0.3879	0.0614***
New issue5	0.0173	0.0505	-0.0520	0.0600
New issue6	-0.2213	0.0555***	-0.2791	0.0696***
Proceedings	—	—	—	—
Year effects	Included		Included	
-2 * Log likelihood	90,178.746		90,201.740	

Note: Sample period: 1990 through 2000.

*** Coefficient significance, two-tailed tests = 1%.

** Coefficient significance, two-tailed tests = 5%.

TABLE A7*JF* New Authors and the Internet: The Empirical Papers Sample (Weight = Pages)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-2.5721	0.2266***	-2.5904	0.2560***
Internet	0.3293	0.2363	0.3612	0.2825
Internet × coauthored	0.1894	0.0591***	0.1854	0.0639***
Coauthored	0.6419	0.0344***	0.6639	0.0314***
Issue2	-0.1974	0.0390***	-0.1912	0.0388***
Issue3	-0.1400	0.0399***	-0.1294	0.0395***
Issue4	0.0519	0.0394	0.0663	0.0379*
Issue5	0.0578	0.0378	0.0755	0.0357**

(continued)

TABLE A7
(Continued)

Variables	Internet Effect		Lagged Internet Effect	
	Coefficient	Standard Error	Coefficient	Standard Error
New issue2	0.00378	0.0565	-0.00996	0.0571
New issue3	-0.1065	0.0564*	-0.1334	0.0596**
New issue4	-0.4756	0.0651***	-0.5092	0.0709***
New issue5	-0.0671	0.0552	-0.1078	0.0658
New issue6	-0.0634	0.0609	-0.1125	0.0772
Proceedings	—	—	—	—
Year effects	Included		Included	
-2 * Log likelihood	70,264.047		70,266.800	

Note: Sample period: 1990 through 2000.

*** Coefficient significance, two-tailed tests = 1%.

** Coefficient significance, two-tailed tests = 5%.

* Coefficient significance, two-tailed tests = 10%.

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