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Thomas J. Miles

Tom Ginsburg

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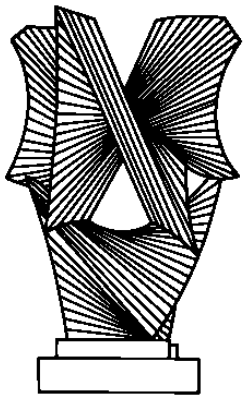

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Tom Ginsburg and Thomas J. Miles[†]
The University of Chicago Law School

Introduction

Peanut butter and jelly. Abbott and Costello. Hall and Oates. Cooter and Ulen. History is replete with great partnerships in which the whole seems to exceed the sum of the parts. What is it that makes a great partnership in legal scholarship? This paper sets out to understand the determinants of coauthorship in law.

Legal scholarship, of course, is a subset of scholarship in general, and so we need to situate the analysis in a broader perspective. Historically, most scientific writing in all fields was sole-authored until the mid-twentieth century.[1] Since then, many fields have witnessed an increase in the frequency of coauthorship. As coauthorship has burgeoned, so too has a literature on the causes, consequences, and ethics of coauthorship.[2] Much of this literature focuses on the discipline of economics, but attention has recently turned to the incidence of coauthorship in law.[3] Casual empiricism, and earlier studies, suggest an apparent trend toward coauthorship in law, notwithstanding early advice to younger scholars *not* to coauthor.[4] The causes and implications of the trend are not fully understood. In particular, the role of interdisciplinary scholarship, such as law and economics, and empirical work in driving the trend toward coauthorship has not been analyzed.

In this paper we set out to understand the determinants of coauthorship in legal scholarship, and we give particular attention to the influence of interdisciplinary legal

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[1] M. Greene, *The Demise of the Lone Author,* 450 NATURE 1165 (2007); L. D. Claxton, *Scientific Authorship: Part 2. History, Recurring Issues, Practices, and Guidelines*, 589 MUTATION RESEARCH/REVIEWS IN MUTATION RESEARCH 31 (2005).

[2] See, e.g., Jason W. Osborne and Abigail Holland, *What Is Authorship, And What Should It Be? A Survey Of Prominent Guidelines For Determining Authorship In Scientific Publications,* 14 Practical Assessment, Research and Evaluation 1 (2008), available at http://pareonline.net/pdf/v14n15.pdf

[3] Tracey E. George and Chris Guthrie, *Joining Forces: The Role of Collaboration in the Development of Legal Thought*, 52 J. Legal. Educ. 559 (2002); Paul H. Edelman & Tracey E. George, *Six Degrees of Cass Sunstein: Collaboration Networks in Legal Scholarship,* 11 Green Bag 2d 19 (2007); *see* also Paul H. Edelman & Tracey E. George, *Sunstein 1s and* 2s, *in* THE GREEN BAG ALMANAC AND READER 473 (Ross Davies ed., 2008).

[4] Robert Abrams, *Sing Muse: Legal Scholarship for New Law Teachers,* 37 J. Legal Education 1, 6 (1987) (young legal scholars should never coauthor because of concerns about shared credit and increased time required.)

scholarship, including empirical legal studies. In part I, we review the existing theories of academic collaboration, and we draw out the empirical implications for legal academics. A key prediction of this literature is that intellectual collaboration rises with scholarly specialization. As knowledge grows, a subject may become increasingly complex, and greater and more specific intellectual inputs may be necessary to make a contribution. The likelihood that a single person possesses all of the human capital necessary to produce a contribution falls, and collaboration rises. In effect, collaboration represents a greater division of labor as the size of the scholarly "market" grows.

In legal scholarship, interdisciplinary work tends to be more specialized than general legal scholarship because it draws on a different academic literature and it often applies unfamiliar methodologies. Among interdisciplinary approaches in law, empiricism appears particularly specialized relative to more conventional legal scholarship. Quantitative analysis is a methodology that historically has not been part of legal curriculum, and even now, it is rare for a legal academic to have graduate training in these methods. A plausible prediction is that by virtue of its higher degree of specialization, interdisciplinary, and particularly empirical, work will more often be collaborative than general legal scholarship.

In Part II, we test this prediction by examining patterns of coauthorship in two sets of legal academic publications. First, we examine all articles published in the "top fifteen" law reviews between 2000 and 2010. We find wide variation across these reviews in the incidence of coauthored and interdisciplinary articles. We confirm the patterns that other investigators have detected in subsamples of these reviews: the presence of upward trends in coauthorship and empiricism in law reviews.[5] Parallel upward trends, however, do not tell us if the two phenomena are related. To test the specialization hypothesis, we examine whether the growth in both coauthorship and empiricism are connected, and we find that they are. The increase in empirical articles accounts for a substantial share of the growth in coauthored articles.

In Part III, we examine two prominent, faculty-edited journals specializing in law & economics: the *Journal of Legal Studies* and the *Journal of Law, Economics & Organization*. We focus on these journals because they offer a long time series, and they are "bellwethers" of mainstream law & economics scholarship. Coauthored articles are far more common in these journals than in the general-interest, student-edited law reviews, a fact which itself is consistent with the specialization hypothesis. Strikingly, the data show that the share of non-technical articles in these journals has plummeted since 1989. With the expansion of empiricism and formal modeling in these journals,

[5] Shari Seidman Diamond and Pam Mueller, Empirical Legal Scholarship in Law Reviews, 6 Ann. Rev. Soc. Sci. 581 (2010) (empiricism); Michael Heise, An Empirical Analysis of Empirical Legal Scholarship Production, 1990-2009, __ Ill. L. Rev. __ (2011) (this volume) (empiricism); Theodore Eisenberg, The Origins, Nature, and Promise of Empirical Legal Studies and a Response to Concerns, __ Ill. L. Rev. __ (2011) (this volume) (empiricism); Edelman and George, infra n.3 (coauthorship); Guthrie and George, infra n.3 (coauthorship).]

coauthorship has risen substantially. These results strongly support the view that specialization, and specifically the demand for empirical legal scholarship, has contributed to the coauthorship trend in law.

A second prediction of the literature on intellectual collaboration is that as the opportunity cost of a scholar's time rises, the implicit price of collaborating with her increases. For example, a colleague who previously may have been satisfied with an acknowledgment in the "dagger footnote" for her comments on a draft may instead demand coauthorship credit. We call this the compensation theory of coauthorship. The advent of empirical legal studies increased the value of empirical skills in legal academia and thereby improved the bargaining position of empiricists. Although we do not test the prediction that acknowledgement credits will be elevated into coauthorship, we test an alternative hypothesis about the compensation of collaborators. When the value of a coauthor's contribution increases, she might demand deviation from the norm of alphabetical ordering of authors. A more prominent placement of a scholar's name would signal the importance of her scholarly input. We examine deviations from the alphabetical ordering of names in coauthored papers. Among both the law review and the faculty-edited journals, we find some evidence that these deviations are more common for empirical papers than for other papers. This pattern does not appear to reflect a different disciplinary norm because economics tends to follow the alphabetic norm, and there is no evidence of deviation from the norm for articles involving formal mathematical models.

The results suggest that legal scholarship in the past decade has undergone an unprecedented transformation marked by the rapid growth of interdisciplinary, especially empirical, work. This article builds on the work of prior investigators in documenting this pattern. But, what has heretofore gone relatively unnoticed is that this shift in legal output is also accompanied by a change in the means of scholarly production. A legal empiricist, in contrast to the more traditional faculty member who labors in isolation, is likely to produce scholarship through a partnership. In Part V, the paper concludes with conjectures on some broader consequences of this shift for legal academia.

I. Why Coauthor?

A. Leading Theories and Additional Considerations

The question of what drives scholarly collaboration is not new. The literature has identified four leading factors that influence the decision to coauthor. The first is the increased complexity of scientific fields, with associated demands for specialization. This is partly driven by scientific progress, but also a result of the labor conditions for researchers. As higher education enrollments and budgets have expanded, there are more professors. The need for research faculty to carve out a distinctive niche for their scholarly careers leads to more specialization, requiring collaboration to produce research

of publishable quality.[6] The distinctive skills of a collaborator may permit an academic to produce work that she would not able to produce on her own. Two authors with different specialties are likely to play a complementary role in a team production function. From this perspective, which we call the *complementarity* theory of coauthorship, predicts a continuous, and possibly accelerating, trend toward collaboration.

A second theory treats coauthorship as a means of compensating colleagues for input. The opportunity cost of a scholar's time has increased, raising the market price of presubmission comments on manuscripts by colleagues. An oft-cited possibility is that colleagues who would formerly be willing to provide uncompensated comments on manuscripts must now must be offered coauthorship credit in return for their constructive comments.[7] An analogous prediction is that a colleague's input may be so valuable that she may garner a lead authorship as a public acknowledgement of the importance of her contribution. We call this theory, developed in the context of economics, the *compensation* account of scholarly collaboration. It emphasizes the collective nature of scholarly production, but does not imply any increase in quality relative to the former equilibrium of sole-authorship with uncompensated input from colleagues.[8] Rather, it is a prediction of how the rewards to intellectual teamwork will be distributed. When a certain input becomes more valuable, it will command a higher (implicit) price.

A third possibility is that quality may be enhanced through coauthored work. Collaboration may improve quality when there are increasing returns to specialization, as conjectured above under complementarity theory. In addition to joint contributions to production brought by people with different scholarly profiles, coauthors might increase the assessment of reliability of the paper. If the conditions for the Condorcet jury theorem apply, more coauthors would indicate that more people thought the paper was worth claiming [partial] credit for. It also means, presumably, that multiple authors have carefully evaluated the data and argument. For a journal editor, this is a signal of quality: not one but two or more authors are willing to stake their reputation on the accuracy and quality of the paper. This should lead to higher quality research, ceteris paribus. Indeed, there is some evidence from economics that coauthorship leads to higher output of better quality.[9]

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[6] Andy H. Barnett, Richard W. Ault, David L. Kaserman, *The Rising Incidence of Coauthorship in Economics: Further Evidence*, 70 REV. ECON. STAT. 539 – 543 (1988); John M. McDowell and Michael Melvin, *The Determinants of CoAuthorship: An Analysis of the Economics Literature*, 65 REV. ECON. STAT. 155 – 160 (1983).

[7] Barnett, Ault and Kaserman, supra n. 6; see also See also David Laband and Robert Tollison, *Intellectual Collaboration,* 108 J. Pol. Econ. 632 (2000) (emphasizing multiple forms of collaboration besides coauthorship).

[8] Compensation theory can be seen as consistent with the collaboration theory, as it simply describes the division of credit between two producers of a collaborative product. Collaborative work of constant quality now merits coauthorship as a price for inducing the second producer to contribute, whereas it would not have in an earlier era.

[9]See Durden and Perri, supra n. 11 (coauthorship enhances productivity in total and per-capita article production); see also Raymond D. Sauer, *Estimates of the Returns to Quality and Coauthorship in*

A fourth prominent explanation for collaboration relates to the uncertainty of the editorial review process. Having two authors to review a manuscript and provide input might make for a better article, but will also facilitate market saturation if two people are working in closely aligned fields.[10] Diversification reduces the risk of rejection from journals, and is particularly attractive given shorter tenure clocks and longer review periods by journals. It also may increase the chances of a "home-run" paper, if we think that academic influence is distributed with a long right tail. In other words, if a few papers have a large impact, authoring more papers increases the probability that one will produce such a paper. This *diversification* theory emphasizes strategic factors in the decision to coauthor, and so implies no increase in quality relative to sole-authored work.

None of these theories from the literature has been definitively accepted, and empirical tests of them are rare.[11] These theories address the benefits of collaboration or the distribution of the benefits between coauthors. The costs of collaboration have received less attention, but they warrant mentioning. Perhaps the first of these is the cost of finding a scholarly match. The increase in the size of the academic profession in recent years means that there is a larger pool from which to find suitable coauthors,[12] and the impact of this growth on the cost of collaborating is ambiguous. A larger pool may reduce the cost of collaborating because it raises the likelihood that an academic with a particular specialty exists. At the same time, the larger pool from which to choose a collaborator may raise the search cost of finding the well-suited academic partner.

Perhaps the most obvious cost of coauthorship is the time and energy expended managing the partnership, which we call coordination costs. These costs include direct expenditures such as telephone calls and traveling for meetings. They also include intellectual efforts such as reviewing and editing one another's work and integrating disparate parts of a paper.[13] Technological advances have surely lowered these costs. Word processing features such as "track changes" ease the process of writing. A consequence of email and the internet is that the geographic proximity of a collaborator is much less relevant than in the past.

Less directly observable are the costs of reaching an agreement on the substance of the article or the structure of its argument. Part of this cost is incurred up front in the decision to form a scholarly partnership. The collaborators must have an initial agreement on the aims and scope of the research project and a plan for the division of labor.

Economic Academia, 96 J. POL. ECON. 855 (1988) (Collaboration through formal coauthorship increases the quantity or quality or both of one's professional productivity, which has market value); Matthias Sutter and Martin Kocher, *Patterns of coauthorship among economics departments in the USA*, 36 APPLIED ECON. 327 (2004) (Quality of coauthors' institutions, measured by rankings of institutions, has a significant impact on the number of coauthored papers in top economics journals).

[10] Barnett, Ault and Kaserman, supra n. 6.

[11] See Garey C. Durden and Timothy J. Perri, *Coauthorship and Publication Efficiency,* 23 Am. Econ. J. 69 (1995).

[12] J. Hudson, *Trends in multi-authored papers in economics*, 10 J. ECON. PERSP. 153 – 158 (1996).

[13] Abrams, supra n. 4 ("Integrating two peoples' work into a single cohesive product consumes additional hours.")

Negotiation over objectives and duties may be costly. As the collaboration progresses, unexpected obstacles may be encountered, and unanticipated results emerge. Differences of opinion as to the direction of the research effort may develop, and it may be necessary for coauthors to engage in explicit renegotiation over which research claims will be advanced and how responsibilities will be divided. In the extreme, when collaborators cannot reach agreement, it may imply the dissolution of the research partnership. It is not obvious whether technological changes raise or lower the likelihood of disagreements between a given set of authors. But it is possible that technology may facilitate the sorting of potential collaborators such that the members of resulting partnerships are better matched.

An additional cost of collaboration is the familiar agency problem. A collaboration is a partnership, and when a partner's contribution requires costly effort, she may contribute less than promised or expected. To curtail her free-riding off the efforts of others, members of the collaboration must monitor each others' contributions. Yet, monitoring itself is costly, and in some instances, it may not be possible because of unobservability or unverifiability. Collaborators may be geographically distant , and even when physically proximate, it is unlikely they directly observe how much effort each is contributing. Even if labor hours were known, it may be hard for a collaborator to assess the effort entailed in a partner's contribution. Imagine a collaboration between a physicist and a poet. The physicist likely cannot judge whether the few lines of haiku contributed were tossed off quickly or the product of deep reflection and arduous burnishing. As interdisciplinary collaborations often join together scholars with divergent skill sets, the trend toward interdisciplinary scholarship in law may expand the incidence of agency problems in coauthorships in legal academia.

Another cost of collaboration is the diminution of credit. Inputs of author effort are not directly observed, and consequently, outsiders cannot easily tell which author contributed the most to an article or book. A common rule of thumb is to divide credit equally among coauthors. Thus, each author of a paper of quality Q will be assigned Q/n of credit, where n is the number of coauthors. [14] Although we do not observe directly the rewards to scholarship or the efforts of authors, this rule of thumb has immediate implications for the relationship between inputs and payoffs of collaboration. For example, in order to make it worthwhile for an author to invest the same amount of effort in an article with *n-1* coauthors as she would in a single-authored article, the total payoffs to the coauthored article must equal or exceed, by a factor of *n,* the average payoff of the sole-authored paper. Alternatively, if the payoff to an author of joining a collaboration with *n-1* coauthors is less than *1/n*th of a solo-authored article, the author's contribution (in terms of effort or time) must be less than *1/n*th that of a solo-authored article. As

[14] James Lindgren and Daniel Seltzer, *The Most Prolific Professors and Faculties*, 71 CHI-KENT L. REV 791 (1996); Bernard Black and Paul Caron, *Ranking Law Schools: Using SSRN to Measure Scholarly Performance*, 81 INDIANA L. J. 83 (2006) (both counting giving fractional credit to each coauthor.)

effort and payoffs are not directly observable, we cannot tell which of these possibilities (coauthoring earns higher rewards) or (coauthoring requires less effort) occurs most often.

A caveat is that an unequal division of credit among coauthors may be unavoidable. A strong norm is to refer to collaborations of two authors by listing their names (e.g., Cooter and Ulen). But when the number of collaborators is greater than two, the tendency is to refer to the collaborators by the name of the first author with all other coauthors tucked into the catchall phrase "et al." (e.g., Black, et al.)[15] In this appellation, only the lead author's name is mentioned, and he may receive a disproportionate amount of the publicity and reputational benefit of the collaboration. A very small number of collaborations have successfully acquired designations that reflect a relatively equal crediting of authors, such as abbreviations (e.g., LLSV) or Esperanto-like acronyms (e.g., "McNollgast").[16] But these instances are rare. The relative penalty of having one's name disappear into an "et al." tag offers another reason why coauthorships in law are almost entirely pairings rather than larger combinations.[17]

Coordination costs and credit diminution create a potential adverse selection problem. It is unlikely that any partnership enjoys a perfectly equitable division of labor (and the coordination costs of ensuring that it does would be very high). A consequence is that Q/n of credit overcompensates some members of a collaboration for their contributions. Ceteris paribus, this may imply an adverse selection problem in scholarly collaboration. The pool of potential coauthors may contain a higher number of slackers than the overall academic population. This could lead to less overall effort being put into coauthored papers. One solution is to coauthor repeatedly with the same partners, which makes it likely that any inequalities on particular projects will even out over time. Repeated interactions may enhance the ability of coauthors to monitor each other's effort. This solution also means that the partners can develop a joint reputation, raising the external assessment of Q relative to their sole-authored work. This would help overcome any moral hazard problems that arise after a partnership has begun.[18] A reason to doubt the

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[15] Bernard Black, Charles Silver, David Hyman & William Sage, *Stability, Not Crisis: Medical Malpractice Claim Outcomes In Texas, 1988-2002*, 2 J. EMP. L. STUD. 207 (2005). But see, e.g., Kathryn Zeiler, Charles Silver, Bernard Black, David Hyman & William Sage, *Physicians' Insurance Limits and Malpractice Payments: Evidence from Texas Closed Claims,* 1990-2003, 36 J. L. STUD. S9 (2007).

[16] Rafael La Porta, Florencio Lopez-de-Silanes & Andrei Shleifer*, Corporate Ownership Around the World*, 54 J. FIN. 471 (1999); Rafael La Porta, Florencio Lopez-de-Silanes & Andrei Shleifer, 106 *Law and Finance*, J. POL. ECON. 1113 (1998); Mathew D. McCubbins, Roger G. Noll, and Barry R. Weingast, Administrative Procedures as Instruments of Political Control, 3 J.L. ECON. & ORG. 243 (1987); Mathew D. McCubbins, Roger G. Noll, and Barry R. Weingast, *The Political Origins of the Administrative Procedure Act*, 15 J. L. ECON. & ORG. 180 (1999).

[17] This suggests that bluebook citing conventions might impact coauthorship practices. We do not test this proposition in this article. Further work might examine the covariance of disciplinary citation practices with coauthorship rates.

[18] We expect that the pattern of coauthor relationships over time bears further examination from this perspective. A long term coauthoring relationship probably implies declining marginal coordination costs

severity of any adverse selection problem is that for every slacking academic who seeks a coauthorship, there must be a partner willing to furnish inputs for less than a proportionate share of the rewards. An academic anticipating that she would be shortchanged in this manner would decline to collaborate. A key prediction of the canonical adverse selection model is that this fear of disadvantageous trades would create a vicious cycle resulting the unraveling of the "lemons market." [19] As we observe the incidence of collaboration rising rather than declining, we doubt any adverse selection problems are severe. Moreover, many coauthored works are undoubtedly of very high quality, including some of the most respected and influential contributions in law and in law & economics.[20]

This discussion has alluded to the fact that most collaborations comprise two scholars but others involve more. We do not offer a sharp prediction on the optimal number of coauthors. But many of the considerations mentioned above would are directly relevant. For example, coordination costs may increase dramatically, possibly even exponentially, as the number of coauthors rises above two. In a group of three, each coauthor must monitor two others; and if a potential slacker is identified, the two reliable coauthors must decide who will enforce the coauthorship norms. This may explain why the modal number of authors on a coauthored paper is two; but disciplinary norms in this regard vary. In psychology, for example, more coauthors is the norm.[21]

We readily acknowledge that we do not have a generally accepted theory about what academics seek to maximize.[22] The complementarity theory described above implicitly assumes that scholars maximize quality of output. If producing better work requires coauthorship, then academics will coauthor. Diversification theory, on the other hand, assumes that academics maximize reputational payoff, which might be only loosely correlated with actual quality. Reputation might be enhanced by the sheer number of publication produced. In this case, coauthoring might expand the number of lines on the resume that a scholar can obtain, and at the same time, it may make it difficult for external assesors of outputs, such as academic deans and departments, to evaluate the

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over time; on the other hand, there may be also be declining marginal returns to the relationship as complementarities get exploited.

[19] George Akerlof, "The Market for Lemons": Quality Uncertainty and the Market Mechanism, 84 Q. J. ECON. 488 (1970).

[20] Prominent partnerships in law and economics we might mention include William Landes and Richard Posner, Frank Easterbrook and Daniel Fischel, Robert Cooter and Tom Ulen, and Louis Kaplow and Steven Shavell.

[21] See e.g., Tom R. Tyler, Lawrence Sherman, Heather Strang, Geoffrey C. Barnes, and Daniel Woods, *Reintegrative shaming, procedural justice, and recidivism: The engagement of offenders' psychological mechanisms in the Canberra RISE drinking-and-driving experiment,* 41 L. SOC. REV. 553 (2007); *Law and Society Review*, 41(3), 553-586; H.J. Smith, T.R Tyler., Y.J. Huo, D. J. Ortiz, and E.A. Lind, *The self-relevant implications of the group-value model: Group membership, self-worth, and procedural justice*, 34 J. EXPERIMENTAL SOC. PSYCH. 470 (1998). See generally George and Guthrie, supra n. 3, at 567 ("Roughly a quarter of social science collaborations involved three or more authors.").

[22] Compare Richard A. Posner, *What Do Judges and Justices Maximize? (The Same Thing Everyone Else Does*), 3 SUPREME COURT ECONOMIC REVIEW, Volume 1 (1993).

individual contribution. Suppose, alternatively, that academics seem to maximize leisure, which would require them to claim credit for as much work as they can produce for as little effort as possible. As noted above, collaboration allows free-riding, and the increase in coauthorship may reflect greater leisure consumption. The difficult task of identifying the preferences of academics lies beyond the scope of this paper, but we recognize that our results raise these questions.

B. Implications for Interdisciplinary Scholarship in Law

What do these theories suggest about the role of interdisciplinarity and specialization as drivers of coauthorship in legal scholarship? Consider first complementarity theory, which suggests in part that the increase in specialized technical skills required in a particular area is likely to increase the demand for coauthorship. By bringing together knowledge from different fields, interdisciplinary work requires a diverse set of skills. It is costly for a single individual to acquire all the necessary skills, and collaboration may be more convenient among two or more individuals when each of them furnishes a different skill. Some disciplines have seen significant increases in technical specialization associated with the rise of modern computing and statistics program. Other disciplines have not. It is perhaps unsurprising that Guthrie and George show that coauthorship rates in elite law reviews are higher than those in humanities journals in philosophy, English and history, but are lower than those in psychology, economics, sociology or political science. The latter disciplines rely heavily on statistics; the tools of philosophy, English and history on the other hand, have not changed in any fundamental way. Thus technological change contributes to the increased gains from cooperation in certain disciplines and not others.

Law falls somewhere in the middle of this disciplinary spectrum. Historically, law was closer to the humanities end of the technological spectrum than the social science end. For example, George and Guthrie report that from 1970-1999, coauthored work comprised 15% of law review articles.[23] This contrasts with more than 60% of social science articles in leading journals.[24]

But legal academia is changing. First, there has been a trend toward socio-legal and interdisciplinary scholarship. More and more entry-level candidates have Ph.Ds, typically from social sciences like economics or political science. These scholars are more trained in technical methods, and may bring with them norms of coauthorship from other disciplines. Furthermore, there are natural gains from collaboration because the new PhDs have skills that older legal scholars lacked, while older scholars have more experience and knowledge of law. Although it is beyond the scope of this paper, we

[23] George and Guthrie, supra n. 3, at 562-66.

[24] Id. Durden and Perri report an estimate that by 1985, 52% of published articles in economics were coauthored. Garey C. Durden and Timothy J. Perri, *Coauthorship and Publication Efficiency,* 23 Am. Econ. J. 69 (1995).

suspect that the increase in coauthorship in law is partly due to a wider diversity of academic training and consequently skill sets on law faculties.

As interdisciplinary fields (such as law & economics) mature, a contribution that makes an advance over existing knowledge requires an ever greater degree of technical proficiency. This intensifies the incentives for coauthorship because, when a scholar lacks knowledge of a relevant field, an offer of coauthorship credit may be necessary to induce a colleague to provide input on research project. Authors possessing especially valuable skills sets may even demand that their names appear first in the sequence of authors, deviating from the norm of alphabetic ordering.More technical sophistication raises the value of collaboration and hence, the "price" of careful, time-consuming comments to a colleague may rise to coauthorship credit. On the whole, compensation theory may explain any contribution of interdisciplinary and empricial work to the increase in coauthorship.

The quality theory, on the other hand, does not appear to offer as strong an incentive for coauthorship in empirical work as does skill complementarity. If technical complexity *alone* is the driver of coauthorship, we ought to observe an increase in coauthorship in some areas of law and not others. After all, there is considerable variation in the degree of complexity across subjects in law. Tax law, for example, is often considered highly complex. If technical complexity alone were driving coauthorship, rates of coauthorship in complex legal fields such as tax should rise. In contrast, if increasing returns from cross-disciplinary work are driving the coauthorship phenomenon, increases in coauthorship should be concentrated in empirical and interdisciplinary work.

Similarly, diversification theory does not seem to have special salience for interdisciplinary work. Collaboration may allow an academic to manage more effectively the risks of scholarship by trimming downside risks and expanding upside gains. A collaborator may act as a de facto reviewer or editor and thus reduce the risks of rejection from journals. But this rationale seemingly applies to all forms of legal scholarship and is not limited to or uniquely applicable to empirical or interdisciplinary work.

Collaboration provides the opportunity to free-ride off the efforts of others. This opportunity may be greater in interdisciplinary work as monitoring is less effective when a scholar lacks proficiency in a collaborator's field. As the respective skills of collaborators become more specialized, each is less equipped to assess the (labor or effort) cost of the other's contribution, and the inability to monitor may provide greater opportunities for shirking. But we have no reason to think that the pool of scholars producing interdisciplinary and empirical work is more likely to be motivated by consumption of leisure than are other legal scholars. To the extent that authors of interdisciplinary and empirical work may include people who have spent years getting a Ph.D., sometimes in addition to a J.D. degree, one might presume the opposite: these coauthors have sent a costly signal of willingness to work hard and invest in novel skills.

To summarize, all of the various theories of coauthorship that we outlined above appear relevant to coauthorships in law. Yet, complementarity theory seems to predict a particularly strong relationship between collaboration and the growth of empirical and interdisciplinary scholarship. We might also expect compensation theory to have some explanatory power, and a prediction is that among coauthored articles, empirical pieces will be more likely to deviate from the alphabetic ordering of authors. In contrast, the quality, diversification or leisure consumption theory may be relevant, but they do not offer an account as to why interdisciplinary scholarship, especially empirical work, would be accompanied by greater incidence of coauthorships.

II. Data and Empirical Approach

We examine two sets of data located through the ISI-Web of Science™. First are all articles published in the top 15 law reviews during 2000-2010,[25] and second are all articles published in two faculty-edited, interdisciplinary journals, the *Journal of Legal Studies* (JLS) and the *Journal of Law, Economics & Organization* (JLEO), during the period 1989-2010.[26] Our predictions that interdisciplinarity, particularly empiricism, may influence coauthorship necessitated examination of both data sources. We chose to examine both student- and faculty-edited journals in order to have confidence that we were capturing trends in interdisciplinary scholarship rather than epiphenomena of particular journal markets.

We examined the top 15 law reviews rather than limiting our attention to a few top reviews in order to assess coauthorship practices in a large swath of legal academia.[27] We chose *JLS* and *JLEO* because they are influential interdisciplinary journals with long histories. Their age provides the opportunity to look at patterns in scholarship over a relatively long time horizon – two decades.[28] An additional consideration was the position these journals occupy at the intersection of law and social science, particularly economics. Another highly regarded interdisciplinary journal with a long history, the *Journal of Law & Economics*, tilts more clearly in the direction of economics than law, and for decades it has regularly published sophisticated empirical work.[29] In contrast, we believe *JLS* and *JLEO* are bellwethers of trends in interdisciplinary legal scholarship,

[25] Definitions of "top" are inherently arbitrary. We define the top fifteen law reviews as comprising Harvard Law Review, Yale Law Journal, Stanford Law Review, University of Chicago Law Review, Columbia Law Review, New York University Law Review, Michigan Law Review, University of Pennsylvania Law Review, Virginia Law Review, Cornell Law Review, California Law Review, Duke Law Journal, Northwestern University Law Review, Texas Law Review, and the Georgetown Law Journal.

[26] For another study of empirical work in the *JLS*, see William Landes, *The Empirical Side of Law and Economics,* 70 U. CHICAGO L. REV. 167 (2003).

[27] Compare Ian Ayres and Frederick K. Vars, *Determinants of Citations to Articles in Elite Law Reviews,* 29 J. Leg. Stud. 427 (2000) (Harvard, Yale, Stanford).

[28] For this reason, we chose not to examine *ALER* and *JELS*, which are influential but of more recent provenance.

[29] William M. Landes, The Empirical Side of Law & Economics, 70 U. Chi. L. Rev. 167, 173 (2003).

particularly law & economics. Our sample includes 7,540 items published in law reviews, including 2,785 major articles, and 1,030 articles in the two peer-reviewed journals.

We define coauthorship in the same manner as Edelman and George. Their criteria is that a coauthor is any individual listed in the "by" line along with at least one other person. This excludes contributors identified as "with" as well as editors or those in a footnote. Papers can, of course, have multiple coauthors. This definition seems intuitive, and is consistent with the economics literature on coauthorship. From the ISI-Web of Science™, we generated citation reports for each article in our data. A limitation of this source is that its coverage of citations in social science journals is more extensive than its coverage of citations in law reviews.[30] For this reason, the results may be biased in the direction of favoring articles of interest to social scientists. If so, articles of greater interest to social scientists, such as those containing formal models and empirical analyses, might have higher than average citation rates. But, as we shall show in Part III, this is not the case, and this pattern suggests that any bias arising from the use of this citation data base rather than a legal data base appears modest.

We coded each article for its legal subject and methodology based on a brief inspection of the physical volume. Our subject categories were Corporate/Securities Law, Criminal Law, International/Comparative Law, Private/Commercial Law, and other Public Law. For the faculty-edited journals, we expanded this to include another category, which we called "Other," to encompass articles that addressed economic behavior generally and not specific to any area of law. With regard to methodology, we were particularly interested in the presence of the two technical methods most common to law and economics: empirical methods and formal mathematical models. We counted an article as empirical if it presented a novel analysis of data. We excluded from this category articles that merely included tables or figures which had previously been published elsewhere, such as in a government report. We coded an article as containing a formal mathematical model if it had at least one numbered equation. To provide a contrast with other types of interdisciplinary scholarship, we attempted to code articles that were methodologically humanities-oriented, such as law & literature, philosophy, and legal history. These techniques are less evident upon inspection, and therefore, we strongly suspect that we undercounted, perhaps severely, the presence of humanities-oriented interdisciplinary work.

[30] Citations by courts are not recorded.

We examine these data in summary statistics, and then we turn to multiple regression analysis to control for the possible multiple influences on coauthorship. Specifically, we estimate the probability that an article is coauthored in an equation of the form:

$$\Pr(Y_{it}) = \sum_{j}^{\text{method}} \alpha_{ij} + \sum_{k}^{\text{subject}} \delta_{ik} + \sum_{l}^{\text{type}} \gamma_{il} + \sum_{m}^{\text{position}} \rho_{im} + \alpha_i^T t + \varepsilon_{it},$$

where Y_{it} is an indicator variable that takes the value one when article i published in year t is coauthored and zero otherwise. We focus on collaboration as a binary choice because we observe relatively little variation in the size of coauthorship teams. The vector X_{it} contains continuous characteristics of the article, including its (log) page length and the average number of citations per year it has received since publication. For the faculty-edited journals, we collected a richer set of article characteristics including the number of figures, whether it includes an appendix, the number of tables in an empirical article, and a count of the numbered equations in an article with a formal model. As we show below, the faculty-edited journals featured more technical articles, and we gathered these variables to capture more of the variation in technological sophistication of those articles. [31]The term α_i^T is a coefficient on a time trend, t, and because fluctuations in the propensity to coauthor may not vary linearly with time, this term is replaced in some specifications with fixed effects for the year of publication. The remaining explanatory variables are indicator variables. The α_{ij} terms are a series of binary variables for law review article i's methodology: whether it is empirical, contains a formal model, or appears to be humanities-oriented. An article employing conventional legal analysis is the omitted category of methodology. The terms δ_{ik} are binary variables for the subject matter of the article: criminal law, international/comparative Law, private/commercial law, other public law, and for faculty-edited journals, the category of "other." Articles in corporate and securities law are the omitted category for subject. The terms γ_{il} measure the type of law review article: student note or comment, book review, tribute or memorial, and symposium article. The final set of indicator variables, ρ_{im}, measures the "running order" of the article in each volume and issue. They consist of binary variables for whether the article appeared first in a volume or first in an issue. Lastly, ε_{it} is an error term.

We estimate a similar equation in examining the alphabetical ordering of authors with collaborative articles. There, the sample is restricted to coauthored articles, and the dependent variable is the probability that coauthored paper has an ordering of names that deviates from the alphabetical ordering of last names. The same set of control variables is included in those equations.

[31] We believe that the count of equations for articles with formal models is a noisy measure of a model's sophistication. Articles are not consistent in their numbering conventions. Some articles number only a subset of the equations they include, and this tendency appears particularly pronounced for game theoretic articles.

III. Law Reviews

A. Summary Data

Table 1 reports summary statistics on the law reviews. It presents two cuts at the data: column (1) includes all the articles published, and column (2) includes only "major articles." Excluded from the category of major articles are book reviews, student notes and comments, tributes and memorials, and symposium pieces. As column (1) shows, these other types of publications compose 73% of the items published in the law reviews. There are strong reasons to treat these other types of publications differently. First, authors of major articles tend to be faculty, while students usually write notes and comments. The purpose of notes and comments is arguably primarily pedagogical rather than scholarly. Book reviews are arguably different as well. Although they can approximate a full article in length and scope, their purpose is to review an existing work rather than to make a stand-alone contribution. Tributes and memorials also serve a different purpose. They often lack scholarly content, and even when they do, it often is a summation of the honoree's prior work rather than a novel, independent contribution. They sometimes contain personal reminiscences, and they tend to be brief. Articles appearing in symposia are a harder call, but here we treat them as separate from major articles. Symposium publications tend to result from invitations rather than the submission process governing regular issues, and they tend to be shorter than major articles. It is also doubtful whether a symposium contribution carries the same heft in a junior scholar's tenure evaluation as a major article does. We tend to think it does not, and for that reason, we treat law review symposiums as different from major articles.

Table 1 shows that major articles differ from the other categories of publication across several dimensions. The incidence of coauthorship nearly doubles when the data are limited to major articles. This pattern is consistent with the fact that student notes and comments are nearly always single-authored. Table 1 shows that among major articles, nearly 20% were coauthored during the decade. This aggregate figure masks considerable temporal movements in coauthorship during the decade.[32] Figure 1 shows the faction of major articles in law reviews that were coauthored by year. The time series do not show a monotonic increase, but an upward trend in coauthorship can be detected. In 2000, 15% of major articles were coauthored, and by 2010, this figure was 23%.

Although not reported here, the growth in coauthorship has not been accompanied by an increase in the number of authors on each coauthored article. Of the coauthored articles 86% had two authors, nearly 11% had three authors, and about 3% had three or more authors. While there is some year-to-year fluctuation in the size of coauthorships, there is no pronounced upward trend favoring larger collaborations. In other words, the growth in coauthorships in these law reviews is due to expansion along the extensive

[32] The rate represents an increase from the findings of George and Guthrie, supra n. 3, of a 15% rate for law reviews.

rather than intensive margin. This pattern contrasts sharply with the norms in the physical sciences, where it is common to list all members of a laboratory's research team as authors.

Major articles and other categories of publication also diverge in the frequency with which they employ interdisciplinary methodologies. Major law review articles boast rates of empirical, formal theory, or humanities approaches that are roughly double the rates for all items published in law reviews.. This is perhaps unsurprising because the different types of items published in law reviews tend to follow different conventions. A purpose of a student note or comment is to demonstrate command of law, and law students, whose immediate academic aim is to master the law, are less likely to possess the training necessary to produce interdisciplinary work. Book reviews and tributes tend to follow the essay form and survey and evaluate existing work rather than introduce novel analysis. Symposium pieces are also less likely to be interdisciplinary, perhaps because the restriction of topic or the fixed time-frames of symposiums restrict opportunities to employ other methodologies.

Despite the concentration of interdisciplinary work in major articles,, the use of interdisciplinary methodologies remains scarce in the law reviews. These measures of interdisciplinarity suggest that articles using formal methodologies constitute only a small fraction of the scholarship in law reviews. At first blush, these estimates seem in tension with the widespread belief, which we share, that interdisciplinary scholarship has enjoyed substantial growth in recent decades.[33] On closer inspection, the tension is not as great as it first appears. Figure 1 shows a slight upward trend in the incidence of empirical articles in law reviews. There is some variability over the decade, but the rate of empirical articles rises from slightly more than 5% in 2000 to about 10% in 2010. Still, the low incidence of empiricism even at the end of the decade may surprise critics who believe that legal empirical studies is overdone.[34] An important caveat is our classification scheme does not encompass nontechnical interdisciplinary work. As described above, we suspect our coding of humanities-oriented scholarship undercounts some, perhaps much, of that scholarship. In addition, our coding scheme simply does not incorporate nontechnical law & economics. For example, an article applying economic analysis without a formal, mathematical model is not counted in our measures of interdisciplinary methodologies. Our measures are confined to instances in which technical methods of formal modeling or empiricism. According to these metrics, law review articles infrequently apply more technical interdisciplinary methods.

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[33] See Robert B. Thompson, *Corporate Law's Criteria: Law's Relation to Private Ordering*, 2 Berkeley Bus. L.J. 95, 97 (2005) ("The most dramatic change in law teaching over the last generation has been the growth of interdisciplinary scholarship"); George L. Priest, *The Growth of Interdisciplinary Research and the Industrial Structure of the Production of Legal Ideas: A Reply to Judge Edwards*, 91 MICH. L. REV. 1929 (1993)

[34] Brian Leiter, *On So-called "Empirical Legal Studies" and its Problems,* blog post, available at http://leiterlawschool.typepad.com/leiter/2010/07/on-socalled-empirical-legal-studies.html

Table 1 shows other differences in the types of law review publications. Major articles tend to be longer than student notes, book reviews, and tributes. Page lengths are expressed in natural logarithms in order to place less weight on a few extremely long articles. In log terms, major articles are slightly longer. In actual pages, the average major article is 60 pages, and the average length of the other categories of publication is only 41 pages. This difference is consistent with the common observation that tributes, book reviews, and student pieces tend to be shorter than major articles. Although not shown in the table, coauthorship implies no difference in the average page length of major articles, but the median length of coauthored articles is two pages shorter.

Another difference between major articles and other pieces is that major articles are much more likely to appear first in the "running order" of printed issues. When a law review dedicates an entire issue to a symposium, a symposium piece necessarily occupies the lead position. Tributes and memorials often appear at the beginning of law reviews issues. The data show that consistent with conventional understanding, student notes and book reviews virtually never lead off an issue. In these data, student notes never appear first in the issues.

Major articles are also far more likely to be cited. Column (2) of Table 1 shows that the typical major article is on average nearly two times per year. In contrast, other forms of law review publication receive only fractional citations per year. The typical tribute is cited on average .04 times per year, the typical student note is cited .20 times per year, and the typical book review .46 times per year. Even articles in appearing in symposiums are cited only once per year on average, nearly half of the citations of the "regular" or typical major law review article.

In addition to these differences, there are several dimensions across which major articles and the other categories of publication are similar. Given the manner in which the data were assembled, it is unsurprising that the average age of articles is the same across the two samples. Perhaps most interestingly, Table 1 shows that their distribution across legal subjects is almost identical. An important caveat is that our topical coding was relatively crude. More than half the articles ended up in the "public law" category. Nevertheless, the inclusion of student notes, book reviews, symposiums, and tributes does not alter the distribution of law review publications by topic. Other than public law – which we suspect is something of a catch-all category – private and commercial law was the most popular topic, accounting for roughly 20% of the items published. Criminal law represented another 10%. Despite their popularity during the past decade, corporate and international law account for little more than 10% of the published items.

We also observed substantial variation across law reviews in the rates at which they publish coauthored and empirical work. Figure 2 shows that the fraction of major articles that were coauthored and empirical by law review. Chicago led the way on both fronts. The share of its major articles that were coauthored (33%) was more than twice that of NYU (13%). In fact, Chicago exceeded by nearly ten percentage points the next

top venue for coauthorships (Penn). With regard to empiricism, the differences were also substantial. The widest gap was between Chicago, in which 17% of major articles were empirical, and Georgetown, in which around 2% of articles were empirical.

An initial inspection of the law review data provides some support for the prediction of a correlation between collaboration and interdisciplinarity. Figure 3 shows the relationship between coauthorship and the use of interdisciplinary methodologies. Panel A repeats in visual form the information about major articles in column (2) of Table 1, and Panel B shows the distribution of methodology in major articles that are coauthored. The pie charts reveal that the median coauthored article employs no special methodology, but it is much more likely to be empirical than a solo-authored article. The rate of empiricism among coauthored articles is 21.6% in contrast to 9.4% among all major articles. The fraction of formal models also rises slightly, to 5.2% from 3.5%. It suggests that articles presenting formal models are more likely to be coauthored than the traditional law review article, but less likely to be coauthored than an empirical article. In contrast, the presence of humanities methodologies is lower among coauthored articles (2.6% versus 5.2% in the full sample). This pattern is consistent with the low rate of coauthorship in the humanities as mentioned in the introduction.[35]

B. Determinants of Coauthorship

The summary statistics show an upward trend in coauthorship, and to a lesser degree empiricism, in major law reviews. They also reveal that empirical articles are far more likely to be coauthored. To assess whether these relationships persist after controlling for other influences, we turn to regression analysis. As described above, we estimate a series of probit models in which the dependent variable is the whether the article is coauthored or not. The independent variables include the methodological approach, the log of the length of the article, average number of cites per year since publication, and several measures of the qualities of the article including the subject, article type, and placement in the journal. The results are laid out in Table 2. The table reports marginal effects, rather than coefficients, in order to ease interpretation of the estimates. The first two columns analyze the complete sample of all articles published; the last two columns analyze major articles only. To account for the observed time trend we described in Part III.A, we estimate two models for each sample: one including a time trend, and the other including fixed effects for the number of years since publication. All equations also include fixed effects for each law review.[36]

The results are largely consistent with our predictions and the patterns seen in the summary statistics. The estimates show a strong correlation between coauthorship and the presence of empirical analysis in an article. In the full sample, when an article is

[35] *infra*.

[36] Although not reported in the tables, the coefficients for the law reviews are jointly significant with p-values less than .05 in all equations in Tables 2 and 4.

empirical, the likelihood it is coauthored is higher by 16 percentage points, and for major law review articles, the likelihood is 26 percentage points higher. The estimates for other forms of interdisciplinary work are weaker. In the full sample, articles with formal models have a higher probability of coauthorship by three percentage points, and for humanities-oriented articles, the probability is lower by about two percentage points. When the sample is limited to major articles, these differences become slightly larger in magnitude, but they remain much smaller than the effect of empiricism. At most, the presence of a formal model implies a difference in the likelihood of coauthorship of seven percentage points, and humanities implies a difference of less than five percentage points. Because the estimates are less precise in the smaller sample, they lose statistical significance. The results are consistent with the idea that empirical analysis of law provides strong opportunities for collaboration, stronger than other forms of interdisciplinary work such as formal model or humanities.

The probit regressions in Table 2 also include several explanatory variables that might be considered rough proxies for an article's quality: its placement in the running order of an issue and the number of citations it subsequently receives. It is difficult to obtain reliable measures of an article's quality because quality determinations of much scholarship are subjective. Therefore, the measures we employ come largely from academic lore. It is sometimes said that prestige attaches to an article's appearing first in a volume, and if so, law review editors may assign the article they believe to have the highest quality to that spot. The estimates in Table 2 imply that articles leading off a volume are about four percentage points more likely to be coauthored, but the effect is statistically insignificant when the sample is limited to major articles. Articles that appear first in other issues of a volume are no more or less likely to be coauthored.

A second measure of quality is the number of citations an article subsequently receives. This measure is inadequate for many reasons. A citation may be given in order to criticize rather than praise an article. A superfluous citation may be given to a friend, or a deserving citation may be denied to an adversary. One may give citations to one's own prior work to boost its prominence. Despite these and other distortionary practices, a literature analyzing citations and interpreting them as an article's quality or influence has developed.[37] We follow that literature in controlling for citations, and Table 2 shows that the average number of citations an article receives per year correlates positively with coauthorship. But, the estimated effect is small. Taking the largest estimate in Table 2, a doubling of the average number of annual citations for a major article from 1.9 to 3.8 would imply only an 8.4 percentage point increase in the likelihood of coauthorship. On the whole, these measures suggest that empiricism has a stronger bearing on coauthorship than quality.

[37] Theodore Eisenberg and Martin T. Wells, *Ranking and Explaining the Scholarly Impact of Law Schools*, 27 J. Leg. Studies 373 (1998); Ian Ayres and Frederick K. Vars, *Determinants of Citations to Articles in Elite Law Reviews,* 29 J. Leg. Stud. 427 (2000); Theodore Eisenberg and Martin T. Wells, *Ranking and Explaining the Scholarly Impact of Law Schools,* 27 J. Leg Studies 37 (1998).

The subject matter of coauthored work also correlates closely with the incidence of coauthorship. The omitted category is corporate and securities law, and the negative estimates on the indicator variables for other subjects imply that articles on these topics are less likely to be coauthored than corporate and securities articles. The magnitudes of these correlations are relatively modest. The largest – a decline of about 12 percentage points for the average public law article – is smaller than the effect of empiricism. When the sample is restricted to major articles, the estimate for private law loses statistical significance. We suspect that corporate and securities law is not uniquely complex or technical, compared with our other subject categories. Rather, empiricism correlates with subject areas. Only corporate law and private law articles were more likely to be coauthored than singly authored. Other subject categories were less likely to be coauthored.

The positive estimate for the time trend in columns (1) and (3) suggests that the likelihood of articles in top law reviews being coauthored is rising, even after controlling for other characteristics of the article. The estimate from the sub-sample of major articles in column (3) implies that the probability a major article is coauthored rises by ten percentage points every five years, which is a sharper upward movement than was evident in Figure 1. Movements over time in likelihood of collaboration may be linear, and for that reason, the equations in columns (2) and (4) replace the time trend with the more flexible fixed effects for years of publication. The coefficients on the fixed effects for publication years were jointly significant (with p-values less than .05), and this replacement has virtually no effect on the other estimates for other variables.

Table 3 reports the results from a test of the compensatory theory, or the idea that empirical articles are more likely to involve deviations from the norm that author names are alphabetically ordered. The table shows probit regressions on the probability that the sequence of authors names deviates from alphabetical ordering among coauthored articles. Most of the estimates from the full data set are close to zero and statistically insignificant. Two exceptions are large point estimates for tributes and student notes. Perhaps not much credence should be given to them because they are based on a very small number of observations; only 8 tributes and only 7 student notes in sample were coauthored.

The restriction of the sample to major law review articles does not change most of the estimates. Although a few flip sign, they remain modest in size and statistically insignificant. The exception here is the estimate on empiricism. For major law review articles, empiricism is the *only* covariate that is statistically significant predictor of reversal of author order. Moreover, its estimated effect, 8 percentage points, is enormous relative to the baseline rate of non-alphabetic orderings for major, coauthored articles: 16%. The estimate implies that the rate of deviating from an alphabetic ordering is roughly twice as high for empirical coauthored articles as for other types of coauthorships. Interestingly, this pattern does not appear attributable to the importation of

different crediting practices from other disciplines. Ph.D. economists are responsible for much of the recent empirical legal studies, and alphabetic ordering has long been the norm in economics. Moreover, the estimates for formal theory and humanities do not predict sizable or statistically significant differences in name sequencing. The relationship between empiricism and deviations from alphabetical name order does not appear to reflect the migration of different credit conventions from other disciplines. While further investigation is necessary, the results for non-alphabetic ordering are consistent with a high demand for empirical skill commanding a high compensation, though there may be other explanations for the pattern.

IV. Peer Reviewed Legal Journals

A. Summary Data

In this section we compare the qualities of articles published in the JLS and JLEO with major articles published in law reviews. The analysis includes all articles published in the JLS and JLEO. Unlike law reviews, these faculty edited journal do not publish student notes, book reviews, or tributes as law reviews, but they occasionally publish symposiums. To make our results as comparable as possible to the results for law reviews, we present estimates for these journals, both including and excluding symposiums. Symposium pieces compose about 20% of the articles published in these journals over these years. As the results demonstrate, the inclusion of symposium articles has little effect on the observed patterns.

Table 4 presents summary statistics for this sample. There are several contrasts with the law review sample that are immediately apparent: these journals feature more collaborative work, more interdisciplinary work and more technical sophistication. Coauthored articles comprise nearly half of the articles published in these journals during these two decades. This is more than double the rate of coauthorship for major articles in the top law reviews during the past decade.

With respect to technical methodologies, empirical articles account for roughly 30% of the articles in these journals over this period, which is about three times the rate in law reviews during the past decade. More strikingly, articles involving formal models account for 40% or more of the articles in the faculty-edited journals, which is an order of magnitude higher than in the law reviews. Perhaps unsurprisingly for two journals focused on law and economics, humanities-oriented articles were too rare to record as a separate category. Instead, we noted when an article contained both a formal model and empirical analysis. These articles, which are in a sense doubly interdisciplinary, represent less than 10% of the published pieces in these journals.

Figure 4 shows the fluctuations over time in the mix of theory and empirics in the peer reviewed journals. In most years, theory was more common than empirics, but both are well represented. The amount of empirics in the journals has varied from year to year.

For all of the attention that "empirical legal studies" has received, the figure does not show a dramatic surge in the presence of empirical work in these journals. Rather, empirical analyses have been a mainstay of these journals. Articles containing both a formal model and empirical analysis were only a small share of the publications throughout this period.

Figure 5 examines the relationship between technicality and coauthorship over time. It shows the movements in "nontechnical" articles, which we define as articles that contain neither empirical work nor a formal model. Over this period, these journals shifted sharply away from nontechnical articles: the share declined from 40% of articles at the end of the 1980's to less than 10% by 2005.[38] In the last five years, nontechnical articles have remained below 10% of these journals' published output. We believe this dramatic decline reflects the "maturation" of law & economics. Early applications of economics to law could make substantial progress by employing economic ideas at a broad, conceptual level without technical nuance. As early contributions were scrutinized or challenged, it became necessary to specify the precise conditions under which particular results would obtain, and more formal modeling was necessary. Similarly, economic analysis of law generated a welter of predictions about the consequences of laws, and statistical testing of these predictions is necessarily technical. Another factor is that, during the past twenty years, economics itself became more technical in its models and empirics, and these methods migrated into law & economics. Computing costs have declined sharply over his period, and large datasets are readily available on the internet. This means that enormous amounts of data can now be handled at low cost. Off-the-shelf statistical software permits application of sophisticated statistical procedures with ease. All of these factors have spurred more elaborate empirical analyses.

Nontechnical law & economics has not, of course, disappeared from legal academia. For example, it remains a substantial portion of the program at the annual American Law & Economics Association conference. Rather, we suspect that much of that work has migrated to law reviews.[39]

As nontechnical work has vanished from these journals, technical analyses and coauthorship have become more closely correlated. Figure 5 shows that for these journals, as nontechnical articles have become increasingly, general trends in coauthorship are determined almost exclusively by trends in coauthorship in their technical articles. Figure 6 steps back from the time series patterns and examines the relationship between coauthorship and specific methodologies. Panel A repeats in visual form the figures in column (2) of Table 4: the fraction of all major articles by

[38] Figure 5 does not separately break out the trends for each journal. Yet, the data available on JLS extends back to the 1970s, and in those data, it is apparent that the fall in nontechnical articles in that journal is even more pronounced over the longer time period. In the 1980's, more than half of the journal's articles were nontechnical under our definition, and that share falls with a few brief interruptions until the end of our observation period in 2010.

[39] We did not code the law reviews for nontechnical law & economics, because it would be very difficult to identify such work from a brief inspection of the article.

methodology. Panel B of Figure 6 shows the same fractions for coauthored articles. The contrast as not as pronounced as in Figure 3 for law reviews, but some differences are noticeable. Empiricism accounts for a slightly larger share of coauthored articles than all articles (36% versus 31%) as do articles employing both formal models and empirics (6.5% versus 10%). In contrast, nontechnical articles are much less likely to be coauthored. They account for 14% of all articles but only 6% of coauthored articles.

These features of the data made clear that growing technical sophistication was a central trend in these journals. Therefore, we collected several proxies for the technical complexity of articles. Table 4 shows that 37% of all articles in these two journals had at least one appendix, and they had on average 1.6 figure. Even nontechnical articles sometimes had figures, such as supply and demand diagrams.[40] The average length of articles was 25 pages, which is considerably shorter than the 55 pages of the typical law review article. In addition, symposium pieces in these journals averaged about 5 pages shorter than the typical article. Average article length rose slowly but steadily over this period. For example, in the first five years of the 1990's, the average length was 23.3 pages, and in the last five years of the 2000's, it was 28.7 pages. The growing length of articles may be another reflection of the rising degree of technicality, or it may simply indicate the maturation of law & economics. That is, more recent articles have a larger body of existing work to confront and discuss as a prelude to making their own contributions. While far from certain, the slightly lower rate at which articles in these journals are cited (1.3 per year versus 1.9 per year) may indicate that more technical work is less accessible to a wide audience than is the typical law review article.

The distribution of articles across topics in the faculty-edited journals differed slightly from law reviews. The coding of subjects was not fully comparable, because we observed that the faculty-edited journals included some articles that did not pertain to any specific area of law. Rather, they were effectively economics articles. We coded these articles as "Other," and they represented about 10% of the articles in these journals. Private law subjects were more prevalent in the peer-reviewed journals than the law reviews, and the percentage of public law topics is roughly half that in law reviews. These differences are consistent with the close attention economic analysis of law has given to common law subjects such as contracts.

[40] Although not reported here in order to conserve space, we collected other metrics of technical complexity. For example, we found that empirical papers averaged 5.7 tables, and formal papers averaged 16 equations. Our confidence in the estimate of tables is greater than for equations. Counting numbered equations was difficult, because there was some inconsistency across articles in whether every equation was numbered. This was especially true for game-theoretic articles, which while clearly technical, often did not number their equations.

B. Determinants of Coauthorship

As with the analysis of law reviews, we also interrogate the determinants of coauthorship, and run a parallel set of probit regressions on coauthorship and deviations of alphabetical name ordering among coauthored pieces. The first two columns of each table report regression results on the full sample of all articles published in these journals, and the last two columns display results from a sample excluding symposium pieces. The removal of the symposium pieces from the sample has no material effect on the estimates. The estimates in columns (1) and (2) show that after controlling for other factors, a symposium piece is about as likely to be coauthored as a typical article. The point estimate for a symposium piece is slightly negative but not statistically significant.

The estimates for methodology are not exactly comparable to those for the law reviews. For the law reviews, articles not employing any special interdisciplinary methodology were the omitted (or comparison) category. For faculty edited journals, the analogous category would be nontechnical articles. But the precipitous decline in nontechnical articles during this period meant that there were very few observations in this group during the last years of the sample. For that reason, articles with formal models and nontechnical articles constituted the omitted category in Tables 5 and 6.[41] The results show that relative to these groups, articles with empirical work or with both formal modeling and empirics are more likely to be coauthored. The difference ranges from 14 to 18 percentage points, which is slightly smaller than the impact of empiricism on major articles in law reviews. But it must be remembered that the comparison group here includes articles with formal models, and the overall average rate of coauthorship is much higher (49% versus 20%).

In addition, these equations include two additional controls for technical complexity. Estimates for both of those measures are positive and statistical significant. They imply that a one-standard deviation increase in the number of figures in an article corresponds to a three percentage point increase in the probability the article is coauthored. More importantly, the presence of an appendix to an article suggests a ten percentage point increase in the likelihood of coauthorship.

As with the law reviews, the proxies for article quality provide mixed results. Again, an article's page length does not correlate with coauthorship. Average citations per year predict coauthorship, and the magnitude of the estimate is identical to that for law reviews. Oddly, the lead position in the second issue in a volume correlates strongly with coauthorship,[42] but lead position in the first issue of the volume does not. Unlike the law

[41] Although not reported here due to space constraints, we also estimated the equations using only nontechnical articles as the comparison group. The estimates for empirical articles and articles containing both formal theory and empirics were even longer than those shown in Tables 5 and 6. Also, articles with formal theory were more likely to be coauthored than nontechnical articles. These results imply that consistent with Figure 6, any article employing a technical methodology was more likely to be coauthored than a nontechnical article.

[42] These journals have only two regular issues per year.

reviews, the subject matter of the articles does not predict coauthorship. In contrast to the results for law reviews, the point estimates for subject matter are generally smaller, possessing different signs, and statistically insignificant. Lastly, Table 5 shows that as with law reviews, there is an upward trend in coauthorships, even after controlling for other factors. The size of the estimate is half as larger as in the law review sample. But the flatter slope is perhaps not surprising as the average rate of coauthorships for these journals was already much higher than among law reviews.

Table 6 tests the compensation theory for the faculty edited journals. Again, the dependent variable is whether the coauthors deviate from an alphabetical sequencing of names. Only two variables appear to have any impact on this ordering. As with the law reviews, empirical articles were substantially more likely to depart from the alphabetical norm. The rate at which the average coauthored article did not follow alphabetical ordering was seven to eleven percentage points higher than in the comparison group. This difference represents a very substantial increase because on average only 12% of coauthored (non-symposium) articles did not have alphabetical ordering. Interestingly, the estimates for articles containing both theory and empirics are smaller (2 – 4 percentage points) and not statistically significant.

The other significant predictor in these regressions was whether the article was a symposium piece. The estimate reflects the fact that 25% of coauthored symposium pieces in the sample did not have alphabetical ordering. Why this is so is left for future investigation.

V. Implications and Extensions

Coauthorship, we have demonstrated, is indeed on the rise, as earlier analyses have suggested. In keeping with theories of complementarity, it appears that coauthorship is a response to increasingly technical demands in scholarship, as it is found most frequently in the peer-reviewed journals, then in major law review articles, and less frequently observed in lower-status work in law reviews including book reviews, student notes, and symposium pieces. We have also demonstrated that empirical and interdisciplinary work, with their increasingly sophisticated methodologies, are driving much of the coauthorship trend.

We have not directly addressed the normative question about whether the trend toward coauthorshjp is a good thing or not. To the extent coauthorship is driven by the empirical turn in legal scholarship, it will be subject to many of the criticisms directed at that movement. Professor Leiter has recently questioned the trend, even challenging the use of the term "empirical legal studies."[43] If, as our analysis suggests, coauthored empirical work is more technically sophisticated (as demonstrated through more figures and appendices in peer reviewed journals), then there is certainly a risk that it will be

[43] Leiter, *supra* n.34

more difficult for traditional legal academics to understand. This could provoke a backlash in the legal academy, even as the work becomes more accessible to those from other disciplines.

At the same time, our finding about citation counts indicates the possibility that coauthored work is of higher quality overall. A full analysis of the consequences of coauthorship is beyond the scope of this paper. But a finding that coauthored work was of higher quality would be consistent with our analysis, and would help to rebut the complaint our beloved colleague.

Another challenge associated with coauthorship is the assignment of credit among authors. This is a real issue for tenure committees, academic administrators, and other consumers of academic research. Since the precise division of effort in any article is not readily apparent, even to the coauthors, this is a very tough problem to solve. Indeed, one might imagine that the total amount of credit being assigned to coauthored work by external audiences is more than it should be.

Our evidence on name-order reversal suggests that those doing empirical work, in particular, are better able to make the division clear. This may result from the importation of norms from other disciplines, or the fact that empirical authors are more likely to insist on full credit for their specialized skills. It may also be the case that the division of labor is clearer in empirical work than in other kinds of scholarship. One author typically takes the lead in any quantitative empirical analysis, and so the precise division among coauthors is clearer, even to the authors themselves. This allows an easier negotiation over name order.

VI. Conclusion

We have provided an economic theory of coauthorship that emphasizes the crucial role of complementarity, as well as compensation, credit diminution and other factors, in driving the decision to coauthor. Complementarity is affected by the labor market for academics, but also by technological advances that allow for increasingly sophisticated technical work. We thus observe the trend to coauthorship is greatest in disciplines like economics and hard science, and much slower in humanistic scholarship in which the tools of research have not been affected by technical developments. Within law, coauthorship is driven by empirical and inter-disciplinary work that is itself influenced by outside fields, and relies on the same tools that push coauthorship generally. Empirical scholars also seem better able to resolve some of the problems of credit assignment that have been identified as one of the risks of coauthorship. While we do not directly address the quality of coauthored work, our analysis is consistent with the theory that suggests that it is producing more sophisticated, and more influential scholarship, and if this is so we expect the trend to intensify in years to come.

Table 1.
Summary Statistics on Articles in Top Fifteen Law Reviews, 2000–2010

	All Articles (1)	Major Articles Only (2)
Coauthored	.121 (.326)	.201 (.401)
Empirical	.053 (.225)	.094 (.292)
Formal Theory	.021 (.144)	.035 (.185)
Humanities	.033 (.180)	.053 (.223)
(Log) Page Length	3.453 (.837)	3.938 (.624)
First in Volume	.021 (.144)	.043 (.203)
First in Issue	.084 (.278)	.173 (.378)
Tribute	.034 (.182)	--
Symposium	.286 (.452)	--
Book Review	.090 (.287)	--
Student Note or Comment	.290 (.454)	--
Corporate/Securities Law	.051 (.220)	.060 (.237)
Criminal Law	.102 (.303)	.093 (.290)
Int'l / Comparative Law	.059 (.236)	.061 (.239)
Private / Commercial Law	.195 (.391)	.230 (.421)
Public Law	.592 (.481)	.556 (.497)

Time Trend	5.692	5.846
	(3.085)	(3.104)
Citations per Year	1.061	1.931
	(1.1697)	(2.197)
N	7,540	2,785

Note: The columns report means and in parentheses standard deviations. “Major articles” excludes student notes and comments, book reviews, tributes and memorials, and symposium articles.

Table 2.
Probit Regressions on Number of Multiple-Authored Articles in Top Fifteen Law Reviews

	(1)	(2)	(3)	(4)
Empirical	.163**	.164**	.255**	.256**
	(.022)	(.022)	(.033)	(.033)
Formal Theory	.030*	.029*	.067	.066
	(.019)	(.018)	(.047)	(.047)
Humanities	-.024**	-.023**	-.046	-.044
	(.010)	(.010)	(.034)	(.034)
(Log) Page Length	.009**	.009**	-.016	-.016
	(.004)	(.004)	(.013)	(.013)
Average Citations per Year	.011**	.011**	.021**	.022**
	(.002)	(.002)	(.004)	(.004)
First in Volume	.035**	.035**	.039	.041
	(.019)	(.019)	(.039)	(.039)
First in Issue	.001	.001	-.003	-.005
	(.008)	(.008)	(.021)	(.021)
Tribute	-.043**	-.043**	--	--
	(.008)	(.008)		
Symposium	.007	.007	--	--
	(.006)	(.006)		
Book Review	-.018**	-.018**	--	--
	(.007)	(.007)		
Student Note or Comment	-.132**	-.132**	--	--
	(.006)	(.006)		
Criminal Law	-.036**	-.036**	-.107**	-.104**
	(.008)	(.008)	(.025)	(.026)
Int'l / Comparative Law	-.040**	-.039**	-.099***	-.096***
	(.007)	(.007)	(.028)	(.029)
Private / Commercial Law	-.024**	-.022**	-.043	-.042
	(.008)	(.009)	(.030)	(.030)
Public Law	-.045**	-.043**	-.119**	-.118**
	(.011)	(.011)	(.032)	(.032)
Time Trend	.005**	--	.021**	--
	(.001)		(.004)	

Publication Year Fixed Effects?		Yes		Yes
Major Articles Only?			Yes	Yes
N	7,540	7,540	2,785	2,785

Note: The columns report marginal effects and standard errors in parentheses. Regressions also include fixed effects for law reviews. The omitted category of topic is Corporate & Securities Law. Standard errors are clustered on articles. The symbol * denotes statistical significance at the 10% level, and ** denotes statistical significance at the 5% level.

Table 3.
Probit Regressions on Nonalphabetical Ordering of Coauthors
in Articles in Top Fifteen Law Reviews

	(1)	(2)	(3)	(4)
Empirical	.028	.028	.082**	.081**
	(.035)	(.035)	(.043)	(.043)
Formal Theory	-.065	-.062	-.007	-.008
	(.055)	(.055)	(.073)	(.073)
Humanities	-.067	-.089	.045	.028
	(.074)	(.065)	(.109)	(.103)
(Log) Page Length	.002	-.005	.018	.014
	(.020)	(.020)	(.028)	(.027)
Average Citations per Year	-.007	-.007	-.003	-.042
	(.007)	(.007)	(.007)	(.054)
First in Volume	.063	.051	-.040	-.042
	(.079)	(.079)	(.056)	(.054)
First in Issue	-.052	-.050	-.020	-.023
	(.031)	(.037)	(.039)	(.038)
Tribute	.318*	.259	--	--
	(.206)	(.215)		
Symposium	.046	.040	--	--
	(.032)	(.032)		
Book Review	-.024	-.023	--	--
	(.056)	(.055)		
Student Note or Comment	.148	.087	--	--
	(.206)	(.196)		
Time Trend	-.008*	--	-.006	--
	(.005)		(.005)	
Publication Year Fixed Effects?		Yes		Yes
Major Articles Only?			Yes	Yes
N	913	913	560	560

Note: The columns report marginal effects and standard errors in parentheses. Regressions also include fixed effects for law reviews and for subject matter of the articles. Standard errors are clustered on articles. The symbol * denotes statistical significance at the 10% level, and ** denotes statistical significance at the 5% level.

Table 4.
Summary Statistics on Articles in *JLS* and *JLEO*, 1989–2010

	All Articles (1)	Major Articles Only (2)
Coauthored	.464	.496
	(.499)	(.500)
Empirical	.286	.313
	(.452)	(.464)
Formal Theory	.398	.466
	(.490)	(.499)
Both Formal Theory and Empirics	.074	.085
	(.261)	(.278)
(Log) Page Length	3.153	3.216
	(.500)	(.396)
Average Citations per Year	1.381	1.301
	(2.447)	(1.737)
First in Volume	.047	.051
	(.213)	(.212)
First in Issue	.052	.051
	(.223)	(.212)
Symposium	.199	--
	(.400)	
Number of Figures	1.608	1.662
	(2.618)	(2.420)
Any Appendices	.372	.428
	(.484)	(.495)
Corporate/Securities Law	.080	.097
	(.272)	(.296)
Criminal Law	.053	.065
	(.225)	(.247)
Int'l / Comparative Law	.043	.030
	(.202)	(.171)
Private / Commercial Law	.320	.345
	(.467)	(.171)
Public Law	.299	.300
	(.458)	(.458)

Other Topic	.205	.163
	(.404)	(.370)
Time Trend	11.064	11.321
	(6.161)	(6.262)
N	1,030	827

Note: The columns report means and in parentheses standard deviations. “Major articles” excludes symposium articles.

Table 5.
Probit Regressions on Number of Multiple Authored Articles in *JLS* and *JLEO*

	(1)	(2)	(3)	(4)
Empirical	.135**	.142**	.152**	.161**
	(.038)	(.039)	(.040)	(.041)
Both Formal Theory and Empirics	.145**	.153**	.165**	.179**
	(.065)	(.063)	(.063)	(.063)
(Log) Page Length	.030	.025	.007	-.0002
	(.038)	(.039)	(.050)	(.051)
Average Citations per Year	.021**	.021**	.020**	.020**
	(.009)	(.009)	(.012)	(.012)
Number of Figures	.023**	.024**	.013**	.014**
	(.007)	(.007)	(.006)	(.008)
Any Appendices?	.113**	.108**	.098**	.093**
	(.036)	(.037)	(.038)	(.039)
First in Volume	.044	.041	-.009	-.007
	(.074)	(.073)	(.079)	(.080)
First in Issue	.167**	.175**	.145**	.156**
	(.072)	(.071)	(.078)	(.077)
Symposium	-.061	-.064	--	--
	(.045)	(.049)		
Criminal Law	.046	.050	.073	.080
	(.095)	(.096)	(.094)	(.095)
Int'l / Comparative Law	-.029	-.029	-.118	-.116
	(.098)	(.103)	(.114)	(.120)
Private / Commercial Law	-.044	-.047	-.005	-.019
	(.070)	(.072)	(.074)	(.076)
Public Law	.003	.008	.032	.034
	(.067)	(.067)	(.067)	(.068)
Other Topic	-.018	-.015	.005	.004
	(.067)	(.067)	(.068)	(.067)
Time Trend	.012**	--	.010**	--
	(.003)		(.003)	

Publication Year Fixed Effects?		Yes		Yes
Major Articles Only?			Yes	Yes
N	1,030	1,030	827	827

Note: The columns report marginal effects and standard errors in parentheses. Regressions also include fixed effects for law reviews. The omitted category of topic is Corporate & Securities Law. Standard errors are clustered on articles. The symbol * denotes statistical significance at the 10% level, and ** denotes statistical significance at the 5% level.

Table 6.
Probit Regressions on Nonalphabetical Ordering of Coauthors
in Articles in *JLS* and *JLEO*

	(1)	(2)	(3)	(4)
Empirical	.070**	.095**	.069**	.107**
	(.035)	(.041)	(.035)	(.043)
Both Formal Theory and Empirics	.018	.046	.023	.041
	(.054)	(.068)	(.056)	(.067)
(Log) Page Length	.002	.009	.003	.009
	(.039)	(.044)	(.048)	(.054)
Average Citations per Year	-.004	-.004	.004	.007
	(.004)	(.004)	(.010)	(.010)
Number of Figures	-.001	-.003	.001	.004
	(.004)	(.005)	(.005)	(.007)
Any Appendices?	.020	.005	.041	.025
	(.029)	(.003)	(.031)	(.035)
First in Volume	-.079	-.093	--	--
	(.031)	(.027)		
First in Issue	-.020	-.005	-.069	-.077
	(.049)	(.060)	(.043)	(.045)
Symposium	.150**	.127**	--	--
	(.064)	(.066)		
Time Trend	-.007**	--	.007**	--
	(.002)		(.002)	
Publication Year Fixed Effects?		Yes		Yes
Major Articles Only?			Yes	Yes
N	479	479	389	389

Note: The columns report marginal effects and standard errors in parentheses. Regressions also include fixed effects for law reviews and for the subject matter of the articles. Standard errors are clustered on articles. The symbol * denotes statistical significance at the 10% level, and ** denotes statistical significance at the 5% level.

Figure 1.
Trends in Empiricism and Coauthorship at Major Law Reviews, 2000–10

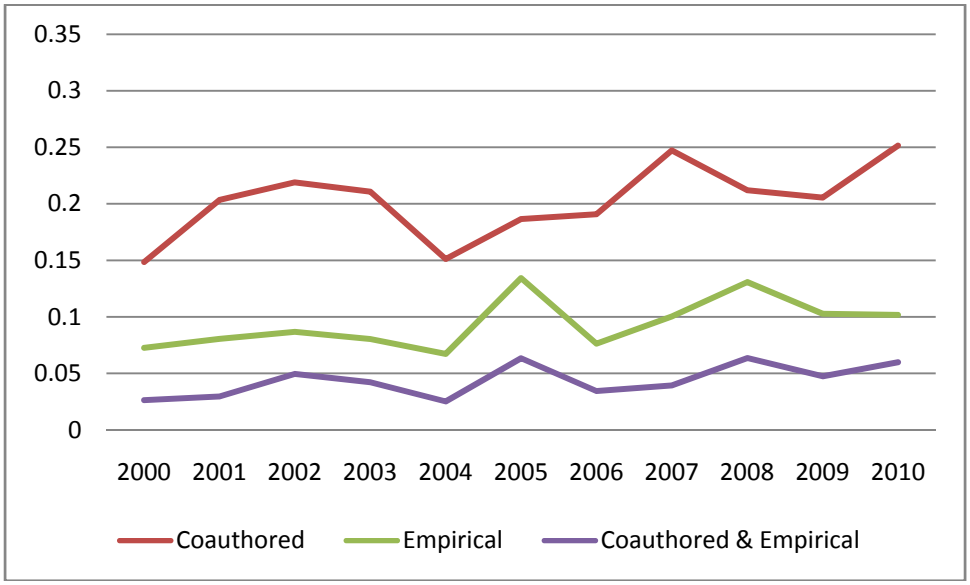


Figure 2.
Variation across Major Law Reviews in Coauthorship and Empiricism, 2000–10

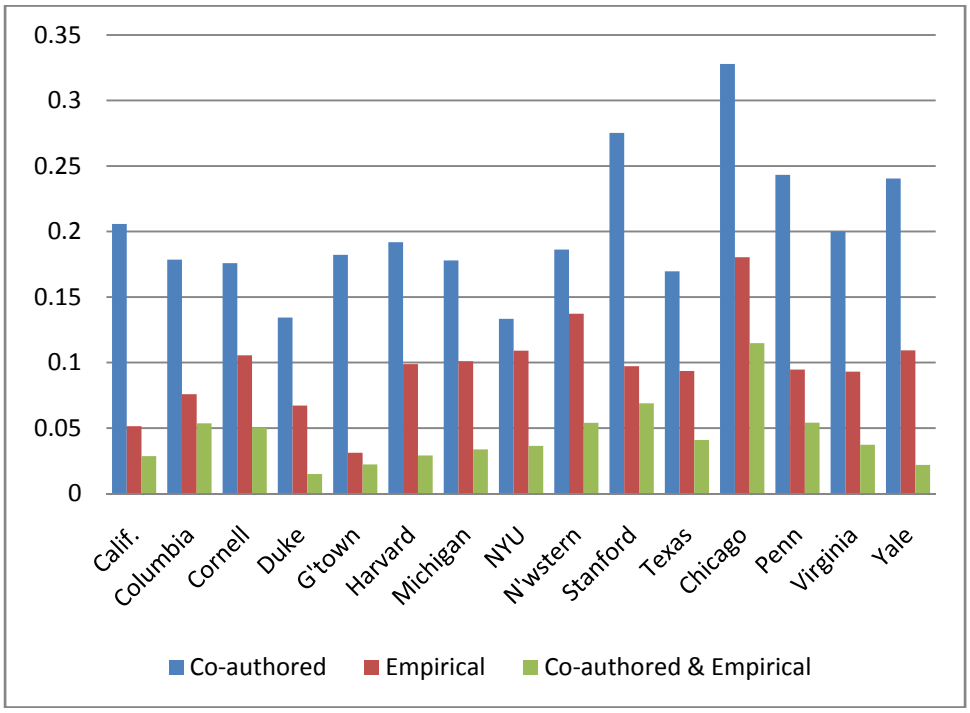
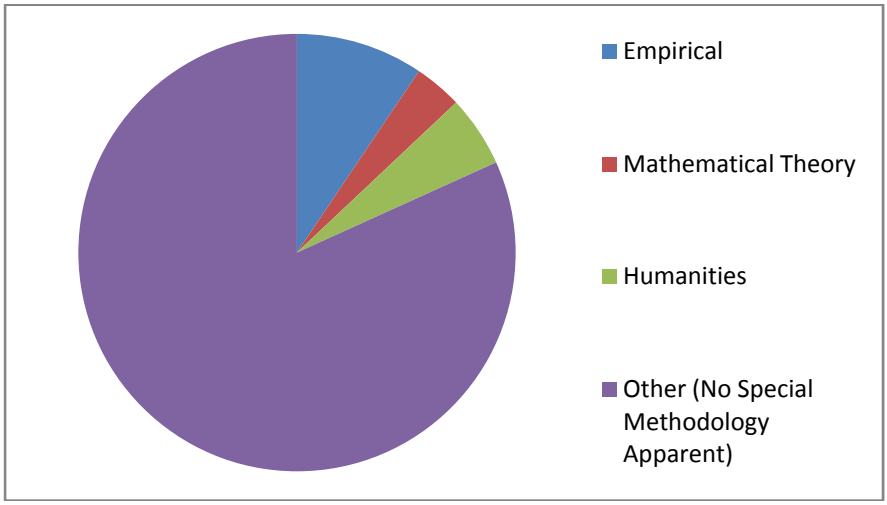


Figure 3.
Coauthorship and Methodology at Major Law Reviews, 2000-10

A. Fraction of Major Articles



B. Fraction of Major Coauthored Articles

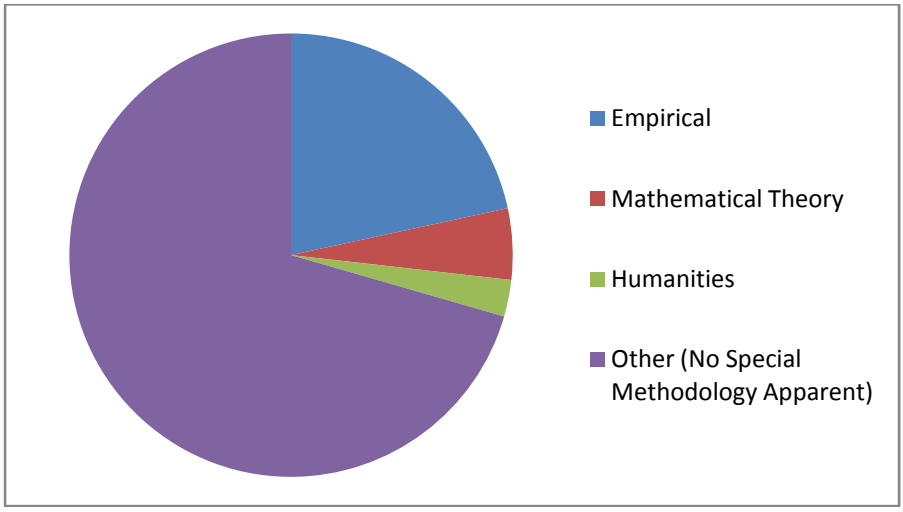


Figure 4.
Trends in Methodology at *JLEO* and *JLS*, 1989–2010

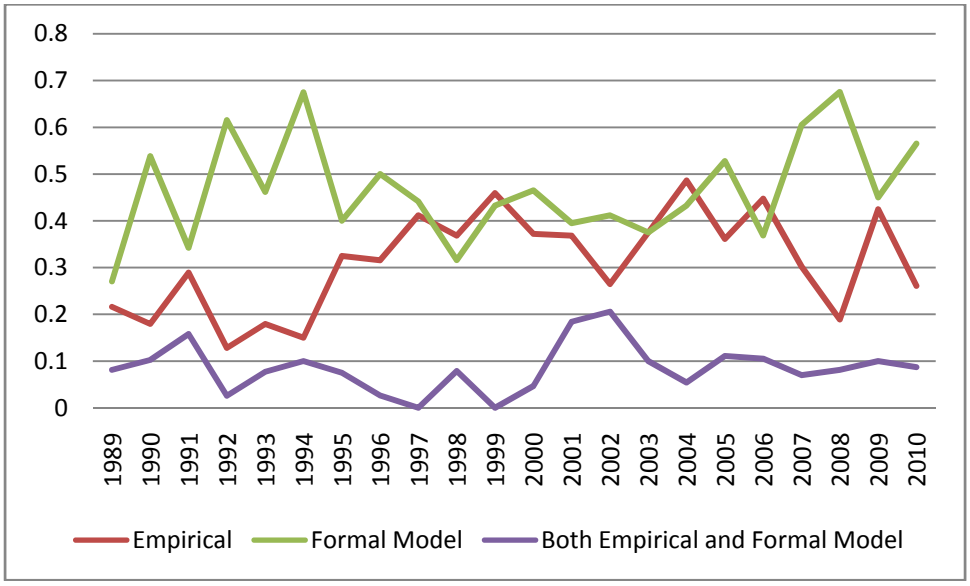


Figure 5.
Trends in Methodology and Coauthorship at *JLS* and *JLEO*, 1989–2010

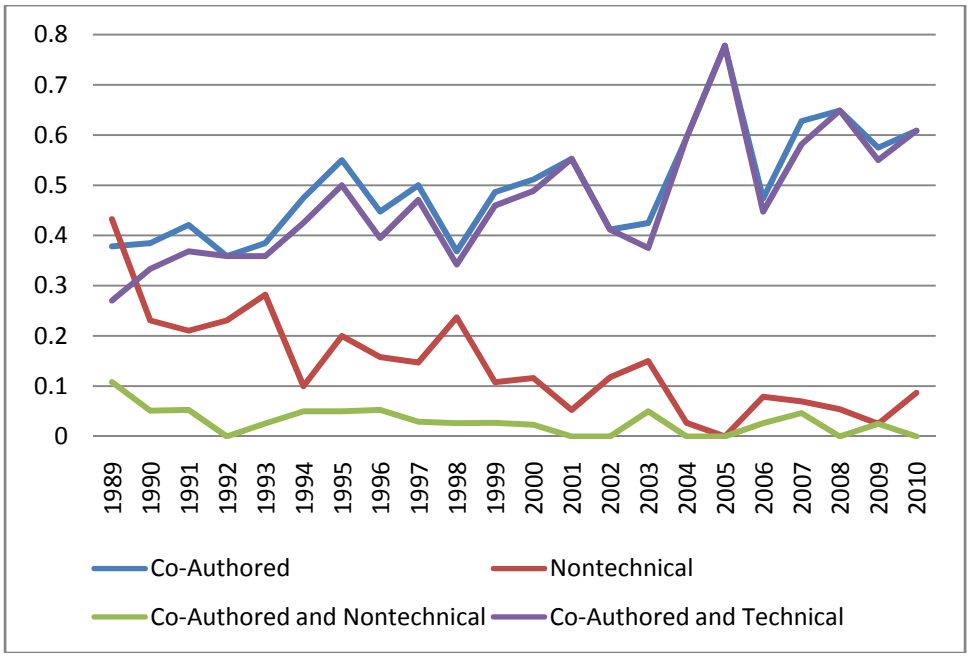
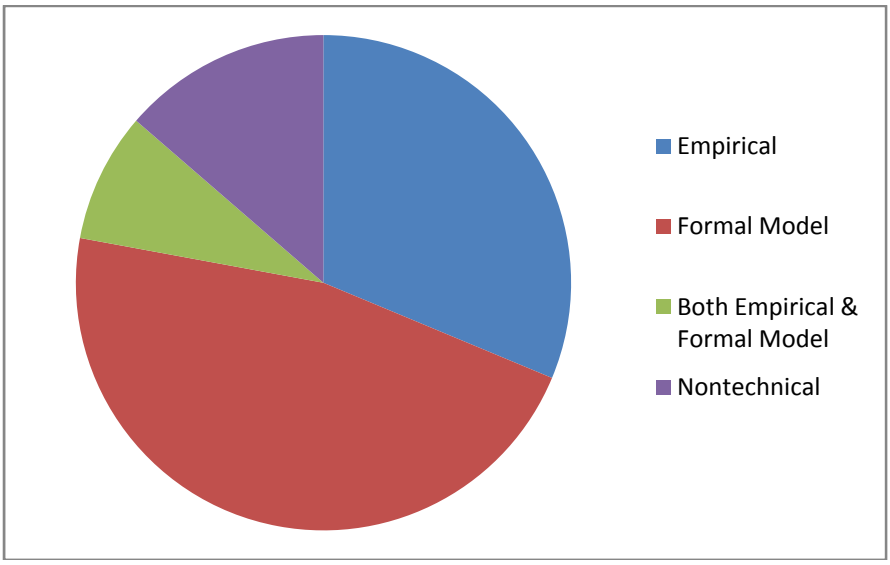
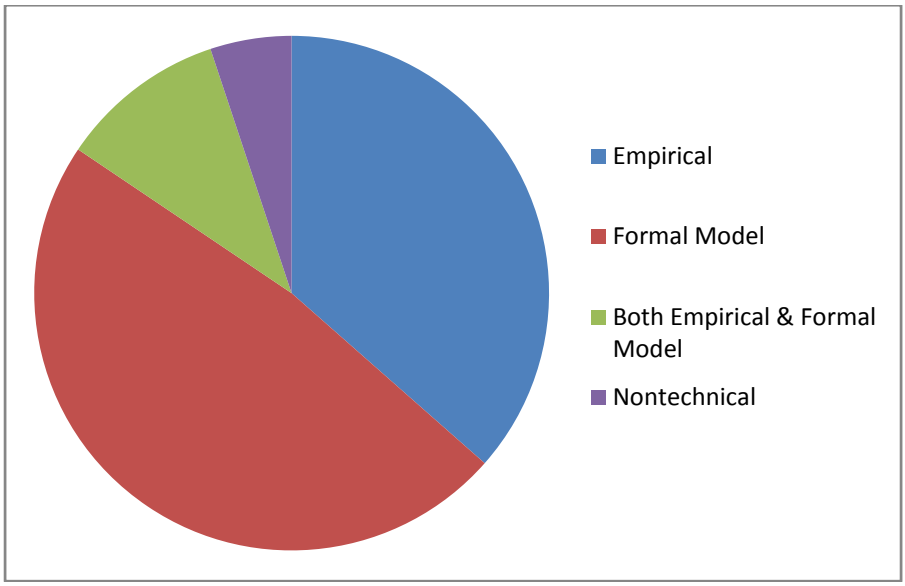


Figure 6.
Coauthorship and Methodology at *JLS* and *JLEO*, 2000-10

A. Fraction of Major Articles



B. Fraction of Major Coauthored Articles



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Professor Tom Ginsburg
University of Chicago Law School
1111 East 60th Street
Chicago, IL 60637
tginsburg@uchicago.edu

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