ECONOMICS IN PRACTICE

Where Would Adam Smith Publish Today?
The Near Absence of Math-free Research in Top Journals

DANIEL SUTTER[*] AND REX PJESKY[**]

ABSTRACT

IF HE WERE AROUND TODAY, WOULD ADAM SMITH BE ABLE TO PUBLISH in top economics journals, assuming he would want to? Our investigation shows that he would have serious difficulty unless he mastered some mathematical techniques and modes of thinking.

Critics have accused top economics journals of being closed to math-free analysis and scholarship. If valid, such a closedness could significantly affect the economics profession. An inability to publish in prominent journals disadvantages kinds of thought and research that either do not much rely on math, or perhaps are compromised or degraded by math – for example, the kind of research that earned Nobel prizes for Myrdal, Hayek, Coase, Schelling, Buchanan, and that surely would have earned a prize for Keynes had he lived long enough. It appears that these pantheon economists in their prime today would be totally unable to place their classic works in top journals. Their contributions would fall to obscurity unless they could do the math, which they might well be able to do, *and* unless the substance and clarity would survive the make-over.

The math modes tend to advantage individuals with the requisite human capital, mentalities, and characters. The combination of the pyramidal structure of the discipline and majoritarian department politics might make the selection effects long lived (Klein 2005). And with tenure, decisions made today could have impacts for decades to come.

Economics is a field calling for exploration of how the accumulation of models, data, and other learning are best formulated and interpreted, and such

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[*] Department of Economics and Finance, University of Texas – Pan American, Edinburg, TX 78541-2999

[**] Department of Accounting and Finance, Northeastern State University, Talequah, OK 74464

exploration should involve diverse voices heterogeneous with respect to training. Few critics of formalism contend that there should not be *any* outlets or prestige for mathematical articles. Model building definitely has virtues, and regression analysis is obviously tremendously important, and we do not seek to denigrate these types of research. But scholars with a deep understanding of history, politics, policy analysis, law, and business, among other fields enrich the discipline. Such a heterogeneous cast of characters would produce diverse research. Economics is impoverished if only some types of learning reaches top journals and some of the diverse characters are permanently banished to the profession's back benches.

In evaluating such concerns, it is good to have evidence on whether the top journals are open to math-free research. Sometimes commentators see patterns that do not exist. Consider the "hot hand" phenomenon in basketball. Many fans and announcers believe that players will get hot and go on a rush where they can hardly miss a shot. But Gilovich, Vallone and Tversky (1985) found no support for the hot hand. Faulty perceptions may also underlie charges of media bias. Vallone, Ross and Lepper (1985) found that highly partisan viewers of news segments on Israeli-Palestinian relations perceived bias against their side in the coverage, but the bias was in subjects' selective recall -- remembering parts of stories favorable to the other side and forgetting bits favorable to their side. Our investigation seeks to qualify the current percentage of math-free papers in top journals to inform further debate.

Several previous studies have examined the mathematical content of economics journals. Leontief (1982) found that over half of the papers in the *American Economic Review* between 1972 and 1981 contained mathematical models without data. Examining the 1980s, Morgan (1988) documented a similar pattern for the *Economic Journal* and found that the percentage of math-free papers in the *American Economic Review* continued to fall. Examining four top general interest journals from 1963 through 1996, Coehlo and McClure (2005) found that mathematical research increased over time and that model-building crowded out empirical research. These papers focus on the balance of modeling and empirics. In the present paper, the primary distinction is that between math and "math-free" research. Math-free research in this paper means verbal or graphical analysis, case study evidence, and empirical work which does not rely on multiple regression analysis. Thus math articles here include not only model building but also papers with regression tables. However, our research does speak to the balance of modeling and empirics.

OUR APPROACH

We examined ten leading economics journals to assess the number of math-free papers published. We excluded explicitly mathematical or econometric journals, such as *Econometrica*, the *Journal of Econometrics*, or the *Journal of*

Mathematical Economics. We also did not include nominally general interest but widely recognized mathematical journals such as the *Journal of Economic Theory*, *Review of Economics and Statistics*, the *Review of Economic Studies*, and the *International Economic Review.* We did not include the *Journal of Economic Perspectives*, which publishes many math-free papers but does not work by the usual open submission. We chose the following ten journals, all of which were among the thirty six top journals used by Scott and Mitias (1996) to rank U.S. economics departments:

<u>Six top general journals (listed alphabetically)</u>
American Economic Review (AER)
Economic Inquiry (EI)
Economic Journal (EJ)
Journal of Political Economy (JPE)
Quarterly Journal of Economics (QJE)
Southern Economic Journal (SEJ)

<u>Four top field journals</u>
Journal of Development Economics (JDE)
Journal of Law and Economics (JLE)
Journal of Monetary Economics (JME)
Journal of Public Economics (JPubEc).

The field journals chosen were leading journals in four of the prominent fields of the profession. We recognize that many special journals publish much math-free research, but they are not "top" journals.

Our sample excludes comments, replies, review articles, and book reviews.[1] We also exclude presidential, invited, or Nobel Prize lectures, because these do not represent normal publication pathways. Our totals for the *AER* include the shorter papers but exclude the annual American Economics Association Papers and Proceedings issue.

We employ three nested criteria:

Weak criterion of math-free: A paper is weakly math-free if it has no numbered equations *and* no tables of regression results.

Intermediate criterion of math-free: A paper is intermediately math-free if it is weakly math-free and we judged it to be without mathematical or regression analysis.

Strong criterion of math-free: A paper is strongly math-free if it is intermediately math-free and it is neither experimental economics, about economics instruction, nor part of a special issue or symposium.

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[1] Our sample contained no literature review articles and several journals published no book reviews.

The weak criterion counts provide a simple "first cut" to identify papers with a minimal degree of math. We make no effort to distinguish articles based on the complexity and simplicity of their mathematical or statistical content, and thus our weak criterion excludes some not very sophisticated articles. But sometimes an article presents regression results in equation form in the text as opposed to in tables. Also, some papers present mathematical material without numbering any equations or expressions. Thus, some papers with mathematical content can pass the weak math-free criterion. We then evaluated the papers meeting the weak criterion and excluded those that nonetheless contained mathematical or regression analysis, yielding our second criterion.

Several types of papers meet our intermediate criterion yet may not constitute math-free regular research articles. One type is experimental economics. Although some experimental papers have large enough sample sizes for regression analysis, some feature only verbal statements of hypotheses and means tests. Consequently some experimental papers meet our intermediate criteria. But experimental papers do require a suitable laboratory and funding and thus may overstate the accessibility of journals to genuinely math-free research. Articles in special issues and symposia, sometimes based on conferences or workshops, constitute another type. These articles again depart from normal publication pathways, since an author must be invited to participate in the conference or symposium. Finally, several math-free papers addressed economics instruction (specifically in the *SEJ*'s Targeting Teaching feature), again departing from normal research. Our strong criterion omits experimental, symposium, and instruction articles from the sample (thus counting them neither as mathematical nor math-free).

We feel that the "strong" criterion should be regarded as the appropriate criterion for the issues explored here. It is "strong" only in relation to the other two criteria, which we see as simply steps toward the formulation of the appropriate criteria.

An Excel file contains the citation for all the papers in the ten journals meeting the weak, the intermediate, and the strong criteria. In addition, the file contains author information and a brief description of all papers meeting the intermediate criterion.

THE NEAR ABSENCE OF MATH-FREE RESEARCH

Table 1 presents our findings concerning technical papers in the ten journals. Overall 5.8, 3.0 and 1.5 percent of the papers in the sample met our weak, intermediate and strong criteria for math-free. The *EJ* was most accessible to math-free research. The *EJ* was the only journal to exceed 10 percent weakly math-free papers, and accounted for over 40 percent of the strongly math-free papers. The *QJE* ranked second in weakly math-free research at 9 percent while the *JPE* was second in strongly math-free at 3 percent. The other general interest journals - *AER, EI,* and *SEJ* - published 5-9 percent weakly and one percent

strongly math-free. The field journals all had 5 percent or less weakly and 2 percent or less intermediately math-free. The *JDE* was least accessible, with only two papers weakly and zero intermediately math-free. Our findings confirm Anderson and Boettke's (2004) characterization of the *JDE* as favoring formalism over a "detailed institutional narrative that makes sense of the policy history, developments, and alternatives" (307).

Table 1: Math-free Papers in Top Journals

Journal	(1)	(2)	(3)	(4)	(5)	(6)
AER	168	18	46	5	2	1 [2]
JPE	115	10	52	6	3	3 [3]
QJE	80	16	26	9	4	1 [1]
EJ	149	21	50	13	7	5 [8]
EI	88	15	38	7	3	1 [1]
SEJ	108	23	31	6	5	2 [2]
JLE	46	39	7	2	2	2 [1]
JME	126	7	63	5	2	0
JDE	149	9	39	1	0	0
JPubEc	222	13	61	4	2	0 [1]
Totals	1251	15	46	6	3	2 [19]

Note: Column headings are as follows: (1) Total articles; (2) percentage with no equations; (3) percentage with no regression tables; (4) percentage weakly math-free; (5) percentage intermediately math-free; (6) percentage strongly math-free, [number of strongly math-free articles].

Math-free research was more common in the general interest journals than the field journals. The general interest journals published 8 percent weakly, 4 percent intermediately, and 2 percent strongly math-free. The field journals published 3 percent weakly, 1.7 percent intermediately, and 0.4 percent strongly math-free. Our sample includes only four field journals, so the lower math-free rate among field journals may not hold up with a larger sample of field journals.

Of course any general-versus-field comparison will be highly sensitive to the fields included.

Our findings confirm that the *JLE* is a highly empirical journal. Table 1 shows that only 7 percent of its articles do not have a single regression table, which means that 93 percent of its articles contain at least one regression table. The next most empirical was the *QJE*, with 74 percent. At the other end, 50 percent of *EJ* articles had regression tables, followed by the *JPE* with 48 percent, *JPubEc* with 39 percent, and *JME* with only 37 percent. As for articles with numbered equations, the *JME* led the pack, with 93 percent of articles with at least one numbered equation. At the other end, the JLE had 61 percent with at least one numbered equation.[2]

A LOOK AT THE STRONGLY MATH-FREE ARTICLES

For all ten journals, 73 articles met the weakly math-free criterion, 38 were intermediately math-free, and 19 strongly math-free. Of the 38 intermediately math-free articles which do not meet the strong criterion, 10 were experimental, 6 were conference or special-issue papers, and 3 were economic education papers (in the *SEJ*). Removing those 19, which do not contain math but are excluded because they arguably provide a misleading picture of the accessibility of top journals to math-free research, we are left with 19 strongly math-free articles, listed here (all from 2003 or 2004):

American Economic Review:
John Komlos, "Access to Food and the Biological Standard of Living: Perspectives on the Nutritional Status of Native Americans"
Alexander Field, "The Most Technologically Advanced Decade of the Century"

Economic Inquiry:
E. Woodrow Eckard, "The 'Law of One Price' in 1901"

Economic Journal:
David Greenaway and Michelle Haynes, "Funding Higher Education in the UK: The Role of Fees and Loans"
Richard Dickens and David Ellwood, "Child Poverty in Britain and the United States"

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[2] Coehlo and McClure (2005) investigate whether mathematical complexity crowds out empirical research. Their main results come from a time series of articles from the *AER* between 1975 and 1995. Our cross sectional results provide some modest support for crowding out. The journal with the largest percentage of papers with no equations, the *JLE*, also has the highest percentage of papers with regression tables, while the journal with the fewest papers with regressions, the *JME*, has the lowest percentage of papers with no numbered equations. The five journals (*JLE, QJE, SEJ, EI, JDE*) with at least 60 percent of papers with regression tables had 17 percent of their papers with no numbered equations, which slightly exceeds the 14 percent for the five journals with fewer than 60 percent of papers with regression analysis.

Mike Brewer, Tom Clark and Allissa Goodman, "What Really Happened to Child Poverty in the UK in Labour's First Term"

Knut Roed and Raaum Oddbjorn, "Administrative Registers – Unexplored Reservoirs of Scientific Knowledge?"

Barham Pranab, "Journal Publication in Economics: A View from the Periphery"

Paul Fenn, Alastair Gray and Neil Rickman, "The Economics of Clinical Negligence Reform in England"

Costas Meghir, "A Retrospective on Friedman's Theory of Permanent Income"

Michael Mandler, "Status Quo Maintenance Reconsidered: Changing or Incomplete Preferences?"

Journal of Political Economy:

Thomas Piketty, "Income Inequality in France, 1901-1998"

Muriel Niederle and Alvin Roth, "Unraveling Reduces Mobility in a Labor Market: Gastroenterology with and without a Centralized Match"

Richard Thaler and Shlomo Benartzi, "Save More Tomorrow: Using Behavioral Economics to Increase Employee Savings"

Quarterly Journal of Economics:

Thomas Piketty and Emmanuel Saez, "Income Inequality in the United States, 1913-1998"

Southern Economic Journal:

Paul Rubin, "Folk Economics"

Jason Taylor and Jinill Kim, "The Pre- and Postwar Price-Output Paradox Revisited"

Journal of Law and Economics:

Maria Arbatskaya, Morten Hyiid and Greg Shaffer, "On the Incidence and Variety of Low Price Guarantees"

Journal of Public Economics:

Brad Barber and Terrence Odean, "Are Individual Investors Tax Savvy? Evidence from Retail Discount Brokerage Accounts"

Kocher and Sutter (2001) find that 25.7 percent of papers in 15 top journals came from just 10 U.S. schools. We examined the affiliations of the authors of the 19 strongly math-free articles, which had 33 authors (with authors of more than one paper counted multiple times in the total). Of the 27 authors with an academic affiliation, 15 were at universities with the world's top 60 economics departments, according to Tom Coupé's world rankings for 1990-2000 (Coupé 2003). Two of math-free the top journals - the *JPE* and *QJE* - are even more closed. Five of the seven authors for the strongly math-free papers in these journals were from a top 60 department, and the lowest ranked of these top universities is Carnegie-Mellon (#32). Thus economists not already holding a position at a top ranked department face long odds publishing math-free research in top journals.

IS MODEL BUILDING LOSING MARKET SHARE?

Leontief (1982) criticized what he saw as the trend in economics toward "mathematical models without any data," which was diminishing the relevance of the discipline. Leontief found that over 50 percent of the papers in the *AER* in the 1970s met this description. Morgan (1988) found that half of the papers in the *EJ* in the 1980s were similarly exclusively mathematical. Examining the period from 1963 to 1996, Coelho and McClure (2005) found a positive and statistically significant time trend coefficient in a regression of the percentage of articles that included "lemma" or "multiple equilibrium," in each journal *AER, JPE, QJE* and *EJ*.

Table 2: Trends in Model-Building Share

Journal	1972-76	1977-81	1982-86	2003-04
AER	50%	54%	42%	44%
EJ	34	50	52	43
JPE				49
QJE				22
EI				35
SEJ				26
JLE				5
JME				61
JDE				39
JPubEc				59

Table 2 reports the earlier findings of Leontief and Morgan for the *AER* and *EJ* and our corresponding percentages for each journal. For the *AER*, the measured years 1982-1986 coincide with the editorship of Robert Clower (1981-1986), which are thought to have been "off trend" in a math-free direction, and hence may not be representative of the trend. The preponderance of pure model building moderated from 54 percent in the late 1970s to 42 percent in the 1980s and 44 percent in our sample. For the *EJ*, the trend toward mathematics for its own sake has been halted, with the current percentage of 43, down from 52 percent in the 1980s. But two journals in our sample, the *JME* and *JPubEc*, feature about 60 percent mathematical models without regression tables.

The numbers are percentages of papers which feature mathematical models without regression analysis. The totals for the *AER* for 1972-76 and 1977-81 are from Leontief (1982), while the totals for the *EJ* and 1982-86 *AER* totals are from Morgan (1988). The totals 2003-04 are from our sample, calculated as papers with no regression tables minus papers meeting the intermediate criterion.

THE FUTURE

We found that only 1.5 percent of papers published in 10 top journals in 2003-04 met a strong criterion for math-free. And one journal, the *Economic Journal*, accounts for 40 percent of the strongly math-free papers. Also, more than half of the authors of these papers with academic affiliations were at top-60 ranked world departments. And perhaps the most surprising and disturbing result is the absence of math-free research from three leading field journals – one out of 497 papers in the *JME*, *JDE* and *JPubEc* were strongly math-free.

We are inferring the accessibility of journals based on published research, which is a bit tricky since we have no evidence on the acceptance rates of math-free and mathematical submissions. Conceivably, math-free research might have a higher acceptance rate despite the low overall proportion of published papers. But it seems unlikely, since the supply of math-free research should be reasonably elastic to a perceived receptiveness of editors. With 98.5 percent of papers mathematical, it would appear that many referees and editors treat modeling or regressions as a necessary condition for publication.

The emphasis on mathematical modeling and regression analysis imposes a toll on the profession. Adam Smith spent his early years studying literature, history, ethics, political and moral philosophy, and then teaching literature and rhetoric to college students. Today to succeed in the profession he would need to study model building and regression analysis well enough to publish in "good" journals, and he (and the rest of us) would have lost the value added from the studies displaced. The same would apply for many Nobel prize winners who published their work in an economics profession less tied down to model building and regression analysis. The emphasis of top journals on regression analysis also disadvantages other types of research. Many times this leads to the assembling of a data set large enough for regression analysis at the cost of a richer quantitative portrait of a smaller sample. Is ignoring data sets too small for robust econometric analysis good social science? While rigorous statistical testing of hypotheses is an invaluable tool of social science, a corner solution of all regression analysis is unlikely to be optimal.

APPENDIX

Spreadsheet of 19 strongly math-free articles with full citations. Link

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ABOUT THE AUTHORS

Daniel Sutter is an associate professor of economics at the University of Texas - Pan American. He graduated with a Ph.D. in economics from George Mason University in 1993, and has previously taught at Northern Michigan University, Old Dominion University, and the University of Oklahoma. His research has examined public choice in nondemocratic countries, automobile safety regulation, constitutional economics, the news media, and natural disasters. His email is dssutter@utpa.edu.

Rex Pjesky is an assistant professor of economics at Northeastern State University in Oklahoma. He received a Ph.D. in economics from the University of Oklahoma in 2002. His primary research area is state and local public finance. His email is pjesky@nsuok.edu.