

An Examination of the Influence of Theory and Individual Theorists on Empirical Research in Microeconomics

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Most economists would concur that an important role of economic theory is to influence the direction of empirical research, either by posing new questions or by suggesting new answers to old questions. Whether or not modern theory should be judged to be a success on that metric is a frequently debated question, but one on which there has been little systematic investigation. In this paper, we provide some preliminary empirical evidence on the extent to which various fields of economic theory, as well as specific theorists, have succeeded in influencing the path followed by empirical research in the area of microeconomics.

Based on our analysis of all empirical microeconomics papers published in three leading journals over a three-year period, we arrive at a number of conclusions concerning the impact of theory on empirical research. Our first finding is that the set of theory papers cited as the primary motivation for leading empirical work is surprisingly dispersed. Very few individual works of theory seem to have exerted a great influence. In the 149 empirical papers we consider, one author (Gary Becker) is cited fifteen times, all other authors are cited ten times or less; no single paper is cited more than six times. A second finding is that empirical researchers behave as if they are heavily influenced by recent theoretical contributions. Among the theory papers identified as providing the central motivation for the empirical research, over half of all the citations are to theory papers published after 1990. The extent to which this pattern of citations is truly meaningful, however, is called into question by our third finding. Namely, the great majority of empirical papers test traditional economic ideas (i.e. concepts that were quite familiar to economists in the 1940s and 1950s), although often these old ideas are applied in non-traditional settings (e.g. crime, household economics). These papers do not show

much direct influence of the theoretical fields that emerged since that time (e.g. general equilibrium, game theory, information economics, behavioral economics). Among the major innovations in theory in recent decades, only information economics has had a substantial influence on the empirical papers in our data set. Empirical papers testing game theory, general equilibrium, and behavioral economics are all quite rare in our sample. This pattern sharply contrasts with the distribution of *theoretical* contributions in the same journals in the same period, where the more ‘recent’ fields clearly dominate. Finally, we examine the influence of particular theorists. Gary Becker stands out as the theorist who has most greatly influenced current empirical work.

Our empirical approach

In order to better understand how theory has influenced empirical work in recent years, we constructed a database of all empirical microeconomics papers published in *American Economic Review*, *Journal of Political Economy*, and *Quarterly Journal of Economics* between the years of 1999 and 2001. To be classified as empirical, a paper simply needed to contain original regression analysis. We excluded laboratory experiments (11 of them), as well as papers in the area of finance, viewing those areas of research as distinct from mainstream empirical micro. Papers published in *AER* under the category of “shorter papers” were also excluded from the analysis, as were comments and replies, *AEA Papers and Proceedings*, and special issues. 149 papers remained in the data set after these exclusions. These papers represent 38 percent of all papers published in these three journals over this time period.¹

For each paper in the data set, we made a judgment regarding the broadly defined area of theory that the empirical work appeared to be testing.² The six categories of theory that we used were as follows: price theory, applications of price theory, information economics, game theory, behavioral economics, and general equilibrium. Price theory refers to basic economic principles and techniques used by economists in the 1950s and before, such as consumer theory, production theory or partial equilibrium. Applications of price theory refer to the testing of simple economic ideas (such as those just listed as well as externalities or public goods, for instance) in domains outside the traditional purview of the field (crime, household behavior, etc.). Information economics encompasses models involving asymmetric information and (complete and incomplete) contract theory, signaling, and search. Game theory is intended in a broad sense; it includes both cooperative and non-cooperative game theory, as well as a number of applications, such as voting, political economy, and auctions. Behavioral economics also is broadly defined, including for instance non expected utility, bounded rationality, and addiction. Finally, general equilibrium encompasses standard ‘Walrasian’ theory as well as more recent developments (incomplete markets, etc.).

In addition to classifying each empirical paper as described above, we also cataloged the specific theory papers that the authors themselves identify as motivating their work.³ Using this information, we are able to identify papers and theorists that have been particularly influential on recent empirical work.

Finally, we cataloged every micro theory paper published in these three journals over the same period into one of these same six broad categories. This provides the

opportunity to compare the distribution of the current output of theory to the distribution of theory that is materially influencing empirical research.

The influence of theory on empirics

Figure 1 reports the distribution of theoretical papers according to their area, and that of empirical papers according to the area of theory that motivates the empirics. The discrepancy between the two distributions is striking. Among empirical works, price theory and applications of price theory dominate the output, accounting for almost seventy percent of all empirical papers. Approximately 20 percent of the papers test an aspect of information economics.⁴ Game theory and behavioral economics each account for about five percent of the papers; finally, tests of general equilibrium are extremely rare (a total of 2 papers out of 149 total).⁵ The picture for theory is largely reversed. Information and game account for more than half of all papers; applications of price theory represent about 20 percent of the total, price theory and behavioral economics 10 percent each, and while general equilibrium remains scarce, its proportion is still five times as high as for empirical works.

Such patterns are open to many interpretations. One factor that is no doubt important in explaining the predominance of price theory in motivating empirical research is that price theory, whether ‘pure’ or applied to non traditional domains, tends to yield well defined predictions. In addition, both the positive analysis and the normative recommendations usually rely on a small number of empirical concepts (e.g., elasticities) that are often relatively easy to estimate from available data. In contrast, more ‘recent’ theories have been largely unsuccessful at deriving general predictions that

can be robustly tested on *observable* variables – a fact that probably reflects the inherent nature of the new developments, but also perhaps the lack of interest in such an exercise from the theorists. Most predictions of information economics are extremely sensitive to the detailed setting of the model, of which some crucial aspects (e.g., the nature of contractual incompleteness) can hardly be given a simple empirical translation. Data requirements are also more stringent; the recent developments in empirical tests of asymmetric information models, for instance, may be partly due to the increased availability of high quality data sets.⁶ The empirical implementation of game theory may be especially difficult when the equilibrium is indeterminate (hence the theory inconclusive), as is often the case for repeated games or games with incomplete information. Moreover, such basic concepts as strategy spaces may be either hard to observe or excessively complex (or both) in real situations, and available data often raises thorny issues of aggregation (Pierre-Andre Chiappori, Timothy Groseclose, and Steven Levitt 2002). Most general equilibrium models do not produce testable predictions, and their testing may require both specific data sets and strong auxiliary assumptions. Finally, behavioral economics may suffer, at least for the moment, from the absence of a unified theoretical corpus (especially for models involving bounded rationality). Even when some partial agreement exists among theorists, as in the case of behavior under uncertainty, the empirical distinction between recent advances and standard approaches (e.g., expected utility) turns out to be extremely delicate.

Based on Figure 1, one could reasonably be led to believe that the theoretical advances of the last four decades have exerted little influence on the current practice of empirical research. Citation patterns, however, suggest a very different conclusion.

Figure 2 reports the distribution by decade of the theory papers cited as motivating the empirical papers in our data set. These citations are overwhelmingly skewed to recent decades. More than half of all these citations are to theory papers published in the 1990s. Only 3 percent of all the cites are to papers published prior to the 1960s, despite our contention above that fully 70 percent of the empirical papers test basic economic ideas that were well understood half a century ago. This pattern may suggest that the discrepancy between theory and empirics is less deep than it could be feared. While the fields recently opened by the theorist may be less prone to empirical applications, applied work still remains in touch with recent theory, at least to the extent that it is motivated at all by theory insights.

The influence of individual theorists on empirics

The information we have collected allows us to go beyond the influence of broad areas of theory to examine the particular contributions of individual theorists. Our measure of a theorist's influence on empirical research is the number of different empirical papers in our data set for which one of his/her papers appears as a key motivational cite. Self-citations are excluded. No correction is made for co-authorship, i.e. each author is given full credit. Table 1 provides a ranking of the fifteen theorists currently exerting the greatest influence on empirical work, subject to the important caveat that there is a heavy bias in citation behavior towards recently published theory.

Gary Becker leads the list with fifteen citations (out of a possible 149, which is the number of papers in our data). Remarkably, thirteen different papers are represented among Becker's fifteen citations, with no individual work cited more than twice. Papers

published by Becker in every decade since the 1950's are cited, highlighting both the longevity of his early scholarship, and his remarkable ability to continually produce influential theory over a span of more than forty years. Bengt Holmstrom and Paul Milgrom have ten cites each, five of which are joint. Holmstrom and Milgrom (1991) is cited three times, as is Milgrom and Weber (1982). Joseph Stiglitz and Roland Benabou each garner eight citations. A number of different works by Stiglitz are cited, the most frequent of which is Michael Rothschild and Stiglitz (1976). Benabou's cites are spread out over three papers. Robert Lucas, George Stigler, and Sherwin Rosen are next on the list, giving the University of Chicago economics department four of the top ten theorists on the list.⁷ The strong Chicago influence is consistent with the fact that one of the most successful empirical strategies in recent years has been to apply traditional economic ideas in new applications, an area in which Chicago's theorists have been at the forefront. It is worth noting that neither Lucas nor Hersh Shefrin, whose works are mostly in finance, would be considered traditional micro theorists. Interestingly, three non-economists also make the list. Two of these are psychologists who have influenced behavioral economics (Daniel Kahneman and Amos Tversky). William J. Wilson, a sociologist, rounds out the list, with all of his citations for his influential book Wilson (1987).

Although Table 1 emphasizes the fact that there are a handful of theorists who have exerted a great influence on empirical research, we find it surprising how little concentration there is among the particular theory papers cited. There are a total of approximately 550 cites to motivating theory in our data set. Only four papers or books receive four or more cites (George Baker 1992, Edward Glaeser, Bruce Sacerdote, and

Jose Scheinkman 1996, Lucas 1988, Wilson 1997). There are nine papers that receive three cites, 37 papers that receive two cites, leaving over 400 papers that are cited exactly once.

Conclusion

The statistical analysis above, while shedding some light on the issues, can of course provide only a partial view of the influence of theory on empirical economics. Empirical models rely on some common economic “culture,” many ingredients of which are often directly borrowed from theory. Works measuring the return to education may not quote the source of the notion of human capital; still, this is a purely theoretical concept, and possibly one of the most important insights of modern economic theory. Most papers in empirical IO and other fields use such equilibrium concepts as Nash, subgame perfection or sequentiality without explicitly giving credit to their inventor; and the main spirit of general equilibrium is present in several empirical contributions which are not explicitly aimed at testing GE theory. Unusually successful innovations tend to enter economists’ toolbox without explicit reference to their author. Ironically, not being cited may thus be the ultimate sign of intellectual influence.

Table 1: Theorists Most Often Cited as Motivating Empirical Microeconomic Research

Among papers published in *AER*, *JPE*, and *QJE*, 1999-2001

<u>Theorist</u>	<u>Number of citations</u>
Gary Becker	15
Bengt Holmstrom	10
Paul Milgrom	10
Joseph Stiglitz	8
Roland Benabou	8
Robert Lucas	7
Daniel Kahneman and Amos Tversky	6
Sherwin Rosen	6
George Stigler	6
George Akelof	5
Kenneth Arrow	5
George Baker	5
Boyan Jovanovic	5
Hersh Shefrin	5
William Julius Wilson	5

Notes: Number of citations refers to the total number of empirical microeconomics papers published in *AER*, *JPE*, or *QJE* during the period 1999-2001 which list the work of the named author as a key motivating cite in the empirical research. Self-citations and citations in a single empirical paper to multiple theory papers by the same author are not included. The total number of empirical microeconomics papers in the data base is 149.

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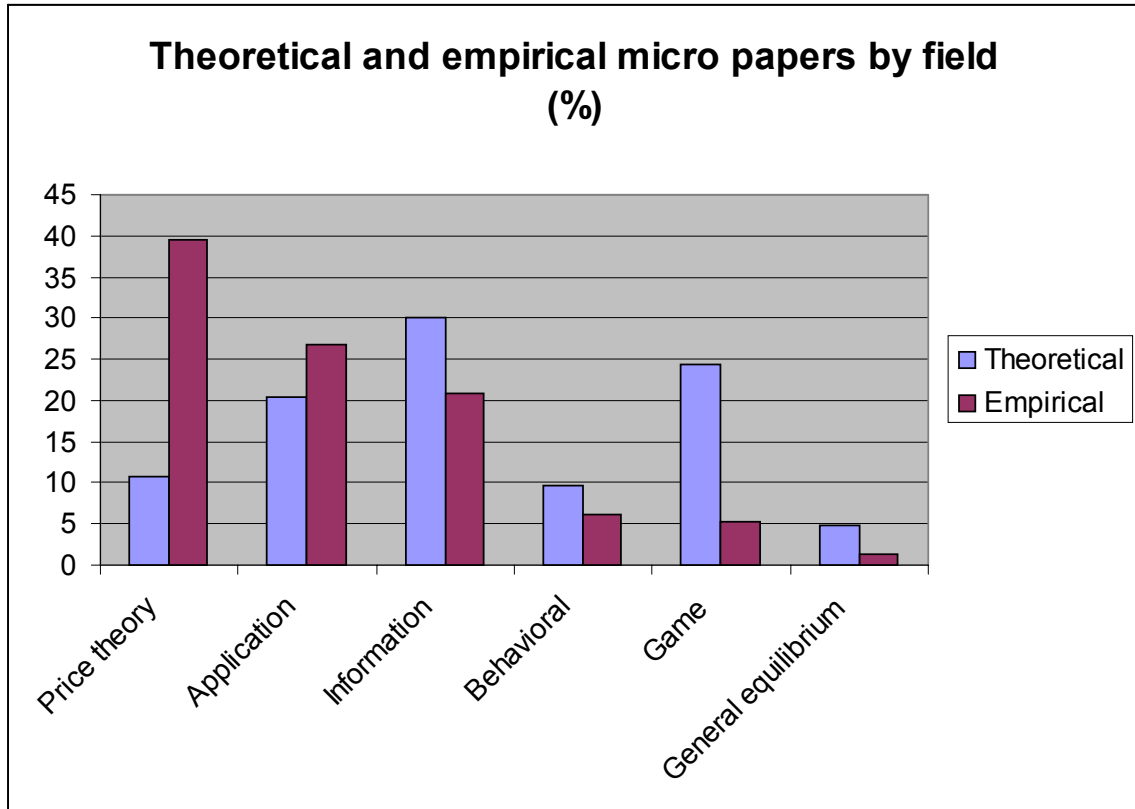


Figure 1

Number of main cites per decade of publication of cited article

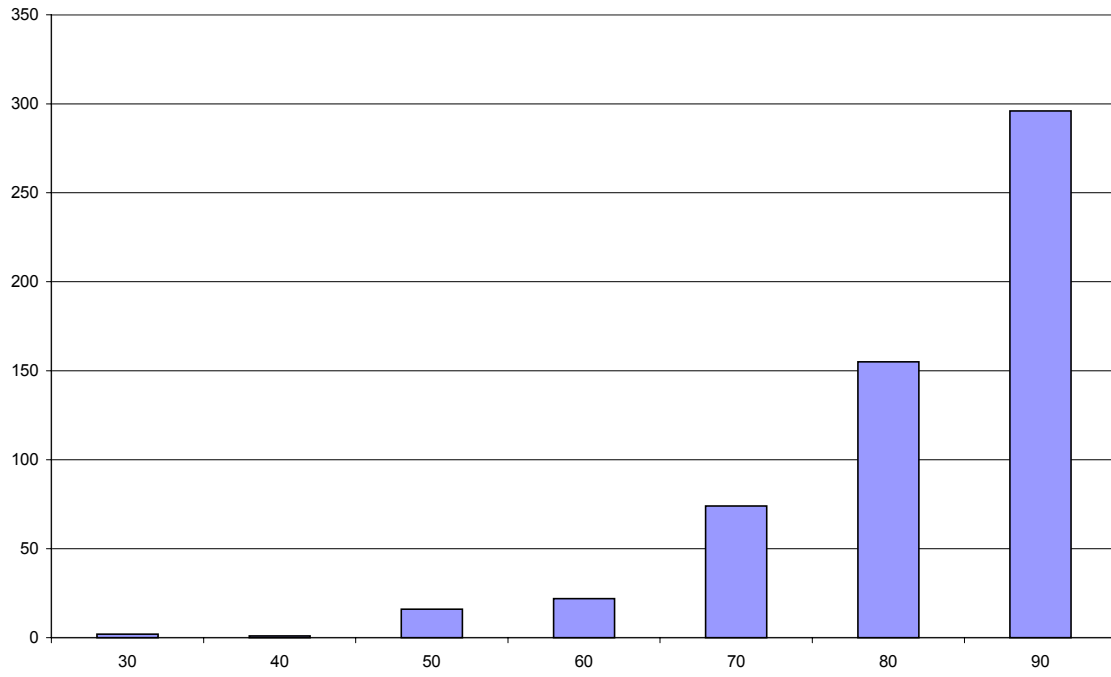


Figure 2

Endnotes

¹ Empirical micro papers represent slightly more than half of the papers published in *Quarterly Journal of Economics*, 46 percent of papers in *Journal of Political Economy*, but only 25 percent of the papers in *American Economic Review*.

² As one might imagine, there is a great deal of judgment involved in this categorization. Like sausage-making, one may prefer not to know precisely what goes into the final product. For those who are interested, however, the full database and classifications are available on request from the authors.

³ The typical empirical paper in our sample has one paragraph, usually in the introduction, which discusses the theoretical foundation of the work. Only papers cited in this manner are included.

⁴ The most common empirical test of information theory addresses issues of contracting within the firm. There are also papers on auctions (3), insurance markets (2), statistical discrimination (2), as well as single papers on a number of other topics.

⁵ Including laboratory experiments would have little impact on the conclusions regarding empirical tests of game theory. Only one of the eleven laboratory experiments published were explicit tests of game theory. Five of the lab experiments were classified as behavioral economics, three as information, and two as price theory.

⁶ An obvious example is the explosion of empirical works devoted to insurance data: clearly, the availability of large, high-quality data sets is a recent phenomenon.

⁷ The heavy representation of Chicago economists is not an artifact of including *Journal of Political Economy* in the data base. The leading Chicago economists are only slightly more likely to be cited in *Journal of Political Economy* papers than they are in *American Economic Review* or *Quarterly Journal of Economics*.