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Daniel S. Hamermesh
Gerard A. Pfann

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ABSTRACT

We develop a theory of the market for individual reputation, an indicator of regard by one's peers and others. The central questions are: 1) Does the quantity of exposures raise reputation independent of their quality? and 2) Assuming that overall quality matters for reputation, does the quality of an individual's most important exposure have an extra effect on reputation? Using evidence for academic economists, we find that, conditional on its impact, the quantity of output has no or even a negative effect on each of a number of proxies for reputation, and very little evidence that a scholar's most influential work provides any extra enhancement of reputation. Quality ranking matters more than absolute quality. Data on mobility and salaries show, on the contrary, substantial positive effects of quantity, independent of quality. We test various explanations for the differences between the determinants of reputation and salary.

Daniel S. Hamermesh
Department of Economics
University of Texas
Austin, TX 78712-1173
and NBER
hamermes@eco.utexas.edu

Gerard A. Pfann
Faculty of Quantitative Economics
Maastricht University
Maastricht, THE NETHERLANDS
g.pfann@maastrichtuniversity.nl

…reputation ... traditionally has been regarded as too squishy to measure.
(*Business Week*, July 9, 2007)

I. Introduction

There has been a substantial literature in economics on the formation of reputation, both of individuals and of the groups to which they belong. Most of the research has been purely theoretical, with an analysis of reputation of firms (good-will) as an asset (Tadelis, 2002) and with much of the work focused on reputation arising from behavior in repeated games (Mailath and Samuelson, 2006). Another strand of theory has focused on timing, including the dynamics of the relation of individuals' behavior and reputations and those of the firms for which they work (or the products or services they produce) (Tirole, 1996), and on the reputation-maximizing timing of the release of information (Sarafidis, 2007). Presumably reputation, defined as "overall quality or character as seen or judged by people in general," is something that develops over time in the minds of those who are judging the person, group, product, etc.[1]

Because reputation is based on perceptions of "overall quality," the appropriate prior question would seem to be what we mean by quality—what aspects of individuals' behavior contribute to quality and thus generate their reputations and those of the groups to which they belong. As such, the construction of reputation might be thought of as analogous to an implicit market in which bundled aspects of a good or service are traded for some overall price (Rosen, 1974). A "supplier" of characteristics brings them to a market, where "purchasers" (employers; the public; one's professional peers; one's fellow employees; one's neighbors; one's customers) express their preferences by assigning weights to the suppliers' efforts. These weights in turn combine in the purchasers' views to generate the suppliers' reputations. In this implicit market for reputation the returns to its various determinants are created by buyers' preferences and the ability of existing and potential suppliers to generate those determinants. We can always measure the market "prices" of the dimensions of quality; and if we can identify the separate behavior of each party, or assume that one party's behavior does not respond to the returns to various determinants of reputation, we can even infer the structure of preferences for reputation or the reputation-enhancing productivity of various characteristics.

[1]Merriam-Webster Online Dictionary, June 5, 2008.

In this study we illustrate the notion of the implicit market for reputation with the example of the determinants of the reputations of academic economists. Our particular focus is on how the market values both the quantity of their scholarly output and, in the spirit of the hedonic markets literature, various aspects of the quality of their output. The more specific questions are: 1) How does the quantity of publications affect the regard in which a scholar is held by other scholars? 2) Do a few extremely well-regarded publications have the same reputational effect as an equally successful (in terms of its total impact on other scholars) publication list that is more diffuse? and 3) Are the determinants of reputation the same as the determinants of pecuniary returns? The answers to these specific questions about the rewards to scholars should shed some light on the general determinants of professional reputation, especially about how its formation is affected by the trade-offs along various dimensions of reputation-enhancing activities, as well as on the pecuniary returns to reputation.

II. Thinking about Reputation

Our question asks how reputation is formed—what goes on in buyers' minds as they observe the outcomes of suppliers' efforts that might generate reputations. Presumably reputation is related to memory and how the actions and sequences of suppliers' behavior produce memories in the minds of the buyers. As such, the literature on memory and learning in experimental psychology may be informative for our purposes. That literature unsurprisingly makes it clear that memory is enhanced by additional exposure. In terms of our question about the trade-offs among the dimensions of quality, however, the issue is whether memory of an item within a class is better enhanced by a given number of stimuli of one item in that class or of several different items in the same class.

A fundamental work in the general area of memory (Tulving and Thomson, 1973) demonstrated its complexities and proposed a theory of "encoding specificity"—that the specifics underlying exposure to events and the keys that might lead to the retrieval of memory interact to determine how memories develop. This study led to a huge literature, none of which speaks directly to our question, but part of which may shed some light on it. Arnold and Lindsay (2002) imply that people will remember better if they are stimulated by exact repetition of an event rather than by variations in it. Starns and Hicks (2005) show that providing related stimuli at the same time has complementary effects on memories of each, but

that this is only true if the stimuli are provided in the same experimental session. In a slightly different context, that of studying for tests, the results of Kurtz and Loewenstein (2007) show qualitatively similar results. Overall one might infer that these experiments support the notion that memory will be more strongly enhanced by repetitions of the same stimulus than by the same number of different, but related stimuli. Viewing the class of stimuli as all references to a scholar's work, and each individual stimulus as a reference to a particular study, they suggest that scholarly reputation may be more strongly affected by a very important publication than by an equally-visible series of lesser works.

While there are many human endeavors in which multiple dimensions of quality might be viewed as determining rewards, there has heretofore been no direct analysis of the relative roles of different measures of quality. An area in which one might examine such effects is in sports, with the most research having been carried out on major league baseball. While no studies have focused on our concerns, several have examined salary determination as affected by various dimensions of players' productivity. Faurot and McAllister (1992) find a negative effect of a player's home runs on arbitrators' salary awards, once runs created are held constant; Kahn's (1993) estimates of salary determination do not suggest any additional effects of extra-base hits on salary among white batters. At least in the endeavor of professional baseball, a second dimension of quality does not appear to generate additional rewards beyond those produced by overall quality.

The particular issue is how the market for reputation, R, is affected by three dimensions of production: Quantity, and two types of quality.[2] In the example of academic reputation, we define quantity as the number of publications, Q. We define quality as q_1, the total recognition of a scholar's entire *oeuvre* by other scholars, and q_{2n}, the recognition of his/her n^{th}-most recognized publication (where n is some arbitrary small number, with n=1 in most of our empirical work).[3] We assume that the members of a scholar's profession consider his/her outputs in creating their estimates of the scholar's reputation. Buyers thus have some demand for reputation as a function of these characteristics:

[2]Obviously, we could generalize this to additional dimensions of quality; but the formulation we use is the simplest that allows us to construct empirical analogues.

[3]One might for convenience analogize to baseball and think of Q as at-bats, q_1 as runs batted in and q_{21} as slugging average.

(1) $R^D_i = R^D_i(Q, q_1, q_{2n}),\ i = 1,\ldots, I,$

with the partial derivatives $R^D_{ij} \geq 0$ for all j dimensions of reputation-enhancing activity. The responses of reputation to its determinants show the marginal willingness of demanders to reward various dimensions of scholarly work.

The identity of the "buyers" of reputation varies with the example. Certainly the phrase from the definition, "people in general," should not be interpreted too broadly. The public in general does not determine and probably does not care about the reputations of individual scholars. Also, within the scholarly community some members undoubtedly have a greater influence in contributing to judgments about reputation than others. Because of the difficulties in identifying members of the groups that determine reputation, we base our example on a wide variety of measures of reputation. The buyers could be the individual's professional peers, his/her professional organization, some professional opinion leaders, or perhaps those institutions that are potential or actual buyers of his/her services.

By analogy, the scholars whose reputations are determined in this market generally engage in activities that will maximize their reputations, conditional on their abilities, by responding to the market returns to quantity and the quality dimensions. Their activities will produce an analogous set of reputational supply functions, one by each of the scholar/participants in this reputational market:

(2) $R^S_k = R^S_k(Q, q_1, q_{2n}),\ k = 1,\ldots K,$

with the $R^S_{kj} \geq 0$ for all j. The responses in (2) show the reputational returns to an increase in particular aspects of a scholar's efforts. As is usual in hedonic models, together the demand and supply functions interact to generate a market reward function describing the determinants of reputation:

(3) $R = R(Q, q_1, q_{2n})$, with $R_j \geq 0$ for all j.

The buyers i presumably differ in their ability to purchase reputation—those institutions that are richer will be able to buy more reputation, and in general will presumably be observed with a staff that has higher Q, q_1 and q_{2n}. There is no reason to assume that the R^D_i are homothetic, so that an interesting empirical exercise would examine how the returns to these determinants of reputation vary with the total

resources available to the buyers to purchase reputation.[4] Our empirical work provides some evidence on this issue.

Whether there is any substitution in scholars' production of reputation and whether the supply functions (2) actually result from some maximizing calculations are more difficult questions. Individual heterogeneity is implicit in (2), but we also assume that the total amount of effort devoted to producing reputation is fixed to the individual, or at least that individuals' production functions, while different, are homothetic. Even within this assumption, if the returns to particular dimensions of quality differ, are scholars aware of this? If they are aware, are they capable of substituting toward more highly rewarded dimensions—is the market output of reputation really jointly determined by demanders and suppliers? It may be that each scholar has a Leontief-type production function in these inputs into reputation (although clearly individual production functions may differ), so that no supply-side substitution is possible and the market prices reflect buyers' preferences.

III. Testing the Determinants of Reputation—Measuring Inputs and Output

A. General Issues

Ideally we would have measures of individuals' reputations or of some result of the reputations that they have established. One approach is based on the notion that some of the purchasers of reputation are one's peers, so that awards conferred by peers represent their assessments of a scholar's reputation. A second, indirect approach assumes that the members of an academic collective (department) seek to avoid diminishing its reputation. To achieve this goal they only add those marginal members whose individual reputations are at least as high as some summary measure of the reputations of the collective's current members (e.g., Rosen, 1987; Basu, 1989, and, by analogy, the literature on the worker-managed firm

[4]This view of buyers seeking to purchase reputation based on their resources predicts the unsurprising result that scholars attached to richer schools will have greater reputations. This outcome arises not because the school confers reputation on the scholar, but rather because it can "purchase" the services of those scholars who are capable of generating greater reputations, which are then conferred onto the institution. This approach has the interesting prediction that, where there is greater heterogeneity in institutional resources, we should observe a steeper gradient across institutions in the extent of scholarly reputation. This prediction seems supported by work of Cardoso *et al* (2008) showing that the research success of younger American labor economists varies more with the source of their doctorate than does that of their European counterparts.

going back to Ward, 1958).[5] Thus for members of collectives that are sufficiently large, a measure of individual reputation is the reputation of the collective. Taking the same tack, the collective's reputation is an even better proxy for the reputations of its newer members—those whose reputations were recently deemed by more senior members of the collective to be sufficiently high that their admission to the collective would not reduce its reputation.

One might argue that salary or compensation is a result of scholarly reputation and can be analyzed in the same way as the indicators already discussed. Since we assume that economics departments and the universities of which they are constituents attempt to maximize reputation, one might expect that the inputs that affect reputation will affect salaries in similar ways. Indeed, a long literature exists on the role of the quantity and quality of publications in salary determination in economics, with citations by other scholars often being the proxy for quality (Hamermesh *et al*, 1982; Moore *et al*, 1998; and Bratsberg *et al*, 2009, are just a few of the many that typically use samples of scholars at a few institutions) and with counts of articles and books proxying quantity. This literature could be viewed as measuring the impacts of these indicators on an outcome of reputation. One way of obtaining extra salary is by obtaining additional job offers. These too are presumably based on one's reputation, so that examining a sub-sample of offers (accepted offers by job-changers) provides an additional test for the role of reputation and the possible distinction between its determinants and those of salaries.

B. Specific Measures

Our sample consists of full professors in those economics departments that are included among the 88 American departments listed as being in the top 200 in the world by Kalaitzidakis *et al* (2003). This provides a sample of 1339 scholars. While this sample is obviously selected—its members had to have sufficient individual reputations to be included in this fairly elite group of institutions—there is presumably enough variation in reputation across the 88 departments that selectivity bias is not solely responsible for any results we obtain.[6]

[5]The minimum size of the collective whose reputation can be assigned to the individual for this purpose and is thus not determined by that individual is not clear, and in the empirical work we experiment with various cut-offs.

[6]In the Kalaitzidakis *et al* (2003) rankings these 88 departments range from Harvard to the University of Arkansas--Fayetteville in this selected group of institutions.

To proxy individual reputation we develop specific representations of the general measures outlined above. The first series of measures proxies reputation by awards received by the individual. We first define *Honored* as equaling one for those sample members who received a Nobel Prize, were elected President of the American Economic Association (AEA), named a Distinguished Fellow of the AEA or received its Clark Medal (until 2009 awarded biennially to an economist under age 40). The set of individuals who are the buyers of reputation in (1) is the Nobel Committee (with solicited advice) for the Nobel Prize and various AEA committees for the other awards.

The difficulty with the variable *Honored* is that economists are extremely stingy in providing distinctions to each other—using this definition, an honor is received by only a tiny fraction of individuals even in this elite sample. A more broadly received indicator of reputation is election as a *Fellow* of the Econometric Society. (A description of these elections is in Hamermesh and Schmidt, 2003.) Members of our sample account for all of the fellows who are not emeriti in American economics departments and for nearly half of all fellows world-wide. Here the buyers of reputation comprise the set of existing fellows.

The second series of measures is based on the reputation of the department with which the scholar is associated and stems from our hypothesis that the reputation-maximizing collective's reputation forms a lower bound of the individual's. The first measure is the department's ranking in Kalaitzidakis *et al* (2003) (between 1, the highest, and 200, the lowest), based on publications by members of the department. We also use the *U.S. News and World Report* subjective ratings of graduate programs in economics as another proxy for reputation. The National Research Council's (1995) subjective ratings of faculty quality in 1993 are yet another measure of departmental reputation. All three measures allow us to examine the determinants of the collective reputations of the institutions which chose to employ the scholars, implicitly therefore proxying the lower bounds of each scholar's reputation.[7] That is clearly the case using the NRC93 ratings as measures of the reputation of people who moved into or were tenured in those departments after1992.

[7]Most department administrators are admonished to build a better department, one that is stronger in research. Thus, for example, one university describes the chair's role, "The chairperson has a special obligation to build a department strong in scholarship…." (Michigan State University, *Faculty Handbook*, 2.1.2.1)

We create an indicator of whether a scholar moved between 1993 and 2007 among those who had been professionally active at least since 1986, long enough to have established a reputation that might have affected their mobility. This allows us to study mobility to examine whether its determinants are the same as those of our proxies for reputation. Salary data for individual faculty members are difficult to obtain (nearly impossible for private institutions), but for 43 of the 53 public institutions in our sample we were able to acquire data from university websites and direct contacts to calculate full-time academic-year salaries.[8] After various consistency checks on these data we were left with usable observations on the academic-year salaries of 564 economists.[9]

The measures of quantity and the dimensions of quality all come from the Web of Science® *Social Science Citation Index*, which includes articles in an immense variety of refereed and unrefereed journals, but no books or unpublished papers.[10] Social science journals are where economists publish most of their scholarly work and are thus the outlets in which they establish their reputations and in which other scholars acknowledge their influence.[11] To represent Q we use the number of entries in a scholar's record from 1956-2007, a period that encompasses the active worklives of all members of our sample.

[8]Most of the data were for 2007-08, but where they were not we used $1.04^{(2007-t)}$ to inflate salaries. One institution only had salary data for 2004-05, while for many, particularly the University of California system, the data were for 2006-07. In some cases it was impossible to determine if the faculty member was on a 9-month appointment, and those cases were not included in the analysis.

[9]Sixteen of the schools included here comprise the biennial survey of salaries reported for 2006-07 at http://www.eco.utexas.edu/faculty/Hamermesh/EcSalsPublicCleaned.xls . The correlation of the average salaries computed for each school and the averages provided there is 0.89, suggesting relatively little systematic measurement error in our compilation of salary data.

[10]One might be concerned that excluding publications that are in science journals, and also excluding citations from science journals, might bias our results. It is obviously true that this exclusion generates errors; but the errors are clearly small—in a random sample of 50 observations (chosen from a consecutive section of the alphabet) the correlation between citations in the *SSCI* and total citations in the *SSCI*, *Science Citation* and *Arts and Humanities Indexes* together was 0.979, while that between citations to the most-cited paper from the two sources was 0.993. One might also be worried that we count all citations, including self-citations. To examine this potential problem we took another random sample of 50 and computed the correlation of total citations and total citations without self-citations. The Pearsonian correlation coefficient was 0.984, while the rank correlation coefficient was 0.991. We thus do not view this as a problem. (In any case, while it is easy to obtain total citations excluding self-citations, obtaining q_{2n} excluding self-citations is not feasible.)

[11]This choice seems the best among the possible ways of counting total citations and citations to individual works. One should stress, however, that Q, and thus the publications that could be cited, excludes books and working papers. The former exclusion is not important for most economists, and the latter exclusion matters little in a sample of full professors. The alternative use of the *SSCI* would be based on authors rather than publications, but the *SSCI* does not allow a convenient tabulation of a scholar's most-cited works by this method. An alternative would be to use Google Scholar or SCOPUS, but their methods of tabulation are less clear.

The dimensions of quality are represented by citations, with q_1 proxied by the total citations to a scholar's works that are included in Q, and q_{2n} being the numbers of citations to the scholar's n'th most-cited work, n=1,…, 5.[12] Obtaining information for those whose names are unique (like the authors of this paper) is not difficult; for nearly 100 others it required direct comparisons of *curricula vitae* to the entries in the *SSCI* and, in several cases, correspondence with individuals in the sample.[13]

The other measures account for individual characteristics that may affect the measured market prices of the determinants of reputation because they may be correlated with Q or one of the q. We include the year of the author's first publication listed in the *SSCI* to measure the time s/he has had to construct a reputation, always in quadratic form. The gender of the scholar may bias our measures of quality, since some have argued (Ferber, 1986) that same-sex citation is a common practice, although others (Hamermesh and Schmidt, 2003) fail to find any disparate outcomes in receipt of a particular award. The author's place in the alphabetical list in the sample may function similarly, as some (Einav and Yariv, 2006) have shown that those whose names are earlier in the alphabet tend to be favored in certain aspects of scholarly work. We used on-line *vitae* to generate a measure of whether the person received his/her undergraduate education at an English-language university, on the grounds that migration to the U.S. from the upper tail of the ability distribution might occur (Borjas, 1987) and might be correlated with the quantity and quality measures. Finally, we created an indicator for anyone who had published an article in the sub-field of theoretical econometrics. Most of the results that we present use these controls, but including them does not alter the general conclusions of the study about the crucial variables that can generate reputation.

IV. Descriptive Statistics

Table 1 presents statistics describing the outcome measures that we use to proxy reputation. The publication-based ranking (again, 1 is highest) has a mean well below the average of 200 departments,

[12]The results of Cole and Cole (1973) make it clear that concerns that citations might measure infamy rather than fame are misplaced.

[13]One might argue that citations themselves measure reputation. That argument, however, is equivalent to stating that labor inputs into production represent output. Given that we have various measures of reputation, it makes sense to view the process of reputation formation as citations, an input, producing one of our proxies for reputation, an output.

partly because higher-ranked departments are larger, partly because American economics departments disproportionately comprise the higher ranks of the world-wide set of 200 institutions. The *USNWR* and NRC ratings (with 5 being the maximum possible in both, and 2.5 and 0 the respective minima) indicate similarly that the average sample member's location is in a department that is fairly highly rated. Being *Honored* by the Nobel Committee or the AEA has been attained by only 3 percent of the full professors at these 88 departments, with honors, as we have defined them, having been received by individuals in only 18 different departments. Econometric Society *Fellows* comprise 21 percent of the sample and are found in 46 of the departments.

Table 2 contains descriptive statistics on the determinants of reputation. The first thing to notice about these inputs is the skewness of all the quality measures—the means of both q_1 and the q_{2n} far exceed their medians; and the maxima are huge. The quantity measure is also highly skewed, although not nearly so much as the quality measures. In this sample 6 percent of the members are women, roughly consistent with a recent survey (CSWEP, 2009) showing 8.5 percent females among full professors at a small number of Ph.D.-granting institutions. Nearly one-fourth of the sample members received their undergraduate education in a country where English is not the predominant language, and we classify 9 percent as econometricians.

Our central focus is on the roles of quantity and various dimensions of quality in determining reputation. If the quality measures were perfectly correlated, this would be a futile exercise. They are not. It is the case that twelve of the twenty most heavily cited members of our sample are among the top twenty in terms of the scholar's most-cited single publication. Obviously, this information is barely more than anecdotal. While the correlation of these two measures is high, 0.81, the measures are far from perfectly collinear, suggesting there may be enough independent variation to allow us to examine the roles of both dimensions of quality in generating reputation. The correlations between Q, the number of items published, and q_1 and q_{21}, are much lower—0.56 for q_1, 0.32 for q_{21}. Only four of the twenty most prolific authors are in the top twenty along either of the quality dimensions. Publishing papers represents a different dimension of activity from total measured quality or the quality of one's best-known work as indicated by citation counts.

V. Estimating the Impact of Quantity and Qualities on Reputation

A. Reputation Reflected in Awards

The first three columns of Table 3 report the results of estimating the impacts of Q, q_1 and q_{21} on the probability of receiving one of the rare honors available to American economists. The second three columns present estimates of the determinants of having been elected a *Fellow* of the Econometric Society. In addition to the results displayed in the table, the probits describing *Honored* all hold constant for alphabetical location, location of undergraduate education, a quadratic in the year the scholar's first *SSCI*-indexed paper appeared, while the probits for election as *Fellow* add the indicator for female to these.[14] Place in the alphabet never has a significant effect on receipt of one of these awards (and has no significant effect on any of the reputational measures discussed in this Section), nor does gender. Not surprisingly, being *Honored* is substantially more likely among authors whose first published paper appeared earlier—except for the Clark Medal, these awards are usually for a lifetime of producing these inputs into reputation.

The results presented in Column (4) are similar to those in Column (1), as are those in Column (5) to Column (2), and in Column (6) to Column (3). The first point to note throughout is that the number of entries, Q, never has a significant positive impact on reputation as measured in these two ways. Conditional on quality, having produced a lot of material adds nothing to reputation. Indeed, the effect on *Fellow* is negative and significant in all three specifications. At the very least we can conclude that quantity does not add to these proxies for academic distinction and may diminish it, conditional on the quality of the work.[15]

There is some evidence in Table 3 that both dimensions of quality generate reputation, as proxied by these measures, although the returns to q_{21}, conditional on q_1, are only barely statistically significant in

[14]The indicator for female is not included in these probits, because only one woman has been honored according to this measure.

[15]One might be concerned that we measure from the stock of existing Fellows, not from the flow of newly-elected Fellows. To do that would require obtaining information on Fellows at the time they were elected, which is difficult but possible. Fatally, however, it would require information on those who were never elected, most of whom were never on the Fellows ballot. While using the stock may introduce errors, there is no reason for them to be generating biases that lead these results to mirror those for all the other measures of reputation discussed in this Section.

the equations for *Honored*, and insignificant in the equations for *Fellow*. There is also evidence that the marginal payoff to additional citations in total, or to the author's most-cited work, is diminishing: Adding quadratic terms to these probits, as shown in Columns (2) and (5), substantially increases their ability to predict the receipt of these awards.[16]

Also intriguing in Table 3 are the changes in the estimates that occur when we recognize that, except for the Nobel Prize, each of the other honors is awarded to American economists on a regular basis. Even if Q or each measure q were smaller, some American economist would have his/her reputation acknowledged by receipt of one of the AEA awards; and while it is not necessary, one might imagine that current Econometric Society Fellows, of whom half are Americans, would continue to elect many of their American peers. Columns (3) and (6) are identical to Columns (1) and (4), except that total citations, citations to the most-cited paper and number of publications are replaced by the scholar's rank along each dimension. Here and throughout we treat rank as increasing, so that a positive coefficient indicates that higher quality or quantity increases the likelihood of the outcome that reflects an enhanced reputation. In the case of *Honored* the equation does not fit as well as the quadratic version, but the fit is better than in Column (1). The ability to predict receipt of election as *Fellow* is, however, substantially enhanced.[17] These results suggest that the market for reputation, at least as proxied by these awards, may be more like a tournament than a competition in which additional quality *per se* increases the chance of success (Lazear and Rosen, 1981).

B. Individual Reputation Reflected by Departmental Reputation

In this sub-section we examine how the reputation of the economics department with which an individual is affiliated is related to the quantity and quality measures that we believe may determine

[16]We do not use the h-index (Hirsch, 2005). (Ranking an author's papers in descending order of their citation counts, an author's h-value indexes the paper that is ranked h'th in the order and that receives h citations. An h-index of around 35 is typical for Nobel laureates in economics.) For analytical purposes this measure has the problems that it combines quantity and quality and also fails to indicate dispersion in quality. No doubt it could be used here, but interpreting the meaning of any measured impact would be difficult.

[17]The equations in Columns (1)-(3) were re-estimated defining the outcome to exclude receipt of the Clark Medal. The results were very similar to those presented in the Table. Similarly, none of the conclusions here or anywhere else in this study changes qualitatively if we estimate bivariate relationships between a reputational outcome and each of the quality and quantity measures singly.

reputation. We have argued that the market for scholars makes the reputation of one's department a proxy for one's own reputation and thus a reflection of the roles of quantity and quality of research in generating reputation. In order to maintain the assumption that a department of a given reputation is "purchasing" scholars' attributes, we arbitrarily restrict the samples in this section to departments with at least 10 full professors (so that presumably an individual's reputation has only a small part in establishing the reputation of the collective and problems of reverse causation are minimized). This reduces the number of observations from 1339 to 1188 (and the number of departments to 66).[18]

The determinants of the scholarly reputations of the scholars (proxied by the reputations of their departments) are presented in Table 4. Included in all the equations, but not shown in the table, are the effects of experience, alphabetical position, being an econometrician and gender. None of the last three came close to statistical significance in any of the estimates. Given the importance of size, the number of full professors in a department is held constant and is unsurprisingly highly significant in increasing a department's reputation.

Columns (1) and (5) present results analogous to those in Columns (1) and (4) of Table 3. We again treat the publication ranking so that a higher number indicates a higher rank, and thus that all the independent variables with positive (negative) coefficients indicate an improvement in the rankings. In non-tabulated estimates younger authors (those whose first papers are more recent) are associated with departments with higher reputational rankings. Holding this measure constant may be important and may reflect the crucial nature of one's first publication (Siow, 1991); but the result is at least partly an artifact of the sample selection criterion we have used—full professors. Those scholars who become full professors earlier tend to be associated with schools with higher reputations.[19] This outcome may result from higher-ranked schools having sufficient resources to buy an option by gambling on very promising younger researchers.

[18]The crucial results in this sub-section hardly change if we restrict the sub-sample to the 940 scholars located in the 44 departments with at least 15 full professors, or if we include all 1339 observations.

[19]Dropping this measure from the regression hardly changes the results: The coefficient on q_1 becomes 0.511, that on q_{21} becomes 0.945, and that on Q becomes -4.882.

Having been educated in an English-speaking country (for the overwhelming majority of the sample this is the U.S.) is associated with being at an institution with a lower reputation.[20] This is similar to the results for election as *Fellow*, although having been educated abroad had no impact on being *Honored* by the Nobel Committee or the AEA. On the supply side these results may reflect self-selection by potential scholars from the upper tail of ability among potential non-American graduate students and/or faculty. On the demand side it may reflect the unwillingness of lower-ranked institutions to hire otherwise identical foreigners, either because the school values teaching relatively more and is concerned about language ability, or because of pure discrimination.

As with the results on reputation reflected in awards, at the very least here too Q has no impact. The estimates in Columns (1) and (5) of Table 4 show, however, that increases in q_1 lead the scholar to be located in a higher-ranked department. There is no extra fillip to these proxies for reputation from having one's scholarly recognition concentrated more heavily on one work—q_{21} has no effect on the *USNWR* rating and an insignificant positive effect on the publication-based ranking. When we allow for non-constant marginal returns to the quality measures, in the estimates shown in Column (2) and (6), it is clear that there are diminishing returns to quality along both dimensions. Moreover, both linear and quadratic terms along the overall quality dimension are statistically significant, but the quadratic in q_{21} only matters for the publication-based ranking. Implicitly, the results demonstrate that higher-ranked departments are concerned with the overall quality of publications, as measured by the author's total recognition by other scholars, and possibly too by the distinction of the scholar's best-known work. They do not, however, pay any attention to the quantity of publications.

Unlike the results in the previous sub-section, there is no mechanical reason to expect any relation between a scholar's rank along some quality dimension and his/her reputation, as reflected in the department with which s/he is affiliated. Departments and universities are, however, competing for prestige/students/funds, so that at least to some extent one might imagine that there are tournament-like aspects to the market for individuals' reputations, as reflected in the ranking of their departments. To

[20]There may be a distinction between those educated on the Indian sub-continent and those educated elsewhere, perhaps due to differential discrimination, perhaps to differential familiarity with English. We added an indicator for Indians and Pakistanis, but its effect was tiny and statistically insignificant.

examine this possibility we re-estimated the basic equation, again proxying Q, q_1 and q_{21} by the scholar's rank in the sample along the criteria of number of publications, total citations and citations to his/her most-cited work. Comparing the results, presented in Column (3) and (7), to those in either of Columns (1) and (2), or (5) and (6), it is clear that a scholar's rank along all three dimensions has a bigger impact on his/her reputation than do the cardinal measures. While not explicitly a tournament for reputation, the results also suggest that the market for scholarly reputation has tournament-like characteristics along one dimension of quality. In this formulation, however, q_{21} is not important—only total citations matter. Moreover, the impact of one's rank in Q on both proxies for reputation is significantly negative. The reputations that their departments confer on the more prolific scholars are lower than those of less prolific scholars whose work has achieved the same recognition.

One might be concerned about a possible two-tier labor market in economics, with the determination of reputation differing between public and private institutions. That argument is especially cogent given that the top eight departments in both the publication-based rankings and the *USNWR* ratings are in private institutions. There is in fact very little difference in the effects of the determinants of the two proxies for reputation between the two types of institution. Separate estimates of Column (3) for public (private) schools yield estimates of the effects of q_1, q_{21} and Q as 6.264 (6.080), -7.806 (-1.237) and -2.995 (-1.796) respectively. For Column (7) similar re-estimates yield 0.564 (1.036), -0.0105 (-0.0096) and -0.0071 (-0.0416). Tests of equality of the estimates across the equations fail to reject the hypothesis that the structures are the same. This similarity should not really be surprising—there is substantial mobility between tenured positions between the two sectors, so that reputational effects are likely to be determined at the same margins.

We can expand the quality ranking measures to use both q_{21} and q_{22}, as shown in Columns (4) and (8) of Table 4.[21] As in Columns (3) and (7), only the scholar's ranking in total citations has a significant effect on the proxies for reputation. There is no evidence of a significant additional impact of either the

[21]The simple correlation between the numerical proxies for these quality measures is 0.82.

most- or second-most-cited paper. What matters for reputation is the overall quality of the works that an author has produced.[22]

Relying on the formulations in Columns (3) and (7), we examine how the proxies for reputation are affected by quantity and quality at different levels of the publication-ranking and the *USNWR* rating. In other words, do their effects on reputation differ at the margin depending on the scholar's ability to generate reputation at different levels? Quantile regressions at the 75th percentile, the median and the 25th percentile of the quality rankings of departments suggest that there are few differences in the effects of the significant variables, q_1 and Q, at these quantiles. The importance of total quality, and the negative impact of quantity, pervades the distribution. The same conclusions are produced from separate least-squares regressions on individuals in the upper and lower halves of the publication-based rankings and the *USNWR* ratings. The absence of important differences at the quantiles suggests that the demand functions for reputation may be homothetic.

While the effects of total quality and quantity have statistically significant (in opposite directions) effects on these proxies for reputation, the sizes of the effects are at least as important. Using the distributions in Table 2 and the estimates in Columns (3) and (7) of Table 4, we can calculate the impacts of changes in these measures. Taking the publication rankings, a move from the 25th to the 75th (5th to 95th) percentile of q_1 increases the ranking by 42 (75). Using the *USNWR* ratings, the same changes generate effects of 0.62 (1.11) on the rating. The inter-quartile change thus increases the reputational proxies by about 2/3 of a standard deviation, while a change from the 5th to the 95th percentile would move one's reputation from near the middle to near the top of the range. Increases in Q significantly reduce the reputational proxies, although the effects are smaller but still substantial: -18 (-32) in the publication ranking, -0.15 (-0.27) in the *USNWR* rating.

In Section II we argued that our estimates are tracing out the hedonic locus between scholarly efforts that generate quantity and various dimensions of quality and the scholarly reputation that they produce. To what extent can we interpret the estimates as reflecting the preferences of buyers of quantity

[22]The partial correlation coefficient between q_1 and the vector q_{21} through q_{25} is 0. 974, making it difficult to move beyond the estimates presented in Column (4).

and quality in this reputational market? This depends on the extent to which scholars (suppliers of reputation) can substitute along the different margins of quality, and between quantity and quality. If each produces along a (possibly personal) Leontief-type function, then the estimates that we have presented of the market locus are structural estimates of the values that buyers attach to the determinants of reputation, given the fixed supply along each margin. If suppliers are able to substitute along these margins, then the failure of the market returns to be equated at all margins (the facts that overall quality generates extra rewards and that quantity *per se* has no or even a negative impact) suggests either that suppliers are unaware of the differential returns or that they cannot fully substitute at all margins. Either way, the possible existence of some substitution by suppliers of reputation along these margins implies that, if anything, our results understate the degree of inequality of the partial derivatives in the demand functions R^D_i.

C. Using Mobility to Bound Reputation

An additional way of examining the roles of quantity and quality in generating reputation using schools' reputational ratings is to study the quality of the department into which new full professors were hired between 1993 and 2007. We assume here that the decision to hire a new full professor, either from outside or by granting tenure to an untenured professor, reflects decision-makers' beliefs that the person will add to the reputation of the department (his/her reputation is at least that of the collective's average without him/her). Accordingly, a lower-bound measure of the individual's reputation is the reputation of the department some time shortly before s/he joined it

Table 5 shows the distribution and some statistics describing the 308 sample members who became tenured full professors at one of the 88 schools between 1993 and 2007. 40 percent were promoted internally; of the other 60 percent, nearly one-third were hired from unranked departments, from non-U.S. institutions or from outside academe. Of the remaining 40 percent, roughly half moved from schools that were lower in the publication ranking than their current position.

For the scholars in our sample who moved between schools from 1993 to 2007 or who entered the economics labor market after 1992, we relate the 1993 NRC quality rating to the variables included in the equations presented in Table 4. The scholarship of these 308 individuals could not have affected the

quality rating of the school in 1993. Thus relating the 1993 NRC rating to the individuals' efforts is an even cleaner measure of the impact of the quantity and quality inputs on reputation than those used in the previous sub-section, under the maintained assumption that schools will not hire or tenure scholars who reduce their reputations.

The estimates are shown in Table 6. As in all the estimates based on other measures of departmental reputation as proxies for the lower bound on the scholar's reputation, using rankings of the quality and quantity inputs describes the determinants of reputation better than cardinal measures. Also as before, there is a negative relationship between this proxy for reputation and the scholar's ranking in the distribution of Q. As with all the other measures that we have examined in this Section, merely writing more papers, conditional on the overall quality of one's work, generally reduces one's reputation. As the results in Columns (1)-(3) show, only q_1 significantly increases what we have identified as the lower bound of the scholar's reputation. Moreover, as in nearly all our other efforts to describe various proxies for reputation, the marginal effect of additional quality is diminishing; and, as before, increasing q_{21} has essentially no effect on reputation.

VI. The Non-Reputational Returns to Quality and Quantity

A. The Impact on Mobility

Assuming as we have that universities seek to maximize their reputations through the reputations of their faculty, one would expect that we would observe the same effects of our measures of quality and quantity on the payoffs that universities offer to attract and/or retain faculty. Thus we initially examine the impact of these measures on the likelihood that an individual whose first publication appeared before 1987 was hired with tenure between 1993 and 2007. Of the full professors in the sample 913 presumably could have moved with tenure to the department in which they are now located. Of those eligible for inclusion in the sub-sample by this criterion, in 2007 20 percent were at departments different from the one that employed them in 1992.

In Table 7 we report the results of estimating probits describing whether one of the members of this sub-sample moved during this fourteen-year period, as determined by the number of publications and several dimensions of quality. That English-educated faculty members are significantly less likely to

move is unsurprising: The foreign-born presumably are earlier in the process of searching for a good job and/or geographic match. As in the estimates of its effect on the various proxies for reputation, greater general quality makes mobility more likely; and having one's scholarly recognition concentrated on one study has no significant impact.

The crucial difference here is that the probability of moving is strongly positively related to the number of publications one has generated. This result may merely reflect the fact that movers are a doubly selected sample: While they have to meet at least the reputational median of the department that hires them, other scholars may have at least as high a reputation but reject mobility, either because they reject formal job offers or because it is known that they do not seek them. There are other explanations, and we consider them in the general context of additional evidence on non-reputational outcomes.

Of the 308 faculty who moved or were newly tenured, Table 5 showed that 181 were movers, and of these 130 came from ranked schools. Movements up and down the quality ladder were roughly equal, and the range of mobility was huge. The question is how the quality and quantity measures affected the size of the change in the quality of the department with which the scholar was affiliated. We divide the set of 130 rank-changers into those who improved by at least 10 ranks, those whose ranking changed only marginally, and those whose ranking fell by at least 10, and present estimates of the ordered probits describing this outcome in Column (1) of Table 8. None of the parameter estimates is statistically significant, although Q approaches significance and is surprisingly positive.

Additional evidence on this is provided by the probits in Columns (2) and (3), the first of which defines an indicator equaling 1 if the person's ranking improved by at least 10, the second of which defines an indicator equaling 1 if his/her ranking declined by at least 10. Again no estimated parameter on q_1 or q_{21} is statistically significant; but the impact of Q for those whose position improved is statistically significant and positive. As with the probability of moving, the probability of moving up is determined chiefly not by quality but by the sheer volume of output.

B. The Impacts on Salary

To examine more closely this apparent disconnect between the determinants of individuals' reputations and the determinants of individuals' non-reputational returns, we examine the salary data that

we collected for 2007-08 for full professors in 43 public universities. Although we only have salary data on 42 percent of the economists comprising our sample, this group of faculty members at public universities should be sufficiently large to allow us to explore a comparison of the impacts of Q, q_1 and q_{21} on salary to their impacts on reputation.

We stress that the observations that we use in this sub-section are not a random sub-sample: Unsurprisingly, since public universities are typically lower-ranked, the members of the sub-sample have fewer citations in total (median of 250 compared to 310 in Table 2), fewer citations to their most-cited paper (median of 57 compared to 71), but nearly the same number of papers (median of 22 compared to 24).[23] Moreover, we could not obtain salary information on 10 of the 53 public institutions in the sample, and those individuals on whom we have usable salary and citations data have statistically insignificantly lower averages of Q, q_1 and q_{2n} than those public-university faculty members on whom we do not have salary information.

Regressions of the logarithms of nine-month salaries against the same combinations of citations and publications measures used in the previous sections are shown in Columns (1)-(3) of Table 9. The usual control variables are included too, along with school fixed effects.[24] As with the reputational measures, salaries are described better by ranks in citations in total and to top-cited papers than by raw numbers. Thus we concentrate on the results in Column (3). As before, total citations have a significant positive effect on salary. The effect is not small: Going from the 25th to the 75th percentile of total citations in this sub-sample raises salary by 33 percent, and from the 5th to the 95th by 67 percent (on a mean of $150,200).

Unlike its impact on reputation, which for some of the proxies was positive, as in the results in the previous sub-section there is no significant additional effect of citations to the author's most-cited paper—indeed, it seems to have less of an effect on salary than citations to the scholar's other work.

[23]Indeed, the distributions of citations and numbers of publications are similar below the median, but the overall distributions have longer right tails.

[24]While the vector of fixed effects is highly significant statistically, its inclusion changes none of the inferences about the impacts of the citations and publication measures on salary. The results are also qualitatively nearly identical if we replace the school fixed effects with the departmental rankings, or the departmental ratings, used in the previous section; and the correlation of ranking (rating) with average salary is 0.80 (0.84).

Moreover, unlike the results on direct measures of reputation, but like that on the probability of moving and the quality of the move, and as shown in some studies of academic salaries, Q has a positive and statistically significant effect on salary. The effect is moderate: Going from the 25th to the 75th (5th to the 95th) percentile of Q increases salary by 6 (10) percent), but it stands in sharp contrast to the results on reputation itself in this study. Estimates of these effects at the 25th, median and 75th percentiles (not presented) show that the effects are quite similar at different points of the distribution of salaries.

One might be concerned that the results on salary arise simply because the sub-sample differs along quality dimensions from the overall sample. To examine this possibility, in Columns (4)-(6) of Table 9 we re-estimate the equations in Columns (6) of Table 3 and (3) and (7) of Table 4, here using only the sub-sample of public university faculty on whom we have salary data.[25] The impacts of Q and q_1 on *Fellow* are smaller in absolute value in this sub-sample, but they are qualitatively not that different from those for the entire sample. The estimated impacts of the quality and quantity measures on departmental rankings and ratings are nearly identical in this sub-sample to those in the entire sample. Overall the results suggest that the effect of Q on an individual's salary is at the very least quite different from its effects on various proxies for his/her reputation.[26]

Although some of their determinants are the same, clearly reputation does not translate directly to salary nor can they be equated (Moore *et al*, 2001). The contrast between the effects of Q in Column (3) and in Columns (4)-(6) thus poses an interesting conundrum: Why should universities pay off on something—the sheer volume of production—that, as our results demonstrate, does not raise and may even reduce an individual's reputation? There are two general categories of explanation for this remarkable difference: 1) The information available to those who determine salaries differs from that

[25]We do not use *Honored* here, as only 5 of the 564 observations received an honor, while 63 are *Fellows*.

[26]These results are not a matter of somehow different salary determination for younger and older full professors. Re-estimating the specification in Column (3) on the large majority of the sample who received their doctorate before 1987 hardly changes the results. Similarly, interacting experience with the quantity and quality measures adds nothing to the estimates in Column (3). Nor are salaries lower, other things equal, as a compensating differential for those who have better reputations: For those scholars for whom *Fellow* = 1, in re-estimates of Column (3) salaries are a significant 10 percent higher, other things equal; but the qualitative impacts of Q, q_1 and q_{21} are unchanged. No doubt suppliers trade off honorifics for pecuniary returns in compensation packages (see Besley and Ghatak, 2008), but their honorifics are also rewarded by the market.

available to the demanders of reputation generally; and 2) There are unobservable factors correlated with Q that make scholars who produce a lot of output more productive in ways that do not affect or even lower their external reputations.

We can test various explanations under the first general rubric. One possibility is that those who determine salaries are unaware of citation information or do not take it into account, so that Q provides the only signal of productivity (remember that Q and the q measures are positively correlated). As one effort to examine this possibility, we surveyed individuals in the departments used in this sub-section, obtaining data on whether information on recent accepted/published work, and/or recent citations, is collected for use in determining annual salary changes.[27] We obtained responses from all 43 departments, with the unsurprising result that all obtain information on publications; but only 8 departments, covering 126 of the 564 individuals included in the estimates in Table 9, obtain information on annual citations. The contrast between the results on salary and reputation may therefore simply arise from most schools ignoring citation information in salary-setting.

If these results stem from the failure of most institutions to obtain information on citations, we would expect to see that the number of publications affects salary determination less in those departments that do collect citations data, while total citations and citations to the most-cited paper have greater effects there. Adding interactions of an indicator for collecting citations data with Q, q_1 and q_{21} to Column (3) of Table 9, as shown in Column (1) of Table 10, we find that none of the interactions has a t-statistic above one, and the vector of interactions is statistically insignificant. Entering each interaction term separately does not alter the conclusion. While some schools do collect citation data when salaries are determined, having that information available does not seem to alter the effects of the determinants of salaries.

A related possibility is that the locus of control of salary-setting may differ across the 43 institutions, with salary-setting in departments that are part of relatively homogeneous colleges paying less attention to Q, since other departments in the unit have similar production technologies and internal

[27]The e-mail questionnaire was: "In doing annual merit/salary reviews, what information is requested from faculty members in your Department? 1) List of articles accepted and/or published during the year—YES or NO. 2) List or count of citations during the year to published or unpublished work—YES or NO. Please delete the incorrect answer to each of these two questions."

systems of evaluation. To examine this possibility we created an indicator for those departments that are part of large general colleges (typically called Arts and Sciences, Liberal Arts, etc.), equaling 1 for 41 percent of the observations used in the estimates in Table 9. The results of interacting this indicator with the quality and quantity measures are shown in Column (2) of Table 10. Again, none of the interactions has a t-statistic above one, and the entire vector is insignificant. [28]

Another explanation may be that the salaries of those who have moved into a department are determined differently from those of stayers (although the evidence in the previous sub-section suggested the same effects on the probability of moving that we have observed here on salaries), with the determination of movers' salaries being more responsive to Q and less to the quality measures. For the reduced sample who could have moved from another institution, we interact the indicator of movement with the quality and quantity measures, with the results presented in Column (3) of Table 10. Again none of the individual interactions is significant, nor is the entire vector of interactions as a group.[29]

Yet another possibility under this rubric is that salary determination in larger departments, where there is a greater likelihood that a colleague is familiar with the quality of one's work and does not need to rely so much on quantity as a signal, is based less heavily on Q. Interacting the number of full professors in a department with Q and the two quality indicators, as shown in Column (4) of Table 10, produces the same insignificant interactions as the previous three re-specifications.

One (perhaps testable) possibility under the second rubric is that the same personality characteristics that lead scholars to churn out many papers are correlated with other characteristics that generate high salaries and make them more likely to move. Some of the correlations may be with characteristics that might be viewed as desirable. For examples, those who write a lot might also be energetic or even better teachers, might be more active departmental citizens, and/or less troublesome and

[28]One might also guess that higher-ranked schools pay more attention to total citations, which, as we showed, are the major determinant of reputation, and less to Q. Re-estimating the equation in Column (3) of Table 9 by adding the interactions of the department's ranking (rating) with Q, q_1 and q_{21} suggests that this is not the case in this subsample. The interaction terms were insignificant individually and as a group, F(3, 550)=0.92, (F(3, 348)= 0.64).

[29]The estimates imply that, other things equal, those who had moved earned 14 percent more per year than otherwise identical faculty who had not. This result is consistent with the Ransom's (1993) findings on the relation between academic salaries and job tenure.

more stable colleagues. Some might be viewed as undesirable—they might agitate more successfully for salary increases, either by soliciting and receiving job offers and/or by clever negotiation with their current employer.

To examine this possibility, admittedly quite imperfectly, we obtained (for all but two people) information on whether individuals in the sub-sample had ever been a department chair or a more senior university official. Presumably being chosen for such a position indicates at least a minimal level of organizational ability and desirable personality traits. We interact an indicator for this proxy for personality traits with the quantity and quality measures, with the results shown in Column (5) of Table 10. (The indicator equaled one for 24 percent of the sub-sample.) Here the interactions as a group are statistically significant; and q_1 matters relatively more than Q for those who were never administrators, which gives some credence to this explanation for the disconnect between reputation and salary. Nonetheless, even for those who never were administrators, Q has a positive and nearly significant effect on salary.

None of the testable explanations explains the conundrum very well. Some additional, non-testable explanations combine both informational inadequacy and unobservables. Assume that entrants into the academic market for reputation consist of two observably indistinguishable but distinct types: Good guys, whose future papers will be cited a lot; and opportunistic guys, who devote their effort to publishing articles that eventually generate few citations. Reputation alone cannot fully sort the good from the opportunistic, because updating wages may not be fully possible when wages are not adjustable downward. In the academic market a disconnect between reputation and salary will occur. The reputational market may have characteristics comparable to those of markets for firms' reputations (Tadelis,2002).

Alternatively, assume that each supplier of reputation produces along a stochastic Leontief production function, so that each paper has the same probability of being an important contribution, but some are of higher quality than others. Then greater quantity, indicative of more effort (more draws from the person's distribution), indicates that the scholar is more likely to produce a high-quality piece of research. Quantity itself becomes an indicator of future quality. Clearly this explanation too is not

testable, but it might be an additional explanation for the findings that the quantity of scholarly output *per se* has negative effects on reputation but positive effects on mobility and salary.

VII. Conclusions

We have used the careers of academic economists as a simulacrum for studying the determinants of reputation. Reputation is a nebulous concept, and for that reason we have been compelled to find a number of proxies for it, none of which, we admit, could possibly capture the idea fully. Our focus has been on the relative roles of what might be characterized as the number of attempts to establish reputation, the number of actual impressions made on those who might determine one's reputation and the distribution of those impressions across their number. We proxy the number of attempts by the number of papers a scholar has published, their impressions by the number of times those published works are cited, and their distribution by the concentration of citations on one or several published papers.

Although the evidence is somewhat mixed, it appears that, at least in this example, simply attempting to establish a reputation by writing more papers has no impact on a large number of proxies for reputation and very possibly even a negative effect. It does, however, affect the likelihood that a scholar is able to change jobs, and it also raises salaries in the sub-sample we have used. The major determinant of reputation—what is rewarded in this particular academic reputational market—is the interest that a scholar's work generates among his/her peers. There is at most only weak evidence that the concentration of impressions on a single piece of work—one article, in this case—generates additional increases in one's reputation. Finally, we also find evidence that this reputational market has tournament-like aspects—one's ranking along the dimension of overall quality appears to describe one's reputation better than do one's absolute achievements along this dimension.

The disconnect between the determinants of reputation and the determinants of salary might merely result from a difference in goals between agents on the demand-side of reputational markets and those university official who set salaries. Assuming, however, that the goals of universities are best achieved by enhancing their reputation rather than by paying for characteristics that do not enhance reputation, there may be an opportunity for university administrators to reallocate resources in salary-setting and improve their institutions' positions. Paying off at the margin more on reputation and less on

the quantity of publications would be a sensible approach. One would think that, with the recognition of this disconnect, we would see markets working to remove these differences at the margin.[30]

While our example is obviously quite specific, the general view of a market in which various characteristics are implicitly supplied and purchased and interact to generate reputation seems useful in a variety of other reputational markets. Any labor market in which the participants' output can be identified would appear equally amenable to studying the quantity/quality determinants of reputation. The establishment of reputation in other academic disciplines and in the professions (attorneys and physicians being obvious examples for which overall measures of reputation are readily accessible) can *mutatis mutandis* be analyzed using essentially the same methods that we have used here; and the nature of reputation in artistic/creative activities is similar enough to that in academic disciplines to make studying it using approaches like the one here worth pursuing. Also, the reputations of restaurants, and perhaps other retail outlets, might be studied in the same way. The main points are that it is useful to view the establishment of reputation as stemming from market interactions, and that the various determinants of reputation can be analyzed in a wide variety of real-world contexts.

[30]If general managers of major league baseball teams can recognize these profit opportunities, as they seem to have (see Hakes and Sauer, 2006), one would think that department and university administrators would also be able to do so.

REFERENCES

Michelle M. Arnold and D. Stephen Lindsay. 2002. "Remembering Remembering," *Journal of Experimental Psychology: Learning, Memory and Cognition*, 28(3), 512-529.

Kaushik Basu. 1989. "A Theory of Association: Social Status, Prices and Markets," *Oxford Economic Papers*, 41(4), 653-671.

Timothy Besley and Maitreesh Ghatak. 2008. "Status Incentives," American Economic Association, *Papers and Proceeding*s, 98(2), 206-211.

George Borjas. 1987. "Self-Selection and the Earnings of Immigrants," *American Economic Review*, 77(4), 531-553.

Bernt Bratsberg, James Ragan and John Warren. 2009. "Does Raiding Explain the Negative Returns to Faculty Seniority?" *Economic Inquiry*, forthcoming.

Ana Cardoso, Paulo Guimaraes and Klaus Zimmermann. 2008. "Comparing the Early Research Performance of Ph.D. Graduates in Labor Economics in Europe and the USA," IZA Discussion Paper No 3898, December 2008.

Jonathan Cole and Stephen Cole. 1973. *Social Stratification in Science*. Chicago: University of Chicago Press.

CSWEP. 2009. *Newsletter*, Winter, p. 10.

Liran Einav and Leeat Yariv. 2006. "What's in a Surname? The Effects of Surname Initials on Academic Success," *Journal of Economic Perspectives*, 20(1), 175-188.

David J. Faurot and Stephen McAllister. 1992. "Salary Arbitration and Pre-Arbitration Negotiation in Major League Baseball," *Industrial and Labor Relations Review*, 45(4), 697-710.

Marianne A. Ferber. 1986. "Citations: Are They an Objective Measure of Scholarly Merit?" *Signs*, 11(2): 381-389.

John Hakes and Raymond Sauer. 2006. "An Economic Evaluation of the *Moneyball* Hypothesis," *Journal of Economic Perspectives*, 20(3), 173-186.

Daniel S. Hamermesh, George E. Johnson and Burton A. Weisbrod. 1982. "Scholarship, Citations and Salaries: Economic Rewards in Economics," *Southern Economic Journal*, 49(2), 472-481.

---------- and Peter J. Schmidt. 2003. "The Determinants of Econometric Society Fellows Elections," *Econometrica*, 71(1), 399-407.

Jorge E. Hirsch. 2005. "An Index to Quantify an Individual's Scientific Research Output," *Proceedings of the National Academy of Sciences,* 102(46), 16569-16572.

Pantelis Kalaitzidakis, Theofanis P. Mamuneas and Thanasis Stengos. 2003. "Rankings of Academic Journals and Institutions in Economics," *Journal of the European Economic Association*, 1(4), 1346-1366.

Lawrence M. Kahn. 1993. "Free Agency, Long-Term Contracts and Compensation in Major League Baseball: Estimates from Panel Data," *Review of Economics and Statistics*, 73(1), 157-164.

Kenneth Kurtz and Jeffrey Loewenstein. 2007. "Converging on a New Role for Analogy in Problem Solving and Retrieval: When Two Problems Are Better Than One," *Memory and Cognition*, 35(2), 334-341.

Edward P. Lazear and Sherwin Rosen. 1981. "Rank-Order Tournaments as Optimum Labor Contracts," *Journal of Political Economy*, 89(5), 841-864.

George Mailath and Larry Samuelson. 2006. *Repeated Games and Reputation: Long-Run Relationships*. New York: Oxford University Press.

William J. Moore, Robert J. Newman and Geoffrey K. Turnbull. 1998. "Do Academic Salaries Decline with Seniority?" *Journal of Labor Economics*, 16(2), 352-366.

----------, ---------- and ----------. 2001. "Reputational Capital and Academic Pay," *Economic Inquiry*, 39(4): 663-671.

National Research Council. 1995. *Research-Doctorate Programs in the United States; Continuity and Change*. Washington: National Academy of Sciences.

Michael Ransom. 1993. "Seniority and Monopsony in the Academic Labor Market," *American Economic Review*, 83(1), 221-233.

Sherwin Rosen. 1974. "Hedonic Prices and Implicit Markets," *Journal of Political Economy*, 82(1), 34-55.

----------. 1987. "Some Economics of Teaching," *Journal of Labor Economics*, 5(4), 561-575.

Yianis Sarafidis. 2007. "What Have You Done for Me Lately? Release of Information and Strategic Manipulation of Memories," *Economic Journal*, 117(2), 307-326.

Aloysius Siow. 1991, "Are First Impressions Important in Academia?" *Journal of Human Resources*, 26(2), 236-255.

Jeffrey J. Starns and Jason L. Hicks. 2005. "Source Dimensions Are Retrieved Independently in Multidimensional Monitoring Tasks," *Journal of Experimental Psychology: Learning, Memory and Cognition*, 31(6), 1213-1220.

Steven Tadelis. 2002, "The Market for Reputations as an Incentive Mechanism," *Journal of Political Economy*, 110(4): 854-882.

Jean Tirole. 1996. "A Theory of Collective Reputations (with application to the persistence of corruption and to firm quality)," *Review of Economic Studies*, 63(1), 1-22.

Endel Tulving and Donald M. Thomson. 1973. "Encoding Specificity and Retrieval Processes in Episodic Memory," *Psychological Review*, 80(5), 352-373.

Benjamin Ward. 1958. "The Firm in Illyria: Market Syndicalism," *American Economic Review*, 48(4), 566-589.

Table 1. Means and Standard Deviations, Outcome Measures, Full Professors in Top-Rated Departments, 2007-08, N =1339 except where otherwise noted

Outcome	
Publication-Based Ranking (1 top, 200 bottom)*	62.92 (57.20)
USNWR Rating (5 highest) (N = 865)	3.88 (0.78)
NRC93 Faculty Rating (5 highest) (N = 1179)	3.25 (1.02)
Moved 1993-2007 (N=913 eligibles)	0.197
Honored	0.031
Honored (w/o Clark)	0.025
Fellow	0.207

*From Kalaitzidakis *et al* (2003).

Table 2. Descriptive Statistics, Personal Measures, Full Professors in Top-Rated Departments, 2007-08, N=1339

Input

			Percentile					
	Mean	**Minimum**	**5**	**25**	**50**	**75**	**95**	**Maximum**
Citations:								
q_1	685	0	25	131	310	727	2575	14232
q_{2n} :								
1st Paper	150	0	9	32	71	155	498	4580
2nd Paper	82	0	5	21	44	91	260	2212
3rd Paper	59	0	3	15	32	68	189	1059
4th Paper	46	0	2	11	25	53	150	879
5th Paper	38	0	1	8	20	42	124	717
Q	31.76	1	7	14	24	39	79	283
Female	0.060							
English-language education	0.778							
Econometrician	0.087							
No. of Full Professors	19.45	3	7	13	17	24	39	39

Table 3. Determinants of Various Honors, Probit Derivatives, N=1339*

	(1)	(2)	(3)	(4)	(5)	(6)
		Honored			***Fellow***	
Ind. Var.:						
Total Citations/1000	0.0043	0.0042		0.296	0.351	
	(3.57)	(2.46)		(8.47)	(8.65)	
(Total Citations/1000)^2		-0.00026			-0.0196	
		(2.63)			(6.47)	
Citations to Most-Cited Paper/1000	0.0103	0.0099		0.138	0.088	
	(2.14)	(1.84)		(1.08)	(0.64)	
(Citations to Most-Cited Paper/1000)^2		-0.0015			-0.0537	
		(1.37)			(1.50)	
No. of Entries/1000	0.015	0.0387		-1.861	-1.238	
	(0.37)	(0.63)		(2.70)	(0.98)	
(No. of Entries/1000)^2		-0.0131			-5.33	
		(0.53)			(0.78)	
Total Citations Rank/1000			0.0034			0.585
			(2.74)			(7.42)
Citations to Most-Cited Paper Rank/1000			0.00061			-0.0323
			(0.79)			(0.54)
No. of Entries Rank /1000			0.00016			-0.124
			(0.30)			(3.17)
English Education	0.0028	0.0018	0.00002	-0.200	-0.193	-0.156
	(0.75)	(1.03)	(1.28)	(5.87)	(5.97)	(6.03)
Econometrician	-0.0071	-0.0029	-0.00002	0.109	0.099	0.082
	(2.20)	(2.19)	(0.88)	(2.38)	(2.33)	(2.73)
Pseudo-R^2	0.482	0.542	0.541	0.337	0.355	0.365

*Absolute values of t-statistics in parentheses here and in Tables 4, 6 and 7, based on.robust standard errors. Also included in all the probits for *Honored* are rank in the alphabet, location of undergraduate education and a quadratic in the year of first paper. The probits for *Fellow* add an indicator for female.

Table 4. Determinants of Measures of Departmental Reputation*

	Publication-Based Ranking**				*USNWR*		Rating	
Ind. Var.:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total Citations/100	0.559	1.868			0.0124	0.0391		
	(1.91)	(2.51)			(2.59)	(4.62)		
(Total Citations/100)^2		-0.0141				-0.00025		
		(2.57)				(4.60)		
Citations to Most-Cited Paper/100	0.946	1.773			0.00034	-0.0104		
	(1.07)	(1.64)			(0.02)	(0.53)		
(Citations to Most-Cited Paper/100)^2		-0.0439				-0.00005		
		(2.06)				(0.16)		
No. of Entries/100	-5.153	-1.832			0.0164	-0.2339		
	(0.78)	(0.92)			(0.17)	(-1.30)		
(No. of Entries/100)^2		3.980				-0.0598		
		(0.49)				(0.80)		
Total Citations Rank/100			6.234	4.985			0.0921	0.0796
			(4.36)	(3.34)			(3.62)	(2.39)
Citations to Most-Cited Paper Rank/100			-2.254	-4.912			-0.0108	-0.0137
			(0.28)	(0.64)			(0.77)	(1.04)
Citations to Second-Most Cited Paper Rank/100				1.432				-0.0147
				(1.23)				(0.69)
No. of Entries Rank/100			-2.653	-2.446			-0.0223	-0.0202
			(3.08)	(3.08)			(1.99)	(1.75)
English Education	-4.970	-7.383	-5.338	-5.253.	0.0566	0.0484	0.0516	0.0531
	(1.41)	(1.98)	(1.58)	(1.53)	(1.12)	(0.97)	(1.13)	(1.15)
No. of Full Professors	2.916	2.787	2.387	2.384	0.0604	0.0555	0.0552	0.0552
	(5.55)	(5.26)	(4.75)	(4.74)	(9.04)	(8.64)	(8.42)	(8.42)
R^2	0.331	0.359	0.421	0.422	0.530	0.561	0.577	0.577
N =		1188				858		

*The samples are restricted to individuals in departments with 10 or more full professors. Also included are rank in the alphabet, indicators for female and econometrician, and a quadratic in year of first paper.
**From Kalaitzidakis *et al* (2003).

Table 5. The Distribution of Movers and Newly Tenured

Category:	**Number of Faculty** and Statistics
Movers and Newly Tenured	308
Movers	181
In Ranked Department before 2007	130
Mean Change (Improvement)	-6.21
S.D. Change	(44.24)
Improved	60
Minimum, Maximum	(1, 132)
Worsened	70
Minimum, Maximum	(-1, -142)

Table 6. Determinants of NRC93 Faculty Rating, Movers and Newly Tenured, N = 308

Ind. Var.:	(1)	(2)	(3)
Total Citations/1000	0.199	0.541	
	(1.82)	(3.37)	
(Total Citations/100)^2		-0.0220	
		(2.42)	
Citations to Most-Cited Paper/1000	-0.0925	0.0294	
	(0.21)	(0.04)	
(Citations to Most-Cited Paper/1000)^2		-0.737	
		(1.77)	
No. of Entries/100	-0.194	-0.0673	
	(0.78)	(0.14)	
(No. of Entries/100)^2		-0.216	
		(1.24)	
Total Citations Rank/100			0.167
			(3.38)
Citations to Most-Cited Paper Rank/100			-0.0429
			(1.40)
No. of Entries Rank/100			-0.0678
			(2.57)
English Education	0.221	0.189	0.150
	(2.42)	(2.24)	(1.86)
R^2	0.491	0.520	0.533

*Also included here are rank in the alphabet, indicators for female and econometrician, a quadratic in year of first paper, and the number of full professors in the department.

Table 7. Determinants of the Probability of Moving Between 1993 and 2007, Probit Derivatives, N=913

	(1)	(2)	(3)
Ind. Var.:			
Total Citations/1000	0.0477	0.0785	
	(2.15)	(1.81)	
(Total Citations/1000)^2		-0.0038	
		(1.13)	
Citations to Most-Cited Paper/1000	-0.139	0.150	
	(1.66)	(0.69)	
(Citations to Most-Cited Paper/1000)^2		-0.217	
		(1.95)	
No. of Entries/100	0.236	0.452	
	(5.13)	(4.31)	
(No. of Entries/100)^2		-0.137	
		(3.08)	
Total Citations Rank/100			0.0405
			(3.19)
Citations to Most-Cited Paper Rank/100			-0.0144
			(1.35)
No. of Entries Rank/100			0.0088
			(1.51)
English Education	-0.109	-0.090	-0.102
	(3.02)	(2.56)	(2.65)
Pseudo-R^2	0.129	0.166	0.173

Table 8. Determinants of Rankings Changes of Academic Movers, N=123*
(Dep. Var is Ordinal in Size of Improvement)

	Ordered Probit	Probit	Probit
	(1) **All**	(2) **Improve**	(3) **Worsen**
Ind. Var.:			
Total Citations Rank/100	0.0930 (0.93)	0.0020 (0.05)	-0.0659 (1.59)
Citations to Most-Cited Paper Rank/100	-0.1263 (1.66)	-0.0403 (1.41)	0.0473 (1.34)
No. of Entries Rank/100	0.1029 (1.83)	0.0624 (2.51)	-0.0176 (0.76)
Pseudo-R^2	0.080	0.107	0.218

*Also included here are rank in the alphabet, indicators for female and econometrician, number of full professors in the current department, and a quadratic in year of first paper

Table 9. Determinants of Salary, ES Fellow and Departmental Rankings, 43 Public-University Economics Departments*

Dependent Variable:	**Ln(Salary)**			***Fellow***	**Publication Ranking**	***USNWR* Rating**
	(1)	(2)	(3)	(4)	(5)	(6)
Ind. Var.:						
Total Citations/100	0.0208	0.0338				
	(6.37)	(5.90)				
(Total Citations/100)^2		-0.00046				
		(3.57)				
Citations to Most-Cited Paper/100	-0.0275	-0.0280				
	(3.80)	(2.11)				
(Citations to Most-Cited Paper/100)^2		0.00083				
		(2.14)				
No. of Entries/100	0.191	0.4178				
	(3.74)	(4.32)				
(No. of Entries/100)^2		-0.1790				
		(3.42)				
Total Citations Rank/100			0.0428	0.0223	6.597	0.0665
			(5.60)	(3.33)	(3.55)	(2.98)
Citations to Most-Cited Paper Rank/100			-0.0127	0.0023	-0.429	-0.0162
			(2.09)	(0.46)	(0.35)	(1.16)
No. of Entries Rank/100			0.0081	-0.0050	-3.151	-0.0074
			(2.16)	(1.45)	(2.56)	(0.89)
p-value on F-test of 42 School Fixed Effects	<.001	<.001	<.001			
Adj. R^2 (Pseudo- R^2 in Col. (4))	0.495	0.524	0.534	0.326	0.387	0.398
N	564	564	564	564	564	362

*t-statistics based on robust standard errors in Columns (5) and (6). Also included in all equations here and in Table 10 are: Rank in the alphabet, indicators for female, English education and econometrician, and a quadratic in years since the first paper. Columns (5) and (6) also include the number of full professors.

Table 10. Testing for Informational and Other Determinants of Salary Effects, 43 Public-University Economics Departments*

Interacted With:	(1) Use Citations	(2) Broad College	(3) Moved	(4) NFULLS	(5) Ever Admin
Ind. Var.:					
Total Citations Rank/100	0.0406 (4.71)	0.0469 (4.63)	0.0389 (4.07)	0.0623 (3.48)	0.0460 (5.40)
Total Citations Rank/100*Interaction	0.0110 (0.59)	-0.0083 (0.54)	-0.0035 (0.12)	-0.0011 (1.22)	-0.0284 (1.64)
Citations to Most-Cited Paper Rank/100	- 0.0114 (1.64)	-0.0173 (2.14)	-0.0129 (1.63)	-0.0281 (1.89)	-0.0129 (1.88)
Citations to Most-Cited Paper Rank/100 * Interaction	-0.0059 (0.40)	0.0098 (0.80)	0.0194 (0.83)	0.0001 (1.13)	0.0067 (0.47)
No. of Entries Rank/100	0.0087 (2.10)	0.0100 (2.13)	0.0118 (2.59)	0.0013 (0.14)	0.0074 (1.84)
No. of Entries Rank/100* Interaction	-0.0034 (0.39)	-0.0053 (0.74)	-0.0026 (0.16)	0.0004 (0.85)	0.0101 (1.18)
Main Effect	---------	---------	0.184 (2.37)	---------	-0.0174 (2.36)
F-statistic on interactions df	0.15 (3, 509)	0.43 (3, 509)	0.88 (3, 306)	0.50 (3, 509)	3.26 (3, 506)
Adj. R^2	0.532	0.534	0.549	0.533	0.549
N	564	564	362	564	562

* Columns (1), (2) and (4) also include school fixed effects.