# Does Paying Referees Expedite Reviews?

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> *"It is also probably the case that incentives for high-quality refereeing and editorial work are weak, there being essentially no penalty for an inadequate performance though possibly some reward for a good performance*." P.K. Trivedi (1993), p. 99

Scientific journals have employed peer review to appraise the quality of manuscripts for over three centuries (Zuckerman and Merton). Referees providing peer reviews generally do so voluntarily as part of their professional duties. When requesting peer reviews, journal editors place their trust in referees to provide high quality, timely reviews. Even with single-blind reviews, the identities of referees are ordinarily not revealed until the journal publishes a list of referees acknowledging their contribution. But the publication of such lists does not allow the matching of reviews with referees; only editors and members of editorial boards have first-hand knowledge of the quality and timeliness of the reviews provided by referees. While editors can try to choose referees who will provide high quality reviews, editors typically can provide few incentives to elicit careful, timely reviews or impose penalties on delinquent referees.

Some economics journals have begun to offer payments as an incentive to referees for providing on-time reviews. Perhaps surprisingly, the empirical research examining the efficacy of these "bribes" to induce punctuality on the part of referees is quite limited. Hamermesh (1991, 1994) provides cross-sectional evidence from a sample of 50 manuscripts submitted to seven journals in November 1989. He compared the daily hazard rate—the rate at which a manuscript can be expected to escape from waiting in the queue—between the single journal offering payment for an on-time (6 weeks) review and the other six journals. Payments had a

noticeable effect on increasing the proportion of referee reports completed by the end of the sixth week. Journals not employing payments had a larger proportion of reviews still to be completed at the end of six weeks.

That there is so little empirical research on the efficacy of referee payments is perhaps even more surprising given current lags in publication at some journals. The increased time between submission of manuscripts to publication in economics journals over the last four decades has been documented thoroughly (Marshall; Coe and Weinstock; Yohe; Laband, Maloney, and McCormick; Trivedi; Chong; Ellison). Ellison attributes about one quarter of the increase in the submission-to-publication lag to increased times between submission and the first editorial response. Payments to referees to encourage on-time reviews have been implemented in most instances to expedite submission-to-first-editorial response times. Payments for subsequent reviews of revised manuscripts are not common because editors may not know *ex ante* whether the authors will be invited to revise their manuscripts. And when editors choose to permit revisions, the extent of the revision and the timeliness with which the authors make such a revision may not be influenced by editors.[1]

The purpose of this note is to provide some empirical evidence about payments to referees for a single field journal, the *Journal of Agricultural and Resource Economics* (*JARE*), through time. The first question we seek to answer is: Do payments have a significant effect on reducing submission-to-first-response times? We have information on these response times both before payments were made as well as after payments were implemented at *JARE*. Hence, we can complement Hamermesh's cross-sectional comparisons of journals with and without

[1] The journal *Contemporary Economic Policy* does offer incentives for authors to expedite revisions. A "revision fee" of $75 is typically imposed. However, if authors can make revisions within four months, the revision fee is waived. The focus of CEP is on providing timely, policy-relevant articles so it is not surprising the editor wants to encourage quick revisions.

payments by making time-series comparisons of the efficacy of payments to referees of the same journal. The second question we want to answer is: Once implemented, do payments lose their efficacy over time? There are numerous reasons why the incentives provided by payments might lose strength over time. Other journals might adopt payment schemes in order to compete for timely reviews. If the nominal payment value is not adjusted through time, the real value of the payment might be eroded enough to diminish its strength in encouraging punctual reviews. Finally, referees might simply find that the initial surprise at being offered a payment—a payment "glow" as it were—attenuates as referees begin to expect some kind of payment or incentive for producing on-time reviews.

**Previous Theoretical Underpinnings**

Most of the theoretical models developed to address the question of payments to referees have focused on the *participation rate* of referees when asked by editors to review manuscripts (Engers and Gans; Chang and Lai). The stylized facts motivating these models are that editors send referees manuscripts requesting a review. On receipt of the editor's correspondence, the referee must decide whether to review or not. If the referee refuses and returns the manuscript, a delay between submission and first editorial response occurs while the editor searches for a new referee and the "start date" for the review is delayed. In Chang and Lai's model, editors may choose to make payments to referees in an effort to increase participation rates. Referees, on the other hand, may decide to review for free if the journal requesting the review is very prestigious. [2] Referees may still decide to review for a slightly less prestigious journal if the editor offers sufficient payment. Multiple equilibria can exist in the Chang and Lai model as journals of

[2] Refereeing appears to be a valued professional activity in academia because dossiers for promotion and tenure often report numbers of reviews written as well as the journals for which the reviews were requested. The more prestigious the journal requesting refereeing services, the higher the boost to the academic economist's reputation.

varying calibers may choose payments or in-kind incentives of varying levels in hopes of increasing participation rates.

Engers and Gan endogenize both the participation rate as well as the review time in considering the equilibrium level of payments. In their framework, referees find reviewing an onerous task. Yet they agree to participate insofar as they are concerned with upholding the quality of the journal in which they may publish. Of course, referees may be less concerned than the journal's editor about the quality of a journal, in which case the cost to the referee of refusing to review is low. Engers and Gan find the equilibrium payment to induce on-time reviews to be zero, even when referees and editors value journal quality equally highly, because editors have the option of imposing a maximum time limit for reviews. If the referee fails to meet the time limit, the editor searches for a new referee. The time limit allows the editor to see which referees have a low enough fixed cost of reviewing to agree to review in the fixed time period. Any payment exceeding zero would not permit the editor to verify any additional information about a referee's decision to agree to review but the non-zero payment would reduce the editor's payoff. Hence, the equilibrium payment is zero. Engers and Gan argue that a direct subsidy in lieu of a referee payment might be warranted because the equilibrium described is not Pareto optimal; that is, neither the referees nor the editor fully internalize the effects of their decisions on each other when attempting to value journal quality.

Hamermesh's appointment-book model (1991) focuses on the effects of payments on the average waiting time in "queue"—the time elapsed until the review is completed—as well as on the referee's decision to refuse—the participation rate. Referees (or doctors) as suppliers of services do not charge market prices or fees for *access* to their services. Instead, journal editors (or patients) as customers of their services must wait in a queue for delivery of services.

Referees choose the average waiting time in the queue—time to completion of manuscript review—as well as the rate at which to deny customers a place in the queue—the rate at which they refuse journals' requests to review manuscripts. Hamermesh identifies the supplier's *commitment* to particular customers as an important factor in determining who gets a place in the queue and how long that customer must wait to get served. Customers desiring more rapid service could "bribe" suppliers for the privilege of jumping ahead in the queue. Hamermesh distinguishes suppliers by their quality. Although one might expect higher quality suppliers to have higher refusal rates and longer waiting time in their queues, the model does not generate these unambiguous hypotheses.[3]

All the theoretical models discussed emphasize one salient feature of the market for referee services: because referees provide their services voluntarily, there is no price mechanism to allocate effort. Monetary payments, in Hamermesh's model, are not designed to compensate referees for their time; instead, payments may elicit "queue-jumping" behavior whereby a referee moves the manuscript in question close to the front of the queue of manuscripts to be reviewed in order to meet the deadline for receiving payment. Referees still supply reviews gratis but payments can influence the order in which voluntary tasks are completed.[4]

[3] A number of factors mitigate against unambiguous results. When the cut-off time in the queue is endogenous, the effects of supplier quality on refusal rates and average waiting times becomes more complicated. Also, if customers are can discern supplier quality and adjust their behavior accordingly, the supplier who is aware of these customer adjustments will also choose different refusal rates and average waiting times.

[4] One aspect of payments not mentioned in the literature is that editors may prefer payments because writing a check for on-time performance requires much less effort than monitoring referees for punctual reviews and having to remind delinquent referees that their reviews are past due. Monitoring and enforcement are unpleasant tasks for an editor whereas rewarding good referees is agreeable. Payment of referees also requires less effort than establishing and enforcing a minimum time requirement like that mentioned in Engers and Gan.

**The Natural Experiment**

The natural experiment generating the data consists of editorial records for *JARE* before payment to referees and after implementation of the payment. The editorial duties of *JARE* typically rotate every three years. An editorial team of an editor and 3 co-editors assumed responsibility for *JARE* from April 2000 to April 2003. The editorial period for which the data consist began in April 2000. For purposes of continuity, all initial submissions received through March 2003 were handled by the same editors until first editorial response. All subsequent editorial correspondence and revised manuscripts were forwarded to the new editors whose duties began in April 2003.

In July 2001, the executive council of the Western Association of Agricultural Economics (WAEA)[5], the governing body responsible for approving new uses of the WAEA budget, voted to approve a payment of $50 for on-time first-round reviews of manuscripts submitted to JARE. On-time reviews were taken to be those completed within six weeks of the referee agreeing to the editor's request to review a manuscript. This natural experiment generated 15 months of reviews with no payment—April 2000 through June 2001—and about 24 months of reviews under the payment regime. All reviews were double blind.

The protocol for soliciting reviews, whether with or without payments, was to send prospective referees an electronic mail message soliciting a review. A copy of the typical wording of the email message is found in the appendix. After the referee agreed to review the manuscript, a copy of the manuscript with cover letter was sent either electronically or by regular mail to the referee. Although JARE policy encouraged electronic submission, many authors submitted manuscripts by mail. If manuscripts were not submitted electronically and referees resided outside of North America, paper copies of the manuscript and cover letter were usually

[5] Members of WAEA represent 17 western states in the United States and 4 provinces in western Canada.

sent by courier to reduce lag times in foreign mail delivery. Nearly all referees' reports were submitted by electronic mail to the editors, which facilitated exact dating of reports. In the majority of cases, the determination of an on-time submission of the referee's report was clear-cut because reports were submitted before the deadline. If a report was received a day late, it was usually considered "on-time" and payment was sent. However, payment was not made to referees who sent their reports two or more days after the deadline.

The editors of JARE almost always used two referees for each manuscript. In extenuating circumstances, a single referee report might have been used. In a few cases, a third referee report might have been used even though it was received well after the deadline. The natural experiment does not include data on participation rates before and during payments. Although individual editors kept track of participation rates for their own purposes of obtaining two referees per manuscript, participation rates were not recorded. Hence, the natural experiment does not afford a measure of the impact of payments on participation rates.

The natural experiment provides data with some desirable characteristics for measuring the impacts of referee payments on time to first review. In contrast to Hamermesh's data, the present data do not require comparisons across journals, each with possibly different editorial policies and procedures. Further, the present data arguably apply to the same potential pool of referees whereas Hamermesh's data include four general economics journal as well as three "subspecialty" journals, for which it might be argued the potential pool of referees differ in systematic ways that could affect their refereeing behavior. The within-journal comparisons afforded by the natural experiment hold editors, editorial policy with the exception of payments, editorial procedures, and the potential pool of referees constant across comparisons. The data from the natural experiment are not left-censored because there is no carry over of first reviews

from the editor prior to April 2000. Right-censoring is minimized as all first submissions received before April 1, 2003 were handled by the 2000-2003 editors with the possibility of a referee returning a report as late as October 2003, about 30 weeks after initial request .

The data employed here have several shortcomings. As mentioned, participation rates were not systematically recorded. Differing lag times owing to different methods of sending manuscripts—electronic, regular mail for domestic referees, and courier for referees outside of North America—cannot be measured because we did not observe the dates on which referees received manuscripts.[6] The protocol for on-time reviews, however, stipulated a deadline six weeks from the date of the electronic mail correspondence so that the differences in mailing time had little influence on actual time available for the referee to review the manuscript. It should be noted that no other journal in agricultural and resource economics, domestic or international, paid referees during the three years of our tenure. Hence, there are no "side stream" effects of another, potentially competing journal having decided to pay referees during the natural experiment.[7]

**Covariates and Descriptive Statistics**

*Referee- and Author-Specific Characteristics*

Although the payment was not designed to compensate referees for time spent reviewing manuscripts, one might argue that the higher a referee's income, the less likely is the referee to respond to the payment. Even though information about academic salaries at public universities

[6] Anomalies in the Canadian postal system for some provinces lead to use of courier for some referees in Canada. However, regular mail and courier were used at different times throughout our tenure so lag times may have varied.
[7] A couple of referees eligible for payment declined to receive the payment. They suggested the money would be better spent on other activities like the support of graduate student travel to professional meetings. Also, payments could not be legally offered to U.S. federal government employees.

is publicly available, not all referees were employed at public universities.[8] Instead of attempting to measure income, we use two proxies for income: years of experience since earning a Ph.D. and number of publications listed in *EconLit*. Hamermesh, Johnson and Weisbrod found years in service and citations to be the two most significant determinants of academic salaries.[9] Ellison also notes that more widely cited and productive authors may have more proclivity to write "clean" manuscripts which require relatively little comment.

Gender is another variable used in some empirical studies (Hamermesh 1991; Ellison). We also include an indicator variable for female referees and authors. We include this variable in order to characterize authors and referees. We have no a priori expectations about gender differences in refereeing behavior. Neither Hamermesh (1991) nor Ellison found statistically significant results by gender.

Affiliation with top-ranked departments is measured in order to compare potential differences across referees and authors. Although all reviews were double blind, authors from top-ranked schools might tend to write better, more easily evaluated manuscripts because they benefit from colleagues' reviews from within their departments. Rankings of departments are usually drawn from two sources: surveys of opinions and indices of citations of faculty (Dusansky and Vernon). Although reputation as measured by surveys may not track contemporaneously with publication productivity as measured by citations, Duskansky and Vernon find relatively high correlations among the ranks of economics departments based on these disparate sources. For purposes of ranking agricultural economics departments in the United States and Canada, we used several rankings generated from citations (Beilock et al.;

[8] But even salaries are only a proxy for income because academics may engage in other activities to earn more money.
[9] Information on citations from the Social Science Citations Index will be included in a future version of this manuscript.

Beilock and Polopolous; Tauer and Tauer) and a more recent survey by Perry. We find positive correlations among the rankings of these studies (see appendix). After examining the rankings of departments using various combinations of criteria, we opted for an unweighted linear combination of the rankings from Perry's survey with the rankings from Beilock and Polopolous' Social Science Citations Index per capita measure. The departments included in the top 20 rankings were relatively stable across various alternative ranking schemes.[10]

Authors and referees residing outside the United States and Canada were identified by an indicator variable. Hamermesh posited that reviewers affiliated with institutions outside the United States would likely be less committed to U.S.-based journals and would, therefore, be less inclined to submit prompt reviews. We suspect that even with electronic mail and courier delivery, foreign referees are likely subject to more lag time in receiving manuscripts. Referees at foreign academic institutions may also be subject to academic schedules not coinciding with those in the United States and Canada. And foreign academicians may face different incentives: research and publishing activities may be rewarded relatively less than at some U.S. and Canadian universities.

Whether an author or referee was employed by an institution other than a university was also noted. The distinction is important for paying referees because U.S. federal law prohibits federal employees from receiving remuneration of any sort for professional duties like refereeing.

An indicator variable measuring whether the referee was also the author of a manuscript under review in *JARE* at the same time was also constructed. We suspect referees whose work is currently under review will be more likely to return reviews promptly in order to build goodwill with editors.

[10] Procedures used for combining rankings are available on request from the authors.

*Manuscript-Specific Characteristics*

Nearly all empirical studies of publication lags find that longer manuscripts take longer to review (Hamermesh 1991, 1994; Laband, Maloney, and McCormick; Chong; Ellison). Accordingly, we include the number of pages as a measure of the length of the manuscript. We wanted to include a measure of complexity or difficulty of the manuscript because we have anecdotal evidence that more technically demanding manuscripts take longer to review. However, we could not find an unambiguously defensible measure of complexity or difficulty so we use only manuscript length.

The number of co-authors as well as the rank of the corresponding author are measured to assess the impact of more authors on review times. More authors suggest potential for more coordination problems among authors with the possible deterioration in the coherence and uniformity of quality throughout the manuscript. Ellison discovered conflicting evidence regarding the effect of number of authors: in the 1970's it was associated with a reduction in publication lags but was positively associated in the 1990's. Rank of the corresponding author may have mixed influences on review times. Laband finds strong circumstantial evidence that order of authorship matters critically among agricultural economists so we expect the rank of the corresponding author might influence review time through quality of preparation of the manuscript for submission.

*Review-Specific Characteristics*

Time to completion of review is measured by the number of days from when the referee agreed to review the manuscript to the date when the completed referee report was received. We also include a measure of size of the review. If all referee reports were received electronically, we could have conducted a word count. Instead of word count, we rely on a less precise but

indicative measure, namely, the number of pages of single-spaced prose, including equations and figures. Finally, we record the incidence of referee reports never completed.

*Descriptive Statistics*

Descriptive statistics for referees and authors are displayed in Table 1. Note, the sample of corresponding authors and manuscripts is about one half the size of the sample of referees and referee report statistics because an average of two referees per manuscript were chosen. The respective samples are divided into the period of about 15 months before payments were implemented ("Before") and the roughly 24months during which payments were made ("During").

There are relatively few systematic differences in the sample statistics before and during payments. A few differences should be highlighted. Most notably, days to completion of review are fewer, on average, during the period when payments for on-time reviews were made, and the difference is statistically significant (p-value = 0.0008). The size of referee reports also tended to be larger during the payment period (p-value = 0.013). Although we would like a quality measure of the reviews to compare before and during payments, a widely agreed-upon measure appears illusive. The incidence of incomplete reviews fell when payments were made but the difference in the mean incidence rates is not statistically distinguishable (p-value = 0.161).

On average, the pool of referees appears comparable before and during payments. Referees performing services during the payment period had slightly longer publication lists. Fewer U.S. federal employees refereed while the share of foreign referees grew slightly.

Average manuscript length and co-author measures showed no detectable change before and during payments.

The sample of authors differed little across the two periods. The only statistically discernible differences were in the percentage of authors from top 20 schools—more top 20 authors when payments occurred—and in author publications and citations in *JARE*.

These descriptive statistics tend to corroborate the contention that the pool of referees is highly comparable over the sample period. The most notable change in the characteristics of the referees is an apparent substitution of more foreign-based referees for those employed by the U.S. federal government. Although that change is statistically significant, it has a very modest compositional effect with just over 5 percent of the referees during the payment period residing outside of the United States and Canada.

While the characteristics of referees and authors appear homogeneous through the sample period, there are notable differences between the two groups. There are relatively more women in the author sub-sample. Authors possess fewer years of experience, shorter lists of publication, and their publications in *JARE* have not been as widely cited, on average.

**Econometric Evidence**

The process by which referees agree to review and complete reviews could be modeled as a sequential decision in which the binary participation decision conditions subsequent performance of the review. The sample of referees who agree to review constitutes a censored sample: we observe how long a review takes to completion only when referees agree to review manuscripts. Although we recognize the potential difficulties with censoring due to the participation decision, we do not have participation data with which to model that decision explicitly. Thus we focus only on the behavior of referees once they have agreed to review a manuscript.

Even after agreeing to review manuscripts, not all referees return reviews. Hamermesh (1991) referred to these delinquent referees as "losers." In his cross-section of 343 referees, almost five percent fell under the "loser" rubric: after 8 months they had yet to send the editors a report. In our sample of 599 referees, 2.7 percent correspond to such "losers" who as of the end of 2000-2003 editorial period had returned nothing. The most delinquent of these "losers" had failed to return a report 122 weeks (2 years and 4 months) after initially agreeing to review the manuscript.

The behavior of these "losers" results in right-censoring of some observations: their failure to deliver means we cannot observe how long it takes them to complete a review. There is some degree of arbitrariness in determining the date by which right censoring occurs: in most cases when it became evident the referee would not deliver in a reasonable time, the editors sought another referee as a replacement. However, the editors did not inform delinquent referees that a replacement referee was being sought, thereby leaving the delinquent referee the option of sending a report. Because the incidence of right-censoring is relatively small in the sample, the effects on alternative estimators is likely quite small.

The problem of time varying covariates is negligible in this sample. Manuscript-specific characteristics do not vary over the duration of the manuscript review. A few referee-specific characteristics do not vary: institution granting the Ph.D., year Ph.D. was granted, and gender. Even those referee-specific characteristics which change—professorial rank, institutional affiliation, number of citations, etc.—will vary almost imperceptibly over the review period because those characteristics change infrequently[11]

[11] Many characteristics are measured annually from secondary sources such as *EconLit* or the *Social Science Citation Index*. To the extent many of these measures are a proxy for reputation, one suspects changes in reputation are likely to occur very slowly relative to the time required to referee a manuscript.

Before estimating alternative models of the duration of referee reports, we display the hazard and survival functions estimated using the Kaplan-Meier product limit estimator (see Figures 1 and 2). The sample was split into before and during periods to explore any systematic differences. All 16 right-censored observations were omitted in the calculation of the hazard and survivor functions. The hazard functions before and during payments display pronounced differences in weeks 5 and 6 when the deadline for on-time payments approaches. The hazard rate—the rate at which a referee report is expected to be completed—is nearly triple at week 5 in the sub-sample when payments were made. The survival functions permit a different view of the same phenomenon. The probability of a referee report "surviving" (i.e. not being completed) is markedly higher in weeks 5 and 6 in the sub-sample when payments were not in effect. The Kaplan-Meier estimates do not explain refereeing behavior but they do indicate pronounced differences in that behavior before and during payments.

A number of referee- and manuscript-specific covariates were specified for estimation of hazard functions. In addition, an indicator variable for the period in which payments were made is used to capture any systematic differences associated with payments. Estimation results for selected models are reported in table 2.[12] We tested for fixed effects by editors—*JARE* had one editor and 3 co-editors—but found no statistical differences among manuscripts handled by the 4 editors. Consistent with the descriptive statistics and the Kaplan-Meier estimates, we find significant evidence that payments do expedite review times. The OLS parameter estimate on *Payment* indicates a reduction in completion time of just over a week. The corresponding parameter estimates from the Weibull models, with and without heterogeneity, indicate reductions in median review time of 6.9 and 6.3 days, respectively.

[12] Results from a number of other parametric models as well as a semi-parametric model were similar qualitatively to those reported here.

With the inclusion of covariates, the parametric estimation results obviously "control" for factors other than payment. Only three referee-specific characteristics had significant impacts on days to completion of referee reports. The number of articles previously published in *JARE* reduced completion times by about one day. This impact is small but suggests referees with previous publications finish reviewing manuscripts slightly more quickly perhaps out of a sense of commitment or "ownership." Perhaps surprisingly, referees who had manuscripts under review at the time were slower in completing their reports. Although the impact is positive and statistically distinguishable, the slowdown is almost unnoticeable: the reductions in the mean (OLS) or median (Weibull models) review times translate into roughly 30 minutes! Finally, referees employed at universities ranked in the top 20 take about 4 to 5 days longer to complete reviews than other referees. Whether this increased time owes to more painstaking evaluations or to more demands on faculty time in higher ranked departments cannot be discerned.

Having found substantial evidence that payments do expedite reviews, we now turn to the question of whether the effects of payments on expediting reviews persist through time. As a first approximation to answering this question, we divide the "during" payment sub-samble into two periods: Year 1 denotes the first calendar year of payments from July 2001 to June 2002 ($n_{Year\ 1} = 198$) and Year 2 corresponds to last period beginning July 2002 with various ending dates depending on how long referees took to complete reports on manuscripts submitted just prior to April 1, 2003 ($n_{Year\ 2} = 169$). The Kaplan-Meier non-parametric estimates of the hazard functions for both years are displayed in Figure 3. For weeks 1 through 9, the two hazard functions nearly coincide, suggesting little attenuation of the impacts of payments on expediting reviews.

Indicator variables for Years 1 and 2 of payments were included in place of a single payment indicator in the various parametric models of hazard rates (see Table 3). Parameter estimates of the effects of payments in years 1 and 2 are statistically significant in all models. The effects of payments in year 2 appear to have declined but the statistical evidence regarding a significant decline is mixed. In the OLS and Weibull-with-heterogeneity models, the null of equal effects of payments across years cannot be rejected. However, in the Weibull model, the parameter estimates for *Payment Year 1* and *Payment Year 2* differ statistically (p-value = 0.052). The parameter estimates from this model translate into a reduction in review times of 9.1 days in year 1 versus a corresponding reduction of 4.3 days in year 2.

**Conclusions**

Time series evidence on refereeing manuscripts at the *Journal of Agricultural and Resource Economics* (*JARE*) from 2000 to 2003 suggests nominal payments to referees can expedite review times. JARE editorial policy established six weeks as the deadline for an on-time review. With payments for meeting the on-time deadline, referees expedited their reviews by about one week. Although an average reduction of one week appears modest, it affords editors time to pursue other editorial duties besides reminding referees that their reports are due or past due.

Payments were in effect for roughly two years. The effects of the payments on expediting review time appear to have diminished slightly, although the statistical evidence is mixed. One source of a diminishing incentives could have been the declining real value of the $50 payment. But inflation as measured by the consumer price index was quite modest, resulting in less than a four percent reduction in the real value of the payment in those two years. Perhaps the initial excitement of being “paid” for a voluntary professional duty simply faded.

The single-journal evidence presented here complements Hamermesh's cross-sectional study of seven economics journals in 1989. One advantage of the single-journal data used here is that the pool of referees and authors is virtually homogeneous through time. Hamermesh's cross-sectional data compared referees from four general and three subspecialty journals in economics.[13] One disadvantage of the single-journal data is that they do not control for editorial activities and policies from other journals. But no other journals in agricultural and resource economics offered referee payments during the three years analyzed.

[13] Hamermesh (1991) notes that the anonymous journal "G1" employs higher quality referees.

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**Table 1. Sample Means, Before and During Payments to Referees**

| Category | Before | During |
|---|---|---|
| **Review Characteristics** | | |
| Days to Complete Review | 49.6 (45.0) | **41.6** (41.0) |
| Number of Pages of Review | 1.5 | **1.7** |
| % of Reviews not Completed | 3.6% | 2.1% |
| **Referee Characteristics** | | |
| Years Experience | 14.28 | 14.43 |
| Number Articles *EconLit* | 18.33 | **21.72** |
| Number Articles *EconLit* per Annum | 1.5 | **1.7** |
| Number Articles *JARE* | 1.51 | 1.66 |
| Number Citations *JARE* | 2.21 | 2.07 |
| Female | 10.7% | 10.4% |
| Top 20 School | 42.9% | 43.2% |
| Foreign | 2.7% | **5.3%** |
| Federal Employee | 7.6% | **4.5%** |
| Also Author | 9.4% | 10.9% |
| *Sample Size* | 224 | 375 |
| **Manuscript Characteristics** | | |
| Number of Pages of Manuscript | 29.5 | 29.7 |
| Number of Coauthors | 1.60 | 1.57 |
| Rank of Corresponding Author | 1.28 | 1.32 |
| **Author Characteristics** | | |
| Years Experience | 9.5 | 10.6 |
| Number Articles *EconLit* | 14.6 | 16.5 |
| Number Articles *EconLit* per Annum | 1.6 | 1.5 |
| Number Articles *JARE* | 1.34 | **1.87** |
| Number Citations *JARE* | 1.15 | **1.87** |
| Female | 15.6% | 18.0% |
| Top 20 School | 28.4% | **38.1%** |
| Non-University Affiliated | 12.8% | 9.0% |
| Foreign | 3.7% | 5.3% |
| *Sample Size* | 109 | 189 |

Note: Median in parentheses. Boldfaced entries denote statistically significant differences in the means before and during as measured by one-tailed tests of differences in means.

**Table 2. Selected Hazard Rate Models**

| | OLS | | Weibull | | Weibull, Het. | |
|---|---|---|---|---|---|---|
| | **Coef.** | **P-value** | **Coef.** | **P-value** | **Coef.** | **P-value** |
| Intercept | 48.680 | 0.000 | 3.998 | 0.000 | 3.881 | 0.000 |
| **Referee Characteristics** | | | | | | |
| Years Experience | 0.026 | 0.33 | 0.001 | 0.55 | 0.001 | 0.72 |
| Number Articles *EconLit* | 0.027 | 0.27 | 0.001 | 0.16 | 0.0005 | 0.67 |
| Number Articles *JARE* | -1.025 | **0.07** | -0.025 | **0.03** | -0.028 | **0.03** |
| Number Citations *JARE* | 0.037 | 0.89 | -0.0005 | 0.92 | 0.003 | 0.58 |
| Female | 2.223 | 0.55 | 0.012 | 0.89 | 0.056 | 0.56 |
| Top 20 School | 4.723 | **0.06** | 0.102 | **0.02** | 0.091 | **0.09** |
| Foreign | -4.886 | 0.40 | -0.099 | 0.26 | -0.160 | 0.24 |
| Federal Employee | -4.889 | 0.35 | -0.139 | 0.26 | -0.100 | 0.41 |
| Also Author | 0.017 | **0.07** | 0.0006 | **0.05** | 0.00049 | **0.03** |
| **Manuscript Characteristics** | | | | | | |
| Number of Pages of Manuscript | 0.006 | 0.47 | 0.0002 | 0.58 | 0.0001 | 0.71 |
| Number of Coauthors | -0.017 | 0.40 | -0.0003 | 0.61 | -0.0005 | 0.35 |
| Rank of Corresponding Author | 0.0089 | 0.52 | 0.0001 | 0.52 | 0.0002 | 0.28 |
| **Payment** | -7.721 | **0.001** | -0.171 | **0.0002** | -0.160 | **0.002** |
| $\sigma$ | | | 0.567 | 0.000 | 0.319 | 0.000 |
| $\theta$ | | | | | 0.454 | 0.000 |
| $R^2$ or Log Likelihood | 0.051 | | -571.426 | | -558.314 | |
| $\lambda$ [a] | | | 0.020 | 0.001[b] | 0.023 | 0.001[b] |
| p [a] | | | 1.763 | 0.049[b] | 2.204 | 0.099[b] |
| Estimated Median | | | 40.2 | 1.086[b] | 39.3 | 1.458[b] |

[a] $\lambda$ and p are location and scale parameters.

[b] Estimated standard errors.

**Table 3. Selected Hazard Rate Models, Payments by Year**

| | OLS | | Weibull | | Weibull, Het. | |
|---|---|---|---|---|---|---|
| | **Coef.** | **P-value** | **Coef.** | **P-value** | **Coef.** | **P-value** |
| Intercept | 48.765 | 0.000 | 4.004 | 0.000 | 3.884 | 0.000 |
| **Referee Characteristics** | | | | | | |
| Years Experience | 0.024 | 0.371 | 0.001 | 0.590 | 0.001 | 0.740 |
| Number Articles *EconLit* | 0.024 | 0.315 | 0.001 | 0.218 | 0.000 | 0.701 |
| Number Articles *JARE* | -1.046 | **0.069** | -0.027 | **0.026** | -0.029 | **0.026** |
| Number Citations *JARE* | 0.028 | 0.920 | -0.001 | 0.843 | 0.003 | 0.633 |
| Female | 2.136 | 0.564 | 0.000 | 1.000 | 0.053 | 0.591 |
| Top 20 School | 4.767 | **0.053** | 0.102 | **0.025** | 0.091 | **0.089** |
| Foreign | -4.446 | 0.445 | -0.087 | 0.330 | -0.147 | 0.284 |
| Federal Employee | -4.821 | 0.353 | -0.136 | 0.252 | -0.100 | 0.412 |
| Also Author | 0.018 | **0.060** | 0.001 | **0.036** | 0.001 | **0.024** |
| **Manuscript Characteristics** | | | | | | |
| Number of Pages of Manuscript | 0.007 | 0.432 | 0.000 | 0.528 | 0.0001 | 0.668 |
| Number of Coauthors | -0.015 | 0.449 | 0.000 | 0.594 | -0.0005 | 0.383 |
| Rank of Corresponding Author | 0.009 | 0.507 | 0.000 | 0.438 | 0.0002 | 0.295 |
| **Payment Year 1** | -9.660 | **0.0004** | -0.226 | **0.00003** | -0.205 | **0.001** |
| **Payment Year 2** | -5.350 | **0.062** | -0.107 | **0.051** | -0.108 | **0.088** |
| $\sigma$ | | | 0.565 | 0.000 | 0.319 | 0.000 |
| $\theta$ | | | | | 0.453 | 0.000 |
| $R^2$ or Log Likelihood | 0.051 | | -569.532 | | -557.105 | |
| F-Test ($df_1$=1,$df_2$=568) | 2.19 [a] | .1395 | | | | |
| Likelihood Ratio Test | | | 3.789 [a] | **0.052** | 2.419 [a] | 0.120 |
| $\lambda$ [b] | | | 0.020 | 0.001 [c] | 0.023 | 0.001[c] |
| p [b] | | | 1.770 | 0.051[c] | 2.208 | 0.100[c] |
| Estimated Median | | | 40.241 | 1.082[c] | 39.302 | 1.474[c] |

[a] The null hypothesis is that payment coefficients in both years are equal.

[b] $\lambda$ and p are location and scale parameters.

[c] Estimated standard errors.

**Figure 1. Hazard Rates, Before and During Payments**

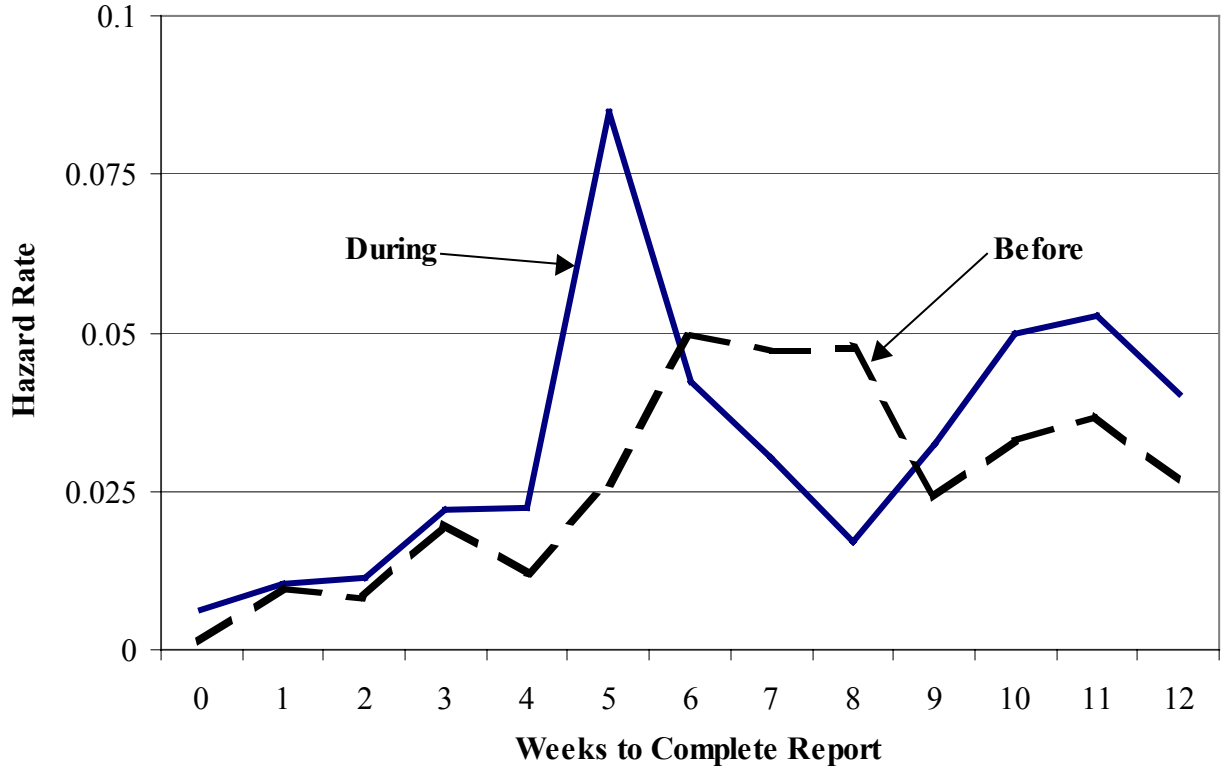



**Figure 2. Survival Functions, Before and During Payments**

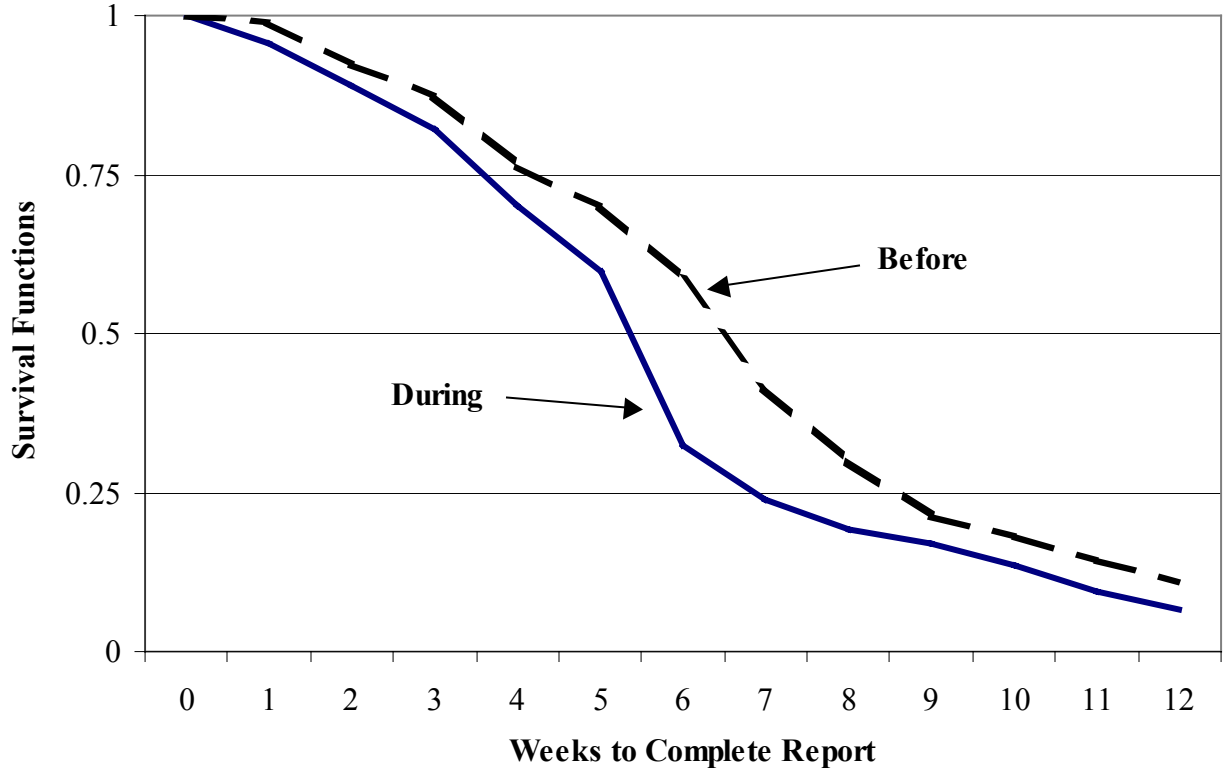
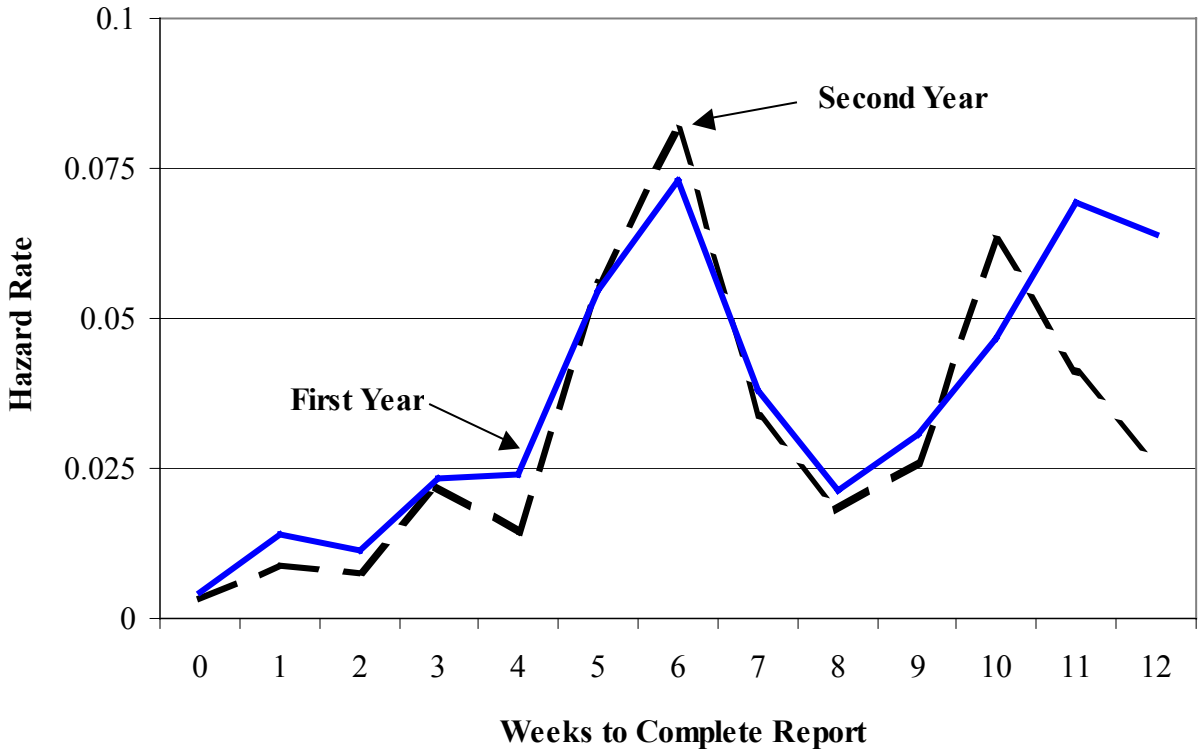


**Figure 3. Hazard Rates, First and Second Year of Payments**



## Appendix

The text of the typical message sent to prospective referees is a follows. Note, before payments were made, the text referring to the amount and timing of payments was not included in messages to referees.

"Dear <Title> <Surname>:

I have received a manuscript submitted to the *Journal of Agricultural and Resource Economics* titled "<MS Title>" for which I think you would be an appropriate reviewer. I am wondering if you would have the time and interest to review the paper. Ordinarily, I would ask that the review be completed within 6 weeks.

Please note that we have implemented a payment for on-time reviews. If you return your review within 6 weeks of the date we send you the manuscript, we will pay you **U.S.$50**.

In advance, thank you for considering to review the manuscript.

Editor, JARE"

## Top 20 Departments

The top 20 departments include those from the following universities.

| | |
|---|---|
| UCBerkeley | Michigan State |
| Iowa State | Purdue |
| Minnesota | Oklahoma State |
| Stanford | Florida |
| Maryland | Ohio State |
| UCDavis | Oregon State |
| Wisconsin | Penn State |
| Illinois | Texas A&M |
| Cornell | VPI |
| North Carolina State | Georgia |