Partial Gift Exchange in an Experimental Labor Market: Impact of Subject Population Differences, Productivity Differences and Effort Requests on Behavior*

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Abstract

We report a gift exchange experiment in which there are no opportunities for reputation or repeated play game effects. In each play of the game, firms make wage offers to workers, and workers respond by either accepting or rejecting an offer and determining an effort level. Higher effort levels are more costly to workers and there is no mechanism for firms to punish or reward workers based on their effort. Consistent with the partial gift exchange hypothesis workers provide more effort at higher wages, but undergraduate students provide substantially *less* effort than do MBAs. Evidence suggests that this difference results from differences in prior work experience that carry over into the laboratory. Firms' non-binding effort requests are at least partially honored by undergraduates and MBAs, and result in a significant increase in overall effort for undergraduates (but not for MBAs). Workers do *not* provide more effort to lower productivity firms even though it is relatively more costly for these firms to offer higher wages.

Key words: gift exchange, effort levels, subject population differences, productivity differences.

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The partial gift exchange hypothesis (Akerlof, 1982, 1984) proposes that norms of fairness and reciprocity can affect wages and employment in an otherwise competitive labor market. Some firms willingly pay employees in excess of the market-clearing wage. In return these firms expect their employees to supply greater effort than if wages were at market-clearing rates. This partial gift exchange hypothesis is one of several efficiency-wage theories explaining why wages exceed market-clearing levels. The distinguishing characteristic of the Akerlof model is that it provided the first explicitly sociological model leading to the efficiency wage hypothesis (Yellen, 1984); a model in which social conventions and principles of appropriate behavior, not entirely individualistic in origin, provide the motivation for employers paying more than the market-clearing wage.

This paper examines the Akerlof model in an environment where workers receiving higher than minimum wages can provide minimum effort without fear of any punishment. Our experiment consists of a finite number of two-stage games: In the first stage, firms post wage offers. In the second stage, workers accept or reject offers, and those accepting offers choose an effort level. Higher effort levels are more costly for workers, but provide firms with greater profits. Since the game is repeated a finite number of times, and there is no opportunity to build reputations because firms and workers are anonymous and are re-matched in each period, standard economic theory predicts that workers will provide minimum effort and that firms, anticipating minimum effort, will offer minimum wages. However, consistent with a model in which social conventions and common sense notions of fairness guide employer-employee behavior, this does not happen. Rather firms and workers avail themselves of the considerably higher joint payoffs to be had by firms offering above minimum wages and workers responding

with above minimum effort levels. In this respect our results replicate those reported by Ernst Fehr and his colleagues (Fehr, Kirchsteiger, and Riedl, 1993; Fehr, Kirchler, Weichbold, and Gachter, 1998) in a series of experiments.[1]

In designing a new experiment to investigate gift exchange in labor markets we had two purposes in mind. First, we wanted to see whether, and to what extent, Fehr's results would replicate in the U.S. Fehr and his colleagues have conducted their experiments exclusively in European countries (e.g., Austria, Switzerland and Russia). Researchers in cross-cultural organizational behavior have pointed out the potential problems with generalizing theories and empirical findings across national boundaries without regard to cultural differences that may affect their validity. This is particularly relevant to the partial gift exchange hypothesis, resting as it does on the notion of social conventions. One of the distinguishing attributes of the U.S. is the significant role that personal, individual success plays in the motivation of workers (Hofstede, 1980, p.376). Thus, we were interested in seeing the extent to which workers in the individualistic U.S. society would engage in gift exchange, and how gift exchange behavior might vary between the U. S. and more socialist cultures.[2]

Our second purpose in conducting a new experiment was to add a market variable that had not been previously investigated in a two-stage game: differences in firm productivity. It is important to investigate this because firms competing in the labor market typically do not have identical productivity levels. An interesting empirical question is whether workers, knowing that higher wages are more costly in terms of forgone profits for low productivity firms, will respond

[1]Field surveys of compensation executives (e.g., Agell and Lundborg, 1995; Levine, 1993) as well as laboratory experiments conducted by psychologists (for reviews see Greenberg, 1982; Mowday, 1979) support these results as well.

[2]After starting this research we became aware of Charness (1998) who conducted a gift exchange experiment at University of California, Berkeley. We discuss this paper in relation to our results in the discussion and conclusions section.

with greater effort than to high productivity firms at comparable wage rates.[3] Both equity theory (Adams, 1965; Walster, Berscheid, and Walster, 1973) and models accounting for reciprocity in economics (Rabin, 1993) suggest that since a given wage represents a larger gift from a low productivity firm, workers will respond with greater effort.

A third, unanticipated, focus of the study is to compare responses of U.S. undergraduate students with those of MBA students. This focus was motivated by the results of our initial experimental sessions with undergraduates in which we found substantially lower effort levels and lower wages than Fehr and his associates had reported. This gave rise to the following conjecture: The primary work experience of most U.S. undergraduates consists of minimum wage jobs in which the social convention calls for minimum effort in response to minimum wages. Therefore, the employment context in which we framed our experiment might have elicited minimum effort as a carryover from subjects' experience with these minimum wage jobs. In contrast, MBA's typical work experience is with higher tier jobs, exactly those jobs in which gift exchange is hypothesized to exist. Did experience with gift exchange in the workplace, in conjunction with the contextual framework of our experiments, evoke the mental scripts learned in the workplace, resulting in higher effort levels and higher wages for the MBAs?

We report two experiments investigating these issues. Experiment 1 establishes that although both MBAs and undergraduates engaged in gift exchange, the extent of gift exchange was substantially higher in the MBA sessions. However, we failed to find any differences in workers' effort levels, controlling for wages, between high and low productivity firms.

Experiment 2 was designed to follow up on the low gift exchange levels for

[3]Fehr, Gachter, and Kirchsteiger (1996) study a three-stage game in which firms had different productivity levels. The third stage allowed firms to punish or provide a bonus to workers after observing their effort. This provides the firms with a last mover advantage, which was exercised, and makes the experiment fundamentally different from ours.

undergraduates by adding an unenforceable "requested effort level" along with the wage offer. We introduce requested effort for two reasons. First, it permits us to indirectly determine if the differences across subject pools observed in Experiment 1 were the result of different experiences with the labor market context. If lack of experience with gift exchange in labor markets was the cause of lower undergraduate reciprocation in experiment 1, then the posted effort treatment may increase the salience of the relationship between wages and effort, thereby partially compensating for our undergraduates' lack of familiarity with gift exchange in labor markets. Second, this treatment permits us to directly test the conjecture that posting non-binding effort requests increases workers' overall effort level (Fehr, Kirchsteiger, and Riedl, 1996, Fehr and Gachter, 1998). Our data are consistent with the first hypothesis, but only partially consistent with the second hypothesis as there is a significant increase in overall effort levels for undergraduates compared to experiment 1, but no effect on overall effort levels for MBAs. Our data also show that although firms receive less effort than requested, requests for greater effort are at least partially honored, holding wages constant, even when this does not result in any *overall* increase in effort levels, as was the case for MBAs.

The structure of the paper is as follows: Section II outlines the basic experimental design. Sections III and IV report the results of experiments 1 and 2, respectively. Section V reports the effect on firm profitability of offering above minimum wages. A concluding section summarizes our main results and relates them to other findings in the literature.

II. Experimental Design

Our labor markets consisted of one-sided posted offer markets. Each market period had two stages. In stage one, firms made wage offers to workers. These were posted on a blackboard visible to all participants with offers for high and low productivity firms posted in

separate columns. Wages were posted in random order within each column along with the firm's identification number (which, in order to prevent any opportunity for reputation building, subjects knew changed randomly from period to period).

In stage 2 workers decided which, if any, offers to accept and chose their effort levels. The order in which workers were permitted to accept offers was randomly assigned in each period using a block random design that ensured roughly equal chances, within an experimental session, of each worker having first choice over wages, second choice over wages, etc. Workers could only accept a single wage offer, which was no longer available once it had been accepted. There was excess supply of labor. But workers were not required to accept offers, so there was some potential for unaccepted offers. Firms and workers with no labor contract earned nothing for that period. Firms could not identify workers who accepted their offers and only the worker, and the firm employing the worker, knew the effort level chosen by that worker.[4]

A total of 12 market periods were conducted in each experimental session, except for one MBA session where time constraints resulted in 10 market periods. The total number of market periods was announced in advance. In the one session with 10 market periods, subjects were told after period 9 that the following period would be their last. Workers and firms were in the same room, with a partition dividing them. Communication was handled manually via paper "Communication Forms."

Half of all firms were high productivity and half were low productivity, with type fixed throughout the entire session. The firms' profit function, in terms of our experimental currency, lira, is given by:

$$(1) \qquad \Pi = (v-w)\, e$$

[4]Unaccepted wage offers, which were infrequent, were public information.

where v = 120 for high productivity firms and 90 for low productivity firms, w = the wage offered, and e = the effort level chosen by the firm's worker. To prevent the possibility of losses, wages above v were not permitted.

The payoff function for workers is given by:

(2) $U = w\text{-}c(e) - 20$

where w = wage accepted that period, and c(e) = the cost of effort the worker chose. To prevent the possibility of negative payoffs for the workers, wages below 20 were not permitted. Cost of effort was an increasing function as shown below:

Cost of Effort

Effort	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Cost	0	1	2	4	6	8	10	12	15	18

The payoff functions for both workers and firms were public information, with all subjects given payoff tables providing them with the menu of wage-effort combinations both in terms of firm profitability and worker earnings. Equations (1) and (2), as well as the parameter values for high productivity firms and workers are from Fehr, Kirchler, Weichbold, and Gachter (1998; hereafter, FKWG).

Subjects' earnings were summed over all market periods to determine total earnings. Lira were converted to dollars at the rate of 16 lira = $1.00. Sessions lasted approximately one and one-half hours, with earnings averaging $13.75 plus a $5.00 participation fee.[5]

Three undergraduate (UG) sessions and four MBA sessions were conducted.[6] Each session had ten firms and twelve workers, except for one UG session, where excessive no-shows resulted in eight firms and ten workers.

[5]We added the $5 participation fee after the first session as earnings were lower than expected.

To control for cultural effects, we screened subjects during the recruiting process. Six of our sessions (3 MBA and 3 UG) used subjects raised in the United States. For the seventh session, we recruited MBAs who had been raised in Taiwan. All subjects were recruited from the University of Pittsburgh, with the exception of three Taiwanese MBA students recruited from Carnegie Mellon University. We have pooled the data for the MBA sessions since we find no differences in behavior between the U.S. and Taiwanese MBA students.[7]

III. Results from Experiment 1

A. Overview of the Data

This section provides an overview of the data in which we compare the effort and wage rate data from our experiment with the data from Austrian students reported in FKWG. In comparing results across experiments we make several assumptions. First, we ignore any potential differences in effort levels in response to low versus high productivity firms since, as we show below, there are no significant differences in these responses. Second, we ignore any potential differences resulting from procedural differences between our experiment and FKWG's experiment. These would be (i) our use of a one-sided posted offer auction versus FKWG's one-sided oral auction (the latter permits firms to adjust their wages should they not be accepted; ours does not) and (ii) FKWG had greater excess supply of labor than we did (at least 50% versus 20-25%). We ignore these differences because they would appear to have little impact: FKWG had less than 3% of all wage offers rejected (i.e., there was little if any adjustment of wages within a market period). And, given that all workers in both our and FKWG's experiment lacked market

[6] As indicated above, a UG session was conducted first. Remaining sessions alternated between UG and MBA subject pools, except for the last two sessions which both used MBA subjects.

[7] Results are substantively the same when the Taiwanese session is excluded from the analyses. Although the U.S. and Taiwan differ on many cultural dimensions, presence in an MBA program may be associated with a shared cultural norm regarding gift exchange.

power, differences in the magnitude of the excess supply of labor are unlikely to have any impact.

**** insert Figure 1 about here ****

Figure 1 compares average effort levels, conditional on wage offers received. Effort levels are quite similar across subject populations at lower wage rates, with close to minimum effort levels provided at the lowest wage rates. But whereas effort level increases considerably at higher wages for MBAs, averaging over .36 for the highest three wage strata, effort levels increase much less for the UGs, never rising above .27 on average. Further, although effort levels for MBAs are greater than for FKWG's students over the middle wage strata, they are virtually the same over the highest wage strata, and neither group exhibits the extreme flattening out of effort levels at higher wage rates that our UGs do.[8] Thus, gift exchange occurs for all three subject populations because higher effort levels occur at higher wages in all three cases, but U.S. undergraduates engage in considerably less reciprocal behavior than either MBAs or Austrian undergraduates.

**** insert Figure 2 about here ****

Figure 2 shows average wages over time, where we only report wages for high productivity firms from our experiment. Mean wages for high productivity MBAs average 59.4 versus 45.0 for UGs. This contrasts with an average wage of 58.7 in FKWG. Thus, our MBAs look quite similar to FKWG's undergraduates, with our UGs being the outlier population.

In the following sections we provide more detailed documentation of the differences between our MBAs and UGs, as well as the absence of any systematic response of workers to firm productivity differences.

[8]All comparisons to FKWG are restricted to Austrian students. Fehr and his colleagues have replicated these results with other Austrian students as well as Swiss students, Russian students and Austrian soldiers.

B. Worker Effort Responses

To investigate effort responses we regress wages and other explanatory variables against effort. Due to the limited range of the dependent variable effort, we employ two-sided censored (Tobit) regressions with a random components error term (with subject as the random component).[9] Preliminary regressions employed a number of different dummy variable specifications to control for possible period effects. These were rejected in favor of regressions that include a single dummy variable for period 1, dp1 (= 1 if period 1, = 0 otherwise), since it provides the most explanatory power and is the only time dummy that proves significant, at conventional levels, in any of the regressions.

**** insert Table 1 about here ****

Table 1 reports our regression results. We employ two different model specifications, with and without dummy variables accounting for differential responses to firm productivity differences. The wage variable has been normalized with the minimum wage of 20 subtracted from each and every wage rate. As such, the intercept term in the regressions tells us what is happening at the minimum wage of 20. A wage squared term is included since it proves to be statistically significant for UGs and has some explanatory power for MBAs as well.

Looking at model 1, for both MBAs and UGs the coefficient for the wage variable (waget) is positive and statistically significant at better than the 1% level. The wage squared variable (waget2) is negative for both MBAs and UGs, so higher wages generated less than proportionate increases in effort, but is only significant at conventional levels for the UGs. Both intercept terms are negative, indicating that if workers could have responded with less than the

[9] The random effects model adjusts the standard errors of the estimates to account for repeated observations across the same subjects (see Ham, Kagel, and Lehrer, 2000, for example). The STATA software package was used along with the Huber-White variance estimator.

minimum effort level at minimum wages they would have. The results for model 1 confirm that both MBAs and UGs engaged in gift exchange. The coefficient estimates for the wage and wage squared terms indicate that effort increases monotonically for all possible wage levels for the MBAs, and increases monotonically up to a wage of 93-94 for UGs (well beyond where the bulk of the wage offers lie).

Model 2 tests for worker responsiveness to differences in firm productivity. Two dummy variables are introduced: an intercept dummy dprod (= 1 for low productivity firms, = 0 for high productivity) and the dprod dummy interacted with the wage rate (dprxwt). Neither productivity coefficient is close to statistical significance in its own right, nor do the two variables come close to satisfying a Wald test for inclusion at conventional significance levels.[10] Although we anticipated that workers would provide greater effort for low productivity firms, other things equal, the data provide little support for this view.

Figure 1 and the regressions in Table 1 suggest that at higher wage rates MBAs respond with greater effort than UGs. Before turning to statistical tests, it is informative to view detailed scatter plots of wage and effort. Figure 3 presents these scatter plots with wages on the horizontal axis and the corresponding effort level on the vertical axis. Each observation is indicated by a small circle or "hub." Each line or "spoke" extending from the hub represents an additional observation at that same wage-effort combination.[11]

**** insert Figure 3 about here ****

The UG effort is anchored along .1, the minimum possible level (and the median effort for UGs). Responses above the minimum effort level are also very flat relative to wages.

[10]Introducing a dummy variable interacting wage squared with the dprod dummy still leaves the Wald probabilities above .15.

[11]For visual clarity we group similar wages, with each hub and spoke representing wages at approximately five-lira intervals. Effort is not grouped. Wages above 89 are re-coded as 89 (five observations).

Minimum effort is a focal point regardless of the wage level: for *every* wage level, UG firms received minimum effort at least 48% of the time.

In contrast, MBA effort has a noticeable upward slope as wages increase. For wages of 40 lira or below, the response is typically minimum effort. Around 45 lira, 50% or more of the workers reciprocate with greater than minimum effort, although a substantial percentage (35%) continue to respond with minimum effort. At 55 lira, the median effort response has shifted upward substantially, to .3 or .4, with a slight upward trend for wages above 55 lira. However, as was the case for UGs, the MBA firms were plagued by minimum-effort responses from workers throughout.

**** insert Table 2 about here ****

We conducted a number of formal tests for differences in effort levels between MBAs and UGs. Panel A of Table 2 reports one such test, a random effects Tobit in which the data for MBAs and UGs have been pooled. Two model specifications are reported, one with and one without the wage squared term. Both specifications include an intercept dummy, dmba (= 1 if MBA, = 0 otherwise) and an interaction term for the dmba dummy and the wage rate (dmaxwt). In both specifications the intercept dummy by itself fails to achieve statistical significance, indicating that effort responses are essentially the same at the lowest wage rate. The interaction terms (dmbaxwt) are positive and significant in both specifications, indicating that differences in effort only emerge at higher wages and continue to grow with increases in the wage rate.[12]

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[12] The inclusion of an interaction term for the dmba dummy and the wage squared variable in model 2 fails to achieve statistical significance. Consistent with the regressions results, non-parametric statistical tests, using session mean effort levels as the unit of observation for each of the wage strata in Figure 1, also show significant differences between the two subject populations. Specifically Mann-Whitney tests indicate that there is no significant difference in effort for the two wage strata below 40. However, for the four wage strata covering wages of 40 and above, MBA effort is greater than UG effort at p-values ≤.10 or better .

Further analysis shows that one of the striking differences between UGs and MBAs is the number of workers who *always* responded with minimum effort, or *almost always* responded with minimum effort (minimum effort in all periods but one): 39% of all UGs versus 6% of all MBAs.[13] We refer to these workers as "economic." The random rotation rule in conjunction with the near universal tendency of workers to accept the highest remaining wage offer first, means that these differences in the number of economic workers reflect underlying subject population differences.

Do the differences between MBAs and UGs in effort levels result primarily from the greater number of economic UG workers? To determine this we re-estimated models 1 and 2 in Table 2 dropping the data for these economic workers. These results are reported in Panel B of Table 2. At higher wage rates, the regressions continue to show greater effort for the MBAs (dmbaxwt is positive and significant at $p<.05$ in model 2). Thus, it appears that the source of the effort response differences across subject pools has two components: (1) UGs had greater numbers of "economic" workers who provided minimum effort levels regardless of the wage rate, and (2) at higher wage rates, non-economic MBA workers provided more effort than non-economic UGs.

C. Wage Offers

Although workers were not required to accept wage offers, there were few unaccepted offers (seven in the UG sessions; six in the MBA sessions). For UGs all unaccepted wage offers were for 25 lira or less (11% of all such offers were rejected). For MBAs, all unaccepted wage offers were 35 or less (30% of all such offers were rejected). In the analysis that follows, we exclude these unaccepted wage offers.

[13] A binomial test for differences between these percentages yields a Z-stat = 3.60 ($p < .01$, two-tailed test).

**** insert Figure 4 about here ****

MBA wage offers were consistently higher than UG offers, as shown in Figure 4. With the exception of one period, average wage offers of high productivity firms are higher for MBAs than for UGs and, likewise, average wage offers of low productivity firms are higher for MBAs than for UGs. The higher average MBA wage offers are even more dramatically illustrated by comparing low productivity MBAs to high productivity UGs: with the exception of the first two market periods, average *low* productivity MBA wage offers were greater than or equal to average *high* productivity UG offers.

The higher average wages for MBAs compared to UGs is robust across experimental sessions and across market periods. There is no overlap in average wages between MBA and UG sessions ($Z = 2.12$, $p < .06$, two-tailed Mann-Whitney U test, using mean wages in each session as the unit of observation).[14] Further, after the first two market periods, there is no overlap in mean wages in any market period between MBAs and UGs (Mann-Whitney U tests significant at the 10% level or better, two-tailed tests, in each of these last 10 periods). Table 3 reports mean wages in each market period. The trend of wage differences is informative. In the first two periods, mean MBA and UG wages are close, and there is substantial overlap in wage offers. Wages begin to separate in period 3 and continue to separate until there is virtually no overlap in periods 6 through 8. Wages move somewhat closer together in the last market periods.[15] The separation in average wages in these middle periods results primarily from a drop in mean UG wages, probably in response to the relatively low UG effort levels in the first two market periods.

**** insert Table 3 about here ****

[14]Similar results are found using median wages.
[15]The standard deviation of wages is generally greater for UGs than for MBAs after the first period as well.

IV. Experiment 2

A. Procedures

Experiment 2 employed the same procedures as experiment 1 except that firms submitted a requested effort level together with their wage offer each period. This non-binding effort request was posted on the blackboard together with the firm's wage offer. We conducted two UG and two MBA posted effort sessions. As in experiment 1, subjects were recruited from the University of Pittsburgh and were screened to ensure that they had been raised in the U.S. All sessions lasted twelve periods. Due to excessive no-shows, one MBA session had 10 workers and 8 firms; all other sessions had 12 workers and 10 firms.

B. Experimental Results

**** insert Figure 5 about here ****

Figure 5 shows requested and actual effort levels for UGs and MBAs by wage strata, distinguishing between high and low productivity firms. Requested effort and wages are highly correlated (r = .59 for UGs, = .70 for MBAs). Further, holding wages constant, lower productivity firms ask for significantly greater effort than do high productivity firms.[16] Actual effort is uniformly lower than requested effort, with less effort provided than requested in 75% of all cases (see Table 4). There were only a few cases where actual effort exceeded requested effort -- 3% of all cases for MBAs and never for UGs.[17] The primary differences between MBAs and UGs in these data are that (i) as in experiment 1, at higher wage rates MBAs clearly provide more effort than do UGs and (ii) although the general pattern is the same, UGs tend to request less effort for any given wage, especially among low productivity firms.

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[16]This is confirmed in random effect Tobit regressions with requested effort as the dependent variable.
[17]These differences between actual and requested effort are quite similar to those reported by Fehr and Gachter (1998) and Fehr, Kirchsteiger, and Riedl (1996).

**** insert Table 4 about here ****

**** insert Table 5 about here ****

Although workers typically did not respond with the effort level requested, larger requests resulted in greater actual effort, other things equal. This result can be seen in Table 5. For MBAs the requested effort variable has a relatively large, positive coefficient ($p<.01$).[18] For UGs the requested effort variable is positive, but about half the size of the MBA value, and is only marginally significant at $p<.08$ (one-tailed test). Thus, in both cases, requests for greater worker effort resulted in more effort, other things equal, although the response is clearly stronger for MBAs than for UGs (and in both cases workers do not respond with as much effort as firms request). The effect of requested effort on actual effort is consistent with a large number of industrial psychology studies showing that specific and challenging goals lead to better performance than do easy goals, "do-your-best" goals, or no goals (see Locke et al., 1981 and Locke and Latham, 1990, for reviews of the relevant literature, which includes both laboratory and field studies.)

Regressions testing for whether workers responded with greater effort to low versus high productivity firms yield results similar to those reported for experiment 1 -- no differences at anything approaching conventional significance levels. Thus, although workers were somewhat more responsive to those who requested more effort, and low productivity firms requested more effort at all wage rates, this did not translate into a positive response to the plight of low productivity firms. For MBAs (where responsiveness to effort requests was strongest at the margin) the proximate reason for this is that workers were much less responsive to effort requests from low productivity compared to high productivity firms. This conclusion comes

[18] Although this specification eliminates the statistical significance of the wage variable by itself, a Wald test for the wage and wage squared variables is significant at better than the 5% level.

from running separate Tobits for high and low productivity firms like those reported in Table 5. These Tobits produce a similar coefficient value for the requested effort variable for high productivity firms like the one reported in Table 5, but a *negative* coefficient value (p=.21) for low productivity firms. In other words, the MBAs responded to the higher effort requests of low productivity firms as if they were asking for too much effort, essentially giving them the same average effort level provided to high productivity firms at any given wage rate.[19]

Why should workers be responsive to firms' effort requests above and beyond the wage rate paid? Two possible factors (not necessarily mutually exclusive) may be at work: (1) A possible reference-point effect. That is, workers, not knowing the "conventional" effort level for any given wage, use the firm's request to help guide their response,[20] and (2) A greater sense of reciprocal obligation to those firms that requested more effort. Evidence for the latter effect is found in the rejected wage offer data for MBAs. There were 20 wage offers below 30 for the MBAs, 9.3% of all offers, of which 16 were accepted. Mean requested effort was .15 for those wage offers accepted, compared to .48 for those rejected. Further, there were fewer rejected wage offers below 30 in the posted effort sessions than in experiment 1 (20% versus 38%). This suggests that, when firms signaled that they were not expecting high effort levels in exchange for low wage offers, workers were more willing to accept these wage offers.

**** insert Table 6 about here ****

Yet to be addressed is whether the posted effort treatment resulted in higher effort levels than in experiment 1. Random effects Tobits testing this are reported in Table 6, where we have pooled the data from experiment 1 and 2 and introduced a dummy variable, dpe (= 1 for posted

[19]Since the primary difference in effort requests between low and high productivity (MBA) firms occurred at lower wage rates (recall Figure 5), this effect must be driven largely by the substantially higher effort requests of low productivity firms at these low wage rates.

effort sessions; = 0 otherwise), and a dpe by wage interaction term (dpexwt) as explanatory variables. Regression results indicate that the posted effort treatment did *not* result in more overall effort for MBAs since neither the dpe dummy by itself nor the dpe dummy and the dpexwt interaction term achieves statistical significance at conventional levels. However, for UGs, the posted effort treatment resulted in greater overall effort but only at higher wages: Model 2, with the dpe dummy by itself is not statistically significant, but the dpe dummy and the dpe by wage interaction terms are jointly significant in model 3 ($p < .02$ for the Wald test), with the coefficient estimates indicating that effort is greater for wages above 48. Thus, for UGs permitting firms to make a non-binding effort request increased overall worker effort, but only at higher wage rates.[21]

**** insert Figure 6 about here ****

Given that the posted effort treatment resulted in increased UG effort, but had minimal effect on MBA effort, the question remains whether this was sufficient to close the gap in effort and wages between the groups. Panel A in Figure 6 shows that a relatively large effort differential continues to hold between MBAs and UGs, particularly at higher wage rates. Tobits, similar to those reported in Table 2, confirm the statistical significance of this result. Further, as in experiment 1, much of the difference between the two groups can be accounted for by the relatively large number of UGs who consistently provided minimum effort (29% for UGs versus 4.5% for MBAs).[22]

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[20]Locke et al. (1981) suggest that goals affect performance by directing attention, mobilizing effort, and increasing persistence. Of these, directing attention would be most relevant to our situation.

[21]Note that Figures 1 and 5 show that mean UG effort is about the same in the regular and posted effort session for wages below 50. However, although mean UG effort is relatively flat for wages above 50 for regular sessions (Figure 1), UG effort increases monotonically for wages above 50 in the posted effort sessions (Figure 5). This is the effect that regression model 3 in Table 6 picks up for UGs.

[22]$Z = 2.20$, $p < .05$, two-tailed test.

Panel B of Figure 6 compares average wages over time between MBAs and UGs for the posted effort sessions. For MBAs, the mean (median) accepted wage offer in the posted effort sessions was 53 (53) versus 45 (45) for UGs. Although this difference in average wages is somewhat narrower than the difference reported in experiment 1 (8 versus 12), there continues to be no overlap between MBA and UG wages, using session averages as the unit of observation and pooling the session values here with those reported for experiment 1.

V. Efficiency and Rationality

Higher worker effort in the MBA sessions led to greater payoffs for both firms and workers: Average earnings per period for the MBAs were 24.2 lira versus 17.2 lira for UGs, 41% higher earnings for the MBAs.[23] Workers earned more than firms in both cases (average MBA earnings per period were 30.1 lira for workers versus 18.2 for firms; average UG earnings per period were 22.3 lira for workers, 12.0 for firms), but MBA firms profited from their higher wage offers as they earned more than UG firms.

**** insert Table 7 about here ****

Table 7 reports average firm profits at different wage strata. Excluding wage strata with less than 5% of the observations, firm profits are higher at higher wages, although there is a tendency to flatten out at the highest wages. Thus, in general it was more profitable for firms to offer higher wages, although the expected gain for UG firms was minimal, and was accompanied by a relatively high probability of minimum effort. Note, however, that very low wage offers (below 26 for UG firms and below 36 for MBA firms) carried their own risk as they were not assured of being accepted.

VI. Discussion and Conclusions

[23]This is a difference of 43.8 cents per period, or $5.25 for the session as a whole.

We have investigated reciprocal gift exchange behavior in a labor market in which there is no threat of punishment or reputational effects to enforce higher than minimal effort in response to higher than minimum wages. The novel elements of our experiment, relative to those already reported in the literature, include our use of firms with different productivity levels, explicit comparisons of undergraduate students with MBAs, and the effects of non-binding posted effort requests on behavior. We also compare our results, for U. S. students, to those reported for Austrian students.

Gift exchange is alive and well in our experiment. However, it does not extend to explicit consideration of differences in firm's productivity associated with different wage rates. That is, workers did not provide higher effort to low productivity firms in exchange for the relatively larger sacrifice that paying higher wages imposed on these firms. We attribute the lack of effort differences across firm productivity levels, at least for MBAs, to subjects' unfamiliarity with the notion that lower productivity firms were making a relatively larger gift when paying higher wages. This interpretation is supported by Hannan (2001) who found that, controlling for wages, MBAs provided higher effort to firms whose profits decreased compared to firms whose profits increased. The fact that it is more costly for firms with reduced profits to provide higher wages than for firms whose profits increased would be totally transparent and familiar to MBAs. In contrast, the relationship between profits and firm productivity is an indirect one, and is probably a less familiar one for subjects, so it is likely to be less salient.[24]

Posting a non-binding effort request along with a wage offer did, in the MBA case, result in significantly greater effort, other things equal, for firms requesting more effort. Although low productivity firms requested greater effort levels than high productivity firms, this did not result in greater effort as workers were systematically less responsive to the effort requests of low

productivity firms. It is as if workers let high productivity firm's effort requests serve as a self-serving reference point for the amount of effort provided (Babcock and Loewenstein, 1997). Even though MBAs generally responded favorably to individual firms requesting more effort, the posted effort treatment did not result in any overall change in effort levels compared to experiment 1. In contrast, although there was only a marginally significant response to posted effort requests of individual firms for undergraduates, this treatment did produce higher overall effort levels compared to experiment 1. We return to the implications of this result later.

Finally, we found marked differences in the level of gift exchange between MBA and undergraduate subject populations. Our MBA effort levels are greater than or equal to those reported by Fehr and his colleagues for various European subject populations. However, our undergraduates provided much less effort. This resulted in large measure from the relatively large percentage of subjects who never, or almost never, provided greater than minimum effort levels regardless of the wage rate. As noted in the introduction, one plausible explanation for the differences between undergraduates and MBAs is the different experiences that the two subject pools brought into the laboratory. Specifically, MBAs have greater experience in jobs where gift exchange plays an important role, and could readily relate these past experiences to the labor market context under which our experiment was conducted. That is, MBAs typically have had some full-time work experience at well above minimum wages before entering the program. In contrast, most undergraduate work experience in the U.S. is associated with minimum wage jobs.

This interpretation is consistent with the Akerlof (1982, 1984) model of partial gift exchange, which assumes that higher wages result from social conventions and norms of fairness in the work place. There is no reason that undergraduates with their typical work experience in minimum wage jobs will share the same social norms with respect to effort as MBA students,

[24]Hannan (2001) also used a within subject design, which is typically more powerful than a between subject design.

many of whom have worked at white-collar jobs for several years prior to entering the MBA program. This interpretation is supported by evidence from the present experiment and a related experiment. First, the results of the posted effort treatment resulted in a general increase in undergraduate effort compared to experiment 1, but had no overall impact on MBA effort. Posting requested effort levels along with the wage offers makes the wage-effort relationship more salient. For MBAs this would have had little impact, since for most of them the relationship was already salient from past work experience. In contrast, posting effort may have provided undergraduates with information that the experimental context alone did not provide because they lacked the work experience necessary for this context to evoke a gift exchange

response.[25] Second, Hannan (2001) provides direct evidence of a statistically significant effect of work experience outside the lab on performance inside the lab for this same MBA subject population. This experiment employed procedures similar to those employed here and collected self-reported measures of professional work experience. Classifying subjects by level of professional work experience, average effort levels were .372 for those with professional experience above the median reported versus .263 for those with below median experience ($t = 2.56$, $p < .05$, two-tailed test).[26] Further, three subjects satisfied the criteria for economic workers specified here. Professional work experience for these three subjects averaged 1.67 years versus 4.84 years for all other subjects.

While we attribute differences in results between MBAs and undergraduates to context effects in conjunction with past work experiences, a number of colleagues have proposed alternative explanations. One is that the MBAs are a more cohesive group. However, we consider this an unlikely explanation since MBAs tend to be extremely competitive, as evidenced by a general concern with their ranking in relation to their peers and the repeated warnings we were required to give at the end of an experimental session not to compare their earnings while they were being paid. Further, if the group cohesion explanation is correct, it implies that cohesiveness will increase during participation in the MBA program. However, the majority of the MBA sessions (4) were conducted during the first two months of the program, before it is

[25]The relationship between context and behavior is almost totally unexplored in economics (for a notable exception to this see Cooper, et al., 1999), but has been studied extensively by psychologists (e.g., Kreitler and Kreitler, 1982; Rogoff, 1884; Medin and Reynolds, 1985; Butterworth, 1992). Key results from this research are (i) behaviors are typically learned within a specific context and (ii) past behavior most readily generalizes to new settings when a familiar context elicits the learned behavior, even though the behavior might not be "optimal" in terms of the new setting (see Cooper, et al., 1999 and Burns, 1985).

[26]There was no significant difference in mean wages between the two groups. These results are also supported by a regression similar to regression 1 for MBAs in Table 1, but also including mean years of professional experience as an explanatory variable. The payoff structure in the Hannan (2001) experiment is similar to the high productivity case here.

likely much group cohesiveness would have developed. The remaining sessions were conducted mid-way through the program. If the MBA results were due to greater group cohesiveness from being in the MBA program, we would expect to see increased reciprocation in the later sessions. We do not observe this.

Another suggestion is that MBAs are more strategic. According to this logic, MBA workers provided higher effort in order to mimic reciprocation to maintain high wages. If this were the case, however, we would expect to see substantial end-game behavior. All subjects were aware of the number of periods and it would have been rational to see an outbreak of minimum effort and low wages in anticipation of low effort in the last period, or the next to last period. However, the data exhibit only slight end-game effects, and regressions including dummy variables for the last, or the last two periods, do not indicate any statistically significant end-game behavior (the lowest p-value is .29). Therefore, we reject this as a plausible explanation for differences between MBAs and undergraduates.

The one piece of data not entirely consistent with our proposed work-experience explanation for the different work norms between undergraduates and MBAs reported here is an experiment by Charness (1998) which investigated gift exchange at the University of California, Berkeley. Charness used a bilateral wage setting mechanism in which a single firm was matched with a single worker each period. Comparing Charness's results with FKWG's results under similar procedures, effort levels are approximately the same, and are increasing over higher wage rate strata, similar to what we observe for MBAs.[27] Average wages are, however, substantially lower in Charness. But this may be explained by the fact that in Charness workers were required to accept all wage offers, but were not required to do so in FKWG. Allowing rejections puts

[27]FKWG used Austrian soldiers in this particular treatment. However, soldiers and students exhibit similar behavior under FKWG's one-sided oral auction procedures.

upward pressure on wage offers, since low ones tend to be rejected (approximately 7% of all wage offers were rejected in the FKWG experiment, and these tended to be low offers). Thus, on the effort side, Charness's data for a U.S. university match the data from Austria, and the lower wages may well be explained by the requirement that workers accept all offers.

However, what is unclear from Charness's experiment is what percentage of his subjects were undergraduates versus graduate students, and what percentage were foreign born or raised outside the U.S. So there may be significant differences in population characteristics between our undergraduates and Charness's subject population in terms of past work experiences that are entirely consistent with our proposed explanation. Barring this, we might look to differences in socio-economic backgrounds of our undergraduates versus the UC-Berkeley subjects to explain the differences in work norms.[28]

However one interprets Charness's results relative to ours, the key point is the same: To the extent that one is investigating behavior which is assumed to spring from social conventions and norms of behavior that are not entirely individualistic in origin, there are likely to be significant quantitative differences in behavior between subject populations. We have found this in comparing levels of gift exchange between undergraduates and MBAs. Consistent with our interpretation of this result Hannan (2001) finds a statistically significant effect among University of Pittsburgh MBAs, in the expected direction, based on years of professional work

[28]Charness did not gather data regarding undergraduate status or country of origin. He estimates that about 15% of his subjects were graduate students and that, although his undergraduate subjects were mainly from the U.S., there was a substantial proportion of Asian-Americans (Charness, personal communication). Published student profiles (www.usnews.com/usnews/edu/college/corank.htm; October 2, 2000) indicate that the student bodies of the two universities come from different ethnic and socio-economic backgrounds. Specifically, UC-Berkeley has substantially more non-whites than the University of Pittsburgh (59% and 16%, respectively). This difference results primarily from a higher percentage of Asians (39% vs. 4%) and Hispanics (10% vs. 1%) at UC-Berkeley. UC-Berkeley students also have higher SAT scores (middle 50th percentile of 1200-1430 vs. 1040-1250) and better high school class rank (98% from the top 10% of their high school class vs. 28%). It is common knowledge that SAT scores and class rank are positively associated with socio-economic status. There may be differences in work-ethic norms across ethic groups and/or socio-economic classes.

experience. Moreover, significant differences in behavior, resulting from differences in social conventions and norms, have been reported in a number of other experiments. For example, Major, McFaralin and Gagnon (1984) report two experiments which find that women's internal standards for fair pay are significantly lower than men's, and Roth et al. (1991) report significant quantitative differences in offers based on cultural differences in an ultimatum game experiment.

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Table 1
Effort Response to Wage and Productivity

	MBAs		Undergraduates	
	Model 1	Model 2	Model 1	Model 2
waget	.0214*** (.0082)	.0185** (.0079)	.0280*** (.0073)	.0295*** (.0078)
waget2	-.00015 (.00011)	-.00011 (.00011)	-.00038*** (.00012)	-.00037*** (.00012)
dprod		-.0321 (.1079)		.1138 (.0925)
dprxwt		.0022 (.0035)		-.0025 (.0032)
dp1	-.0172 (.0553)	-.0203 (.0546)	.1549 (.1091)	.1501 (.1076)
constant	-.2124 (.1485)	-.1803 (.1433)	-.3894*** (.1256)	-.4547*** (.1507)
Wald		1.51 p=.47		1.68 p=.43
Model χ^2	80.16	82.94	43.74	45.52
n obs. n subjects	454 48	454 48	319 33	319 33

* p. ≤.10
** p. ≤.05
*** p. ≤.01
Standard errors in parentheses
Wald test: joint significance of dprod, dprxwt

Table 2
Subject Pool Differences in Effort Response to Wage

	Panel A		Panel B	
	All Workers		Excluding Economic Workers[(1)]	
	Model 1	Model 2	Model 1	Model 2
waget	.0062*** (.0015)	.0202*** (.0048)	.0080*** (.0019)	.0167*** (.0049)
waget2		-.00023*** (.00008)		-.00017** (.00008)
dmba	.0607 (.0671)	-.0647 (.0844)	-.0006 (.0680)	-.1160 (.0826)
dmbaxwt	.0043** (.0021)	.0074*** (.0025)	.0023 (.0023)	.0058** (.0027)
dp1	.0307 (.0523)	.0466 (.0514)	-.0186 (.0512)	-.0007 (.0507)
constant	-.1045** (.0510)	-.2621*** (.0800)	-.0008 (.0488)	-.0882 (.0716)
Wald	13.39 p=.0012	15.08 p=.0005	3.05 p=.2176	5.85 p=.0538
Model χ^2	220.69	248.18	154.32	163.72
n obs.	773	773	618	618
n subjects	81	81	65	65

* p. ≤.10
** p. ≤.05
*** p. ≤.01
Standard errors in parentheses
Wald test: joint significance of dmba, dmbaxwt
(1) See text for a description of the term "economic workers."

Table 3
Mean Wage by Period by Subject Pool

Period	n	MBAs	UGs	t-value
1	68	54.0 (16.0)	49.3 (13.8)	1.26 *
2	68	48.9 (11.4)	46.0 (11.6)	1.03
3	66	50.5 (11.4)	41.6 (12.8)	2.97 ***
4	63	54.4 (14.2)	42.1 (12.9)	3.55 ***
5	68	55.1 (10.3)	39.1 (11.8)	5.94 ***
6	68	57.1 (9.3)	34.7 (11.9)	8.68 ***
7	67	57.8 (9.5)	38.3 (13.7)	6.33 ***
8	67	58.6 (10.3)	39.9 (11.9)	6.83 ***
9	67	57.5 (9.8)	43.9 (14.0)	4.36 ***
10	67	58.0 (9.9)	45.0 (18.8)	3.29 ***
11	58	55.0 (8.2)	47.2 (19.1)	2.01 **
12	58	51.6 (11.0)	46.8 (14.5)	1.45 *

*** p-value ≤ .01 (one-tailed)
** p-value ≤.05 (one-tailed)
* p-value ≤.10 (one-tailed)

Standard deviations in parentheses.
Statistical test: MBA mean wage > UG mean wage. Means and t-tests use all observations in each period. Reported t-values are for unequal (equal) variance where Levene's test for equality of variance indicates unequal (equal) variances at p-value <.10. Reported significance levels would be the same under either assumption.

Table 4
Actual Effort Compared to Requested Effort

Subject Pool	Actual < Requested		Actual = Requested	Actual > Requested	
	%	Average deficit	%	%	Average excess
MBAs	74%	.38	23%	3%	.13
UGs	77%	.36	23%	0%	

Table 5
Effort Response to Wage and Effort Request

	MBAs	Undergraduates
waget	.0093	.0187***
	(.0071)	(.0022)
waget2	-.00004	-.00012***
	(.00009)	(.00005)
reqefft	.4382***	.1927
	(.1573)	(.1351)
dp1	.1528**	.0455
	(.0742)	(.0509)
constant	-.2284**	-.4162***
	(.1099)	(.0797)
Wald	8.53	111.43
	p=.0140	p=.0000
Model χ^2	53.98	85.21
n obs.	212	238
n subjects	22	24

* p. ≤.10
** p. ≤.05
*** p. ≤.01
Standard errors in parentheses
Wald test: joint significance of waget, waget2

Table 6
Posted Effort Session Differences in Effort Response to Wage

	MBAs			Undergraduates		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
waget	.0197*** (.0049)	. 0204*** (.0050)	.0208*** (.0051)	.0248*** (.0037)	.0248*** (.0037)	.0225*** (.0043)
waget2	-.00013** (.00007)	-.00014**) (.00007)	-.00014** (.00007)	-.00025*** (.00005)	-.00025*** (.00005)	-.00027*** (.00006)
dpe		.0388 (.0551)	.0578 (.0803)		-.0027 (.0640)	-.2178** (.0940)
dpexwt			-.0005 (.0023)			.0078*** (.0027)
dp1	.0251 (.0439)	.0253 (.0439)	.0257 (.0441)	.0981 (.0645)	.0980 (.0649)	.1066* (.0644)
constant	-.1756** (.0892)	-.2001** (.0945)	-.2107** (.0979)	-.3840*** (.0760)	-.3832*** (.0819)	-.3066*** (.0846)
Wald			0.74 p=.6916			8.52 p=.0141
Model χ^2	122.35	124.88	124.96	111.31	111.32	121.64
n obs. n subjects	666 70	6660 70	666 70	557 57	557 57	557 57

* p. ≤.10
** p. ≤.05
*** p. ≤.01
Standard errors in parentheses
Wald test: joint significance of dpe, dpexwt

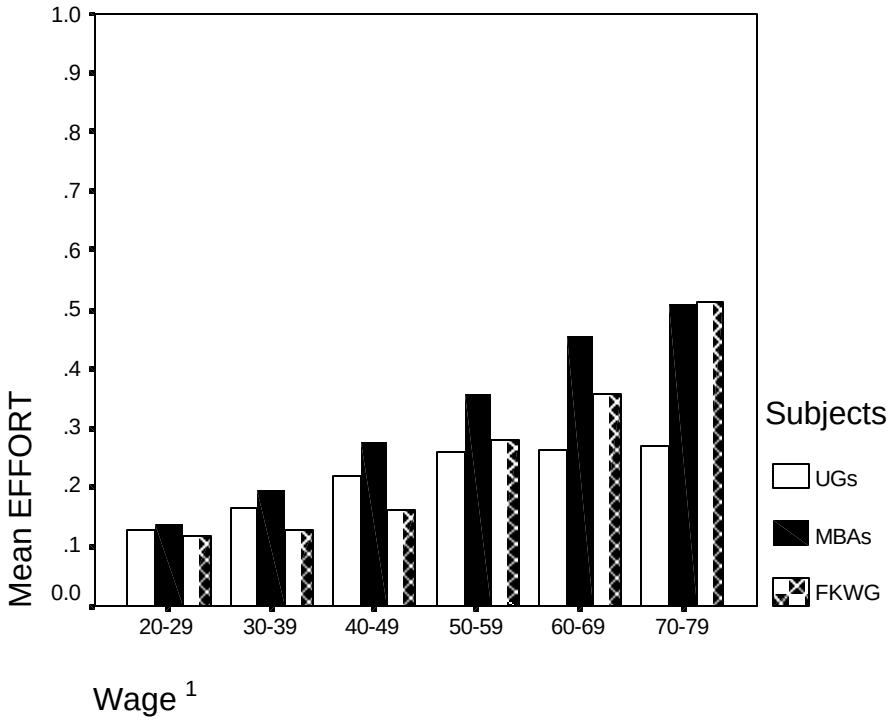
Table 7
Mean Firm Profit by Wage

Wage Stratum	MBAs	UGs
	profit (sd) [%obs.]	profit (sd) [%obs.]
20-29	15.29 (11.00) [3%]	9.85 (6.30) [22%]
30-39	11.69 (8.33) [7%]	10.92 (6.92) [18%]
40-49	15.32 *** (10.63) [22%]	12.43 * (10.09) [25%]
50-59	17.89 *** (10.26) [32%]	12.95 (8.22) [20%]
60-69	21.71 *** (12.53) [23%]	14.39 (11.65) [12%]
70+	22.17 (13.56) [12%]	13.33 (13.35) [4%]
overall	18.18 (11.63) [100%]	11.98 (8.98) [100%]

Firm profit is reported in Lira
(sd) = standard deviation
[% obs.] = % of observations

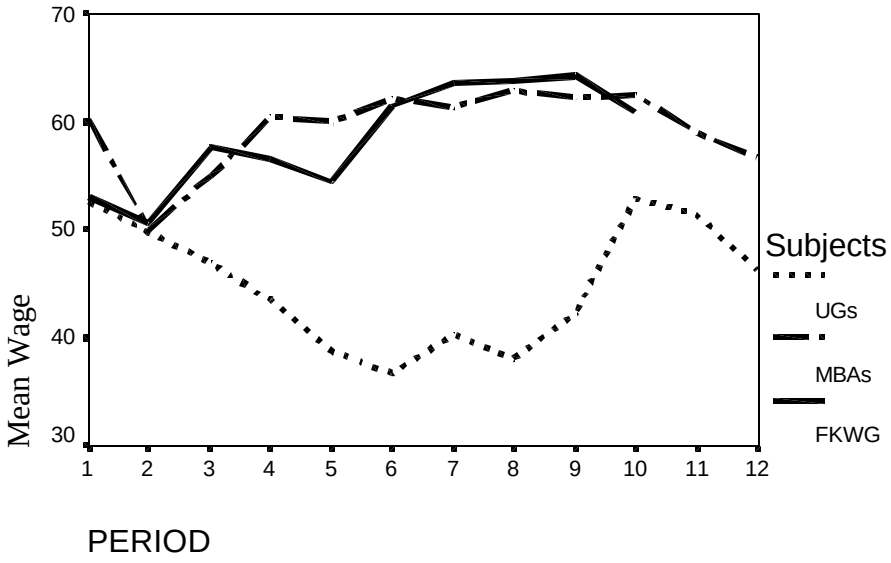
* t-test indicates mean is different from next lowest stratum at $p \leq .10$ (one-tailed)
** t-test indicates mean is different from next lowest stratum at $p \leq .05$ (one-tailed)
*** t-test indicates m

Figure 1
Mean Effort by Wage



[1] Wages are truncated at 79 because the data are thin above that level.

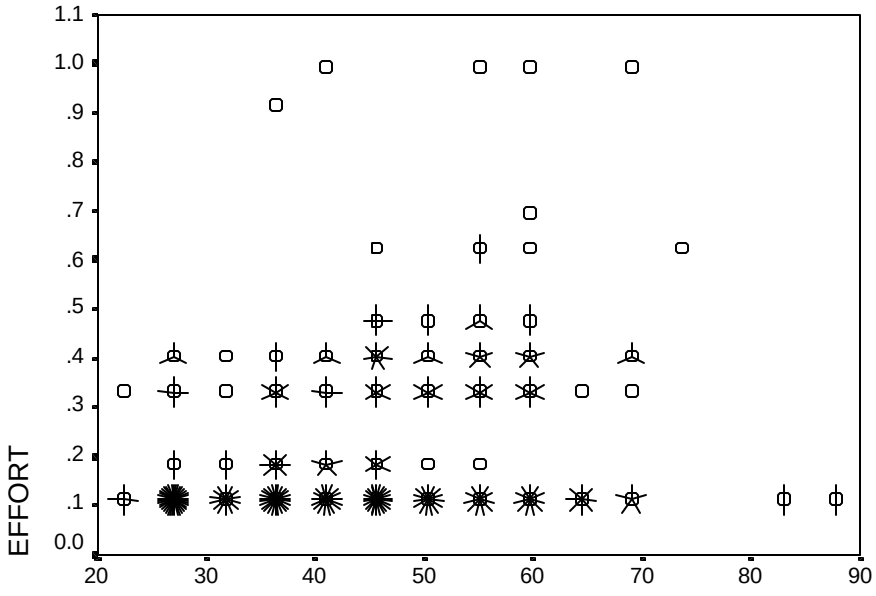
Figure 2
Mean Wage Offers by Period



accepted wage offers only

Figure 3
Scatterplots of Wage and Effort

Panel A - Undergraduates



Panel B - MBAs

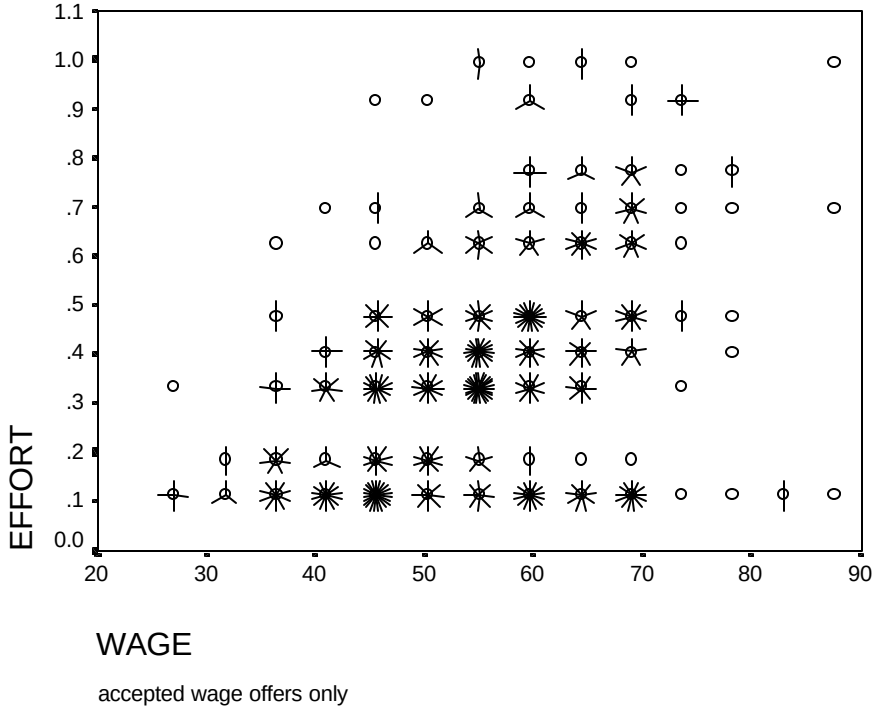


Figure 4
Mean Wage Offers by Period

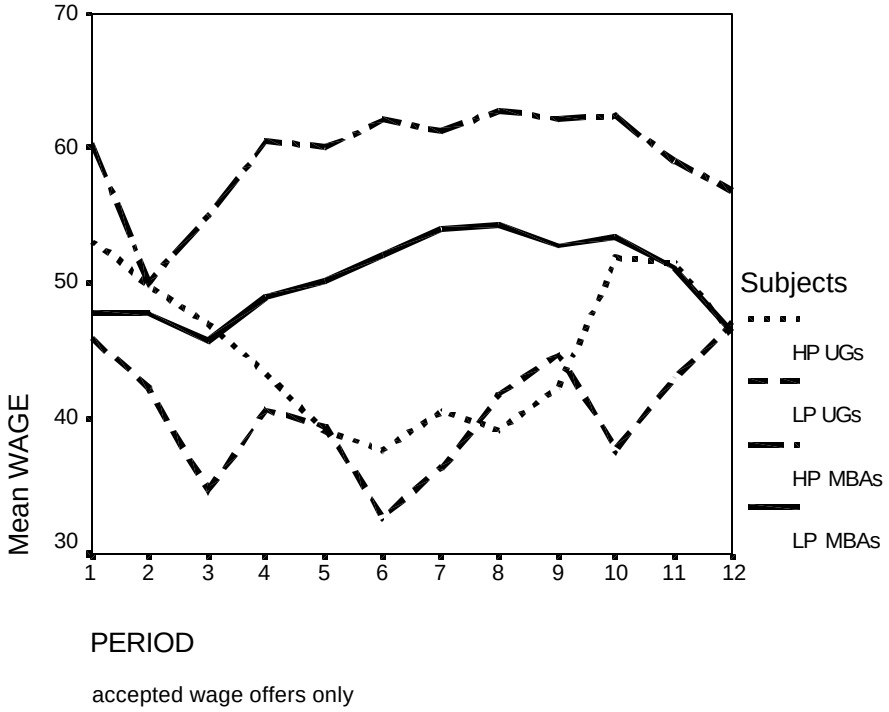
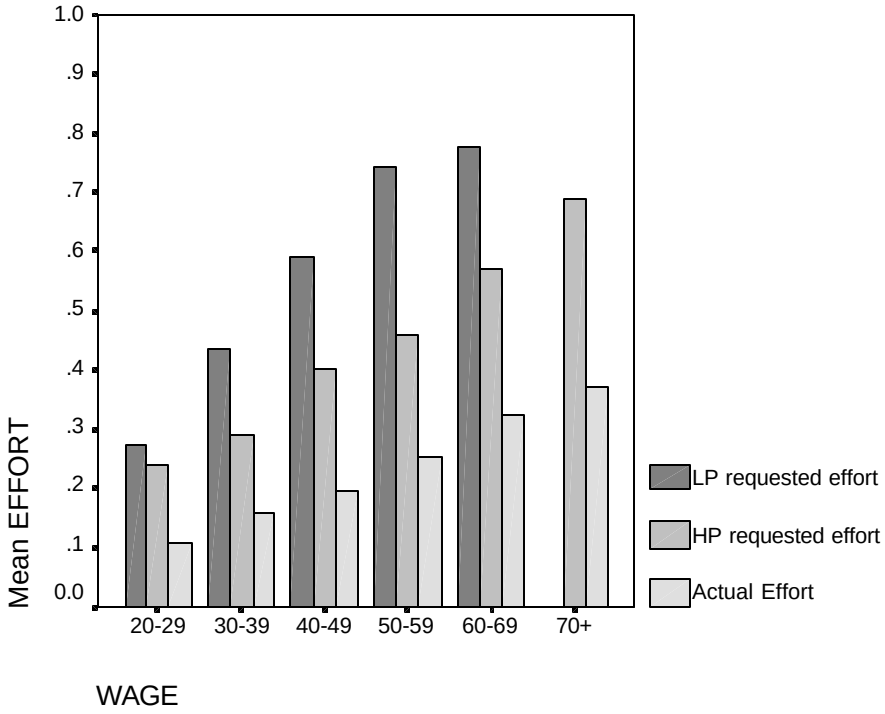


Figure 5
Requested and Actual Effort

Panel A - Undergraduates



(There are no LP wage offers above 69.)

Panel B - MBAs

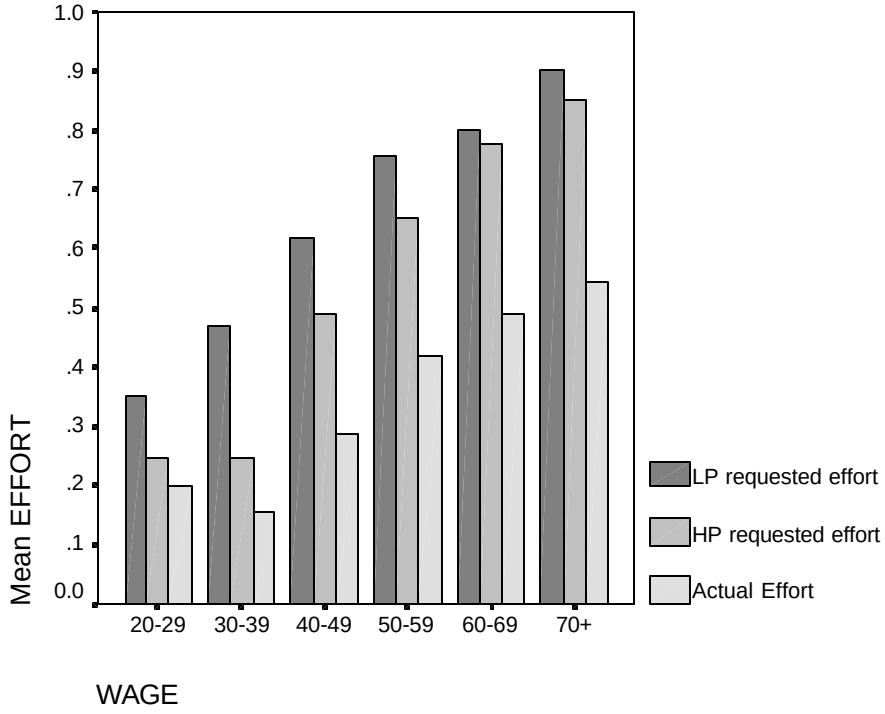
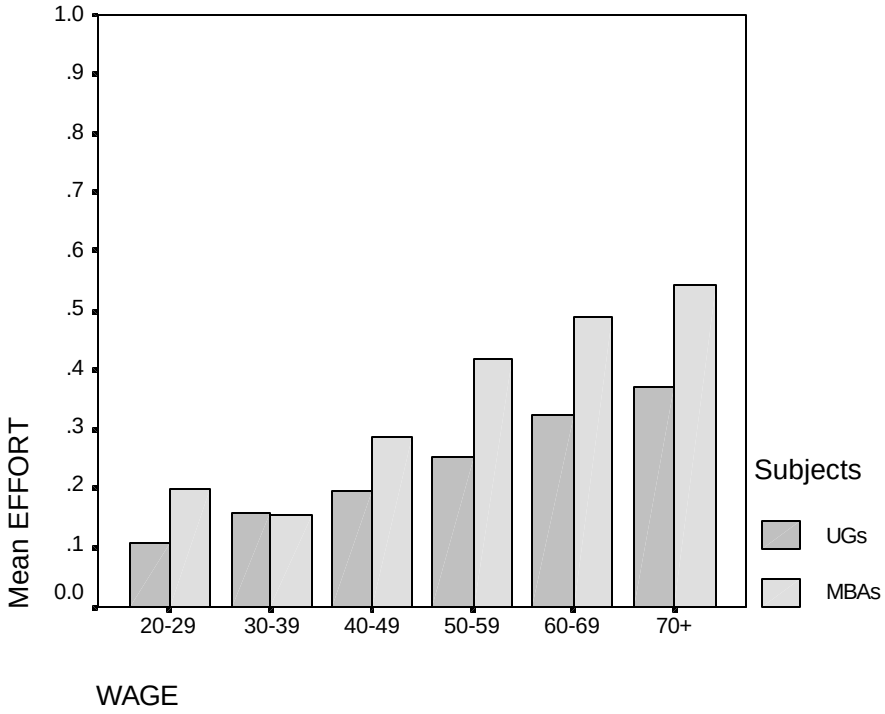
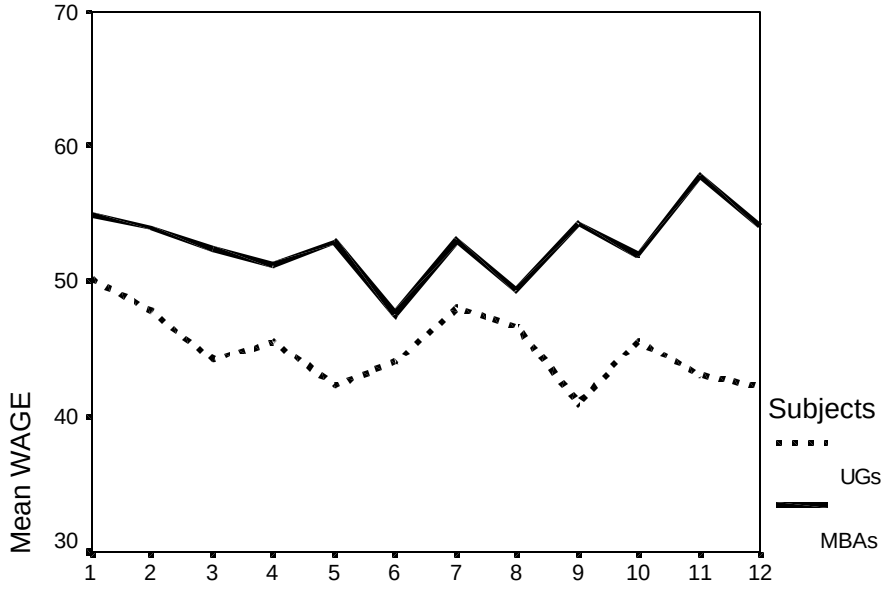


Figure 6
Posted Effort Sessions

Panel A – Mean Effort by Wage



Panel B – Mean Wage Offers by Period



accepted wage offers only