Wages and Reciprocity in the Workplace

CSAE WPS/2004-18

Abigail Barr
Pieter Serneels [1]

Centre for the Study of African Economies, University of Oxford

July 2004

Abstract[2]

We explore the role of reciprocity in wage determination by combining experimental and survey data. The experiment is similar to Berg, Dickhaut and McCabe's (1995) and is conducted with Ghanaian manufacturing workers. The survey relates to the same sample workers and the firms within which they are employed. We find a strong positive association between individual reciprocity and individual wages. However, the direction of causality is unclear. Various aspects of the distribution of the tendency to reciprocate within an employee's workforce are also associated with that employee's wage and, in this case, there are strong arguments for a causal link is from former to latter. In particular, the mean, median, and minimum levels of reciprocity have a positive effect on wages, while the spread in the distribution (standard deviation) has a strong significant negative effect. This suggests that homogenous behaviour, or convergence to a norm, is rewarded. The results underline the importance of behavioural characteristics and firm culture for the operation of the labour market.

Key words: wages, reciprocity, field experiment
JEL classification: J31, C93 ,Z13

---

1. Introduction

Do workers' social preferences – their behavioural tendencies in interactive situations – affect their productivity and earnings? There are two possible channels through which such an effect might act. First, individual workers who are more cooperative, reciprocating, accepting of authority, team spirited, and so on may be more productive than their less 'other regarding' colleagues and may be remunerated accordingly. Second, workers may interact to create workplace cultures that are more or less supportive of collectively productive behaviour. Behavioural norms may emerge that encourage greater cooperation and the application of greater effort. Social sanctioning mechanisms that serve to enforce these norms may also emerge and be effective due to workers' preferences for acceptance and acknowledgement by their colleagues Bernheim (1994), Akerlof (1980).

In contrast to labour economics as a whole, the existing evidence pertaining to these behavioural questions is predominantly experimental, coming from laboratory-based experiments using university students as subjects. An experimental approach to these questions has major advantages over a survey-based approach. In particular, because there is full control over the decision making environment, the approach allows researchers to isolate the effects of specific behavioural tendencies on specific outcomes. Thus, building on the work of Fehr, Kirchsteiger and Riedl (1993), Charness (1996) shows that 'workers' deliver greater effort when wages are set higher because they wish both to share fairly and reciprocate acts of generosity. And Ostrom et al (1992) and Fehr and Gachter (2000) show that agents in groups such as work teams will, if given the opportunity, punish socially inefficient behaviour by fellow

group members and can elicit greater cooperation as a result. However, such experimental evidence is often criticised as lacking in external validity. Is it appropriate to assume that undergraduate students in university laboratories behave similarly to workers in enterprises or that choosing to contribute money to a shared fund is equivalent to contributing effort to a collective assignment? And is a social norm that emerges within the context of a laboratory experiment in any way equivalent to a social norm that emerges, probably over a much longer period of time, in a workplace? The answer to each of these questions is that we simply do not know for, as yet, we have very little evidence pertaining to the external validity of laboratory-run experiments.

Some survey-based evidence relating to the impact of behavioural characteristics on labour market outcomes does exist. The Bureau of the Census (1998), for example, showed that, when recruiting new production staff, US employers ranked attitude and communication skills above years of schooling and grades. Green, Machin and Wilkenson (1998) reported that UK employers suffering recruitment problems cite deficits in attitude and motivation as the primary reason. With respect to wage adjustments for existing employees, Kaufman (1984), Kahneman, Knetsch, and Thaler (2000) ,Blinder and Don Choi (1990), Levine (1993), Agell and Lundborg (1995), and, most recently, Bewley (1999) found that employers resist cutting wages because of the impact it has on worker morale, especially it seems when the cut is viewed as unfair or as an act of hostility. And with respect to the possible role of behavioural norms and social sanctions, Hamilton et al (2003) showed that a shift from individual piece rates to group piece rates can dramatically increase productivity and Bartel et al (2003) found that employee attitudes in the US banking sector both

differ between workplaces and affect workplace productivity. However, while externally valid and potentially salient to our question, such studies fail to identify the precise nature of the behavioural characteristics involved in generating the observed outcomes. Also, they depend critically on subjective assessments by respondents about their own and others' behavioural tendencies and motivations and these can be biased depending on how the incentives associated with different responses are perceived within the context of the survey (Fehr, Fischbacher, Rosenbladt, Schupp and Wagner (2003)).

Here, following the recommendation of Bowles, Gintis and Osborne (2001), we use a combined empirical approach to obviate the problems raised above while investigating the effects of one particular behavioural characteristic on earnings. We use an economic experiment to derive measures of workers' individual and collective tendencies to reciprocate which we then analyse in conjunction with survey data on the earnings and socioeconomic characteristics of the same workers and data on the characteristics such as the size of the workforce, profits, and ownership structure collected from the workers' employers. Thus, we find that individual reciprocity and earnings are highly correlated, although we cannot determine the direction of causality. We also find that the distribution of reciprocity across employees within the workplace affects earnings and by inference productivity. This lends support to the hypothesis that workplace culture affects labour market outcomes.

The paper has 5 sections. In section 2 we provide a brief review of the theoretical literature on reciprocity and earnings and the experimental evidence relating to the role of reciprocity and workplace culture in determining effort. In section 3 we outline

our combined methodology. In section 4 we present our results relating to the effect of individual reciprocity (section 4.1) and the effect of the distribution of reciprocating tendencies within the workplace (section 4.2) on earnings. Finally, in section 5 we present our conclusions about the relationship between reciprocity and earnings and critically review our combined empirical approach to behavioural issues in labour economics.

2. Experimental evidence on reciprocity, social norms, effort, and earnings

The tendency to reciprocate has received considerable theoretical attention as a strong motivator in both interactive contexts in general (Rabin (1998), Fehr and Falk (2002)) and labour market interactions in particular. Over two decades ago Akerlof (1982) modeled a labour transaction as a gift exchange game between employer and employee. This inspired a series of empirical studies that took the form of laboratory-based behavioural experiments involving undergraduate students. Thus, Fehr, Kirchsteiger and Riedl (1993) found that 'workers' deliver greater effort when wages are set higher. Fehr, Gachter and Kirchsteiger (1997) presented results suggesting that reciprocity is a contract enforcement device, while Fehr and Gachter's (1998) results emphasized the more general function of reciprocity as a powerful effort elicitation device. And, as described above, Charness (1996) showed that higher paid reciprocating workers are in part sharing their additional wealth with their employer and in part responding to their employer's generosity.

But should our focus be reciprocity between employers and employees? Particularly in large enterprises, employer-employee dyads represent only a small proportion of all

the dyads in the enterprise. Further, some researchers have argued that the notion of reciprocity is essentially interpersonal (Offer 1997, Polanyi 1957), implying that, since in large hierarchical organizations the employer is perceived as an abstract and anonymous concept rather than a real person, the notion of reciprocity cannot be ascribed to the interactions between employer and employee. Yet only the experiment of Schotter (1998) explores the impact of reciprocity between employees. Schotter's experiment had two stages. In the first, the subjects developed beliefs about each others' reciprocating tendencies during a game of trust and in the second they participated in a coordination game. Schotter found that the performance of the players in the coordination game was influenced by the beliefs they developed during the preceding trust game and took this as evidence that reciprocity and trust facilitate efficient exchange of information and ease coordination.

The experimental literature on public goods games, behavioural norms and social sanctioning is also of relevance here as it relates to the role of workplace culture in determining effort. Building on the work of Ostrom et al (1992) and Fehr and Gachter (2000) cited above, Carpenter (2000) found that familiarity improves the efficacy of punishment suggesting that some stability in the group within which a norm may emerge may be important. Sefton et al (2000) and Dickinson (2001) found that both reward and punishment can improve efficiency thereby providing some insights into how social norms might optimally be maintained. And Huck et al (2003) found that individual extrinsic incentives can crowd out efficiency enhancing social norms.

3. Methodology

We seek answers to two questions. Are more reciprocating workers paid more? And are workplaces with stronger social norms of reciprocity more productive and so higher paying? To address these questions we combine experimentally derived data on individual workers' tendencies to reciprocate and the strength of the social norm to reciprocate within their places of work with survey data on earnings, workers' socio-economic characteristics, and employers' characteristics. Survey-based data on earnings and socio-economic characteristics have often been used to explain variations in experimentally derived behavioural measures. Thus, for example, Glaeser et al (2000) show that students with higher social status can elicit greater trust from their playing partners in face-to-face trust games. However, the use of experimental data to predict actual economic outcomes is rare. Binswanger (198?) was one of the first to try: he used experimentally derived measures of risk aversion to predict investment decisions made by smallholder farmers in India. Subsequently, Barr and Packard (2002) used similar measures to predict involvement in formal pension schemes in Peru, while Karlan (2003) used experimentally derived measures of trust and trustworthiness to predict loan repayment in microfinance schemes also in Peru.

One reason for the rarity of combining experimental and survey data is that the approach generally requires field-based behavioural experimentation, i.e., the experiments have to involve subjects drawn from the population of interest and, depending on the question to be addressed, may have to be conducted in the context of interest. Taking experiments to the field challenges our ability to control the decision making environment and brings us into contact with subjects who are less familiar with abstract decision-making than undergraduate students. Control and

subject cognition affect the quality of our data. As each declines the data becomes increasingly noisy, thereby reducing our ability to identify the relationships of interest. That Binswanger, Barr and Packard, and Karlan have identified such relationships indicates that control and cognition can be sufficient to support the type of analysis we propose. However, it is worth bearing in mind that the statistical significance of experimentally derived measures placed on the right hand side of regression analyses may be suppressed by these factors. As the following account attests, we took great care to ensure a high degree of control and subject cognition in our experiment.

Our experiment involved the Investment Game designed by Berg, Dickhaut and McCabe (1995). The game has two players. At the start of the game both players receive an equal amount of cash, x. Player one has to decide how much of her cash, $s < x$, to pass to the second player. The amount she passes is tripled by the experimenter, and then given to the second player. The second player then decides how much to pass back, $r < 3s$, to the first player. So, the first player's final payoff is $x-s+r$ and the second player's final payoff is $x+3s-r$. Under the classical assumptions of selfish money maximization the second player returns nothing and, knowing this, the first player sends nothing.

We involved 424 full employees and apprentices from 22 Ghanaian manufacturing enterprises in the experiments. However, the experimental data used in the analysis below pertains only to the 113 full employees who took the role of second player and received some positive amount from their corresponding first player. These full employees were drawn from 20 different enterprises. In order that we might generate

estimates relating to the distribution of reciprocating behaviour for every workforce, we drew random samples from each enterprise. The total number of sampled employees from each enterprise varied from 8 to 46, with sampling proportions varying from 9 to 53 percent.

The games were played after work hours, in the evenings or on Saturday afternoons, in schools near to the employees' places of work. Two classrooms and a corridor were used in every case. The employees were taught the game while sitting at amply spaced desks in one of the classrooms. Then they were called one at a time to interviews with a research assistant sitting at a desk in the corridor. In these interviews they were taught the game once more, were verbally tested on their understanding of the game, and then played. Then they were directed to wait in the second classroom until everyone had played and they could receive their payoffs. Both the description of the game presented in the first classroom and the one-to-one interviews were scripted. The scripts were written in English, translated into Twi, a Ghanaian language spoken by all of the employees in our sample, piloted and adjusted, and then back translated by an uninformed translator to check that intended meanings had not changed (Appendix 1 contains a copy of the script in English). The scripts were adhered to at all times. If subjects asked questions, the relevant part of the script was repeated. The experimenter (Barr) and a monitor were posted in the first classroom to prevent the waiting employees talking after learning the game but prior to making their decisions. Both roles and pairs were randomly assigned. The first players (the trusters) were interviewed in random order and then the second players (the trustees) were interviewed, again in random order. Each player knew that they were playing with a colleague but did not know which particular colleague.

Our measure of individual employees' tendencies to reciprocate is the natural log of the amount returned by them when assuming the role of second player, expressed as a proportion of the amount sent by the first player, $\ln(r/s)$.

We ensured that the employees both played and knew they were playing with colleagues from the same workforce in the hope that they would bring not only their own personal preferences and internalized motivations but also entire sets of heuristics, socially acquired values and expectations about how others might play into the experimental context (Cardenas (2003) and Harrison and List (2003)). Thus, our behavioural measures may capture workplace social norms (Henrich et al (2001)).

If generally adhered to, social norms that define what an individual should do when interacting with others, can reduce the uncertainty that individuals face when interacting with one another and so reduce the costs of interaction. Thus, they can facilitate effective communication, coordination, and cooperation. In the context of an enterprise this can have positive effects on productivity and, hence, on earnings. *Ceteris paribus*, in contexts where there is divergence between privately and socially optimal behaviour, a social norm stating that individuals should behave in accordance with the social optimum or in a way that will cause others to behave in accordance with the social optimum would lead to greatest efficiency. However, adherence to such norms may not be as great as adherence to norms that advocate behaviour that diverges less from the private optimum. Low adherence implies less predictable behaviour and so less efficiency.

Thus, the strength of a reciprocating norm can be thought of as having two dimensions the first relating to the expected return on trust that the norm implies, and second relating to the extent to which the norm is adhered, i.e., the extent to which it suppresses variation in that return.[3] Our proxy for the first of these dimensions is the mean level of reciprocity displayed by the employees from each workplace during the game, $\overline{\ln(r/s)}$.[4] We use two proxies for the second dimension, the standard deviation of reciprocity across the workers from each workplace, $\text{sd}(\ln(r/s))$ and the minimum level of reciprocity within each workplace, $\min(\ln(r/s))$. The latter will be of particular importance if agents fear or are averse to being the victim of a betrayal and are, as a result, highly focused on the worst possible response they could get to an act of trust.

We predict employees' earnings (w) using an econometric model based on human capital theory (Becker 1993, Mincer 1974): wages are modeled as a function of individual employee characteristics (I) and employer or workplace characteristics (F):

$$w = f\left(I, F, \varepsilon\right)$$

The vector I usually includes the age, sex, education, experience, and the family background of the employee. However, we extend the definition of human capital to include the individual employee's tendency to reciprocate. Similarly, in addition to the usual employer characteristics, such as the size of the workforce, ownership structure, and profits, we include in F our proxies for the strength of reciprocating norms. A positive, significant, and robust coefficient on $\ln(r/s)$ will be taken as

---

[3] Barr (2003) shows that, across a sample of 26 Zimbabwean villages, levels of trust increase with mean reciprocity and decrease with the variation in reciprocity.
[4] The mode would have been a more natural choice. However, across workplaces the mode varies little and, so, performs badly in the regressions. We also tried the median, but this performs less well than the mean.

evidence that more reciprocating workers are more productive and remunerated accordingly. A positive, significant and robust coefficient on $\overline{\ln(r/s)}$, a negative, significant and robust coefficient on $\mathrm{sd}(\ln(r/s))$, and a positive, significant and robust coefficient on $\min(\ln(r/s))$ will be taken as evidence that workplaces with stronger reciprocating norms are more productive and remunerate their workers accordingly.

4. Results

Figure 1 contains a histogram and a kernel density estimation for the reciprocity of workers. We find that reciprocity follows a bimodal distribution, with one peak corresponding to a reciprocity score of 1 ($\ln(r/s)=0$)) and another corresponding to a reciprocity score of 2 ($\ln(r/s)=0.69$). Most of the workers who deviate from these modes fall in between the two, suggesting that there are essentially three groups: those who send back exactly what the first player gave away keeping all of the return on the trusting act for themselves; those who send back twice the amount sent by the first player, thereby ensuring equal final payoffs to both players and providing a 100 percent rate of return to the trustor; and those who choose some positive rate of return less than 100 percent for the trustor. Many in the third group chose a rate of return of 50 percent for the trustor. It is unclear why there are three types: it may be due to variations in exogenous individual characteristics such as preferences, to the existence of distinct workplace cultures, or, if the way the employees play the game is subject to some sort of income effect, to variations in the employees' earnings.

Figure 2 plots the histogram and kernel density function for earnings. The distribution is unimodal and skewed slightly to the right.[5] This suggests that even if reciprocity and wages are related (as we show below) variations in reciprocity – as measured within the context of the game – cannot result solely from an income effect.

4.1 Individual reciprocity as a predictor of earnings

To see whether reciprocity predicts earnings, we regress the log of earnings on $\ln(r/s)$ while controlling for other individual characteristics. The other individual characteristics we include are: years with current employer, years of formal education, sex, age, age squared, whether the individual is related to their employer by blood, and whether the individual is a member of a labour union (Table 2 contains precise definitions and means). Table 3 presents the results. The first column reports an ordinary least squares (OLS) regression and indicates that reciprocity and wages are positively related (10 percent significance level). The coefficient reflects the elasticity of wages with respect to reciprocity and is very large: a one percent change in reciprocity is associated with a 15 percent change wage.

However, this result may suffer from endogeneity bias. Most theorists working in this area assume that an individual's propensity to reciprocate is exogenous. So, for example, Fehr, Klein and Schmidt (2001) abstract to two types of agents, one more and one less reciprocating. But this does not imply that our measure is exogenous. The experiments were conducted using money which may have framed the game in the minds of the employees. This could have had several effects on their decisions

---

[5] A Shapiro-Wilk test as well as a combined test for skewness and kurtosis rejects the hypothesis that wages are normally distributed for either workers or apprentices.

including an income effect – those who earn more may have been more inclined to

reciprocate – thereby bringing our first regression result into question. So, in Column

2   of

Table 3 we report the results for a two stage instrumental variable estimation in which we instrument for reciprocity. The coefficient on individual reciprocity is no longer significant even though the point estimate is unchanged. The first stage regression is reported in column 3 (Table 2 contains precise definitions and means of all the right hand side variables in the first stage regression). We find that 'unhappiness as a child', 'being a youngest child', and 'being a member of an association' all have a significant and positive effect on reciprocity. Being born outside Ghana, a member of a union, working in Kumasi, and belonging to a new, as opposed to an old or world, Christian religion all have significant negative effects. This first stage equation explains 24 percent of the variation in reciprocity across our sample. This is encouraging when viewed in isolation but may not be sufficient to support the second stage of the estimation procedure. This alone may explain why the coefficient on reciprocity in the second stage regression is not significant.[6]

As a further check on the magnitude of the estimated coefficient on the reciprocity variable we conduct a GMM instrumental variable estimation. This method is better at dealing with heteroscedasticity of unknown form and so may yield greater hypothesis testing power given the bimodal distribution of reciprocity. However, it needs to be born in mind that the standard errors reported using this method are biased downwards (Wooldridge 2002). Column 4 shows that the point estimate for the coefficient on reciprocity, while still large, is smaller in the IV GMM estimation than in the 2SLS estimation. According to the IV GMM estimation a 1 percent change in reciprocity is associated with a 9 percent change in wages.

---

[6] Neither a Hansen-Sargan test nor a Davidson-Mackinon test indicate that the model is over-identified and a Hausman test supports the hypothesis that the point estimates in the instrumental and OLS models are equal. Tenure may also be endogenous. If we instrument for both reciprocity and tenure, both are insignificant and the size of the coefficient on reciprocity does not change significantly.

To summarize, the relationship between wages and reciprocity is positive, significant, and strong. However, we cannot identify a causal link from reciprocity to wages. The point estimate on reciprocity in the wage function remains large after controlling for endogeneity suggesting that reciprocity may have a considerable effect on wages. However, if that is indeed the case, our data is not sufficiently rich to identify the relationship.

4.2 Reciprocating norms as predictors of earnings

Now we investigate the impact of reciprocating norms on earnings. First, we introduce workplace fixed effects into the model presented in column 1 of Table 3 in order to establish whether more reciprocating employees are better remunerated than their less reciprocating colleagues. If the individual reciprocity variable shrinks and looses significance as a result, it suggests that the tendency to reciprocate is correlated with the workplace fixed effects. This would be consistent with the existence of distinct reciprocating norms in different workplaces. Then, we replace the workplace fixed effects with our proxies for the strength of reciprocating norms, $\overline{\ln(r/s)}$ and $\mathrm{sd}(\ln(r/s))$ and with $\min(\ln(r/s))$. Finally, we investigate possible bias due to omitted enterprise characteristics. First, we introduce additional enterprise characteristics into the model, and second, in order to be explicit about the constraints we face in terms of degrees of freedom at the workplace level, we use the estimated workplace fixed effects from the individual earnings function as the dependent variable in a further set of regressions. The results of these exercises are reported in Tables 4, 5 and 6.

To facilitate easy comparisons, column 1 of Table 4 repeats the OLS results reported in column 1 of Table 3. The regression reported in column 2 contains workplace fixed effects.[7] Their inclusion reduces the size of the coefficient on individual reciprocity and renders it insignificant.[8] The regression reported in column 3 of Table 4 contains $\overline{\ln(r/s)}$ which enters the model with a positive and highly significant coefficient (1 percent level). The coefficient on $\mathrm{sd}(\ln(r/s))$ in column 4 is negative and highly significant. And the coefficient on $\min(\ln(r/s))$ in column 5 is positive and significant although lower than the coefficient on the mean. If we include both $\overline{\ln(r/s)}$ and $\mathrm{sd}(\ln(r/s))$ in the model only the former is significant. And if we put all three workplace level reciprocity variables in the model, again, only $\overline{\ln(r/s)}$ is significant. The three workplace-level reciprocity variables are highly correlated: the correlation coefficient between $\overline{\ln(r/s)}$ and $\mathrm{sd}(\ln(r/s))$ is -0.7163, between $\overline{\ln(r/s)}$ and $\min(\ln(r/s))$ it is 0.7303; and between $\mathrm{sd}(\ln(r/s))$ and $\min(\ln(r/s))$ it is -0.8686. This explains why we cannot accurately estimate all coefficients when more than one enters the model. The introduction of the workplace level reciprocity variables reduces the significance but not always the magnitude of the coefficient on individual reciprocity. Indeed, when $\overline{\ln(r/s)}$ is included, the coefficient on individual reciprocity increases.[9] However, as before, controlling for the possible endogeneity of the individual-level reciprocity variable renders it insignificant.

---

[7] A random effects model fails the Breusch-Pagan LM test for random effects.
[8] This result remains unchanged if we instrument individual reciprocity.
[9] This result is suggestive of an interaction effect between individual and firm-level reciprocity. However, when an interaction is included in the model it is insignificant.

The firm level reciprocity variables are unlikely to be endogenous to individual earnings, especially as we exclude ego's reciprocity from the calculation in every case. However, if individual reciprocity is endogenous to earnings and if colleagues' earnings are highly correlated, the coefficients and standard errors on the firm-level reciprocity variables might nevertheless be biased. In other words, the firm-level reciprocity variables might be acting as a proxy for other firm-level determinants of wages. To explore whether this is the case, in Table 5, we include the mean wage for the workforce as an additional regressor. The coefficient and corresponding standard error on the mean wage for the workplace will be subject to bias as described by Manski (1993). However, we are only interested in seeing whether its inclusion reduces the significance of the workplace level reciprocity variables. The coefficient on the mean wage is both positive and significant. The coefficients each of our three workplace reciprocity variables, while smaller, remain significant.

We only have 20 degrees of freedom at the workplace level and so run the risk of over-identifying the model if we incorporate too many workplace-level regressors. Over identification can pass undetected when it relates to incorporating group level variables in individual level regressions. So, for the remainder of our analysis we use the estimated workplace fixed effects relating to the regression in column 2 of Table 4 as our dependent variable and work with a sample of only 20 workplaces. Initially, our set of explanatory variables includes one of the three workplace-level reciprocity variables, the total number of employees in the workforce, profits,[10] a dummy variable indicating that the enterprise is domestically rather than foreign owned, the number of apprentices in the workforce, a dummy indicating that the enterprise is

---

[10] The total number of employees in the workforce and profits have been found to be a key determinant of earnings, especially in African manufacturing firms (Bigsten et al, (2000), Söderbom and Teal (2001), Strobl and Thornton (2001), Söderbom, Teal and Wambugu (2003)).

located in Kumasi, the percentage of the workforce that is unionized, and three sector dummies. Then we conduct a careful general to specific process of elimination of the insignificant (10 percent level used as a cut-off) explanatory variables to ensure that overidentification does not lead us to draw spurious conclusions.

Table 5 presents the results of this exercise. Columns 1 to 3 indicate that even after including the full set of additional workplace characteristics the coefficients on the workplace-level reciprocity variables remain large and significant. Columns 4 to 6 indicate that their significance is not an artefact of overidentification.

5. Conclusion

In this paper we explore the effect of reciprocity between colleagues on individual earnings by combining data from a behavioural experiment and surveys relating to the same sample of Ghanaian employees and their places of work. We find evidence of a strong relationship between individual tendencies to reciprocate and individual earnings, even after controlling for a range of other individual characteristics. However, our data is not sufficiently rich to enable us to control for potential problems of endogeneity and thereby identify the direction of causality. A comparison of the kernel density estimations for reciprocity and earnings suggests that, while income may have affected reciprocating behaviour in the game, there must be other factors such as innate behavioural tendencies or workplace-specific behavioural norms also affecting reciprocating behaviour. However, our efforts to identify effective instrumental variables were unsuccessful.

Our results relating to workplace-specific reciprocating norms are considerably more robust. An employee's earnings are greater the higher the mean level of reciprocity, the lower the standard deviation in reciprocity, and the higher the minimum level of reciprocity among his colleagues. These three variables are highly correlated, but all relate to the concept of norm strength – a norm of reciprocity is stronger the higher the expected return it leads to for trusters, the lower the uncertainty about trustees' behaviour, and the higher the lowest possible return facing trusters.

Our results lend support to the argument that behavioural characteristics affect labour market outcomes, while also indicating that individual employees' behavioural characteristics generate externalities – their tendency to reciprocate may affect not only their own but also their colleagues' wages. Further, if wages reflect productivity, as argued in theory and shown for the Ghanaian manufacturing sector by Serneels (2003), our results suggest that employers should select workers with a strong tendency to reciprocate and should facilitate the emergence of strong norms of reciprocity among their workers.

Our analysis suffers from several weaknesses. In particular, our efforts to collect data that may be used to instrument for individual-level reciprocity and thereby control for possible income effects relating to the behavioural variable failed. Also, with only 20 observations at the level of the workplace, we are deeply constrained when endeavouring to control for omitted variable bias.

These weaknesses notwithstanding, our analysis does demonstrate the potential advantages to a combined approach to behavioural issues in labour economics. Our

experimentally derived data on reciprocity does not suffer from the weaknesses associated with attitudinal data. And our fieldwork approach appears to have generated interesting results both at the individual and the workplace level. In our opinion, this work is most appropriately viewed as a complement to the experimental and survey work cited in section 2 above. In particular, the evidence of strong associations between experimentally derived measures of reciprocity among colleagues and earnings that we present suggests that an experimental approach can generate externally valid conclusions. The complementarity between the work of Schotter (1998, 2003) and the results presented above is particularly striking.

References

Agell, J. and Lundborg, P. (1995). "Theories of Pay and Unemployment: Survey Evidence from Swedish Manufacturing Firms." Scandinavian Journal of Economics 97(2): 295-307.

Akerlof, G. A. (1980). "A theory of social custom, of which unemployment may be one consequence." The Quarterly Journal of Economics 94: 749-75.

Akerlof, G. A. (1982). "Labor Contracts as Partial Gift Exchange." Quarterly Journal of Economics 97: 543-69.

Barr, A. (2001). Trust experiments in Zimbabwe. mimeo.

Barr, A. and T. Packard (2002). "Revealed Preference and Self-Insurance: Can We Learn from the Self-Employed in Chile?" World Bank, Policy Research Working Paper, No. 2754.

Bartel, A., R. Freeman, et al. (2003). "Can a work organization have an attitude problem? The impact of workplaces on employee attitudes and economic outcomes." NBER Working Paper 9987.

Becker, G. S. (1993). Human Capital: A Theoretical and Empirical Ananlysis with Special Refernce to Education, The University of Chicago Press.

Berg, J., J. Dickhaut, et al. (1995). "Trust, Reciprocity and Social History." Games and Economic Behavior 10: 122-142.

Bernheim, B. D. (1994). "A Theory of Conformity." Journal of Political Economy 102(5): 841-77.

Bewley, T. F. (1999). Why Wages Don't Fall During a Recession.

Bigsten, A., P. Collier, et al. (2000). "Rates of Return on HUman and Non-Human Capital in Africa's Manufacturing Sector; a preliminary assessment." Economic Development and Cultural Change 48(2).

Binswanger H., D. Sillers (1983). "Risk Aversion and Credit Constraints in Farmers' Decision-Making: A Reinterpretation." Journal-of-Development-Studies 20(1): 5-21.

Blinder and D. Choi (1990). "A Shred of Evidence on Theories of Wage Stickiness." Quarterly Journal of Economics 105(4): 1003-15.

Bowles, S., H. Gintis, et al. (2001). "The Determinants of Earnings: A Behavioural Approach." Journal of Economic Literature 39(4): 1137-1176.

Bowles, S., H. Gintis, et al. (2001). "Incentive-Enhancing Preferences: Personality, Behavior and Earnings." American Economic Review.

Bureau of the Census (1998). "Firts findings from the EQW National Employer SUrvey." EQW Catalog RE01.

Camerer, C. F. (2003). Behavioral Game Theory: Experiments in Strategic Interaction, Princeton University Press and Russel Sage Foundation.

Cardenas, J. C. (2003). Bringing the Lab to the Field: More than Changing Subjects. mimeo: http://www.peel.pitt.edu/esa2003/papers/cardenas_labtofield.pdf.

Carpenter (2000).

Charness, G. (1996). Attribution and Reciprocity in a Simulated Labor Market: An Experimental Investigation. mimeo. University of Calofornia at Berkeley.

Coase, R. H. (1937). "The nature of the firm." Economica 4(16): 386-405.

Dickinson (2001).

Falk, A. and U. Fischbacher (2000). A Theory of Reciprocity. Intsitute for Empirical Reserach in Economics, University of Zurich.

Fehr, E. and A. Falk (2002). "Psychological Foundations of Incentives." IEW Working Paper iewwp095.

Fehr, E., U. Fischbacher, J. Schupp, B. von-Rosenbladt, G. Wagner (2003). "A Nationwide Laboratory Examining Trust and Trustworthiness by Integrating Behavioural Experiments into Representative Surveys" C.E.P.R. Discussion Papers, CEPR Discussion Papers: 3858 2003

Fehr, E. and S. Gachter (1998). "Reciprocity and Economics: The Economic Implications of Homo Reciprocans." European Economic Review 42: 845-859.

Fehr, E. and S. Gachter (2000). "Cooperation and Punishment in Public Goods Experiments" American-Economic-Review 90(4): 980-94.

Fehr, E., S. Gachter, G. Kirchsteiger (1997). "Reciprocity as a Contract Enforcement Device: Experimental Evidence" Econometrica 65(4): 833-60.

Fehr, E., G. Kirchsteiger, et al. (1998). "Gift Exchange and Reciprocity in Competitive Experimental Markets." European Economic Review 42: 1-34.

Fehr, E., Klein and K. Schmidt (2001). "Fairness, Incentives and Contractual Incompleteness" C.E.P.R. Discussion Papers, CEPR Discussion Papers: 2790 2001

Fehr, E. and K. M. Schmidt (1999). "A theory of fairness, competition and cooperation." Quarterly Journal of Economics 114(817-68).

Fershtman, C., H. K. Hvide, et al. (2003). "Cultural diversity, status concerns and the organization of work." CEPR Discussion paper 3982.

Glaeser, E. L., D. I. Laibson, et al. (2000). "Measuring Trust." The Quarterly Journal of Economics 115(3): 811-846.

Green, F., S. Machin, et al. (1998). "The Meaning and Determinants of Skill Shortages." Oxford Bulletin of Economics and Statistics 60(2): 165-87.

Hamilton, B. H., J. A. Nickerson, et al. (2003). "Team Incentives and Worker Heterogeneity: An Empirical Ananalysis of the Impact of Teams on Productivity and Participation." Journal of Political Economy 111(3): 465-497.

Harrison, G. W. and J. A. List (2003). What Constitutes a Field Experiment in Economics. mimeo.

Henrich, J., R. Boyd, et al. (2001). "In Search of Homo Economicus: Behavioral Experiments in 15 Small-Scale Societies." American Economic Review 91(2): 73-38.

Huck, S., D. Kubler, et al. (2003). "Social norms and economic incentives in firms." Working paper.

Kahneman, D., J. Knetsch, R. Thaler (2000). "Fairness as a Constraint on Profit Seeking: Entitlements in the Market" in Kahneman, D. and A. Tversky (eds) Choices, values, and frames. New York: Russell Sage Foundation, 317-34.

Karlan, D. (2003). Using Experimental Economics to Measure Social Capital and Predict Financial Decisions. Working Paper.

Kaufman, R. (1984). "On Wage Stickiness in Britain's Competitive Sector." British Journal of Industrial Relations 22(1): 101-12.

Levine, D. (1993). "Fairness, Markets, and Ability to Pay: Evidence from Compensation Executives" American Economic Review 83(5): 1241-59.

Manski, C. (1993). "Identification of Endogenous Social Effects: The Reflection Problem." Review of Economic Studies 60(3): 531-42.

Mincer, J. (1974). Schooling, experience and earnings. New York, Columbia University Press.

Offer, A. (1997). "Between the Gift and the Market: The Economy of Regard." The Economic History Review 50(3): 450-476.

Ostrom, E. (1992). Crafting institutions for self-governing irrigation systems. San Francisco: ICS Press.

Polanyi, K. (1957). The Great Transformation. The Political and Economic Origins of Our Time., Beacon Press.

Rabin, M. (1993). "Incorporating fairness into game theory and economics." American Economic Review 83(1281-1302).

Rabin, M. (1998). "Psychology and Economics." Journal of Economic Literature 36(1): 11-46.

Schotter, A. (1998). Worker trust, system vulnerability, and the performance of work groups. Economics, Values and Organization. A. Ben-Ner and L. Putterman, Cambridge University Press: 364-407.

Schotter, A. and B. Sopher (2003). "Social learning and coordination conventions in intergenerational games: an experimental study." Journal of Political Economy 111.

Sefton (2000).

Serneels, P. (2003). "Do wages really reflect productivity? An application to the Ghanaian Manufacturing Sector." mimeo.

Slemrod, J. and P. Katuscak (2002). "Do Trust and Trustworthiness pay Off." NBER Working Paper 9200.

Soderbom, M. and F. Teal (2001). Firm Size and Human Capital as Determinants of Productivity and Earnings. CSAE Working Paper. Oxford.

Spagnolo, G. (1999). "Social relations and cooperation in organizations." Journal of Economic Behavior and Organzation 38: 1-25.

Strobl, E. and R. Thornton (2001). Do Large Employers Pay More in Developing Countries? The Case of Five African Countries. mimeo.

Wooldridge, J. M. (2001). "Applications of Generalized Method of Moments Estimation." Journal of Economic Perspective 15(4): 87-100.

Wooldridge, J. M. (2002). Econometric Analysis of Cross Section And Panel data.

Tables and figures

Figure 1: The Distribution of Reciprocity for workers

(a) Histogram   (b) Kernel Density Estimate (Epanechnikov)
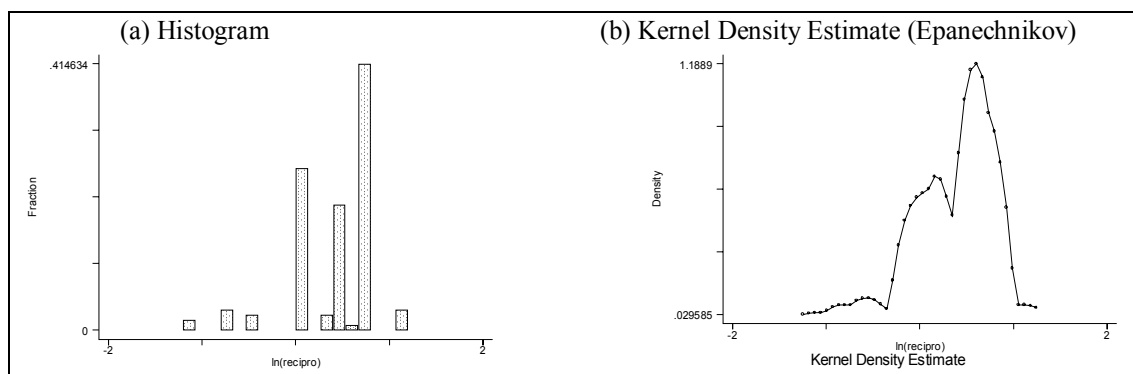
Table 1: Frequency Distribution of the Log of Reciprocity for workers

Reciprocity	ln(reciprocity)	Freq.	Percent	Cum.
0.33	-1.10	2	1.63	1.63
0.50	-0.69	4	3.25	4.88
0.67	-0.41	3	2.44	7.32
1.00	0.00	31	25.20	32.52
1.33	0.29	3	2.44	34.96
1.50	0.41	22	17.89	52.85
1.67	0.51	2	1.63	54.47
1.75	0.56	1	0.81	55.28
2.00	0.69	51	41.46	96.75
3.00	1.10	4	3.25	100.00
Total		123	100.00	

Figure 2: The Distribution of Earnings for workers

(a) Histogram   (b) Kernel Density Estimate (Epanechnikov)
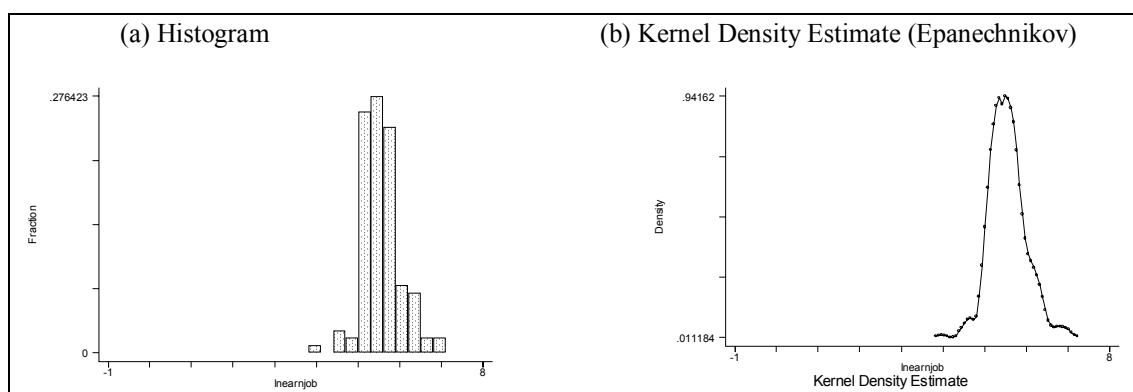
Table 2: Description of the variables

Variable name	Variable description	Mean	Std. Dev.
Individual characteristics			
Lnearnjob	Log of individual earnings (in Cedi), including allowances, after tax	5.556	0.481
Ln(r/s)	Log of the amount returned by Player 2 in the Trust Game; proxy for individual tendency to reciprocate	0.354	0.438
Years with current employer		5.830	5.668
Years of formal education		10.407	3.096
Player female	Dummy variable equal to 1 if individual is female	0.186	0.391
Age in years		32.469	9.998
Age in years squared		1153.319	782.607
Blood relative of employer	Dummy variable equal to 1 if individual is related by blood to their employer	0.133	0.341
Member of a labour union	Dummy variable equal to 1 if individual is a union member	0.310	0.464
Kumasi	Dummy variable equal to 1 if individual works in Kumasi	0.425	0.497
Other Christian	Dummy variable equal to 1 if individual belongs to a 'new' Christian religion, i.e., Christian but not Protestant or Catholic	0.345	0.478
Muslim	Dummy variable equal to 1 if individual is Muslim	0.088	0.285
No religion	Dummy variable equal to 1 if individual has no religion	0.381	0.488
Mum's education	Years of schooling of mother	3.248	4.543
Active member of a religion	Dummy variable equal to 1 if individual attends church or mosque	0.956	0.207
Youngest	Dummy variable equal to one if individual is the youngest in his or her family	0.097	0.298
Born outside Ghana	Dummy variable equal to 1 if individual is born outside Ghana	0.009	0.094
Number of siblings		4.973	2.324
Years spent away from parents		0.593	1.860
Unhappy as a child	Dummy variable equal to one if individual reported his or her childhood as 'unhappy' or 'very unhappy' on a 5 item Likert scale varying from 'very happy' to 'very unhappy'.	0.053	0.225
Associational membership	Number of clubs, associations, societies or groups the individual belongs to.	0.434	0.581
Times let down by a friend	Answer to the question 'During the past 12 months how many times has a friend or relative that you trusted let you down?'	0.646	1.511
Firm characteristics			
$\overline{\ln(r/s)}$	The mean of ln(r/s) for other employees in the same workplace (ego excluded from calculation)	0.348	0.149
sd(ln(r/s))	The standard deviation of ln(r/s) for other employees in the same workplace (ego excluded from calculation)	0.402	0.125
min(ln(r/s))	The minimum of ln(r/s) for other employees in the same workplace (ego excluded from calculation)	-0.382	0.501
Total number of employees	Number of employees in the workforce	47.549	23.588
Mean lnearn excluding ego	The mean of the logs of individual earnings for other employees in the same workplace (ego excluded from calculation)	5.368	0.453
Profits per employee	Profits per employee in millions of Cedi	1.631	2.497
Percentage of workforce unionized		45.841	46.574
Domestically owned private firm	Dummy variable equal to 1 if employer is a domestically owned private firm	0.646	0.480
Food	Sector dummy, omitted sectors are wood, metal and machines	0.080	0.272
Bakery	Sector dummy, omitted sectors are wood, metal and machines	0.035	0.186
Garment	Sector dummy, omitted sectors are wood, metal and machines	0.088	0.285
Textile	Sector dummy, omitted sectors are wood, metal and machines	0.186	0.391
Furniture	Sector dummy, omitted sectors are wood, metal and machines	0.292	0.457
Chemicals	Sector dummy, omitted sectors are wood, metal and machines	0.133	0.341
Number of apprentices in the firm		10.133	13.841
Cost of labour in the firm	Total wage bill in Cedi	$1.35e^8$	$1.57e^8$

Table 3: Regression of earnings on reciprocity

	(1) OLS lnearnjob	(2) Ivreg2, r Ln(r/s) endogenous lnearnjob	(3) 1st stage ln(r/s) ln(r/s)	(4) Ivgmm 0,ln(r/s) endogenous lnearnjob
ln(r/s)	0.150 (0.090)+	0.150 (0.208)		0.110 (0.137)
Years with current employer	0.023 (0.008)**	0.023 (0.008)**	0.005 (0.009)	0.021 (0.007)**
Years of formal education	0.022 (0.020)	0.022 (0.019)	0.012 (0.014)	0.011 (0.016)
Player female	-0.144 (0.112)	-0.144 (0.106)	0.029 (0.115)	-0.137 (0.073)+
Age in years	0.032 (0.021)	0.032 (0.020)	-0.007 (0.025)	0.024 (0.017)
Age in years squared	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Blood relative of employer	0.099 (0.169)	0.099 (0.162)	-0.118 (0.139)	-0.068 (0.130)
Member of a labour union	-0.015 (0.097)	-0.015 (0.104)	-0.176 (0.103)+	-0.033 (0.091)
Kumasi	0.101 (0.101)	0.101 (0.103)	-0.178 (0.094)+	0.071 (0.084)
Other Christian			-0.182 (0.105)+	
Constant	4.448 (0.369)**	4.448 (0.350)**	0.468 (0.671)	4.721 (0.291)**
Muslim			0.065 (0.176)	
No religion			-0.049 (0.116)	
Mum's education			-0.004 (0.014)	
Active member of a religion			-0.220 (0.248)	
Youngest			0.339 (0.110)**	
Born outside Ghana			-0.339 (0.154)*	
Number of siblings			0.019 (0.019)	
Years spent living away from parents			-0.003 (0.020)	
Unhappy as child			0.410 (0.104)**	
Associational memberships			0.111 (0.065)+	
Times let down by a friend			-0.013 (0.040)	
Observations	113	113	113	113
R-squared	0.24		0.24	

Robust standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 4: Introducing workplace fixed effects and workplace reciprocity variables

	(1) OLS Lnearnjob	(2) Fixed effects lnearnjob	(3) OLS lnearnjob	(4) OLS lnearnjob	(5) OLS lnearnjob
$ln(r/s)$	0.150	0.092	0.198	0.154	0.155
	(0.090)+	(0.093)	(0.093)*	(0.090)+	(0.089)+
years with current employer	0.023	0.019	0.020	0.021	0.019
	(0.008)**	(0.008)*	(0.007)**	(0.007)**	(0.007)*
years of formal education	0.022	0.024	0.030	0.024	0.022
	(0.020)	(0.014)+	(0.016)+	(0.019)	(0.018)
player female	-0.144	-0.284	-0.219	-0.203	-0.227
	(0.112)	(0.121)*	(0.112)+	(0.111)+	(0.112)*
age in years	0.032	0.029	0.035	0.038	0.041
	(0.021)	(0.022)	(0.021)+	(0.021)+	(0.021)+
age in years squared	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)+
blood relative of employer	0.099	-0.058	0.078	0.091	0.062
	(0.169)	(0.170)	(0.154)	(0.163)	(0.158)
member of a labour union	-0.015	-0.028	0.048	0.017	0.055
	(0.097)	(0.134)	(0.091)	(0.090)	(0.091)
Kumasi	0.101		0.247	0.166	0.208
	(0.101)		(0.098)*	(0.096)+	(0.096)*
$\overline{ln(r/s)}$			1.108		
			(0.334)**		
sd(ln(r/s))				-0.967	
				(0.284)**	
min(ln(r/s))					0.302
					(0.084)**
Constant	4.448	4.606	3.851	4.705	4.376
	(0.369)**	(0.429)**	(0.391)**	(0.385)**	(0.366)**
Observations	113	113	113	113	113
R-squared	0.24	0.27	0.33	0.29	0.32
Number of workforces		20	20	20	20

Robust standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 5: Controlling for mean wage

	(1) lnearnjob	(2) lnearnjob	(3) lnearnjob
ln(r/s)	0.171	0.136	0.139
	[0.088]+	[0.082]	[0.083]+
years with current employer	0.021	0.021	0.02
	[0.007]**	[0.007]**	[0.007]**
years of formal education	0.026	0.021	0.019
	[0.016]	[0.018]	[0.017]
player female	-0.253	-0.257	-0.264
	[0.114]*	[0.115]*	[0.114]*
age in years	0.033	0.034	0.037
	[0.021]	[0.021]+	[0.022]+
Agesq	$-3.62e^{-4}$	$-3.91e^{-4}$	$-4.23e^{-4}$
	$[2.45e^{-4}]$	$[2.40e^{-4}]$	$[2.50e^{-4}]+$
blood relative of employer	0.081	0.089	0.069
	[0.151]	[0.150]	[0.150]
member of a labour union	-0.022	-0.056	-0.021
	[0.090]	[0.090]	[0.093]
Kumas	0.208	0.153	0.181
	[0.100]*	[0.097]	[0.099]+
$\overline{\ln(r/s)}$	0.792		
	[0.330]*		
sd(ln(r/s))		-0.723	
		[0.291]*	
min(ln(r/s))			0.218
			[0.093]*
mean lnearn	0.236	0.297	0.259
	[0.111]*	[0.113]*	[0.120]*
Constant	2.863	3.184	3.124
	[0.560]**	[0.600]**	[0.599]**
Observations	113	113	113
R-squared	0.36	0.36	0.36

Robust standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 6: Workplace-level analysis of earnings controlling for total number of employees and mean wage

	(1) Workplace fixed effect	(2) Workplace fixed effect	(3) Workplace fixed effect	(4) Workplace fixed effect	(5) Workplace fixed effect	(6) Workplace fixed effect
$\overline{\ln(r/s)}$	1.692 [0.611]*			1.595 [0.330]**		
sd(ln(r/s))		-1.206 [0.429]*			-1.204 [0.362]**	
min(ln(r/s))			0.552 [0.164]**			0.372 [0.102]**
total number of employees	-0.001 [0.005]	0.003 [0.005]	0.001 [0.005]			
profits	$-1.49e^{-8}$ $[3.07e^{-8}]$	$4.55e^{-9}$ $[2.93e^{-8}]$	$-1.73e^{-8}$ $[3.15e^{-8}]$			
domestic enterprise	-0.183 [0.295]	0.010 [0.290]	-0.263 [0.328]	-0.173 [0.085]+		
number of apprentices	-0.007 [0.006]	-0.013 [0.006]+	-0.010 [0.007]			
kumasi	0.367 [0.162]+	0.110 [0.139]	0.140 [0.151]	0.380 [0.125]**		
percentage of workforce unized	$-2.98e^{-4}$ [0.002]	-0.002 [0.002]	-0.003 [0.003]			
food sector	-0.316 [0.216]	-0.273 [0.237]	-0.175 [0.271]	-0.348 [0.095]**	-0.270 [0.086]**	-0.292 [0.093]**
garment and textilse sector	0.0189 [0.134]	0.237 [0.209]	0.265 [0.201]			
furnature	0.180 [0.307]	0.304 [0.401]	0.510 [0.409]			
Constant	-0.506 [0.293]	0.412 [0.536]	0.291 [0.455]	-0.563 [0.121]**	0.492 [0.176]*	0.125 [0.081]
Observations	20	20	20	20	20	20
R-squared	0.69	0.61	0.69	0.64	0.29	0.35
Joint sig. of other vars. (excluding reciprocity var.)	0.106	0.183	0.158	0.011	0.006	0.006

Robust standard errors in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%