Measuring Coworker Effects:
Evidence from an American Manufacturing Firm

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This paper studies coworker effects and the dynamic of social identity, determined by worker tenure, in a manufacturing setting. Using a unique data set to measure time invariant productivity, or ability, of each worker, I find evidence of a free-rider effect stemming from an increase in average ability of similarly tenured coworkers. The lack of performance-based pay structures incentivizes workers to exert lower levels of effort when working with high ability coworkers.

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1. Introduction

In many settings, a worker's productivity is at the mercy of his or her coworkers because workers are jointly responsible in the production process. For example, a single construction worker can accomplish little individually, and the pace at which work is completed depends on the productivity of the group. Consequently, measuring changes in individual coworker productivity becomes very challenging. Mas and Moretti (2009) and Kato and Shu (2016) avoid this problem by investigating empirical settings in which workers share a workspace, but the production process depends on the solo work of many individuals rather than a single group. Those papers study grocery store cashiers and Chinese textile workers, respectively. This paper approaches the issue in a similar fashion by studying an American copper wire manufacturing firm.

This paper finds its place in the literature by examining a manufacturing environment in which there are no incentive pay structures and an unexplored social identifier. Additionally, I investigate the significance of changes in team size on the production of the individual. Social identity is not exogenously assigned, but rather, it depends on the distribution of worker tenure in the firm, which creates two groups: temporary and committed workers. The workers all operate machines in various stages of the production process of copper wire, but an individual's efficiency is independent of the efficiency of his or her peers. The firm does not use piece rate or relative wage structures, but instead, a flat hourly wage independent of a worker's efficiency or relative efficiency.

By predicting the time invariant productivity (ability) for each worker in the firm, I estimated the effects of changing the average worker's ability in a work group. The results show no evidence of an overall coworker effect – an increase in the average ability of all coworkers is not associated with a change in a focal worker's efficiency. However, there is a strong effect stemming from in-group, similarly tenured, coworkers. An increase in the average ability of in-group coworkers is associated with a decrease in a focal worker's efficiency. This effect is very consistent across the studied population; there is no evidence that this effect is any different for a certain group of coworkers, or that the effect is non-linear. In addition, there is no evidence that an overall increase in the number of workers in a work group increases a focal worker's efficiency, which is intriguing, as a higher number of coworkers could imply a higher level of social pressure to perform well. In the absence of incentive pay structures, I attribute the negative effects to an incentive to free ride off the work of more talented coworkers. The rationale for the effect being exclusive to in-group coworkers lies in the empirical setting; the social dynamic associated with tenure groups makes it easier for coworkers to build an understanding of the innate ability of coworkers with whom they socialize.

2. Literature Review & Background:

Research on peer effects in the workplace has suggested that individuals adjust their level of output and productivity according to the ability and/or various traits of their surrounding coworkers. Productivity can be adjusted on account of a coworker's differing social identity (Kato and Shu 2016), whether a coworker is a friend (Bandiera, Barankay, and Rasul 2010), and even whether or not an individual is in the sightline of a very productive worker (Mas and Moretti 2009). Despite a high level of influence in very contextualized situations, the lack of external validity remains a common thread in many empirical studies on peer effects in the workplace.

Kato and Shu (2016) is perhaps the most relevant to this study because of the manufacturing setting, but there are key differences. Kato and Shu attribute coworker effects to an exogenously assigned variable: Hukou status. Hukou serves as a system of household registration that provides those with “Urban Hukou Status” a higher level of economic opportunity. As such, social identity theory plays a significant role in explaining why urban Hukou holders increase their productivity significantly when the average ability of rural coworkers increases: urban workers hold rural workers in contempt and perceive them as inferior. Additionally, the Chinese textile firm in Kato and Shu utilizes a relative wage scale. Weavers are pitted against one another, with the highest performers receiving the highest wages, creating motivation to perform better than one’s peers. Similarly, the empirical setting of Mas and Moretti (2009) allows for the study of peer effects as they pertain to the presence of high ability workers causing a productivity boost in a work setting (in this case, a large chain grocery store checkout). However, the effect is subject to a focal worker’s orientation to the highly productive coworker in the work space. The grocery store cashiers are shown to be increasingly sensitive to the presence of a highly achieving coworker the closer their checkout lines are to one another. For this paper, the empirical setting is a bare copper wire manufacturing firm in Upstate New York. Much like Kato and Shu (2016), the workers in this empirical setting are responsible for operating machines, but unlike the Chinese textile firm, workers vary in the type of machine they use and products they produce. Peer effects in settings like grocery bagging and manufacturing are also shown to be stronger and easier to identify since the labor is relatively low skilled - Cornelissen, Dustmann, and Schoenberg (2013) found evidence that as the skill required for a job increases, the strength of peer effects decreases.

Comparing competition structures between peers, Mas and Moretti (2009) most closely matches this paper; there is no incentive to work above what is expected. Wages in both settings are not determined by production, performance, or experience. In Kato and Shu (2016) and

Bandiera, Barankay, and Rasul (2010), employees are working in systems that reward higher productivity with higher pay. Chinese textile workers are paid based on their ability to produce a lower level of defective output, while fruit pickers are paid a piece rate per a kilogram of fruit picked. From this, it can be hypothesized that performing above expected efficiency can be caused by either social pressure (as in Mas and Moretti 2009) or prosocial/altruistic behavior. Nonetheless, highly productive fruit pickers in Bandiera, Barankay, and Rasul (2010) show a willingness to forego income to work at a lower social norm. This is a surprising outcome, as workers are shown to value their social standing more than potential economic gains. Alternatively, it is possible the effort put forward is a result of a focal worker's view on the fairness of his/her wage; it has been suggested that productivity can be boosted by a wage increase if the original wage was perceived to be unfairly low – Cohn, Fehr, and Goette (2014) found evidence of this phenomenon by hiring workers for a one-time job in Switzerland, studying their productivity, and surveying the workers on perceived fairness of pay.

Methodologically, Kato and Shu (2016) has strong influence on this paper. Using the panel data, time-invariant productivity is estimated, and the lack of systematic department assignment based on ability is confirmed. Time invariant productivity, regarded as ability, is estimated by a productivity measure while controlling for the presence of other coworkers, worker fixed effects, and time. Furthermore, the effects of productivity spillover based on spatial orientation, as in Mas and Moretti (2009), is achieved by using data describing which workers were present from a given department on a given shift. Finally, another potentially confounding factor to consider is a superstar effect. It has been suggested through research of professional golf tournaments that the presence of Tiger Woods, a highly skilled player, causes other players to perform worse on average, compared to when the superstar is absent (Brown 2011). This conflicts with the effect found in Mas and Moretti (2009), which is a positive superstar effect, meaning that the work environment and different incentives have a strong level of influence on the sign and magnitude of peer effects. However, it is important to note that the source of the negative effects in golf tournaments is the lower motivation to perform because the odds of winning the tournament are lowered by the presence of a superstar. Cashiers and machine operators are in much different situations because they do not compete with their coworkers for a payout.

Some studies associated with peer effects also take social identity into account. While the empirical setting of this paper lacks an exogenously assigned social identity, the uneven distribution in tenure among the workers opens the possibility of social group creation. The lack of exogenously assigned social identity may reflect typical human behavior better than an exogenously assigned social identifier – social groups are rarely determined by a single factor, yet much of the social identity literature studies these uncommon situations. Moreover, it can become very difficult to quantify social connections without a survey, but even then, there is room for confounding factors - Cohn, Fehr, and Goette (2014) suggested that variation in the time at which their survey was completed by subjects may have influenced their results.

While there is no potential to reward or punish coworkers for acting in line with or against social norms in the copper wire firm, small, seemingly insignificant differences, like tastes in art, can cause the formation of social alliances and influence behavior towards out of group members. Chen and Li (2009) found that randomly assigned groups and groups determined by art preference both exhibit behavior that differs significantly when interacting with out-group players compared to in-group players. Specifically, they found matching with an in-group member is associated with a 47% increase in charity concerns and a 93% decrease in envy (Chen and Li 2009). Similarly, strategic behavior can be greatly influenced when group membership is salient. Rigotti and Rustichini (2007) found that having more group members present causes more coordinated group effort in search of a higher payoff in the "Battle of the Sexes" game but causes a higher likelihood of defection in the Prisoner's Dilemma. Bernhard, Fehr, and Fischbacher (2006) performed a similar lab experiment by having two distinct tribes in Papua New Guinea play the dictator game. They found a third party is more willing to punish norm violators if the victim is in the same group and that compliance is stronger within groups than between groups.

A secondary aim of this paper is to investigate the effect of a change in the size of a focal worker's team. The literature on peer effects stemming from this change is limited, but Haleblian & Finkelstein (1993) offers some insight, as they show that top management team size has positive effects on firm performance; firms with CEO dominated management were shown to perform significantly worse than firms with large leadership teams. Given the manufacturing setting of this paper and the fact workers are not managers, this paper adopts a unique perspective. Workers in the manufacturing firm are assigned to their departments randomly, meaning that they are put in positions that do not necessarily lend themselves to the workers' strengths. This is much different from a large corporate leadership team that likely assigns positions based on the skills of the individuals.

Finally, there are other issues concerning the study of peer effects in complicated empirical situations that can possibly bias or interfere with the results. The potential for promotion is oftentimes a difficult concept to quantify but is considerably important in the case of a manufacturing plant; it has been suggested that helping efforts are reduced and individual efforts are raised considerably when promotion incentives are strong (Drago & Garvey 1998).

The empirical situation of this paper does not contain high promotion incentives, so it is unlikely that this style of incentive influences the behavior of workers in any significant manner.

This paper aims to expand the peer effects literature by offering evidence of coworker effects through the interaction between worker efficiency and the average ability of coworkers while accounting for social group membership, determined by tenure. In this case, tenure creates a social identity that is not as strictly defined as hukou status or tribe membership (Bernhard, Fehr, and Fischbacher 2006). Rather, it is more likely tenure variations create bonds between workers much like the friendships shown in Bandiera, Barankay, and Rasul (2010). Considering the uncommon pay structure of the manufacturing firm and the presence of a social identifier that has never been explored, this paper investigates effects that demonstrate the variety of dynamics that influence human interaction in an economic setting.

3. Empirical Setting:

The American manufacturing firm in this study is headquartered in Upstate New York, with a total of 11 plants in various locations across the United States. The firm manufactures many forms of bare copper wire from raw copper rods. The three plants examined in this paper operate in Upstate New York. In collaboration with the firm, I obtained personnel and productivity data that includes personal characteristics, daily performance measures, wages, and production information. The observations take place over an eight-month span between January and August 2017. The raw dataset contains a total of 131,977 observations spread across a total of 223 workers and three plants. One observation comprises of data taken on one employee on a single machine for one continuous period, typically the length of one shift.

3.1 Efficiency Metric

There are a variety of processes that go into production; workers use several machines and produce a variety of products depending on which department they were assigned into when hired. The machines are not automated, and output is heavily dependent on the skill and effort of the worker. The typical role of a worker is to load his or her machine with the necessary inputs, start the machine, and monitor the production process by dealing with potential breakdowns and errors.

The performance metric in this study is efficiency. Efficiency is calculated by the firm based on what the engineers believe to be the maximum safe output for a given machine over a set period of time. Workers are expected to run their machines at 80 percent capacity for the length of their shifts. So, if a machine can produce an output of X at 100 percent capacity for the length of a shift, the standard that a worker is expected to produce is .80X. This level of output would return a worker efficiency rating of 100 percent for that shift. Therefore, it is possible for a skilled worker to receive an efficiency rating over 100 percent by operating his or her machine at greater than 80 percent capacity. Workers typically run four or five separate machines each shift, so the daily efficiency rating is calculated using the average. The time spent on each machine depends on an individual worker's ability to complete an order. Moving away from the assigned work schedule should not be done without consulting a supervisor. Variation in the products produced by workers is not a significant factor influencing efficiency, as most products are made using the same set of machines. Thus, changes in the demand for certain products have negligible effects on the daily work of an individual. Since efficiency is monitored by each machine's computer, workers are informed of their efficiency following every shift. Workers are aware of the expected standard and know that consistent low efficiency can be considered grounds for dismissal. The summary statistics for average efficiency are described in Table 7.

Furthermore, wage is based on what job a worker does on the factory floor, or more specifically, what machines a worker runs. Wages range from $14.5 to $18 per hour. The wage data summary statistics can be found in Table 7 along with summary statistics for employee age and tenure. Because wages are fixed, there is no tangible incentive to work beyond the expected 80 percent production standard. There is also no incentive for promotion, as working in a managerial role requires a level of knowledge and education that is not typically held by factory floor workers. Moving to a higher paying job is not regarded as a promotion, but rather a lateral move, because higher paying positions on the factory floor typically involve more physically stressful work with no increase in responsibility. Workers may potentially move to a more demanding job in search of a higher hourly wage, but this depends on the creation of an open spot in a higher paying department. The only true motivational factor in the work setting is the risk of being fired if the managers believe low efficiency is being caused by excessive laziness or free-riding. Because of the lack of tangible incentives to work harder, workers may decide to work harder based on either social pressure or prosocial behavior (Mas and Moretti 2009).

3.2 Tenure Differences

An important dynamic of the manufacturing firm in this study is the presence of a large divide in worker tenure. As shown by Figure 1, there is a significant drop off in the number of workers with over four years of tenure. Because of this, most new hires are not expected to be retained for most of their working lives. This distribution creates a separation of “committed” and “uncommitted” (called “temporary” in this study) workers. While there may be workers in the “uncommitted/temporary” group that end up working for the firm for an extended period, they have yet to show it. Furthermore, the distribution of age is shown in Figure 2. Age is much more evenly distributed than tenure, suggesting that tenure is not strictly determined by age. That being said, long tenured workers have to be of a certain age, and there exists generational differences between workers in their 50's and 60's versus those in their 20's and 30's that likely determine some social bonds in the workplace.

Long tenured, committed workers have reason to act differently around newer workers because new hires must be trained and taught all the intricacies of production on the factory floor while also learning to navigate the social landscape of the work place during breaks throughout the shift. Workers tend to associate with coworkers they are more familiar with, and tenure often determines with whom a worker is acquainted for a variety of reasons. The workers may have been trained at the same time, have mutual friends in the workplace, or share common interests. Longer tenured workers also do not expect that most of the training will be a long-term investment since most workers end up leaving within four years. The effort and behavior of less experienced workers also varies and may sway a longer tenured worker's opinion. Moreover, new hires are easy to spot in the workplace because they are required to wear a high visibility vest for the first four weeks of work.

Due to the general social divide caused by large tenure differences among the firm's employee population, there is good reason to believe that long tenured workers behave differently around coworkers with similar tenure compared to coworkers with vastly less experience. For example, a long tenured work could potentially resent a new hire because even though the tenured worker has a significantly higher level of skill development, he or she is still paid the same wage as the new hire. Although, both temporary and uncommitted workers may feel reason to behave differently around others in their same tenure group; the effect could potentially vary in the directional effect on efficiency. For example, if two long tenured workers are familiar with one another, they may revert to an efficiency norm (which may be higher or lower that the focal worker's time invariant efficiency) to avoid breaking an implicit etiquette. Overall, the effects on efficiency gains and losses may be the result of increased or decreased social pressure to perform depending on the experience and ability of one's coworker(s). Age is important to consider, as it is often a determinant of tenure, but given the shape of the distributions between age and tenure, there is reason to believe that tenure is the more socially divisible factor.

3.3 Sources of Coworker Effects

The manufacturing firm in this study uses a combination of shift systems, depending on the plant being observed[1]. The first is a three-shift system, meaning that every 24 hours there are three shifts, each eight hours long. In this system, workers do not change their shift time. Changes in an individual's composition of coworkers in this system can be attributed to a combination of factors: vacation time, absenteeism, and open positions caused by turnover all give workers the chance to fill empty shift positions and earn overtime pay. The second shift system is a 12-hour system in which workers are assigned to work a combination of four days in a week. Due to varying shift assignments, a focal worker's coworkers will change randomly. For example, if worker A is assigned to work the day shift (7:00am to 7:00pm) on Monday, Tuesday, Wednesday, and Thursday during a given week, and worker B is assigned Saturday, Sunday, Monday, and Tuesday during the same shift, workers A and B only work together for two shifts. However, this could change on a weekly basis, as the schedules for workers A and B change independently from one another. Because the factors that result in compositional coworker

[1] Results by plant can be found in Tables 7, 8, and 9

variation are exogenous, it can be assumed that changes are random no matter what shift system is in use. In addition, work is broken down by department. A worker's department is determined by his or her job, so a department consists of only workers with the same role in the production process. In this paper, a coworker is designated as a worker who works in the same department during the same shift on a given observation day. There is a total of 19 departments across the three plants observed. The workers are mostly male, as only 17 out of the 223 observed workers are female[2]. Additionally, the typical worker is white/Caucasian - there are no ethnic minorities in the work environment.

Furthermore, there is no teamwork-centric production in the manufacturing firm. Each worker is responsible for running his or her machine(s) while working alongside coworkers from the same work department. During the period of observation, the smallest work team is comprised of a single worker[3], while the largest contained a total of 15 workers. The summary statistics for team size can be found in Table 7 and the distribution can be found in Figure 3. The employees' assigned machines are tied to their department, which only switches on rare occasions, thus there is no need to control for machine level fixed effects. On the job interactions can occur between workers but are limited due to the loud noise on the factory floor and the company policy that enforces the use of earplugs. Coworkers can choose to help each other should a machine break down, but there is no incentive to do so.

The bulk of worker interaction takes place during the 15-minute breaks and the lunch period imbedded in the daily work schedule. On breaks, workers tend to associate with the same groups of coworkers regularly; thus social "cliques" develop, typically compromised of workers that are familiar with one another. This familiarity can be due to a variety of factors, including

[2] Dropping females from the population was shown to have no significant effects on results.
[3] Observations in which there are no coworkers present are dropped

being in the same shift/department, mutual friends, or pre-existing friendships. During breaks, a worker can develop an estimation of the work ethic of his coworkers. Due to the layout of the factory floor and the way machines are oriented it is unlikely that "contemporaneous coworker effects" (increased productivity caused by a coworker increasing his or her productivity) exist. Coworkers may observe the output of each other's machines and can observe how quickly one another fix problems or load more inputs into the machines; however, it is quite difficult to do so if a worker is paying undivided attention to his or her own work. Since machines are typically quite large, workers are often moving about their work area, so coworkers are typically observed at random intervals. Additionally, since workers typically use multiple machines, it becomes extremely difficult to judge a coworker's aggregate output. Productivity can typically only be judged on the factory floor based on the physical effort put forward; if a coworker is seen moving quickly and efficiently between machines, it is safe to infer that said coworker can be judged as a high ability worker, as high efficiency ratings are oftentimes a result of high levels of effort and skill.

A worker may be influenced by "compositional coworker effects" - changes in productivity due to the mere presence of a more skilled coworker. A change in a focal worker's efficiency could be attributed to a social relationship with a coworker. These effects would likely not be driven by incentives to outperform one's peers, due to the lack of incentive pay structures in the workplace. There are also no formal structures in place to mark highly efficient workers as high ability performers. Recognition of ability is dependent on a worker's observations of his or her coworkers during the production process. Workers can develop a sense of understanding for a coworker's average ability through prolonged exposure to said coworker on breaks and during work periods. Time spent observing the speed and effort of a coworker is valuable in the process of forming an understanding how efficient a given coworker is in the production process. Moreover, workers may discuss the effort and skill levels of coworkers on their breaks, meaning that workers likely have superior knowledge of the ability of the coworkers with whom they socialize. Overall, observing the speed and effort of coworkers and the development of a pool of common knowledge among in-group coworkers allows workers to identify coworkers with higher average levels of ability while on the factory floor. For the most part, workers do not change their departments, but the composition of coworkers on a given work shift does change. Later, I investigate the method of shift assignment to confirm that it is random and not based on ability.

While the mechanics of the production process are not teamwork-centric, the business operations of the firm are. Workers do not generate output unless there is an order from a customer or the firm wants to increase its inventory by a given amount. Orders are received by management and passed on to the departments responsible for creating the product that fills the request. Workers in said departments then work separately such that their aggregate output fulfils the order. Supervisors are responsible for ensuring that orders are completed with time and quality standards in mind. Therefore, a worker who underperforms does have a negative effect on the business since orders cannot be completed as quickly. In short, the production of an individual is not reliant on his or her peers, but the operations of the firm are heavily reliant on departments filling given orders.

4. Methodology: Estimating Peer Effects

4.1 Predicting Time Invariant Productivity (Ability) and Proving Random Assignment

The first task in the process of measuring coworker effects is predicting "time-invariant productivity", referred to as ability. Ability (measured in efficiency, the unit of which is percentage points) is estimated for each individual worker using the following specification:

(1) $Eff_{\mathrm{it}} = D_{\mathrm{i}} + \alpha C_{jt} + \gamma M_{it} + \varepsilon_{\mathrm{it}}$

D_{i} is the set of worker fixed effects. C_{jt} is the set of dummies for every observation day interacted with department dummies and shift number dummies. M_{it} is the set of 223 coworker dummies to control for the presence of a given coworker. Therefore, the dummy variable "coworker n" is given a value of one if the coworker is in focal worker *i*'s department and shift, *j*, on day, *t*.

If workers are not randomly assigned to their given departments and shifts, there exists a possibility that unobservable variables besides changes in work group composition drive the observed coworker peer effects. The case firm claims that all workers are assigned to their given jobs randomly and not according to demonstrated ability nor aggregate demand. Shifts are assigned very far in advance, so changes to worker composition in the face of a large order cannot occur. Due to a high level of turnover, a new worker can be assigned to any department and there is no predetermined measure of aptitude for a given job before assignment, so true ability can only be estimated after training and a sizeable sample of work.

The method for econometrically proving random assignment based on ability (i.e. proof that high ability workers are not systematically assigned to work with other high ability workers) follows a similar form to Kato and Shu (2016):

(2) $ability_i = \beta ability_{-i,jt} + \gamma ability_{-i,j} + \alpha D + \varepsilon_{it}$

$ability_i$ denotes the ability of focal worker *i*, $ability_{-i,jt}$ is the average ability of worker *i*'s coworkers on day *t*, and $ability_{-i,j}$ is the average ability of all of worker *i*'s possible coworkers. In other words, any coworker that worked in worker i's department on the same shift and day during the length of the eight-month observation period. D denotes weekly fixed effects.

The main coefficient of interest is β, which indicates whether high ability workers are assigned to work with one another on day *t*. Because a given worker cannot be assigned as his or her own coworker, the coworkers are taken from an identical pool of employees that does not include the focal worker. Therefore, $ability_{-i,j}$ needs to be controlled for because the estimated value of β would otherwise show an upward bias that becomes more severe with smaller pools (Guryan et al. 2009 and Kato and Shu 2016).

Table 1 shows evidence in favor of random assignment based on ability. Because the main variables of interest (ability) are predicted by separate regressions, standard errors shown in parentheses are bootstrapped with 2000 repetitions and clustered at the individual level. Columns 1 and 2 include the leave-me-out average pool to control for bias in $ability_{-i,jt}$. Column 1 does not include week dummies while column two does, showing that controlling for the week of observation does not affect β. In both columns, β is approaching 0 and is statistically insignificant. The leave-me-out average is shown to be statistically significant at the 1 percent level in both cases as expected. Columns 3 and 4 do not include the leave-me-out average and demonstrate the upward bias on β. Column 3 does not include the dummies controlling for the week of observation, while Column 4 does.

4.2 Regression Results on Coworker Effects by Tenure

Having confirmed the random assignment of coworkers based on ability, the level equations and first-difference equations measuring coworker effects can now be established:

(3) $Eff = \beta ability_{-i,jt} + \pi groupsize_{jt} + \alpha(controls) + \varepsilon_{it}$

(3.1) $Eff = \mu ability_{-i,gjt} + \gamma ability_{-g,jt} + \rho groupsize_{g,jt} + \tau groupsize_{-g,jt} + \alpha(controls) + \varepsilon_{it}$

(4) $\Delta Eff = \beta\Delta ability_{-i,jt} + \Delta\pi groupsize_{jt} + \alpha(\Delta controls) + \varepsilon_{it}$

(4.1) $\Delta Eff = \mu\Delta ability_{-i,gjt} + \gamma\Delta ability_{-g,jt} + \rho\Delta groupsize_{g,jt} + \tau\Delta groupsize_{-g,jt} + \alpha(\Delta controls) + \varepsilon_{it}$

i denotes a worker, *t* denotes a day, *j* denotes a work team (combination of shift and department), and g denotes a group (temporary or committed). Thus, $ability_{-i,jt}$ is the average ability of worker i's coworkers. $ability_{-g,jt}$ is the average ability of worker i's out-group coworkers and $ability_{-i,gjt}$ is the average ability of worker i's in-group coworkers. Controls include hours worked, age, and department tenure. Gender was not included as a control because the sample size of women is too small and dropping females was shown to have no significant effect on results. Furthermore, $groupsize_{jt}$ denotes worker i's total work team size, $groupsize_{g,jt}$ denotes worker i's total number of in-group coworkers, and $groupsize_{-g,jt}$ denotes worker i's total number of out-group coworkers. Additionally, week fixed effects are included in Columns 2 and 4 in Table 2.

Summary statistics for the main variables of interest can also be found in Table 7. Table 2 shows the OLS estimates of equations (4) and (4.1) with bootstrapped standard errors with 2000 repetitions clustered at the individual level. Columns 1 and 2 show no evidence that a focal worker performs differently when the average ability of coworkers in the work team changes. This is also the case when weekly fixed effects are included in the regression (column 2). π is not statistically significant either, meaning that there is no evidence that worker *i* is influenced by the size of his or her work team. Columns 3 and 4 show evidence that workers decrease efficiency according to the ability of their *in-group* coworkers. µ is statistically significant; a 1 percentage point increase in the average ability of worker *i*'s in-group coworkers is associated with an average decrease of .0262 percentage points in worker *i*'s efficiency. Therefore, an increase of one standard deviation in the average ability of worker *i's* in-group coworkers is associated with a 1.39 percentage point decrease in worker *i's* efficiency. While this effect is small in magnitude, it is very consistent. Considering if the coefficients are economically significant depends on how the firm values small fluctuations in efficiency of individuals. While the lower ability workers may decrease their effort in the presence of high ability workers, it is likely that production of the high ability worker makes up for the difference.

To check the robustness of the negative peer effect, the same regressions were run with different tenure thresholds. Tables 4, 5, and 6 display results that are consistent with the results shown in Table 2. The three supplementary tables all display a negative peer effect with nearly identical magnitudes, but with the threshold of years of tenure required to be considered a committed worker being slightly different. Tables 4, 5, and 6 have thresholds of one, three, and five years, respectively.

4.3 Exploring Interaction Effects and Non-Linearity

Table 3 examines whether being a temporary or committed worker changes the response to an increase of in-group or out-group ability by adding interaction terms to equations (3) and (4). Week fixed effects are present in all three OLS specifications. Column 1 shows that neither committed nor temporary workers differ in their responses to overall increased coworker ability and that neither group responds significantly different to an increase in work team size. Columns 2 and 3 suggest that neither group has a significantly different response to increased in-group or out-group ability.

With no significant interaction effect stemming from a single tenure group, it was deemed possible that the in-group coworker effect could be non-linear. To explore this idea, a square of average in-group coworker ability and average out-group coworker ability was added to equation (4.1). The results can be found in Table A4. There is no evidence that the in-group coworker effect is non-linear, as the square term is statistically insignificant. This result suggests that the relationship between a focal worker's average daily efficiency and his in-group coworkers' ability is more likely to be linear than non-linear.

Additional tests were run to investigate if the observed effects differed based on a focal worker's ability relative to the ability distribution of his or her department. There is no evidence that being above or below the departmental average is associated with an additional response to a change in average teammate ability. The same can be said for workers in the top and bottom quartiles of departmental ability distribution. The results can be found in Tables 11 and 12. The lack of significant results further builds the case that the negative in-group coworker effect is the same, on average, across the worker population.

5. Results and Discussion

The findings suggest that workers in the focal firm decrease their efficiency when the average ability of their in-group teammates increases. Moreover, there is no evidence that changes in the average ability of out-group coworkers has any significant effect. The results suggest that workers free ride on the higher ability of their in-group coworkers while working towards a social norm set by plant supervisors. On the other hand, workers are shown to work harder when the average ability of their similarly tenured coworkers decreases, an effect that I attribute to a combination of prosocial behavior and increased pressure from managers. Additionally, the rationale behind the difference in significance between the in and out-group effects revolves around the relative ease of ability identification among in-group coworkers compared to out-group coworkers. The lack of any performance incentives in the firm's wage structure suggests that workers are not discouraged from or punished for free riding during a group effort to complete an order.

There is straightforward motivation to free-ride when the average ability of one's coworkers increases. When an order is given to a department and a focal worker is surrounded by teammates with above average ability, the focal worker is likely to reduce effort because he or she knows that the order can be completed without having to extended full effort. Furthermore, the flat wage structure does not discourage workers from free-riding, as all workers in a given department are paid the same hourly wage. The effect is reversed when the average ability of teammates decreases. A focal worker extends a higher than average level of effort when the work team has a relatively low level of ability. The motivation behind this effect is twofold. The first is that workers feel a duty to fill the void of ability in the department. For example, a worker may exhibit prosocial behavior and work harder to complete an order when a high ability teammate is absent. The second source of motivation comes from supervisors, who will put extra pressure on a department to complete an order if the average ability of the workers is relatively low that shift due to an exogenous shock such as sick leave.

The coworker effect is partial to in-group coworkers due to the level of familiarity a focal worker develops with the other workers in his or her tenure group. Due to the increased exposure to in-group coworkers, a focal worker has an easier time identifying which of them are low, average, and high ability. Since workers are less likely to associate with workers in the opposite group, it becomes difficult to judge ability, as the only exposure to out-group coworkers is on the factory floor during a work period. Moreover, the effect is impartial to tenure groups, meaning that neither committed nor temporary workers differ in levels of sensitivity to a change in the average ability of in-group, out-group, or the whole pool of coworkers.

Additional results show no evidence in favor of the suggestion that the in-group coworker effect is non-linear, nor that a focal worker's ability relative to the ability distribution of his or her department is a significant factor in determining the average response to a change in average coworker ability. The breakdown of the results by plant also offer insight into which plant populations are driving the effect. The results can be found in tables A1, A2, and A3. Plants 1 and 3 are shown to be the most influential in determining the aggregate effect, which is unsurprising, given that Plant 2 has a much smaller worker population, so there are fewer changes in the Plant's worker pool on a per-shift basis during the period of observation. On a final note, there was no indication that a change in the size of a work team has any significant effect on the efficiency of workers within said team.

Overall, the results indicate a small but significant negative coworker effect that is, on average, consistent across the entire factory population. Higher average in-group coworker ability motivates workers to free-ride on their coworkers' efforts towards a social norm set by a supervisor. The small magnitude and consistency of the effect across the population makes it difficult for management to prevent free-riding by organizing work teams accordingly. The implementation of relative performance incentives in the wage structure may erase the incentive to free ride, but this would be a radical and complicated change for the firm.

6. Conclusion

This paper examines the dynamic between tenure and social identity in the context of how it effects the efficiency of workers in an economic setting that does not reward performing better than one's peers. The setting of an American manufacturing firm provides another opportunity to study how workers respond to a change in the demographic of their work group. Social identity theory has suggested that individuals can bond themselves to a group identity through seemingly insignificant factors, and due to the very uneven distribution of tenure in the firm, it makes sense that workers bond with those who have similar levels of experience.

The evidence suggests that there is an in-group coworker effect; workers decrease their efficiency to free-ride when the average ability of their similarly tenured coworkers increases. On the other hand, there is no evidence that workers respond to changes in the average ability of their out-group coworkers. This is likely due to the relative ease at which a worker can identify the ability of an in-group coworker compared to an out-group coworker. There is no evidence that committed or temporary workers respond differently to the coworker effects. Workers are motivated to free ride by the lack of incentive pay structures, but they are not believed to be influenced by work team size.

This paper offers insight into a unique empirical setting in which coworker effects are suggested to exist. Most literature in the realm of peer effects lacks a certain degree of external validity, so the phenomena shown in this paper should not be considered universal or applicable to other work settings.

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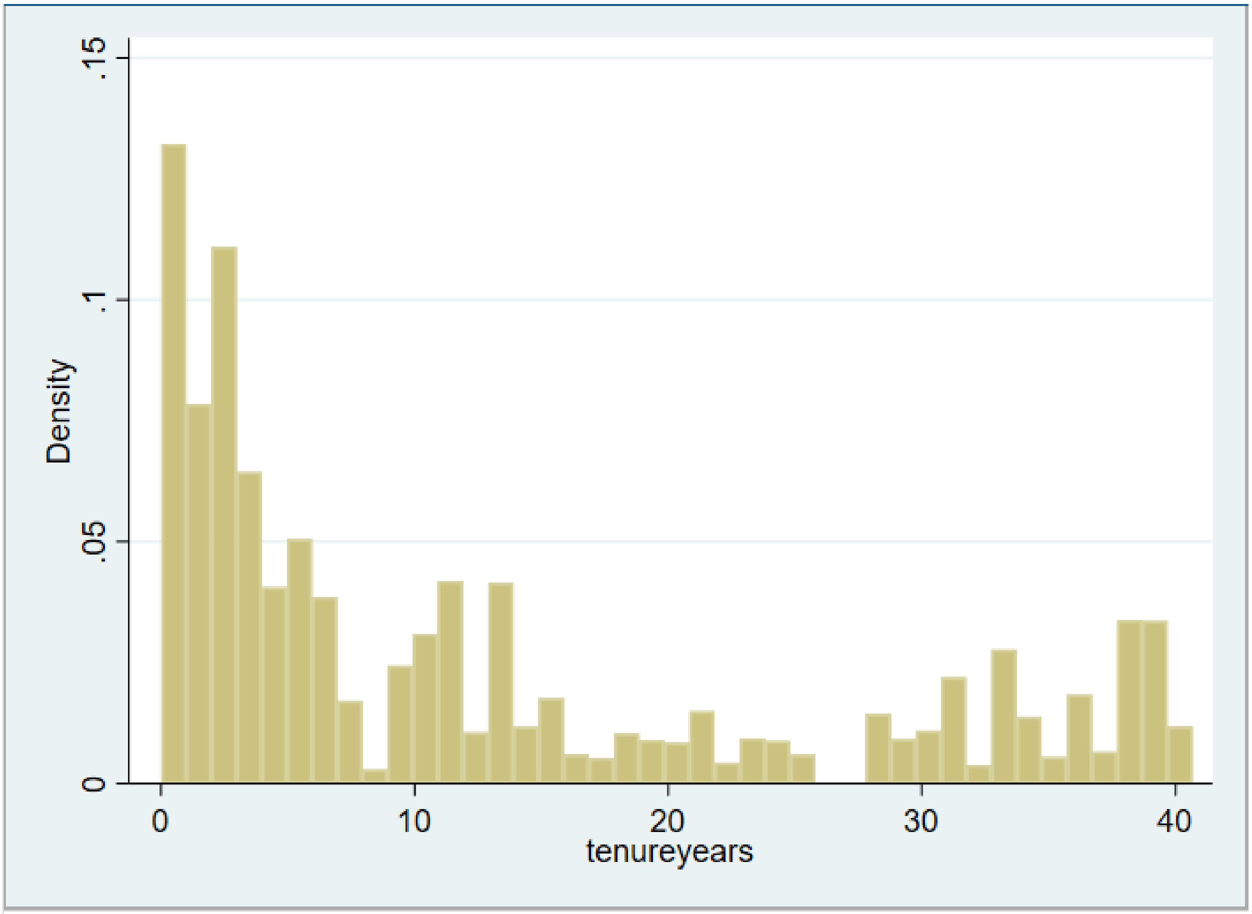
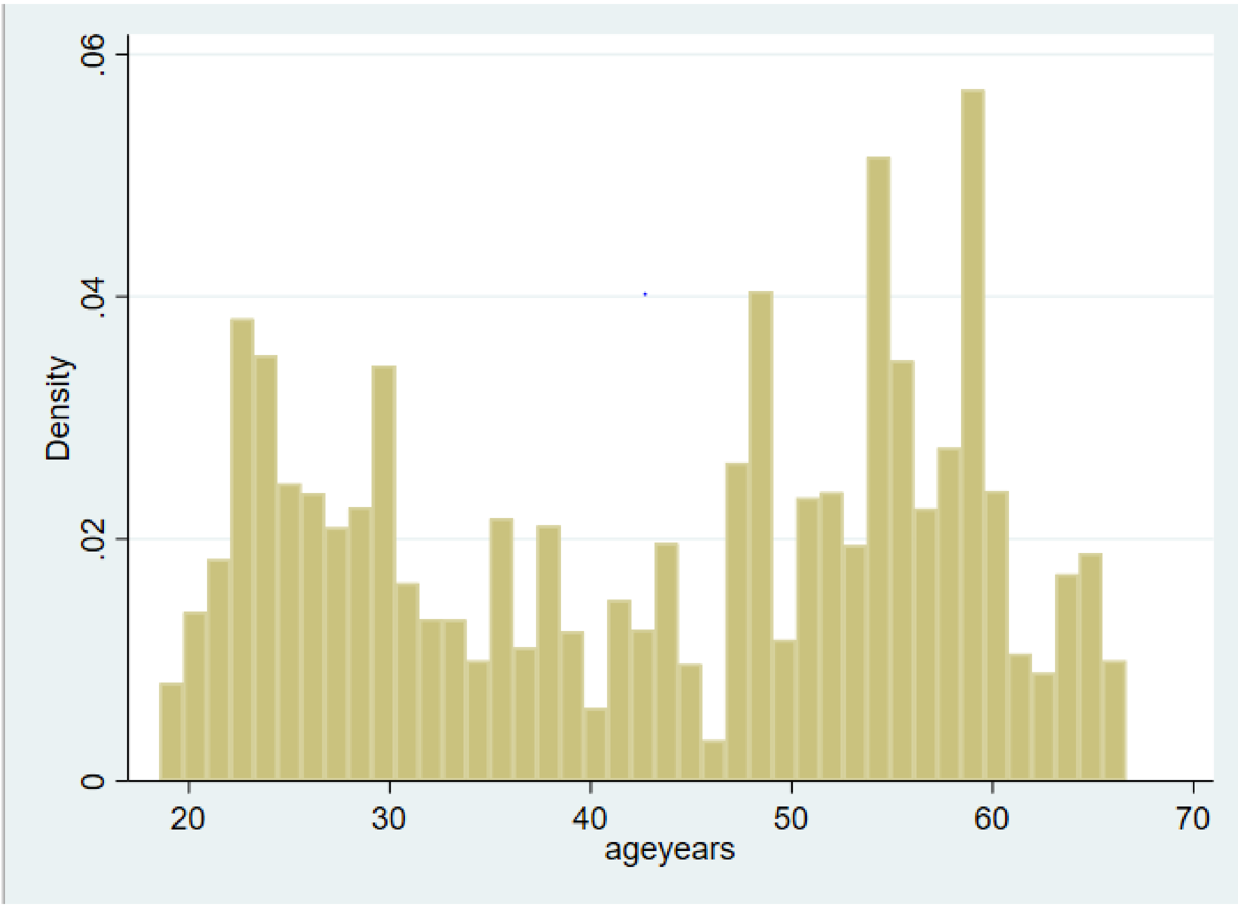
Figure 1: Tenure Distribution



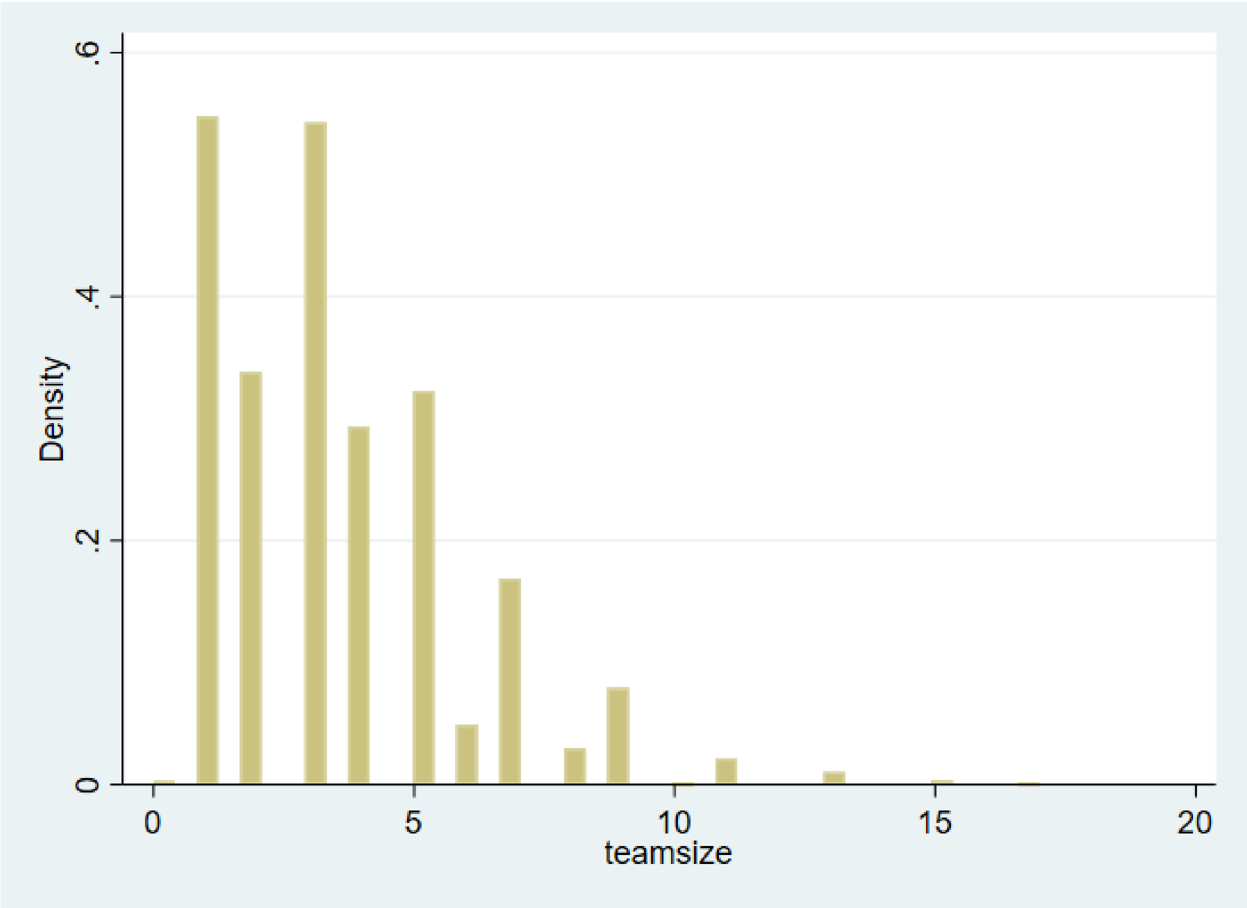
This figure shows a histogram of each observed worker's tenure at the firm on the first day of observation. This shows workers with tenure of four years or less make up a significant percentage of the worker population.

Figure 2: Age Distribution



This figure shows a histogram of each worker's age on the first day of observation. Comparing this to the histogram of tenure provides insight into the weak connection between age and tenure at the firm.

Figure 3: Team Size Distribution



This figure is a histogram of the different team sizes during the period of observation. From this, it can be estimated that workers typically work with between one and six coworkers on any given day.

Table 1: Confirming Random Assignment

	(1) Ability	(2) Ability	(3) Ability	(4) Ability
Teammates' Avg Ability	-0.0298	-0.0298	0.0958*	0.0957*
	(0.0325)	(0.0327)	(0.0389)	(0.0394)
Leave Me Out Average	0.672***	0.671***		
	(0.0780)	(0.0795)		
Constant	42.86***	43.15***	112.1***	112.5***
	(9.030)	(9.253)	(4.422)	(4.450)
Observations	11792	11792	11792	11792
r2	0.337	0.338	0.0514	0.0541

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

This table shows no evidence that workers are assigned based on ability. The dependent variable is the ability of the focal worker, while the main independent variable is the average ability of coworkers. The *Leave Me Out Average* controls for bias.

Table 2: Main Effects

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency	(4) FD Efficiency
FD Average Team Ability	0.0165	0.0159		
	(0.0791)	(0.0775)		
FD Team Size	0.498	0.497		
	(0.284)	(0.285)		
FD Average In-Group Ability			-0.0260*	-0.0262*
			(0.0114)	(0.0116)
FD Average Outgroup Ability			0.00440	0.00390
			(0.0109)	(0.0110)
FD In-Group Size			0.988	0.988
			(0.593)	(0.602)
FD Out-Group Size			0.344	0.350
			(0.392)	(0.396)
Constant	0.00300	4.160***	-0.00247	4.099***
	(0.0427)	(1.187)	(0.0428)	(1.199)
Observations	11787	11787	11785	11785

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

This table shows that increased Average In-Group Coworker Ability has a negative effect on a focal worker's efficiency. It also shows that the average ability of all teammates has no effect. The dependent variable is the first difference of efficiency.

Table 3: Interaction Effects

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency
FD Average Team Ability	-0.0485		
	(0.109)		
Temporary * FD Average Team Ability	0.131		
	(0.142)		
FD Average In-Group Ability		-0.0141	-0.00535
		(0.0144)	(0.0162)
FD Average Outgroup Ability		0.00916	0.0330
		(0.0108)	(0.0392)
Temporary * FD Average Ingroup Ab~y		0.00878	
		(0.0219)	
Temporary * FD Average Outgroup A~y		0.0238	
		(0.0402)	
Committed * FD Average Ingroup Ab~y			-0.00878
			(0.0220)
Committed * FD Average Outgroup A~y			-0.0238
			(0.0403)
Constant	4.298***	4.222***	4.222***
	(1.209)	(1.235)	(1.205)
Observations	11786	11786	11786

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level

This table shows that the observed effect shown in Table 2 is not exhibited in a stronger or weaker magnitude by either committed or temporary workers. The dependent variable is the first difference of efficiency. No interaction effects are found to be statistically significant.

Table 4: Main Effects, 1 Year Tenure Threshold

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency	(4) FD Efficiency
FD Average Team Ability	-0.0226* (0.00919)	-0.0227* (0.00909)		
FD Team Size	0.627* (0.287)	0.626* (0.292)		
FD Average In-Group Ability			-0.0261** (0.0100)	-0.0261* (0.0104)
FD Average Outgroup Ability			0.00265 (0.00953)	0.00263 (0.00957)
FD In-Group Size			0.672 (0.481)	0.667 (0.498)
FD Out-Group Size			0.646 (0.333)	0.648 (0.334)
Constant	0.00483 (0.0353)	3.421** (1.115)	0.0117 (0.0360)	3.461** (1.108)
Observations	15276	15276	15266	15266

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

This table displays the same elements as Table 2, but in this case the tenure threshold that determines groups is set to 1 year. The results are nearly identical to those shown in Table 2.

Table 5: Main Effects, 3 Year Tenure Threshold

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency	(4) FD Efficiency
FD Average Team Ability	-0.0241*	-0.0243*		
	(0.0109)	(0.0110)		
FD Team Size	0.463	0.465		
	(0.255)	(0.257)		
FD Average In-Group Ability			-0.0258*	-0.0260*
			(0.0102)	(0.0103)
FD Average Outgroup Ability			0.000143	-0.000345
			(0.00871)	(0.00858)
FD In-Group Size			0.834	0.836
			(0.561)	(0.571)
FD Out-Group Size			0.420	0.429
			(0.317)	(0.323)
Constant	0.00509	3.484**	0.00909	3.409**
	(0.0354)	(1.121)	(0.0359)	(1.101)
Observations	15276	15276	15272	15272

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

This table displays the same elements as Table 2, but in this case the tenure threshold that determines groups is set to 3 years. The results are nearly identical to those shown in Table 2.

Table 6: Main Effects, 5 Year Tenure Threshold

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency	(4) FD Efficiency
FD Average Team Ability	-0.0260*	-0.0263*		
	(0.0115)	(0.0116)		
FD Team Size	0.411	0.412		
	(0.232)	(0.234)		
FD Average In-Group Ability			-0.0210*	-0.0211*
			(0.00915)	(0.00922)
FD Average Outgroup Ability			0.00424	0.00364
			(0.00860)	(0.00833)
FD In-Group Size			0.650	0.662
			(0.535)	(0.548)
FD Out-Group Size			0.268	0.270
			(0.290)	(0.298)
Constant	0.00508	3.471**	0.00574	3.461**
	(0.0353)	(1.119)	(0.0357)	(1.108)
Observations	15276	15276	15270	15270

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

This table displays the same elements as Table 2, but in this case the tenure threshold that determines groups is set to 5 years. The results are nearly identical to those shown in Table 2.

Table 7: Summary Statistics

N = 11,792

Variable	Mean	SD	Min	Max
Age (Years)	43.17	14.044	18.55	66.64
Tenure (Years)	12.69	12.95	0.0027	40.67
Wage ($)	15.17	0.765	14.5	18
Efficiency (% Point)	104.71	27.81	.021	287.33
Average Coworker Ability (% Point)	100.19	32.5	47.07	165.06
Average Coworker Ability In-group (% Point)	93.43	53.02	0	165.06
Average Coworker Ability Out-group (% Point)	49.56	53.93	0	152.72
Team Size	4.32	2.16	2	17
FD Efficiency (% Point)	.0024	31.38	-205.69	189.91
FD Average Coworker Ability (% Point)	-.002	6.51	-100.68	86.53
FD Average Team Ability Out-group (% Point)	-.0055	39.31	-152.72	152.72
FD Average Team Ability In-group (% Point)	-.0011	37.48	-165.05	165.05
FD Team Size	-.00025	1.67	-12	14

Appendix A: Results by Plant

To further investigate the reasoning behind the observed peer effects, the results of equation (4) were re-run on a by-plant basis. The results can be found in Tables 7, 8, and 9. The findings suggest that the total coworker and in-group effects are sourced primarily from the worker populations found in plants 1 and 3. Plant 2's population does not demonstrate any significant coworker effect that is of the same sign or magnitude of the overall effect. This is not too surprising because plant 2's worker population is the smallest of the three, and therefore the average day to day change of a focal worker's coworker population is much smaller than that in plants 1 and 3.

Table A1: Main Effects, Plant 1

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency	(4) FD Efficiency
FD Average Team Ability	-0.0205*	-0.0204*		
	(0.00990)	(0.00974)		
FD Team Size	0.146	0.142		
	(0.274)	(0.260)		
FD Average In-Group Ability			-0.0203	-0.0206
			(0.0113)	(0.0111)
FD Average Outgroup Ability			-0.0124	-0.0125
			(0.0114)	(0.0113)
FD In-Group Size			-0.134	-0.103
			(0.706)	(0.704)
FD Out-Group Size			0.717	0.704
			(0.382)	(0.389)
Constant	-0.000588	3.024**	-0.00865	3.111**
	(0.0384)	(1.135)	(0.0373)	(1.087)
Observations	8914	8914	8912	8912

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

Table A2: Main Effects, Plant 2

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency	(4) FD Efficiency
FD Average Team Ability	0.0110	0.0112		
	(0.0236)	(0.0231)		
FD Team Size	0.229	0.183		
	(0.667)	(0.696)		
FD Average In-Group Ability			0.0171	0.0174
			(0.0333)	(0.0339)
FD Average Outgroup Ability			0.0175	0.0164
			(0.0185)	(0.0185)
FD In-Group Size			-0.434	-0.511
			(2.319)	(2.303)
FD Out-Group Size			0.0316	0.00985
			(0.956)	(1.045)
Constant	0.00134	0.267	0.00113	0.143
	(0.0843)	(4.715)	(0.0852)	(4.607)
Observations	2390	2390	2390	2390

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

Table A3: Main Effects, Plant 3

	(1) FD Efficiency	(2) FD Efficiency	(3) FD Efficiency	(4) FD Efficiency
FD Average Team Ability	-0.00244	-0.00220		
	(0.0189)	(0.0186)		
FD Team Size	0.442	0.444		
	(0.393)	(0.380)		
FD Average In-Group Ability			-0.0222	-0.0217
			(0.0161)	(0.0161)
FD Average Outgroup Ability			-0.0391	-0.0372
			(0.0301)	(0.0310)
FD In-Group Size			0.0418	0.0145
			(1.320)	(1.334)
FD Out-Group Size			1.540	1.544
			(1.145)	(1.186)
Constant	-0.00932	5.165	-0.0104	5.248
	(0.0809)	(2.755)	(0.0813)	(2.795)
Observations	3972	3972	3972	3972

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Columns 2 and 4 include weekly fixed effects

Table A4: Checking Non-Linearity

	(1) FD Efficiency	(2) FD Efficiency
FD Average In-Group Ability	-0.0261*	-0.0262*
	(0.0113)	(0.0115)
Average Ingroup Teammate Ability^2	0.0000113	0.00000929
	(0.0000547)	(0.0000570)
FD Average Outgroup Ability	0.00435	0.00384
	(0.0112)	(0.0108)
Average Outgroup Teammate Ability^2	-0.0000353	-0.0000360
	(0.0000493)	(0.0000506)
FD In-Group Size	0.992	0.992
	(0.599)	(0.611)
FD Out-Group Size	0.344	0.349
	(0.410)	(0.391)
Constant	0.0362	4.145***
	(0.111)	(1.172)
Observations	11785	11785

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Column 2 includes weekly fixed effects

This table shows that the In-Group coworker effect is likely not non-linear. This OLS estimation is the same as that shown in Table 2, but with a square of Average Out-Group and In-Group Ability added. Neither of the square terms are statistically significant.

Appendix B: Laggard Effect and Top/Bottom Quartile Results

While the interaction effects run in section 4.3 showed no evidence that either group of workers is more or less sensitive to the coworker effects, it was deemed possible that a focal worker's relative ability influences his or her sensitivity to a change in the average ability of coworkers. To find out if there is evidence behind this idea, OLS estimates of equation (5) were run.

(5) $\Delta Eff = \mu\Delta ability_{-i,gjt} + \gamma\Delta ability_{-g,jt} + \beta\Delta ability_{-i,gjt} * laggard + \rho\Delta groupsize_{g,jt} + \tau\Delta groupsize_{-g,jt} + \alpha(\Delta controls) + \varepsilon_{it}$

Equation (5) takes similar form to equation (4.1), but with an interaction term added. The controls include hours worked, age, and department tenure. The *laggard* variable is a dummy variable that takes a value of one if the observed worker has an ability rated lower than the average of his department, and a value of zero if above. The findings suggest that being below the departmental average ability is not associated with any additional increase or decrease in the in-group coworker effect. On average, both above and below average workers respond the same to an increase in the average ability of in-group coworkers. The results can be found in Table B1.

To investigate whether the coworker effects were truly universal across the ability distribution, equations (6) and (7) were run.

(6) $\Delta Eff = \mu\Delta ability_{-i,gjt} + \gamma\Delta ability_{-g,jt} + \beta\Delta ability_{-i,gjt} * bottomquartile + \rho\Delta groupsize_{g,jt} + \tau\Delta groupsize_{-g,jt} + \alpha(\Delta controls) + \varepsilon_{it}$

(7) $\Delta Eff = \mu\Delta ability_{-i,gjt} + \gamma\Delta ability_{-g,jt} + \beta\Delta ability_{-i,gjt} * topquartile + \rho\Delta groupsize_{g,jt} + \tau\Delta groupsize_{-g,jt} + \alpha(\Delta controls) + \varepsilon_{it}$

These equations are the same as equation (5), but the laggard effect has been replaced by a dummy that denotes if a coworker is in the bottom or top quartile of the departmental ability distribution. The results for equations (6) and (7) can be found in columns 1 and 2, respectively, in Table B2. The findings suggest that there is no significant additional in-group coworker effect if a focal worker is in the top or bottom quartile of his or her departmental ability distribution.

Overall, the findings show that the in-group coworker effect are universal across the departmental ability distribution, on average. There is no evidence that low ability or below average ability workers decrease their effort at a higher magnitude than high ability workers when the average ability of similarly tenured coworkers increases.

Table B1: In-Group Laggard Effect

	(1) FD Efficiency	(2) FD Efficiency
FD Average In-Group Ability	-0.0353* (0.0158)	-0.0353* (0.0160)
Laggard * Average Ingroup Teammate A~y	0.0163 (0.0186)	0.0160 (0.0186)
FD Average Outgroup Ability	0.00402 (0.0110)	0.00351 (0.0111)
FD In-Group Size	1.000 (0.605)	0.999 (0.603)
FD Out-Group Size	0.352 (0.397)	0.358 (0.398)
Constant	-0.00208 (0.0421)	4.108*** (1.170)
Observations	11785	11785

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Column 2 includes weekly fixed effects

This table shows an OLS estimation like the Main Effects shown in Table 2, but with an interaction added. The Laggard dummy interacted with Average In-Group Ability is statistically insignificant, meaning that there is no evidence that a worker acts differently if he or she is below the 50th percentile of the departmental ability distribution.

Table B2: In-Group Top/Bottom Quartile Effects

	(1) FD Efficiency	(2) FD Efficiency
FD Average In-Group Ability	-0.0328*	-0.0244
	(0.0128)	(0.0125)
Bottom Quartile * Average Ingroup Te~y	0.0206	
	(0.0210)	
FD Average Outgroup Ability	0.00361	0.00376
	(0.0111)	(0.0109)
FD In-Group Size	1.005	0.991
	(0.592)	(0.584)
FD Out-Group Size	0.358	0.357
	(0.390)	(0.402)
Top Quartile * Average Ingroup Te~y		-0.00694
		(0.0237)
Constant	4.105***	4.105***
	(1.195)	(1.184)
Observations	11785	11785

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Standard errors are bootstrapped with 2000 repetitions and clustered at the individual level
Column 1 includes an ingroup * bottom quartile interaction
Column 2 includes an ingroup * top quartile interaction

This table shows an OLS estimation like the Main Effects shown in Table 2, but with two interactions added. The Top and Bottom Quartile dummies are interacted with Average In-Group Ability, and are statistically insignificant, meaning that there is no evidence that a worker acts differently if he or she is in the top or bottom quartile of his or her departmental ability distribution.