Wage Distribution Preferences and Productivity Effects: An Experiment

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**Abstract:**

Inequality has received substantial attention across academic research and popular press. This study investigates individuals’ preferences over distributions of performance-based wages, and examines the productivity effects associated with these different wage distributions using a real-effort work task. Importantly, the wage distributions vary in the degree of inequality, average wage, and implied level of final income inequality. Overall, we find identifiable patterns in wage preferences regarding how individuals trade-off equity versus efficiency within the group. We find strong evidence that equality of opportunity – in the form of equal piece-rates – is preferred by many individuals at the expense of some overall loss in collective efficiency. The distribution of wages has little impact on the *quantity* of output produced; however, we do observe an impact on output *quality*. Moreover, for individuals who have expressed a preference for equality of opportunity, working under equal piece-rates can incentivize provision of higher quality output.

*Keywords:* Wage Inequality; Wage Preferences; Productivity; Performance Pay; Real-Effort Experiment

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**1 Introduction**

The distribution of wages within firms and the associated degree of inequality remains a hot button issues that garners substantial attention in both academic research and popular press (e.g., Piketty, 2014). Theoretically, inequality can be justified on the grounds of optimally incentivizing effort provision (e.g., Lazear, 2018). That said, there is a rich literature promoting the idea that the distribution of wages can influence worker productivity via wage comparisons and corresponding inferences regarding fairness (e.g., Frank, 1984; Lazear, 1989; 1991; Ackerlof & Yellen, 1990; Bewley, 1999 for seminal work; Fehr et al., 2009 for a review). Recently, widespread discussions on policies aimed at compressing wages and reducing the pay gap have renewed (e.g., raising minimum wage or regulating executive compensation). Relatedly, there has also been substantial discussion, and even some reform (e.g., Dodd-Frank regulation on reporting of pay-ratios), on pay secrecy and the extent to which employee pay information should be made more transparent. Such a policy, while not directly altering the distribution of pay, would subsequently reveal salient information about the distribution of wages. The ramifications of these types of wage reforms hinge crucially on how such policies might be perceived by workers and, consequently, how workers might react under given wage regimes within the organization given their preferences.

The primary motivation of this study is to empirically examine individual-level preferences over how wages are distributed among a group of workers, and the subsequent impacts on productivity. To do so, we design a real-effort experimental study. In the experiment, we first present participant workers with a menu of different wage distributions – specifying a rank-based, piece-rate wage for each member of the group. Importantly, the distributions vary in terms of the degree of: wage inequality, average wage, and level of implied income inequality. After eliciting preferences (in an incentivized manner), the groups of workers then complete the real-effort task under one of the realized wage distributions, and we measure group-level and worker-level output. Moreover, the real-effort task is complex enough to permit both a *quantity* and *quality* measure of output produced, which provides more robust and realistic inferences regarding the overall impact. Lastly, by combining incentivized preference elicitation with incentivized productivity data, our design enables us to examine some possible interactions between wage distribution preferences and corresponding effects on production.

Our experimental study enables us to examine several important questions: (i) what distribution of *piece-rate* wages do people prefer for a group of heterogeneous workers; specifically, how do individuals trade-off a preference for *ex-ante* equality in wages with collective efficiency? (ii) how do wage-distribution preferences differ based whether workers are stating preference from behind the “veil of ignorance” (Harsanyi, 1953: Rawls, 1971), acting in the role of a planner, or perfectly informed about their relative rank (and hence how they will be impacted by the specific distribution)? (iii) how do different wage distributions and their corresponding characteristics subsequently impact worker output, both in terms of *quantity* and *quality*? (iv) are there interactions between stated wage-distribution preferences and consequent impacts on productivity? (v) does the manner by which workers are ranked within the group, either merit-based or randomly assigned, impact wage preferences and their consequent effort response?

Summarizing our main findings regarding preferences, our results suggest there is significant heterogeneity in wage-distribution preferences. Amongst other things, our design enables us to examine the possible trade-off between equality and efficiency of the wage distribution. When participants state their preferences from a *planner’s* perspective (i.e., choosing a wage distribution for another group of workers) or from behind the veil (i.e., when they are uninformed of their rank within the group), many participants (roughly 50%) prefer a distribution with *equal wages*, which is also the most *collectively inefficient* (as measured by average wage within the group). However, we also observe a large fraction of participants (roughly 25%) preferring the most unequal (as measured by difference between highest and lowest paid group member) distribution, which is also the most *collectively* efficient. Taken at face value, this suggests that many people express a preference for *ex-ante* equal opportunity or, said differently, equal pay for equal work. However, when examining the data further, such a preference appears “weak” in the sense that once workers state their preference from a *known* position within the group and, hence a certain wage to be received, we see a shift toward purely selfish preferences. In particular, top-ranked workers overwhelmingly prefer (roughly 70%) the unequal wage distribution that gives the highest payoff to the top-ranked worker, while bottom-ranked workers generally prefer (roughly 60%) a wage distribution that gives them the highest wage but is also the least efficient. We also document some evidence that merit can play a moderating role in shaping preferences.

Much of the existing experimental literature on “social-welfare preferences” consider how *income* is (re)distributed across groups of workers, where any redistribution choices come *ex-post* (after the incomes have been earned).[[3]](#footnote-3) Conversely, we look specifically at *ex-ante* preferences for the distribution of performance-based wages and not final incomes, which has been largely under-explored in the literature. This strikes us as an important distinction for three primary reasons. First, the distribution of wages ultimately plays a large role in shaping the distribution of final incomes, which then potentially necessitates redistribution; this is especially true in instances where compensation is tied to performance (e.g., piece-rates or performance-based bonuses), which has become quite prevalent across many labor markets (see Kuhn & Lozano, 2008; Lemieux et al., 2009).[[4]](#footnote-4) Second, some potential reforms are aimed specifically at altering the distribution of wages or making the wage distribution more transparent, and the effects of such reforms may be different for salary, hourly, and piece-rate workers. Third, workers may actually care directly about ex-ante fairness in wages distinct from ex-post fairness in incomes, especially in those instances where final incomes are a function of wages and performance. Prior literature suggests that most people generally have a preference to (re)distribute unequal *income* (e.g., Durante et al., 2014; Lefgren et al., 2016; Gee et al., 2017; Deffains et al., 2016), even if there is some efficiency loss in doing so.[[5]](#footnote-5) We document a similar pattern regarding wage-distribution preferences; specifically, people generally prefer the distribution with equal wages over a more-efficient, but less-equal, distribution. Importantly, though, because of substantial heterogeneity in worker output, the equal-wage distribution generates ex-post inequality in the distribution of final incomes. Thus, our results suggest that workers value *ex-ante* equality and fairness in the distribution of wages.[[6]](#footnote-6) By considering *foundational* preferences for the distribution of wages, our study can help us better understand what motivates preferences for income redistribution, and our results suggest that ex-ante wage equality might play an important role in the degree of desired, ex-post, redistribution.

Our main results regarding how the wage distribution impacts productivity are more nuanced. As in many real-life jobs, our real-effort task enables us to measure both *quality* and *quantity* of output. Importantly, this provides a clearer picture of how the distribution of wages consequently impacts effort provision in the task, which aligns with prior literature that has documented possible tradeoffs between quality and quantity (e.g., Paarsch & Shearer, 1999; Bellemare et al., 2010; Ederer & Manso, 2013; Johnson et al.,2015; Rubin et al., 2018). Regarding quantity, we document negligible differences in output levels across the different wage distributions we implement. More specifically, we find no significant differences in either group-level or worker-level output across wage distributions when workers’ ranks are merit based. However, we do see an impact of the wage distribution manifest through changes in quality of output. Notably, when high-ability workers are paid the least, they produce significantly lower quality. We also find some complementary evidence that lower-ability workers produce higher quality when they are given a higher wage. We find some evidence implying that if worker ranks within a group are determined randomly, then unequal pay schemes might induce lower quality output by those workers receiving the unfair wages. Lastly, in combining preference data with productivity data, we are able to document an interesting pattern in one of our conditions where workers who have expressed a preference for wage equality produce higher quality output when working under an equal-wage regime. This supports the notion that a happy worker is a more productive worker.

Recently, a body of experimental literature examines how wage comparisons and resulting perceptions of wage fairness impact effort provision.[[7]](#footnote-7) Typically these papers use some type of multi-lateral, gift-exchange paradigm with a fixed wage, and the results are somewhat mixed.[[8]](#footnote-8) The results from similarly motivated *real-effort* studies are also mixed.[[9]](#footnote-9) Importantly, we examine relative pay comparisons under a performance-pay scheme, which results in very different implications. In the standard chosen-effort gift-exchange game (e.g., Fehr et al., 1993), reducing effort increases the total payoff to the worker (conditional on the fixed wage); whereas the opposite relation can emerge with piece-rate pay. Thus, with piece-rate pay the motivation to reduce effort in response to a (perceived) unfair wage might be crowded out by the corresponding reduction in earnings from producing lower output. Indeed, our results seem to confirm this. In fact, even in the perverse case where the highest ranked worker is paid the lowest piece rate, we see no impact on the quantity of output produced. However, our results also suggest that relative pay comparisons can impact quality of output produced. For example, high-ability workers produce lower quality output when they are paid the least. In a sense, this is a subtler manifestation of the effect found by Gross et al. (2015) where the high-ability workers reduce effort, via lower quality, if they are paid less than the low-ability worker.

We think this study makes several contributions to the existing literature. First, we elicit preference data on the type of piece-rate wage distribution people most prefer. Relative to the large body of work that has sought to better understand preferences over final income distributions, our study sheds light on a related but less-understood dimension of preferences over wages, which are income-generating source. Second, we consider the productivity effects associated with relative wage comparisons under a piece-rate scheme. More generally, we view the qualitative implications of our results as being applicable to a broader set of performance-based compensation schemes where final incomes are (at least in part) determined through some combination of wages and output (e.g., performance-based bonuses); this is important given the prevalence and increasing trend toward the inclusion of performance pay in the economy. Our results suggest that for firms who implement performance pay, the distribution of wages across employees might play less of a role (or a different role) in how it impacts worker productivity compared to simple fixed-wage compensation schemes. Third, our real-effort task permits effort to manifest through both quality and quantity, which provides a more nuanced examination of how relative wage comparisons can impact productivity; indeed, we do observe difference in quality. Fourth, in combining individual preference data with output data, we can examine possible interactions between preferences and productivity; specifically, we are able to examine how workers respond when the actual wage distribution does not align with their preference, or how certain “types” of workers respond to different wage distributions. Overall, we feel that in combining preference data with productivity data – both quality and quantity of output – our study is informative for better understanding how workers might perceive and respond to wage-reform policies aimed at combating income inequality. This is particularly true of reforms implemented within organizations that utilize some form of performance-based pay.

# 2 Experimental Design

We conducted an experimental study to examine wage distribution preferences and their possible interactions with productivity. The experiment consisted of three main stages, which are separately discussed below. The first stage was a ranking stage, where each participant had an opportunity to complete the real-effort task as a way to familiarize themselves with the task and provide a signal of their productive capability, which is later used to rank workers. The second stage was the voting stage, where participants stated their preferred wage distribution under different voting scenarios. The third stage was the paid work stage, where groups of three workers completed the real-effort task under one of the realized wage distributions. After completing the paid work stage, participants filled out a questionnaire to elicit general demographic characteristics, and other attitudes regarding: politics, merit pay, income equality, wage inequality, and redistribution. At the onset, participants were provided instructions for the first stage, and informed that there would be multiple stages to the study.

All experimental sessions were conducted at the Rawls College of Business at Texas Tech University. In total, 27 experimental sessions were conducted with 480 total participants (46% were female; the median age was 21). We implemented a between-groups design. Each session lasted approximately 60 minutes and participants earned an average of $22.4. The experiment was computerized, and the software was programmed in z-Tree (Fischbacher, 2007). A copy of the experimental instructions for all conditions and sample screen shots are provided in the Appendix.

**2.1 Overview of Real-Effort Work Task**

Participants were provided with a packet of printed job application forms that were populated with fictitious applicant information, and were required to type select information from each application into a computerized, digital template.[[10]](#footnote-10) The required fields included: the application number, date, the applicant’s name, birthdate, phone number, email, zip code, education level, and some questions about materials that had been submitted with the original application (e.g., cover letter, resume, references, and recommendation letters). For the remainder of the paper, the output level of a participant will be in reference to the number of applications they entered into the digital database. Applications were not checked for accuracy, so total output includes entries with errors. Participants were paid for erroneous entries, which, importantly, enables us to measure *output quality*, as we discuss in more detail later.

We think this data entry task is well-suited for several reasons. First, there is not a strong analytical component to the task (e.g., anagram, word unscrambling, or multiplication tasks), which implies that output is an increasing function of effort. This enables us to identify how the wage distribution impacts output specifically through the provision of effort. Second, because of the open-endedness of inputting hand-typed information, there is both a *quantity* and *quality* dimension associated with output. Being able to measure both quantity and quality provides a more robust analysis of how worker output is impacted by the wage distribution.

**2.2 Overview of Experimental Procedure**

**Stage 1 – Ranking Stage**

In Stage 1, participants had an opportunity to complete the data-entry task for 8-minutes. The primary function of this stage was to provide (to us as the experimenters) a signal of the productive capability of participants. In one of the conditions, described in detail below, we use this information as a way to “rank” workers within the group based on merit. We did not incentivize production in this stage to ensure that there was no difference in accrued earnings entering the subsequent paid work period, which could have then confounded our results. Rather, as a (albeit imperfect) way to induce effort provision, we informed participants that later in the study their total compensation would depend on how many applications they are able to enter into the database in an allotted period of time; hence, this stage provides them with an opportunity to practice and become familiar with the applications and using the digital template.[[11]](#footnote-11) In essence, we were trying to prime participants of the importance of taking this stage seriously and motivating effort by appealing to the non-pecuniary “practice makes perfect” adage.

**Stage 2 – Eliciting Wage Distribution Preferences**

In Stage 2, we elicited information about each participant’s preferred wage distribution. Participants were informed that they would be randomly paired with two other participants to form a 3-person group, and that each person would receive a ranking of either 1, 2, or 3.

We experimentally manipulated how participants were ranked according to the following two randomly assigned conditions:

***Earned Rank (EARNED) Condition*** *– Each participant in the 3-person group is ranked from highest to lowest based on their level of output in the practice period.[[12]](#footnote-12)*

***Random Rank (RANDOM) Condition*** *– Each participant in the 3-person group is ranked randomly, independent from their level of output in the practice period.*

Participants were informed (in the instructions) about which ranking regime applied to them, but were not informed of the other possible option. Hence, at the time of eliciting wage distribution preferences for the group, participants know *how* ranks would be determined, but did not yet know with certainty their own rank within the group.

The motivation for implementing these two conditions is to identify whether earning one’s rank based on (perceived) merit affects wage-distribution preferences and the resulting productivity response, compared to random assignment. Prior survey evidence suggest that people tend to be more favorable to income redistribution when income is less merit-based, while many laboratory experiments confirm this notion that people are more redistributive when income is determined more by chance/luck.[[13]](#footnote-13) Moreover, a recent field experiment by Breza et al. (2018) suggests that effort responses to wage inequality may be less pronounced when the pay inequality is merit based. In essence, the EARNED condition is *more meritocratic* in the way rank is determined, compared to the RANDOM condition where ranking is purely random.

Participants were then shown a table that listed 4 different, piece-rate wage distributions. All participants faced the same set of 4 wage distributions, which are depicted in Table 1, with the corresponding piece-rate to each worker based on their rank, and the average wage for the group. For expositional clarity, we label the “type” of wage distribution each option was intended to model; however, in the experiment, the 4 different wage distributions were generically labeled A, B, C, D and the columns of the table were randomly oriented for each participant, to avoid any order effects, demand effects, anchoring effects, or focal point effects.

**[Table 1 – Possible Wage Distributions]**

The four wage distributions are meant to represent the following *types* of wage allocations: (i) a *Wage Equality* setting where the piece-rate wage is, literally, the same for all participants, (ii) a *Wage Inequality* setting where wages are positively correlated with rank, but are very unequal (iii) a *Wage Inversion* setting where the wages are negatively correlated with rank, such that the highest ranked worker received the lowest wage while the lowest ranked worker received the highest wage; this distribution provides a setting to potentially compress the final incomes among the workers, and (iv) a *Minimum Wage* environment where the wages are still positively correlated with rank, but the wage to the lowest ranked worker is raised to a higher level than in the *Wage Inequality* distribution thus reducing inequality. The wage distributions also vary, as expected, in terms of their average wage per worker (i.e., their group-level efficiency). As depicted in Table 1, the *Wage Inequality* distribution has the highest average wage of $1.2 per application, while the *Wage Equality* and *Wage Inversion* distributions have the lowest average wage of to $1 per application. Finally, in the *Minimum Wage* distribution, the average wage is $1.1.

Note, a lower average wage would imply, in expectation, lower aggregate earnings for the group. In this regard, we can think of a distribution with a lower average wage as being less-efficient, in that there is a smaller pie of total income across the group to be distributed among the group. This characterization of efficiency referring to the total pool of earning within the group accords with the literature on redistribution of income (e.g., Durante et al., 2014). In this sense, the *Wage Equality* and *Wage Inversion* distributions are the least efficient, while the *Wage Inequality* distribution is the most efficient. This idea is consistent with Okun’s (1975) “leaky bucket” idea capturing the tradeoff between equality versus efficiency.[[14]](#footnote-14) Importantly, participants can’t simultaneously satisfy a preference for equality and efficiency within the same distribution; hence, there is a clear and explicit trade-off between equality and efficiency between the *Wage Inequality* and *Wage Equality* distributions. Our primary interest is better understanding preferences over different types of wage distributions, which differ fundamentally in their degree of: (i) ex-ante wage equality, (ii) efficiency, (iii) ex-post, implied income equality.

For the elicitation of each participant’s preferred wage distribution, we used the strategy method to elicit preferences under several different scenarios. In particular, participants didn’t know their actual rank within the group when they state their preferred wage distribution.[[15]](#footnote-15) Rather, we asked participants to choose their preferred wage distribution under the following five scenarios:

**Planner**– preferred distribution for *another* group within the session

**Veil** – preferred distribution for *own* group assuming your rank is unknown

**Rank 1**– preferred distribution for *own* group assumingyou are Rank 1

**Rank 2**– preferred distribution for *own* group assuming you are Rank 2

**Rank 3**– preferred distribution for *own* group assuming you are Rank 3

The Planner scenario is meant to capture each participant’s preferences when playing the role of a manager or social planner. Because they are *not* personally impacted in the Planner scenario, this essentially can be viewed as eliciting their true idealized preference. The Veil scenario is meant to represent the situation of choosing a wage distribution behind the “veil of ignorance” (Harsanyi, 1953; Rawls, 1971), where participants know they will be a part of the group for which the wage distribution will be applied, but they don’t know, ex-ante, where in the group they will be positioned.[[16]](#footnote-16) While that rank scenarios help us characterize how preferences might change based on how participants would subsequently be impacted by the given wage distribution.

**Stage 3 – Paid Work Period**

In Stage 3, participants completed a work task for 22 minutes. First, a wage distribution was selected for each group – in part based on the various wage-distribution choices made during Stage 2 and in part based on random chance (to ensure sufficient productivity data for all four distributions). Prior to beginning the 22-minute paid work period, participants received information about: (i) their realized rank within the group, (ii) the selected wage distribution under which the group would be working, and (iii) their corresponding piece-rate wage. However, to ensure the cleanest test of how the wage distribution impacts productivity, participants were not informed about whether the selection of the wage distribution had been based on random chance or the result of the implementation of a participant’s actual choice from Stage 2.[[17]](#footnote-17) To ensure that the rank and wage information were salient, they were continually displayed on the same screen as the digital database template. During the work period, participants were free to work at their own pace and complete as many applications in their stack as they were able to or chose to.[[18]](#footnote-18)

**2.3 Correlation between Output in Ranking Stage and Paid Work Stage**

Recall, in the EARNED condition, we assign worker rankings based on output in Stage 1. The intent of this feature is to create the perception among workers that assignment of ranking within the group is merit-based (i.e., those with higher productive capability are assigned a higher rank). Thus, before proceeding with the main results, we first briefly discuss the relation between Stage 1 output and Stage 3 output, as a manipulation check of sorts. Table 2 presents the summary statistics for productivity in Stage 1 (8-minute ranking stage) and Stage 3 (22-minute paid work stage) for each condition – EARNED and RANDOM – aggregated over all possible wage levels.

**[Table 2 – Comparison of Stage 1 and Stage 3 Productivity]**

Looking first at productivity in the 8-minute practice period in Panel A, we see that across conditions, participant workers (on average) produced non-zero amounts of output, despite this being non-incentivized. Moreover, the productivity levels in Stage 1 are very similar across conditions (and not statistically different), as we would expect given that the conditions are identical up to the completion of Stage 1. The similarity in Stage 1 output suggests we have adequate randomization to condition. Thus, we can identify how different wage distributions, along with the manner in which they are assigned, impact productivity by focusing on productivity differences in the Stage 3 paid work period.

Importantly, there is a very strong positive correlation between productivity in Stage 1 and Stage 3 in both the EARNED condition (*r* = .819; *p <*.001) and RANDOM condition (*r* = .418; *p <*.001). This implies that, on average, workers who produced more output in the Stage 3 paid work period were the same workers who produced more in the Stage 1 ranking stage. Given this positive correlation, we maintain that the EARNED condition creates a perception among workers that assignment of ranking within the group is *more* merit-based (i.e., those with higher productive capability are assigned a higher rank), compared to the RANDOM condition.[[19]](#footnote-19)

**3 Results**

**3.1 Preferences over Wage Distributions from Stage 2**

Recall, in Stage 2 of our experiment, participants in the EARNED (186 participants) and RANDOM (168 participants) conditions were asked to choose between 4 different wage distributions under 5 different voting scenarios. Figure 1 displays breakdown of preferred wage distribution across voting scenarios separately for the EARNED condition (Panel A) and the RANDOM condition (Panel B).

**[Figure 1 – Breakdown of Wage-Distribution Preferences]**

Before discussing specific results, it is worth commenting on a few general features of the preference data. From Figure 1 we see there is substantial variation in the preferred wage distribution across voting scenarios, and this is true for both the EARNED and RANDOM conditions. In fact, only 10% of participants chose the same preferred wage distribution across all 5 scenarios. To examine the voting patterns across scenarios more closely, Table 3 presents the percentage of participants that chose the same preferred distribution across all the different voting scenario pairs for both the EARNED and RANDOM conditions. From Table 3, the highest level of consistency across scenarios is 61% (between the Veil and Planner in the EARNED condition). Importantly, though, there is also evidence that preference selections were not made at random. Namely, there was more consistency across scenario pairs with more similar incentives (like Planner versus Veil) compared to scenarios pairs with very different incentives (like Rank 1 versus Rank 3). Taken together, these features of our voting data from Stage 2 data suggest that our experimental methodology was successful in eliciting participants’ *contingent* preferences.

**[Table 3 – Preference Consistency across Voting Scenario by Condition]**

**3.1.1 Preferences for Trading off Equality and Efficiency**

In this subsection we investigate the research question, “how do participants motivations for ‘equality’ and ‘efficiency’ interact in the context of piece rates?” While these motivations are fairly well understood in the context of final income distributions (see footnote 2), there has been relatively little work in the context of piece-rate wages. Our experimental setup pitted the two motivations against one another. The wage distribution with the highest average wage (i.e., the most efficient) – *Wage Inequality* – was also the most unequal (i.e., largest difference in piece-rate between Rank 1 and Rank 3). The wage distribution with equal wages – *Wage Equality –* also had the lowest average wage (i.e., the least efficient). Participants were then unable to satisfy both motivations. Our specific research question, then, can be understood as, “Are participants willing to trade off ‘efficiency’ for equality in the context of piece-rate wages?”

To answer this question, we turn to data on wage distribution preferences in the EARNED and RANDOM conditions that are presented in Figure 1. At first glance, it is evident that for both conditions, in three of five voting scenarios – Planner, Veil, and Rank 2 – the *Wage Equality* distribution was the most preferred distribution by participants. Furthermore, Wage Equality was usually preferred over Wage Inequality, and this difference was significant for the EARNED condition in the Planner, Veil, and Rank 3 scenarios, and for the RANDOM condition in the Planner, Veil, and Rank 3 scenarios. It is worth noting here that the Planner, Veil, and Rank 2 scenarios provide the least opportunity, compared to Rank 1 and Rank 3, to personally benefit from one’s own vote in expectation. As such, these three scenarios should be more reflective of participants’ *general* preferences and values. Overall, the data reveals a strong pattern in participants expressing a preference for Wage Equality over Wage Inequality; thus forgoing more efficiency for (ex-ante) equality in wages.

However, when there is an opportunity to personally benefit from NOT *Wage Equality*, we observe participants overwhelmingly express a preference for the distribution that awards them the highest wage – participants become selfish. Namely, The *Wage Inequality* distribution was preferred by the most participants in the Rank 1 voting scenario (70% in both EARNED and RANDOM), while the *Wage Inversion* distribution was most popular in the Rank 3 voting scenario (50% in EARNED; 70% in RANDOM). It is also worth noting that even when holding the piece-rate constant we do observe a non-trivial fraction expressing a preference for Wage Inequality. Specifically if we consider the Rank 2 scenario, a worker of rank 2 is slated to receive a piece-rate of $1 in both the Wage Equality and Wage Inequality scenarios. Yet, 35% and 30 % preferred Wage Inequality in the EARNED and RANDOM conditions, respectively.

Digging a little deeper, we actually find that 43% of participants (80 of 186) in the EARNED condition and 58% (98 of 168) in the RANDOM condition can be classified as “selfish voters.” We define selfish voters as those who, in the three Rank scenarios, always vote for a distribution that assigns themselves the highest wage. While these selfish voting patterns are defined in, and thus mostly apply to, the Rank scenarios, it is worth noting that selfish voters were also significantly less likely to vote for the *Wage Equality* distribution in the Veil and Planner scenarios.[[20]](#footnote-20) To summarize, the spikes in votes for the *Wage Inequality* and *Wage Inversion* distributions in the Rank 1 and Rank 3 scenarios, respectively, seem to be the result of participants motivated by individual wage maximization. Compared to their peers, these same participants appear less interested in wage equality more generally, indicating a connection between preferences for wage equality, and a willingness to sacrifice one’s own wage.

Our results evidence that participants are often willing to give up overall efficiency in favor of more equal piece-rate wages under certain conditions; namely, when they essentially incur no person cost – in the form of a lower wage for themselves – from a expressing such a preference for equality. However, this preference is “weak” in the sense that participants often express a preference for a more unequal distribution when they can selfishly benefit from such a distribution in the form of a higher wage. Importantly, these results are not about fixed wages or final income; indeed, final incomes may differ substantially even under a regime of equal piece-rate wages. While our results generally mesh well with various theories and results relating to distributional preferences, we contend that economists should be looking beyond just final income distribution when trying to understand core notions and norms relating to fairness in compensation schemes. Specifically, our results are in-line with the idea of equality of opportunity.

**3.1.2 Merit’s Effect on Preferences**

In this subsection, we address the research question, “how do wage-distribution preferences change when one’s position or rank in the distribution is determined in different ways?” Recall that, the EARNED and RANDOM conditions differed in the way ranks were assigned in groups. Under the RANDOM condition the ranks were assigned randomly, while in the EARNED condition, ranks were assigned based on performance in the ranking stage. Thus, we address this research question by comparing preferences across conditions and voting scenarios.

A few key differences emerge in the pattern of wage-distribution preferences between the EARNED and RANDOM conditions. Notably, under the Planner scenario the percentage who vote for *Wage Equality* is marginally lower in the RANDOM condition (45%) compared to EARNED (55%) (Chi-Squared test: *p =* .071), with more people instead choosing the *Wage Inversion* distribution that has a more moderate level of wage dispersion. Another difference emerges under the Rank 3 scenario where the fraction of workers in the RANDOM condition that choose the *Wage Inversion* distribution is over 20 percentage points higher compared to the EARNED condition, 71% vs 50% (Chi-Squared test: *p <* .001), while the fraction that choose the *Wage Equality* distribution is 12 percentage points lower than in EARNED condition, 23% vs. 35% (Chi-Squared test: *p =* .013). This indicates that workers are much more willing to forgo their own wage for wage equality when their low rank in the group is a result of their relatively lower productive capability, compared to when their low rank is a result of random chance. Alternatively stated, in the RANDOM condition, workers who are randomly assigned Rank 3 feel more entitled to receive the highest wage because their disadvantageous rank was by chance.

Overall, our results suggest that merit can play some role in how people think wages ought to be distributed among workers; namely, we see a shift away from equal wages when rank is random. The results for the Rank 3 scenario are particularly telling, as we observe an increase in “entitlement” (e.g., preferring the *Wage Inversion* distribution) in the RANDOM condition. While our results are far from settling society-wide debates, they are marginally supportive of the idea that a meritless social arrangement would see a rise in rent seeking and similarly entitled behaviors.

**3.1.3 Ability’s Effect on Preferences**

In this subsection, we address the research question, “Do participants with higher ability have systematically different preferences between efficiency and equality?” Furthermore, the two conditions allow us to address the follow-up, “To what extent are differences a function of high-ability participants directly benefitting from inequality?” Specifically, we use the fact that in the EARNED condition, higher ability participants are more likely to be assigned Rank 1, compared to the RANDOM condition, which may differentially impact preferences in the Veil scenario.

Since participants do not have full information about other participants’ ranking stage performance, we must operate on the level of beliefs. We assume that participants have some belief about their relative productivity when voting, based on their ranking stage performance. This could be because participants develop reasonable expectations during the ranking stage, or that high ability participants have prior beliefs about being high-ability, and that these same participants are more likely to do well in the ranking stage. In either case, we use the ranking stage output as our best proxy of a participant’s believed relative productivity. Table 4 presents the results of a set of logit regressions with the main independent variable being the output from ranking Stage 1, and its effect on choosing either the *Wage Equality* or *Wage Inequality* distribution (for both the EARNED condition and the RANDOM condition)

**[Table 4 – Preferences by Ability]**

The most intuitive result from the table is that more productive workers in the ranking stage tended to prefer *Wage Inequality* in the Veil scenario under the EARNED condition. This is consistent with monetary self-interest as more productive workers would be more likely to receive the high rank 1 wage in the *Wage Inequality* distribution. A somewhat more puzzling result is that workers in the Rank 2 scenario were also more likely to prefer *Wage Inequality* (to the detriment of the *Wage Equality* distribution in particular). Such a preference had no particular monetary benefit to underpin it. This could be a result of more productive workers having a propensity to value efficiency or possibly holding stronger meritocratic or Just World beliefs.

Looking at the RANDOM condition, where output in Stage 1 did not play a role in ranking, we see little impact of Stage 1 output on preferences for *Wage Equality* or *Wage Inequality*. Furthermore, looking at the planner scenario (arguably the most representative of participants’ subscribed norms), we also see no significant relation between Stage 1 output and preferences, even in the EARNED condition. Taken as a whole, we find little evidence that preferences between *Wage Equality* and *Wage Inequality* are strongly correlated with our proxy for raw ability.

**3.1.4 Participant Characteristics and Voting Patterns**

As part of the post-work survey, we elicited some self-reported information on a variety of different characteristics including: (i) attitudes toward income inequality, (ii) attitudes toward wage inequality, (iii) deservingness of pay, (iv) attitudes toward welfare, and (v) political affiliation. We conducted some post-hoc analysis to examine any possible moderating effects of these characteristics on wage-distribution preferences. For brevity we omit reporting the full set of results regarding these moderating effects. However, we note that in general, there was very little difference in the voting patterns that emerged based on differences in these characteristics, and any effects that emerged were small and in the obvious and expected direction. For example, one pattern that seemed to consistently emerge is that participants who reported more strongly that income inequality was a serious problem were more likely to vote for the *Wage Equality* distribution. Similarly, participants who reported that current wage inequity in large firms was too high were more likely to vote for the *Wage Equality* distribution. Alternatively, participants who reported more strongly that merit is an important component in determining pay were more likely to vote for the *Wage Inequality* distribution. Lastly, more politically conservative participants were more likely to be classified as selfish voters; this result could be due to the emphasis that conservative policies place on individual self-determination, as well as the emphasis that liberal policies place on equality. These results are generally consistent with findings documented in the prior literature related to preferences for income redistribution.

**3.2 Productivity Responses to Wage Distributions from Stage 3**

We now turn to the second main objective of this study; to examine how different types of wage distributions impact the productivity of the affected workers.[[21]](#footnote-21) In this section, we present the data on group-level and worker-level output from the 22-minute paid work period that followed the Stage-2 preference elicitation. When appropriate, we decompose the data by rank-assignment condition (EARNED vs RANDOM), wage distribution, and worker rank.

Before presenting the output data, we begin with an overview of group-level earnings and inequality to verify, ex-post, that the distributions generated the intended tradeoffs between equality and efficiency. Table 5 presents (at the group-level) the average total earnings for the group (i.e., the total size of the pie), and the average Gini coefficient (calculated for each group) across each wage distribution by condition.

**[Table 5 – Average Group-Level Earnings per Wage Distribution by Condition]**

From Table 5 it is evident that the various wage distributions generated substantial variation in both efficiency and equity. Importantly, the relation in these measures across distributions was generally in the intended direction. Specifically, the *Wage Inequality* distribution, intended to be the most efficient, did result in the largest average group earnings across both the EARNED and RANDOM conditions. Meanwhile, the *Wage Equality* and *Wage Inversion* distributions, intended to be the least efficient, did result in smaller average group earnings. Importantly, in moving from the *Wage Inequality* distribution to either the *Wage Equality* or *Wage Inversion* distribution, there was a significant reduction in group-level earning, indicating a reduction in overall efficiency.[[22]](#footnote-22) On the other hand, when consider the average Gini coefficients, we see that *Wage Inequality* generated the largest Gini in both the EARNED and RANDOM conditions, indicating the most unequal distribution of earnings; whereas the *Wage Equality* and *Wage Inversion* distributions generated the smallest Gini, indicating the most equal distributions. With respect to contrasting wage preferences with final income distributional preference, our Gini results generally show an ex-post alignment of the two. We had intended the *Wage Inversion* distribution in the EARNED condition to draw the attention of those with income-level preferences for equality. The statistically similar Gini coefficients for *Wage Inversion* and *Wage Equality* in the EARNED condition lend support for our intention, though a statistically lower coefficient for Wage Inversion would have been more convincing. Still, ex-ante preferences would not have been based on Gini results, but rather off of initial beliefs that we did not directly observe. All-in-all, we created a situation where participants could have expressed a desire for income-level equality over wage-level equality, but we cannot say that the lack of such an expression implies the opposite desire.

**3.2.1 Quantity of Output across Wage Distributions.**

In this subsection, we address the research question, “How do participants respond, in the quantity dimension, to varying levels of wage inequality?” We expected that participants would respond negatively to wage inequality, and that this response would be generally greater in the RANDOM condition. This would be consistent with a distaste for inequality, and more so inequality without justification. In addition to a group-level effect of inequality, our distributions invite relative wage comparisons that could impact participants disparately depending on their realized rank and wage. However, we find little evidence at the individual level of systematic responses to the different wage distributions. Table 6 presents the average output of workers in the paid work period, broken down by the wage profile for the group, the workers rank within the group. Panel A displays the results for the EARNED condition and Panel B for the RANDOM condition.[[23]](#footnote-23)

**[Table 6 – Average Output in Paid Work Period by Condition and Worker Ranking]**

Looking first at output from the EARNED condition, Panel A of Table 6 reveals that there is very little difference across the four different wage distributions. Testing for an overall treatment effect of the wage distribution on output level, we find no significant effect (ANOVA: *p =* .718).[[24]](#footnote-24) The distribution of wages, had little effect on the aggregate amount of output produced within the group of workers when worker rank was earned based on productive capability. Looking next at aggregate output in the RANDOM condition, Panel B of Table 6 reveals that there are some differences across the four wage distributions. Testing for an overall treatment effect of the wage distribution on the aggregate level of production within the group, we do find a significant treatment effect (ANOVA: *p <* .001). Specifically, the *Wage Equality* distribution results in lower average output than under *Wage Inequality* (Mann-Whitney U-test: *p =* .088) and the *Minimum Wage* distribution (Mann-Whitney U-test: *p <* .001). Additionally, average output is significantly higher under the *Minimum Wage* condition compared to the *Wage Inequality* condition (Mann-Whitney U-test: *p =* .007) and the *Wage Inversion* distribution (Mann-Whitney U-test: *p =* .008).[[25]](#footnote-25) However, some caution needs to be taken in, what we would consider, the outlier of *Minimum Wage* distribution under the RANDOM condition; this result seems spurious given a lack of intuitive rationale and relatively small number of observations for this distribution (since it was rarely chosen in Stage 2 as the preferred distribution).

We also run regressions for each condition that assumes total quantity of output is a function of inequality in the wage distribution, with and without controlling for individual wage. We used the Gini coefficient formula applied to the wage distribution as a measure of the inequality of each of our wage distributions. We present the results of these regressions in Table 7.

**[Table 7 – Quantity Response to Wage Equality]**

Our regression results reinforce those noted previously, i.e. the lack of an effect in the EARNED condition, and results in the RANDOM condition in favor of more unequal distributions. In our second specification, we control for wages, which should neutralize the advantage of the *Wage Inequality* and *Minimum Wage* distributions having higher average wages, yet we still see a significantly positive regression coefficient on the wage distribution Gini. All-in-all, we do not see the effect of wage inequality on output quantity that we expected at the group level. We suspect that the nature of piece-rate wages in incentivizing quantity maximization plays a large role in dulling the effect of wage inequality.

Beyond group-level output, our design allows us to identify how possible heterogeneous impacts on the different-ranked workers in the group. In particular, even in the EARNED condition where we found essentially no significant group-level output differences across wage distributions, it’s still possible that there might be differential effects for certain types of workers, which could have had opposing effects and, hence netted out in the group-level analysis.[[26]](#footnote-26) In the EARNED condition, Panel A of Table 6 shows that there are no sizable heterogeneous effects on output based on worker ranking; specifically, there is no significant treatment effect of the wage distribution for rank 1 workers (ANOVA: *p =* .881), rank 2 workers (ANOVA: *p =* .719), or rank 3 workers (ANOVA: *p =* .582). Overall, the data reveals that the implemented wage distribution had virtually no impact on worker output, regardless of their rank within the group, when rank was earned.[[27]](#footnote-27)

In the RANDOM condition, Panel B of Table 6 reveals more variation in worker-level output across wage distributions. In particular, there is a significant wage distribution effect on productivity for rank 2 workers (ANOVA: *p =* .028) and rank 3 workers (ANOVA: *p =* .046), while there is no significant overall treatment effect for rank 1 workers (ANOVA: *p =* .266). While it is the case that the wage distribution seems to impact worker-level output more in the RANDOM condition than in the EARNED condition, it is prudent to exercise some caution regarding this finding. Namely, the significant treatment effect of the wage distribution is largely being driven by the higher output levels under the *Minimum Wage* distribution, but we only observe a total of nine groups under this wage distribution (because of the infrequency with which this distribution was voted as the preferred distribution). Given the small sample size, it is plausible that the presence of a few highly productive outliers could be driving this result.

In summation, we find little evidence of systematic differences in output quantity as a function of wage distribution in the EARNED condition and, at most, only a small effect (and in the counter-intuitive direction) in the RANDOM condition. Lastly, we briefly comment on the *efficiency* of the different wage distributions from a firm’s perspective. That is, considering group-level output on a per dollar basis. If we combine the group-level output data from Table 6 with the average group-level earnings from Table 5, an interesting story emerges. From the perspective of a cost-conscious firm, *Wage Equality* seems to be a clear winner over the *Wage Inequality* and *Minimum Wage* distributions.

**3.2.2 Quality of Output across Wage Distributions.**

In this subsection, we address the research question, “How do participants respond, in the quality dimension, to varying levels of wage inequality?” In our data-entry task, as well as many real-world work tasks, there is a quality dimension to output produced; worker productivity encompasses not only how much output the worker produced but also the *quality* of that output. Thus, there is the possibility for inequality in wage distributions to impact the quality of work produced, even in the absence of significant differences in quantity (e.g., Greiner et al., 2011).

In our task, workers can produce *lower quality* output in the form of more error-laden entries. We construct a quality measure based on the accuracy of the information entered; naturally, more errors correspond to lower quality output. Recall that by design, participant workers did not have to enter applications correctly to receive their compensation, thus there was scope for observed inaccuracy. For each application entry, we check accuracy based on following entry fields:

* First Name
* Last Name
* Zip code
* Set of 6 radio buttons indicating education background and inclusion of documents

For each application entered, we check if each of these 9 fields were entered correctly. If any of the 9 fields were entered incorrectly, that application is designated as being inaccurate. Then, we construct a worker-level measure of quality, which we denote as *inaccuracy,* as the proportion of total forms entered that were inaccurate.[[28]](#footnote-28) In essence, higher rates of *inaccuracy* would represent lower levels of effort, manifested through being more careless and less focused. Table 8 displays the average *inaccuracy* rate, broken down by worker ranking across each of the four wage distributions, separately for the EARNED and RANDOM conditions.

**[Table 8 – Output Quality: Comparison of *Inaccuracy* Rates]**

We begin by looking at output quality in the EARNED condition.[[29]](#footnote-29) From Panel A, we see that the overall *inaccuracy* rate is relatively stable across the four wage distributions; in particular, the average *inaccuracy* rates are 13.3% under *Wage Equality* distribution, 12.9% under *Wage Inequality*, 10.2% under *Wage Inversion*, and 12.8% under *Minimum Wage*, which are not jointly significantly different (ANOVA: p = .732). In terms of comparisons at the worker rank level, there are no discernable differences in *inaccuracy* rates for either rank 1 or rank 2 workers across wage distributions. On the contrary, for rank 3 workers, the *inaccuracy* rate is noticeable lower under the *Wage Inversion* condition (7.1%) compared to the other three distributions (15.7%, 15.3%, 17.3%, respectively); this difference is significant when comparing to *Wage Equality* (Mann-Whitney U-test: p = .019) or *Wage Inequality* (Mann-Whitney U-test: p = .023) distributions. Thus, when the lower capability, rank 3 workers are provided with the highest wage, they seem to take the task more seriously and produce higher quality output.

Panel B of Table 8, presents the *inaccuracy* rates for the RANDOM condition. Similar to with the output level data, we see much more variation in quality in the RANDOM condition. Namely, the overall average *inaccuracy* rate was 7.2% under *Wage Equality* distribution, 12.1% under *Wage Inequality*, 16.0% under *Wage Inversion*, and 13.8% under *Minimum Wage*, and these differences are jointly significantly different (ANOVA: *p =* .008). Thus, in the aggregate, the *Wage Equality* distribution seems to generate the lowest rate of inaccurate entries (i.e., the highest quality), and this difference is significant when comparing to *Wage Inversion* distribution (Mann-Whitney U-test: *p <*.001), and marginally so to both the *Minimum Wage* and *Wage Inequality* distributions (Mann-Whitney U-test: *p =* .082 and *p =* .061, respectively).

Some interesting results also emerge within the worker ranks in the RANDOM condition. In particular, for the rank 1 workers there is a noticeably higher *inaccuracy* rate under the *Wage Inversion* condition (16.7%), especially compared to the *Wage Inequality* condition (Mann-Whitney U-test: *p =* .079), and marginally so to the *Wage Inequality* condition (Mann-Whitney U-test: *p =* .106); thus, rank 1 workers seem to produce the lowest quality output when they are paid the least (and their low rank is a result of random chance). For rank 2 workers, we also see differences in quality across distributions. In particular, they have the lowest *inaccuracy* rate under the *Wage Equality* distribution (5.2%), compared to the other three distributions (15.5%, 11.7%, 12.0%, respectively), which are all significantly different (Mann-Whitney U-test: *p =* .036; *p =* .011; *p =* .053; respectively). Thus, rank 2 workers appear to produce lower quality output when the wage distribution is not equal and there is another worker who is *unjustifiably* making more than they are. Lastly, for the rank 3 workers, we see that similar to rank 2 workers, the *Wage Equality* distribution produces the lowest *inaccuracy* rate (7.0%). Also, we see that the *Wage Inversion* condition, where rank 3 workers are paid the most, induced the highest *inaccuracy* rate (19.7%); this rate is significantly higher than under *Wage Equality* (*p =* .009) and the *Wage Inequality* (*p =* .049). Thus, the higher wage, when it is randomly assigned, possibly entices the rank 3 workers to work faster and make more errors.

Overall, the data reveals a much stronger impact of inequality in the wage distribution on quality of output produced, especially in the RANDOM condition. Importantly, when there is no merit component to worker rank, *Wage Equality* generally results in higher quality output.

**3.3 Preferences and Productivity Combined**

Due to our multifaceted design, we can investigate a couple of questions relating to how productivity responses were impacted by preferences. In particular, we look at how productivity is affected when a participant is working under a preferred wage distribution, and we look at how participants who expressed a general preference for wage equality respond when working under the *Wage Equality* distribution. It is useful at this point to distinguish the use of “preference” in these two instances. When discussing a preferred wage distribution, we have in mind the conditional preference given the rank realized. A general preference for wage equality is not meant to be conditional, it is instead intended to refer to the idea that equal wages are desirable in a normative sense. This idea is best captured in the Planner and Rank 2 scenarios where monetary incentives between wage distributions are minimal or non-existent. For lack of a better term, and to reduce confusion, we will refer to participants who express a general preference for wage equality as “fair minded.”

**3.3.1 Realization of Preferred Wage Distribution**

We document substantial heterogeneity in wage-distribution preferences. A natural question, and one we focus on in this subsection, is, “Do workers make different production choices when the realized wage distribution (under which they are working) is consistent with their stated preferences?”[[30]](#footnote-30) To shed light on this question, we first stratify workers in the paid working period based on whether the implemented wage distribution matches their stated preference, given their actual realized rank.[[31]](#footnote-31) Next, we examine if this impacts their productivity, both in terms of level of output and quality of output. To do so, we regress both the level of output and the quality of output (Inaccuracy Rate) on worker rank and the interaction with a dummy variable, *PWD* = 1, when the implemented wage distribution matched the workers stated *preferred wage distribution* (*PWD*). Table 9 displays the regression results.

**[Table 9 - Productivity under a Preferred Wage Distribution (PWD)]**

From column 1, we see that working under one’s stated *PWD* has little impact on the output level in the work period; this is true for both the EARNED and RANDOM conditions, as well as for each of the worker ranks. Namely, the interaction term of *PWD* and worker rank is not statistically significant for any of the three worker ranks in either condition. Similarly, looking at column 2, we see little evidence that working under one’s preferred wage distribution impacts *quality*. Specifically, in terms of *Inaccuracy* rate, we see that the interaction terms of *PWD* and worker rank are generally negative, but only statistically significant for the rank 2 in the RANDOM condition; these negative interaction terms indicate the corresponding workers were less likely to produce an inaccurate application when working under their stated wage-distribution preference. Overall, the data does not suggest that participants respond significantly to getting a preferred wage distribution, despite the sensible intuition that they would.

**3.3.2 “Fair Minded” Response to Wage Equality**

In this subsection we look at responses to working under the wage equality distribution after having expressed a general preference for wage equality. We focus on the question, “Do fair minded individuals respond positively to working under the *Wage Equality* distribution?” We define a “fair minded” individual as one who voted for the *Wage Equality* distribution in both the Rank 2 and Planner scenarios.[[32]](#footnote-32) We look at this measure of “fair mindedness” as well as our classification of selfish voting in relation to quantity and quality responses to working under the *Wage Equality* distribution in Table 10.[[33]](#footnote-33)

**[Table 10 - Response to Wage Equality by “Fair Minded” Workers]**

We present six specifications which allow for slightly different comparisons; our first specification isolates the quantity response of “fair minded” subjects, the second allows a relative comparison the quantity response of “fair minded” subjects to the response of other subjects, and the last controls for our selfish voting classification. A subject could be classified as both “fair minded” and “selfish”. This third specification is meant to check if the “fair minded” response is being driven by subjects also classified as selfish voters. Specifications four through six follow the same identification pattern but look at inaccuracy rates.

What jumps out immediately is that “fair minded” quantity responses to wage equality are negative in all of our specifications. That is to say, “fair minded” subjects produced less under *Wage Equality* than other distributions, responded more negatively to *Wage Equality* than other subjects, and that the “fair minded” response was not merely a result of selfish voters who were also classified as both “fair minded.” That said, these results were only statistically significant in the case of the isolated “fair minded” response in the RANDOM condition.

Regressions on error rates show a less consistent pattern in that the quality response of “fair minded” subjects was in opposite directions in our two conditions. That said. The response was not significant in the EARNED condition, while it was highly significant in the RANDOM condition. Focusing on the RANDOM condition, we see that “fair minded” subjects produced much higher quality output when working under wage equality, that this response was significantly greater than the response of other subjects, and that this response remains when controlling for our selfish voting classification.

Looking at the quantity and quality results together, we see in the RANDOM condition a clear case of subjects working slower but more carefully. It is not clear, of course, to what extent this response can be generalized. Still, it is worth highlighting that in the context of piece-rate wages, this type of response is beneficial for firms. The reduced quantity, from the firm’s perspective, matters little since wages are tied directly to quantity. The increased quality, on the other hand, is a clear benefit, as firms receive a higher quality of output for the same cost. The situation calls to mind a gift exchange, where “fair minded” workers reward firms with higher quality output after receiving an equitable wage distribution. In order to gain confidence in such a story, however, more investigation is necessary, as this story is but one potential explanation of our results.

**4 Discussion and Concluding Remarks**

The main motivation of this paper is twofold. First, we examine people’s preferences over how piece-rate wages are distributed among groups of workers, when faced with a menu of possible distributions that differ in their degree of: equality, efficiency, and implied final income equality. Substantial research attention has been geared toward understanding peoples’ preferences for ex-post income redistribution. We aim to complement this literature by examining ex-ante preferences over how piece-rate wages are distributed among workers, which in combination with subsequent effort provision, ultimately plays a large role in shaping the distribution of final incomes. Second, we examine how these different wage distributions impact worker output, both in terms of quantity and quality of output using a real-effort experiment. Importantly, by combining preference data with productivity data, we are able to empirically examine plausibly interesting interactions at the individual worker level. More generally, we see our study as being applicable in settings where final incomes are (at least in part) performance based (e.g., performance-based bonuses or commissions), which are becoming increasing more prevalent across a host of different industries and occupations (Lemieux et al., 2009).

Summarizing our main results regarding wage-distribution preferences, we find significant heterogeneity. When participant workers are acting as a *social planner* (deciding a wage distribution for another group of workers) or from *behind the veil* (when they don’t know with certainty where in the group they rank and hence how they will be affected), the majority of people (roughly 55%) prefer equal wages, despite it having the lowest average wage (i.e., being the most inefficient); thus, expressing a preference for trading-off overall efficiency for (ex-ante) equality in piece-rate wages. However, when workers are asked to choose their preferred distribution assuming they know their rank within the group, we observe significant non-stationarity in preferences, and people become much more selfish. Thus, workers appear to like the idea of wage equality, so long as they can’t selfishly benefit from a more unequal pay (i.e., they incur a cost to express a preference for equality). Namely, if they are highly ranked, then they instead prefer a more unequal wage distribution that rewards the high-rank worker with a higher wage. In a similar vein, if workers are ranked low, they actually prefer a somewhat perverse wage distribution that provides the low ranked worker with the highest wage. Lastly, we see that merit does impact wage-distribution preferences. Most notably, the lowest rank workers are much less likely to vote for the distribution that gives them the higher wage (in favor of wage equality), when rank is earned, compared to randomly assigned; this indicates that these lower ranked workers exhibit less selfish voting when their low rank is deserved.

Our results regarding piece-rate, wage-distribution preferences point toward a more nuanced view of redistributive preferences. Namely, when acting as a planner or behind the veil of ignorance, most workers expressed a preference for less *ex-ante* wage inequality and were willing to trade off lower average wages in favor of an equal wage distribution. While the equal wage distribution does generate a more equal final income distribution (compared the alternative wage inequality distribution), it is important to note that it does generate some inequality in final incomes because of inherent differences in ability and consequent levels of output. Furthermore, the *Wage Inversion* distribution, which would plausibly generate more income equality than the *Wage Equality* distribution, was the least preferred distribution. Thus, our results suggest that in an effort to reduce high levels of income inequality, policies aimed at reducing wage dispersion (e.g., increasing minimum wage or capping executive compensation) may be a plausible and preferred alternative to income redistributive policies (e.g., taxation and social welfare programs). The reason being that such wage policies might garner more support given they have the appeal of being perceived, ex-ante, as fairer; importantly, this could hold true even under performance-based pay where equal wage distributions can still, ultimately, generate some inequality in final incomes based on differences in worker-level effort. Overall, our results seem to largely support the narrative of equality of opportunity or, alternatively stated, equal pay for equal work.

At the same time, there is some potential concern that compressing wages could have detrimental impacts on productivity (through altering the effort incentives), although our results would not support this view entirely. Notably, we find very little difference in quantity of output produced across the four different distributions, especially when worker ranking within the group is merit based. However, because on the nature of the real-effort work task, we also examine how the distribution of wages impacts the *quality* of output. Our results do suggest that relative pay comparisons can impact productivity more subtly, through changes in output quality. Most notably, when high-ability workers are paid the least, they produce significantly lower-quality output. This result is similar to the findings in Gross et al. (2015) where high-ability workers reduce effort if they are paid less than the low-ability worker. Thus, under a piece-rate, our results suggest that high-ability workers may still shirk in response to low pay, albeit in a subtler way through low-quality work. We also find some evidence cutting the other way. Specifically, low-ability workers produce higher quality output when they are given the highest relative wage. Furthermore, we find some evidence implying that if worker ranks within a group are determined randomly, then unequal pay schemes might induce lower-quality output by those workers receiving the unfair wages. Lastly, we document evidence that workers who value wage equality tend to produce a lower quantity of output in exchange for a somewhat higher quality. In our view this underscores the importance of utilizing a real-effort task rich enough to allow for effort responses to manifest through both quantity and quality of output produced. Overall, these results can help to deepen our understanding of how wage distributions and relative pay comparisons impact overall productivity, beyond just the output-quantity dimension.

We acknowledge that our design is stylized and the lack of observed differences in output across the different wage distributions may be, in part, an artifact of the design. First, participant workers were not provided with a *compelling* outside option to working,[[34]](#footnote-34) which reduces the implicit effort cost (Goerg et al., 2019) and could have muted the pure wage effect on total output.[[35]](#footnote-35) That said, we do observe an effort response based on the distribution of wages that manifests more subtly through changes in quality of output produced. One way to interpret this is that in work environments where explicitly “opting out” of work is less realistic (e.g., working on an assembly line), the distribution of wages might impact worker productivity in meaningful ways through the more natural channel of output quality. Second, workers in our setting might have felt adequately compensated for the task, even at the lowest piece-rate. Cohn et al. (2015) find that effort responses to wages depend on the workers’ initial perception of wage, where an effort response to a wage increase is only observed for those who felt underpaid, whereas those who initially felt adequately paid or over-paid don’t show an effort response. In line with the findings from Cohn et al., such perceptions could have resulted in an inelastic response of output to changes in the wage over the range we consider (Araujo et al., 2016). That said, Charness and Kuhn (2007) also find little effort response to changes in wages and they aptly note that there is a difference between caring about relative wages and actually acting on them. Of course, our quality results suggest that workers may indeed have been sufficiently motivated but chose to act on these motivations through the alternative dimension of quality. Despite the aforementioned limitations, we view our results as being informative in the narrowest scope to workplace settings where compensation is (partly) performance-based and where explicitly “opting-out” of work may be infeasible or unrealistic.

Topics surrounding the degree of inequality continue to remain the focus of important scholarly debate (Piketty, 2014; Piketty & Saez, 2003; 2014; Piketty & Zucman, 2014). Large-scale survey studies by Alesina & La Ferrara (2005), Norton & Ariely (2011), Cruces et al. (2013), and Kuziemko et al. (2015) show that people seem to have a preference for less income inequality. Better understanding preferences over wage distributions and their possible impact on productivity strikes us as an important step in the process of better understanding views on income inequality and implications of policies aimed at reducing the pay gap within firms. Kiatpongsan & Norton (2014) provide survey evidence that people express a desire for more equal pay within firms. Our incentivized wage-distribution preference results echo this finding; the majority of people prefer the (*ex-ante*) equal wage distribution, even if it is less efficient and some inequality arises in final incomes (*ex-post*).

More recently, a new debate has sprung about the merits of limiting pay secrecy and making wages within firms more transparent.[[36]](#footnote-36) While these polices do not directly alter the distribution of wages, they do reveal the wage distribution to workers. Hence, in evaluating the potential ramifications of enacting such a pay transparency policy, it is important to anticipate how workers might respond under the presence of becoming informed of the distribution of wages. Our results suggest that such policies are more likely to result in workers altering their *quality* of work, rather than total output (especially if there is a performance pay component). Namely, those who (perceive) being paid unfairly will shirk. Moreover, if the exposed wage distribution does not accord with workers’ ideals, the consequential impact of effort provision might be amplified.

A unique component of our study is the elicitation of wage-distribution preferences, which enables us to gain insights into workers’ attitudes regarding the wage distribution at their current employer, and how workers might view proposed changes that would impact the wage distribution. Having a more precise characterization of wage-distribution preferences is useful in determining how employers balance the need for inequality as an incentive mechanism with the need to maintain employee morale. Our productivity results suggest that policies aimed at altering the pay gap with firms, or exposing the pay dispersion within the firm, might not result in large impacts on total output produced; particularly in settings where wages are merit based and there is some degree of performance pay. Although, these policies could result in more subtle impacts through reductions in quality of output produced, especially if they don’t align with worker preferences.[[37]](#footnote-37) Overall, the result from our study can help to deepen our understanding of preferences over the distribution of wages within firms and how those preferences relate to preferences over final incomes, as well as the corresponding impact of relative pay comparisons on productivity, both in terms of quantity and quality of output produced.

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**Figure 1 – Breakdown of Wage-distribution Preferences by Condition and Voting Scenario**

**Table 1 – Possible Wage Distributions**

|  |  |
| --- | --- |
|  | Wage Distributions |
| Worker Ranking | *Wage Equality* | *Wage Inequality* | *Wage Inversion* | *Minimum Wage* |
| Rank 1 | $1 | $2.1 | $.75 | $1.8 |
| Rank 2 | $1 | $1 | $1 | $.75 |
| Rank 3 | $1 | $.5 | $1.25 | $.75 |
| Average Wage within the Group | $1 | $1.2 | $1 | $1.1 |

**Table 2 – Comparison of Stage 1 and Stage 3 Productivity by Condition**

|  |  |  |
| --- | --- | --- |
|  |  | Experimental Condition |
|  | EARNED | RANDOM |
| *Stage 1 Ranking Period Output* |
|  | Mean | 5.6 | 5.6 |
|  | Median | 6 | 6 |
|  | Min  | 3 | 2 |
|  | Max | 9 | 9 |
|  |  |  |  |
|  | N | 186 | 156 |
| *Stage 3 Paid Work Period Output* |
|  | Mean | 20.1 | 20.1 |
|  | Median | 20 | 20 |
|  | Min  | 13 | 10 |
|  | Max | 30 | 29 |
|  | Avg. Earnings | $22.5 | $21.75 |
|  |  |  |  |
|  | N | 156 | 168 |
| **Notes:** Due to a computer crash, 12 ranking period totals in the RANDOM condition were lost, leaving 156 remaining.ranking period observations. Due to a coding error, we drop 30 observations from EARNED condition in the work period due to mis-assigned ranks. |

**Table 3 – Preference Consistency across Voting Scenario by Condition**

|  |  |  |  |
| --- | --- | --- | --- |
| ***Panel A: EARNED Condition*** |  |  |  |
|  | Voting Consistency |
|  | Rank 1 | Rank 2 | Rank 3 | Veil | Planner |
| Rank 1 | 100% | 46% | 21% | 41% | 31% |
| Rank 2 |  | 100% | 44% | 51% | 54% |
| Rank 3 |  |  | 100% | 40% | 40% |
| Veil |  |  |  | 100% | 61% |
| Planner |  |  |  |  | 100% |
| ***Panel B: RANDOM Condition*** |  |  |  |
|  | Rank 1 | Rank 2 | Rank 3 | Veil | Planner |
| Rank 1 | 100% | 35% | 10% | 36% | 29% |
| Rank 2 |  | 100% | 37% | 52% | 40% |
| Rank 3 |  |  | 100% | 30% | 27% |
| Veil |  |  |  | 100% | 49% |
| Planner |  |  |  |  | 100% |
| **Notes:** “Voting consistency” represents the percentage of subjects that voted for the same wage distribution in the voting scenarios above and at left. By definition, the diagonal is always 100%. |

**Table 4 – Impact of Ranking Stage Productivity on Voting Preferences**

|  |
| --- |
| ***Panel A: EARNED Condition*** |
|  |  | Dependent Variable: *Wage Equality* |
|  |  | (1)Rank 2 Condition |  | (2)Veil Condition |  | (3)Planner Condition |
| Ranking Period Total |  | -0.306\*\* |  | -0.047 |  | 0.172 |
|  |  | (0.134) |  | (0.128) |  | (0.130) |
|  |  | Dependent Variable: *Wage Inequality* |
|  |  | Rank 2 Condition |  | Veil Condition |  | Planner Condition |
| Ranking Period Total |  | 0.241\* |  | 0.319\*\* |  | -0.050 |
|  |  | (0.135) |  | (0.147) |  | (0.165) |
|  |  |  |  |  |  |  |
| N |  | 186 |  | 186 |  | 186 |
| ***Panel B: RANDOM Condition***  |
|  |  | Dependent Variable: *Wage Equality* |
|  |  | Rank 2 Condition |  | Veil Condition |  | Planner Condition |
| Ranking Period Total |  | 0.028 |  | -0.011 |  | 0.049 |
|  |  | (0.124) |  | (0.121) |  | (0.122) |
|  |  | Dependent Variable: *Wage Inequality* |
|  |  | Rank 2 Condition |  | Veil Condition |  | Planner Condition |
| Ranking Period Total |  | 0.047 |  | -0.069 |  | 0.067 |
|  |  | (0.133) |  | (0.133) |  | (0.151) |
|  |  |  |  |  |  |  |
| N |  | 156 |  | 156 |  | 156 |
| **Notes:** Results are using logit regressions. Standard errors are in parentheses.(\*), (\*\*) and (\*\*\*) indicate the coefficients are statistically significant at the 10%, 5%, and 1% levels, respectively. |

**Table 5 – Group-Level Summary Statistics of Earnings and Inequality**

|  |  |  |
| --- | --- | --- |
| ***Panel A: EARNED Condition*** | Wage Distribution |  |
|  |  | *Wage Equality* | *Wage Inequality* | *Wage Inversion* | *Minimum Wage* | *p* – value |
|  | Total Group Earnings | 59.88 | 76.89 | 56.69 | 69.18 | *p <* .001 |
|  |  | (7.58) | (9.74) | (6.62) | (3.96) |  |
|  |  |  |  |  |  |  |
|  | Group Gini Coefficient | 0.087 | 0.495 | 0.115 | 0.409 | *p <* .001 |
|  |  | (0.052) | (0.057) | (0.048) | (0.066) |  |
|  |  |  |  |  |  |  |
|  | # of Groups (Firms) | 16 | 22 | 8 | 6 |  |
| ***Panel B: RANDOM Condition*** | Wage Distribution |  |
|  |  | *Wage Equality* | *Wage Inequality* | *Wage Inversion* | *Minimum Wage* | *p* – value |
|  | Total Group Earnings | 56.00 | 71.28 | 59.30 | 74.13 | *p <* .001 |
|  |  | (6.11) | (7.50) | (4.61) | (9.27) |  |
|  |  |  |  |  |  |  |
|  | Group Gini Coefficient | 0.096 | 0.431 | 0.188 | 0.334 | *p <* .001 |
|  |  | (0.053) | (0.081) | (0.086) | (0.041) |  |
|  |  |  |  |  |  |  |
|  | # of Groups (Firms) | 12 | 20 | 15 | 9 |  |
| **Notes:** Standard deviations are in parentheses. P-values are for group-level ANOVAs testing the null hypothesis that outcomes of left-hand-side variables are unrelated to the realized wage distribution. |

**Table 6 – Average Output in Paid Work Period by Condition and Worker Ranking**

|  |  |  |
| --- | --- | --- |
| ***Panel A: EARNED Condition*** | Wage Distribution |  |
|  |  | *Wage Equality* | *Wage Inequality* | *Wage Inversion* | *Minimum Wage* | *p* – value |
|  | Avg. Rank 1 Output | 22.38 | 22.55 | 21.88 | 22.67 | *p =* .957 |
|  | Avg. Rank 2 Output | 19.44 | 20.55 | 19.50 | 20.33 | *p =* .744 |
|  | Avg. Rank 3 Output | 18.13 | 18.00 | 16.63 | 17.50 | *p =* .698 |
|  |  |  |  |  |  |  |
|  | Avg. Worker Output | 19.96 | 20.36 | 19.33 | 20.17 | *p =* .700 |
|  | Avg*. Ranking Stage* Total | 5.63 | 5.62 | 5.50 | 5.61 | *p =* .975 |
|  |  |  |  |  |  |  |
|  | # of Workers | 48 | 66 | 24 | 18 |  |
|  | # of Groups | 16 | 22 | 8 | 6 |  |
| ***Panel B: RANDOM Condition*** | Wage Distribution |  |
|  |  | *Wage Equality* | *Wage Inequality* | *Wage Inversion* | *Minimum Wage* | *p* – value |
|  | Avg. Rank 1 Output | 20.58 | 19.55 | 19.67 | 22.11 | *p =* .266 |
|  | Avg. Rank 2 Output | 17.17 | 20.05 | 20.13 | 23 | *p =* .028 |
|  | Avg. Rank 3 Output | 18.25 | 20.35 | 19.53 | 22.78 | *p =* .046 |
|  |  |  |  |  |  |  |
|  | Avg. Worker Output | 18.66 | 19.98 | 19.78 | 22.63 | *p <*.001 |
|  | Avg. *Ranking Stage* Total | 5.25 | 5.55 | 5.62 | 6.29 | *p =* .027 |
|  |  |  |  |  |  |  |
|  | # of Workers | 36(36) | 60(54) | 45(42) | 27(24) |  |
|  | # of Groups | 12(12) | 20(18) | 15(14) | 9(8) |  |
| **Notes:** P-values are for group-level ANOVAs testing the null hypothesis that outcomes of left-hand-side variables are unrelated to the realized wage distribution. Due to a computer crash, 12 ranking period totals in the RANDOM condition were lost, leaving 156 remaining.ranking period observations. The number of remaining ranking period observations by wage distribution are shown in parentheses. |

**Table 7 –** **Quantity Response to Wage Equality**

|  |  |
| --- | --- |
| ***Panel A: EARNED Condition*** |  |
|  |  | *Specification 1* | *Specification 2* |
|  | Wage Distribution Gini | 1.167 | 0.030 |
|  |  | (1.536) | (1.488) |
|  | Wage |  | 2.432\*\*\* |
|  |  |  | (0.592) |
|  |  |  |  |
|  | N | 156 | 156 |
| ***Panel B: RANDOM Condition*** |  |
|  |  | *Specification 1* | *Specification 2* |
|  | Wage Distribution Gini | 3.518\*\* | 3.816\*\* |
|  |  | (1.742) | (1.772) |
|  | Wage |  | -0.603 |
|  |  |  | (0.651) |
|  |  |  |  |
|  | N | 168 | 168 |
| **Notes:** Results are using OLS regressions. Standard errors are in parentheses.(\*), (\*\*) and (\*\*\*) indicate the coefficients are statistically significant at the 10%, 5%, and 1% levels, respectively. |

**Table 8 – Output Quality: Comparison of *Inaccuracy* Rates**

|  |  |  |
| --- | --- | --- |
| ***Panel A: EARNED Condition*** | Wage Distribution |  |
|  |  | *Wage Equality* | *Wage Inequality* | *Wage Inversion* | *Minimum Wage* | *p* – value |
|  | Rank 1 Avg. | 10.7% | 11.5% | 11.1% | 11.0% | *p =* .997 |
|  | Rank 2 Avg. | 13.7% | 12.5% | 8.5% | 8.3% | *p =* .648 |
|  | Rank 3 Avg. | 15.7% | 14.2% | 8.9% | 20.9% | *p =* .533 |
|  |  |  |  |  |  |  |
|  | Overall Group Avg. | 13.3% | 12.7% | 9.5% | 13.4% | *p =* .649 |
|  |  |  |  |  |  |  |
|  | # of Workers | 48 | 66 | 24 | 18 |  |
|  | # of Groups | 16 | 22 | 8 | 6 |  |
| ***Panel B: RANDOM Condition*** | Wage Distribution |  |
|  |  | *Wage Equality* | *Wage Inequality* | *Wage Inversion* | *Minimum Wage* | *p* – value |
|  | Rank 1 Avg. | 9.5% | 9.6% | 16.7% | 12.4% | *p =* .225 |
|  | Rank 2 Avg.  | 5.2% | 15.5% | 11.7% | 12.0% | *p =* .072 |
|  | Rank 3 Avg. | 7.0% | 11.1% | 19.7% | 16.9% | *p =* .069 |
|  |  |  |  |  |  |  |
|  | Overall Group Avg. | 7.2% | 12.1% | 16.0% | 13.8% | *p =* .008 |
|  |  |  |  |  |  |  |
|  | # of Workers | 36 | 60 | 45 | 27 |  |
|  | # of Groups | 12 | 20 | 15 | 9 |  |
| **Notes:** P-values are for group-level ANOVAs testing the null hypothesis that outcomes of left-hand-side variables are unrelated to the realized wage distribution. |

**Table 9 - Productivity under One’s *Preferred Wage Distribution* (PWD)**

|  |
| --- |
| ***Panel A: EARNED Condition*** |
|  |  | Output Level |  | Inaccuracy Rate |  |
| Wage |  | 0.513 |  | 0.001 |  |
|  |  | (1.031) |  | (0.024) |  |
| Rank 1 |  | 2.475\*\*\* |  | -0.007 |  |
|  |  | (0.861) |  | (0.028) |  |
| Rank 3 |   | -2.660\*\*\* |   | 0.039 |   |
|   |   | (0.828) |   | (0.027) |   |
| Rank 1 \* *PWD* |  | -1.156 |  | 0.020 |  |
|  |  | (1.284) |  | (0.033) |  |
| Rank 2 \* *PWD* |   | -0.443 |   | -0.009 |   |
|   |   | (0.895) |   | (0.043) |   |
| Rank 3 \* *PWD* |  | 1.080 |  | -0.006 |  |
|  |  | (1.041) |  | (0.069) |  |
| N |  | 156 |  | 3,128 |  |
| ***Panel B: RANDOM Condition*** |
|  |  | Output Level |  | Inaccuracy Rates |  |
| Wage |  | -0.100 |  | -0.008 |  |
|  |  | (1.021) |  | (0.022) |  |
| Rank 1 |  | 0.569 |  | -0.014 |  |
|  |  | 0.916 |  | (0.027) |  |
| Rank 3 |   | 0.187 |   | -0.002 |   |
|   |   | (0.907) |   | (0.029) |   |
| Rank 1 \* *PWD* |  | -1.156 |  | 0.003 |  |
|  |  | (1.417) |  | (0.034) |  |
| Rank 2 \* *PWD* |   | -0.503 |   | -0.061\*\* |   |
|   |   | (1.255) |   | (0.024) |   |
| Rank 3 \* *PWD* |  | -0.566 |  | -0.010 |  |
|  |  | (1.232) |  | (0.032) |  |
| N |  | 168 |  | 3,372 |  |
| **Notes:** The Output Level regression employs OLS at the subject level. The Inaccuracy Rate regressions employ a Linear Probability Model at the application level. Application-level regressions use robust standard errors clustered at the subject level. Ranks are Boolean variables that equal 1 if the subject was the specified rank, and 0 otherwise. PWD (Preferred Wage Distribution) is a subject-level Boolean variable that equals one if the realized wage distribution matches the vote of the subject in the voting scenario corresponding to his or her realized rank, and 0 otherwise. Rank 2 is omitted as a comparison group. Included rank terms can be interpreted as the difference from Rank 2 when PWD=0. Interaction terms can be interpreted as the effect of PWD for the specific rank.(\*), (\*\*) and (\*\*\*) indicate the coefficients are statistically significant at the 10%, 5%, and 1% levels, respectively. |

**Table 10 –Response to Wage Equality by “Fair Minded” Workers**

|  |  |  |
| --- | --- | --- |
| ***Panel A:*** ***EARNED Condition*** | Output Level Specifications | Inaccuracy Rate Specifications |
|  |  | *I* | *II* | *III* | *IV* | *V* | *VI* |
|  | Wage | 2.412\*\*\* | 2.495\*\*\* | 2.461\*\*\* | -0.015 | -0.014 | -0.019 |
|  |  | (0.591) | (0.598) | (0.593) | (0.019) | (0.019) | (0.019) |
|  | *Wage Equality* |  | 0.764 |  |  | -0.003 |  |
|  |  |  | (0.821) |  |  | (0.024) |  |
|  | Fair Minded | 0.055 | 0.260 | 0.025 | -0.045\* | -0.044\* | -0.049\* |
|  |  | (0.712) | (0.745) | (0.755) | (0.025) | (0.026) | (0.027) |
|  | Fair M. \* *Wage Eq.* | -0.500 | -1.265 | -0.868 | 0.093 | 0.090 | 0.100 |
|  |  | (0.954) | (1.259) | (0.999) | (0.077) | (0.081) | (0.078) |
|  | Selfish Voting |  |  | -0.565 |  |  | 0.080 |
|  |  |  |  | (0.681) |  |  | (0.053) |
|  | Selfish V. \* *Wage Eq.* |  |  | 1.376 |  |  | -0.057 |
|  |  |  |  | (0.959) |  |  | (0.081) |
|  |  |  |  |  |  |  |  |
|  | N | 156 | 156 | 156 | 3,128 | 3,128 | 3,734 |
| ***Panel B:******RANDOM Condition*** | Output Level Specifications | Inaccuracy Rate Specifications |
|  |  | *I* | *II* | *III* | *IV* | *V* | *VI* |
|  | Wage | -0.424 | -0.517 | -0.493 | -0.016 | -0.018 | -0.017 |
|  |  | (0.643) | (0.642) | (0.642) | (0.018) | (0.018) | (0.018) |
|  | *Wage Equality* |  | -1.408\* |  |  | -0.044\*\*\* |  |
|  |  |  | (0.800) |  |  | (0.017) |  |
|  | Fair Minded | 0.837 | -1.300 | 0.628 | 0.055\* | 0.047 | 0.057\* |
|  |  | (0.734) | (1.065) | (0.745) | (0.029) | (0.029) | (0.029) |
|  | Fair M. \* *Wage Eq.* | -4.062\*\* | -2.666 | -3.091 | -0.175\*\*\* | -0.132\*\*\* | -0.175\*\*\* |
|  |  | (1.856) | (2.008) | (1.942) | (0.028) | (0.032) | (0.028) |
|  | Selfish Voting |  |  | 0.351 |  |  | 0.052 |
|  |  |  |  | (0.643) |  |  | (0.038) |
|  | Selfish V. \* *Wage Eq.* |  |  | -1.676\* |  |  | -0.113\*\* |
|  |  |  |  | (1.006) |  |  | (0.051) |
|  |  |  |  |  |  |  |  |
|  | N | 168 | 168 | 168 | 3,372 | 3,372 | 3,372 |
| **Notes:** The Output Level regression employs OLS at the subject level. The Inaccuracy Rate regressions employ a Linear Probability Model at the application level. Standard errors are in parentheses. Specifications I and IV show the impact of the *Wage Equality* distribution on “fair minded” subjects. Specifications II and V show the impact relative to other subjects. Specifications III and VI show the impact controlling for selfish voters.(\*), (\*\*) and (\*\*\*) indicate the coefficients are statistically significant at the 10%, 5%, and 1% levels, respectively. |

1. †Rawls College of Business, Texas Tech University, Lubbock, TX 79409; Telephone: (806) 834-7482; Email: eric.cardella@ttu.edu [↑](#footnote-ref-1)
2. ‡ Economics Department, Franklin & Marshall College, Lancaster, PA 17604; Telephone (717) 358-4869; Email: alex.roomets@fandm.edu [↑](#footnote-ref-2)
3. These types of income re-distributive motives can be justified based on the well-known models of inequality aversions (e.g., Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000). Importantly, the motivation of our experimental investigation does not fit within the confines of these models. The reason is that these models primarily deal with preferences over *ex-post* final income/earnings distributions, whereas we are considering preferences over *ex-ante* piece-rate wage distributions that do not map into final incomes in a deterministic way because of heterogeneity in both capability and effort. So while models of inequality aversion can be quite useful in thinking about income re-distribution, they are ill-equipped handle modeling preferences over piece-rate wage distributions. [↑](#footnote-ref-3)
4. Lemieux et al. (2009) show that the overall proportion of performance-pay jobs in the U.S. has increased from about 3 percent in the late 1970s to approximately 45 percent in the 1990s.More recently, Kuhn & Lozano (2008) present evidence that incentive pay across fortune 1000 firms has increased over the latter part of the 20th century. [↑](#footnote-ref-4)
5. For example, see experimental studies by Mitchel et al. (1993), Scott et al. (2001), Michelbach et al. (2003), Krawczyk (2010), Durante et al. (2014), Hong et al. (2015), and Beckman et al. (2016). [↑](#footnote-ref-5)
6. There are previous studies suggesting that people are less inclined to support costly income redistribution when income (and the corresponding inequality) is largely determined by effort rather than luck (e.g., Piketty, 1995; Fong, 2001; Alesina & Angeletos, 2005; Alesina & La Ferrara, 2005; Benabou & Tirole, 2006; Krawczyk, 2010; Cojocaru, 2014; Lefgren et al., 2016; Deffains et al., 2016), implying some degree of ex-ante fairness and equal opportunities are important determinants of redistributive preferences. [↑](#footnote-ref-6)
7. Several recent papers have also examined how relative wage comparisons within firms impact other important worker-level outcomes including cohesiveness (Levine, 1991; Breza et al., 2018), satisfaction (Clark & Oswald; 1996; Card et al., 2012; Godechot & Senik, 2015), happiness (Alesina et al., 2004; and Ferrer-i-Carbonell & Ramos, 2014 for a review), the supply of labor (Bracha et al., 2015; Breza et al., 2018; Dube et al., 2019), and pro-social and anti-social behaviors (Butler & Cardella, 2020). [↑](#footnote-ref-7)
8. In terms of chosen-effort studies, Abeler et al. (2010), Clark et al. (2010), Gachter and Thoni (2010), Angelova et al. (2012), Nosenzo (2013), Gross et al. (2015), and Charness et al. (2016) document evidence that horizontal wage comparisons can impact productivity, while Charness and Kuhn (2007), Bartling et al. (2011), and Bolton and Werner (2016) find little effect on effort provision. Relatedly, Gill and Prowse (2012) document experimental evidence that effort provision is impacted by comparisons of peer effort provision. [↑](#footnote-ref-8)
9. Specifically, Cohn et al. (2014) and Breza et al. (2018) find evidence of relative wage comparisons impacting productivity, whereas Hennig-Schmidt et al. (2010), Greiner et al. (2011), and Butler (2016) find no significant wage comparison effect on productivity. [↑](#footnote-ref-9)
10. In the instructions, participants were not told that the job applications were fictitious. Rather, to ensure no deception was used, participants were truthfully informed that their task was to enter information from printed job application forms into a digital database. For stronger causal identification of potential treatment effects, we wanted all participants to have the same packet of printed job application forms, which is why we opted to use fictitious applications. However, the opacity in the instructions created an environment where it seems plausible that participants perceived the data entry task as regular, economically valuable work (Falk & Ichino, 2006). [↑](#footnote-ref-10)
11. Importantly, our design did not involve any active deception. While we did not specify on the onset how they would be grouped in the subsequent work period, we did not provide any false information to respondents. Moreover, by referring to the ranking stage as “practice” and disclosing that there would be a subsequent work period with a similar task, we implicitly convey that outcomes in the subsequent work period may, indeed, be tied in some capacity to outcomes in the ranking stage. In this regard, we feel this protocol of providing incomplete – but truthful – instructions that role out in a sequential manner complies with the established and accepted norms of no deception. [↑](#footnote-ref-11)
12. In the event of a tie, the rank was randomly determined among the set of participants that tied. Participants were informed of this tie breaking procedure in the instructions. [↑](#footnote-ref-12)
13. For examples of survey evidence see: Alesina et al. (2001), Fong (2001), Corneo & Grüner (2002), Alesina & Angeletos (2005), Cojocaru (2014). For examples of experimental evidence see: Mitchell et al. (1993), Hoffman et al. (1994), Clark (1998), Ruffle (1998), Cherry et al. (2002) Michelbach et al. (2003), Oxoby & Spraggon (2008), Krawczyk (2010), Balafoutas et al. (2013), Durante et al. (2014), Lefgren et al. (2016). Relatedly, Gill and Prowse (2014) find that effort provision in a tournament competition is impacted by prior outcome when the outcome is determined by luck/chance. Although, there are some prior experimental papers that find less support for the claim that merit plays a role in redistributive preferences (e.g., Esarey et al., 2012; Ku & Salmon, 2013; Gee at al., 2017). [↑](#footnote-ref-13)
14. It is beyond the scope of this paper to delve into why these inefficiencies might arise; however, our modeling is based off the premise that, in practice, altering the wage profile would likely require some form of regulatory intervention (e.g., wage controls, subsidies, transfer payments, etc.), that would reduce total welfare and, thus, shrink the overall size of the pie that can be divided among workers. It is common among experimental studies on redistribution to incorporate a tradeoff between equality and efficiency (e.g., Mitchell et al., 1993; Scott et al., 2001; Andreoni & Miller, 2002; Michelbach et al., 2003; Beckman et al., 2004; Traub et al., 2009; Krawczyk, 2010; Hong et al., 2015; Beckman et al., 2016). Indeed, when making redistributive choices, people seem to have a preference for both equality and efficiently, amongst other possible factors (e.g., Mitchell et al., 1993; Andreoni & Miller, 2002; Konow, 2003; Michelbach et al., 2003; Engelmann & Strobel, 2004; Bolton & Ockenfels, 2006; Fehr et al., 2006; Traub et al., 2009). [↑](#footnote-ref-14)
15. We made it clear to participants that there was a non-zero chance that their selected wage distribution in each of the five scenarios might actually be implemented in the work stage (depending on some combination of random chance and their realized rank). Specifically, we informed participants that there would be a 40% chance that the wage distribution would be randomly chosen (with each of the 4 being equally likely), and a 60% chance the wage distribution is determined by the actual preference choices made in Stage 2. Each of the voting scenario was equally likely to be chosen. While the actual programmed randomization taking place in the background was somewhat complex (because of the nature of the elicitation in Stage 2 with different wage distributions, difference scenarios, and different possible realized ranks), what is important is that participants were clearly informed that their actual choices in Stage 2 might be implements and, hence, they needed to consider their decisions in Stage 2 carefully. [↑](#footnote-ref-15)
16. Prior studies show than redistribution choices differ based on whether people act as planners, from behind the veil, or known rank (e.g., Traub et al., 2009; Schilberg-Horish, 2010; Durante et al., 2014; Beckman et al., 2016). [↑](#footnote-ref-16)
17. For example, prior work by Charness (2004) and Charness & Levine (2007) show that attribution impacts how agents respond to wages; namely the effort level of agents is impacted, via reciprocal motivations, by whether their wage was chosen randomly or by an actual human principal. Therefore, to ensure that possible treatment effects are not contaminated by how the wage distribution was chosen, we do not reveal this information to participants. [↑](#footnote-ref-17)
18. Moreover, participants were seated at individual carrels and were unable to observe the progress and output of other workers; as such, there is little scope for peer effects to influence productivity (e.g., Falk & Ichino, 2006; Mas & Moretti, 2009; see Herbst & Mas, 2015 for a review). [↑](#footnote-ref-18)
19. Our experimental design was developed to cleanly identify how the distribution of wages impacts productivity. As such, we did not incentivize Stage 1 to ensure we did not induce any earned income differences in Stage 1 that could then “spill-over” and impact preferences in Stage 2 or productivity in Stage 3. Despite the lack of explicit incentives, we do see a significant variation in Stage 1 output and, importantly, a positive correlation between output in Stage 1 and output in Stage 3. Thus, in our EARNED condition, ranking within the group is, at least in part, more meritocratic compared to the RANDOM condition where ranks were simply randomly assigned. We contend that the data suggests that there was a meaningful difference in ranking procedure between the EARNED and RANDOM conditions. [↑](#footnote-ref-19)
20. The proportion of Wage Equality votes for selfish voters (compared to the rest of the participant population and pooled over conditions) was 43% (vs. 61%) in the Veil scenario and 41% (vs. 60%) in the Planner scenario. Both are significant at the 5% level using a Fisher’s Exact test. [↑](#footnote-ref-20)
21. To ensure that any potential differences in productivity across wage distributions was not purely a function of *pure* wage effects, we ran some additional *baseline* sessions where participant workers simply complete the work task under a known piece-rate (with no knowledge of the other possible wage rates). The set of possible wages that participants could receive was {$.5, $.75, $1, $1.25, $1.8, $2.1}, which corresponded to the six unique values that span the four different wage distributions depicted in Table 1. Based on the results from 126 additional participants, we observe no significant pure-wage effects on output. We speculate that there are several factors that could have contributed to the observed null wage effect. First, wages are essentially determined from a random external process, which could have mitigated reciprocal motivations of the worker (e.g., Charness, 2004; Charness & Levine, 2007; Gachter & Thoni, 2010). Second, participants were unware of the set of possible wages; hence, there is no reference point for determining wage fairness and, thus, no scope for judgements about wage fairness to factor into the worker’s effort choice (Akerlof & Yellen, 1990). Third, we did not offer an explicit outside option (e.g., internet browsing), which reduces the “implicit” effort cost (Goerg et al., 2019), which in combination with the sufficiently high piece rates, could have mitigated the pure incentive effect on output. Moreover, a null wage effect is consistent with some other recent experimental, real-effort studies (Hennig-Schmidt et al., 2010; Greiner et al., 2011; Araujo et al., 2016; Carpenter, 2016; Carpenter & Gong, 2016; Sliwka & Werner, 2007; Cardella & Depew, 2018). However, the fact that we don’t document a strong pure wage effect doesn’t rule out the possibility that people would react negatively (positively) to a distribution of wages they view as unfair (fair). Consequently, if we observe differences in worker productivity in the paid work period across the different wage distributions, then this can be attributed solely to differences in the distribution of wages across workers and how wages compare across workers. [↑](#footnote-ref-21)
22. For brevity we do not report all pair-wise comparisons across the four distributions for each condition. However, a series of pair-wise Mann-Whitney tests generally confirms the predicted associations in group-earnings. Namely, in the EARNED condition, all pair-wise comparisons are significantly different at the 1% level except the comparison of Wage Equality and Income Equality, which should not be different given that they had the same average wage. Similarly, in the RANDOM condition all pair-wise comparisons are significant at the 1% level expect the comparison of the Wage Equality and Income Equality, as well as the Wage Inequality and Minimum wage. We suspect the latter is a result of the Minimum Wage distribution having such few observations. [↑](#footnote-ref-22)
23. After running several sessions, we detected a small glitch in the software regarding how worker rank was assigned in the EARNED condition. As a result, there were a total of 10 groups (30 participant workers) who were assigned the wrong rank (based on their total in the practice period). Thus, we drop these groups from any analysis involving the impact of wage distribution on productivity. [↑](#footnote-ref-23)
24. Similarly, if we run a regression of the productivity in the paid work period on the wage distributions, while controlling for output in the practice period, none of the coefficients on the wage distribution dummies are significantly different from zero, further indicating a null effect of the wage distribution on productivity in EARNED. [↑](#footnote-ref-24)
25. Similar to in the EARNED condition, if we regress output on wage distribution, while controlling for output in the practice period, the wage distribution effect is muted. In particular, only one marginally significant effect (at the 10% level) emerges and that is between the *Wage Equality* distribution and the *Minimum Wage* distribution. [↑](#footnote-ref-25)
26. Some recent papers have documented heterogeneous effects of pay comparisons on effort. For example, Gross et al. (2015) find that high-ability worker reduce effort when getting paid less than or equal to low-ability workers, while the same is not true when low-ability workers get paid less than, or equal to, high-ability workers. Similarly, Abeler et al. (2010) find that high-ability workers choose lower effort when getting paid the same as low-ability workers. There may also be asymmetric effects in how workers respond to wage comparisons. Cohn et al. (2014) find that workers lower effort when getting paid less than another person, but the workers do not increase effort when getting paid more than another person. Mas (2006) finds that reductions in effort among workers are larger the lower the wage relative to a reference point, suggesting that effort responses to less fair wages might be larger. [↑](#footnote-ref-26)
27. While workers in the BASELINE condition did not work in groups of three, we programmed the software such that groups of three were randomly created and workers were assigned counter-factual worker ranks based on their productivity in the practice work period, just as in the EARNED condition. As such, we are able to identify a “baseline” measure of output for each of the worker ranks absent any group dynamics and social comparisons. When we do this, the average output for rank 1 workers is 22.09, for rank 2 workers is 19.00, and for rank 3 workers is 16.86. In comparing the EARNED condition to the BASELINE, there are no significant differences for either rank 1 or rank 3 workers, and only a marginal difference for rank 2 workers (*p =* .097). Thus, not only does the type of wage distribution not have a large impact on output produced, we also find little evidence that working in a group and having information about the distribution of wages across the group impacts productivity. [↑](#footnote-ref-27)
28. Our results are qualitatively robust if we instead look at the total number of inaccurate fields entered per application. We prefer the simple binary measure of *inaccuracy* because it ensures that any differences we document are not being inflated by applications that are haphazardly entered with all 9 fields being incorrect. Moreover, the proportional nature of the *inaccuracy* rate measure makes for ease of aggregation and interpretation. [↑](#footnote-ref-28)
29. As we did with output quantity tested for differences in output quality (based on the measures we use in our analysis) across the six different piece-rate wage levels in the separate baseline sessions. Importantly, we found no statistically significant differences in output quality across the six different wage levels. This suggests that there is little pure wage effect on output quantity, which mirrors the results we found on quantity. Thus, we can again identify wage distribution effects on quality by comparing across distributions. [↑](#footnote-ref-29)
30. While not in the same context, DeCaro et al. (2015) document evidence that people differentially respond based on whether a realized outcome aligns with one’s preferred outcome. Specifically, they show that people are less cooperative in a CPR dilemma when the adopted conservation rule does not align with the alternative they voted for. [↑](#footnote-ref-30)
31. Note, within each group it is possible for zero up to all three workers to have the realized wage distribution match their stated preference. As a practical example of how this was determined, suppose the realized wage distribution was the *Wage Equality* distribution. If, in the group, the worker ranked #1 voted for *Wage Inequality* in the Rank 1 scenario, while the workers ranked #2 and #3 voted for *Wage Equality* in the Rank 2 and Rank 3 scenarios, respectively, then we would indicate that both the rank 2 and rank 3 workers got their preferred wage distribution. [↑](#footnote-ref-31)
32. We chose this classification because in both the Rank 2 and Planner scenarios there is little or no direct monetary incentive present, save a small wage reduction for choosing the Minimum Wage distribution in the Rank 2 scenario. This allows an arguably unbiased measure of a subject’s underlying normative belief. We require Wage Equality votes in both scenarios to ensure a level of consistency in a subject’s “fair mindedness.” [↑](#footnote-ref-32)
33. A participant could be classified as both “fair minded” and “selfish” as the selfish voting classification was primarily based on rank 1 and rank 3 scenario choices. [↑](#footnote-ref-33)
34. Note, we required participant workers to be present for the entire 22-minute work period and they had no outside option (e.g., internet browsing or playing games) other than just sitting quietly. Thus, you could interpret this result as not finding a significant output response by workers, *conditional* on working. However, there may be more subtle ways in which the distribution of wages might impact overall productivity via labor participation decision, which are beyond the scope of the current study. For example, by impacting how long workers work (e.g., Abeler et al., 2011; Goerg et al., 2019), or whether workers choose to supply their labor (e.g., Bracha et al., 2015; Breza et al., 2018). [↑](#footnote-ref-34)
35. It is worth noting that “chasing” a pure wage effect would come at a cost when interpreting preferences. As designed, our experiment elicits preferences over specific wage distributions which represent the only reasonable avenue for subjects to benefit. An explicit outside option allows an ambiguous alternative to one’s assigned wage. Introducing subjects’ beliefs about others’ choices and rewards with respect to an outside option would limit our ability to interpret preference results. [↑](#footnote-ref-35)
36. As anecdotal support for this claim, we have included a sample of references across a variety of reputable business publication outlets focusing on the merits of pay transparency within organizations: Time (Cooney, 2018), Fortune (Fisher, 2015), The Wall Street Journal (Shellenbarger, 2016), and Business News Daily (Conlin, 2018). [↑](#footnote-ref-36)
37. However, interpreted within a broader scope, there may be longer-term, indirect productivity effects that manifest through changes in workers attitudes. Specifically, deceasing wage inequality within a firm could increase cohesiveness (Levine, 1991; Breza et al., 2018), satisfaction (Clark & Oswald; 1996; Card et al., 2012; Godechot & Senik, 2015), happiness (Alesina et al., 2004; and Ferrer-i-Carbonell & Ramos, 2014 for a review), and/or the supply of labor (Bracha et al., 2015; Breza et al., 2018; Dube et al., 2019), all of which could increase long-run productivity. [↑](#footnote-ref-37)