Does Financial Strain Lower Productivity?*

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Abstract

This paper empirically tests for a direct causal impact of financial strain on worker productivity. We randomize the timing of income receipt among Indian workers who earn piece rates for manufacturing tasks: some workers receive their wages on earlier dates, altering when cash constraints are eased while holding overall wealth constant. Workers increase productivity by 5.3% on average in the days after cash receipt. The impacts are concentrated among poorer workers in the sample, who increase output by over 10%. This effect of cash on hand on productivity is not explained by mechanisms such as gift exchange, trust in the employer, or nutrition. We present positive evidence that productivity increases are mediated through lower attentional errors in production, indicating a role for improved cognition after cash receipt. Finally, directing workers' attention to their finances via a salience intervention produced mixed results—consistent with concerns about priming highlighted in the literature. Taken together, our results indicate a direct relationship between financial constraints and worker productivity and suggest that psychological channels mediated through attention play a role in this relationship.

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1 Introduction

Understanding the persistence of poverty lies at the heart of research and policy efforts aimed at poverty alleviation. A rich literature in development economics has considered various explanations, including credit constraints and institutional or informational barriers. One longstanding hypothesis in this space is the idea that poverty itself can lower one's earnings. The focus of the existing literature has been on various investments that raise output, including complementary inputs (such as machines or fertilizer), education (schooling, training), and health (nutrition, bed nets, or vaccines). A vast literature considers each of these factors and documents potential output increases spurred by these investments. Recent research at the intersection of psychology and economics brings forward another, potentially complementary possibility: The available cash on hand *itself* can make individuals more productive. That is, holding constant any impacts of potential investments facilitated by the availability of cash on hand, financial strain has additional impacts on workers' own productivity through stress, worries, or other psychological factors.

Different lines of research postulate the idea that poverty might impact economic behaviors through various psychological channels, including stress (Chemin et al., 2013), worries (Mullainathan and Shafir, 2013), and mental health (de Quidt and Haushofer, 2018). However, there remains scant evidence that poverty—mediated through non-investment channels—can itself affect field behaviors broadly, and earnings specifically (Kremer et al., 2019). The main focus of this paper is to examine the plausibility of such a relationship by testing for a causal link between cash on hand and worker productivity.

To investigate the impact of cash on hand on worker productivity in a real-world setting, we conducted a field experiment with 408 workers in rural India. Workers worked on a small-scale manufacturing task for a period of two weeks in contract jobs. The job was their primary source of income during this time. They were paid piece rates for output, so that productivity directly impacted their earnings.

The experiment took place during the lean season, when workers have little cash on hand and limited work opportunities. Consistent with financial strain, over 85% of workers report feeling "very worried" or "quite worried" about their finances at baseline (Figure 1).

Our main experimental manipulation comprised of relaxing workers' financial constraints by inducing random variation in when workers received their compensation.

The Control workers were paid their earnings at the end of their two weeks at the work site. The treated workers, the Early-Pay group, were paid a subset of their earnings early: they received their accrued earnings to date 5 days before the end of their contract (with the remainder paid at the end of the contract). Consequently, all workers were paid the same amount for their work—some just received a subset of their earnings earlier than others. The sizable early payments were equivalent to almost one month's worth of typical labor earnings for our sample in the lean season.The timing of earnings was scheduled and announced in advance. Given workers' severe liquidity constraints at the time of the experiment, this variation allows us to observe the direct effect of cash on hand on worker productivity while holding constant workers' overall wealth.

The early payments significantly altered workers' financial constraints. Within three days of receipt of the early cash payments, workers were 40 percentage points more likely to pay off loans to moneylenders and other debtors (a 220% increase relative to the Control group). They also increased other household expenditures. These stark effects validate our view that receiving the cash windfall meaningfully lowered financial constraints.

Easing workers' cash constraints made them more productive. From the next day after being paid early, worker productivity in the Early-Pay Group increased by 5.3% relative to the Control group. Productivity increased throughout the work day. Moreover, the increases in productivity persisted for the remaining days of the treatment period. The productivity impacts were concentrated among poorer workers, as measured by several wealth indicators such as land ownership or housing quality. Early payment increased worker productivity for poorer workers by about 10%.

These impacts are remarkable given the relatively minor experimental variation in payment schedules and the relatively low wage elasticity of productivity in many real-effort settings (DellaVigna et al., 2019). Other interventions such as commitment devices at work (Kaur et al., 2015), reducing environmental noise (Dean, 2018), or increasing sleep (Bessone et al., 2019) each caused significantly smaller productivity effects.

While the Early-Pay Treatment was designed to ease financial constraints, it may have also altered beliefs or perceptions toward the employer, We consider two potential sets of confounders: reciprocity concerns and trust.

Under reciprocity or fairness concerns, (not) receiving the early payment could have altered workers' feelings toward the employer—potentially inducing the observed productivity responses. Such impacts are unlikely for several reasons. First, in contrast

to results from a substantial literature on the impacts of gift exchange in real-world experiments (Gneezy and List, 2006; Esteves-Sorenson, 2017; DellaVigna et al., 2019), the impacts in our study are sizable and persistent for several days. Second, an explanation based on reciprocity or fairness alone has difficulty explaining the heterogeneity of impacts in baseline wealth. Third, we find no evidence of impacts of announcing the early payment to workers. That is, learning about their future payment schedule did not alter worker productivity. Instead productivity increased only once workers actually received their payment. Consistent with the findings by Mani et al. (2013), this result suggests that receiving cash itself was crucial for causing the observed effects, rather than changes in expected future payment streams.

In addition, actually receiving payment could have altered workers' levels of trust that they would be paid as promised, potentially raising the perceived return to effort. Note that this would require the treatment group to update differentially than the Control group—who also saw that workers were paid according to their promised schedule. In addition, it would require updating to be stronger for poor treatment workers relative to richer treatment workers. More directly, to address this concern, we incorporated additional variation in the Early-Pay Group. Some of these workers were paid on day 8 of the study, others were paid on day 9. This variation allows us to consider workers who saw others being paid on day 8 but who were not paid themselves until the following day. If trust were driving the above results, we would expect workers who were going to be paid the evening of day 9 to also update positively (to some partial extent) about being paid—and therefore show some increase in productivity the day before they were paid themselves. In contrast, we find no such early effect on productivity for this group—workers only become more productive once they have cash in hand.

A separate set of concerns is whether the early payment could have enabled workers to invest in their productivity. Through the design of the experiment, we can rule out investments in machines or other physical capital and other longer-run investments in schooling or training. In addition, we consider potential investment impacts via increased caloric intake. There are two ways through which this could affect productivity: improvements in underlying nutrition, and blood sugar increases during the workday from increased breakfast consumption. A large literature in medicine and health documents that the former—underlying biological changes in nutrition—cannot occur overnight (the time period after which our effects emerge) (Schofield, 2014). The latter, however, could affect productivity in the short run. Since participants were provided lunch at the worksites and there were no other breaks where they could purchase

food from outside, any blood sugar increases would have to come from breakfast at home. Detailed measures of breakfast consumption show no impacts on quantities and composition of breakfast items following the early payment. Moreover, we document that the treatment effects persist throughout the hours of the workday—including post-lunch and over 6 hours after the start of the workday, by which time any blood sugar effects from breakfast would have worn off.

Consequently, we interpret our treatment effects as reflecting a direct impact of cash on hand on worker productivity, which cannot be explained through more traditional existing explanations such as investment or fairness. The findings are therefore consistent with emerging evidence that financial strain can have psychological consequences, including reduced stress or increased attention or happiness. While we do not attempt to distinguish between these psychological mechanisms, our design embedded positive tests for a particular channel: cognition.

As part of the experiment, we collected measures that are markers for how attentive or focused workers managed to be.These unincentivized measures capture errors that cause workers to exert additional effort for the same piece rate. For example, we count the number of times the worker made a mistake during production, which he then had to undo—slowing him down in making the item relative to if he had not made the error. Note that these inattention measures do not affect the firm or the price received by contractors for the finished items; they simply mean that the worker spends more minutes per item, hurting only himself. Early-Pay decreased attentional errors by 0.11 standard deviations. Moreover, these impacts were concentrated among poorer workers, whose attentional errors went down by 0.21 standard deviations. While this does not rule out the relevance of other potential psychological pathways, it does indicate that treatment effects on productivity are (at least in part) mediated through improved cognition or attention during the production process. Indeed, various factors—including worries, stress, or happiness—could affect attentiveness at work.

In addition, we also tested the impacts of a priming intervention that made financial strain salient to a random subset of workers. Workers were asked in the morning of one workday to recount their outstanding loans, and think about how they would come up with a large sum in an emergency. We randomized a subset of treatment and control workers to receive priming, and also varied the date on which workers were primed: before the Early Pay day (when financial constraints are more binding) vs. after the Early Pay day (after constraints have been eased for treatment workers).

Previous work examines the effects of financial priming on laboratory measures

such as Ravens Matrices tests (Mani et al., 2013). In contrast, in our setting, workers' actions can actually affect the problem that is brought top of mind. Consequently, a potential negative cognition effect on productivity could be offset by a potential positive motivational effect from making concerns salient, as has been documented in reminders studies (e.g. Karlan et al., 2016). We hypothesized that while the overall level effect of priming is therefore ambiguous, negative effects would be more likely to occur when workers were more financially strained (i.e. before cash receipt). Consistent with this, priming leads workers to increase productivity by 7% when it occurs when they are cash rich; in addition, there is an offsetting -7% relative productivity effect if priming occurs when workers are cash poor relative to when they are cash rich. However, unlike the effects of directly manipulating cash receipt, these effects are not driven by poorer individuals; rather, they stem from those who reported having more outstanding loans about which they were worried at baseline. This pattern is consistent with two challenges with priming that have been well-noted in the literature: (i) Effects could be non-monotonic—neither very strained individuals (who already have finances on top of mind) or very well-off individuals (who do not have concerns to begin with) will be responsive to priming. (ii) Targeting is difficult since one cannot manipulate thoughts precisely—for example, while we would have liked to prime financial constraints overall, we actually appear to have primed loans, to which the very poor have less access. Our findings lend support to the assessment in the literature about the challenges of priming instruments (e.g. Molden, 2014).In contrast, using real cash variation leads to robust results, at least in our setting. Put differently, rather than using attention as a treatment (through primes) to uncover mechanisms, our results suggest it might be more effective to use attention as an outcome.

We view the primary contribution of our paper as establishing a direct relationship between cash on hand and worker productivity. The relationship we document is distinct from traditional theories—which usually focus on investments in physical capital or human capital (education, nutrition, or health)—of how income could directly affect productivity and earnings (e.g. Dasgupta and Ray, 1986).Our findings are consistent with findings in other studies that income transfers to the poor can boost labor supply, productivity, and earnings (e.g. Banerjee et al., 2015; Bandiera et al., 2017). While such studies have focused on traditional physical and human capital channels, our results suggest that psychological pathways could also have the potential to contribute to such effects. This is consistent with work showing that transfer programs affect psychological outcomes such as mental health (e.g. Haushofer and Shapiro, 2016; Finkelstein et al.,

2012). Our results, while only an initial proof of concept, provide impetus to explore these possibilities more formally in future work.

In addition, our study advances a nascent but rapidly growing literature on the psychology of poverty. Existing work has examined the relationship between poverty and outcomes such as stress (Chemin et al., 2013; Haushofer and Fehr, 2014), cognitive function and decision making (Mullainathan and Shafir, 2013; Mani et al., 2013; Shah et al., 2015; Carvalho et al., 2016; Ong et al., 2019), and mental health (Haushofer and Shapiro, 2016).[1] To date, existing work has focused on examining this relationship using laboratory measures and tests or survey self-reports. Our findings lend credence to the view that psychological mechanisms have the potential to affect economic field behaviors.

Taken together, our results have potential implications for public policy and the well-being of the poor. Productivity reductions due to cash constraints could amplify negative income or wealth shocks. Impediments to productivity would occur precisely at times when individuals face the greatest financial pressure and have the greatest need for cash, for instance, following worker layoffs. Conversely, reducing volatility or mitigating financial vulnerability could have direct productivity benefits – suggesting a viable rationale for such policies that extends well beyond the static benefits that appear in the traditional economics literature.

Even in the absence of volatility, the social return to (un)conditional cash transfer or public workfare programs could have productivity benefits that are unmeasured to date. Existing evaluations of cash and other transfer programs usually focus on the returns to different investments, such as physical or human capital (Banerjee et al., 2015; Bandiera et al., 2017). The results from our experiment suggest that direct impacts on worker productivity could amplify the returns to these investments.

The remaining parts of this paper are organized as follows. Section 2 provides background information on the study and its experimental design. Section 3 discusses the impact of the Early-Pay Treatment on workers' expenditure patterns and their work performance, as well as potential confounds. Section 4 discusses positive evidence of one specific channel through which the hypothesized psychological effects might operate: workers' cognition. Section 5 concludes.

[1]Note not all studies find such a relationship (e.g. Carvalho et al., 2016).

2 Experimental Design

Our experimental design features three key ingredients. First, the experiment takes place in a setting with the potential to impact productivity via psychological channels. In the experiment, we hire piece-rate workers to complete a cognitively challenging production task for which we collect precise measures of hourly productivity for two weeks. Second, we create experimental variation in workers' (perceived) financial situation by varying workers' payment schedules while holding overall payments (approximately) constant across treatment groups. Third, our design allows for the testing of potential confounds in addition to providing positive evidence of the hypothesized psychological channel, attention.

2.1 Measuring Worker Productivity

The experiment took place in a low-skill manufacturing environment in rural Odisha, India, using the infrastructure developed by Breza et al. (2018). As part of the field experiment, 408 male workers were employed full-time over the course of 14 rounds. The majority of the rounds (9 rounds) had a standard schedule lasting for 2 weeks with 5 working hours per day.[2] Such seasonal contract jobs are common during the agricultural lean season. The jobs at the study worksites were the primary source of earnings for workers and a regular job from their perspective. The output produced by workers was sold in a local wholesale market.

Work task. Workers produced disposable plates by stitching together sal tree leaves, as depicted in Figure 2. This task is relatively cognitively demanding as it requires considerable attention to stitch together the leaves in a way that satisfies the required quality standards. In accordance with quality standards set by partnering contractors, leaf plates were required to (i) meet a minimum size requirement, (ii) have no gaping holes, (iii) have all leafstalks (petioles) covered by other leaves, and (iv) have the inner center parts placed underneath the outer rings of the plates. Workers were paid a flat base wage of Rs. 200 for attendance plus a piece rate of Rs. 3 per completed leaf plate that satisfied the quality standards.[3]

[2]Some of the rounds were shorter in length and had different daily work schedules. These changes are described in detail in the appendix.

[3]The piece rate in round 1 was Rs. 2 and the base rates were Rs. 180 and Rs. 175 in rounds 2 and 3, respectively.

Output measures. We collected hourly measures of output. At the end of each work hour, staff collected completed leaf plates from each worker. Workers were allowed to continue and complete unfinished leaf plates in the subsequent hour. The main measure of output in our study is the number of completed leaf plates, which can be further divided into rejected and accepted output. Workers quickly learned to meet the required standards such that over 96% of leaf plates were accepted by the fourth day of work. The empirical analysis below assumes accepted leaf plates. However, given the high acceptance rates, using the completed number of leaf plates yields nearly identical results.

Attentional errors. In addition to the incentivized measures of production, we collected three unincentivized markers of worker efficiency ("attentional errors") for a subset of work hours. These measures comprise (i) the number of leaves per plate, (ii) the number of stitches per plate, and (iii) the number of "double holes", i.e. instances in which it took a worker several attempts to connect a given set of leaves. For each of these markers, high values indicate inefficiencies that may occur as a result of lapses in worker attention. That is, workers need to increase the required time and effort to complete the leaf plate to receive a given piece-rate compensation for the plate. For instance, conditional on passing the quality threshold (which is the case for nearly all plates), a higher number of leaves per plate means that a worker needs to stitch together a higher number of leaves to be paid for a given plate.

2.2 Inducing Variation in Financial Constraints

Figure 3 provides an overview of the timeline of the experiment. The main goal of the experiment was to create and examine an exogenously-induced reduction in financial constraints. To accomplish this goal, we varied the timing of earnings payout across workers while holding piece rates and flat base payments across workers constant, thus altering workers' short-run financial constraints while holding their overall wealth approximately constant.[4]

Common features across workers. With the standard schedule, workers worked for

[4]There are two reasons for (expected) wealth differences across treatment groups. First, the Early-Pay Group might save some interest by paying back loans or credits following the early payment. Second, productivity differences due to the early payment translate into differences in worker pay by the end of the experiment.

12 days at their worksite from 9 am to 2 pm.[5] All payments occurred at the end of work days. Workers were informed of their output for each day throughout the experiment, limiting any uncertainty about the outstanding payment amount. On day 1, all workers were paid a flat wage of Rs. 250 for their training and work on this day to foster trust in the worksite among workers. While larger or additional early payments would have been desirable to foster further trust, they would have eased financial constraints among all workers, thus limiting the potential for the experimental variation to create meaningful differences in financial constraints.

In addition, all workers were told on day 1 that they would be paid all of their wages at the latest by day 12. On this day, all workers were paid any outstanding payments they had not been paid for until then. Workers were also paid a completing bonus (Rs. 300) if they attended all of days 6 through 11, so as to avoid selective attendance issues. This completion bonus effectively shuts down any potential labor supply responses to the treatment. Accordingly, the experiment is designed to isolate the impact of cash on hand on worker productivity while holding labor supply constant.

Payment schedule variation. The key experimental variation of the experiment was paying some workers earlier than others. On day 1, we informed all workers everyone would be paid for their work by day 12, but the payment schedules would differ across workers, with some workers receiving part of the payments earlier than others. On the morning of day 5, workers were given full information about their individual payment schedules. Workers in the control group were told that they would be paid on day 12 (as promised on day 1). Moreover, they were informed that some workers at their worksite would be paid on an earlier day.

In contrast, workers in the Early-Pay Group were told that they would be paid on day 8 (Early Group I) or 9 (Early Group II) of the experiment for their wages earned by the previous day—i.e. wages from days 2 to 7 for Early Group I and days 2 to 8 for Early Group II—and the remaining amount on day 12. While payments were made in private at the end of each day, all workers were aware of payments when they occurred at their worksite.

Anticipated payday variation vs. randomized cash drop. As an alternative way to induce variation in financial constraints we could have randomized unconditional

[5]The deviations from the standard schedule are described in Appendix A.1.

cash transfers across workers. We implemented the current design of anticipated payday variation because it features several advantages. First, it is more realistic than randomized cash drops in this setting since unconditional cash transfers are less common in our study area than in sub-Saharan Africa or other parts of the world. Second, anticipated payday variation is commonplace in developing and developed countries, thus boosting the external validity of our study (Shapiro, 2005; Kaminski et al., 2014). Third, the payday variation holds workers' wealth (approximately) constant, thus limiting the potential for effort or labor supply responses due to wealth or income effects.[6]

However, the current design also entails some drawbacks. First, the empirical test comparing workers across treatment groups around the early payday is only powerful if the psychological effects ensue only when workers actually received their payments, as opposed to when they only anticipate receipt of payment. Second, since the employer (our staff) delivered the news of payment variation across workers, the Early-Pay Treatment features an ancillary component of potential changes in workers' relationship with their employer, including gift giving, fairness, and trust in the employer paying workers as promised. We discuss and address each of these issues in Section 3.4.

2.3 Recruitment, Sample Description, and Balance Checks

Recruitment. We recruited our study subjects from rural villages in Odisha, where a large number of villagers are engaged in daily wage labor. The study focused exclusively on male workers since it is more culturally appropriate for them to take jobs outside of their village for an extended period of time. A few days prior to the start of a new round of experiment, the recruiters visited the target villages and advertised the upcoming work opportunity through door-to-door visits and fliers. Potential study participants were informed about the location and purpose of the study, the tasks that they would be asked to do, the duration of the study, and their potential compensation. They were also provided with the contact information of the recruiting staff for any questions.

The day before the experimental round, recruiters revisited the villages so that the interested villagers could sign up to participate in the study. During the sign-up process, recruiters used a number of screening questions to determine eligibility. Male workers meeting the following criteria were eligible to participate in the study: (i) aged

[6]Empirical studies have found limited evidence of cash transfers negatively or positively impacting labor supply (Banerjee et al., 2017; Baird et al., 2018). However, we would have been underpowered to confirm this evidence in our setting.

between 18 and 55, (ii) fluent in Odiya (the local language), (iii) regularly working as daily wage laborers, (iv) having been present in their home villages for more than half of the time during the preceding 6 months, and (v) no prior experience producing leaf plates. In addition, the recruiters verified that potential participants were willing to come to work for the entire duration of the round.

Since usually the number of interested villagers exceeded the worksite capacity per experimental round, we randomly selected approximately 30 participants from the sign-up list to be invited to participate in the study. In addition, 5 back-up participants were selected so that in case some subjects dropped out of the study during the first three days of a round (i.e. before the randomization), they could be replaced with back-up participants.

Sample description and balance checks. The main experiment sample comprises of 408 male workers from 14 experimental rounds with about 30 workers each.[7] 90.7 percent of workers started on the first day of the rounds, and 98.7 percent stayed until the last day of the rounds. Overall, daily attendance was high at 98.7 percent (excluding the days the workers had not yet joined or dropped out of the study before the randomization). 10.1 percent of workers had at least one day of unexpected absence, with 2 percent having 2 or 3 days of absences during their participation in the study. The sample includes 4,094 worker-days and 3,949 non-absent worker-days, with 5 to 7 hourly productivity measures per day.

During workers' first day of work, we conducted a short baseline survey to collect basic demographic and wealth information from workers. Basic sample characteristics and balance checks comparing the Control Group to the Early-Pay Groups are reported in Table 1. A typical worker in our sample was about 40 years old, had 4 to 5 years of education and was primarily employed in daily wage labor.

Workers' responses suggest relatively low wealth levels and severe financial constraints, as expected to be case especially during the lean season. Over 70 percent of workers live in houses that contain mud structures, indicating low wealth, and over half have outstanding credits at stores for food and basic household consumption. When asked how concerned they were about their (future) finances, 86 percent of workers indicated any worries and 70 percent reported being very worried about their finances. 68 percent of workers reported outstanding loans, including 18 percent of workers in-

[7] This excludes 21 people who dropped out in the first four days before the payment schedules were announced.

dicating loans from moneylenders charging high interest rates, suggesting their lack of access to other sources of credit.

The baseline characteristics do not statistically differ between the Early-Pay Group and the Control Group, which indicates a successful randomization procedure.

3 The Impact of Early Pay

3.1 Expenditure Patterns

The early payments provided meaningful amounts of liquidity to workers. These payments comprised almost one month's typical wages during the lean season (over Rs. 1,000 for most workers), given that typical workers worked 8.7 days of wage paying work in the month preceding the experiment. The majority (83%) of workers had outstanding loans at baseline, with a median amount of Rs. 6,000 of debt in our study population. Accordingly, the early payment relieved some of the pressure from indebtedness, but did not eliminate debt for most workers.

Consistent with most workers in the sample facing meaningful credit constraints, the early treatment induced variation in workers' expenditure patterns (Table 2). Within the first couple of days of being paid, workers were 40 percentage points more likely to pay off any loan or credit, corresponding to an additional Rs. 278 of repaid loans and credits, an increase of over 200 percent relative to the control group mean of Rs. 122.

Workers also reported changes in other expenditure patterns, most meaningful among those an increase in food expenditures of Rs. 68 relative to a mean of Rs. 270. While these impacts indicate a clear need to consider potential impacts through nutrition channels (which we consider in Section 3.4), it is worth noting here that the expenses reported in this survey were often family expenditures (as opposed to individual expenditures) that did not necessarily translate into workers' increased short-run nutritional intake.

3.2 Labor Supply Responses

In addition to potential productivity impacts, cash on hand may impact the type of jobs workers engage in, or the number of days or hours worked. Our experiment was designed to capture potential impacts of increased cash on hand on worker productivity while keeping the extensive and intensive margins of labor supply constant.

The completion bonus induced a high overall attendance (98.7 percent), thus limiting the extent of any potential labor-supply response to the experimental variation in payments. Indeed, we find only minimal and statistically insignificant impacts of the early payment on the number of days worked. By the design of the experiment, there was no intensive-margin response to the treatment given that workers came and left their worksite jointly.

3.3 Productivity Impacts

Before considering the impacts of the Early-Pay Treatment on productivity, it is worth noting that increasing worker productivity at real-world workplaces is challenging. Similar to other real-effort work settings, effort and productivity were relatively inelastic to wage variation (DellaVigna et al., 2019).

The Early-Pay Treatment increased worker productivity by 5.3 percent following the early payment (Table 3 columns 1 and 2). This treatment effect is economically meaningful, both relative to the wage elasticity in this setting and compared to the productivity impacts of other interventions (Dean et al., 2018). For instance, the observed treatment effects of relieving workers' cash constraints were larger than the impacts of offering commitment devices at work (Kaur et al., 2015), exposing workers to considerable levels of noise or heat (Dean, 2018; Adhvaryu et al., 2018), or increasing their night-sleep and offering them the opportunity to nap (Bessone et al., 2019).

The treatment effects concentrate almost exclusively among poorer workers, as illustrated by heterogeneous treatment effects with respect to baseline wealth (remaining columns of Table 3). Wealth measures include whether the individual reported being a landowner, living in a non-mud house, not having outstanding food credits, and whether he reported the ability to come up with Rs. 1,000 easily in case of an emergency, a standard measure of financial health (Lusardi et al., 2011). For each of these indicator variables, we observed large impacts of the Early-Pay Treatment on worker productivity for the poorer part of the sample and significantly lower (and often close to zero) impacts for the richer part of the distribution.

There are two potentially complementary interpretations for the stronger impacts among poorer workers. First, the poor might be experiencing more financial strain (e.g. loans, worries about finances) to start with, thus providing more opportunities for the greater impact of any given intervention that might reduce such strain. Alternatively, most workers in the sample were financially strained, but the intervention was more

meaningful for poorer workers since it was larger compared to their wealth.

The impacts on worker productivity proved persistent over several days and throughout the day (Table 4). Worker productivity in the Early-Pay Groups increased on each of the three days following the early payment. Similarly, the patterns of heterogeneous treatment effects with respect to wealth persisted for each of these days. Finally, productivity impacts occurred throughout the day, including the last two hours of the workday (see Table 7, discussed below).

3.4 Potential Confounds

3.4.1 Ancillary Components of Bundled Treatment

Since the employers administered the Early-Pay Treatment, two ancillary components could have contributed to the observed treatment effects on productivity. First, the Early-Pay Treatment may have changed workers' feelings toward their employer, which could have affected their work performance via gift-exchange or fairness concerns. Second, the Early-Pay Treatment could have specifically impacted workers' trust in their employer.

Gift exchange and fairness. Being paid early might have caused the early payment group to feel more positive about their employer. Conversely, the Control Group might have felt unfairly treated by their employer. Several pieces of evidence contradict the hypothesis that such effects caused significant impacts on worker productivity. First, the literature on gift exchange at the workplace has largely found no and/or short-lived effects, especially in field settings (Gneezy and List, 2006; DellaVigna et al., 2019; Esteves-Sorenson, 2017; de Ree et al., 2018; Gilricht et al., 2016).

Second, if gift exchange or fairness concerns were important considerations in this setting, we would expect there to be measurable impacts immediately following the announcement. However, we do not find any evidence of positive announcement effects on productivity on day 5 and/or day 6 of the study. The estimates in Table 5 show no evidence of significant announcement effects, neither when considering the entire announcement period (columns 1 and 2) nor the announcement day only (i.e. on day 5; columns 3 and 4) nor the two work days following the announcement (columns 5 and 6).

One might explain the absence of such effects by the fact that there were no actual payment differences across workers (unlike in Breza et al. (2018)). Moreover, while

we did not collect data of workers' demand for the different payment regimes, evidence from other settings suggests that at least some workers prefer more infrequent payments as a method of commitment savings (**?**), such that the direction of any potential effects was a priori unclear.

Third, we do not find evidence of negative impacts on control-group workers after cash payments were made at the worksite (Table 6). Comparing workers in the Control Group with workers in the Early Payment Group II (who were paid at the end of day 9) revealed no productivity differences on the day following payments to workers in the Early Payment Group I (who were paid at the end of day 8). Finally, any explanation involving gift exchange and fairness would also need to address why the effects would concentrate among poorer workers, which might be possible ex post but not what one might expect ex ante.

Trust in the employer. The Early-Pay Treatment could have increased workers' trust in their employers' assurances of future payments. Such increased trust would have increased workers' perceived expected piece rate—the probability of being paid and the piece rate—and thus potentially increasing both effort and output. Several reasons lead us to believe that the observed treatment effects are not explained by such considerations.

First, we designed the payment on day 1 so as to build workers' trust in their employer. Second, as described above, some workers in the Early-Pay Group were paid on day 8; others were paid on day 9 (at the same worksite). If trust in the employer were a major concern among workers, then we would expect workers who were to be paid on day 9 to display an increase in trust towards their employer following the payment of day 8 payees. However, we found no impacts on day 9 for workers who were going to be paid later that day compared to the Control Group (Table 6).

3.4.2 Investment Channels

In general, cash on hand can have a variety of impacts on worker productivity, ranging from physical capital (e.g. machines, fertilizer) to human capital (e.g. training, schooling) and health investments (e.g. bed nets, nutrition). By design, the results of our experiment cannot be explained via effects of investments in physical or human capital since there was no scope for workers to bring any of their own physical capital to the worksite. Moreover, any human-capital investments would have taken much longer to

come to fruition than the horizon of the experiment.

Nutrition. A long literature in development economics considers the impact of nutrition on worker productivity (Dasgupta and Ray, 1986). We find some evidence of workers increasing their food expenditures following the early payment, as discussed above (Table 2). However, meaningful impacts of the Early-Pay Treatment on worker productivity via nutritional channels are unlikely. We consider two categories of potential pathways.

A first potential channel could be biological changes for malnourished workers due to increased food intake. However, according to the biological and medical literatures on the impacts of increased food intake, such changes do not occur overnight. Consistent with this view, Schofield (2014) finds evidence of increased earnings among workers only starting a week after increasing their caloric intake.

A second potential channel could occur via potential impacts of increased breakfast intake due to blood-sugar spikes. We find clear evidence against such effects. We collected direct measures of breakfast consumption following the early payday. We find no evidence of increased breakfast on any of the dimensions of our survey, including whether workers had breakfast, how much, and what they ate (columns 4 through 8 of Table 7). A possible explanation for this lack of impacts on breakfast consumption patterns appears to be the fact that almost all workers (98 percent) in the Control Group reported eating breakfast (thus leaving not much room at the extensive margin), and almost everyone (94 percent) reported eating a particular rice dish that is common in the area (often involving vegetables).

Moreover, we would expect any impacts of blood sugar spikes due to increased breakfast consumption to wear off by the end of the work day. However, we find persistent impacts of the Early-Pay Treatment throughout the day, including the last couple of hours or the workday, i.e. 5 to 7 hours after eating breakfast (columns 1 through 3 of Table 7).

4 Psychological Channels

Having documented evidence of direct impacts of cash on hand on worker productivity that is not explained by the ancillary components of the treatment or investment impacts, we now investigate the underlying psychological impacts of cash constraints

more closely. We first provide positive evidence of impacts on worker attention by considering the above-described measures of attentional errors as a potential channel of reduced worker productivity. Second, we consider the impact of a salience intervention that seeks to bring worries about financial strain to the top of workers' minds and its interaction with the Early-Pay Treatment on worker productivity.

4.1 Attentional Errors

The manufacturing task in our setting is a relatively cognitively demanding production task, in particular when compared to other manual labor such as carrying sand bags or loading trucks. To consider whether cognitive impacts contributed to the productivity impacts of the Early-Pay Treatment, we collected detailed measures of three markers of inattention, which may have influenced workers' efficiency of production ("attentional errors"), as described in detail in Section 2.1. Each of these measures indicates work patterns that occur easily as consequences of attention lapses. Such patterns are inefficient as they increase the time and effort per leaf plate (for the same piece rate). The measures are not incentivized. In fact, workers are not even aware that we collected these measures, such that we would not expect any changes in these measures as a consequence of alternative explanations for impacts (e.g. gift exchange).

The early treatment reduced workers' attentional errors by 0.07 to 0.1 standard deviations, as measured by a normalized index of attentional errors (columns 1 and 2 of Table 8). Mirroring the impacts of the Early-Pay Treatment on productivity, the impacts are almost exclusively concentrated among the poorer half of the sample (columns 3 to 5).

The observed impacts of the Early-Pay Treatment on attentional errors suggest that impacts on attention are one contributing mechanism of the observed treatment effects on worker productivity. Such attentional impacts could be explained by cash on hand reducing worries and thus distractions during work hours, as hypothesized by Mullainathan and Shafir (2013). However, this evidence could also potentially be consistent with other psychological channels such as stress, mental health, sleep, happiness, or motivation, that operate in the same way, i.e that are concentrated among the poor and mediated through attentional errors.

4.2 Salience Treatment

In addition to considering the impact of the Early-Pay Treatment, we also investigate the role of attention by investigating potential impacts of directly focusing workers' attention on their financial situation. To do so, we implemented a salience intervention that was cross-randomized to the Early-Pay Treatment. Some workers received the salience treatment on day 6 of the study, others on day 10 of the study, and others not at all. In this intervention, surveyors told workers during the first hour of their work about another (fictional) worker's financial strain and then asked them about their own finances. Workers then returned back to their work. The exercise is similar in spirit to the mall study in Mani et al. (2013).

Directing workers' attention can have two potentially opposing effects. First, since attention is limited, drawing workers' attention to their finances might divert valuable attentional resources from the work task and thus reduce worker productivity. Second, however, focusing workers' attention on their finances might raise workers' perceived marginal value of a dollar. Such impacts, resembling reminder effects in Karlan et al. (2016), might increase worker effort and thus increase worker productivity. Importantly, previous work on scarcity—such as Mani et al. (2013)—had only limited scope for a positive channel.

To test for differential effect before vs. after payment, the salience treatment was randomized to be conducted before or after cash payment. Some workers received the salience intervention on day 6 (i.e. before any early payments occurred), others received it on day 10 (i.e. after some of those workers had received early payments), and others received no salience intervention. This design allowed us to test whether potentially stronger impacts of induced financial worries on cognition before the early payment caused differential effects of the intervention for workers who had been paid compared to workers who had not been paid.

In our setting, the overall impact of the salience intervention on worker productivity is positive (column 1 of Table 9). On days after receiving the salience intervention in the morning, workers were about 3.2 percent more productive compared to the remaining study sample. This result suggests that the motivational effect of focusing workers' attention on their finances is stronger than adverse effects of diverting attentional resources away from work.

The positive effects are entirely concentrated among workers who have already been paid. When workers were cash-poor (i.e. before their first major payment), we found

no evidence of any (positive or negative) impact of the salience treatment on worker productivity, suggesting that the two opposing effects described above cancel each other out. In contrast, after workers were paid, the salience intervention increased worker productivity by up to 7 percent (columns 2 and 3 of Table 9).

The heterogeneous treatment effects (columns 4 and 5 of Table 9) highlight the difficulties in targeting salience interventions precisely. Our intention was to target poverty with the salience intervention, but it appears that we may have instead made loans more salient. This interpretation may explain the lack of heterogeneous treatment effects with respect to wealth and the clear evidence of heterogeneous impacts with respect to existing loans. More generally, it is difficult to raise the salience of only one particular issue of interest.[8]

Finally, while we find some evidence of increased attentional errors following the salience treatment, the evidence is only suggestive. Overall, we find a complicated set of results of the impact of the salience treatment on worker productivity, which highlights the caution warranted with salience or priming interventions, as also pointed out by Kahneman (2012).

5 Conclusion

This paper tests for a direct relationship between financial constraints and productivity. We provide evidence that even relatively minor improvements in workers' financial situations can have relatively large impacts on their productivity. When workers have less cash on hand, they produce fewer plates, make more errors per plate, and earn less in total. This evidence suggests that financial constraints by themselves may be detrimental for earnings, beyond potential impacts through investments in complementary inputs, human capital, or health. We also provide some evidence that attention is one mediating mechanism. We find that relaxing workers' financial constraints also reduced attentional errors.

Given the impacts, it seems worth revisiting other contexts in search of similar direct effects. For instance, Fink et al. (2018) document large seasonal variation in earnings among farmers in Zambia. **?** and Bandiera et al. (2017) find large and persistent

[8]Moreover, salience interventions are likely to be non-monotonic (e.g. in baseline wealth or worries). For instance, on the one hand, one can only bring worries top of mind if they exist, e.g. impacts of making financial strain might be larger for people with more severe financial strain. On the other hand, the underlying concerns may already be top of mind for people who are very strained, leading to smaller treatment effects for people with more severe financial strain.

impacts of bundled treatments to support the ultra-poor. Such impacts are often attributed to neoclassical explanations such as credit constraints. Our evidence suggests that direct effects of changes in financial strain may have contributed to the observed impacts in these settings.

Finally, our findings may have some implications for policy. The direct impact of financial strain on worker productivity is a parameter of interest for various policies, including unemployment insurance, basic income, or conditional and unconditional cash transfers. Importantly, the observed direct effects of reducing financial strain may occur *in addition* to any investment effects economists usually consider.

References

Adhvaryu, Achyuta, Namrata Kala, and Anant Nyshadham, "The Light and the Heat: Productivity Co-Benefits of Energy-Saving Technology," *NBER Working Paper No. 24314*, 2018.

Baird, Sarah, David McKenzie, and Berk Ozler, "The Effects of Cash Transfers on Adult Labor Market Outcomes," *IZA Journal of Development and Migration*, 2018, *8* (22).

Bandiera, Oriana, Robin Burgess, Narayan Das, Selim Gulesci, Imran Rasul, and Munshi Sulaiman, "Labor Markets and Poverty in Village Economies," *Quarterly Journal of Economics*, 2017, *132* (2), 811–870.

Banerjee, Abhijit, Esther Duflo, Nathanael Goldberg, Dean Karlan, Robert Osei, William Parienté, Jeremy Shapiro, Bram Thuysbaert, and Christopher Udry, "A Multifaceted Program Causes Lasting Progress for the Very Poor: Evidence From Six Countries," *Science*, 2015, *348* (6236), 1260799.

Banerjee, Abhijit V., Rema Hanna, Gabriel E. Kreindler, and Benjamin A. Olken, "Debunking the Stereotype of the Lazy Welfare Recipient: Evidence from Cash Transfer Programs," *The World Bank Research Observer*, 2017, *32*, 155–184.

Bessone, Pedro, Gautam Rao, Frank Schilbach, Heather Schofield, and Mattie Toma, "Sleepless in Chennai: The Consequences of Increasing Sleep among the Urban Poor," *mimeo*, 2019.

Breza, Emily, Supreet Kaur, and Yogita Shamdasani, "The Morale Effects of Pay Inequality," *Quarterly Journal of Economics*, 2018, *133* (2), 611–663.

Carvalho, Leandro S., Stephan Meier, and Stephanie W. Wang, "Poverty and Economic Decision-Making: Evidence from Changes in Financial Resources at Payday," *American Economic Review*, 2016, *106* (2), 260–284.

Chemin, Matthieu, Joost de Laat, and Johannes Haushofer, "Poverty and Stress: Rainfall Shocks Increase Levels of the Stress Hormone Cortisol," *mimeo*, 2013.

Dasgupta, Partha and Debraj Ray, "Inequality as a Determinant of Malnutrition and Unemployment," *Economic Journal*, 1986, *96*, 1011–1034.

de Quidt, Jonathan and Johannes Haushofer, "Depression Through the Lens of Economics: A Research Agenda," in Christopher B. Barrett, Michael R. Carter, and Jean-Paul Chavas, eds., *The Economics of Poverty Traps*, Chicago: NBER/University of Chicago Press, 2018, chapter 3, pp. 127–152.

de Ree, Joppe, Karthik Muralidharan, Menno Pradhan, and Halsey Rogers, "Double for Nothing? The Effects of Unconditional Teacher Salary Increases in Indonesia," *Quarterly Journal of Economics*, 2018, *133* (2), 923–1039.

Dean, Emma Boswell, Frank Schilbach, and Heather Schofield, "Poverty and Cognitive Function," in Christopher B. Barrett, Michael R. Carter, and Jean-Paul Chavas, eds., *The Economics of Poverty Traps*, Chicago: University of Chicago Press, 2018.

Dean, Joshua T., "Noise, Cognitive Function, and Worker Productivity," *mimeo*, 2018.

DellaVigna, Stefano, John List, Ulrike Malmendier, and Gautam Rao, "Estimating Social Preferences and Gift Exchange with a Piece-Rate Design," *mimeo*, 2019.

Esteves-Sorenson, Constanca, "Gift Exchange in the Workplace: Addressing the Conflicting Evidence with a Careful Test," *Management Science*, 2017, *64* (9), 4365–4388.

Fink, Günther Fink, Kelsey Jack, and Felix Maxiye, "Seasonal Liquidity, Rural Labor Markets and Agricultural Production," *NBER Working Paper No. 24564*, 2018.

Finkelstein, Amy, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P Newhouse, Heidi Allen, Katherine Baicker, and Oregon Health Study Group, "The Oregon health insurance experiment: evidence from the first year," *The Quarterly journal of economics*, 2012, *127* (3), 1057–1106.

Gilricht, Duncan, Michael Luca, and Deepak Malhotra, "When $3 + 1 > 4$: Gift Structure and Reciprocity in the Field," *Management Science*, 2016, *62* (9), 2639–2650.

Gneezy, Uri and John A. List, "Putting Behavioral Economics to Work: Testing for Gift Exchange in Labor Markets using Field Experiments," *Econometrica*, 2006, *74* (5), 1365–1384.

Haushofer, Johannes and Ernst Fehr, "On the Psychology of Poverty," *Science*, 2014, *344* (6186), 862–867.

_ **and Jeremy Shapiro**, "The Short-Term Impact of Unconditional Cash Transfers to the Poor: Experimental Evidence from Kenya," *Quarterly Journal of Economics*, 2016, *131* (4), 1973–2042.

Kaminski, Jonathan, Luc Christiaensen, and Christopher L. Gilbert, "The End of Seasonality? New Insights from Sub-Saharan Africa," *World Bank Policy Research Working Paper No. 6907*, 2014.

Karlan, Dean, Margaret McConnell, Sendhil Mullainathan, and Jonathan Zinman, "Getting to the Top of Mind: How Reminders Increase Saving," *Management Science*, 2016, *62* (12), 3393–3411.

Kaur, Supreet, Michael Kremer, and Sendhil Mullainathan, "Self-Control at Work," *Journal of Political Economy*, 2015, *123* (6), 1227–1277.

Kremer, Michael, Gautam Rao, and Frank Schilbach, "Behavioral Development Economics," in B. Douglas Bernheim, Stefano DellaVigna, and David Laibson, eds., *Handbook of Behavioral Economics: Foundations and Applications*, Vol. 2, Amsterdam: Elsevier/North-Holland, 2019.

Lusardi, Annamaria, Daniel J. Schneider, and Peter Tufano, "Financially Fragile Household: Evidence and Implications," *Brookings Papers on Economic Activity*, 2011, *Spring*, 83–134.

Mani, Anandi, Sendhil Mullainathan, Eldar Shafir, and Jiaying Zhao, "Poverty Impedes Cognitive Function," *Science*, 2013, *341* (6149), 976–980.

Molden, Daniel C, "Understanding priming effects in social psychology: What is âsocial primingâ and how does it occur?," *Social Cognition*, 2014, *32* (Supplement), 1–11.

Mullainathan, Sendhil and Eldar Shafir, *Scarcity: Why Having Too Little Means So Much*, New York: Macmillan, 2013.

Ong, Qiyan, Walter Theseira, and Irene Y.H. Ng, "Reducing Debt Improves Psychological Functioning and Changes Decision-making in the Poor," *Proceedings of the National Academy of Sciences*, 2019, *116* (15), 7244–7249.

Schofield, Heather, "The Economic Costs of Low Caloric Intake: Evidence From India," *mimeo*, 2014.

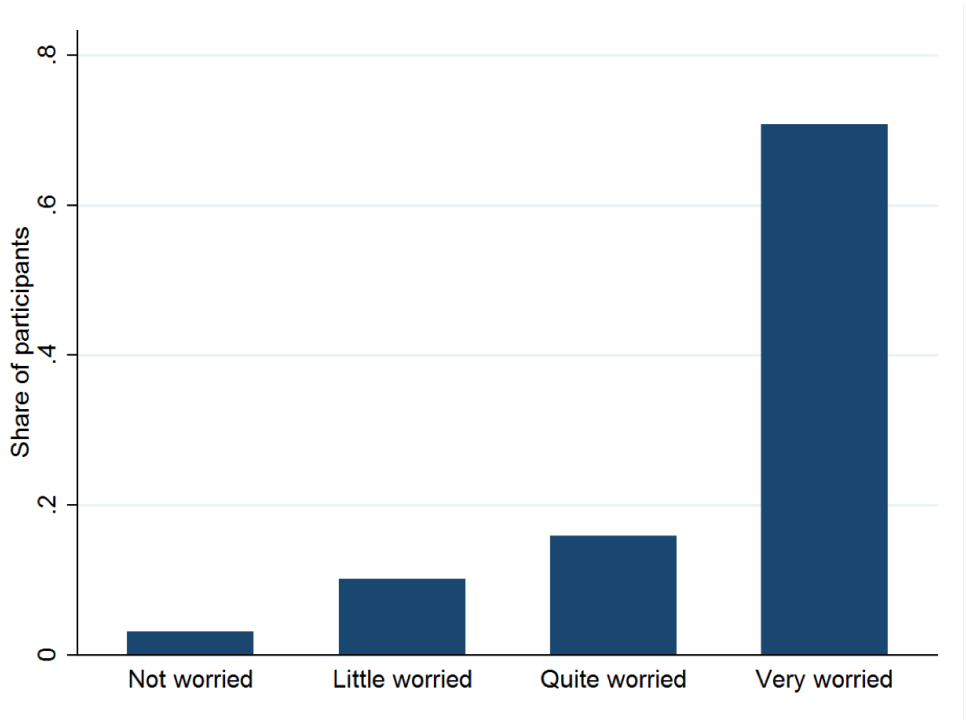
Shah, Anuj K., Eldar Shafir, and Sendhil Mullainathan, "Scarcity Frames Value," *Psychological Science*, 2015, *26* (4), 402–412.

Shapiro, Jesse M., "Is There a Daily Discount Rate? Evidence From the Food Stamp Nutrition Cycle," *Journal of Public Economics*, 2005, *89* (2-3), 303–325.

6 Tables and Figures

6.1 Figures

Figure 1: Motivational Evidence:
How Worried are You About Your Finances?

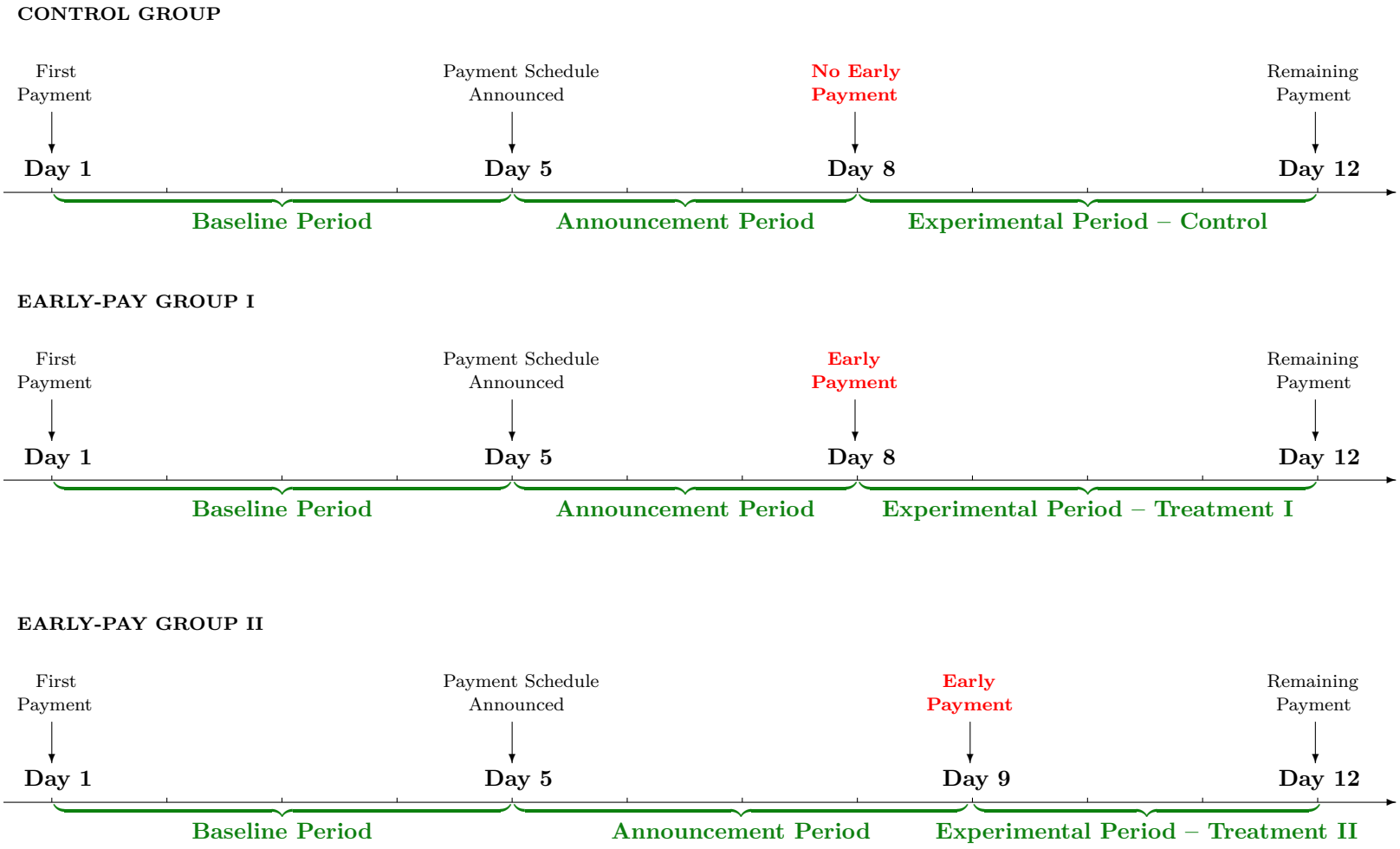


Notes: Workers were asked at baseline, "How worried are you about your finances?" This figure tabulates responses.

Figure 2: Leaf plate

Notes: This figure shows a sal tree leaf plate akin to the ones produced as part of the experiment. In accordance with quality standards set by parterning contractors, leaf plates were required to (i) meet a minimum size requirement, (ii) have no gaping holes, (iii) have all leafstalks (petioles) covered by other leaves, and (iv) have the inner center parts placed underneath the outer rings of the plates.

Figure 3: Experimental Design



Notes: This figure shows the experimental design of the study. In the Control Group (upper part of the figure), workers were paid on days 1 and 12. In the Early-Pay Group I (center part of the figure), workers were paid on days 1, 12, and additionally on day 8. In the Early-Pay Group II (center part of the figure), workers were paid on days 1, 12, and additionally on day 9.

6.2 Tables

	Late payment group mean	Diff. for early payment group	N
Age	39.188	0.180	404
	(0.658)	(0.893)	
Years of education (top-coded at 13)	4.694	-0.322	406
	(0.256)	(0.343)	
Can read newspaper in Odiya	0.630	0.010	403
	(0.036)	(0.048)	
Primarily does daily wage labor	0.751	-0.049	403
	(0.032)	(0.045)	
Income quartile	2.393	0.027	404
	(0.080)	(0.109)	
Ate meat during previous week	0.579	-0.079	405
	(0.037)	(0.050)	
Very worried about future finances	0.691	0.030	352
	(0.036)	(0.049)	
Has loans	0.683	0.048	406
	(0.034)	(0.046)	
Has loans from moneylender	0.175	-0.005	407
	(0.028)	(0.038)	
Very worried about any loan	0.410	0.007	406
	(0.036)	(0.049)	
Total loan amount	11,223	1,371	378
	(1,157)	(1,660)	
Owns land	0.564	0.000	401
	(0.037)	(0.050)	
Non-mud house	0.238	-0.021	403
	(0.032)	(0.042)	
No food credits	0.459	0.005	407
	(0.037)	(0.050)	
Can get 1K in emergency	0.355	-0.066	404
	(0.035)	(0.047)	
Wealth index (avg of the 4 vars above)	0.405	-0.021	401
	(0.018)	(0.026)	
1st principal factor above median (using the same 4 vars)	0.530	-0.058	401
	(0.037)	(0.050)	

Table 1: Balance of Worker Characteristics

Notes: This table shows the tests of differences in baseline worker characteristics. Each characteristic is regressed on "Cash", which refers to whether an individual is in one of the early-payment groups. Standard errors are clustered by worker.

	Dependent Variable - Expenditure Category							
	Paid off any loan or credit (1)	Loans/ Credits (2)	Food (3)	Medical (4)	Agricultural (5)	Tobacco/ Alcohol (6)	Other (7)	Total (8)
Cash x Post	0.401***	277.9***	67.88***	16.47	-17.11	0.260	-125.3	220.1
	(0.0439)	(58.06)	(23.77)	(12.27)	(13.90)	(4.634)	(132.7)	(150.8)
Dependent var mean	0.18	121.98	269.94	31.55	28.33	34.01	285.63	771.43
N: workers	401	401	401	401	401	401	401	401

Table 2: Impact of Early Payment on Expenditure Patterns

Notes: This table shows the impact of the early-payment treatment on expenditure patterns. "Cash" refers to whether an individual was part of one of the two early-payment groups. "Post" indicates whether a worker had received his early payment. Individuals were surveyed about their expenditure patterns during the preceding three days. All regressions control for individual fixed effects. Standard errors are clustered by worker.

Dependent variable: Log hourly output								
			Wealth proxy					
			Owns land	Non-mud house	No food credits	Can get 1K in emergency	1st principal factor	Wealth index (avg)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cash x Post	0.0533**	0.0535**	0.0907**	0.0693**	0.0858**	0.0693**	0.129***	0.110***
	(0.020)	(0.020)	(0.029)	(0.022)	(0.027)	(0.024)	(0.034)	(0.027)
Cash x Post x Wealth			-0.0650	-0.0820*	-0.0719*	-0.0688	-0.125**	-0.200**
			(0.040)	(0.049)	(0.041)	(0.044)	(0.040)	(0.073)
Salience controls?	N	Y	N	N	N	N	N	N
N: worker-hours	22523	22523	22470	22470	22470	22470	22470	22470

Table 3: The Impact of Early Payment on Worker Productivity

Notes: This table shows the impact of the Early-Payment Treatment on worker productivity. "Cash" refers to whether an individual is in one of the Early-Payment Groups. "Post" indicates whether a worker had received his early payment. Regressions control for individual, day in study, hour of day, and round times work hour fixed effects, as well as for whether individuals had received the salience intervention previously. Standard errors are clustered by work.

Dep. variable: Log hourly production	**Wealth proxy**	
	Wealth Index	First PC
Cash X Post 1 Day	0.116***	0.137***
	(0.022)	(0.026)
Cash X Post 1 Day X High Wealth	-0.108***	-0.085***
	(0.031)	(0.029)
Cash X Post 2 Days	0.070***	0.085***
	(0.021)	(0.026)
Cash X Post 2 Days X High Wealth	-0.092***	-0.068**
	(0.031)	(0.027)
Cash X Post 3 Days	0.086***	0.120***
	(0.025)	(0.032)
Cash X Post 3 Days X High Wealth	-0.159***	-0.133***
	(0.054)	(0.041)
Observations	22013	22471
R-squared	0.346	0.344

Table 4: Persistence of Early Pay Impacts

Notes: This table shows the impact of the early-payment treatment on worker productivity. This table shows the same regressions as in columns (7) and (8) in the previous table, splitting up the "Post" coefficient into three days following the early payment. "Cash" refers to whether an individual is in one of the early-payment groups. "Post" indicates whether a worker had received his early payment. All regressions control for individual, day in study, hour of day, and round times work hour fixed effects, as well as for whether individuals have received the salience intervention previously. Standard errors are clustered by worker.

Dependent variable: Log hourly production						
	(1)	(2)	(3)	(4)	(5)	(6)
Cash x Post-announcement	-0.000687	0.00176				
	(0.021)	(0.021)				
Cash x Post-announcement (Day 1)			-0.0302	-0.0339		
			(0.021)	(0.022)		
Cash x Post-announcement (Days 2+)			0.00892	0.0122		
			(0.023)	(0.023)		
Cash x Post-announcement (Days 1-2)					-0.0000374	0.00705
					(0.021)	(0.021)
Cash x Post-announcement (Days 3+)					-0.00106	-0.00144
					(0.024)	(0.024)
Cash x Post-treatment		0.0541		0.0558		0.0542
		(0.029)		(0.029)		(0.029)
Observations	Pre-treatment	All observations	Pre-treatment	All observations	Pre-treatment	All observations
R-squared	0.341	0.341	0.346	0.344	0.341	0.342
N	14983	22523	14983	22523	14983	22523

Table 5: The Impact of Announcing Early Payment

Notes: This table shows the impact of announcing the early payment on worker productivity. The post-announcement period is defined as "1" for days when the payment schedule had been made (i.e. starting on day 5) until the day of the early payment (i.e. day 8 or 9), and 0 otherwise. Standard errors are clustered by worker.

Dependent variable: Log hourly production			
	(1)	(2)	(3)
Later Cash x 1 day before payday	-0.00518	0.0145	
	(0.025)	(0.026)	
Cash x 1 day before payday			0.0158
			(0.024)
Cash x 2 days before payday			-0.0176
			(0.024)
Cash x 3 days before payday			0.0238
			(0.023)
Cash x Post		0.0530	0.0518
		(0.020)	(0.026)
Sample	Pre-treatment period	All observations	All observations
R-squared	0.349	0.342	0.344
N	14983	22523	22523

Table 6: The Impact of Early Payment on Workers Who Did Not Get Paid

Notes: This table shows the Impact of the Early Payment on workers who were *not* paid. Columns 1 and 2 shows regressions that consider the difference in performance on day 9 between workers in the Early-Pay Group II (i.e. who were paid at the end of day 9) to the Control Group (who were paid on day 12). Column 3 estimates potential payday effects, i.e. it considers worker performance during the days before their payment. In all rounds (except for round 2), work on the payday itself did not count toward the payment, e.g. workers paid on day 8 were paid for their work until day 7, thus mitigating potential payday effects.

	Dependent variable: Output			Dependent variable: Breakfast measures				
	Log hourly production			Ate any breakfast	Ate rice	Amount of rice	Ate vegetables	Ate lentils
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cash x Post	0.0513**	0.0481**	0.0548***	-0.00674	-0.00155	-3.823	-0.0207	0.0189
	(0.021)	(0.021)	(0.020)	(0.0130)	(0.0244)	(7.125)	(0.0414)	(0.0159)
Cash x Post x Last 2 hours of day	0.00341	-0.00237						
	(0.015)	(0.016)						
Cash x Post x Last 1 hour of day			-0.0125					
			(0.019)					
p-value: cash effect + interaction	0.0116	0.0396	0.0839					
Dep var mean - Control group	1.36	1.36	1.36	0.98	0.94	180.63	0.76	0.03
N	22523	22523	22523	320	320	320	320	320

Table 7: The Impact of the Early Payment via Nutrition Channels

Notes: This table shows the impact of the early-payment treatment on worker productivity during the last two hours of the day (columns 1 through 3) and on different measures of breakfast consumption (columns 4 through 8).

	Dependent variable				
	Attention (normalized index) (1)	Attention index above median (2)	Attention (normalized index) (3)	Attention (normalized index) (4)	Attention index above median (5)
Cash x Post	-0.110**	-0.0741**	-0.211**	-0.183**	-0.114**
	(0.040)	(0.025)	(0.073)	(0.058)	(0.035)
Cash x Post x Wealth			0.278*	0.163**	0.0879*
			(0.146)	(0.078)	(0.049)
Dependent var mean	-0.049	0.491	-0.049	-0.049	0.491
N: worker-hours	15265	15265	15227	15227	15227

Table 8: The Impact of Early Payment on Attentional Errors

Notes: This table shows the impact of the early-payment treatment on attentional errors. "Cash" refers to whether an individual is in one of the early-payment groups. "Post" indicates whether a worker had received his early payment. All regressions control for individual, day in study, hour of day, and round times work hour fixed effects, as well as for whether individuals have received the salience intervention previously. Standard errors are clustered by worker.

Dependent variable: Log hourly production					
	(1)	(2)	(3)	(4)	(5)
Salience	0.0315**	0.0731***	0.0663***	0.0593**	0.0282
	(0.013)	(0.018)	(0.022)	(0.026)	(0.026)
Salience x Pre-cash		-0.0703***	-0.0517**	-0.0591*	-0.00808
		(0.023)	(0.026)	(0.034)	(0.032)
Salience x High wealth index				0.0181	
				(0.037)	
Salience x Pre-cash x High wealth index				0.00434	
				(0.047)	
Salience x High loan amount					0.0932**
					(0.036)
Salience x Pre-cash x High loan amount					-0.117**
					(0.047)
Cash treatment controls?	No	No	Yes	Yes	Yes
R-squared	0.340	0.341	0.343	0.343	0.344
N	22523	22523	22523	22523	21137

Table 9: The Impact of the Salience Intervention on Worker Productivity

Notes: This table shows the impact of the salience intervention on worker productivity. “Cash" refers to whether an individual is in one of the early-payment groups. “Post" indicates whether a worker had received his early payment. All regressions control for individual, day in study, hour of day, and round times work hour fixed effects, as well as for whether individuals have received the salience intervention previously. Standard errors are clustered by worker.

A Supplementary Appendix

A.1 Deviations in Work and Payment Schedules

The standard schedule refers to the 12-day, 5-hour work schedules with a base rate of Rs. 200 and a piece rate of Rs. 3 per plate, implemented for rounds 4 to 11 of the study. While most rounds had consecutive work days, some rounds had one-day breaks in the first half of the rounds due to local events and religious festivals. Specifically, there were one-day breaks after day 5 in round 2, day 2 of round 3, and day 3 of round 12.

Rounds 1-3, which were conducted in March-June of 2017, had a number of deviations from the standard schedule and wage rates which were later finalized and then implemented during March-June of 2018.

First, in the earlier rounds, each workday consisted of 7 hours of work and a lunch break, rather than 5 continuous hours of work without lunch. Both types of workday schedules are common in the local region. Since some workers expressed their preferences for shorter work days due to hot weather during the lean season, the daily schedules were updated in 2018. Workers with the 5-hour schedules still received a snack at the end of each day.

Second, rounds 2 and 3 had deviations in weekly schedules. Round 2 was shorted by one day, effectively removing day 12 of the standard schedule and giving final payments on day 11. This was due to a local festival that coincided with day 12 of this round. Round 3 had early-payment days pushed back to days 9 and 10. This change was similar to inserting one additional regular work day after day 5, and removing day 12 from the standard schedule. Workers in this round initially predicted a large number of absences for day 6 due to a local event, so the payment days were pushed back, but the event did not take place so the worksite had its regular operation.

Third, the wage rates and payment lags had minor differences. In round 1, workers received a flat wage of Rs. 230 for Day 1, and a lower piece rate of Rs. 2 per accepted leaf plate. Rounds 2 and 3 had lower base wage rates of Rs. 180 and Rs. 175 respectively. In all three rounds, workers in the Early-Pay Group received wages earned two days prior to the early payment day (e.g. wages from days 2-6 for those with an early payment on day 8). Finally, all the workers received the bonus payment of 350 Rs. if they attended all five mandatory days in the later days of rounds.

The later rounds (rounds 12-14) were shortened in order to avoid running the experiment during the transplanting season. Round 12 was shorted by one day, effectively

removing day 5 from the standard schedule and announcing the individual payment schedules in the morning on day 6.

Round 13-14 were shorted to 6 days. There was no flat wage payment on day 1 in these rounds. The Early-Pay Groups received payments on day 3 (group I) and 4 (group II). In order to make the size of the early payments comparable to the other rounds, the workers in the Early-Pay Groups were paid the flat wage for day 1, the wages they earned until that day (e.g. wages for day 2-3 for group I), in addition to a bonus of Rs. 200. The late-pay group received all wages, including the first day wage and the bonus, on the last day.

A.2 Appendix Tables

	Dependent Variable						
	Number leaves (1)	Number of undone mistakes (2)	Number of stitches (3)	Attention (normalized index) (4)	Attention index above median (5)	Attention (normalized index) (6)	Attention index above median (7)
Baseline productivity	-0.179***	-0.239***	-0.259***	-0.176***	-0.0708***		
	(0.0245)	(0.0401)	(0.0458)	(0.0224)	(0.00902)		
Baseline prod. quartile = 2						-0.136*	-0.0155
						(0.0803)	(0.0422)
Baseline prod. quartile = 3						-0.376***	-0.103**
						(0.0823)	(0.0437)
Baseline prod. quartile = 4						-0.704***	-0.258***
						(0.0811)	(0.0417)
N: worker-hours	15265	11620	11620	15265	15265	15265	15265

Figure 4: Relationship between Productivity and Attentional Errors

Notes: This table shows the cross-sectional relationship between worker productivity and attentional errors. Standard errors are clustered by worker.