

CHAPTER 7

Productivity

In 2008, a bank in Colombia realized that it faced a problem: loan officers across its branches were postponing their registration of new clients and collection of credit to the last two weeks of the month, just before their monthly performance bonuses were calculated, even though they had weekly targets and their monthly bonuses were reduced when they failed to meet them. These practices made it harder to manage cash flows and also added to the stress of the loan officers.

Understanding motivation and behavior at work requires us not only to *zoom in* to examine cognitive and psychological barriers that individuals face and the frames that work environments create but also to *zoom out* to examine the social contexts in which work takes place.

The bank experimented with decreasing the time between effort and rewards and with making the rewards more salient. They gave loan officers small weekly prizes like movie tickets or restaurant coupons if they met their goals in the first half of the month and sent weekly reminders about targets. In the branches that implemented these changes, the sourcing of new

loans in the beginning of the month increased by 18 percent, with no changes in the total number of new loans per month or credit quality. Loan officers earned the bonuses they had been missing earlier—increasing their monthly earnings by 25 percent—and at the same time reported less stress (Cadena and others 2011).

Why did these bank officers require weekly reminders to earn more money? This chapter makes the case that a number of the cognitive, psychological, and social barriers described in earlier chapters affect how much effort employees may exert on the job or how much entrepreneurs and farmers may invest in new technologies. Increasing productivity is central to raising living standards, and productivity growth can arise either from augmenting the factors of production—human capital, physical capital, and technology—or from making better use of existing factors. This chapter focuses on the latter. The productivity of labor tends to be low in both the agricultural and the nonagricultural sectors in low-income settings (Caselli 2005), as is the adoption of business and farming practices that have proven effective elsewhere (Bloom and others 2010). Insufficient motivation in those who provide public services is also common in developing countries and has been well documented in the past decade, ranging from absenteeism of school teachers to negligence among doctors.¹

To increase worker motivation, employers in both the private and the public sectors typically turn to monetary incentives: performance pay, bonuses, or the threat of dismissal. Underlying these strategies is an assumption that effort responds primarily to these kinds of incentives. Similarly, to address the lack of productive investment among entrepreneurs and

farmers, a policy maker may rely on subsidies (under the assumption that careful cost-benefit calculations underlie investment decisions) or training services (under the assumption that these workers lack information about the benefits of a technology).

While these assumptions may indeed capture important relationships between monetary incentives and effort and between the distribution of returns and investment, recent evidence suggests additional diagnoses for these problems. As the chapters in this Report have shown, other cognitive, psychological, and social barriers—sometimes more difficult to observe—could also be interfering with the productivity of employees, entrepreneurs, and farmers and could also shape the effectiveness of monetary incentives. Individuals may face challenges in translating their intentions to work harder or to increase their investment into concrete action. Because of the many competing demands on their attention, they may miss opportunities to improve their productivity and earnings. Individuals may seek meaning in their work and may care about how their employers treat them. They may also care about what their peers are doing.

Understanding these aspects of motivation and behavior requires us not only to zoom in to examine the cognitive and psychological barriers that individuals face and the frames that work environments may create but also to zoom out and examine the broader social contexts in which work takes place (see spotlight 4). This chapter reviews evidence on the role that various cognitive, psychological, and social factors may play in the effort employees exert on the job, in recruitment, in the performance of small businesses, and in the adoption of technology in agriculture. It concludes with some general lessons that could be useful in designing interventions to improve productivity.

Improving effort among employees

To maximize incentives for employee effort, an employer may design a contract that ties pay to output: when employees produce more, they earn more. While recent evidence suggests that this is a useful starting point, sometimes these financial incentives are not sufficient. People may want to exert more effort tomorrow than today, and this procrastination can happen even in the presence of performance contracts, as the case of the Colombian bank officers demonstrated. People are also sensitive to how tasks are framed and how they understand their relationship with their employer—whether they are being treated fairly, for example. People may also take cues about

what constitutes adequate effort from those working around them.

Overcoming procrastination

In India, for example, data entry clerks are primarily paid weekly through a piece rate; they earn a small fee for showing up and then an amount for every accurate field (piece) they enter. This kind of contract, however, still failed to motivate some workers in a large data entry firm in the city of Mysore to exert as much effort as they would have liked. They tended to work less hard until rewards or needs became more salient. Their output increased by 8 percent on payday, for example, over that at the start of the week—an increase in productivity equivalent to a 24 percent increase in the piece rate (Kaur, Kremer, and Mullainathan, forthcoming). Output would also spike by 15 percent in the week before major festivals, which typically entail higher expenditures.

While it could be the case that the workers preferred to increase effort only at these times, their responses to survey questions suggested that they struggled to translate their intentions to work harder into action. More than three-quarters agreed with the statement, “Some days I don’t work as hard as I would like to.” Likewise, nearly three-quarters concurred that “it would be good if there were rules against being absent because it would help [me] come to work more often.”

In a field experiment, workers were offered an alternative contract that could help them commit to higher effort; they could set their own target for the number of accurate entries for the week. If they reached the target, they would be paid their usual piece rate; if they did not reach their target, they would be paid a lower rate.

More than one-third chose this kind of commitment contract, even though it increased their risk of being paid less if they did not meet their own goal. Their output increased by 6 percent, an effect equivalent to increasing the usual piece rate by 18 percent. The workers who showed the greatest tendency to increase effort just before payday were 50 percent more likely to opt for the commitment contract, and they also increased their output by much more: 28 percent.

While certainly this was a more cost-effective alternative to a blanket increase in wage rates, one might wonder whether the effects of a commitment contract would persist. For example, did they occur simply because the scheme was novel? Would workers who tended to procrastinate self-diagnose and choose the appropriate kind of contracts? Because these data entry clerks were paid weekly and the experiment took

place over 13 months, they had ample time to learn about the scheme and adjust their behavior. Demand for these contracts persisted over time. Workers who tended to increase productivity closer to payday were more likely to take up the commitment contract over time, suggesting that they could realize that they required the additional motivation and could adopt an option that helped them improve their productivity.

Framing tasks and compensation

Ample evidence also suggests that employees' productivity can depend on how they perceive the value of their work or how they perceive their treatment as an employee, not simply on their financial compensation. That is, their productivity depends on the way their tasks and rewards are framed. Financial incentives may also function differently when the rewards of working are framed as lost opportunities versus potential gains or when work environments are competitive.

The significance of tasks and the value of employees

Most contracts are incomplete. They do not specify every possible task a worker may be assigned, the performance expectations for each task, or the implications of every possible contingency on employment and compensation. The terms of such an explicit contract would be difficult to verify and enforce, and the costs of monitoring worker performance could be prohibitively expensive. Moreover, workers may come to the job with a certain amount of intrinsic motivation or inherent enjoyment or satisfaction from doing a task that is not based on external rewards, which could obviate the need for explicit links between performance and compensation.

When employees first enter an organization, they typically undergo some training or orientation, however brief, to acquaint them with their new position. Some evidence from field experiments suggests that the frames created during this stage of the employment relationship can influence later productivity. Emphasizing the significance of a task, for example, motivated fundraisers for a university in the United States. During their training, some fundraisers first read inspirational stories about how their job could make a difference in the lives of students who received scholarships, while others read stories about how the skills they acquired through fundraising could help their future careers (Grant 2008). The group that had read the inspirational stories collected 69 percent more donations while fundraising.

In India, a division of a large software company experimented with multiple ways of orienting their

new recruits and found that emphasizing their value as individuals substantially decreased turnover and improved satisfaction among company clients using their services (Cable, Gino, and Staats 2013). One group received the standard orientation that focused on skills training and general facts about the firm. Another group received the same training plus an additional one-hour session in which they participated in self-reflection and group exercises that focused on their unique attributes that lead to personal happiness and high performance at work and encouraged them to think of ways that they could replicate such behavior in their current job. During the training, they also wore sweatshirts and badges with their names printed on them. For a third group, the additional one-hour session focused on organizational identity. Senior workers discussed the firm's values and why it was successful. Workers were directed to reflect on and discuss qualities of the firm that made the workers feel proud; their sweatshirts and badges bore only the company's name.

After six months, the employees who had gone through the standard orientation and the variant that stressed the organization's identity had turnover rates that were 216 and 300 percent higher than that of the employees whose individual identities had been emphasized. While it could be the case that the best employees are the most likely to depart the firm (if, for example, they are highly sought after by other firms), this does not appear to explain these large differences in turnover: the clients of employees who had undergone achievement training were more satisfied than clients of employees who had not.

Reciprocity in the workplace

A number of field experiments also demonstrate that rewards and compensation can alter how employees perceive they are being treated, which in turn can affect their productivity. These findings are consistent with models of jobs as a form of gift exchange, in which workers reciprocate perceived acts of employer generosity by increasing effort and punish treatment they consider to be unfair (Akerlof and Yellen 1990; Fehr, Kirchsteiger, and Riedl 1993).

In China, a consumer electronics company offered a one-time bonus equivalent to 20 percent of average weekly pay that was not tied to worker performance. The bonuses improved hourly productivity by 3–5 percent (Hossain and List 2012). The improvement lasted several weeks after the bonus was discontinued and was statistically indistinguishable from another incentive scheme they tried in parallel, in which workers could earn the same bonus only if they met certain production targets for four straight weeks.

Something similar happened in Tanzania. Health care workers who received a gift of a biography of an American doctor working in low-income settings inscribed with a thank-you message from the research team improved their adherence to medical protocols for many weeks afterward (Brock, Lange, and Leonard 2014). The process of providing the gift mattered and generated differential effects over time. When the gift was given immediately and without conditions, it triggered a large response within three weeks of receipt, equivalent to 0.25 standard deviations in protocol adherence. After 10 weeks, on average, however, performance returned to the level of health workers who had received no gift. When the gift was made conditional on observed performance, it triggered a smaller immediate improvement in protocol adherence—equal to about 60 percent of the effect of the unconditional gift—which also disappeared in the long run.

Both these methods were outperformed by one in which the book was promised but delivered later—which triggered both an immediate response at the time of the promise, equivalent to 64 percent of the effect of the unconditional gift—and a larger additional response when the gift was delivered, which persisted even one month later. After 10 weeks, these health care workers demonstrated protocol adherence that was as high as the immediate effect of the unconditional gift.

While these experiences from China and Tanzania demonstrate that improvements in productivity in response to gifts can persist for several weeks, the extent to which such effects persist is an empirical question and is likely to depend on a number of factors, such as the nature of the employment relationship, the type of task, and possibly the wages in the external labor market. Much more transient improvements in productivity in response to monetary gifts have been observed among tree planters in Canada and temporary workers in the United States hired for several days for fundraising and data entry work in a library (Bellemare and Shearer 2009; Gneezy and List 2006).

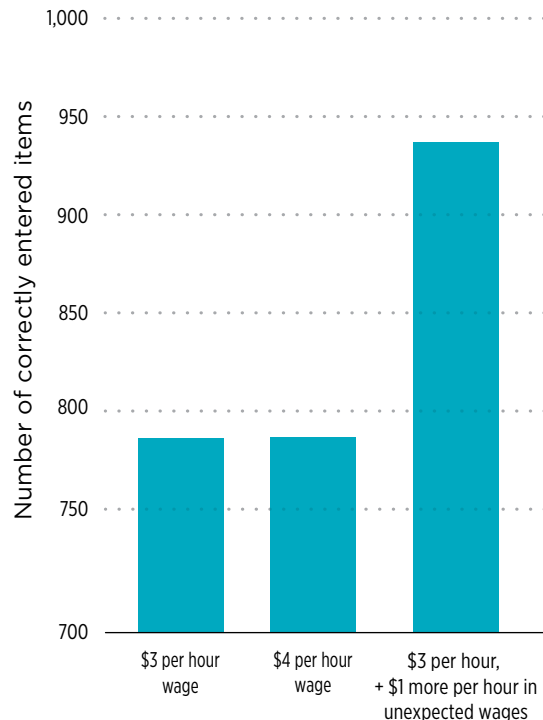
It might be the unexpected nature of a gift that generates reciprocity. In an online experiment hiring freelance data entry workers whose online profiles listed an asking wage below \$3 per hour, workers faced one of three wage structures. One group was simply hired at \$3 per hour, while another was hired at \$4 per hour. A third group was hired at \$3 per hour but right before they started their work, the workers learned that they would earn \$4 per hour due to an unexpected increase in the employer’s budget (call this the \$3+1 group). At the end of the task, the \$3 and \$4 groups had performed identically. Paying a higher wage did not generate higher productivity. The \$3+1 group, however,

correctly entered 20 percent more items (Gilchrist, Luca, and Malhotra 2013) (figure 7.1).

Over time, employees may begin to think of an increase in their earnings as a permanent part of their compensation—that is, they may rescale their expectations. Some evidence comes from an evaluation of a pay equalization reform in southern India that affected tea plantations. Employees who pluck tea leaves were typically paid a fixed daily wage and a piece rate after surpassing certain output thresholds (Jayaraman, Ray, and De Vericourt 2014). One month after unions and tea plantations negotiated a contract revision that increased the daily wage by 30 percent to be in line with minimum wages mandated by state legislation, output per worker increased by an average of 34–37 percent over that of the same plantations the year before and of plantations whose contracts had not been revised. By the fourth month, however, this productivity improvement had declined to 10 percent.

Figure 7.1 Unexpected wage increases can trigger a productivity dividend

In an online experiment, data entry workers were offered three different wage rates. Two groups were offered \$3 per hour or \$4 per hour. A third group was offered \$3 per hour, but after accepting the offer, group members were told they would actually be getting \$4 per hour due to an unexpected increase in budget. This last group correctly entered 20 percent more items than the other groups.



Source: Gilchrist, Luca, and Malhotra 2013.

If employees reward employers' generosity with an increase in effort, to what extent is the converse true? Would they reduce effort in response to perceptions of unfair treatment or compensation that deviates from their expectations? Some evidence from high-income settings suggests that this response is possible. For nearly a 20-year period, when police officers in New Jersey did not receive the wage they requested in binding arbitration, crime reports increased in the months following arbitration, and arrest rates declined (Mas 2006). The greater the gap between their requested wage and what they received, the less effort the police officers expended on the job. Similarly, workers in a tire factory in Illinois produced defective tires when they had to make wage concessions and work alongside strikebreakers, and the company's tires were linked to more than 270 fatalities and 800 injuries (Krueger and Mas 2004).

These deviations in expectations can have very adverse effects in a public health system. In the United Kingdom, as in many countries, nurses' wages in the public hospital system are set by centralized pay regulation. There is very limited regional variation. Thus, there are some regions and times when nurses' pay may be close to the wage prevailing in the local private sector market, but sometimes they diverge. According to an analysis of nine years of data from the public hospital system, in regions where the nurses earned much less than the wage that prevailed in the external labor market, a 10 percent increase in the outside wage was associated with a 15 percent increase in the fatality rate for patients admitted for heart attacks (Propper and Van Reenen 2010). In contrast, in regions where there was only a small pay differential between the centralized wage and outside wages, changes in the outside wage did not affect patient survival.

The upshot of all of this is not to institute a policy of gift giving in the workplace or to regulate increasingly higher wages. Rather, this evidence suggests that workers' effort is sensitive to their expectations of how they should be compensated and that it is possible to improve productivity at least temporarily by exceeding these expectations. In some settings, a one-off surge in output may be required—such as one in tandem with a public health campaign or during a particularly busy time due to business cycle effects. Exceeding worker expectations during times like these could have big payoffs in productivity.

Loss versus gain frames

As previous chapters have discussed, people sometimes put more weight on potential losses than on potential gains. This tendency can also affect people's level of effort in response to monetary incentives.

In China, for example, an experiment in a high-tech manufacturing factory explored this tendency. Some workers were informed that they would receive a bonus after their group's output reached a certain target (the bonus was framed in terms of a gain). Others were told that they would be given a bonus but that it would be rescinded if they failed to meet the target (the bonus was framed in terms of a loss). While both types of bonuses increased worker productivity, total productivity was 1 percent higher under the loss framing (Hossain and List 2012). While this may seem like a small difference, it is important to note that it resulted solely from a change in the wording of the contract.

Would similar results occur outside a factory? In particular, in an application very important to low-income countries, could this reframing of awards improve the performance of civil service workers like health care workers or teachers, who in many places are not penalized with lower salaries or the threat of dismissal for underperformance?

A number of studies from low-income settings have revealed substantial increases in students' test scores or the quantity of health services in response to standard performance pay bonuses framed as gains (Glewwe, Ilias, and Kremer 2010; Muralidharan and Sundararaman 2011; Basinga and others 2011). In the United States, in low-income neighborhoods near Chicago, an alternative loss-framed variant generated improvements where the standard gain-framed bonus had proven unsuccessful (Fryer and others 2012). Some teachers in these Chicago schools were offered the standard bonus at the end of the school year; the bonus would be determined by the test score gains their students achieved. Another group of teachers was given the amount that administrators expected to be the average bonus (\$4,000) at the beginning of the school year. If their students' performance turned out to be above average, they would receive an additional payment at the end of the school year. If it was below average, however, they would have to return the difference between what they received in the beginning and the final bonus they should have received.

This loss-frame manipulation really mattered. Math scores of students taught by teachers who faced loss-framed bonuses were 0.2–0.4 standard deviations higher than the scores of students of teachers paid their regular salaries without any kind of bonus.

Competitive work environments

Recent field experiments also suggest that the organization of the workplace—particularly whether it is competitive—may have an independent effect on productivity. People often do not work in isolation and

tend to compare themselves to others doing similar work, which can be a powerful way to motivate or demotivate people. Consider rankings or social comparisons, where employees learn about their relative performance in a firm or organization. If individuals thrive on competition, they may exert more effort. Or, somewhat perversely, they may decrease effort if they believe that they have relatively high ability but do not want to see it tested empirically. Decreasing effort allows them to maintain their self-image and tell themselves that the reason for their relatively poor performance was that they were not really trying. Existing empirical evidence is consistent with both possibilities, which underscores the importance of experimentation and adaptation to local contexts (chapter 11).

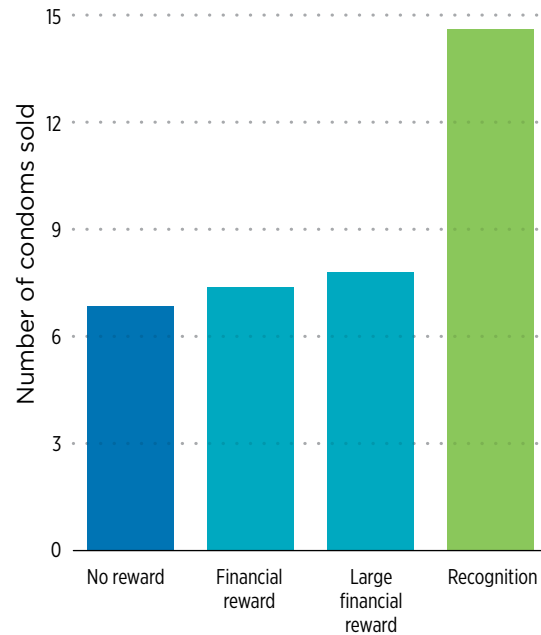
Once a firm in Germany began to include employees' ranks in the distribution of productivity on their paychecks, productivity increased by 7 percent, even though the firm did not use these rankings to adjust wages (Blanes i Vidal and Nossol 2011). Similarly, when a small retail chain in the Netherlands organized tournaments in which groups of stores competed against one another to achieve the highest sales growth, sales growth increased, regardless of whether winners of the tournament earned any monetary rewards (Delfgaauw and others 2013).

In Zambia, recognition proved to be more effective than performance pay among hairdressers tasked by a public health organization with selling female condoms to their clients. Hairdressers who earned a star for every packet of condoms sold, which was stuck on a poster in their salon, sold more than twice as many condoms as hairdressers who received commissions. This impact was strengthened as the number of other salons in the neighborhood also earning stars increased. Meanwhile, hairdressers who received a 90 percent commission on each condom did not sell more condoms, on average, than those who earned nothing and essentially sold the condoms as volunteers (Ashraf, Bandiera, and Jack, forthcoming) (figure 7.2).

In another field experiment in Zambia, however, introducing a competitive element into training backfired among trainees preparing to work as community health workers. When they learned that their relative rankings from exam scores would be revealed, their exam performance dropped by more than a third of a standard deviation (Ashraf, Bandiera, and Lee 2014a)—an effect that was more pronounced among trainees with previously low test scores. Similarly, a firm in the United States found that removing feedback on employee rankings among their furniture sales staff actually increased its sales performance by 11 percent (Barankay 2012).

Figure 7.2 Public recognition can improve performance more than financial incentives can

A public health campaign in Zambia experimented with different ways of motivating hairdressers to distribute female condoms to their clients. Some hairdressers worked as volunteers, while others received either a 10 percent or a 90 percent commission for every packet of condoms sold. A fourth group received a star that was displayed on a poster in their salon for each packet sold. This last group sold twice as many condoms as the other groups.



Source: Ashraf, Bandiera, and Jack, forthcoming.

Considering social relations in the workplace

Peers in the workplace can also exert a strong influence on an individual's effort by enforcing social norms, whether that enforcement is intentional or not. If coworkers see others slacking off, they may do the same, even if this means their earnings may decrease; conversely, people may work harder if others are working harder. This could have implications for how teams should be formed.

The experiment in India with data entry clerks, for example, suggests that peers may help bridge the gap between intentions and actions. Even though their earnings depended solely on their own output, when employees were assigned seats near colleagues who displayed above-average productivity, their own output increased by 5 percent (Kaur, Kremer, and Mullainathan 2010), mainly because they increased their work hours, rather than their efficiency. When seated next to above-average peers, these workers were also less likely to opt for the commitment contract described earlier.

Proximity to more productive workers can also lead to increases in efficiency. Cashiers in a national supermarket chain in the United States, for example, were compensated primarily through a fixed wage that was not sensitive to their productivity (Mas and Moretti 2009). When they worked on a shift with a worker who was more productive, however, their own productivity improved. This improvement in productivity occurred only among cashiers when they could see the more productive worker, and the effect declined with distance. Thus cashiers were truly calibrating their effort to what they could see around them. Less productive workers did not exert a similarly negative effect, so the supermarket could have sold the same number of items in fewer hours if it had rearranged its shifts in a way that maximized skill diversity on a team at any given time.

This might not always be the case, however; sometimes only certain peers matter for these kinds of productivity spillovers. Despite being compensated through individual piece rates, farmworkers on a fruit farm in the United Kingdom picked more or less fruit depending on the productivity of team members who were their friends (Bandiera, Barankay, and Rasul 2010). Compared to when they had no friends on their team, workers who were generally more productive than their friends picked less fruit and sacrificed around 10 percent of their earnings when assigned to teams with their friends; likewise, workers who were less productive than their friends increased their earnings by 10 percent when assigned to teams composed of their friends.

Recruiting high-performance employees

If effort on the job can be influenced by the framing of tasks and compensation and by social relations among employees and if employees themselves demonstrate considerable heterogeneity, could these factors also affect the types of employees that apply for a job at the recruitment stage? For example, could high wages for work that has prosocial benefits, such as jobs in the public sector, attract applicants who care solely about their own career advancement and who exhibit little to no prosocial orientation?

A number of laboratory experiments suggest that financial incentives may crowd out intrinsic motivation, or the inherent enjoyment or satisfaction from doing a task that is not based on external rewards.² Two recent field experiments, however, found that stressing financial incentives during recruitment drives for public sector positions did not attract less

publicly minded job applicants. In 2011, the federal government of Mexico began a program to increase the presence of the state in marginalized and conflict-affected communities through community development agents who could identify the needs of the community and report directly to the federal government. The government experimented with the monthly wage offers used to recruit agents. In some areas, it offered 3,750 pesos, while in others, it offered 5,000 pesos (corresponding to the 65th and 80th percentiles of the wage distributions in program areas, respectively).

The higher wage offer attracted applicants who were more qualified (Dal Bó, Finan, and Rossi 2013). Their previous earnings were 22 percent higher, they were more than 50 percent more likely to be employed at the time of application, and they were nearly 30 percent more likely to have worked in a white-collar position in their previous job. They also scored higher on a cognitive test. This increase in qualifications, however, did not come at the expense of prosocial motivation. The higher wage also attracted applicants with a higher inclination toward public service, as measured by a standard public service motivation index. These applicants, for example, found policy making more attractive and reported a stronger belief in social justice.

In Zambia, researchers collaborated with the government to test two methods of recruiting candidates for a new community health worker position. The sole difference was whether the posters that advertised the positions emphasized career benefits or social benefits. In some districts, the posters called on applicants to “become a highly trained member of Zambia’s health care system, interact with experts in medical fields, and access future career opportunities including: clinical officer, nurse, and environmental health technologist.” In other districts, applicants were called to “learn about the most important health issues in [their] community, gain the skills [they] need to prevent illness and promote health for [their] family and neighbors, work closely with [their] local health post and health center, and become a respected leader in [their] community.”

As was the case in Mexico, emphasizing career-related incentives did not attract applicants with lower measures of social motivation (Ashraf, Bandiera, and Lee 2014b). It did, however, attract more qualified candidates as measured by their past academic achievement, and workers recruited through this method performed better once employed. Workers recruited through career incentives made 29 percent more visits to households (for environmental inspections, health counseling, and referring sick cases to health posts) and organized 100 percent more community meetings.

They were also no more likely to leave their positions than workers who had been recruited through messages that stressed the social benefits of the job.

Improving the performance of small businesses

Many of the barriers that affect job performance among employees also affect decision making by the self-employed. Self-employment accounts for nearly 60 percent of the world's labor force,³ and even in low-income countries, the self-employed account for one-third of the nonagricultural labor force (de Mel, McKenzie, and Woodruff 2010). Divides between intentions and actions and the neglect of potential opportunities may loom even larger for the self-employed because they do not have contracts with an employer interested in their level of effort or explicit work arrangements that dictate what is expected of them. The near absence of certain markets in many low-income settings—in particular the markets for insurance and credit—may also create narrower margins for error for the self-employed.

In Ghana, for example, a test between two different methods of providing support to small-scale entrepreneurs suggests that difficulties in translating intentions into action could prevent them from making profitable investments. Entrepreneurs who received in-kind grants, which came in the form of business equipment, generated 24 percent more profits than those who received no support (Fafchamps and others 2014). Entrepreneurs who received support in the form of cash grants, however, did not increase their profits; the grants ended up partially financing household needs and requests from relatives. The difference was especially large for entrepreneurs who also had difficulties in other areas, such as saving, that require translating intention into actions.

If losses also loom larger than gains for the self-employed, then individuals might be expected not only to avoid losses but also to neglect potential gains—and thus miss opportunities to increase earnings. There is evidence that taxi drivers and bike messengers in high-income settings like the United States and Switzerland work with target earnings or target hours in mind. They do not take advantage of temporary increases in their compensation per ride or per message they could receive by working more. Instead, they either reduce their hours or reduce their effort per hour (Camerer and others 1997; Fehr and Goette 2007).

This phenomenon occurs in low-income settings, as well. Bicycle taxi drivers in Kenya appear to work just enough to meet their daily cash needs, which

fluctuate due to both shocks such as illnesses and predictable expenses such as school fees (Dupas and Robinson 2014). As a result, they forgo some 5–8 percent of their potential income. Fishermen in India also fish less in response to recent increases in the value of their catches (Giné, Martinez-Bravo, and Vidal-Fernandez 2010).

Owners of small businesses in Kenya also failed to notice an opportunity to increase their business income. These businesses are typically ventures such as fruit and vegetable vending, retail shops, restaurants, tailoring shops, and barbershops, and their transactions take place almost entirely in cash. To complete their transactions, owners must be able to make change. This requires that they come to work each day with enough cash in small denominations. The majority of owners,

Divides between intentions and actions and the neglect of potential opportunities may loom even larger for the self-employed because they do not have explicit work arrangements that dictate what is expected of them.

however, report losing a sale in the previous week because they did not have change readily available and spending about an hour and a half searching for change from nearby vendors (Beaman, Magruder, and Robinson 2014).

Pointing out the problem, even indirectly, did improve things. Simply asking the owners about the ways they managed their change once a week for two or three weeks led to a 32 percent reduction in the number of lost sales. Taking a few minutes to go over a calculation of the lost profits attributable to poor change management led to a similar reduction, which translated into an increase in profits of 12 percent.

Even managers of larger firms may fail to notice what seem to be obvious ways of improving productivity. Many large textile plants in India, for example, had piles of garbage, tools, and other obstructions that slowed the flow of workers on production floors and unlabeled and unsorted yarn inventories that increased the probability of defects in quality (Bloom and others 2013). Because their firms were profitable,

many managers believed that they did not need a quality control process.

One might ask why these firms failed to notice these opportunities. Why are they not driven out of the market? While there is little empirical evidence that can address these questions, it is possible to speculate. Many of these businesses may face little competition. Or when choosing a small shop, customers may also put less weight on prices and more on their relationship with the owner. It is also possible that managing a business and making all production and sales decisions alone tax a person's "bandwidth," or cognitive resources, and capture attention that could otherwise be directed toward improving the business.

While these failures to notice opportunities can be addressed directly with information or business training, the ideal programs would take the finite bandwidth of busy entrepreneurs into account. A program in the Dominican Republic, for example, offered an accounting curriculum based on rules of thumb that taught basic heuristics, such as maintaining two different drawers, one for business and one for personal income, and a system of IOU notes for any transfers across the two drawers. This strategy was more successful than a curriculum that taught the fundamentals of accounting. Microentrepreneurs who received rule-of-thumb training improved the way they managed their finances—their sales during bad weeks improved by 30 percent—and they were 6 percent more likely to have any personal savings. In contrast, a standard training package did not achieve any of these benefits (Drexler, Fischer, and Schoar 2014).

Even though entrepreneurs work primarily alone, it may also be possible to take advantage of their relationships within their social networks when designing interventions aimed at increasing their productive potential. In Nicaragua, for example, access to a business grant program was randomly allocated in such a way that community leaders received the same program as beneficiaries in some villages, while in other villages, community leaders did not. The program consisted of a \$200 grant that was conditional on the creation of a business development plan, technical assistance, some follow-up visits by a professional, and an invitation to participate in training workshops on business skills organized within the communities.

The grants did not generate any significant improvements in income for beneficiaries whose village leaders did not also participate in the program. However, beneficiaries experienced substantial increases in income and began to rely much less on agriculture for their livelihoods when three or four of

their village leaders received the program. When the village leaders also participated in the program, beneficiaries' income from nonagricultural self-employment increased by more than 160 percent and the value of animal stock by 94 percent, while agricultural wages went down by 60 percent. Social interactions also increased, consistent with these impacts. Beneficiaries of the business grant were more than four times as likely to report that they had talked to someone in the community about their business (Macours and Vakis 2014).

Increasing technology adoption in agriculture

Macroeconomic and microeconomic data suggest that differences in agricultural labor productivity across countries are much larger than aggregate productivity differences.⁴ One possible reason underlying these differences in agricultural productivity may be the low adoption of simple technologies, such as the use of fertilizer or reduced tillage planting techniques. In 2011, for example, farmers used an average of 13.2 kilograms of fertilizer per hectare of arable land in Sub-Saharan Africa, compared to 118.3 in OECD (Organisation for Economic Co-operation and Development) member states (WDI database).

Much of this underinvestment may be explained by the underdevelopment of certain markets, such as the markets for insurance or credit. In Ghana, for example, an offer of insurance indexed to rainfall led farmers to apply chemicals that were 24 percent more expensive, and they also spent 14 percent more on land preparation (Karlan and others 2014). Nonetheless, just as factors other than financial incentives determine the productivity of employees and the self-employed, the expected distribution of returns to investment may be only one component that a farmer considers in deciding whether to adopt a new technology.

Working around procrastination and scarcity of attention

One potentially important factor for farmers is the need to translate intentions into action, since crop cycles require specific investments at specific times. Missing these timely investments could throw off farm income for an entire season.

Certain fertilizers for maize, for example, need to be applied when the maize is knee-high, at the time of top dressing, which is roughly two months after planting and nearly four months after the harvest. When farmers apply fertilizer at this time, they can increase income by 11–17 percent, according to experimental

evidence from Western Province in Kenya (Duflo, Kremer, and Robinson 2008). However, fewer than 30 percent of farmers sampled in this area reported using fertilizer as of 2009; they attributed their lack of use to a lack of money, even though they could buy fertilizer in small quantities and apply it to only part of their land at a time. If financial resources were indeed a key constraint, then one policy response would be to provide subsidies to lower the cost of fertilizer for farmers.

Lack of money, however, may not be the main barrier to fertilizer use. The problem could be the difference between the timing of income at harvest and the timing of fertilizer needs. Farm household income typically fluctuates, increasing after harvest and tapering off afterward, and that income must compete with many other demands both inside and outside the household. Another obstacle could be the effort—both monetary and cognitive—required to buy fertilizer. Most farmers in the area would have had to walk for 30 minutes to the nearest town center and, once there, decide what type and how much fertilizer to buy.

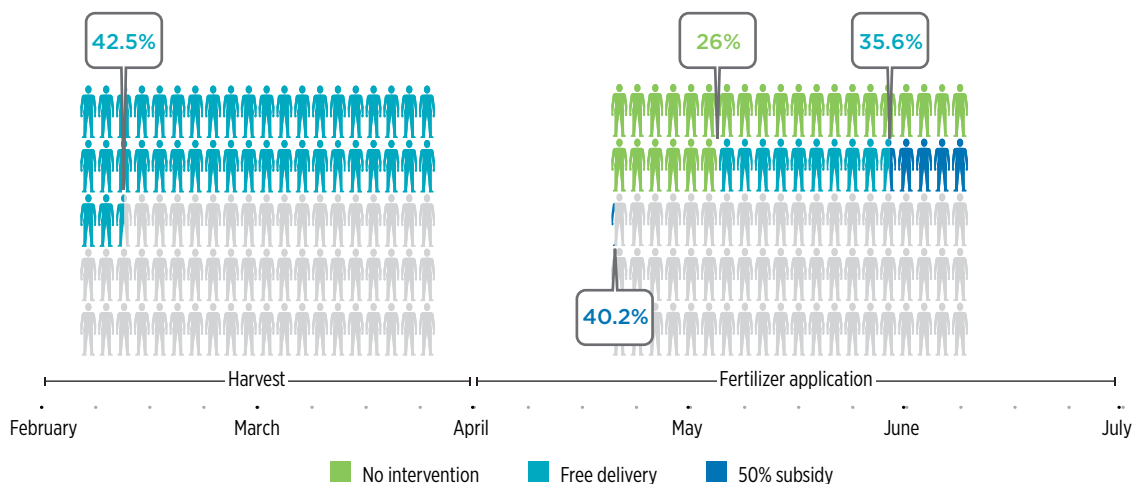
Recent interventions in this area experimented with ways of overcoming these types of obstacles (figure 7.3). When a nongovernmental organization (NGO) offered free delivery and the opportunity to pre-purchase fertilizer at the time of harvest, fertilizer adoption increased by 64 percent—an improvement that

was statistically indistinguishable from a 50 percent subsidy offered later in the season when fertilizer was needed. These results were not driven by free delivery. When the NGO offered some farmers free delivery by itself later in the season, fertilizer use did not improve significantly (Duflo, Kremer, and Robinson 2011). Moreover, the increase in fertilizer use disappeared in subsequent seasons when the NGO stopped offering the intervention, which suggests that farmers found it difficult to commit on their own to purchasing fertilizer early in the season when they had cash.

While these interventions suggest alternatives to subsidies for increasing the adoption of productive technologies, the extent to which fertilizer decisions were suboptimal to begin with is not known. The demonstration trials indicated considerable variation in farmers' profits after they started applying fertilizer. If the farmers who were induced to purchase fertilizer through the prepayment option are also likely to have trouble translating intentions into actions for other parts of the agricultural production cycle, such as for weeding, then the intervention may have served only to increase purchases among a population that stands to gain the least from fertilizer. Nevertheless, these results suggest that increasing take-up need not require subsidies in all cases; paying attention to potential disconnects between the timing of income

Figure 7.3 Altering the timing of purchases can be as effective as a subsidy for improving investment

Farmers in a region in rural Kenya typically purchase fertilizer just before they apply it, not right after the harvest when they have the most cash in hand. Without any intervention, 26 percent of farmers purchase fertilizer. Providing free home delivery right after the harvest increases the amount of fertilizer purchased much more than free delivery provided just before fertilizer is to be applied. Its impact is equivalent to offering a 50 percent subsidy at the time of fertilizer application.



Source: Duflo, Kremer, and Robinson 2011.

and the timing of uptake decisions could yield clues for designing strategies that help make these decisions easier.

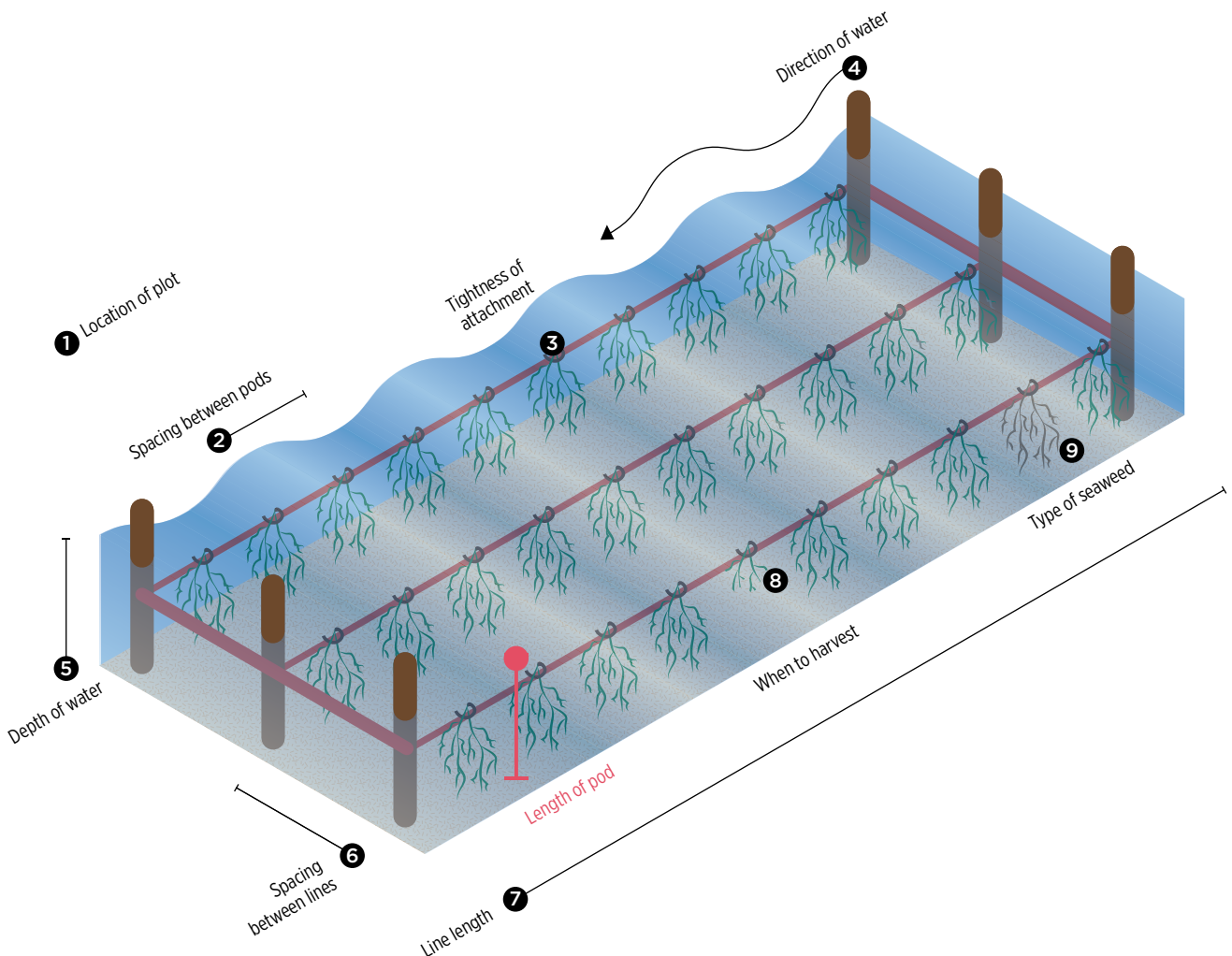
The neglect of potential gains can also be especially serious for farmers, who must always juggle multiple tasks at any given time. Consider seaweed farming. While seaweed may be one of the simplest life forms—an algae—farming it is quite complex. Farmers attach strands (or pods) of seaweed to lines submerged in the ocean. They must decide where to locate their plots, how long the lines should be, how far to space the lines, what kind of seaweed to use, the spacing between pods, the length of pods, how tightly to attach their pods to the lines, and when to harvest the seaweed

(figure 7.4). Even though farmers can experiment and test their assumptions about the importance of certain aspects of production, they must first notice that they are indeed making a decision.

Seaweed farmers in Indonesia, for example, had no problem noticing that the spacing between pods determined the amount of seaweed they could grow, and they could accurately report the spacing on their own lines. They failed to notice, however, that the length of the pod also mattered; they did not even know the lengths of the pods that they used, even though farmers had an average of 18 years of experience and harvested multiple crop cycles per year and thus had plenty of opportunities for learning by doing

Figure 7.4 Not noticing a decision can hurt productivity

Seaweed farming entails many decisions (examples are presented in 1 through 9). Even experienced seaweed farmers in Indonesia overlooked a crucial factor in the growth of their crop—the length of the pods—until researchers presented the missing information in a highly salient and individualized way.



(Hanna, Mullainathan, and Schwartzstein 2014). Even when randomized controlled trials on their own plots demonstrated the importance of both length and spacing—at least for researchers analyzing the data—the farmers did not notice the relationship between length and yields simply from looking at their yields in the experimental plots. Only after researchers presented them with data from the trials on their own plots that explicitly pointed out the relationship between pod size and revenues did farmers begin to change their production method and vary the length of the pods.

Harnessing the power of social networks

While one way of overcoming farmers' failure to notice would be to provide individual farmers with personalized data that make it difficult to ignore whichever aspect of production they are neglecting, this may be an expensive service to deliver. An alternative would be to exploit the fact that farmers may look to their peers for information about what they should be doing. Evidence from the adoption of high-yield varieties of seeds during the Green Revolution in India suggests that friends and neighbors played a role in their adoption (Foster and Rosenzweig 1995; Munshi 2004). Similarly, pineapple growers in Ghana calibrate their fertilizer use to what others in their network are doing (Conley and Udry 2010).

In Uganda, these types of links played a role in diffusing information about growing cotton. A field experiment tested two different methods for teaching female cotton farmers proper growing techniques. In some villages, both male and female cotton farmers attended a standard training program. In other villages, the training program targeted women and focused on social networking. Each woman was randomly assigned a partner whom she did not know before. They played games that gave rewards for remembering cotton farming facts, and they received pictures of their partners and a reminder to talk to them throughout the season. Thus each female farmer gained at least one new link in her social network.

This additional link proved to be more valuable than what was offered during the standard training (Vasilaky and Leonard 2013). For farmers who were not among the highest producers, yields increased by 98 kilograms per acre, an increase of over 60 percent, while the standard training increased it by 67 kilograms per acre (42 percent). The networking intervention also seems to have generated higher impacts for the woman in the pair that had lower yields at the start.

Findings from a field experiment in Malawi mirrored these results. Agricultural extension activities implemented through incentivized peer farmers

improved awareness and adoption of new technologies much more than similar activities implemented solely through the government's extension agents (BenYishay and Mobarak 2014).

Using these insights in policy design

The evidence reviewed in this chapter suggests some general lessons for diagnosing problems of productivity and designing effective solutions. First, there are many nonremunerative aspects of work that influence the effort that employees exert on the job. The time lag between effort and rewards, for example, may induce employees to procrastinate and concentrate their effort only at certain times. Perceptions of generous or unfair treatment can lead employees to increase or decrease their performance, as can ideas about the value of a person's work or the competitive nature of the work environment. Even when production does not directly depend on teamwork, peers can serve as an important reference group and can have an impact on an employee's productivity.

Changing many of these nonremunerative attributes could be relatively inexpensive because they do not affect employees' financial compensation or require any new technologies. Simply recognizing good performance, for example, would be virtually costless, as would emphasizing the meaning of a task or the importance of an employee in an organization.

Not only the content of the interventions, but also the process of delivering them, is important. Design matters greatly.

Similarly, for the self-employed and those working in agriculture, factors beyond the returns to investment can affect the adoption of productivity-enhancing practices and technologies. Competing demands may make it difficult to save enough to make timely investments, and the absence of institutions that could compensate for such tendencies, such as markets for credit or insurance, could worsen the impacts of these tendencies in low-income settings. The sheer number of decisions that the self-employed must make may increase the likelihood that they fail to notice opportunities.

A second lesson that emerges from field experiments around the world is that not only the content of the interventions, but also the process of delivering them, is

important. While pay-for-performance contracts, subsidies, and training are promising instruments for tackling low productivity among employees, entrepreneurs, and farmers, the design of these approaches matters greatly. Discounts for fertilizer in Kenya, for example, were more effective in improving farmers' purchases when they were delivered right after harvest, when farmers had more cash on hand, than months later at the time when the fertilizer was needed. In Malawi and Uganda, information about new farming technologies had greater impact when it came from peers than through standard channels, such as extension agents. In the Dominican Republic, financial training was more effective when converted into simple rules of thumb.

Third, people are heterogeneous. Different groups may be more or less affected by intention-action divides and what their peers are doing, and the interpretation of tasks and rewards is likely to vary substantially from person to person, and even from task to task. Close to one-third of data entry clerks in India and maize farmers in Kenya responded to the commitment devices that were offered to them. The others perhaps required a different intervention.

This importance of both process—the small details of implementing an intervention—and heterogeneity suggests that finding the most effective interventions for a population will require an inherently experimental approach, including testing multiple approaches at the same time or in sequence (chapter 11). The low costs of some of these new designs and the potential for high payoffs to otherwise difficult or intractable problems, however, should justify the experimentation required to find out.

Notes

1. For teacher absenteeism, see Chaudhury and others 2006. For doctors' negligence, see Leonard and Masatu 2005; Das and Hammer 2007; Das and others 2012.
2. See, for example, Gneezy and Rustichini 2000; Heyman and Ariely 2004.
3. WDR 2015 team estimate based on the International Income Distribution Database (I2D2).
4. The labor productivity of agriculture in the 90th and 10th percentiles of countries, for example, differs by a factor of 45–50, compared to a factor of 22 for total labor productivity (Caselli 2005; Gollin, Lagakos, and Waugh 2014).

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