# Incentives to Persevere

Elif Incekara-Hafalir
University of Technology Sydney
elif.incekarahafalir@uts.edu.au

Grace HY Lee
Monash University (Malaysia)
grace.lee@monash.edu

Audrey KL Siah
Monash University (Malaysia)
audrey.siah@monash.edu

Erte Xiao*
Monash University
erte.xiao@monash.edu

**Abstract**
Achieving success often requires persistent effort. We study the effectiveness of two reward mechanisms, all-or-nothing and piece-rate, to incentivize full completion of repeated tasks over time. Our theoretical analysis shows that exogenously imposing the all-or-nothing mechanism can be ineffective due to the potential discouragement effect. In contrast, empowering individuals to choose between the two reward mechanisms can significantly improve the full completion rate. Data from a series of field experiments and follow up replications that involve more than 2000 participants provide robust evidence that the all-or-nothing mechanism is effective only when it is presented as an option. Our results highlight the importance of choice in incentivizing persistent effort.

**Keywords:** perseverance; incentives; self-control; field experiments
**JEL codes:** C93, D91, D82, I20

* We gratefully acknowledge funding from Monash University (Malaysia) Better Teaching Better Learning Education Grant (MUM-BTBL-2016- 010), and University of Technology Sydney Business School. This study is registered in the AEA RCT Registry and the unique identifying number is: AEARCTR-0004518.

## 1. Introduction

Perseverance plays an important role in predicting success and achievement (Heckman and Kautz 2012; Beattie, Laliberté, and Oreopoulos 2018; Heckman, Stixrud, and Urzua 2006; Duckworth 2016). In organizations, completing a project normally requires employees to exert continuous effort for a long period of time. To obtain skills in a field usually requires one to engage in repeated training and practice for several months or even years. Perseverance, however, is hard. A number of studies have found that non-cognitive skills and psychological factors such as self-control, grit, conscientiousness, and growth mindset, are important for perseverance (Tangney, Baumeister, and Boone 2004; Almlund et al. 2011; Claro, Paunesku, and Dweck 2016). While some people can rely on their self-discipline, many do not have enough willpower to sustain effort intrinsically. It is therefore important to investigate whether we can design external mechanisms to incentivize persistent efforts.

Recent studies have been conducted to examine the effectiveness of external interventions, such as classroom education programs or peer pressure, on perseverance after a failure (Alan et al. 2019; Buechel, Mechtenberg, and Petersen 2018; Bettinger et al. 2018). This line of research focuses on resilience aspect of perseverance, i.e., willingness to undertake challenging tasks and/or to continue working on tasks after an initial failure. In this paper, we focus on another important aspect of perseverance that has received relatively less attention – the willingness to repeatedly engage in tasks that occur over a long period of time, e.g. 10,000 hours of deliberate practice (Ericsson, Krampe, and Tesch-Römer 1993). Every day people face all kinds of temptations distracting them from continuing what they have started, especially when they have little personal interest in a task. As a result, even if the task itself is easy, individuals often fail to complete a task if it requires repeated engagement over a long period of time.

We compare two types of reward schemes. One is a *piece-rate mechanism*, commonly used to incentivize efforts, providing a reward for each task completed. The other is an *all-or-nothing mechanism* where efforts are rewarded if and only if all the required tasks are completed. Thus, the all-or-nothing mechanism explicitly incentivizes persistent effort by placing a high cost on giving up. Incentivizing persistent efforts explicitly, as in the case of the all-or-nothing mechanism, can be important when people do not have any self-interest in being persistent. For example, in organizations, an employee's occasional shirking may not significantly affect her earnings when being paid by a piece-rate or hourly wage, but it can lead to the failure or a significant delay of the whole project. Moreover, even when there is self-interest in perseverance, people may fail to take that into account when making decisions. In the case of training, a student who receives credits for each assigned task may fail to understand the importance of completing all the tasks and attending all the training sessions to develop skills in specialized areas. Explicitly rewarding the completion of all the required tasks and emphasizing persistent participation can be essential for achieving the best learning outcome.

Importantly, we introduce a self-select mechanism, where participants have the option to choose between the piece-rate and the all-or-nothing reward mechanisms. The self-select mechanism is motivated by the hypothesis that the reward mechanism may be more effective when participants are able to choose what fits them best. Additionally, given the risk involved in the all-or-nothing mechanism, the self-select mechanism might also be more acceptable in practice and therefore more feasible.

We theoretically analyze the impact of each incentive mechanism on full task completion. First, compared with the piece-rate mechanism, the all-or-nothing mechanism can be a double-edged sword. On the one hand, it provides a commitment device that helps incentivize full completion (*an encouragement effect*). On the other hand, under this mechanism, those who doubt their ability to complete all tasks may quit at the beginning (*a discouragement effect*). Thus, the full completion rate in the all-or-nothing mechanism can be either higher or lower compared with the piece-rate mechanism. In contrast, the self-select mechanism allows participants to sort themselves into the mechanism that works best for them. As a result, it avoids the potential backfire of the all-or-nothing mechanism, as those who were likely to quit under all-or-nothing could simply choose the piece-rate mechanism. On the other hand, those who perform better under all-or-nothing can benefit from having this option available. We show that the self-select mechanism will perform better than the piece-rate mechanism as long as there is a significant number of participants who self-select the all-or-nothing mechanism.

We conduct field experiments to provide empirical evidence on the effectiveness of the all-or-nothing and self-select mechanisms on promoting full completion as compared with the piece-rate mechanism. In particular, based on findings from theoretical analysis, we investigate the following questions: Does the all-or-nothing mechanism promote or inhibit the full completion rate compared to the piece-rate mechanism? Do people choose the all-or-nothing reward mechanism when given the option? Is the self-select mechanism effective at promoting persistent effort compared to the piece-rate mechanism? We investigate these questions for tasks both with and without intrinsic value in two different studies. Differentiating between these two types of tasks is relevant when considering the all-or-nothing mechanism. When there is no intrinsic value, the only reward for completing tasks is the external incentive provided by the mechanism. Therefore, under the all-or-nothing mechanism, individuals will not continue once they fail. In contrast, for tasks with intrinsic value, individuals may be willing to continue to perform tasks after the failure even though there is no external reward for their effort. The intrinsic value also provides additional motivations for choosing all-or-nothing in the self-select mechanism.

We conducted the first study in the setting of coursework where persistent effort is important for the learning outcome. The tasks were weekly quizzes. We randomly assign students to one of three treatments. In all treatments, students were told that the quizzes were worth 10 marks in total. Students in the baseline (Piece-rate) treatment were told that the 10 marks would be spread equally

across each quiz.[1] In the All-or-nothing treatment, students were awarded 10 marks only if they completed all the quizzes, and they would receive no marks if they missed any. In the Self-select treatment, students were given a choice between the two marking mechanisms.

We find that, compared with the baseline Piece-rate treatment, the All-or-nothing treatment did not increase the full completion rate. Interestingly, in the Self-select treatment, more than half of the students chose the all-or-nothing mechanism in spite of the risk of receiving no marks, and this group of students achieved the highest full completion rate. As a result, the full completion rate is significantly higher in the Self-select treatment than the Piece-rate treatment. To test the robustness of the positive effect of the self-select mechanism, we conduct additional replication trials in different course units in the following several years. Although the proportions of students who chose the all-or-nothing mechanism vary, in all the trials, the self-select mechanism always achieves a higher full completion rate compared to the piece-rate.

One interesting observation from the first study is that among the few students who missed one task under the all-or-nothing mechanism, most were willing to continue to work on the tasks although they would not receive any credit for them. This suggests that students have intrinsic incentives for completing the task in addition to the marks awarded. For example, students might believe the quizzes could help them do well in other assignments such as the mid-term or final exams.

To provide empirical evidence for the effectiveness of the mechanisms in the context of tasks with little or no intrinsic value, we conduct a second study in which subjects were recruited to participate in a survey for cash payment. Participants were told they would receive one survey each week for four weeks. In the baseline (Piece-rate) treatment, participants were rewarded for each survey they completed. In the All-or-nothing treatment, participants were rewarded if and only if they completed all four surveys. In the Self-select treatment, participants could choose one of the two reward mechanisms. We observe that 20% of participants still chose the all-or-nothing mechanism in the Self-select treatment. The full completion rate in the Self-select treatment remains significantly higher than in the baseline. As in the first study, there is no difference in the full completion rate between the baseline and the All-or-nothing treatments.

Data from these two studies provides converging evidence for the benefit of choice in promoting full completion of tasks. We note, however, that while students must complete a certain number of questions correctly to receive the credit in the first study, participants in the second study receive the reward as long as they complete the survey questions. One concern is therefore whether participants may shirk by simply completing the survey without really paying attention or applying the best of their knowledge to answer the questions? Importantly, will the quality differ when applying the self-select mechanism? To shed light on these questions, we conducted another trial

[1] To differentiate between the treatment and the mechanism, the treatment names always start with capital letters and the reward mechanism names always start with lower case letters.

where we added attention check questions in each survey. The responses to the attention check questions reveal that participants who self-select the all-or-nothing mechanism in the Self-select treatment are more likely to miss the attention check questions than those who are paid by the piece rate. This result highlights the importance of quality control when adopting the self-select mechanism.

Our paper contributes to the literature investigating the effects of different commitment devices on helping people achieve their long-term goals, particularly goals requiring self-control (Bryan, Karlan, and Nelson 2010; Himmler, Jäckle, and Weinschenk 2019; Toussaert 2018; Kullgren et al. 2016). In relation to our study, we classify the previously analyzed commitment devices as either piece-rate or all-or-nothing types. Piece-rate types are those where there is a positive reward for each success in taking a desirable action. Bundling an instantly gratifying experience (e.g. listening to page-turner low-brow audio novel) with actions requiring exertion of self-control (e.g. exercising) decreases the cost of exerting an effort at each instance (Milkman, Minson, and Volpp 2014). Buying a flat-rate gym membership results in a decrease in the pay-per-visit mental cost of gym visits for *every gym visit* (DellaVigna and Malmendier 2006). Signing up for deposit collection services for saving decreases the transaction cost of making future deposits into a savings account – a reward for each deposit (Ashraf, Karlan, and Yin 2006). Like the Piece-rate treatment in our paper, a common feature of these examples is that individuals are rewarded for each success, while a failure has little impact on either the size of reward for previous successes or on subsequent actions.

In contrast, another type of commitment device similar to our all-or-nothing mechanism is one where the reward explicitly requires persistent effort over a period of time. For such commitment devices, a failure will have a significant negative impact on the rewards for both early and late efforts. That is, the marginal return for an effort can be zero or significantly reduced due to either a subsequent or preceding failure. For example, (Kaur, Kremer, and Mullainathan 2015) study a non-linear dominated contract at a workplace where, each day, workers can choose a target and receive only half of the piece-rate if they fail to reach the target. Likewise, under a deposit contract for smoking cessation (Giné, Karlan, and Zinman 2010) and for gym attendance (Royer, Stehr, and Sydnor 2015), people lose their entire deposit if they give in to temptation even once during a set timeframe; a one-time failure means none of the previous days of abstinence or of gym attendance is rewarded. Another example is a lump-sum payment conditional on the full completion of a certain number of gym visits (Acland and Levy 2015; Charness and Gneezy 2006).

To the best of our knowledge, there is no study systematically comparing the all-or-nothing and the piece-rate mechanisms at promoting persistent efforts. We fill this gap by providing theoretical analysis and empirical evidence for the comparison between the two mechanisms, both

when the mechanisms are exogenously enforced and when participants are empowered to choose the reward mechanism.[2]

The rest of the paper is organized as follows. Section 2 presents a theoretical analysis and comparison of the mechanisms. Section 3 reports the findings from the first study where the mechanisms are examined in the context of coursework. Section 4 presents the results of the second study where the mechanisms are applied to rewarding performance in tasks of little intrinsic value. Section 5 concludes and discusses the implications of the findings.

## 2. Theoretical analysis

To analyze the full completion rate under each treatment, we construct a simple theoretical framework built on the quasi-hyperbolic discounting model where a decision-maker (henceforth, DM) has a self-control problem (Laibson 1997; O'Donoghue and Rabin 1999b; Phelps and Pollak 1968).[3] A risk neutral DM discounts the future utility streams starting with today by $\{1, \beta\delta, \beta\delta^2, ...\}$.[4] The exponential discount factor $\delta$ captures impatience, and $\beta$ captures the present bias which creates a self-control problem. Present bias implies that taking an action with a current cost and future benefit looks less attractive than taking the same action in a future period. We assume $\delta=1$ to simplify the analysis. We focus on sophisticated decision-makers who are aware of their present bias and therefore value commitments (Kaur, Kremer, and Mullainathan 2015; Basu 2011; O'Donoghue and Rabin 1999a).[5]

The optimal plan for a present biased DM changes over time. A model of at least three periods allows to investigate the implications of such changes. For ease of exposition, we can think of a DM at different periods as different selves, strategically interacting with each other. The period-zero-self is assigned to one of two reward mechanisms (piece-rate or all-or-nothing), or selects one of them if given the option. In the latter case, she chooses the mechanism that maximizes her expected

[2] The importance of choice has not received much attention in research on commitment to-date. An exception is Ariely and Wertenbroch's (2002) study of the effect of self-imposed deadlines for class assignments compared to exogenously set deadlines. They found that performance under self-imposed deadlines is lower than performance under exogenously imposed, evenly spaced deadlines due to the suboptimal timing of chosen deadlines. On the other hand, self-imposed deadlines achieve a better outcome than that under maximally delayed deadlines. Conversely, Burger, Charness and Lynham (2011) show that externally imposed deadlines actually lower performance.

[3] Other well-known intertemporal choice models include the planner-doer model (Shefrin and Thaler 1988), the dual-self model (Fudenberg and Levine 2006), the temptation model (Gul and Pesendorfer 2001), and the internal commitment model (Benhabib and Bisin 2005). We use the quasi-hyperbolic discounting model because of its tractability and prevalence to analyze this type of self-control problems.

[4] We model a risk neutral decision making for tractability. A risk averse decision maker would find the all-or-nothing mechanism less attractive than a risk neutral one, therefore would less likely to choose it.

[5] Note that the all-or-nothing mechanism is valuable as a commitment device for the sophisticated decision-maker and has no commitment value for a naïve decision-maker who incorrectly believes that she will not have self-control problems in the future. Depending on the model specifications and parameter values, the naïve decision maker would either be indifferent between two mechanisms or prefer the piece-rate mechanism as the all-or-nothing mechanism is a more restrictive one.

utility.[6] The period-one-self decides whether to complete each task. For simplicity, we include only two tasks in period one.[7] The reward, if any, is received in period two.

The effort cost to complete a task is low, $c_L$, with probability 0.5<p<1 and high, $c_H$, with probability 1–p. The low-cost probability is higher than 0.5. That is, the task per se is not hard overall. The uncertainty about the cost captures the fact that the probability of completing a task repeatedly over a period of time is affected by some exogenous factors. For example, if the DM gets sick, or a new movie comes out, and working on the task requires the DM to resist any new temptation, the effort cost would increase. Such exogenous factors might play a key role in the failure of finishing (even easy) tasks that require persistent engagement over a long period of time. More often, individuals may sometimes perform tasks when they are relatively easy but fail when the cost increases.

We restrict our focus to cases where the reward is always higher than cost, specifically $c_L < c_H < r$. In these cases, the period-zero-self wants to complete all the tasks as a result of her lifetime utility maximization, but the period-one-self may not complete them because of self-control problems and/or exogenous factors. We compare the full task completion rate under piece-rate, $f^P$, and under all-or-nothing, $f^A$, when they are exogenously assigned. Later, we compare the full task completion under the self-select mechanism, $f^S$, to the one under piece-rate, $f^P$.

*2.1 Piece-rate versus all-or-nothing*

We assume that there are only two tasks for simplicity and that the reward to complete a task is 1 without loss of generality. The following function determines whether a DM will complete a task under the piece-rate:

$$e_i^* = \underset{e_i \in \{0,1\}}{\operatorname{argmax}}\, e_i(-c + \beta) \qquad (1)$$

where $c \in \{c_L, c_H\}$ is the cost of the effort to complete the task, $e_i$ is the binary effort decision for each task $i$, and $\beta$ is the present bias. The task completion decision depends both on the present bias, $\beta$, and costs, $c_L$ and $c_H$. Solving DM's problem under piece-rate shows three types of behaviour:

- $T_1$ type, $\beta \geq c_H$, always completes a task: $f^P$=1.
- $T_2$ type, $\beta < c_L$, never completes: $f^P$=0.

[6] The DM may volunteer to choose a dominated contract as in Kaur et al. (2015) to use this contract as a commitment device. In our model, the target is given by the employer as opposed to Kaur et al. (2015) in which the DM chooses his own target. As we are interested in investigating how to incentivize the full completion, which is the goal of the employer and the long-term goal of the DM, it is natural to set the target exogenously.

[7] Grouping the two tasks in the same period simplifies the analysis and will not change the qualitative model predictions, as long as the choice of the mechanism takes place before task completion and the reward is given after the tasks.

- $T_3$ type, $c_L \leq \beta < c_H$, completes each task only if the cost is low: $f^P = p^2$.

In contrast to the piece-rate mechanism, the all-or-nothing mechanism requires the DM to use backward induction to solve the problem because the decision on the first task is affected by the expected action on the second task. The utility maximization problem for the second task is:

$$e_2^*(e_1, c_2) = \underset{e_2 \in \{0,1\}}{\operatorname{argmax}}\, e_2(-c_2 + 2\beta e_1) \qquad (2)$$

where $c_2 \in \{c_L, c_H\}$ is the cost for task 2. We write the utility maximization for the first task as:

$$e_1^* = \underset{e_1 \in \{0,1\}}{\operatorname{argmax}}\, e_1[(-c_1 + p e_2^*(e_1, c_L)[2\beta - c_L] + (1-p) e_2^*(e_1, c_H)[2\beta - c_H]] \qquad (3)$$

The first task decision depends not only on the cost of the current task but also on the expected cost of the second task and the prospect of whether the second task will be performed. It is easy to see that $T_1$ type will complete both tasks and $T_2$ type will never complete a task under the all-or-nothing, as they would do under the piece-rate. Only $T_3$ type performs differently under the two mechanisms. Solving (2) and (3) together, we find that $T_3$ type can be further divided into four types that vary on whether the DM is encouraged or discouraged by the expected performance in the second task (see details in Appendix A.1).

Depending on the parameter values, for some DMs, completing the first task will lead them to complete the second task regardless of cost, which in turn encourages them to complete the first task. We call this an *encouragement effect*. When the encouragement effect is large enough, the DM will complete the first task regardless of cost. We call this type the *encouraged DM* and her full completion rate is $f^A=1$. When the encouragement effect is not large enough to convince the DM to complete the first task regardless of cost, she completes it only when the cost is low. We call this type the *conditional encouraged DM* and her full completion rate is $f^A=p$.

In contrast to the encouragement effect, some other types of DMs, if the first task has been completed, will complete the second task only if the cost is low. As a result, when deciding whether or not to complete the first task, the DM will be discouraged by the high expected cost of the second task. We call this a *discouragement effect*. If the discouragement effect is strong enough, the DM will not complete the first task even if the cost is low. We call this type the *discouraged DM* and her full completion rate is $f^A=0$. If the discouragement is not as strong, the DM will take the risk and complete the first task when the cost is low, hoping that the cost for the next task will also be low. We call this type *the conditional discouraged DM* and her full completion rate is $f^A=p^2$.

We compare the above four possible full completion rates of $T_3$ type under all-or-nothing to those under piece-rate, which is always $p^2$. We find that all-or-nothing can improve the full completion rate for the two encouraged types, but this mechanism can backfire for the discouraged one and has no impact for the conditional discouraged one. Parameter values such as effort costs ($c_L$,

$c_H$), the probability of low cost ($p$), and the present bias ($\beta$), will determine the DM's type and thereby the difference in the full completion rate between the all-or-nothing and the piece-rate mechanisms. Our first proposition specifies the types for whom the full completion rate differs under the two mechanisms.

**Proposition 1:** Under all-or-nothing:

1) if $max\left\{\frac{c_H}{2}, \frac{(1+p)c_L+(1-p)c_H}{2}\right\} \leq \beta < c_H$, the DM is a (conditional) encouraged type and is more likely to complete both tasks compared to piece-rate.
2) if $c_L \leq \beta < min\left\{\frac{(1+p)c_L}{2p}, \frac{(1+p)c_L+(1-p)c_H}{2}\right\}$, the DM is a discouraged type and is less likely to complete both tasks compared to piece-rate.

*Proof.* See Appendix A.1.

Proposition 1 suggests that the all-or-nothing mechanism is risky: it decreases the likelihood of full completion if a decision-maker is of the discouraged type.

It is important to note that the encouragement and discouragement effects occur because of the interdependence of the tasks under all-or-nothing, not because of the present bias ($\beta$). The present bias, however, creates a conflict between the period-zero-self and the period-one-self. Specifically, the period-zero-self wants the period-one-self to make more patient decisions than what the period-one-self actually prefers. Therefore, for some types of DM, the utility maximizing option for the period-zero-self is to choose the all-or-nothing mechanism; this strips away the reward from partial completion and thereby forces the period-one-self to complete both tasks. This is similar to the idea of many commitment models that restrict the choice set to commit a DM to the best outcome (O'Donoghue and Rabin 2001; Giné, Karlan, and Zinman 2010). On the other hand, for some other types of DM, the period-zero-self prefers the non-commitment option (the piece-rate mechanism) as the all-or-nothing mechanism discourages her future self from performing the tasks. We elaborate below how the choice of the all-or-nothing mechanism changes depending on individual types, and the corresponding differences in full completion rate between the Self-select and the Piece-rate treatments.

*2.2 Piece-rate versus Self-select*

To compare the full completion rate between the Piece-rate and the Self-select treatments, we first analyze how the DM at period zero chooses between the piece-rate and the all-or-nothing mechanisms by comparing the expected lifetime utility of each. We have shown that in both mechanisms, $T_1$ type DMs will always complete all the tasks and $T_2$ types will never commence any tasks. Thus, these two types will be indifferent between the two mechanisms. Here we assume that both types will choose

the piece-rate mechanism because it is the status quo familiar to them (e.g. students usually receive credit for the work done for each assignment).

We have demonstrated above that $T_3$ type DMs will perform each task under the piece-rate mechanism as long as the cost of completion is low ($f^P=p^2$). But they act differently under the all-or-nothing mechanism depending on whether they are encouraged or discouraged. Below, we elaborate on how the period-zero-self chooses a mechanism maximizing the expected lifetime utility depending on the encouragement/discouragement effect (see Appendix A.1 for details of the proof):

- *Encouraged DM*: The period-one-self will complete all tasks under all-or-nothing (i.e. $f^A=1$). Anticipating this, the period-zero-self strictly prefers all-or-nothing since the utility is the highest when all the tasks are completed.
- *Conditional encouraged DM*: As explained above, under all-or-nothing, the period-one-self will complete the second task as long as the first task is completed and will complete the first task only if the cost is low. Thus, the probability of full completion under all-or-nothing is $f^A=p$, which is higher than that under piece-rate ($p^2$). However, the downside of all-or-nothing for this type is that the period-one-self will not work on any tasks when the cost of completing the first task is high. In contrast, under piece-rate, zero completion occurs only when the cost of both tasks is high. That is, the all-or-nothing mechanism increases the probability of zero completion compared to piece-rate ($1-p$ vs. $(1-p)^2$). Overall, the expected utility under piece-rate is higher than that under all-or-nothing. Thus, the period-zero-self will choose the piece-rate mechanism.
- *Discouraged DM*: The DM will not engage in either of the tasks under the all-or-nothing mechanism. Thus, the period-zero-self will choose the piece-rate mechanism.
- *Conditional discouraged DM*: We have demonstrated above that this type of DM achieves the same full completion rate under both mechanisms ($f^A= f^P =p^2$). Furthermore, under all-or-nothing, the period-one-self will not complete the first task with high cost. Thus, the probability of zero completion is higher under all-or-nothing than under piece-rate ($1-p$ vs. $(1-p)^2$). Overall, the expected utility under piece-rate is higher than under all-or-nothing, causing the period-zero-self to choose the piece-rate mechanism.

Our analysis shows that, under the self-select mechanism, only the encouraged DM chooses all-or-nothing with all other types preferring the piece-rate mechanism. The self-select mechanism eliminates the risk of discouragement from an exogenously imposed all-or-nothing mechanism. Hence, the self-select mechanism can achieve a higher full completion rate than the piece-rate mechanism as long as there is a significant number of encouraged DMs in the population.

**Proposition 2:** Encouraged DMs, defined by $\frac{(2-p)c_H+pc_L}{2} \leq \beta < c_H$, strictly prefer the all-or-nothing mechanism and always achieve full completion, whereas the full completion rate for them would be only $p^2$ under piece-rate. All other types will choose the piece-rate mechanism. Therefore, the Self-select treatment improves the full completion rate only if there is a significant number of encouraged DMs choosing all-or-nothing in the population.

*Proof*. See Appendix A.1.

It is worth pointing out that empirically, we cannot easily compare DMs in their likelihood of being the encouraged type because it depends on the values of multiple parameters: present bias (β), costs ($c_L$ and $c_H$) and the probability of low cost (p). For example, a higher β DM is not necessarily more likely to be an encouraged type than a lower β DM (e.g. a DM with β above $c_H$ would be a $T_1$ type and therefore would choose piece-rate)

Nevertheless, the theoretical analysis above provides some insights how the share of the encouraged type may change with a particular parameter holding the other parameters constant. Specifically, as the low cost ($c_L$) or the probability of high cost (1-p) increases, it could lead to a smaller share of encouraged types choosing all-or-nothing. For example, if a DM learned that the cost distribution is less attractive than her prior (e.g. higher $c_L$ or lower p), she would be less likely to be an encouraged type choosing all-or-nothing.[8] This may explain the lower take up rate of the all-or-nothing in the replication trails reported in section 3.3.

Since only the encouraged type will choose the all-or-nothing mechanism, Proposition 2 predicts that the self-select mechanism should improve the full completion rate only if there is a significant number of DMs choosing all-or-nothing.

Taking all these together, our analysis predicts that the all-or-nothing mechanism can be risky: it may not always improve the full completion rate and it can even lead to lower full completion. In contrast, the self-select mechanism does not have the risk of achieving a lower full completion rate than the piece-rate mechanism, and it can effectively promote the full completion rate as long as a good number of DMs are willing to choose all-or-nothing. Next, we report data from two studies that test the predictions.

[8] It is not certain how a change in β or $c_H$ affects the share of encouraged types. This is because the change in each of the two parameters would affect the cutoff both between the encouraged and $T_1$ types (e.g. the cutoff determining the need for the commitment device) and between the encouraged and lower types (e.g. the cutoff determining the risk of taking the commitment device).

## 3. Study 1

*3.1 Experiment Design*

Our first experiment involves 343 undergraduate students enrolled in the introductory microeconomics course in Malaysia between July and October 2016, a compulsory unit for the Bachelor of Business and Commerce degree. For each week of lectures during the semester, the lecturer created pre-lecture content to facilitate learning at home. Each week, the lecturer gave students an online quiz that tested their understanding of the course content prior to the lecture. There were 9 quizzes that contributed a total of 10% (10 marks) towards each student's final grade in the unit. Each online quiz involved 10 multiple-choice questions that were available for five days through the online learning platform. Students were given up to five attempts to complete the quiz and they needed to score at least 50% in order to earn their credit.[9]

We implemented randomization at the tutorial level. At the beginning of the semester, students were randomly allocated to different tutorial sessions. We randomly assigned each tutorial session to one of the three treatments: Piece-rate, All-or-nothing, or Self-select. In the Piece-rate treatment, the 10 marks would be spread equally across each quiz and students would receive credit for each quiz that they completed. In the All-or-nothing treatment, the students received the 10 marks only if they completed all of the online quizzes, and zero marks otherwise. In the Self-select treatment, we gave students a choice between the piece-rate and the all-or-nothing options. Students in the Self-select treatment made their decisions during the first tutorial session. To ensure the consistency of treatment implementation in each tutorial session, we provided each tutor a script to read during the tutorial. The script explained how the quizzes would be marked (see Appendix B.1).

*3.2 Results*

Table 1 reports the number of participants in each condition. In the Self-select treatment, 80 out of 154 students selected the all-or-nothing marking mechanism. There is no gender difference in the observed choices. About 53% of female and 51% of male students chose all-or-nothing. Our focus is on the success rate of completing all the quizzes.[10]

Figure 1 plots the distribution of the number of quizzes missed. Across all treatments, very few students missed three or more quizzes. Thus, we pool those students together in Figure 1. A majority (about 68.9%) of students completed all the quizzes, even in the baseline treatment. This high full completion rate suggests that the motivation to work on the quizzes is relatively high. This

[9] All the students who attempted the quiz earned the credit. Thus, the task is mainly effort-based.

[10] Some students registered the course late and only got access to the online course materials after the first-week lecture and/or tutorial. In those cases, students were told that only the quizzes starting from week 2 would affect their mark. Given this, our data analysis includes only quizzes starting from week 2 and we count the quiz in week 2 as the first task.

high motivation is likely to be because of the indirect value of the quizzes to student learning, in addition to the direct credit awarded for completion. As is a common feature of in-semester exercises, working on the quizzes can potentially help students perform well in the final exam. We will return to this in the discussion section. Compared with the baseline (Piece-rate) treatment, the full completion rate is only slightly higher in the All-or-nothing treatment and the difference is not significant (74.4% vs. 68.9%, Z-test, p=0.406).

In contrast, the full completion rate in the Self-select treatment is significantly higher than in the baseline (79.9% vs. 68.9%, Z-test, p=0.046). Figure 1 shows that such an increase of the full completion rate can mostly be attributed to the 68.9% of students who self-selected the all-or-nothing mechanism. The full completion rate of this group of students is 82.5%, much higher than the completion rate of 68.9% in the Piece-rate treatment (Z-test, p=0.036). For those who selected the piece-rate mechanism, the full completion rate is higher than but not significantly different from the average of the Piece-rate treatment (77% vs. 68.9%, Z-test, p=0.235).[11] Thus, the increase in the full completion rate in the Self-select treatment is mainly driven by those who choose the all-or-nothing mechanism.

A probit regression analysis of the full completion rate confirms our results. In addition to the treatment condition variables, we also include control variables in the regressions – gender, and/or whether the course is compulsory for the student. Standard errors are clustered at tutorial level. Regression results reported in Table 2 show that being in the Self-select treatment significantly increases the probability of full completion. In every model we ran, we found that being assigned to the Self-select rather than the Piece-rate treatment has a marginal effect of increasing the likelihood of full completion by at least 10%.

Our results show that the self-select mechanism can significantly improve the full completion rate. Conversely, the all-or-nothing mechanism, if exogenously imposed (All-or-nothing treatment), does not improve the full completion rate compared with the Piece-rate treatment. This result is in line with our theoretical predictions. As stated in Proposition 2, encouraged DMs will choose the all-or-nothing mechanism and the self-select mechanism will be effective if there is a significant number of DMs of this type. Observing more than half the students choosing all-or-nothing suggests that the all-or-nothing mechanism is encouraging for a significant number of students who can use this mechanism as a commitment device to achieve full completion. As predicted in our model, those who choose the all-or-nothing mechanism drive up the full task completion rate. Moreover, observing no difference between the piece-rate and the all-or-nothing condition suggests the existence of discouraged DMs as well. This is because, according to the theory, the only way the existing encouraged DMs do not drive the full completion rates up in the All-or-nothing treatment is the

[11] This result is consistent with our theoretical framework. We show in the proof of Proposition 2 that the full completion rates between the Piece-rate and the self-selected piece-rate groups do not necessarily differ.

existence of a significant number of discouraged students who would balance them out (see the proof of Proposition 2 in Appendix A.1.).

*3.3 Additional replication trials*

We carried out two additional trials (one in 2017 and one in 2018) to see whether the positive effect of the self-select mechanism can be replicated in different course units and in different years. The 2017 trial involves 234 undergraduate students enrolled in the introductory macroeconomics (86), introductory accounting (123), and public sector economics (25) courses between July and October 2017. Our 2018 trial (February – June) involves 312 undergraduate students enrolled in the introductory microeconomics course only. The design and implementation followed the same protocol as the first trial. The number of participants in each treatment is reported in Appendix C.

Overall, we observe very similar effects of the self-select mechanism on the full completion rate. In the 2017 trial, 25.95% (34/131) of students chose all-or-nothing in the Self-select treatment. Compared with the baseline (Piece-rate), the Self-select treatment has significantly higher full completion rate (49.62% vs. 20.39%, Z-test, p=0.000). For those who selected the all-or-nothing mechanism, the full completion rate is significantly higher than both those who chose the piece-rate (64.71% vs. 44.33%, Z-test, p=0.041) and those who were assigned the piece-rate (64.71% vs. 20.39%, Z-test, p<0.01). In the 2018 trial, 15.15% (30/198) of students chose all-or-nothing in the Self-select treatment. Consistent with our previous findings, the Self-select treatment outperformed the baseline with a significantly higher full completion rate (60.1% vs. 47.37%, Z-test, p=0.029). Again, those who chose the all-or-nothing mechanism achieve the highest full completion rate: 70% who self-selected all-or-nothing compared to 47.37% who were assigned to Piece rate treatment (Z-test, p=0.027) and also compared to 58.33% who self-selected piece-rate (Z-test, p=0.229).

One interesting observation is that compared with the first trial conducted in 2016, the percentage of students who chose all-or-nothing in the Self-select treatment is significantly lower in both the replication trials, although the Self-select treatment still achieved a significantly higher full completion rate than the baseline. One possibility for this difference is that the three cohorts of students may somehow differ. We thus examine the academic performance of these three different cohorts of students. The results are reported in Appendix D.[12] Overall, we do not find any significant differences among their academic performance. This observation is consistent with the identical entry requirements and a similar proportion of international students across these semesters. Therefore, it is unlikely that the lower sign-up rate is related to the students' motivation or ability.

We speculate the change in the take up rate may be associated with the culture of communication between junior and senior students. For example, even before a new semester begins,

[12] Although we did not obtain permission to access individual grade reports, we were given information on the average grade distribution of the cohorts. Appendix D reports the average grade distribution of students during the semester, excluding the course with treatment interventions.

the university's student associations use social media platforms to publish the contacts of student representatives for all discipline majors. Incoming students could seek course-related information from their seniors. Students in the replication trials might learn from their seniors in the first cohort about the cost distribution of tasks. As discussed in the theoretical analysis, the choice of the all-or-nothing is determined by the value of $p$, $c_H$, $c_L$, and $\beta$. While the present bias $\beta$ is more a personal trait and unlikely to be affected by the communication with other students, it is likely that the new students update their knowledge about the probability of completing each task after acquiring further information from their seniors (e.g. learning how busy the semester gets towards the end with many assignments from all classes). Note that the year of 2016 (when the first trial was conducted) is also the first time that the school adopted weekly online quizzes in teaching. If the communication leads students to believe the cost distribution to be less favorable than they would have expected, they would be less likely to choose all-or-nothing. In other words, the lower sign-up rate in the replication trials could be due to the information spillover from previous cohort.

Although we cannot directly test the spillover effect, our speculation is consistent with the findings we report in Study 2 where participants were asked to complete a series of online surveys. There, participants in the second trial are not aware of the first trial and thus are unlikely to obtain any information from those in the first trial. Indeed, the sign-up rates for all-or-nothing payment mechanism in the two trials conducted at different times are very similar (22% vs. 28.77%).

*3.4 Evidence of the intrinsic reward of tasks*

We report above that the full completion rate is high, even in the baseline, which suggests the motivation to work on the quizzes is relatively high. In addition, we observe that most of those who missed a quiz continued to work on quizzes in the following weeks, even though they would not receive marks for the completion under the all-or-nothing mechanism. First, in the All-or-nothing treatment in the first trial, among the 21 students who missed at least one task (and thus receive no credit), only one did not do any task. Most students (20) still worked on tasks after missing one. Second, only 2 out of 86 students in the All-or-nothing treatment decided not to try from the very beginning. This indicates that quizzes provided an intrinsic reward for students, in addition to the marks they received upon completion, because the quizzes in principle should help students learn better and therefore perform better in the final exam. In Appendix A.2, we extend our theoretical analysis by including the possibility of an intrinsic reward in the model. Our analysis shows that the theoretical results we stated in previous propositions still hold and the model with intrinsic reward makes additional predictions: (1) there will be decision-makers who continue to work on tasks after a failure; and (2) intrinsic reward creates an additional motivation to choose the all-or-nothing mechanism. Thus, the observation of the students who chose the all-or-nothing mechanism in the Self-selection treatment does not provide conclusive empirical evidence that DMs would still make this choice where tasks have little or no intrinsic reward. As the choice of the all-or-nothing

mechanism in the Self-selection treatment is the key to its effectiveness, we run a second study using a task with minimum intrinsic value.

## 4. Study 2

### *4.1. Experiment Design*

We design a survey task such that the reward for the task is only cash and it is unlikely that subjects can benefit from this task in any other regard. We distributed invitation flyers in tutorial classes. The flyers contained only general information of earnings in Malaysian Ringgits (RM) for filling out a survey without detailing the incentive mechanisms (see Appendix B.2). The randomized trials were carried out via randomizing the distribution of the three sets of flyers that had identical content except for different Quick Response (QR) codes. Each QR code on a flyer represented a unique URL that assigned the subjects to different treatments. When participants scanned the QR code using their smartphones, they were directed to a website where they were informed about the payment scheme for completing the surveys.[13] Thus, our treatment intervention starts at the time after participants scanned the QR code and read the payment information. The total number of participants in each treatment is based on the number of individuals who scanned the barcode.

In the Piece-rate treatment, subjects were told they could earn RM5 for each of the four surveys they completed. In the All-or-nothing treatment, they were told that they would receive RM20 only if they completed all four surveys and no payment if they missed any. In the Self-select treatment, subjects could select whether to be paid by the piece-rate or the all-or-nothing mechanism. The wording for each option was the same as in the other two treatments. Subjects were told that they had up to five days to complete each survey and that each survey contained multiple-choice questions that took approximately 10 minutes to complete. In all three treatments, subjects were told that the payment would be made at the end of the fourth week (see Appendix B.3 for details).

In each treatment, subjects could decide whether to participate in the survey after reviewing the payment information. If they decided to participate, they would expect to receive one survey via email in each of the following four weeks. The option of not participating allows us to know whether there might be treatment difference in the interest to participate at all.

### *4.2 Results*

In each treatment, more than 200 students scanned the QR code to access the information page of the survey. Table 3 reports, for each condition, the number of students who signed up after reviewing the information (including the payment scheme). We observe 22% of students (32 out of 143) in the Self-

[13] In case some participants were unable to access the QR code, we also provided an email contact for participants to receive a link to the website.

select treatment chose all-or-nothing. Combining this with the observation from the first study, our data suggest that the intrinsic value of the tasks is an important factor, but not the only one, in determining individuals' willingness to choose the risky all-or-nothing commitment device. As with Study 1, there is no gender difference in the choice of all-or-nothing (20 out of 86 females and 12 out of 57 males).

Figure 2 plots the distribution of the number of completed surveys in each treatment. Unlike the first study, we observe a significant number of zero completions in all treatments, possibly because of the lack of intrinsic motivation for the task. We also observe that the Self-select mechanism has two effects: it not only increases the rate of full completion but also decreases the rate of zero completion. In particular, compared with the Piece-rate treatment, the Self-select treatment achieves a significantly higher full completion rate (34% vs. 24.91%, Z-test, p=0.016) and a lower zero completion rate (48.18% vs. 57.89%, Z-test, p=0.025). In contrast, while the All-or-nothing treatment does not achieve a higher full completion rate than the Piece-rate treatment (25.09% vs. 24.91%, Z test, p=0.96), its zero-completion rate is slightly higher than the Piece-rate treatment although the difference is not significant (63.8% vs. 57.89%, Z-test, p=0.15).

As in Study 1, we find that the higher full completion rate in the Self-select treatment is mainly attributed to those who self-select all-or-nothing. To see this, we calculate the full completion rate for those who chose all-or-nothing and those who chose piece-rate separately. As only those who signed up in the Self-select treatment made a choice between the two mechanisms, our comparisons are based on only those who signed up in each treatment. Among those who chose all-or-nothing in the Self-select treatment, 78% of them completed all four surveys. The full completion rate is only 54.05% for those who chose piece-rate, which is almost the same as the full completion rate of those who signed up in the Piece-rate treatment (53.79%).

These observations are consistent with our theoretical predictions. The higher full completion rate in the self-select mechanism indicates a significant number of encouraged DMs in the population. Despite the number of encouraged DMs, the result of no difference in the full completion rate between the Piece-rate and All-or-nothing treatments implies a significant number of discouraged DMs, canceling out the effects of encouraged ones in the All-or-nothing treatment. The significant number of both encouraged and discouraged types also explains the treatment differences in the zero-completion rate, as shown in Figure 2. While the encouragement effect of all-or-nothings lowers the zero-completion rate compared to piece-rate, the discouragement effect increases the zero-completion rate. As a result, the all-or-nothing mechanism may not reduce the zero-completion rate and can even lead to a higher zero completion rate. In contrast, the Self-select treatment achieves a lower zero-completion rate than the Piece-rate treatment because it eliminates the discouragement effect of all-or-

nothing while maintaining the encouragement effect.[14] In the proof of Proposition 2 in Appendix A.1, we provide a formal analysis in which the zero-completion rate in the all-or-nothing compared to the piece-rate can be lower or higher; however, the Self-select treatment lowers the zero-completion rate as long as there is a good number of encouraged DMs.

Figure 3 reports further the breakdown of zero-completions. It shows that, in all three treatments, most of the zero-completions come from the decisions not to sign up to the study at the beginning. Interestingly, while the All-or-nothing treatment has the same no sign-up rate as the Piece-rate treatment (about 53%), the Self-select treatment significantly lowers the proportion (42%, Z-test, $p<0.01$). The proportion of participants who signed up but failed to complete any surveys is, overall, very low in all treatments (about 10% or less).

We reported in Study 1 above that those students who missed one task in the All-or-nothing treatment continued working on the tasks even though they would not be awarded any credit for individual task completion. We argued that this was evidence of the high intrinsic value of the tasks. Due to the low intrinsic value of the survey tasks, we expect few participants to continue completing surveys in the All-or-nothing treatment if they missed one. This is indeed the case. We observe 34 out of the 131 participants who signed up in the All-or-nothing treatment missed the first survey. Thirty of these 34 participants did not complete any of the following three surveys. One participant completed the second survey and then stopped. The other three completed the remaining three surveys.

Our data so far suggests that the self-select mechanism can promote full completion rate compared to the piece-rate, even for tasks that have little intrinsic value. We note, however, that unlike the coursework tasks in Study 1, where to receive the credit students need to answer at least 50% of questions correctly[15], in the survey study, participants receive cash reward as long as they complete the questions. An important question to ask therefore is whether there might be any difference in the quality of the work between the self-select and the piece-rate mechanism. We conduct a second trial to shed light on this question.

*4.3 The quality of the survey answers*

In the second trial, we add an attention check question to each survey (Berinsky, Margolis, and Sances 2014; Goodman, Cryder, and Cheema 2013; Oppenheimer, Meyvis, and Davidenko 2009) to investigate the quality of answers. Appendix E provides details of all four attention check questions. As we are mainly interested in the self-select mechanism, we include only the Piece-rate and the Self-

[14] We did not compare the zero-completion rate across treatments in Study 1 because almost no student completes zero in any of the treatments. This again is probably due to the intrinsic value of the quizzes as we discussed there.

[15] In each of the three treatments, the accuracy rate is around 75%, which is higher than the threshold of 50%. Such a consistently high accuracy rate again indicates the intrinsic value of the quiz tasks.

select treatments in this trial. We also added one more survey and thus extended the duration of the survey study to five weeks. Thus, the second trial also allows us to examine whether the above-reported Self-select treatment effect can be replicated when we expand the duration of the tasks. The implementation procedure is identical to the first one.

For each condition, more than 200 students scanned the QR code to access the information page of the survey (Table D 3 in Appendix C reports the details of the number of students who signed up). We find 28.77% (42/146) of students who signed up to the Self-select treatment chose the all-or-nothing payment mechanism. We observe a very similar self-select effect as shown in the first trial. The full completion rate is significantly higher in the Self-select treatment as compared to the Piece-rate (34.17% vs. 24.75%, Z-test, p=0.031). The self-select mechanism also lowers the rate of zero completion in the Self-select treatment although the difference is not significant (45.83% vs. 52.48%, Z-test, p=0.164).

Across all treatments, we detect a high frequency of failing to answer the attention check questions properly (41.31% for the baseline, 42.65% for the Self-select treatment).[16] Students who self-selected the all-or-nothing payment scheme are more likely to miss the attention check questions than those who chose the piece rate (57.22% vs. 37.07%, Z-test, p=0.026), and those in the baseline (57.22% vs. 41.32%, Z-test, p=0.077). Among students who completed all the tasks, those who self-selected the all-or-nothing mechanism also appear to be the ones who are mostly likely to miss the questions (Self-select all-or-nothing: 56.15% vs. Self-select piece-rate: 29.29%; Mann-Whitney test, p=0.04; Piece-rate: 36%; p<0.01). This result suggests that when providing the option of an all-or-nothing incentive mechanism, additional monitoring may be needed to ensure the quality of work.

## 5. Discussion and conclusions

Perseverance is critical in achieving success. Daily temptation or extra duties arriving stochastically, however, often distract people from continuing what they have started. Hence, achieving long-term goals that require persistent effort is hard for many. Designing efficient external incentive mechanisms may encourage individuals to be more persistent in their effort. In this paper, we compare the effectiveness of two reward mechanisms on promoting persistent effort over time. One is the conventional piece-rate mechanism that rewards each completed task and thus does not target perseverance directly. Another is an all-or-nothing mechanism that explicitly requires consistent efforts by rewarding only consistent completion of tasks. Previously studied commitment mechanisms often take the form of one of the two. The all-or-nothing mechanism is useful for dealing with self-control problems but it comes with the risk that people might be discouraged from trying at all, or

[16] The percentage is measured by the number of surveys with failed attention check questions divided by the total number of surveys completed (e.g. if the subject attempted three surveys and gave a wrong answer to the attention check question in all three, we count this subject as missing the attention check question 100% of the time).

might withdraw completely after a one-time failure. Indeed, we find the all-or-nothing mechanism, when exogenously imposed, is not effective.

A self-select treatment where individuals can freely choose between the two reward mechanisms shows promise in promoting full completion. Theoretically, only people who can utilize the all-or-nothing mechanism would choose it, and those who would have been discouraged by the all-or-nothing mechanism can select the piece-rate mechanism instead. Indeed, data from a series of field experiments show that a significant number of individuals are willing to choose the risky all-or-nothing mechanism both when the tasks have high intrinsic value and when the tasks have little intrinsic value. Those who self-select the all-or-nothing mechanism achieve a significantly higher full completion rate than people assigned to the piece-rate mechanism, which also leads to the overall improved outcome under the self-select treatment.

In addition to the sorting effect as argued in our theoretical framework, another possible mechanism that self-select may work is through autonomy (Deci, Ryan, and Koestner 1999; Bowles and Polanía-Reyes 2012). The well-established self-determination theory identifies autonomy as one of the three important psychological needs that must be satisfied for self-motivation (Ryan and Deci 2006). For example, (Zuckerman et al. 1978) show that participants enjoyed tasks more when they could choose what tasks to work on and how much time to allocate. (Duckworth 2016) argue that people are more likely to persevere when they feel in control. Accordingly, the option provided in the self-select mechanism allows autonomy and thereby motivates participants to complete tasks – irrespective of what incentive mechanism they choose. The autonomy effect alone, however, does not offer any insights why/how people choose the all-or-nothing mechanism and therefore does not provide a clear prediction on the performance difference between those who choose the all-or-nothing mechanism and those in the baseline condition. Nevertheless, the potential autonomy effect would be an additional reason for adopting the self-select mechanism instead of exogenously imposing either the piece-rate or the all-or-nothing mechanism.

The findings from our experiment offer useful policy insights in domains such as organization management, education and health, where persistent effort over a long period of time are important. In recent decades, much research has been conducted into helping children do well academically. One key challenge is how to train students to persevere. Different monetary reward mechanisms have been designed and tested, but with mixed results (Fryer 2011; Leuven, Oosterbeek, and van der Klaauw 2010; Levitt et al. 2016). These mixed results indicate that the problem may not be the lack of monetary incentives. Students, especially those who grow up in adverse circumstances, are already likely to have sufficient material incentives to get a good education and change their life prospects. Yet, they may not know how to make decisions to achieve success. Study 1 shows that simple changes in incentive mechanisms may help. A mechanism, such as the all-or-nothing marking mechanism, can be quite helpful when this *option* is offered to students.

Recent research on performance management has emphasized the importance of intrinsic motives. While intrinsic motivation is surely important, many tasks are boring and involve consistent and tedious work (often more boring and time-consuming than the survey tasks in Study 2). Effort, in such cases, has to be motivated by external rewards. Our second study shows that allowing agents to self-select the reward mechanism can be beneficial. First, it attracts more individuals to engage in the tasks (e.g. a higher sign up rate in the survey tasks). Second, individuals are willing to choose the all-or-nothing mechanism even when the tasks have little intrinsic value, and those that do perform significantly better. On the other hand, the data from the second trial in Study 2 highlight the importance of monitoring the quality of the work, especially when agents self-select the all-or-nothing mechanism.

It is worth noting that introducing all-or-nothing as an *option* appears to make it easier to implement in practice compared with exogenously enforcing the mechanism. In many institutions, individuals are likely used to the conventional piece-rate types of reward mechanism. Given its risk, adopting a new all-or-nothing mechanism can be challenging. Introducing it as an option could presumably avoid potential resistance.

We take a first step in understanding the working of the all-or-nothing mechanism and how the option of such an incentive mechanism affects behavior. There remain many interesting and important questions for further investigation. For example, in both studies, we observe participants who chose the all-or-nothing mechanism, failed, and received zero reward. How would such a failure affect future decisions? Would they no longer choose the commitment, or would they learn from the negative experience and try harder next time? We find the Self-select treatment wins mainly because of those who chose the all-or-nothing mechanism. Would it be helpful to design mechanisms that *nudge* more to "self-select" the all-or-nothing mechanism? We are conducting follow up studies to address these interesting questions.

**Table 1.** Number of participants in Study 1

| Treatments | # of obs. | Female | Male |
|---|---|---|---|
| Baseline (Piece-rate) | 103 | 51 | 52 |
| All-or-nothing | 86 | 35 | 51 |
| Self-select | 154 | 83 | 71 |
| piece-rate | 74 | 39 | 35 |
| all-or-nothing | 80 | 44 | 36 |
| Total | 343 | 169 | 174 |

**Table 2.** Probit regression analysis of the full completion in Study 1

| | Dependent variable: full completion | | | |
|---|---|---|---|---|
| | Regression (1) | Regression (2) | Regression (3) | Regression (4) |
| All-or-nothing | 0.162 | 0.220 | 0.199 | 0.263* |
| | (0.20) | (0.20) | (0.20) | (0.20) |
| Self-select | 0.343** | 0.331* | 0.361** | 0.352** |
| | (0.17) | (0.18) | (0.17) | (0.18) |
| Female | | 0.562*** | | 0.579*** |
| | | (0.15) | | (0.16) |
| Compulsory | | | 0.611** | 0.682*** |
| | | | (0.31) | (0.32) |
| Cons. | 0.494*** | 0.235 | –0.097 | –0.433* |
| | (0.13) | (0.15) | (0.33) | (0.35) |
| Pseudo $R^2$ | 0.01 | 0.05 | 0.02 | 0.06 |

Robust standard errors in parenthesis are clustered at the tutorial level.
* Significant at the 10% level
** Significant at the 5% level
*** Significant at the 1% level

**Table 3.** Number of participants in Study 2

| Treatments | # of scans | # of signups | | |
|---|---|---|---|---|
| | | Total | Female | Male |
| Baseline (Piece-rate) | 285 | 132 | 73 | 59 |
| All-or-nothing | 279 | 131 | 60 | 71 |
| Self-select | 247 | 143 | 86 | 57 |
| piece-rate | | 111 | 66 | 45 |
| all-or-nothing | | 32 | 20 | 12 |
| Total | 811 | 406 | 219 | 187 |

**Figure 1**. Distribution of quiz completion rate by treatment (Study 1)

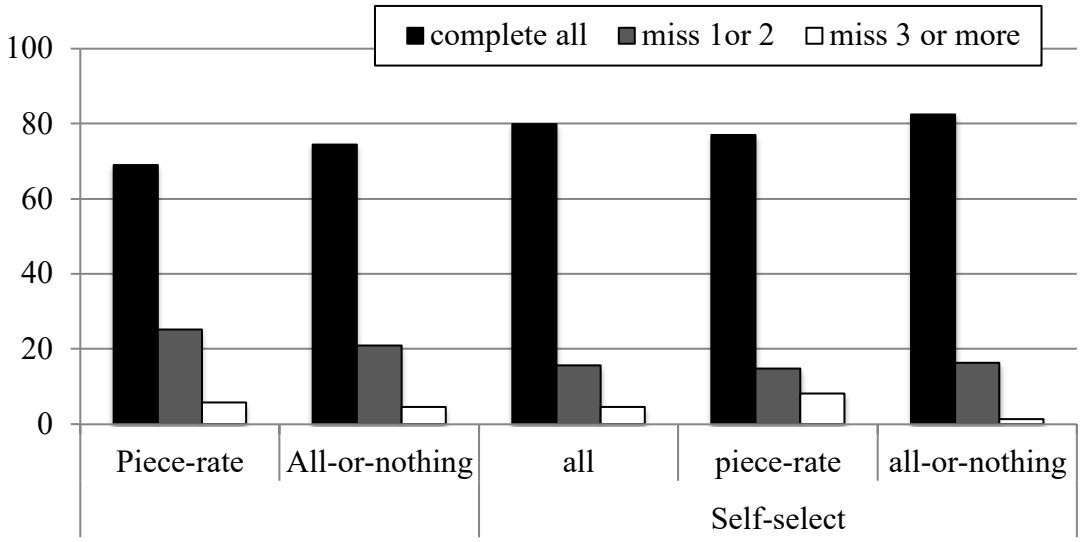



**Figure 2.** Distribution of number of surveys completed by treatment (Study 2)

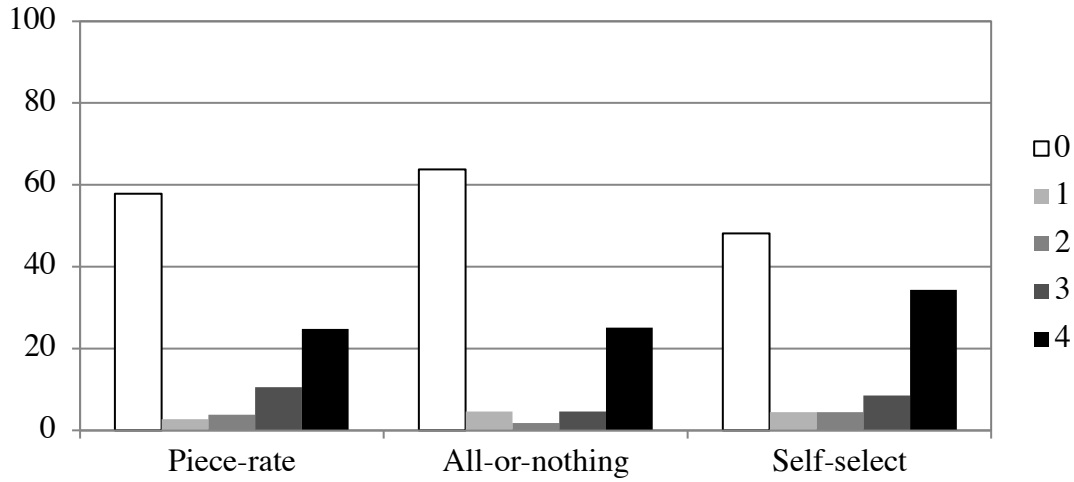
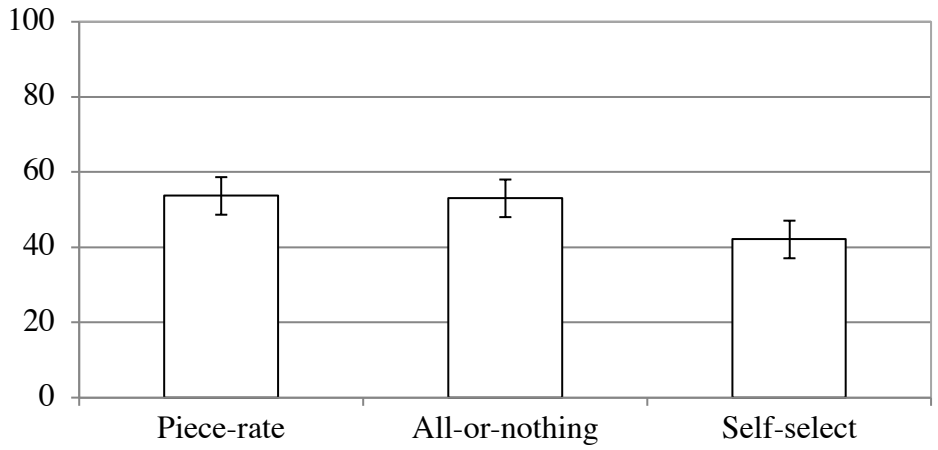
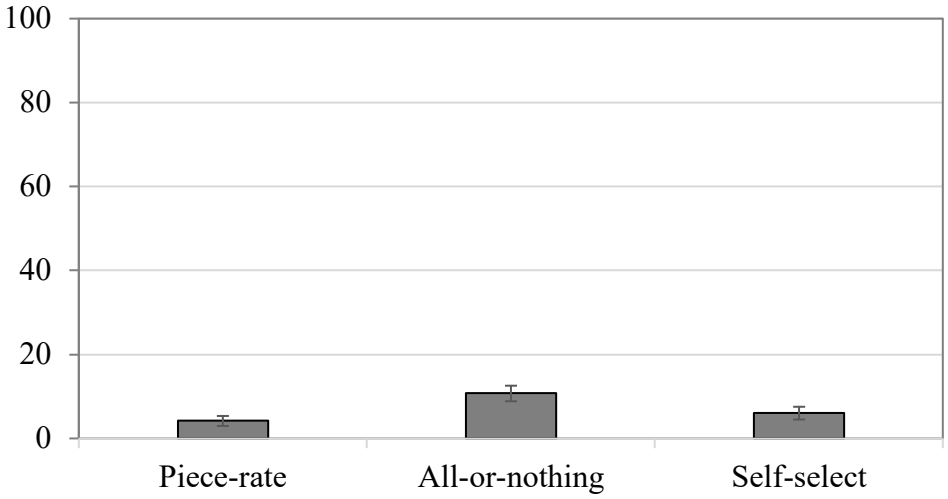


**Figure 3.** Zero completion types by treatment (Study 2)

a) No sign up




b) Sign up but complete none



**References**


Acland, Dan, and Matthew R. Levy. 2015. "Naiveté, Projection Bias, and Habit Formation in Gym Attendance." *Management Science* 61 (1): 146–60. https://doi.org/10.1287/mnsc.2014.2091.

Alan, Sule, Teodora Boneva, Seda Ertac, and Teodora Boneva. 2019. "Ever Failed, Try Again, Succeed Better: Results from a Randomized Educational Intervention on Grit." *Quarterly Journal of Economics* 134 (3): 1121–62. https://doi.org/10.1093/qje/qjz006.

Almlund, Mathilde, Angela Lee Duckworth, James Heckman, and Tim Kautz. 2011. "Personality Psychology and Economics." In *Handbook of the Economics of Education*, 4:1–181. https://doi.org/10.1016/B978-0-444-53444-6.00001-8.

Ashraf, Nava, Dean Karlan, and Wesley Yin. 2006. "Deposit Collectors." *Advances in Economic Analysis & Policy*. https://doi.org/10.2202/1538-0637.1483.

Basu, Karna. 2011. "Hyperbolic Discounting and the Sustainability of Rotational Savings Arrangements." *American Economic Journal: Microeconomics* 3 (4): 143–71. https://doi.org/10.1257/mic.3.4.143.

Beattie, Graham, Jean William P. Laliberté, and Philip Oreopoulos. 2018. "Thrivers and Divers: Using Non-Academic Measures to Predict College Success and Failure." *Economics of Education Review* 62 (February): 170–82. https://doi.org/10.1016/j.econedurev.2017.09.008.

Benhabib, Jess, and Alberto Bisin. 2005. "Modeling Internal Commitment Mechanisms and Self-Control: A Neuroeconomics Approach to Consumption-Saving Decisions." *Games and Economic Behavior*. https://doi.org/10.1016/j.geb.2004.10.004.

Berinsky, Adam J., Michele F. Margolis, and Michael W. Sances. 2014. "Separating the Shirkers from the Workers? Making Sure Respondents Pay Attention on Self-Administered Surveys." *American Journal of Political Science*. https://doi.org/10.1111/ajps.12081.

Bettinger, Eric, Sten Ludvigsen, Mari Rege, Ingeborg F. Solli, and David Yeager. 2018. "Increasing Perseverance in Math: Evidence from a Field Experiment in Norway." *Journal of Economic Behavior and Organization* 146 (February): 1–15. https://doi.org/10.1016/j.jebo.2017.11.032.

Bowles, Samuel, and Sandra Polanía-Reyes. 2012. "Economic Incentives and Social Preferences: Substitutes or Complements?" *Journal of Economic Literature* 50 (2): 368–425. https://doi.org/10.1257/jel.50.2.368.

Bryan, Gharad, Dean Karlan, and Scott Nelson. 2010. "Commitment Devices." *Annual Review of Economics* 2 (1): 671–98. https://doi.org/10.1146/annurev.economics.102308.124324.

Buechel, Berno, Lydia Mechtenberg, and Julia Petersen. 2018. "If I Can Do It, so Can You! Peer Effects on Perseverance." *Journal of Economic Behavior and Organization* 155 (November): 301–14. https://doi.org/10.1016/j.jebo.2018.09.004.

Charness, Gary, and Uri Gneezy. 2006. "Incentives to Exercise." *Econometrica* 77 (3): 909–31. https://doi.org/10.2139/ssrn.905026.

Claro, Susana, David Paunesku, and Carol S. Dweck. 2016. "Growth Mindset Tempers the Effects of Poverty on Academic Achievement." *Proceedings of the National Academy of Sciences of the United States of America* 113 (31): 8664–68. https://doi.org/10.1073/pnas.1608207113.

Deci, Edward L., Richard M. Ryan, and Richard Koestner. 1999. "A Meta-Analytic Review of Experiments Examining the Effects of Extrinsic Rewards on Intrinsic Motivation." *Psychological Bulletin*. https://doi.org/10.1037/0033-2909.125.6.627.

DellaVigna, Stefano, and Ulrike Malmendier. 2006. "Paying Not to Go to the Gym." *American Economic Review* 96 (3): 694–719. https://doi.org/10.1257/aer.96.3.694.

Duckworth, Dr. Angela Lee. 2016. *The Power of Passion and Perseverance*. Vol. 234. New York, NY, US: Scribner/Simon & Schuster.

Ericsson, K. Anders, Ralf T. Krampe, and Clemens Tesch-Römer. 1993. "The Role of Deliberate Practice in the Acquisition of Expert Performance." *Psychological Review* 100 (3): 363–406. https://doi.org/10.1037/0033-295x.100.3.363.

Fryer, Roland G. 2011. "Financial Incentives and Student Achievement: Evidence from Randomized Trials." *Quarterly Journal of Economics* 126 (4): 1755–98. https://doi.org/10.1093/qje/qjr045.

Fudenberg, Drew, and David K Levine. 2006. "A Dual Model of Impulse Control." *The American Economic Review* 96 (5): 1449–76.

Giné, Xavier, D. Karlan, and Jonathan Zinman. 2010. "Put Your Money Where Your Butt Is: A Commitment Contract for Smoking Cessation." *American Economic Journal: Applied*

*Economics* 2 (4): 213–35. https://doi.org/10.1257/app.2.4.213.
Goodman, Joseph K., Cynthia E. Cryder, and Amar Cheema. 2013. "Data Collection in a Flat World: The Strengths and Weaknesses of Mechanical Turk Samples." *Journal of Behavioral Decision Making*. https://doi.org/10.1002/bdm.1753.
Gul, Faruk, and Wolfgang Pesendorfer. 2001. "Temptation and Self-Control." *Econometrica*. https://doi.org/10.1111/1468-0262.00252.
Heckman, James J., and Tim Kautz. 2012. "Hard Evidence on Soft Skills." *Labour Economics* 19: 451–64. https://doi.org/10.1016/j.labeco.2012.05.014.
Heckman, James J., Jora Stixrud, and Sergio Urzua. 2006. "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior." *Journal of Labor Economics* 24 (3): 411–82. https://doi.org/10.1086/504455.
Himmler, Oliver, Robert Jäckle, and Philipp Weinschenk. 2019. "Soft Commitments, Reminders, and Academic Performance." *American Economic Journal: Applied Economics* 11 (2): 114–42. https://doi.org/10.1257/APP.20170288.
Kaur, Supreet, Michael Kremer, and Sendhil Mullainathan. 2015. "Self-Control at Work." *Journal of Political Economy* 123 (6): 1227–77. https://doi.org/10.1086/683822.
Kullgren, Jeffrey T., Andrea B. Troxel, George Loewenstein, Laurie A. Norton, Dana Gatto, Yuanyuan Tao, Jingsan Zhu, et al. 2016. "A Randomized Controlled Trial of Employer Matching of Employees' Monetary Contributions to Deposit Contracts to Promote Weight Loss." *American Journal of Health Promotion*. https://doi.org/10.1177/0890117116658210.
Laibson, D. 1997. "Golden Eggs and Hyperbolic Discounting." *The Quarterly Journal of Economics* 112 (2): 443–78. https://doi.org/10.1162/003355397555253.
Leuven, Edwin, Hessel Oosterbeek, and Bas van der Klaauw. 2010. "The Effect of Financial Rewards on Students' Achievement: Evidence from a Randomized Experiment." *Journal of the European Economic Association* 8 (6): 1243–65. https://doi.org/10.1162/jeea_a_00024.
Levitt, Steven D., John A. List, Susanne Neckermann, and Sally Sadoff. 2016. "The Behavioralist Goes to School: Leveraging Behavioral Economics to Improve Educational Performance." *American Economic Journal: Economic Policy* 8 (4): 183–219. https://doi.org/10.1257/pol.20130358.
Milkman, Katherine L., Julia A. Minson, and Kevin G.M. M. Volpp. 2014. "Holding the Hunger Games Hostage at the Gym: An Evaluation of Temptation Bundling." *Management Science* 60 (2): 283–99. https://doi.org/10.1287/mnsc.2013.1784.
O'Donoghue, Ted, and Matthew Rabin. 1999a. "Doing It Now or Later." *American Economic Review* 89 (1): 103–24. https://doi.org/10.2307/116981.
———. 1999b. "Incentives for Procrastinators." *Quarterly Journal of Economics* 114 (3): 769–816. https://doi.org/10.1162/003355399556142.
———. 2001. "Choice and Procrastination." *Quarterly Journal of Economics* 116 (1): 121–60. https://doi.org/10.1162/003355301556365.
Oppenheimer, Daniel M., Tom Meyvis, and Nicolas Davidenko. 2009. "Instructional Manipulation Checks: Detecting Satisficing to Increase Statistical Power." *Journal of Experimental Social Psychology* 45 (4): 867–72. https://doi.org/10.1016/j.jesp.2009.03.009.
Phelps, Edmund S., and Robert A. Pollak. 1968. "On Second-Best National Saving and Game-Equilibrium Growth." *Review of Economic Studies* 35 (2): 185–99. https://www.jstor.org/stable/2296547.
Royer, Heather, Mark Stehr, and Justin Sydnor. 2015. "Incentives, Commitments, and Habit Formation in Exercise: Evidence from a Field Experiment with Workers at a Fortune-500 Company." *American Economic Journal: Applied Economics*. https://doi.org/10.1257/app.20130327.
Ryan, Richard M., and Edward L. Deci. 2006. "Self-Regulation and the Problem of Human Autonomy: Does Psychology Need Choice, Self-Determination, and Will?" *Journal of Personality* 74 (6): 1557–85. https://doi.org/10.1111/j.1467-6494.2006.00420.x.
Shefrin, Hersh M., and Richard H. Thaler. 1988. "The Behavioral Life-Cycle Hypothesis." *Economic Inquiry* 26 (4): 609–43. https://doi.org/10.1111/j.1465-7295.1988.tb01520.x.
Tangney, June P., Roy F. Baumeister, and Angie Luzio Boone. 2004. "High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success." *Journal of*

*Personality* 72 (2): 271–324. https://doi.org/10.1111/j.0022-3506.2004.00263.x.
Toussaert, Séverine. 2018. "Eliciting Temptation and Self-Control Through Menu Choices: A Lab Experiment." *Econometrica*. https://doi.org/10.3982/ecta14172.
Zuckerman, Miron, Joseph Porac, Drew Lathin, and Edward L. Deci. 1978. "On the Importance of Self-Determination for Intrinsically-Motivated Behavior." *Personality and Social Psychology Bulletin*. https://doi.org/10.1177/014616727800400317.

# Appendix A.1

We model a decision-maker (DM) with a present bias by using quasi-hyperbolic discounting (Phelps and Pollak 1968, Laibson 1997). DM solves an intertemporal choice problem over three periods. Period zero, $t = 0$, is to choose a mechanism or to be assigned to a mechanism. Period 1, $t = 1$ is to make actual task completion decisions, and period 2, $t = 2$ is to receive the reward. For simplicity, we assume two tasks taking place in period one (specifically at $t = 11$ and at $t = 12$).

The task completion cost might be low, $c_L$ with probability $p > 0.5$ or high, $c_H$ with probability $1 - p$, and there is a fix reward $r$ for each task completed under the piece-rate mechanism. We assume $r = 1$ without loss of generality. Under all-or-nothing (A-or-N) mechanism, the reward is 2 if the agent completes both tasks and *zero* otherwise.

We make the following assumptions to narrow our focus:

1. We assume that the period-zero-self always prefers the future selves to exert effort regardless of the cost. This is because we are interested in analyzing task completion for a DM who is interested in completing the tasks but is unable to do so either because of self-control problems or because of exogenous shocks:

$$c_L < c_H < 1 \tag{1}$$

2. The low cost is more likely than the high cost:

$$0.5 < p < 1 \tag{2}$$

3. The DM has a preference for immediate gratification (self-control problem) and she is sophisticated about her self-control problem:

$$0 < \beta < 1 \tag{3}$$

4. For simplicity we assume there is no exponential discounting:

$$\delta = 1 \tag{4}$$

Let us call the two tasks to be completed in period 1 as task-11 and task-12 respectively.

**Proof of Proposition 1.** Under piece-rate, there are three types of DM:

| | | |
|---|---|---|
| T1 type: | $c_H \leq \beta$, | always complete |
| T2 type: | $\beta < c_L$, | never complete |
| T3 type: | $c_L \leq \beta < c_H$, | complete if cost is low |

The problem under all-or-nothing is more complex. We will analyze it in three different parts covering all possible cases stated below:

1. $\frac{1+p}{p} < \frac{c_H}{c_L}$
2. $2 < \frac{c_H}{c_L} \leq \frac{1+p}{p}$
3. $\frac{c_H}{c_L} \leq 2$

1. Under the first case, $\frac{1+p}{p} < \frac{c_H}{c_L}$, we have the following inequalities:

$$\frac{c_L}{2} < c_L < \frac{c_H}{2} < c_H.$$

Note that a necessary condition for the DM to complete the second task at t=12 is the completion of the first task at t=11. We will not restate this condition for each case to keep the writing concise.

(a) If $c_H \leq \beta$: DM will complete both tasks regardless of the cost. She is $T1$ type who *always* completes the tasks regardless of the cost and the mechanism.

(b) If $\frac{c_H}{2} \leq \beta < c_H$, DM at t=12 completes the task regardless of the cost. We analyze the DM's decisions at t=11 below.

i. Facing a high cost, $c_H$, she completes the task if

$$\frac{c_H + pc_L + (1-p)c_H}{2} \leq \beta < c_H.$$

Under the all-or-nothing mechanism, a DM satisfying the condition above completes both tasks regardless of the cost. Because the DM at t=12 compares the cost of task completion with the cumulative benefit to be received in the future. This is why this type does the task regardless of the cost under all-or-nothing while doing that task only when the cost is low under piece-rate. Moreover, the DM at t=11 completes the first task even at a high cost since the expected cost per task is lower than the piece-rate case because of the possibility of a low cost at $t = 12$. We call her the $T3a$ *encouragement* type.

ii. Facing a low cost, she completes the task if $\frac{c_L+pc_L+(1-p)c_H}{2} < \beta$, which is satisfied since $\frac{c_L+pc_L+(1-p)c_H}{2} < \frac{c_H}{2}$. This is the $T3b$ *conditional encouragement* type. Such DMs complete the second task regardless of the cost, however the task completion is conditional on a low cost for the first task.

(c) If $c_L \leq \beta < \frac{c_H}{2}$, the period-12-self will complete only if the cost is low. Period-11-self's optimal actions are as follows:

i. Facing a high cost, she compares the expected cost of $c_H + pc_L$ to the expected benefit of $2\beta p$. This DM would exert an effort only if:

$$\frac{c_H + pc_L}{2p} < \beta$$

However, there is no DM satisfying this condition since $\frac{c_H}{2} < \frac{c_H+pc_L}{2p}$.

ii. Facing a low cost, she exerts an effort only if:

$$\frac{c_L + pc_L}{2p} \leq \beta < \frac{c_H}{2},$$

expecting the period-12-self to exert an effort under low cost. This type exists since $\frac{1+p}{p} < \frac{c_H}{c_L}$. This is the $T3c$ *conditional discouragement* types. She completes the first and second tasks only when the cost is low.

iii. If $c_L \leq \beta < \frac{c_L+pc_L}{2p}$, she never exerts an effort for the first task because of the risk of not completing the second task. This is the $T3d$ *discouragement* type.

(d) If $\beta < c_L$, she acts the same as the $T3d$ type under A-or-N mechanism, but differently under piece-rate. This is the $T2$ *never* type.

Below, we write the full completion rates in the first two columns, $f_i^r$, and zero completion rates in the last two columns, $n_i^r$, for each type i under each mechanism r $\in$ {A(ll-or-nothing), P(iece-rate)}.

| | $f_i^A$ | $f_i^P$ | $n_i^A$ | $n_i^P$ |
|---|---|---|---|---|
| $T1$ | 1 | 1 | 0 | 0 |
| $T3a$ | 1 | $p^2$ | 0 | $(1-p)^2$ |
| $T3b$ | $p$ | $p^2$ | $(1-p)$ | $(1-p)^2$ |
| $T3c$ | $p^2$ | $p^2$ | $(1-p)$ | $(1-p)^2$ |
| $T3d$ | 0 | $p^2$ | 1 | $(1-p)^2$ |
| $T2$ | 0 | 0 | 1 | 1 |

From the table, $T1$ and $T2$ types do not act differently under different mechanisms. The $T3a$ encouragement type performs better under the all-or-nothing compared to piece-rate, because the full completion rate is one under all-or-nothing although it is $p^2$ under piece-rate. Similarly, the zero completion rate is zero under all-or-nothing whereas it is $(1-p)^2$ under piece-rate. The $T3b$ conditional encouragement type also performs better under all-or-nothing although $T3d$ discouragement and $T3c$ conditional discouragement types perform worse. Notably, the $T3d$ discouragement type does not even try to do any task and never completes under all-or-nothing whereas she completes fully $p^2$ of the time under piece-rate.

We summarize the conditions for types as below:

$$\begin{aligned}
T1\text{, always if} \quad & c_H \leq \beta \\
T3a\text{, encouragement if} \quad & \frac{c_H + pc_L + (1-p)c_H}{2} \leq \beta < c_H \\
T3b\text{, conditional encouragement if} \quad & \frac{c_H}{2} \leq \beta < \frac{c_H + pc_L + (1-p)c_H}{2} \\
T3c\text{, conditional discouragement if} \quad & \frac{c_L + pc_L}{2p} \leq \beta < \frac{c_H}{2} \\
T3d\text{, discouragement if} \quad & c_L \leq \beta < \frac{c_L + pc_L}{2p} \\
T2\text{, never if} \quad & \beta < c_L
\end{aligned}$$

2. Under the second case, $2 < \frac{c_H}{c_L} \leq \frac{1+p}{p}$, we again have:

$$\frac{c_L}{2} < c_L < \frac{c_H}{2} < c_H$$

   (a) If $c_H \leq \beta$, the DM is the $T1$ type as in case (1a).

   (b) If $\frac{c_H}{2} \leq \beta < c_H$, the period-12-self completes regardless of the cost. The DM's actions at t=11 are as follows:

      i. Facing a high cost, she completes if $\frac{c_H+pc_L+(1-p)c_H}{2} \leq \beta < c_H$. This is the $T3a$ encouragement type.

      ii. Facing a low cost, she completes if $\frac{c_L+pc_L+(1-p)c_H}{2} \leq \beta < \frac{c_H+pc_L+(1-p)c_H}{2}$. This is the $T3b$ type.

      iii. If

$$\frac{c_H}{2} \leq \beta < \frac{c_L + pc_L + (1-p)c_H}{2},$$

      The DM does not complete the first task, giving the $T3d$ discouragement types.

   (c) If $c_L \leq \beta < \frac{c_H}{2}$, the period-12-self will complete if the cost is low. The DM takes the following actions at t=11:

      i. Facing a high cost, she completes if $\frac{c_H+pc_L}{2p} < \beta$ which is not possible since $\frac{c_H}{2} < \frac{c_H+pc_L}{2p}$.

      ii. Facing a low cost, she completes if $\frac{c_L+pc_L}{2p} < \beta$ and $\beta < \frac{c_H}{2}$, which is not possible since $\frac{1+p}{p} > \frac{c_H}{c_L}$.

      As a result, the DM will never complete a task if $c_L \leq \beta < \frac{c_H}{2}$, being the $T3d$ discouragement type.

   (d) If $\frac{c_L}{2} \leq \beta < c_L$, the DM never completes regardless of the cost or mechanism. She is type $T2$.

Therefore, the full and no completion rates are as below:

| | $f_i^A$ | $f_i^P$ | $n_i^A$ | $n_i^P$ |
|---|---|---|---|---|
| $T1$ | 1 | 1 | 0 | 0 |
| $T3a$ | 1 | $p^2$ | 0 | $(1-p)^2$ |
| $T3b$ | $p$ | $p^2$ | $(1-p)$ | $(1-p)^2$ |
| $T3d$ | 0 | $p^2$ | 1 | $(1-p)^2$ |
| $T2$ | 0 | 0 | 1 | 1 |

The cutoffs for the *always, encouragement,* and *never* regions are the same as before. However the cutoffs for the *conditional encouragement* and *discouragement* types are as follows:

$$T3b, \qquad \frac{c_L + pc_L + (1-p)c_H}{2} \leq \beta < \frac{c_H + pc_L + (1-p)c_H}{2}$$

$$T3d, \qquad c_L \leq \beta < \frac{c_L + pc_L + (1-p)c_H}{2}$$

3. Under the third case, $\frac{c_H}{c_L} < 2$, we have:

$$\frac{c_L}{2} < \frac{c_H}{2} < c_L < c_H$$

   (a) If $c_H \leq \beta$, we have $T1$ types.

   (b) If $c_L \leq \beta < c_H$, the DM completes the second task regardless of the cost. DM's optimal action at t=11 is given as follows:

      i. Facing a high cost, the DM completes the first task if $\frac{c_H+pc_L+(1-p)c_H}{2} \leq \beta < c_H$, giving the $T3a$ encouragement type.

      ii. Facing a low cost, the DM completes the first task if $\frac{c_L+pc_L+(1-p)c_H}{2} \leq \beta < \frac{c_H+pc_L+(1-p)c_H}{2}$, giving the $T3b$ conditional encouragement type.

      iii. If $c_L \leq \beta < \frac{c_L+pc_L+(1-p)c_H}{2}$, DM never exerts an effort, being the $T3d$ discouragement type.

   (c) If $\frac{c_H}{2} \leq \beta < c_L$, the period-12-self will exert an effort regardless of the cost. The analysis of the DM at t=11 is as follows:

      i. Facing a high cost, she completes the first task if $\frac{c_H+pc_L+(1-p)c_H}{2} < \beta$ and $\beta < c_L$, which is not possible.

      ii. Facing a low cost, she completes the first task if $\frac{c_L+pc_L+(1-p)c_H}{2} < \beta$ and $\beta < c_L$, which is not possible.

      As a result, the DM will never complete a task if $\frac{c_H}{2} \leq \beta < c_L$. She is the $T2$ never type.

   (d) Similarly the DM with $\beta < \frac{c_H}{2}$ is also a $T2$ type.

   Therefore, the full and no completion rates are the same as under case (2). Conditions for the types are also the same.

For all three cases, the probability of full completion is strictly higher under all-or-nothing compared with the piece rate only when the DM is of an encouragement or conditional encouragement type. If the DM is a discouragement type, however, the probability of full completion is lower under all-or-nothing showing that all-or-nothing may backfire.

■

**Proof of Proposition 2.**

For each DM type, we calculate the expected utility at period zero under each mechanism:

| | $EU^{P-rate}$ | | | $EU^{A-or-N}$ | |
|---|---|---|---|---|---|
| $T1$ | $\beta[2p^2(1-c_L)$<br>$2(1-p)^2(1-c_H)$<br>$2p(1-p)(2-c_L-c_H)]$ | $+$<br>$+$ | $=$ | $\beta[2p^2(1-c_L)$<br>$2(1-p)^2(1-c_H)$<br>$2p(1-p)(2-c_L-c_H)]$ | $+$<br>$+$ |
| $T3a$ | $\beta[2p^2(1-c_L)$<br>$2p(1-p)(1-c_L)]$ | $+$ | $<$ | $\beta[2p^2(1-c_L)$<br>$2(1-p)^2(1-c_H)$<br>$2p(1-p)(2-c_L-c_H)]$ | $+$<br>$+$ |
| $T3b$ | $\beta[2p^2(1-c_L)$<br>$2p(1-p)(1-c_L)]$ | $+$ | $>$ | $\beta[2p^2(1-c_L)$<br>$p(1-p)(2-c_L-c_H)]$ | $+$ |
| $T3c$ | $\beta[2p^2(1-c_L)$<br>$2p(1-p)(1-c_L)]$ | $+$ | $>$ | $\beta[2p^2(1-c_L)]$ | |
| $T3d$ | $\beta[2p^2(1-c_L)$<br>$2p(1-p)(1-c_L)]$ | $+$ | $>$ | $0$ | |
| $T2$ | $0$ | | $=$ | $0$ | |

The DM at period zero strictly prefers all-or-nothing under self-select treatment only when she is the encouragement type. Below, we summarise the full and no completion rates under the three mechanisms:

| | $f_i^S$ | $f_i^A$ | $f_i^P$ | $n_i^S$ | $n_i^A$ | $n_i^P$ |
|---|---|---|---|---|---|---|
| $T1$ | 1 | 1 | 1 | 0 | 0 | 0 |
| $T3a$ | 1 | 1 | $p^2$ | 0 | 0 | $(1-p)^2$ |
| $T3b$ | $p^2$ | $p$ | $p^2$ | $(1-p)^2$ | $(1-p)$ | $(1-p)^2$ |
| $T3c$ | $p^2$ | $p^2$ | $p^2$ | $(1-p)^2$ | $(1-p)$ | $(1-p)^2$ |
| $T3d$ | $p^2$ | 0 | $p^2$ | $(1-p)^2$ | 1 | $(1-p)^2$ |
| $T2$ | 0 | 0 | 0 | 1 | 1 | 1 |

Let $s_T$ denote the proportion of DMs in region $T \in \{1, 2, 3a, 3b, 3c, 3d\}$. Below, we write the full task completion rate under each mechanism:

$$f^P = s_1 + s_{3a}p^2 + s_{3b}p^2 + s_{3c}p^2 + s_{3d}p^2$$

$$f^A = s_1 + s_{3a} + s_{3b}p + s_{3c}p^2$$

$$f^S = s_1 + s_{3a} + s_{3b}p^2 + s_{3c}p^2 + s_{3d}p^2$$

Comparing self-select to piece-rate, we get:

$$f^S - f^P = s_{3a}(1-p^2) \tag{5}$$

The self-select mechanism will be effective if there is a significant number of encouraged DMs.

Comparing the all-or-nothing to piece-rate, we get:

$$f^A - f^P = s_{3a}(1-p^2) + s_{3b}(p-p^2) + s_{3d}(-p^2) \tag{6}$$

Although *encouragement* and *conditional encouragement* full completion rates are higher, the *discouragement* full completion rate is lower under the

all-or-nothing. Therefore, the effectiveness of all-or-nothing depends on the share of each type. If the share of discouragement types are high enough, it may cancel the positive effect of all-or-nothing coming through encouragement types, and it may even backfire.

As for the full completion rate, below we write zero completion rates under each mechanism:

$$n^P = (s_{3a} + s_{3b} + s_{3c} + s_{3d})(1-p)^2 + s_2$$

$$n^A = (s_{3b} + s_{3c})(1-p) + s_{3d} + s_2$$

$$n^S = (s_{3b} + s_{3c} + s_{3d})(1-p)^2 + s_2$$

Comparing piece-rate to self-select:

$$n^P - n^S = s_{3a}(1-p)^2 \tag{7}$$

Therefore, a significant increase in full completion rates in self-select in comparison to piece-rate should be accompanied by a significant decrease in zero completions.

Comparing piece-rate to all-or-nothing:

$$n^P - n^A = s_{3a}(1-p)^2 + (s_{3b} + s_{3c})(-p + p^2) + s_{3d}(-2p + p^2) \tag{8}$$

Therefore, the zero completion rate under all-or-nothing compared to under piece-rate depends on the share of different types.

The full completion rate for assigned piece-rate and the self-selected piece-rate are as follows:

$$f^{AP} = \frac{s_1 + s_{3a}p^2 + s_{3b}p^2 + s_{3c}p^2 + s_{3d}p^2}{1}$$

$$f^{SSP} = \frac{s_1 + s_{3b}p^2 + s_{3c}p^2 + s_{3d}p^2}{s_1 + s_{3b} + s_{3c} + s_{3d} + s_2}$$

Below we compare the full completion rate under assigned piece-rate to the one under self-selected-piece-rate:

$$f^{AP} < f^{SSP}$$

$$\frac{s_1 + s_{3a}p^2 + s_{3b}p^2 + s_{3c}p^2 + s_{3d}p^2}{1} < \frac{s_1 + s_{3b}p^2 + s_{3c}p^2 + s_{3d}p^2}{s_1 + s_{3b} + s_{3c} + s_{3d} + s_2}$$

simplify:

$$\frac{s_1}{s_2} < \frac{p^2}{1-p^2}$$

showing that the comparison between them depends on the share of always type ($T_1$), never type ($T_3$), and $p$.

■

# Appendix A.2

In order to focus on the effect of the intrinsic reward, we simplify the problem by assuming that the intrinsic reward (w) is high enough such that

$$1 < w \tag{9}$$

Under the piece-rate mechanism, the cutoffs are similar to the analysis under Proposition 1, except for the inclusion of the intrinsic reward, $w$, this time:

| | | |
|---|---|---|
| T1 type: | $\frac{c_H}{1+w} \leq \beta$, | always complete |
| T2 type: | $\beta < \frac{c_L}{1+w}$, | never complete |
| T3 type: | $\frac{c_L}{1+w} \leq \beta < \frac{c_H}{1+w}$, | complete only with low cost |

Since we analysed all possible cases under Proposition 1, we make the following further assumption to minimise the number of cases to analyse under all-or-nothing with intrinsic rewards:

$$\frac{2(1+w)}{w} < \frac{c_H}{c_L} \tag{10}$$

This assumption means that the intrinsic reward is high enough that the decision-maker may find it optimal to complete the second task with low cost without completing the first instead of completing both tasks.

Therefore, we have:

$$\frac{c_L}{2(1+w)} < \frac{c_L}{1+w} < \frac{c_L}{w} < \frac{c_H}{2(1+w)} < \frac{c_H}{1+w} < \frac{c_H}{w}$$

and the DM follows the plan below under the all-or-nothing mechanism.

1. If $\frac{c_H}{1+w} \leq \beta$ : The DM will always exert an effort. She is the $T1$ type.
2. If $\frac{c_H}{2(1+w)} < \beta < \frac{c_H}{1+w}$: The DM at t=12 will complete if she completed in the previous period or if she faces a low cost.
   (a) Facing $c_H$, she will complete only if:

   $$2\beta(1+w) - (c_H + pc_L + (1-p)c_H) > \beta pw - pc_L$$

   Rearranging and simplifying:

   $$\frac{c_H(2-p)}{2(1+w) - pw} < \beta$$

   Since $\frac{c_H}{2(1+w)} < \frac{c_H(2-p)}{2(1+w)-pw} < \frac{c_H}{1+w}$, the DM satisfying the following conditions will complete in both periods regardless of the cost:

   $$\frac{c_H(2-p)}{2(1+w) - pw} \leq \beta < \frac{c_H}{1+w}$$

   This is $T3a$ type.

(b) Facing $c_L$, she will complete only if:

$$2\beta(1+w) - (c_L + pc_L + (1-p)c_H) > \beta pw - pc_L$$

Rearranging and simplifying:

$$\frac{c_L + (1-p)c_H}{2(1+w) - pw} < \beta$$

Therefore, the DM satisfying the following condition will complete both tasks if the first task cost is low:

$$\max\left\{\frac{c_H}{2(1+w)}, \frac{c_L + (1-p)c_H}{2(1+w) - pw}\right\} \leq \beta < \frac{c_H(2-p)}{2(1+w) - pw}$$

This is the $T3b.1$ type. This type is different to the $T3b$ type as she may still do the second task if the cost is low, irrespective of the first task completion.

Consequently, a DM satisfying the following condition will do only the second task if the cost is low:

$$\frac{c_H}{2(1+w)} \leq \beta < \min\left\{\frac{c_H}{2(1+w)}, \frac{c_L + (1-p)c_H}{2(1+w) - pw}\right\}$$

We call such DMs $T3d.1$ types. They are different to $T3d$ types since they may still do the second task without completing the first.

3. If $\frac{c_L}{w} \leq \beta < \frac{c_H}{2(1+w)}$: the DM will do the second task only if the cost is low regardless of the previous period action. The analysis for the t=11 decision is below:

(a) Facing $c_H$, she will complete the first task if:

$$2p\beta(1+w) + (1-p)\beta w - (c_H + pc_L) > \beta pw - pc_L$$

Rearranging and simplifying:

$$\frac{c_H}{2p(1+w) + (1-2p)w} < \beta$$

Since $\frac{c_H}{2(1+w)} < \frac{c_H}{2p(1+w)+(1-2p)w}$, there is no DM satisfying this.

(b) Facing $c_L$, she will complete the first task if:

$$2p\beta(1+w) + (1-p)\beta w - (c_L + pc_L) > \beta pw - pc_L$$

Rearranging and simplifying:

$$\frac{c_L}{2p(1+w) + (1-2p)w} < \beta$$

Since $\frac{c_L}{2p(1+w)+(1-2p)w} < \frac{c_L}{w}$, a DM satisfying the following condition will do the task in each period if the cost is low regardless of the previous action:

$$\frac{c_L}{w} \leq \beta < \frac{c_H}{2(1+w)}$$

This is the piece-rate behavior. We call this type $T3c.1$ which is, again, different to $T3c$, because the DM is still willing to do the second task, at a low cost, even if she has not completed the first task.

4. If $\frac{c_L}{1+w} \leq \beta < \frac{c_L}{w}$: the DM will do the second task if the cost is low and if the task was completed in the previous period.

   (a) Facing $c_H$, the DM will do the task if:

   $$2p\beta(1+w) + (1-p)\beta w - (c_H + pc_L) > 0$$

   Rearranging and simplifying:

   $$\frac{c_H + pc_L}{2p(1+w) + (1-p)w} < \beta$$

   Since $\frac{c_L}{w} < \frac{c_H + pc_L}{2p(1+w)+(1-p)w}$ [1], there is no DM satisfying this condition.

   (b) Facing $c_L$, the DM will do the task if:

   $$2p\beta(1+w) + (1-p)\beta w - (c_L + pc_L) > 0$$

   Rearranging and simplifying:

   $$\frac{(1+p)c_L}{2p(1+w) + (1-p)w} < \beta$$

   Therefore, a DM satisfying the following condition will complete the first task if the cost is low:

   $$\frac{(1+p)c_L}{2p(1+w) + (1-p)w} \leq \beta < \frac{c_L}{w}$$

   This is the conditional discouragement type, $T3c$. Consequently, the DM will not do any task if:

   $$\frac{c_L}{1+w} \leq \beta < \frac{(1+p)c_L}{2p(1+w) + (1-p)w}$$

   This is the discouragement type, $T3d$.

5. If $\beta < \frac{c_L}{1+w}$: the DM will never do a task, creating the $T2$ type.

[1] Rearranging and simplifying the inequality gives $\frac{2pr+w}{w} < \frac{c_H}{c_L}$, which is true since $\frac{2pr+w}{w} < \frac{2(1+w)}{w} < \frac{c_H}{c_L}$ and by assumption (10).

A few points are noteworthy from our analysis above. As a difference from the case without intrinsic motivation, we have three new types, which are $T3b.1$, $T3c.1$, and $T3d.1$.[2] The common feature of these types is that they may still complete the second task under the all-or-nothing mechanism even if they did not complete the first task. This is because of the intrinsic value of the task. Below are the expected utility calculations:

| | $EU^{P-rate}$ | | $EU^{A-or-N}$ |
|---|---|---|---|
| $T1$ | $\beta[2p^2(1+w-c_L) + 2(1-p)^2(1+w-c_H) + 2p(1-p)(2(1+w)-c_L-c_H)]$ | $=$ | $\beta[2p^2(1+w-c_L) + 2(1-p)^2(1+w-c_H) + 2p(1-p)(2(1+w)-c_L-c_H)]$ |
| $T3a$ | $\beta[2p^2(1+w-c_L) + 2p(1-p)(1+w-c_L)]$ | $<$ | $\beta[2p^2(1+w-c_L) + 2(1-p)^2(1+w-c_H) + 2p(1-p)(2(1+w)-c_L-c_H)]$ |
| $T3b.1$ | $\beta[2p^2(1+w-c_L) + 2p(1-p)(1+w-c_L)]$ | $<$ | $\beta[2p^2(1+w-c_L) + p(1-p)(2(1+w)-c_L-c_H) + (1-p)p(w-c_L)]$ |
| $T3c$ | $\beta[2p^2(1+w-c_L) + 2p(1-p)(1+w-c_L)]$ | $>$ | $\beta[2p^2(1-c_L)]$ |
| $T3c.1$ | $\beta[2p^2(1+w-c_L) + 2p(1-p)(1+w-c_L)]$ | $=$ | $\beta[2p^2(1+w-c_L) + 2p(1-p)(1+w-c_L)]$ |
| $T3d$ | $\beta[2p^2(1+w-c_L) + 2p(1-p)(1+w-c_L)]$ | $>$ | $0$ |
| $T3d.1$ | $\beta[2p^2(1+w-c_L) + 2p(1-p)(1+w-c_L)]$ | $>$ | $\beta[p(w-c_L)]$ |
| $T2$ | $0$ | $=$ | $0$ |

According to this table, the period-zero-self strictly prefers all-or-nothing not only if she is the encouragement type, but also if she is a new conditional encouragement type too, $T3b.1$. Because of the intrinsic reward, the new conditional encouragement type does not give up completely after a failure. As a result, we can summarise the full and zero completion rates as follows:

| | $f_i^S$ | $f_i^A$ | $f_i^P$ | $n_i^S$ | $n_i^A$ | $n_i^P$ |
|---|---|---|---|---|---|---|
| $T3b$ | 1 | 1 | 1 | 0 | 0 | 0 |
| $T3a$ | 1 | 1 | $p^2$ | 0 | 0 | $(1-p)^2$ |
| $T3b.1$ | $p$ | $p$ | $p^2$ | $(1-p)^2$ | $(1-p)^2$ | $(1-p)^2$ |
| $T3c$ | $p^2$ | $p^2$ | $p^2$ | $(1-p)^2$ | $(1-p)$ | $(1-p)^2$ |
| $T3c.1$ | $p^2$ | $p^2$ | $p^2$ | $(1-p)^2$ | $(1-p)^2$ | $(1-p)^2$ |
| $T3d$ | $p^2$ | 0 | $p^2$ | $(1-p)^2$ | 1 | $(1-p)^2$ |
| $T3d.1$ | $p^2$ | 0 | $p^2$ | $(1-p)^2$ | (1-p) | $(1-p)^2$ |
| $T2$ | 0 | 0 | 0 | 1 | 1 | 1 |

[2]Type T3d.1 may not exist, which does not affect our main results.

The cutoffs for types are as follows:

$$
\begin{array}{rc}
T1, \text{ if} & \frac{c_H}{1+w} \leq \beta \\
T3a, \text{ if} & \frac{c_H(2-p)}{2(1+w)-pw} \leq \beta < \frac{c_H}{1+w} \\
T3b.1, \text{ if} & \max\left\{\frac{c_H}{2(1+w)}, \frac{c_L+(1-p)c_H}{2(1+w)-pw}\right\} \leq \beta < \frac{c_H(2-p)}{2(1+w)-pw} \\
T3d.1, \text{ if} & \frac{c_H}{2(1+w)} \leq \beta < \min\left\{\frac{c_H}{2(1+w)}, \frac{c_L+(1-p)c_H}{2(1+w)-pw}\right\} \\
T3c.1, \text{ if} & \frac{c_L}{w} \leq \beta < \frac{c_H}{2(1+w)} \\
T3c, \text{ if} & \frac{(1+p)c_L}{2p(1+w)+(1-p)w} \leq \beta < \frac{c_L}{w} \\
T3d, \text{ if} & \frac{c_L}{1+w} \leq \beta < \frac{(1+p)c_L}{2p(1+w)+(1-p)w} \\
T2, \text{ if} & \beta < \frac{c_L}{1+w}
\end{array}
$$

For each type, the lower bound for $\beta$ with intrinsic motivation is smaller than the lower bound for $\beta$ without intrinsic motivation. For example, the lower bound for T1 with intrinsic motivation, $\frac{c_H}{1+w}$, is smaller than the lower bound for the same type without intrinsic motivation, $\frac{c_H}{1}$ (see the cutoffs derived in the proof of proposition 1). This means that a decision-maker with intrinsic motivation will never be classified as a lower type than the type she would have been classified as if she did not have intrinsic motivation. Moreover, the new types we found when there is intrinsic motivation, namely $T3b.1$ and $T3c.1$, are less likely to complete no tasks in comparison to $T3b$ and $T3c$ types, as we explained above.

We can write the full task completion rate under each mechanism as follows:

$$f^P = s_1 + s_{3a}p^2 + s_{3b.1}p^2 + s_{3c}p^2 + s_{3d}p^2$$

$$f^A = s_1 + s_{3a} + s_{3b.1}p + s_{3c}p^2 + s_{3c.1}p^2$$

$$f^S = s_1 + s_{3a} + s_{3b.1}p + s_{3c}p^2 + s_{3c.1}p^2 + s_{3d}p^2$$

Comparing the self-select to siece-rate, we get:

$$f^S - f^P = s_{3a}(1-p^2) + s_{3b.1}(p-p^2)$$

This means that the self-select mechanism will be effective if there is a significant number of decision-makers who are encouraged or conditional encouraged given intrinsic motivation.

## Appendix B

### Appendix B. 1

Instructions given in the tutorials (Study 1):

**Piece-rate treatment**
You will be awarded according to the number of online quizzes that you complete and score at least 50% (i.e., if you complete and score at least 50% in 6 out of the 9 quizzes, you will receive [6/9] *10 = 6.7 marks).

**All-or-nothing treatment**
You will be awarded 10 marks only if you complete and score at least 50% in all the online quizzes and you will receive 0 if you miss any.

**Self-select treatment**
Please choose one of the following options :

1. You will be awarded according to the number of online quizzes that you complete and score at least 50% (i.e., if you complete and score at least 50% in 6 out of the 9 quizzes, you will receive [6/9] *10 = 6.7 marks).

2. You will be awarded 10 marks only if you complete and score at least 50% in all the online quizzes and you will receive 0 if you miss any.

**Appendix B. 2**

A sample of a recruitment form (only the barcode and contact email vary across treatments)

# Online Survey

## Earn up to RM20 in CASH $$$ by filling in simple online survey questions

(Open to Monash undergraduate students only)

If you are interested in participating, please fill in a simple online application form by scanning the QR code:

OR

*(Note: you may login to your Monash student email or any other google email account to access the form)*

Email MonashMalaysiaSurvey3@gmail.com, we will send you the application form.

**Appendix B. 3** Invitation form

- Piece-rate treatment

# Invitation to Participate in Online Survey

* Required

**Your participation will involve you completing up to four different online surveys (one per week over four weeks). Each survey contains multiple-choice questions and will only take approximately 10 minutes to complete.**

You will be rewarded RM5 in cash for each online survey that you complete. For example, if you complete 3 out of 4 online surveys, you will be rewarded RM5 x 3 = RM15 in cash. You will receive your earnings at the end of the fourth week. *

- ○ Yes, I wish to participate
- ○ No, I do not wish to participate

Next

- All-or-nothing treatment

# Invitation to Participate in Online Survey

* Required

**Your participation will involve you completing up to four different online surveys (one per week over four weeks). Each survey contains multiple-choice questions and will only take approximately 10 minutes to complete.**

You will be rewarded RM20 only if you complete all four online surveys, and you will not receive anything if you miss any. For example, if you complete 3 out of 4 online surveys, you will receive 0. You will receive your earnings at the end of the fourth week. *

- ○ Yes, I wish to participate
- ○ No, I do not wish to participate

Next

- Self-select treatment

# Invitation to Participate in Online Survey

* Required

**Your participation will involve you completing up to four different online surveys (one per week over four weeks). Each survey contains multiple-choice questions and will only take approximately 10 minutes to complete.**

If you wish to participate, please choose either "Option 1" or "Option 2" to indicate how you would like to be rewarded for your participation. You will receive your earnings at the end of the fourth week. *

- ○ Option 1: You will be rewarded RM5 in cash for each online survey that you complete. For example, if you complete 3 out of 4 online surveys, you will be rewarded RM5 x 3 = RM15 in cash.
- ○ Option 2: You will be rewarded RM20 only if you complete all four online surveys, and you will not receive anything if you miss any. For example, if you complete 3 out of 4 online surveys, you will receive 0.
- ○ No, I do not wish to participate

Next

## Appendix C

**Table C 1.** Number of participants in the 2017 trial of Study 1

| Treatments | # of obs. | Female | Male |
|---|---|---|---|
| Baseline (Piece-rate) | 103 | 42 | 61 |
| Self-select | 131 | 58 | 73 |
| piece rate | 97 | 43 | 54 |
| all-or-nothing | 34 | 15 | 19 |
| Total | 234 | 100 | 134 |

**Table C 2.** Number of participants in the 2018 trial of Study 1

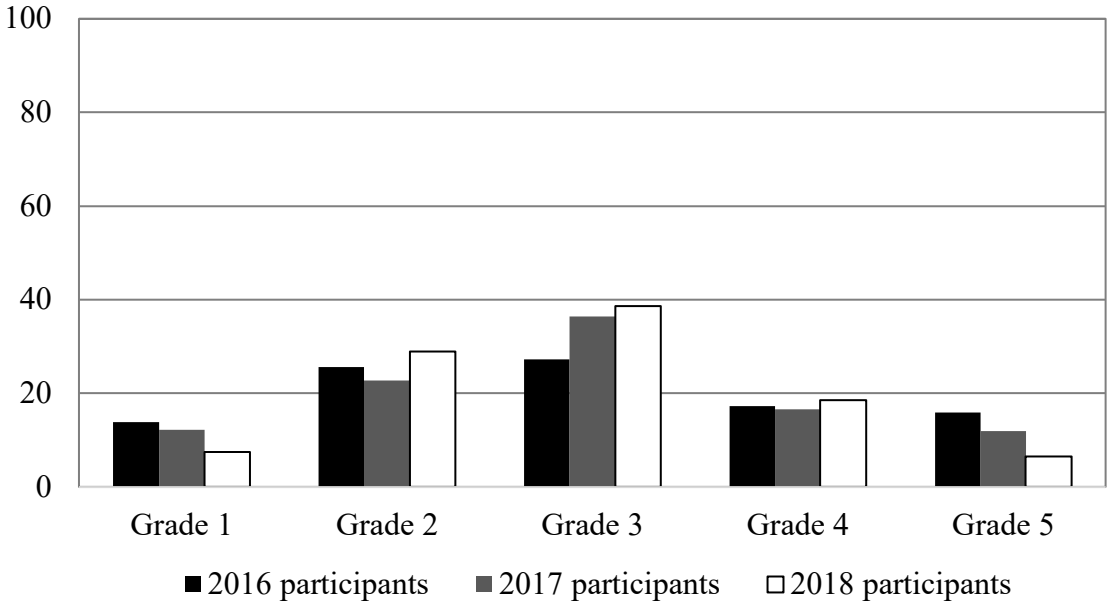
| Treatments | # of obs. | Female | Male |
|---|---|---|---|
| Baseline(Piece-rate) | 114 | 43 | 71 |
| Self-select | 198 | 96 | 102 |
| piece rate | 168 | 81 | 87 |
| all-or-nothing | 30 | 15 | 15 |
| Total | 312 | 139 | 173 |

**Table C 3.** Number of participants in the second trial of Study 2

| Treatments | # of scans | # of signups | | |
|---|---|---|---|---|
| | | Total | Female | Male |
| Baseline (Piece-rate) | 202 | 114 | 42 | 72 |
| Self-select | 240 | 146 | 67 | 79 |
| piece-rate | | 104 | 44 | 60 |
| all-or-nothing | | 42 | 23 | 19 |
| Total | 442 | 260 | 109 | 230 |

## Appendix D

**Figure D 1.** Average grade distribution of student participants in Study 1




Grade 1: 80-100 marks
Grade 2: 70-79 marks
Grade 3: 60-69 marks
Grade 4: 50-59 marks
Grade 5: 0-49 marks

## Appendix E

**Survey 1**
In order to verify that the browser works properly and that we are collecting all of your answers, please go to the next question without answering.

| Completely disagree | | | | | | | | | Completely agree |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**Survey 2**
Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means "no choice at all" and 0 means "a great deal of choice" to indicate how much freedom of choice and control you feel you have over the way your life turns out. In order to make sure that all the answers are accurately recorded, please do not answer this question. You will be asked the same question later. Please choose the option that truly matches your feeling there.

| No choice at all | | | | | | | | | A great deal of choice |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**Survey 3**
Do you think that honest elections play an important role in deciding whether you and your family are able to make a good living? How important would you say this is – very important, fairly important, not very important or not at all important? In order to make sure that all the answers are accurately recorded, please do not answer this question. You will be asked the same question later. Please choose the option that truly matches your feeling there.

| Very important | Rather important | Not very important | Not at all important |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

**Survey 4**

Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view? In order to make sure that all the answers are accurately recorded, please do not answer this question. You will be asked the same question later Please choose the option that truly matches your feeling there.

- o Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs.
- o Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent.
- o Other: _____

**Survey 5**

Most people consider both freedom and equality to be important, but if you had to choose between them, which one would you consider more important? In order to make sure that all the answers are accurately recorded, please choose ‘other’ and type ‘other’. You will be asked the same question later. Please choose the option that truly matches your feeling there.

- o Freedom
- o Equality
- o Other: _____