Soft Commitments, Reminders
and Academic Performance

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January 23, 2017

Abstract

A large share of students in higher education graduates with delay or fails to obtain a degree at all. In our field experiment, students can sign a non-binding agreement and self-commit to staying on track for graduation. We provide first evidence that soft commitment devices can enhance educational progress and – more generally – improve the completion of complex tasks such as passing exams. A pure reminder treatment does not change behavior, suggesting that the effects are not driven by increased salience. As predicted by a simple decision model, we show that procrastinators benefit most from the soft commitment device.

JEL Codes: D03, I20, C93

Keywords: Commitment Device; Reminder; Procrastination; Education; Field Experiment

1 Introduction

A large share of students in higher education never obtains a degree, and those who do graduate often take much longer than scheduled. In the U.S., less than 40% of a cohort entering four-year institutions obtain a bachelor's degree within four years; within six years, slightly less than 60% have graduated and that number does not increase by much with more time.[1] In Germany, one in four students fail to obtain a tertiary degree (OECD 2013), and only 40% of the students who obtain a tertiary degree do so within the prescribed time.[2] The U.S. and Germany are no exceptions. In many countries delayed graduation is prevalent, and about 30% of students entering a four-year tertiary education in the OECD do not complete their studies (OECD 2013).

Both late graduation and non-completion imply a waste of resources (for students as well as for universities) and a loss or delay of the social and individual returns from higher education. At the level of the society, the formation of human capital is central for the economic well-being and growth of countries.[3] At the individual level, there is ample evidence that higher education not only generates monetary gains, but also a number of non-pecuniary benefits, such as greater civic participation, life and job satisfaction, and better health.[4] Accordingly, for most students, exceedingly long times to completion or dropping out of university are undesirable outcomes.

The recent literature emphasizes several reasons why students can make non-optimal education decisions.[5] First, students may lack the necessary information to effectively organize their studies. This can mean being unaware of what classes to take in which sequence, or a lack of knowledge about how many exams per semester are needed in order to be on track for graduation. Problems of this nature can be approached in a rather straightforward way, by providing students with the necessary information. Second, limited attention can hamper the academic progress of students. This means that even if students have received the information on how to best proceed in their studies, the information may become less salient over time. Third, problems of self-regulation can interfere with academic success.

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[1] See the National Center for Education Statistics (NCES), Jan 19 2017, retrieved from http://nces.ed.gov/programs/digest/ d13/tables/dt13_326.10.asp. The National Student Clearinghouse reports an eight year completion rate of 65.2% for the 2006 cohort, with another 6.6% still enrolled (own calculations from Shapiro, Dundar, Yuan, Harrell and Wakhungu 2014).

[2] See DESTATIS, Jan 19 2017, retrieved from https://www.destatis.de/DE/PresseService/Presse/ Pressemitteilungen/2014/02/PD14_037_213.html.

[3] For summaries on growth theory, see, for example, Barro and Sala-i Martin (2003) and Acemoglu (2009). For a recent survey of the related empirical literature, see Hanushek and Wößmann (2010).

[4] See the surveys of Psacharopoulos (1987), Psacharopoulos (1994), and Oreopoulos and Salvanes (2011).

[5] For an overview, see the surveys on the behavioral economics of education in Koch, Nafziger and Nielsen (2015), Lavecchia, Liu and Oreopoulos (2014), and Leaver (2016).

The story is familiar: At the beginning of the semester students aspire to excel academically. However, as the exam period draws nearer, the cost of studying becomes more tangible and students refrain from following through on their original intentions. Procrastination is considered a "quintessential self-regulatory failure" (Steel 2007), and when directly asked, a large share of students thinks of themselves as procrastinators (Potts 1987). In fact, procrastination is estimated to affect up to 95% of tertiary students (Ellis and Knaus 1979). There is reason to believe that procrastination can lead to poor academic performance (Semb, Glick and Spencer 1979) – which may be one of the reasons why more than 60% of students state that they want to reduce their procrastination (Solomon and Rothblum 1984).

In this paper, we focus on whether the latter two reasons for non-optimal education decisions can be overcome by offering students a reminder scheme and a commitment device.[6] We first provide a simple theoretical model and then report results from a field experiment.

In our model, students face a two dimensional intertemporal decision problem. They choose (i) how much study effort they want to invest and (ii) whether or not to take an exam. Because students have to study before they take an exam, their intertemporal preferences play a central role for their decisions. Provided that studying and taking an exam is economically optimal, we show that a student is motivated to study and take an exam if she has time-consistent preferences or if she has time-inconsistent preferences and her present bias is sufficiently low. Otherwise the student procrastinates. We model a situation where individuals can make a non-binding commitment to take the exam. Unlike hard commitments, such soft commitments do not entail monetary, physical or otherwise tangible consequences.[7] Rather, they create a reference point, and failure to reach the reference point will entail psychological costs.[8] As a consequence, the commitment device is predicted to increase the number of exams taken and passed. In the absence of commitment, a pure reminder scheme could also potentially improve performance if students pay little attention to tasks related to the exams.

The subjects in the corresponding field experiment are the incoming cohort of business administration majors at a German university. All students receive an introductory lecture on how to best organize their studies in order to stay on track for a timely graduation. The lecture initially establishes the same academic goals for all students, by providing specific information on the suggested curriculum (how many and which specific exams to take), and by stressing the importance of starting to prepare for the exams in time. Since this infor-

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[6]Bryan, Karlan and Nelson 2010, p.672, define a commitment device as "an arrangement entered into by an individual with the aim of helping fulfill a plan for future behavior that would otherwise be difficult owing to intrapersonal conflict stemming from, for example, a lack of self-control."

[7]See Bryan, Karlan and Nelson (2010) for a discussion of hard versus soft commitments.

[8]See Kahneman and Tversky (1979), Tversky and Kahneman (1991), and Kőszegi and Rabin (2006).

mation is provided at the beginning of the semester, it may fail to remain salient over time. In order to address this problem, we send the first treatment group two reminder letters via mail.[9] The first letter is sent out in the week before the exam sign-ups take place. It reminds students that it is recommended to sign up for all exams that the official curriculum prescribes. We mail a second reminder letter six weeks before the actual exam period, urging students to start studying and to take the suggested exams.

Whenever limited attention and low salience is the cause for failing to participate in or pass exams, a pure reminder should be sufficient to alleviate the problem. However, if students tend to procrastinate, then another technology is needed. In our second – and main – treatment group, we therefore offer students the opportunity to sign a non-binding agreement, on top of sending them reminders. In this agreement, students can declare that they will adhere to the exam schedule recommended by the university, and take the suggested exams. We make clear that signing this soft commitment and then not complying with the schedule does not carry any consequences, aside from forgoing the credit for passed exams. As shown in the theoretical model, the effectiveness of the agreement relies on it establishing a reference point, which students then seek to achieve. In contrast to hard commitments, soft commitments are always self-enforcing, i.e. there is no need for an external party (e.g. the university) to enforce the commitment. The reason is that students make an effort to avoid the negative psychological costs associated with falling short of the reference point.

We show that the pure reminder treatment has no effect on exam sign-up, participation and the number of exams passed. This suggests that limited attention is not a problem when students study for, sign up for, or take exams. In contrast, the soft commitment device is highly effective. It motivates students to take part in 11% more exams, and pass 13% more exams than the controls (an improvement of roughly a quarter standard deviation), while maintaining the same grade point average as the control group. Interestingly, the effect is largest in the two mathematically challenging exams. This could indicate that students tend to procrastinate more when exams are more difficult, i.e., with more complex tasks.

We also document that – in line with the theoretical model – the soft commitment device changes the behavior of procrastinators, whereas it does not affect the outcomes of non-procrastinators. We use administrative data to identify as procrastinators those students who applied late in the application period for the business administration program. While not all late appliers are procrastinators, the reverse is very plausible: students who are procrastinators will apply late; for similar approaches, see Reuben, Sapienza and Zingales

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[9]For examples of reminder schemes in different contexts, see Altmann and Traxler (2014) and Karlan, Berry and Pradhan (2015).

(2015), De Paola and Scoppa (2015), Brown and Previtero (2014). Our findings suggest that procrastinators initially pass fewer exams than the non-procrastinators, and that the soft commitment device can in fact fully offset this performance deficit.

It is worth mentioning that our soft commitment device is not only effective, but also inexpensive both in absolute terms as well as in comparison to more traditional measures of improving educational outcomes, e.g. hiring new faculty in order to reduce class size, or grant schemes.[10] The total cost of our measure per semester and student is under €6 (see Figure 4).

Relation to the literature. A growing literature in economics explores how commitment devices can help individuals change their behavior and overcome problems of self-control and procrastination.[11] A number of outcomes have been the subject of investigation, and the effects can be large. For example, Kaur, Kremer and Mullainathan (2015) find that data entry workers who choose commitment in the form of an agreement that penalizes low output increase their performance by 6 percent – an effect which corresponds to that of increasing wages by 18 percent. Another prominent use of commitment devices is in the context of savings accounts. Kast, Meier and Pomeranz (2012) offer their subjects to join a self-help group in order to boost savings – the effects are large, increasing deposits more than three-fold. Massive increases in employee savings are also found by Thaler and Benartzi (2004) for a program where individuals can pre-commit a portion of their income to retirement savings and by Ashraf, Karlan and Yin (2006), where subjects can open an account that restricts access to the accrued savings. Commitment devices have also been successfully employed in health related settings.[12] Royer, Stehr and Sydnor (2015) show that long-run gym attendance can be increased by offering a commitment agreement which allows subjects to pledge money towards attending the gym. Milkman, Minson and Volpp (2013) find similar effects of commitment on gym attendance, though they are not as persistent. Effects of commitment on smoking cessation are reported by Giné, Karlan and Zinman (2010). They find a 35% increase in the likelihood of passing a test that one is nicotine free 12 months after the intervention.

We contribute to this research on the effects of commitment devices, and in particular to the still scant literature concerned with soft commitments. At the same time, our field ex-

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[10]For example the US Pell Grant initiative explicitly aims at rewarding "accelerated completion" and paying an "On-Track Pell Bonus"; see US Department of Education, Jan 19 2017, retrieved from `http://www.ed.gov/news/press-releases/fact-sheet-helping-more-americans-complete-college-new-proposals-success`.

[11]Brocas, Carrillo and Dewatripont (2004) provides an overview from an economics perspective, and Bryan, Karlan and Nelson (2010) surveys a rich set of applications.

[12]See Rogers, Milkman and Volpp (2014) for a brief survey.

periment complements the literature which explores how educational outcomes can be improved. We provide first evidence from a randomized controlled trial that soft commitments can be highly effective in the education sector. There is some prior research concerned with commitment in the education domain, but it is not as extensive as one might expect, given the importance of education and human capital for individuals and societies, as well as at the high prevalence of procrastination among students. Some studies have focused on deadlines as commitment devices, with mixed results. Ariely and Wertenbroch (2002) find that students choose early deadlines to turn in their exam paper. This is true even though there is a grade penalty for failing to meet the deadline, thus constituting a hard commitment. However, the students with self-imposed deadlines fare worse than when deadlines are externally imposed and evenly spaced.[13] Burger, Charness and Lynham (2011) study an experimental setup where reaching a target number of hours spent studying leads to a monetary payment to the student, and report that exogenously fixed deadlines do not increase the likelihood of accumulating the pre-specified number of study hours. Two recent education-focused papers use commitment devices other than deadlines. Karlan and Linden (2014) investigate the effects of commitment on savings in Ugandan primary schools. Their commitment device therefore does not directly target behavior in the education system – rather the subjects are offered a hard and a soft commitment savings account, where the deposits are designated to be used for education spending. They find that savings deposits are larger for the soft commitment. When the commitment device is combined with an information program for parents, the students' exam scores increase by .11 standard deviations. This constitutes a rather large indirect effect on the education outcome, and the authors provide evidence that it is mediated by increased spending on school supplies. Interestingly, neither the hard nor the soft commitment version of the account deliver effects on exam scores in the absence of the parent information component. The second study comes from Patterson (2015), where the subjects are students in an open online education program. As a means to stay focused on studying online, students are offered the opportunity to install a software by which they can pre-commit to a maximum daily amount of time spent on distracting websites. After exceeding the limit, these websites are blocked. The lockout from certain online activities constitutes a hard commitment device and is shown to have positive effects on course completion and grades.

Our research also adds to the strand of literature which identifies procrastination tendencies from observed behavior. Procrastination measures based on real choices – such as the

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[13]The experiment did not evaluate whether self-imposed deadlines lead to a performance boost in comparison to an external deadline that requires to turn in the work on the last day of class, as is the default in most university settings. The authors do find positive effects of commitment on task completion (vs control) in a related experiment, but this is for a paid proofreading task.

college application date – have an advantage over survey responses in that they do not suffer from systematic measurement error, or bias introduced by respondents answering in socially desirable ways. Moreover, college applications are decisions with relatively high stakes, compared to decisions individuals make in lab experiments on procrastination. Another worthwhile feature is that data on the timing of decisions is often available in administrative data, and therefore the robustness of the measure can be assessed by comparing results across studies (Brown and Previtero 2014). In fact, our approach towards identifying procrastinators is similar in spirit to a number of recent papers. Reuben, Sapienza and Zingales (2015) also use the date of application to an MBA program as a measure of procrastination. De Paola and Scoppa (2015) use the time taken by college applicants for enrolling after they receive the acceptance letter from university as an indicator of procrastination. They use this measure to show that a remedial program works better for those facing procrastination issues. Brown and Previtero (2014) define procrastinators as persons who wait until the last day of the enrollment period to decide on a health care plan. They show that procrastinators behave differently in financial decisions than non-procrastinators.

Finally, the paper is related to the "goals" literature in economics and psychology. Locke and Latham (2002, 2006), as well as Moskowitz and Grant (2009) provide encompassing surveys of the psychological literature, and Corgnet, Gómez-Miñambres and Hernán-Gonzalez (2015), Gómez-Miñambres (2012), Goerg and Kube (2012), or Koch and Nafziger (2011) examine the effects of goals on performance from an economics perspective. Contrary to this literature, we do not focus on the effects of differentially designed goals on behavior. Quite the opposite, we externally set the same goal for all students. Our results therefore shed light on the determinants of attaining predefined goals. Specifically, the fact that students in our commitment group pass more exams than the controls suggests that soft commitment devices can lead to a higher probability of reaching externally assigned goals.

The remainder of the paper is structured as follows. In Section 2, we develop a theoretical framework and derive insights about the effects that a commitment device can have on student behavior. Section 3 outlines the experimental design, describes the randomization procedure and presents descriptive statistics. Section 4 contains the main results. In Section 5, we identify potential procrastinators and show that the effects are driven by these individuals. Section 6 provides evidence that the treatments do not have negative side effects, and Section 7 concludes.

2 A simple model

Consider a set of students $\{1, ..., n\}$, each facing a two dimensional intertemporal decision problem. Student $i \in \{1, ..., n\}$ first has to decide how much study effort $e_i \in \{0, 1\}$ she wants to invest, where $e_i = 1$ means that she studies, while $e_i = 0$ means that she does not study.[14] Her costs of studying are $\chi_i(e_i)$. We normalize $\chi_i(0) = 0$ and write $\chi_i(1) = c_i$, where $c_i > 0$. The student's second choice is whether to take the exam, $w_i = 1$, or not take the exam, $w_i = 0$.[15] If she takes the exam, there are two outcomes. She either succeeds, $y_i = 1$, or fails, $y_i = 0$.[16] The outcomes are associated with the following payoffs: a reward $R_i > 0$ if she succeeds and a loss $L_i < 0$ if she fails. If she does not take the exam, she neither experiences a reward, nor a loss, and her payoff is zero. The student's effort in studying determines the probability distribution over outcomes. Formally, if she takes the exam, the probability that she succeeds is

$$\text{prob}_i\left(y_i = 1 | w_i = 1, e_i\right) = \begin{cases} \bar{p}_i & \text{for } e_i = 1, \\ \underline{p}_i & \text{for } e_i = 0, \end{cases} \tag{1}$$

where $0 \leq \underline{p}_i < \bar{p}_i \leq 1$. We suppose that $\bar{p}_i R_i + (1 - \bar{p}_i) L_i > 0$ and $\underline{p}_i R_i + (1 - \underline{p}_i) L_i < 0$, such that the student optimally takes the exam if she has studied and does not take the exam if she has not studied.[17]

Since students have to study before the exam and thus also before the outcome is realized, their intertemporal preferences play an important role for their decisions. It is well-known that activities which involve immediate costs and delayed rewards are prone to procrastination (Frederick, Loewenstein and O'Donoghue 2002). As O'Donoghue and Rabin (1999) and many others, we use the $\beta - \delta$ model to allow for time-inconsistent and present-biased preferences.[18] If student i wants to take the exam (and thus signs up for it), her expected discounted utility when deciding about her study effort is

$$u_i(w_i = 1, e_i) = \beta_i \delta_i^\tau \left[\text{prob}_i\left(y_i = 1 | w_i = 1, e_i\right) R_i + \left(1 - \text{prob}_i\left(y_i = 1 | w_i = 1, e_i\right)\right) L_i \right]$$
$$- \chi_i(e_i), \quad (2)$$

where $\tau > 0$ is the time distance between the effort investment and the outcome, $\delta_i \in (0, 1]$ the long-run discount factor, and β the present bias parameter. For $\beta_i = 1$ the student's pre-

[14]We later discuss the case of continuous effort.

[15]Note that our results do not change if students first have to decide whether to take the exam or not and then decide how much effort to invest in studying.

[16]One can easily allow for more than two outcomes; see the short analysis below.

[17]Note that if $\bar{p}_i R_i + (1 - \bar{p}_i) L_i < 0$, student i will not take the exam. And this holds true even if her costs of studying are zero. We later discuss this case.

[18]See also the pioneering studies of Phelps and Pollak (1968) and Laibson (1997).

ferences are time-consistent, while for $\beta_i < 1$ her preferences are present-biased and time-inconsistent. Because taking the exam is only optimal if the student invests effort, we can simplify (2) to

$$u_i(w_i = 1) = \beta_i \delta_i^\tau \left[\bar{p}_i R_i + \left(1 - \bar{p}_i \right) L_i \right] - c_i. \tag{3}$$

In contrast, if she does not want to take the exam (and thus does not sign up for it), her expected discounted utility is

$$u_i(w_i = 0, e_i) = \beta_i \delta_i^\tau 0 - \chi(e_i). \tag{4}$$

In this case, she optimally does not invest effort in studying and we can simplify (4) to

$$u_i(w_i = 0) = 0. \tag{5}$$

Comparing formulas (3) and (5) reveals that student i decides to study and take the exam if and only if[19]

$$\beta_i \delta_i^\tau \left[\bar{p}_i R_i + \left(1 - \bar{p}_i \right) L_i \right] - c_i \geq 0. \tag{6}$$

From (6) we see that the student is more eager to study and take the exam if she has time-consistent preferences, $\beta_i = 1$, than when she is plagued by time-inconsistent preferences, $\beta_i < 1$. Time-inconsistent preferences can thus discourage the student from studying and taking the exam. Supposing that studying and taking the exam is economically optimal,[20] i.e., that

$$\delta_i^\tau \left[\bar{p}_i R_i + \left(1 - \bar{p}_i \right) L_i \right] - c_i \geq 0, \tag{7}$$

the student studies and takes the exam if and only if

$$\beta_i \geq \bar{\beta}_i := \frac{c_i}{\delta_i^\tau \left[\bar{p}_i R_i + \left(1 - \bar{p}_i \right) L_i \right]}. \tag{8}$$

Thus, in order to be motivated to study and take the exam, the student must have time-consistent preferences or, if she has time-inconsistent preferences, her present-bias must be sufficiently low. Time inconsistency and the resulting procrastination behavior is empirically indeed a major problem among students; see the discussion and the references in Section 1.

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[19]As a tie-breaking rule, we suppose that the student takes the exam in case of indifference. Such knife-edge cases have probability mass zero and are not important for our results.

[20]Formula (7) expresses that, at least before the time they have to study, students want to take the exam. The case where (7) does not hold is simple: The student does not want to study and take the exam, no matter whether her preferences are time consistent or not.

2.1 Soft commitment device

We are interested in the effects that policy interventions have on student behavior. Suppose students sign a non-binding agreement, where they declare that they will adhere the officially recommended exam schedule. To incorporate this soft commitment device in the model, we let student i experience an additional payoff (or forgone loss) of $Z_i > 0$ if she takes the exam. The idea is that if the student signs the agreement, her reference point is to take the exam. If she follows this plan, she experiences satisfaction, whereas she suffers dissatisfaction if she fails to follow the plan.[21] A fraction of Z_i could also be due to the recognition (or forgone disrespect) the student receives from others (e.g., her classmates, professors, or the dean) when she signs the agreement and follows the plan.[22] [23]

If the student uses the soft commitment device, her expected discounted utility from studying and taking the exam is

$$u_i(w_i = 1)|_{\text{SCD}} = \beta_i \delta_i^\tau \left[\bar{p}_i R_i + \left(1 - \bar{p}_i\right) L_i + Z_i \right] - c_i, \tag{9}$$

while her utility from not taking the exam is $u_i(w_i = 0)|_{\text{SCD}} = 0$. The student optimally studies and takes the exam if and only if

$$\beta_i \geq \bar{\beta}_i\big|_{\text{SCD}} := \frac{c_i}{\delta_i^\tau \left[\bar{p}_i R_i + \left(1 - \bar{p}_i\right) L_i + Z_i \right]}. \tag{10}$$

Comparing the thresholds with and without the soft commitment device reveals that, while both thresholds are positive and below one, the threshold with the soft commitment device is lower than the threshold without the soft commitment device:

$$0 < \bar{\beta}_i\big|_{\text{SCD}} < \bar{\beta}_i < 1. \tag{11}$$

2.2 Main insights

We obtain the following insights. First, the soft commitment device does not influence the behavior of students with perfectly time-consistent preferences, $\beta = 1$, but possibly that of students with time-inconsistent preferences, $\beta < 1$. Second, the soft commitment device incentivizes some types of students to study and take the exam. That is, there are types of

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[21] See Kahneman and Tversky (1979), Tversky and Kahneman (1991), and Kőszegi and Rabin (2006).

[22] Charness and Dufwenberg (2006), Carrillo and Dewatripont (2008), and Vanberg (2008) – among others – investigate how promises can affect behavior.

[23] The analysis of the model stays unchanged if the agreement could have hard consequences, like being expelled by the dean. However, in our field experiment, we explicitly explain to students that signing the agreement does not lead to any hard consequences.

students that study and take the exam with the soft commitment device, but that do not study and take it without the soft commitment device. Third, the converse is not true. That is, every student that studies and takes the exam without the soft commitment device also studies and takes it with the soft commitment device.

Taking together the previous insights, the soft commitment device at least weakly increases the study effort and willingness to take the exam of every single student. Thus, for every student, the probability of passing the exam at least weakly increases. The number of students that study, and take and pass the exam is hence at least weakly higher with the soft commitment device than without. Under a mild condition, the relationship is strict. Suppose that in some initial period, student i's type $(c_i, R_i, L_i, \underline{p}_i, \bar{p}_i, \beta_i, \delta_i, Z_i)$ is drawn from the cumulative distribution function $F_i(\cdot)$. The expected number of students that study and take the exam is $\sum_{i=1}^{n} prob(\beta_i \geq \bar{\beta}_i)$ without the soft commitment device, while it is $\sum_{i=1}^{n} prob(\beta_i \geq \bar{\beta}_i|_{\mathrm{SCD}})$ with the soft commitment device. Given that there is at least some probability mass between $\bar{\beta}_i|_{\mathrm{SCD}}$ and $\bar{\beta}_i$ for at least one student $i \in \{1, ..., n\}$, the expected number of students that study and take the exam is strictly higher with the soft commitment device than without it. Since the probability of passing the exam after studying is positive, i.e., $\bar{p}_i > 0$, the expected number of students that pass the exam is also strictly higher with the soft commitment device than without it.

2.3 Discussion

We next briefly examine the implications of our model. Robustness issues are explored in the Appendix.

Willingness to take up the soft commitment device. When is it optimal for a student to sign the agreement, i.e., to use the soft commitment device? First, if the agreement causes additional payoffs, students' state specific utilities at least weakly increase, such that it is optimal to sign the agreement. Second, suppose the agreement causes no additional payoffs in case students take the exam, but only additional losses in case students do not take the exam. Signing the agreement is then still weakly optimal for students that will take the exam for sure. Students that have time-inconsistent preferences and are naive[24] might expect that they will take the exam for sure, and thus also sign the agreement, although they actually do not take the exam for sure. For sophisticated students with time-inconsistent preferences, the agreement could be a valuable commitment device that helps them to follow their initial plan of taking the exam.[25]

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[24]Sophisticated agents foresee that they will have self-control problems in the future. Naive agents do not foresee these self control problems. This distinction goes back to O'Donoghue and Rabin (1999).

[25]For a discussion on the value of commitment, see O'Donoghue and Rabin (1999).

The above arguments are in stark contrast to hard commitment devices. As carefully explained by Laibson (2015), empirically as well as theoretically, individuals are seldom willing to use hard commitment devices. On the one hand, hard commitment devices create costs by restricting the freedom and flexibility of individuals. On the other hand, hard commitment devices create benefits by mitigating procrastinatory behavior. However, unless fully sophisticated, individuals systematically underestimate these benefits. It is thus often the case that the perceived benefits of a hard commitment device fall short of its total costs. This holds true especially if the total costs do not only include the costs from restricted freedom and flexibility, but also hassle costs (e.g., the time to set up the device and the system of enforcement) or direct payments necessary to obtain the device.

Multiple exams. According to the official curriculum, students should take several exams in every semester. To incorporate this, let each student decide on the set of exams $\{1, ..., m\}$. Student $i \in \{1, .., n\}$ optimally studies for and takes exam $j \in \{1, ..., m\}$ if and only if

$$\beta_i \geq \bar{\beta}_i^j \Big|_{\text{SCD}} := \frac{c_i^j}{\delta_i^{\tau^j} \left[\bar{p}_i^j R_i^j + \left(1 - \bar{p}_i^j\right) L_i^j + Z_i^j \right]}, \tag{12}$$

given that she uses the soft commitment device, and

$$\beta_i \geq \bar{\beta}_i^j := \frac{c_i^j}{\delta_i^{\tau^j} \left[\bar{p}_i^j R_i^j + \left(1 - \bar{p}_i^j\right) L_i^j \right]}, \tag{13}$$

given that she does not use the soft commitment device. Since the soft commitment device at least weakly increases each students' study effort and willingness to take exam j, and this holds for all exams $j \in \{1, ..., m\}$, the device at least weakly increases the expected number of exams taken and passed by every student and in total. As before, under a mild condition, the expected number of exams taken and passed by every student and in total strictly increases due to the device.

Pure reminders. We empirically also examine a treatment where students receive reminders, but cannot use a commitment device. Such pure reminders could potentially influence student behavior via two channels. First, if the exams do not have high salience for students, they may not generate much motivation to invest study effort. Pure reminders may increase students' awareness and thus promote their efforts and willingness to take the exam. Second, due to pure reminders, the students' perception of the exams' importance may rise, which in turn may positively affect their study efforts and willingness to take the exam.[26]

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[26] For classical discussions of framing, salience and perception effects, i.e., context-dependent choices, see Tversky and Kahneman (1981) and Kahneman and Tversky (1984). For a modern economical salience theory,

3 The field experiment

We conduct a field experiment with the incoming cohort of business administration students in the bachelor's program of a German University.[27] Figure 1 outlines the design of the experiment and Figure 2 details the key events in the course of the experiment.

A total of 392 students enrolled, and were scheduled to start their studies in October. We randomly assign students to three treatments: control, reminder, and commitment device.[28] At the beginning of the semester, we then use the first session of the statistics class to begin our treatments. For this session only, students are assigned to three different lecture halls according to their treatment group and receive a standardized introductory lecture on how to best organize their studies.[29] To increase participation in the introductory lecture, in late September we post an announcement on the university website and on the online study platform. The announcement advises students that in the first session of the class they will be given important information on how to organize their studies, and urges them to therefore attend. We also let them know that they will have to show their student ID card and that they will have to pick up a personalized information folder before the lecture. No further information about the contents of the introductory lecture is given.

3.1 Introductory lecture

In the first week of classes, students show up for the introductory lecture. At a central information desk, they show their student ID card and receive the information folders. The folders carry stickers which prominently display the randomly assigned lecture hall. Students then head to their assigned hall, where student helpers at the door check that everyone is entering the correct hall. The information desk and the pickup procedure can be seen in Figure 3.

see Bordalo, Gennaioli and Shleifer (2013).

[27]The university had made it one of its priorities to find measures which can improve the academic performance of their students. In this context it introduced a program which is part of the multi-billion Euro "Qualitätspakt Lehre" (Quality Agreement on Teaching) funded by the German Ministry of Education. The explicitly stated goal of the program is to increase the rate of passed exams and to reduce dropout rates. The university invested the grant money into standard measures such as e.g. small group tutorials and student self-assessments. In this context we implemented an intervention that is far less expensive than such traditional measures. For our investigations we also utilized the data collected to evaluate the self-assessment.

[28]In the randomization, we block on age, sex, and final high school grade.

[29]The randomization across lecture halls is in effect only for the introductory lecture. During the semester some lectures have parallel sessions due to the large number of participants. In this case, the student office assigns students to sessions according to the first letter of their last name, i.e., independently of which treatment group they are in. Irrespective of our treatment assignment and any lexicographic assignment to parallel class sessions during the semester, all students in a class take the same exact exam at the end of the semester.

To ensure that all students possess the same information, and to establish the same set of goals in all treatment groups, students receive a standardized introductory lecture, called 'Study with a Plan', in all three lecture halls. All three lecturers use the same slides and were given the same precise and detailed instructions on which subjects to cover, which information to provide, and how to respond to questions the students might have. The lecture gives an overview of what is expected from the students in the first four semesters, and provides an exam plan recommending five exams per semester. Students are urged to stick to this schedule. The information folder contains the same information in writing; see Figures 13 to 18.

Up to this point, there are no differences between the three lecture halls. In fact, both the control group and the reminder treatment receive completely identical introductory lectures, since the reminders that we later send are not announced at this point. The only variation takes place in the commitment group. The information folder for this group also contains two unsigned copies of an agreement, by which students can voluntarily commit to the recommended exam schedule; see Figures 19 and 20). We emphasize that the agreement can help them achieve their goals, but that it is non-binding and failure to comply carries no further consequences besides forgoing the credit for passed exams. The agreement is thus a soft commitment device. We ask those who choose to sign the agreement to return one copy to us and keep the second copy.

Of the 129 students in the commitment group, 14 students did not show up for the introductory lecture. All 115 students who took part in the lecture chose to sign the agreement. This high rate of participation is perfectly in line with our theoretical model (see Section 2.3) and shows that there is indeed a large demand for commitment among university students.[30] We keep all randomized students in the analysis, irrespective of whether they showed up for the introductory lecture (in the control and all treatment groups). Due to the high rate of participation, differences between intention to treat and treatment on the treated effects will not be large and driven exclusively by those who did not show up to the introductory lecture. In the results section, we will thus prominently feature the intention to treat effects, which are probably also of more interest from a policy point of view.

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[30]There can be other effects on participation that we do not capture in our model. Students may want to signal their quality by participating (Exley and Naecker 2015). Moreover, knowing that others sign the agreement may create peer pressure. It is worth mentioning that all letters contained a phone number and an email address that students could turn to. There were no inquiries or complaints regarding the the commitment device – which tentatively suggests that students did not feel forced to sign the agreement.

3.2 Exam sign-up reminders

In November, students have roughly two weeks to sign up for the exams online (see Figure 2). While the exam plan recommends five exams, students were free to sign up for fewer or more exams than that. Signing up for an exam is a prerequisite for later taking part in it, but students can also withdraw from participation.

In the week before the sign-up starts, students of the reminder and the commitment groups receive an unannounced letter in the mail, reminding them to sign up for the exams (see Figures 21 to 24). In the commitment group the letter states that "surely you remember the introductory lecture to 'Study with a Plan', which took place in the context of the statistics class. In this lecture you were given important information on how to best organize your studies and you have signed a target agreement with us".[31] It continues: "In the period from 18 Nov - 29 Nov please use the university web site to sign up for at least the following exams", and then lists the recommended five exams. Only one slight variation distinguishes the sign-up reminder of the commitment group from that of the reminder group: for the latter, we deleted the phrase "and you have signed a target agreement with us".

3.3 Study reminders

Once students have signed up for exams, it is crucial that they also spend time studying for the exams. In early December, students of the reminder and the commitment groups thus receive another reminder letter (see Figures 25 to 28). It recommends to start preparing for the upcoming exams already before the Christmas break, and once more stresses that the exam plan schedules five exams. For the commitment group, the letter again mentions the agreement, and we enclose a copy of the signed personal agreement in the envelope. This is the last time we contact the students before the exam week, which takes place at the end of January.

3.4 Descriptive statistics and randomization

The 392 students in the incoming cohort are on average 21.5 years old and have obtained a final high school grade of 2.66.[32] Roughly half the cohort starts their studies immediately after graduating from high school (we label this variable a "fresh HS degree") and half the

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[31]Students in the commitment group who did not sign or were not present at the introductory lecture receive no reminder letters.

[32]The final grades in the German system range from 1 (best) to 4 (worst passing grade).

cohort has a high school degree from the general secondary track.[33] The university where we conduct the experiment draws a large share of its students from the surrounding areas: most students have obtained their high school degree in the states of Bavaria (67%) or Baden-Wuerttemberg (19%). Female students account for 51% of the cohort and 5% of students do not hold a German passport.

Randomization was carried out using stratification and balancing. We stratified on final high school grade (four strata) and balanced on all covariates that were available to us at the time of randomization: final high school grade, age, and gender. Table 2 shows that these variables are balanced across our control and treatment groups. Most importantly, there is no difference in final high school grade, which is generally considered to be a strong predictor for success in university. As can be seen in the table, there are also no large differences across the three experimental groups in terms of the observable characteristics for which we received data from the student office only after the semester ended and which we use as controls in some of our estimations. One exception is the geographical origin of our subjects: Students from Baden-Wuerttemberg are under-represented in the commitment group and we will therefore include state fixed effects in some specifications, along with controls for the stratification and balancing covariates (as is recommended to be standard practice in Bruhn and McKenzie 2009).[34]

3.5 Outcome variables

We measure three main outcomes, at two different points in time: the number of exams that students sign up for in November, and the number of exams participated in and passed in January.

From the descriptive statistics in the control group we can gather some intuition as to how much room there is for the interventions to improve student performance. Figure 5 shows that 88.6% of students in the control group sign up for at least five exams, as recommended; on average, they sign up for 4.5 exams. This high number may be due to the exam modalities, by which signing up for an exam and then not showing up carries no penalty, i.e., the exam does not count as failed.

The numbers are very different when it comes to exam participation. Only 66.4% of students in the control group participate in five or more exams; on average, they participate in

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[33]Germany has a tracked secondary school system, and two types of secondary school degree are eligible to enter tertiary education: the general track degree ("Abitur") and the vocational track degree ("Fachhochschulreife" (FOS)). Roughly 5% of students hold other degrees that are also recognized in the German system.

[34]Students who could not be reached by physical mail and therefore received email reminders were also unequally distributed across the groups, and we add an indicator variable. However, their number is very small (n=5, four of which in the commitment group and one in the reminder group).

only 4.0 exams. The numbers are even lower for passed exams. After the first semester, only 46.5% of students in the control group have passed five exams as prescribed by the exam plan; on average, they have passed only 3.4 exams. This means that more than half of the students are not on track for a timely graduation very early on in their study program. The potential for improving student performance in the dimensions of exam participation and passed exams is thus substantial.

4 Results

We next report intention-to-treat (ITT) and treatment-on-the-treated (TT) effects of our interventions on student performance, as measured by the number of exams that students sign up for, participate in, and pass.

4.1 Intention to treat effects

We first provide intention-to-treat (ITT) estimates from OLS models and compare the average outcomes of the control and treatment groups.

The baseline specification is:

$$Y_i^k = \alpha_0 + \alpha_1 Remind_i + \alpha_2 Commit_i + \varepsilon_i, \tag{14}$$

where Y_i^k denotes the level of outcome measure k (exam sign-up, exam participation, or passed exams) for individual i. $Remind_i$ and $Commit_i$ are indicators for being in the reminder or the commitment device group, respectively.

For the second specification, we follow the recommendations in Bruhn and McKenzie (2009) and control for the method of randomization, by including as covariates the variables that were used for stratification and balancing. The vector $\mathbf{X_i}$ contains these variables (high school grade, age, gender) plus a set of state fixed effects, indicating a student's geographic origin:

$$Y_i^k = \alpha_0 + \alpha_1 Remind_i + \alpha_2 Commit_i + \mathbf{X_i}\alpha_3 + \varepsilon_i. \tag{15}$$

In the third specification, we add a vector of control variables $\mathbf{Z_i}$, to which we did not have access at the time of randomization, but which were made available to us at the end of the semester:

$$Y_i^k = \alpha_0 + \alpha_1 Remind_i + \alpha_2 Commit_i + \mathbf{X_i}\alpha_3 + \mathbf{Z_i}\alpha_4 + \varepsilon_i. \tag{16}$$

Z$_i$ includes indicators for whether the student applied in the later half of the application period, whether the student started college immediately after high school, German nationality, high school degree type, and whether the student received reminders via email rather than physical mail.

Effects of the commitment treatment. The number of exams signed up for is 4.5 in the control group, and being in the commitment treatment increases this number by roughly .3 exams; see the baseline specification in Column (1) of Table 3. In the second specification (Column 2) the effect is somewhat larger (the reference person is a 20 year old female Bavarian student), and adding all controls in the third specification leaves the coefficient virtually unchanged (Column 3). In the commitment group, less than 8% sign up for fewer than five exams, whereas 11.5% do in the control group (see Figure 6, which shows how the treatment affects the distribution of sign-up, participation, and passing). The effect on sign-up is statistically significant and of rather large magnitude, given that the control group is already very close to the five exams recommended by the university.

We also find a positive effect of the commitment treatment on exam participation. Participation in the control group is 4.0 exams and being assigned to the commitment treatment increases this number by more than .4 exams; see Column (4) for the baseline specification. Adding controls produces very similar coefficients of up to half an additional exam taken (Columns 5 and 6).[35] This constitutes a significant increase in exams taken of roughly a quarter standard deviation (the standard deviation of exams taken in the control group is 1.77).

The fact that students in the commitment group sign up for additional exams already shows that the commitment device can indeed change behavior. Moreover, the fact that students who were offered the commitment device also participate in more exams suggests that this is a lasting effect, in the sense that the commitment device is also effective in helping students follow through in taking the exams some months later. This is interesting in itself, but for students to merely sign up for and participate in more exams does not carry much value if they do not manage to pass these exams.

Accordingly, the most important outcome measure is the number of passed exams. Each of the exams that the students are supposed to take in the first semester is worth the same amount of credits, and we find that students in the commitment group pass roughly half an extra exam at the end of the semester. This holds in the baseline specification (Column 7),

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[35]The point estimates for additional sign-up are smaller than the point estimates for additional exams participated in. One might therefore be inclined to infer that being in the commitment treatment also increases the probability of participating in exams that students would have also signed up for in absence of the treatment. However, the difference between the coefficients in the sign-up and participation estimations is not statistically significant.

and after adding controls (Columns 8 and 9), suggesting a significant increase of roughly .22 standard deviations (the standard deviation of exams passed in the control group is 1.92).[36] So in line with the predictions of our simple decision model, those in the commitment group not only take more exams, they also pass more exams.

Effects of the reminder treatment. As we can see from Table 2, being assigned to the reminder treatment never elicits any significant effect and none of the coefficients is even close to being significant. This holds for all three outcome variables (sign up, participation, and passing) and all three specifications. The fact that reminding students is not enough to improve their performance suggests that low salience is not a problem for the university students.

Controls. Looking at the control variables in Table 3, it can be seen that for exam sign-up, none of them are statistically significant.[37] When it comes to participation, being non-German and having applied late in the application period are associated with a lower number of exams taken. For passed exams, being non-German and a late application are linked to passing fewer exams, while having a high school degree of the "other" type (not of the Abitur or FOS type, see Footnote 33) is associated with passing more exams. Most importantly, the final high school grade is a strong predictor of exams passed: a one standard deviation better high school grade (sd in the control group= 0.41) increases passed exams by around .15 standard deviations. When compared to the effects of our commitment device, this demonstrates the large potential of behavioral interventions in education.

4.2 Treatment effects on the treated

So far we have explored the ITT effects, which inform us about the causal effect of offering students a commitment device. From a policy perspective the ITT effect is relevant, because it allows to assess the average effects of such interventions on the entire cohort. We also want to quantify the effect that the treatment has on those that are actually treated, i.e., in our case, the effect the soft commitment device has on those that felt compelled to enter into the agreement.

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[36]With regards to grading, the official study regulations of the university state that the "individual performance of the student" determines the grade – there is no provision for relative grading or grading on the curve. In addition, it is important to realize that only one third of students receives the commitment device, and only half of those who receive the treatment also respond with behavioral changes (as we will show in the section on identifying procrastinators). This means that even if some lecturer were to apply relative grading practices despite the above university regulations, our treatments are unlikely to affect the passing threshold in significant ways.

[37]In all specifications that include controls, some of the age and state ("Bundesland") fixed effects are statistically significant, specifically some of the groups with lower cell count (older students and students that are from far away states). Since we did not have information on geographic origin at the time of randomization, these small groups of students are not balanced across treatments (see the descriptives in Table 2). As can be seen in Table 3, the inclusion of these variables thus slightly changes the estimated effects of our treatments.

We offer the soft commitment device as a voluntary means to overcome problems with procrastination and thereby improve performance. Some subjects who are offered the treatment therefore receive no treatment. In our case, these subjects are the ones that do not sign the agreement and/or do not receive the letters. Of the 129 student that were assigned to the commitment group, 14 did not sign the agreement, in all cases because they were not present at the introductory lecture. These students did not receive any letters, but they are still analyzed as being part of the commitment treatment. In the reminder group, 17 students did not show up for the introductory lecture. We did not send any letters to these students, either, and they are also kept in the analysis. Simply comparing the outcomes for those who actually received the commitment or reminder treatment to the control group could produce biased estimates, due to differential selection into attending the lectures and signing the agreement. Because there are no always-takers – students in the control group cannot use the commitment agreement – the treatment effect on the treated (TT) can be calculated as the local average treatment effect, using randomized assignment to the commitment group as an instrumental variable:

$$Agreement_i = \beta_0 + \beta_1 Remind_i + \beta_2 Commit_i + \mathbf{X_i}\beta_3 + \mathbf{Z_i}\beta_4 + \varepsilon_i, \tag{17}$$

$$Letter_i = \delta_0 + \delta_1 Remind_i + \delta_2 Commit_i + \mathbf{X_i}\delta_3 + \mathbf{Z_i}\delta_4 + \varepsilon_i, \tag{18}$$

$$Y_i^k = \gamma_0 + \gamma_1 Letter_i + \gamma_2 Agreement_i + \mathbf{X_i}\gamma_3 + \mathbf{Z_i}\gamma_4 + \varepsilon_i. \tag{19}$$

Equation (17) is the first stage for the commitment agreement, where assignment to the commitment group generates exogenous variation in signing the agreement. The first stage for receiving the pure reminder letter is given in Equation (18). The second stage is shown in (19) and it provides an estimate of the effect that the agreement/reminder has on those that signed/received it.

Table 4 displays the TT effects we obtain from the instrumental variable estimations. The specifications are the same as in the ITT estimations shown in Table 3. The bottom panel shows the first-stage coefficients of being assigned to the reminder or commitment group (controls are not shown). As expected from the participation numbers mentioned above, the TT effects of the commitment device are 11.1% (1/.902) and the reminder coefficients 11.5% (1/.866) larger than the respective ITT effects.

4.3 Exam specific results

An interesting question is whether the effects of our treatments differ across exams. While we do not have information on sign-up for the individual exams, we are able to assess the effects on participation and passing for each of the five main exams that the university recommends

to take in the first semester: Accounting, Statistics, Business Administration, Organization, and Law.[38]

Tables 5 and 6 display the effects on sign-up, participation, and passing from linear probability models. The effects in the individual exams can be seen in Columns (1) through (5), and Column (6) shows the aggregate effect on the five main exams the school suggests to take (ITT in the top panel, TT in the bottom panel). The zero effect of the reminder we have seen earlier could theoretically mask heterogeneous effects across the individual exams. Yet we find no significant effect of the reminder treatment on either participation or passing in any individual exam. The effects of commitment on participation and passing on the other hand are particularly large in the Statistics and Accounting exams: the commitment device significantly increases participation by 12.2 and 10.0 percentage points respectively, and students in the commitment group were 16.6 and 15.6 percentage points more likely to pass the accounting and the statistics exam. Of the other three exams individually, only in the law exam we find a marginally significant effect of commitment. Importantly, however, all point estimates are positive, indicating that the general effect of the commitment device goes in the same direction across all exams.

We propose two channels that can plausibly generate the observed commitment coefficients. First, a common characteristic of the Statistics and the Accounting exam is that mathematics is a substantial factor. Mathematical subjects are a stumbling block for many students already in high school, and the passing rates in these two "numerical" exams are rather low (see Figure 7). The (psychological) costs of starting to study for these exams may therefore be particularly high – making procrastination potentially more prevalent in comparison to exams that require a different set of skills, such as learning by heart and reiterating. Consequently, the commitment device may be more helpful in mathematical subjects (Column 7 shows the combined "numerical exams" effect in Statistics and Accounting).

Second, the Statistics and the Accounting exams take place on the first two days of the exam week (Figure 8 displays the sequence of exams with the corresponding coefficients). If our treatment leads students to focus more strongly on early exams, then this could explain the observed pattern. Alternatively, higher motivation or focus induced by the commitment device may deplete over the course of the exam week. If the arrangement of exams in time rather than the mathematical content of exams drives the differential effects, then it can be wise to schedule exams that are considered stumbling blocks towards the beginning of the exam period.

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[38]The student office could only supply the total number of exams signed up for, so we do not know for which specific exams a student did actually sign up for. Since students at this school can simply not show up for an exam without this resulting in a failed exam, we cannot infer sign-up from the exam results.

4.4 Comparison to other interventions

We have shown that a soft commitment device is a simple and effective instrument to enhance educational progress. Students sign up for, participate in, and pass more exams – with effect sizes of up to .25 standard deviations. It is instructive to compare these effects to those of other interventions and institutional factors studied in the literature on higher education. Dobkin, Gil and Marion (2010) estimate the effect of requiring weaker students to attend class at university. Using a regression discontinuity design, they find that a 10 percentage point increase in attendance is linked to a .17 standard deviations increase in performance. When it comes to offering monetary incentives to increase performance in higher education, the evidence is mixed. De Paola, Scoppa and Nisticò (2012) find that offering college students a merit scholarship increases performance by .18 standard deviations. On the other hand, Angrist, Oreopoulos and Williams (2014) find no statistically significant effect of offering university students monetary rewards for better academic performance. See also the survey of the literature on monetary incentives in Lavecchia, Liu and Oreopoulos (2014). Using data from a UK university, Bandiera, Larcinese and Rasul (2010) find that reducing the number of students in a lecture increases academic performance and estimate an effect size of .108. The quality of the instructional staff also positively affects outcomes. Carrell and West (2010) use the random allocation of students to professors at the United States Air Force Academy to explore the effects of professor quality. They find a positive impact on academic performance with an effect size of .05. Carrell, Fullerton and West (2009) estimate that the quality of peers has a somewhat larger effect on performance; the effect size is .08. Thus, while the effects of our soft commitment device on students' performance are quite large, they do not seem to be unreasonable in comparison to other education interventions – especially if one takes into account that commitment devices generally deliver rather large effects (see the introduction).

5 Procrastinators and commitment

Motivated by the theoretical prediction of our model that the soft commitment device is especially helpful for students who tend to procrastinate, we next seek to identify procrastinators and explore the effects of the commitment device on their behavior. In what follows, we introduce a measure of procrastination derived from administrative application records. We then provide evidence that being a procrastinator is indeed unfavorably related to exam performance in university. Finally, we can show that the commitment device drastically improves the performance of those identified as procrastinators. In fact, it fully offsets the initial performance deficit of procrastinators.

5.1 Identifying procrastinators

Specific information on the individual level of procrastination is typically not available. Even if it is available, the measures are often self-reported in surveys, which is problematic if individuals are (partially) naive about their procrastination. If students are unable to correctly assess their own behavior, any self-reported measures are flawed. The same is true if respondents answer such questions in a way that they believe to be socially desirable. Thus, a particularly promising way to identify an individual's procrastination tendencies is to look at actual behavior, rather than self reports.

We use administrative information from the university about the specific time at which every student submitted online the application for the business administration program.[39] The application period for German university programs typically runs from the beginning of May to mid-July. After the application period closes, the universities decide on whom they admit to their program. Students are free to apply to more than one program and they can submit their application at their convenience at any time in the application period. In this context it is important to note that because students get no admission letters from any university before mid-July, the later applications are not from those students who have already been rejected by another program (as might be the case in the U.S., for example). If we interpret applying early as indicative for taking care of things right away, as opposed to putting them off until the last minute, then we can use the application date as a proxy for procrastination tendencies. To be clear, this does not mean that everyone who applies late is a procrastinator. But if someone is a procrastinator, they will show up in the data as someone who applied late.

Figure 9 shows the distribution of incoming applications in the period from May 2 to July 12. It has two peaks. The single day with the highest number of application is May 2, the first day where applications are accepted. This points to pent up demand from people that apply at the first opportunity. After that the number of applications per day slowly fades, but starts to increase again noticeably in the latter half of the application period. The median application date is June 15 and the last two weeks see many incoming applications.

We use two measures of procrastination. The first is the day of application. The second is an indicator variable that distinguishes applicants who sent in their documents before the

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[39]Technically, we do not have the exact date for all of our subjects, but we have application submission numbers for all subjects. These were assigned ascending in the order the applications were submitted. Because we have time-stamps for students who also completed an online assessment center directly after submission of the application, we can, in combination with the application number, infer the date of application for the rest of the students. For all the results we report here, it does not make a difference whether we use the (non-interpolated) application number or the (interpolated) application date. We use the latter measure, because it is more intuitive and easier to interpret. The distribution of application numbers across the application period is shown in Figure 12.

median application date of June 15 from those who did so after June 15.[40]

5.2 Procrastination and exam performance without commitment

In the left column of Figure 10, we plot the relationship between application date and the number of passed exams after the first semester. The plots are binned scatterplots, where each of the six dots per group represents one sixth of the observations in the group. The plots are corrected for the full set of controls used earlier (binned residual scatterplots).

Looking at the control group ("x" markers), we can see from the fitted line that there is a clear negative relationship between applying later and the passing of exams. The top graph shows that a student who applies very early, on average, passes about 3.75 exams, whereas students that apply very late, on average, only pass less than 3 exams. The middle and bottom graph show the same relationship for the five main exams recommended by the university, and for the two numerical exams only. At first glance, it may seem surprising that this relationship holds even when controlling for high school grades. However, university is a new environment that is far less structured than high school and also provides much more room for procrastination. Academic performance in college may therefore be affected by procrastination more severely than in high school. The negative relationship between exam performance and application date is very similar in the reminder group (square markers), which is not particularly surprising, given that we did not find any effects of the reminders earlier. Overall, this provides suggestive evidence that students who are prone to procrastination display lower levels of performance in the exams.[41]

5.3 Procrastination and exam performance with commitment

In theory, as we have laid out in Section 2, the commitment device should help students with a tendency to procrastinate, whereas it is not expected to have any effect on non-procrastinators. The binned scatterplot for the commitment group confirms this prediction (triangular markers). Early appliers (i.e., the non-procrastinators) in the commitment group fare just as well as the early appliers in the control group. At the same time the late appliers (which include the procrastinators) who were offered the commitment device outperform the late appliers in the control group. Interestingly, students who were randomized into the commitment group perform just as well as the earliest applying students in the control group – across the entire application period. This shows that the commitment device can actually

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[40]The results are not sensitive to choosing a different cutoff date, as long as the two-peaked distribution is captured by the procrastination variable.

[41]The same relationship can also be seen when looking at the link between application date and exam participation (not shown).

completely eliminate the negative effects of procrastination.[42]

We also examine regressions where we interact the indicator for being in the commitment group with (a) the application date and (b) the indicator variable for having applied before the median application date of June 15. The application date variable is coded in a reverse fashion with 72 denoting the first day and 0 the last day of the application period. The indicator variable takes on the value 0 for late appliers and 1 for early appliers. Thus, in these specifications, the main effect of being offered the commitment device can be interpreted as the effect for someone who (a) applies on the last day of the application period, and (b) applies after the median application date.

Table 7 shows that the effects on sign-up, participation, and passing are roughly twice as large for the last applicants in comparison to the average applicant (see the earlier results). When considering the median application date as a cutoff, it can be seen that for the later half of applicants the effects are also considerably larger than for the earlier half (Table 8). In fact, the effects of the commitment device for the early appliers are very small and not statistically significantly different from zero. The main effect of being a procrastinator, i.e., applying later, is negative in both specifications (remember that a later application date carries a smaller number here). It is statistically significant when using the continuous procrastination measure and also significant in three of the six specifications when using the crude division of the sample in two equal sized parts.

Taken together, these results show that procrastination seriously hinders academic performance in university exams. Yet offering students a commitment device can completely offset this handicap.

6 Are there negative side effects?

So far we have shown that the soft commitment device is an effective instrument to improve student performance, as measured by sign-up for exams, participation in exams, and – most importantly – passed exams. However, we have not considered the possibility that the higher number of passed exams might come at a cost in terms of worse grades and higher failure rates, or that the students might drop out at a higher rate due to the treatments.

Table 9 shows that the commitment treatment neither affects the probability of dropping out, nor does it have an effect on the number of failed exams. The same is true for the remin-

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[42]The right hand Column of Figure 10 shows the predicted number of passed exams at each application date in the control and the commitment group with 95% confidence intervals. Underlying the plot are regressions with the full set of controls and an interaction of the commitment treatment with application date. For clarity of exposition, we do not display the predictions for the reminder group; essentially, they are the same as the predictions for the control group. Results are almost identical to those derived from the scatterplots.

der treatment. Even if students do not drop out with higher frequency and also do not fail in more exams when treated, the higher number of passed exams may still come at the cost of performing worse in these exams on average, i.e. receiving lower grades than students in the control group. In other words, students may be trading quality for quantity. Table 10 shows that neither of the two treatments leads to a lower grade point average in the passed exams, see Columns (3) and (4). We obtain the same results if we include in the grade point average also the exams that the students failed, see Columns (1) and (2).[43] Figure 11 also shows that there is no bunching of grades at the passing threshold of 4.0 and that the distribution of grades in the treatment groups is statistically indistinguishable from the control group. It is reassuring that we find no evidence for negative effects, as this confirms the theoretically posited notion that the commitment device at least weakly increases all students' efforts and thus does not cause worse grades or higher failure rates.

7 Conclusion

Procrastination is a widespread phenomenon. It typically leads to unfavorable outcomes, and the education domain is one where individuals are especially prone to delaying action. In a simple model, we study a two dimensional intertemporal decision problem and show that a soft commitment motivates students to increase their efforts and improve performance. We provide supporting evidence for the theoretical considerations from a companion field experiment: Offering students a soft commitment device produces large positive effects on the completion rate in a complex task – passing university exams.

The field experiment provides further insights. First, we have documented a negative relationship between a revealed measure of procrastination and task performance. The soft commitment then changes behavior in exactly those subjects for whom we would in theory expect an effect: It drastically improves the rate of task completion in students identified as procrastinators. In fact, our findings suggest that a soft commitment device can fully offset the large initial performance deficit of these individuals.

Second, the experimental design allows us to gauge alternative pathways through which soft commitment devices may affect behavior. Making sure – by way of the introductory lecture – that all subjects are aware of the target number of passed exams suggests that differences in information or goal setting do not drive the observed changes in behavior. With our

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[43]Students pass more exams than without the treatment, at the same average passing grade as the controls. This should actually lead to a better grade point average when the failed exams are also counted (as the lowest grade possible). We do see the corresponding negative coefficients (recall that in the German system a lower number denotes a better grade), but the effect is not significant. This small effect is due to the on average low failure rates in the exams (Figure 7), as they imply that the grade point average is not strongly influenced by failing grades.

second treatment we can also rule out that it is merely a matter of keeping the task salient: The reminders alone do not have the same effect on student behavior as the commitment; in fact they do not change behavior at all. Similarly, getting help in planning is not sufficient to affect student behavior.[44] This can be inferred from the fact that the reminder treatment does not lead to improved outcomes, despite the fact that it provides the same planning tools (letters) as the commitment treatment.

From a policy perspective, our results have considerable implications. They suggest that soft commitment devices can be very effective in helping students succeed. At a price of single digit euros per student and semester, the commitment device is also particularly cost-efficient. Moreover, there is no need for an external enforcement mechanism, because soft commitments are self-enforcing by nature. On the demand side, we find an extremely high willingness to take up the soft commitment. This ensures that the benefits of the commitment can reach a large number of individuals; a property which we could not necessarily expect from a hard commitment device. Importantly, the design of our intervention is general enough to be implemented in a wide variety of environments, since none of the main features is tied to a specific type of program or field of study, or even the field of education altogether. This makes us confident that soft commitment devices can be a powerful means to improve performance in non-trivial tasks – in education and beyond.

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[44]For a brief overview on the economics of planning, see Beshears, Milkman and Schwartzstein (2016).

References

Acemoglu, Daron, *Introduction to Modern Economic Growth*, Princeton: Princeton University Press, 2009.

Altmann, Steffen and Christian Traxler, "Nudges at the Dentist," *European Economic Review*, 2014, *72*, 19–38.

Angrist, Joshua, Philip Oreopoulos, and Tyler Williams, "When Opportunity Knocks, who Answers? New Evidence on College Achievement Awards," *Journal of Human Resources*, 2014, *49* (3), 572–610.

Ariely, Dan and Klaus Wertenbroch, "Procrastination, Deadlines, and Performance: Self-Control by Precommitment," *Psychological Science*, 2002, *13* (3), 219–224.

Ashraf, Nava, Dean Karlan, and Wesley Yin, "Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines," *Quarterly Journal of Economics*, 2006, pp. 635–672.

Bandiera, Oriana, Valentino Larcinese, and Imran Rasul, "Heterogeneous Class Size Effects: New Evidence from a Panel of University Students," *Economic Journal*, 2010, *120* (549), 1365–1398.

Barro, Robert J and Xavier Sala i Martin, *Economic Growth*, Cambridge: MIT Press, 2003.

Beshears, John, Katherine L Milkman, and Joshua Schwartzstein, "Beyond Beta-Delta: The Emerging Economics of Personal Plans," *American Economic Review*, 2016, *106* (5), 430–434.

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer, "Salience and Consumer Choice," *Journal of Political Economy*, 2013, *121* (5), 803–843.

Brocas, Isabelle, Juan D Carrillo, and Mathias Dewatripont, "Commitment Devices under Self-Control Problems: An Overview," *Psychology of Economic Decisions*, 2004, *2*, 49–67.

Brown, Jeffrey R and Alessandro Previtero, "Procrastination, Present-Biased Preferences, and Financial Behaviors," Technical Report, National Bureau of Economic Research 2014.

Bruhn, Miriam and David McKenzie, "In Pursuit of Balance: Randomization in Practice in Development Field Experiments," *American Economic Journal: Applied Economics*, 2009, *1* (4), 200–232.

Bryan, Gharad, Dean Karlan, and Scott Nelson, "Commitment Devices," *Annual Review of Economics*, 2010, *2* (1), 671–698.

Burger, Nicholas, Gary Charness, and John Lynham, "Field and Online Experiments on Self-Control," *Journal of Economic Behavior & Organization*, 2011, *77* (3), 393–404.

Carrell, Scott E and James E West, "Does Professor Quality Matter? Evidence from Random Assignment of Students to Professors," *Journal of Political Economy*, 2010, *118* (3), 409–432.

Carrell, Scott, Richard L Fullerton, and James West, "Does Your Cohort Matter? Measuring Peer Effects in College Achievement," *Journal of Labor Economics*, 2009, *27* (3), 439–464.

Carrillo, Juan D. and Mathias Dewatripont, "Promises, Promises, ...," *Economic Journal*, 2008, *118* (531), 1453–1473.

Charness, Gary and Martin Dufwenberg, "Promises and Partnership," *Econometrica*, 2006, *74* (6), 1579–1601.

Corgnet, Brice, Joaquín Gómez-Miñambres, and Roberto Hernán-Gonzalez, "Goal Setting and Monetary Incentives: When Large Stakes Are Not Enough," *Management Science*, 2015, *61* (12), 2926–2944.

Dobkin, Carlos, Ricard Gil, and Justin Marion, "Skipping Class in College and Exam Performance: Evidence from a Regression Discontinuity Classroom Experiment," *Economics of Education Review*, 2010, *29* (4), 566–575.

Ellis, Albert and William J Knaus, *Overcoming Procrastination: Or, how to Think and act Rationally in Spite of Life's Inevitable Hassles*, Signet, 1979.

Exley, Christine L and Jeffrey Naecker, "Observability Increases the Demand for Commitment Devices," *Harvard Business School NOM Unit Working Paper*, 2015, (16-064).

Frederick, Shane, George Loewenstein, and Ted O'Donoghue, "Time Discounting and Time Preference: A Critical Review," *Journal of Economic Literature*, 2002, *40* (2), 351–401.

Giné, Xavier, Dean Karlan, and Jonathan Zinman, "Put Your Money Where Your Butt Is: A Commitment Contract for Smoking Cessation," *American Economic Journal: Applied Economics*, 2010, *2* (4), 213–235.

Goerg, Sebastian J and Sebastian Kube, "Goals (th) at Work – Goals, Monetary Incentives, and Workers' Performance," *MPI Collective Goods Preprint*, 2012, (2012/19).

Gómez-Miñambres, Joaquín, "Motivation Through Goal Setting," *Journal of Economic Psychology*, 2012, *33* (6), 1223–1239.

Hanushek, Eric A. and Ludger Wößmann, "Education and Economic Growth," *International Encyclopedia of Education*, 2010, *2*, 245–252.

Kahneman, Daniel and Amos Tversky, "Prospect Theory: An Analysis of Decision under Risk," *Econometrica*, 1979, *47* (2), 263–291.

____ **and** ____ , "Choices, Values, and Frames," *American Psychologist*, 1984, *39* (4), 341–350.

Karlan, Dean and Leigh L Linden, "Loose Knots: Strong versus Weak Commitments to Save for Education in Uganda," Technical Report, National Bureau of Economic Research 2014.

Karlan, Dean S, James Berry, and Menno Pradhan, "The Impact of Financial Education for Youth in Ghana," *Available at SSRN*, 2015.

Kast, Felipe, Stephan Meier, and Dina Pomeranz, "Under-Savers Anonymous: Evidence on Self-Help Groups and Peer Pressure as a Savings Commitment Device," Technical Report, National Bureau of Economic Research 2012.

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

Koch, Alexander and Julia Nafziger, "Self-Regulation Through Goal Setting," *Scandinavian Journal of Economics*, 2011, *113* (1), 212–227.

⸻ , ⸻ , **and Helena Skyt Nielsen**, "Behavioral Economics of Education," *Journal of Economic Behavior & Organization*, 2015, *115*, 3–17.

Kőszegi, Botond and Matthew Rabin, "A Model of Reference-Dependent Preferences," *Quarterly Journal of Economics*, 2006, *121* (4), 1133–1165.

Laibson, David, "Golden Eggs and Hyperbolic Discounting," *Quarterly Journal of Economics*, 1997, *112* (2), 443–477.

⸻ , "Why Don't Present-Biased Agents Make Commitments?," *American Economic Review*, 2015, *105* (5), 267–272.

Lavecchia, Adam M, Heidi Liu, and Philip Oreopoulos, "Behavioral Economics of Education: Progress and Possibilities," Technical Report, National Bureau of Economic Research 2014.

Leaver, Sean, "Behavioural Education Economics," *Handbook for Behavioral Economics*, 2016.

Locke, Edwin A and Gary P Latham, "Building a Practically Useful Theory of Goal Setting and Task Motivation: A 35-year Odyssey," *American Psychologist*, 2002, *57* (9), 705–717.

⸻ **and** ⸻ , "New Directions in Goal-Setting Theory," *Current Directions in Psychological Science*, 2006, *15* (5), 265–268.

Milkman, Katherine L, Julia A Minson, and Kevin GM Volpp, "Holding the Hunger Games Hostage at the Gym: An Evaluation of Temptation Bundling," *Management Science*, 2013, *60* (2), 283–299.

Moskowitz, Gordon B and Heidi Grant, *The Psychology of Goals*, Guilford Press, 2009.

O'Donoghue, Ted and Matthew Rabin, "Doing it Now or Later," *American Economic Review*, 1999, *89* (1), 103–124.

OECD, "Education at a Glance 2013: OECD Indicators," 2013. http://dx.doi.org/10.1787/eag-2013-en.

Oreopoulos, Philip and Kjell Salvanes, "Priceless: The Nonpecuniary Benefits of Schooling," *Journal of Economic Perspectives*, 2011, *25* (1), 159–184.

Paola, Maria De and Vincenzo Scoppa, "Procrastination, Academic Success and the Effectiveness of a Remedial Program," *Journal of Economic Behavior & Organization*, 2015, *115*, 217–236.

⸻ , ⸻ , **and Rosanna Nisticò**, "Monetary Incentives and Student Achievement in a Depressed Labor Market: Results from a Randomized Experiment," *Journal of Human Capital*, 2012, *6* (1), 56–85.

Patterson, Richard W, "Can Behavioral Tools Improve Online Student Outcomes? Experimental Evidence from a Massive Open Online Course," 2015.

Phelps, Edmund S and Robert A Pollak, "On Second-Best National Saving and Game-Equilibrium Growth," *Review of Economic Studies*, 1968, *35* (2), 185–199.

Potts, Timothy J, "Predicting Procrastination on Academic Tasks with Self-Report Personality Measures." PhD dissertation, ProQuest Information & Learning 1987.

Psacharopoulos, George, *Economics of Education: Research and Studies*, Elsevier, 1987.

——, "Returns to Investment in Education: A Global Update," *World Development*, 1994, *22* (9), 1325–1343.

Reuben, Ernesto, Paola Sapienza, and Luigi Zingales, "Procrastination and Impatience," *Journal of Behavioral and Experimental Economics*, 2015, *58*, 63–76.

Rogers, Todd, Katherine L Milkman, and Kevin G Volpp, "Commitment Devices: Using Initiatives to Change Behavior," *JAMA*, 2014, *311* (20), 2065–2066.

Royer, Heather, Mark Stehr, and Justin Sydnor, "Incentives, Commitments, and Habit Formation in Exercise: Evidence from a Field Experiment with Workers at a Fortune-500 Company," *American Economic Journal: Applied Economics*, 2015, *7* (3), 51–84.

Semb, George, D Marvin Glick, and Robert E Spencer, "Student Withdrawals and Delayed Work Patterns in Self-Paced Psychology Courses," *Teaching of Psychology*, 1979, *6* (1), 23–25.

Shapiro, Doug, Afet Dundar, Xin Yuan, Autumn T Harrell, and Phoebe Khasiala Wakhungu, "Completing College: A National View of Student Attainment Rates–Fall 2008 Cohort (Signature Report No. 8).," *National Student Clearinghouse*, 2014.

Solomon, Laura J and Esther D Rothblum, "Academic Procrastination: Frequency and Cognitive-Behavioral Correlates," *Journal of Counseling Psychology*, 1984, *31* (4), 503–509.

Steel, Piers, "The Nature of Procrastination: A Meta-Analytic and Theoretical Review of Quintessential Self-Regulatory Failure," *Psychological Bulletin*, 2007, *133* (1), 65–94.

Thaler, Richard H and Shlomo Benartzi, "Save more tomorrow: Using Behavioral Economics to Increase Employee Saving," *Journal of Political Economy*, 2004, *112* (S1), S164–S187.

Tversky, Amos and Daniel Kahneman, "The Framing of Decisions and the Psychology of Choice," *Science*, 1981, *211* (4481), 453–458.

—— **and** ——, "Loss Aversion in Riskless Choice: A Reference-Dependent Model," *Quarterly Journal of Economics*, 1991, *106* (4), 1039–1061.

Vanberg, Christoph, "Why Do People Keep Their Promises? An Experimental Test of Two Explanations," *Econometrica*, 2008, *76* (6), 1467–1480.

Table 1: Description of Variables.

Variable	Description
Treatment variables	
Reminder	Random assignment to the reminder treatment
Commitment	Random assignment to the commitment contract treatment
Received reminder	Students who received the reminder
Signed contract	Students who signed the commitment contract
Balancing variables	
Age	Age in years
Male	Indicator for being male
High School GPA	Final high school grade point average (1=best, 4=worst)
Individual characteristics	
Application date	Runs from 72 (first day of application period=May 2) to 0 (last day of application period=July 12)
Applied early	Variable indicating students who applied on or before the median application date (=June 15)
Fresh HS degree	Students who start university in the year they graduated from high school
Foreigner	Indicating foreign citizenship
HS degree FOS	High school (HS) degree: vocational track degree ("Fachhochschulreife (FOS)")
HS degree Abitur	HS degree: general track degree ("Abitur")
Other degree	Students who hold other school degrees than "FOS" or "Abitur"
HS degree *State abbreviation*	Indicator for the federal state where students obtained their HS degree (BW = Baden-Wuerttemberg; BY = Bavaria; HE = Hesse; NI = Lower Saxony; NW = North Rhine-Westphalia; RP = Rhineland-Palatinate; SL = Saarland; SH = Schleswig-Holstein; TH = Thuringia; n.a. = not available)
Reminder via email	Indicating students who could not be reached by physical mail and received email reminders.
Outcome variables	
Sign-up	Number of exam sign-ups
Particip	Number of exams participated in
Passing	Number of exams passed
Exams failed	Number of exams taken part in and failed
GPA	Grade point average
Dropout	Indicator for dropping out of the BA program during the first semester
Acct	Accounting exam
MatStat	Statistics/math exam
Busin	Business administration exam
Orga	Organization exam
Law	Law exam
Main5	Five recommended exams: Acct, MatStat, Busin, Orga, Law
Num2	Two numerical exams : MatStat & Acct

Table 2: Descriptive statistics by treatment group, and balancing properties.

	(1) Control	(2) Reminder	(3) Commitment	(4) (1) = (2) p-value	(5) (1) = (3) p-value
Age	21.718	21.545	21.357	0.706	0.412
	(0.309)	(0.334)	(0.312)		
Male	0.504	0.455	0.504	0.426	0.999
	(0.044)	(0.044)	(0.044)		
High School GPA	2.659	2.658	2.662	0.981	0.949
	(0.036)	(0.036)	(0.037)		
Application date	37.168	41.220	39.682	0.205	0.432
	(2.257)	(2.251)	(2.265)		
Applied early	0.542	0.462	0.481	0.197	0.324
	(0.044)	(0.044)	(0.044)		
Fresh HS degree	0.534	0.477	0.450	0.357	0.173
	(0.044)	(0.044)	(0.044)		
Foreigner	0.069	0.038	0.054	0.267	0.630
	(0.022)	(0.017)	(0.020)		
HS degree FOS	0.542	0.500	0.581	0.497	0.524
	(0.044)	(0.044)	(0.044)		
HS degree Abitur	0.412	0.455	0.364	0.490	0.430
	(0.043)	(0.044)	(0.043)		
Other degree	0.046	0.045	0.054	0.989	0.755
	(0.018)	(0.018)	(0.020)		
HS degree in BW	0.229	0.220	0.116	0.857	0.016
	(0.037)	(0.036)	(0.028)		
HS degree in BY	0.626	0.629	0.628	0.962	0.974
	(0.042)	(0.042)	(0.043)		
HS degree in HE	0.061	0.038	0.116	0.388	0.118
	(0.021)	(0.017)	(0.028)		
HS degree in NI	0.000	0.008	0.016	0.320	0.154
	(0.000)	(0.008)	(0.011)		
HS degree in NW	0.015	0.030	0.023	0.416	0.641
	(0.011)	(0.015)	(0.013)		
HS degree in RP	0.000	0.008	0.008	0.320	0.315
	(0.000)	(0.008)	(0.008)		
HS degree in SL	0.000	0.015	0.000	0.158	.
	(0.000)	(0.011)	(0.000)		
HS degree in SH	0.015	0.000	0.000	0.155	0.160
	(0.011)	(0.000)	(0.000)		
HS degree in TH	0.008	0.000	0.016	0.316	0.554
	(0.008)	(0.000)	(0.011)		
HS degree in n.a.	0.046	0.053	0.078	0.788	0.289
	(0.018)	(0.020)	(0.024)		
Reminder via email	0.000	0.008	0.031	0.320	0.042
	(0.000)	(0.008)	(0.015)		
N	131	132	129		

Note: Columns (1)-(3) display the means in the control and treatment groups, standard errors in parentheses. Columns (4) and (5) display t-tests of equality of means. HS= high school, FOS= degree type 'Fachoberschule', Name groups denote the lecture assignment based on first letter of last name. HS degree BW= high school degree in the state of Baden-Wuerttemberg, BY= Bayern, HE= Hessen, NI= Niedersachsen, NW= Nordrhein-Westfalen, RP= Rheinland-Pfalz, SL= Saarland, SH= Schleswig-Holstein, TH= Thueringen, n.a.= information not available.

Table 3: Aggregate effects on sign-up, participation and credit points – OLS estimates (ITT).

	(1) Sign-up	(2) Sign-up	(3) Sign-up	(4) Particip	(5) Particip	(6) Particip	(7) Passing	(8) Passing	(9) Passing
Treatments									
Reminder	0.087	0.109	0.113	0.075	0.056	0.081	−0.090	−0.036	−0.024
	(0.188)	(0.188)	(0.185)	(0.220)	(0.222)	(0.218)	(0.236)	(0.239)	(0.235)
Commitment	0.287*	0.357**	0.372**	0.458**	0.441**	0.490**	0.456**	0.527**	0.542**
	(0.169)	(0.156)	(0.159)	(0.204)	(0.202)	(0.209)	(0.227)	(0.222)	(0.225)
Balancing variables									
Male		0.042	0.027		0.063	0.057		0.036	0.038
		(0.139)	(0.134)		(0.174)	(0.172)		(0.191)	(0.188)
High school GPA		−0.040	0.025		−0.164	−0.045		−0.754***	−0.674***
		(0.179)	(0.180)		(0.200)	(0.200)		(0.235)	(0.235)
Individual characteristics									
Application date			−0.004			−0.011***			−0.010**
			(0.003)			(0.004)			(0.004)
Fresh HS degree			0.047			0.144			0.024
			(0.154)			(0.209)			(0.234)
Foreigner			−0.504			−0.794*			−0.834*
			(0.339)			(0.467)			(0.455)
HS degree Abitur			−0.107			0.030			0.095
			(0.194)			(0.225)			(0.242)
Other degree			−0.197			0.460			0.939**
			(0.399)			(0.386)			(0.390)
Reminder via email			−0.088			−0.587			−0.249
			(0.393)			(0.642)			(0.599)
Constant	4.542***	4.674***	4.679***	4.038***	4.335***	4.171***	3.405***	3.802***	3.693***
	(0.135)	(0.201)	(0.250)	(0.155)	(0.234)	(0.303)	(0.168)	(0.255)	(0.321)
Age FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
State FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	392	392	392	392	392	392	392	392	392

Note: Intention to treat estimates. The dependent variables are the number of exams signed up for, participated in, and passed. 'Reminder' denotes random assignment to the reminder treatment, 'Commitment' denotes random assignment to the commitment contract treatment. Columns (2), (5) and (8) include controls for the randomization balancing variables (male, age fixed effects, high school GPA) and state fixed effects. High school GPA and application date are centered at the mean, the reference category for high school degree type is 'Fachoberschule', for age it is the median (20 years) and for state it is Bavaria. Columns (3), (6) and (9) add further controls. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Aggregate effects on sign-up, participation and credit points – IV estimates (TT).

	(1) Sign-up	(2) Sign-up	(3) Particip	(4) Particip	(5) Passing	(6) Passing
2nd stage: treatments received[a]						
Received reminder	0.127	0.129	0.066	0.093	−0.040	−0.027
	(0.206)	(0.198)	(0.244)	(0.235)	(0.264)	(0.254)
Signed contract	0.397**	0.410**	0.489**	0.540**	0.584**	0.596**
	(0.165)	(0.165)	(0.215)	(0.217)	(0.236)	(0.235)
Balancing variables	Yes	Yes	Yes	Yes	Yes	Yes
Ind. characteristics	No	Yes	No	Yes	No	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	392	392	392	392	392	392
1st stage dep. var: received reminder[b]						
Reminder	0.866***	0.876***	0.866***	0.876***	0.866***	0.876***
	(0.030)	(0.027)	(0.030)	(0.027)	(0.030)	(0.027)
1st stage F	457.90	520.26	457.90	520.26	457.90	520.26
N	392	392	392	392	392	392
1st stage dep. var: signed contract[c]						
Commitment	0.902***	0.909***	0.902***	0.909***	0.902***	0.909***
	(0.025)	(0.026)	(0.025)	(0.026)	(0.025)	(0.026)
1st stage F	707.38	696.40	707.38	696.40	707.38	696.40
N	392	392	392	392	392	392

Note: Intention to treat estimates. The dependent variables are the number of exams signed up for, participated in, and passed. Panel (a) shows the treatment on the treated effects (TT), i.e. the second stage estimates. The endogenous variables are the indicator variables for whether a student received the reminder and whether a student signed the commitment contract. The instruments are indicator variables for the random assignment to the reminder and the commitment contract treatment. Specifications are as in Columns (2), (3), (5), (6), (8), (9) of table 3. Panel (b) shows the coefficient for the instrument 'assignment to the reminder group' and the first stage statistics for the first stage with 'received reminder' as the dependent variable – controls are not shown, but included in the estimations. Panel (c) shows the coefficient for the instrument 'assignment to the commitment group' and the statistics for the first stage with 'signed contract' as the dependent variable – controls are not shown, but included in the estimations. Robust standard errors in parentheses. $^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$.

Table 5: Effects on participation – individual exams, ITT (OLS) and TT (IV).

	(1) Acct	(2) MatStat	(3) Busin	(4) Orga	(5) Law	(6) Main5	(7) Num2
Treatments (ITT)							
Reminder	0.009	0.045	−0.025	−0.006	0.002	0.025	0.054
	(0.047)	(0.052)	(0.051)	(0.047)	(0.047)	(0.210)	(0.089)
Commitment	0.100**	0.122**	0.059	0.069	0.077*	0.427**	0.222**
	(0.045)	(0.052)	(0.050)	(0.044)	(0.043)	(0.203)	(0.087)
Balancing variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind. characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	392	392	392	392	392	392	392
Treatments (TT-IV)							
Received reminder	0.011	0.052	−0.028	−0.007	0.002	0.029	0.062
	(0.050)	(0.056)	(0.056)	(0.051)	(0.050)	(0.227)	(0.096)
Signed contract	0.110**	0.135**	0.065	0.076*	0.085*	0.470**	0.245***
	(0.046)	(0.053)	(0.052)	(0.045)	(0.045)	(0.210)	(0.090)
Balancing variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind. characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	392	392	392	392	392	392	392

Note: The dependent variable is an indicator for exam participation. The top panel shows the ITT estimates from linear probability models for our treatments, TT (IV) estimates are displayed in the bottom panel. The endogenous variables are whether the student received a reminder and whether a student signed the commitment contract, the instrument is random assignment to the respective treatments. All estimations include the full set of controls as in columns (3), (6) and (9) of table 3. Columns (1)-(5) display effects in the 5 individual exams recommended by the university. Column (6) shows the aggregate effect in those 5 exams. Column (7) is the effect in the two numerical exams (Math/Statistics and Accounting) combined. Robust standard errors in parentheses. $^*\,p < 0.10$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$.

Table 6: Effects on passing of exams – individual exams, ITT (OLS) and TT (IV).

	(1) Acct	(2) MatStat	(3) Busin	(4) Orga	(5) Law	(6) Main5	(7) Num2
Treatments (ITT)							
Reminder	0.059	−0.053	−0.045	−0.047	0.007	−0.080	0.006
	(0.060)	(0.062)	(0.061)	(0.051)	(0.054)	(0.227)	(0.107)
Commitment	0.156***	0.166***	0.048	0.054	0.055	0.479**	0.322***
	(0.058)	(0.059)	(0.062)	(0.046)	(0.052)	(0.219)	(0.104)
Balancing variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind. characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	392	392	392	392	392	392	392
Treatments (TT-IV)							
Received reminder	0.067	−0.061	−0.052	−0.054	0.008	−0.090	0.007
	(0.064)	(0.068)	(0.066)	(0.055)	(0.058)	(0.246)	(0.116)
Signed contract	0.172***	0.182***	0.053	0.059	0.060	0.527**	0.354***
	(0.060)	(0.061)	(0.065)	(0.048)	(0.055)	(0.227)	(0.108)
Balancing variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind. characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	392	392	392	392	392	392	392

Note: The dependent variable is an indicator for having passed an exam. The top panel shows the ITT estimates from linear probability models for our treatments, TT (IV) estimates are displayed in the bottom panel. The endogenous variables are whether the student received a reminder and whether a student signed the commitment contract, the instrument is random assignment to the respective treatments. All estimations include the full set of controls as in columns (3), (6) and (9) of table 3. Columns (1)-(5) display effects in the 5 individual exams recommended by the university. Column (6) shows the aggregate effect in those 5 exams. Column (7) is the effect in the two numerical exams (Math/Statistics and Accounting) combined. Robust standard errors in parentheses. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 7: Procrastination (I): Commitment interacted with day of application, 0= last day (ITT effects, OLS).

	(1) Sign-up	(2) Sign-up	(3) Particip	(4) Particip	(5) Passing	(6) Passing
Treatments						
Reminder	0.144	0.135	0.111	0.108	0.016	0.000
	(0.185)	(0.184)	(0.219)	(0.219)	(0.236)	(0.236)
Commitment	0.799***	0.803***	1.005***	1.001***	1.068***	1.019***
	(0.255)	(0.259)	(0.336)	(0.347)	(0.351)	(0.359)
Commit X App. day	−0.012***	−0.012***	−0.016**	−0.015**	−0.015**	−0.014**
	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)
Balancing variables						
Male	0.047	0.018	0.083	0.046	0.054	0.028
	(0.139)	(0.134)	(0.171)	(0.172)	(0.189)	(0.188)
High school GPA	−0.010	0.002	−0.080	−0.072	−0.679***	−0.700***
	(0.180)	(0.181)	(0.201)	(0.199)	(0.236)	(0.233)
Individual characteristics						
Application day	0.008**	0.008**	0.015***	0.015***	0.014***	0.014***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Fresh HS degree		0.022		0.114		−0.005
		(0.153)		(0.207)		(0.232)
Foreigner		−0.457		−0.738		−0.782
		(0.348)		(0.498)		(0.479)
HS degree Abitur		−0.138		−0.007		0.060
		(0.193)		(0.224)		(0.241)
Other degree		−0.232		0.418		0.900**
		(0.408)		(0.400)		(0.407)
Reminder via email		−0.146		−0.656		−0.314
		(0.381)		(0.661)		(0.589)
Constant	4.345***	4.423***	3.735***	3.683***	3.250***	3.246***
	(0.274)	(0.324)	(0.319)	(0.390)	(0.327)	(0.404)
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	392	392	392	392	392	392

Note: Intention to treat estimates. The dependent variables are the number of exams signed up for, participated in, and passed. 'Reminder' denotes random assignment to the reminder treatment, 'Commitment' denotes random assignment to the commitment contract treatment. 'App. day' denotes the day in the application period on which the student applied: 0 denotes the last day, 72 the first day of the application period. All estimations include controls for the randomization balancing variables (male, age fixed effects, high school GPA) and state fixed effects. High school GPA is centered at the mean, the reference category for high school degree type is 'Fachoberschule', for age it is the median (20 years) and for state it is Bavaria. Robust standard errors in parentheses. $^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$.

Table 8: Procrastination (II): Commitment interacted with having a below median (earlier) application date (ITT effects, OLS).

	(1) Sign-up	(2) Sign-up	(3) Particip	(4) Particip	(5) Passing	(6) Passing
Treatments						
Reminder	0.136	0.127	0.098	0.095	0.003	−0.014
	(0.187)	(0.185)	(0.223)	(0.223)	(0.239)	(0.239)
Commitment	0.665***	0.668***	0.787***	0.778**	0.943***	0.886***
	(0.221)	(0.221)	(0.299)	(0.307)	(0.308)	(0.316)
Commit X App. early	−0.595**	−0.601**	−0.642*	−0.579*	−0.797**	−0.713*
	(0.253)	(0.254)	(0.342)	(0.343)	(0.372)	(0.376)
Balancing variables						
Male	0.058	0.028	0.096	0.054	0.062	0.031
	(0.138)	(0.134)	(0.171)	(0.171)	(0.189)	(0.187)
High school GPA	−0.046	−0.033	−0.123	−0.107	−0.748***	−0.769***
	(0.175)	(0.175)	(0.199)	(0.198)	(0.236)	(0.234)
Individual characteristics						
Applied early	0.275	0.268	0.527**	0.539**	0.430*	0.423*
	(0.183)	(0.190)	(0.230)	(0.236)	(0.247)	(0.254)
Fresh HS degree		0.011		0.120		−0.032
		(0.156)		(0.208)		(0.234)
Foreigner		−0.462		−0.769		−0.784
		(0.343)		(0.490)		(0.490)
HS degree Abitur		−0.155		−0.033		0.008
		(0.191)		(0.221)		(0.238)
Other degree		−0.269		0.405		0.858**
		(0.408)		(0.403)		(0.424)
Reminder via email		−0.103		−0.609		−0.263
		(0.394)		(0.678)		(0.610)
Constant	4.499***	4.585***	4.001***	3.955***	3.529***	3.571***
	(0.254)	(0.304)	(0.296)	(0.366)	(0.304)	(0.380)
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	392	392	392	392	392	392

Note: Intention to treat estimates. The dependent variables are the number of exams signed up for, participated in, and passed. 'Reminder' denotes random assignment to the reminder treatment, 'Commitment' denotes random assignment to the commitment contract treatment. 'App. early' is an indicator for having applied on or before the median application date (=June 15). All estimations include controls for the randomization balancing variables (male, age fixed effects, high school GPA) and state fixed effects. High school GPA is centered at the mean, the reference category for high school degree type is 'Fachoberschule', for age it is the median (20 years) and for state it is Bavaria. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Effects on dropout and number of failed exams (ITT only, OLS)

	(1) Dropout	(2) Exams failed	(3) Numerical exams failed
Treatments			
Reminder	0.016	0.105	0.049
	(0.022)	(0.140)	(0.084)
Commitment	−0.007	−0.052	−0.100
	(0.018)	(0.134)	(0.081)
Controls			
High school GPA	−0.020	0.631***	0.314***
	(0.023)	(0.131)	(0.075)
Balancing variables	Yes	Yes	Yes
Individual characteristics	Yes	Yes	Yes
Age FE	Yes	Yes	Yes
State FE	Yes	Yes	Yes
N	392	392	392

Note: Intention to treat estimates. The dependent variable in (1) is an indicator for having dropped out of the program by the end of the first semester. In column (2) it is the total number of exams taken part in and failed, columns (3) repeats this with the subsets of numerical exams. 'Reminder' denotes random assignment to the reminder treatment, 'Commitment' denotes random assignment to the commitment contract treatment. All estimations include the full set of controls as in columns (3), (6) and (9) of table 3. Robust standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 10: Effects on all grades (incl. failing), and passing grades only (ITT only, OLS)

	(1) GPA (all)	(2) GPA num2 (all)	(3) GPA (pass)	(4) GPA num2 (pass)
Treatments				
Reminder	0.063 (0.100)	0.084 (0.135)	0.027 (0.069)	0.131 (0.091)
Commitment	−0.096 (0.102)	−0.127 (0.134)	−0.023 (0.076)	0.097 (0.099)
Controls				
High school GPA	1.002*** (0.112)	1.135*** (0.137)	0.761*** (0.091)	0.809*** (0.106)
Balancing variables	Yes	Yes	Yes	Yes
Individual characteristics	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
N	346	340	341	290

Note: Intention to treat estimates. The dependent variable in (1) is the overall GPA, in column (2) it is the GPA in the two numerical exams. In (1)-(2) the GPAs include the grade '5' (failing) for exams participated in and failed. Columns (3)-(4) use the same exams as in (1)-(2) but do not count failing grades for the GPA. 'Reminder' denotes random assignment to the reminder treatment, 'Commitment' denotes random assignment to the commitment contract treatment. All estimations include the full set of controls as in the columns (3), (6) and (9) of table 3. N is smaller than the respective group size, because some students did not pass any exams in the semester and do not show up here. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 1: EXPERIMENTAL DESIGN.

	Control	Reminder	Commitment
Introductory Lesson	YES	YES	YES
Information Folder	YES	YES	YES
Postal Reminders	-	YES	YES
Commitment Contract	-	-	YES

Figure 2: TIMELINE OF THE EXPERIMENT.
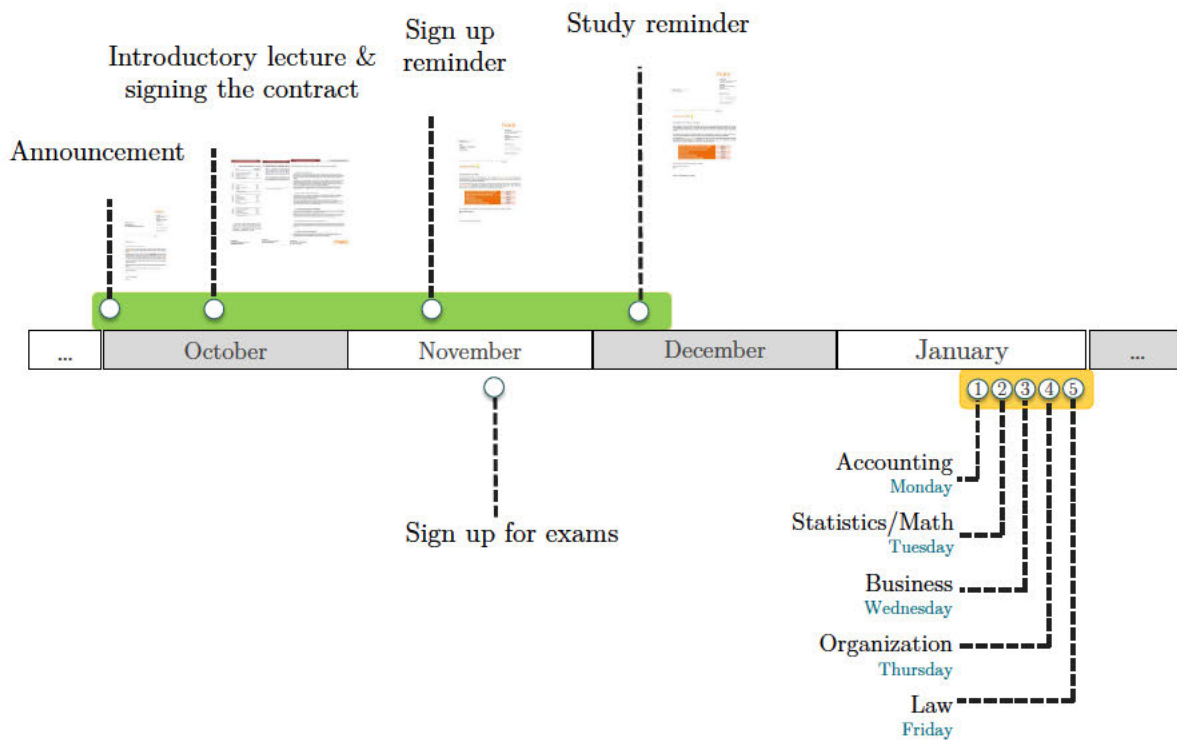
Figure 3: THE INFORMATION DESK AND INFORMATION KIT PICKUP.

Figure 4: SUMMARY OF COST INCURRED BY THE MEASURE (IN EUROS).

| Cost calculation for commitment device measure (cohort of 400)		
Student assistant	(40 hours per semester* 13 Euros)	€ 520.00
Postage	(2 letters * 58ct * 400 Students)	€ 464.00
Printing of Letters/Reminder	(4 pages * 400 students * 10ct)	€ 160.00
Printing of information folders	(2.30 Euros * 400 students)	€ 920.00
Printing of information folder content	(5 pages * 400 students * 10ct)	€ 200.00
Transparent envelopes	(400 students * 10ct)	€ 40.00
Total cost per semester		€ 2,304.00
Cost per student per semester		€ 5.76

Note: This table summarizes the actual cost of the measure in Euros, in total and per student (for a cohort of 400).

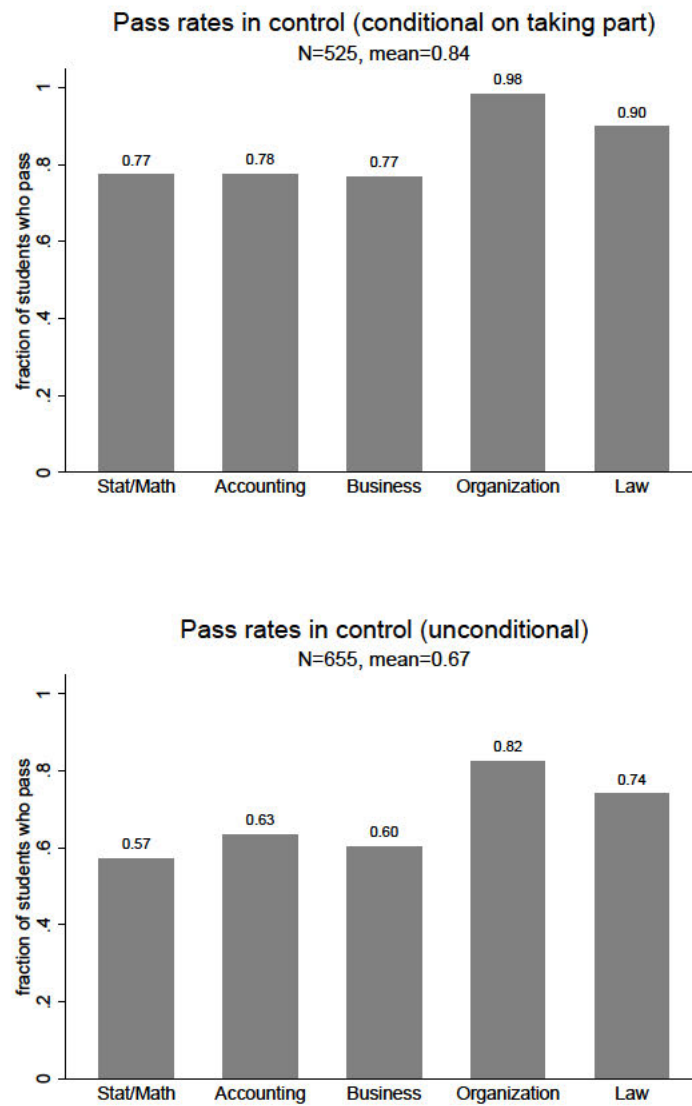Figure 5: DESCRIPTIVES (OUTCOME VARIABLES IN THE CONTROL GROUP).
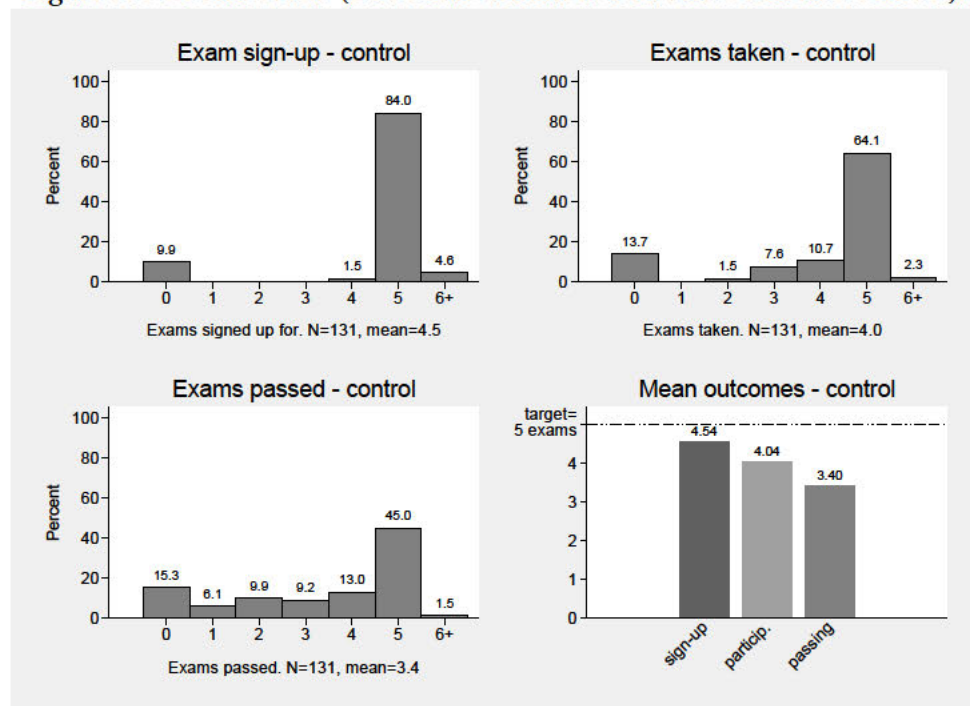
Note: Students could sign up for more than the 5 exams prescribed in the study regulations.

Figure 6: EFFECTS OF COMMITMENT ON DISTRIBUTION OF OUTCOME VARIABLES (ITT).
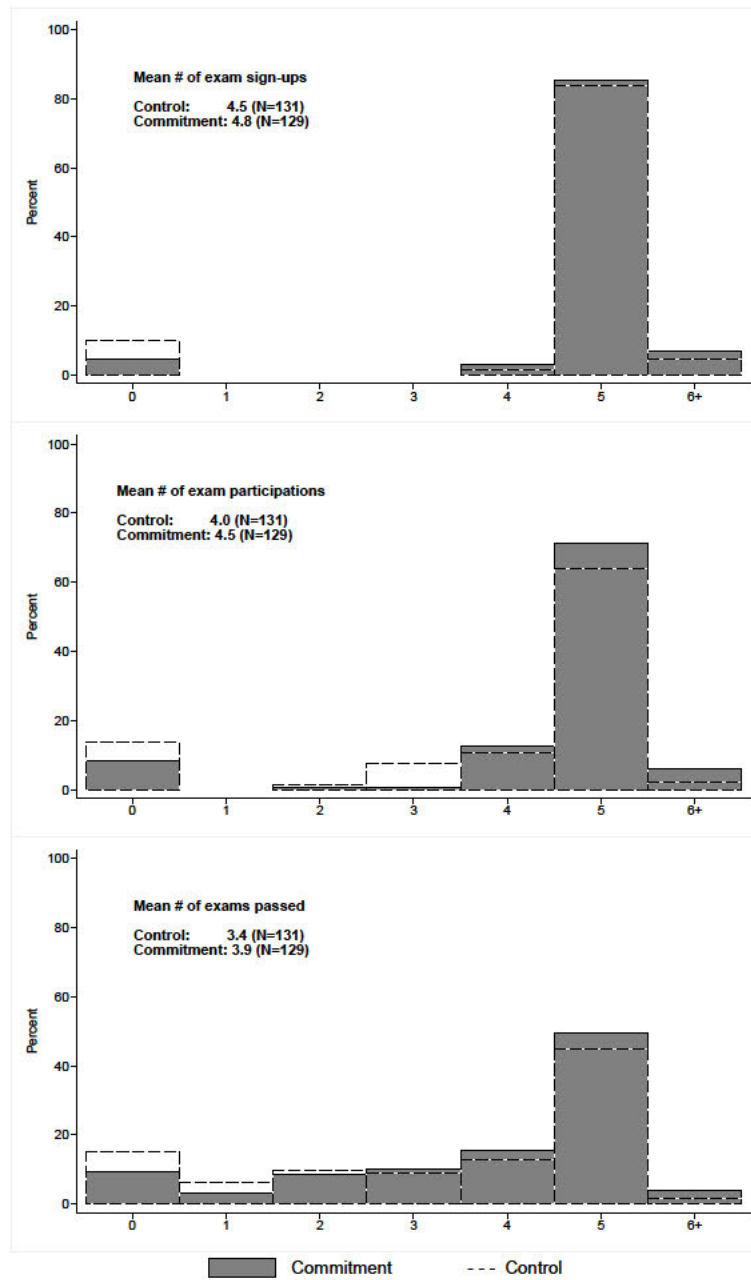
Note: Students could sign up for more than the 5 exams prescribed in the study regulations.

Figure 7: DESCRIPTIVES (PASSING RATES IN THE CONTROL GROUP).

Pass rates in control (conditional on taking part)
N=525, mean=0.84

**Pass rates in control (unconditional)**
N=655, mean=0.67

Note: N=525 in the conditional case is the number of exams taken in the first semester by the 131 people in the control group. N=655 in the unconditional case is the number of exams that students in the control group should have taken in the first semester (5*131).

Figure 8: DYNAMICS OF COMMITMENT TREATMENT EFFECT (ITT).
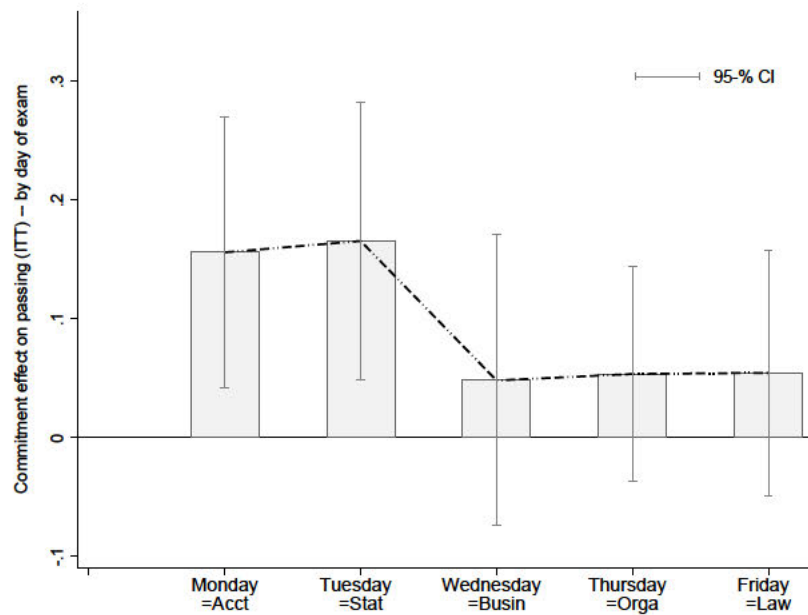
Note: Effect of commitment device on passing, by day the exam was taken on. All exams were taken in the same week, one exam per day from Monday to Friday. Monday=Accounting, Tuesday=Statistics/Math, Wednesday=Business Administration, Thursday=Organization, Friday=Law.

Figure 9: DISTRIBUTION OF APPLICATION DATES.
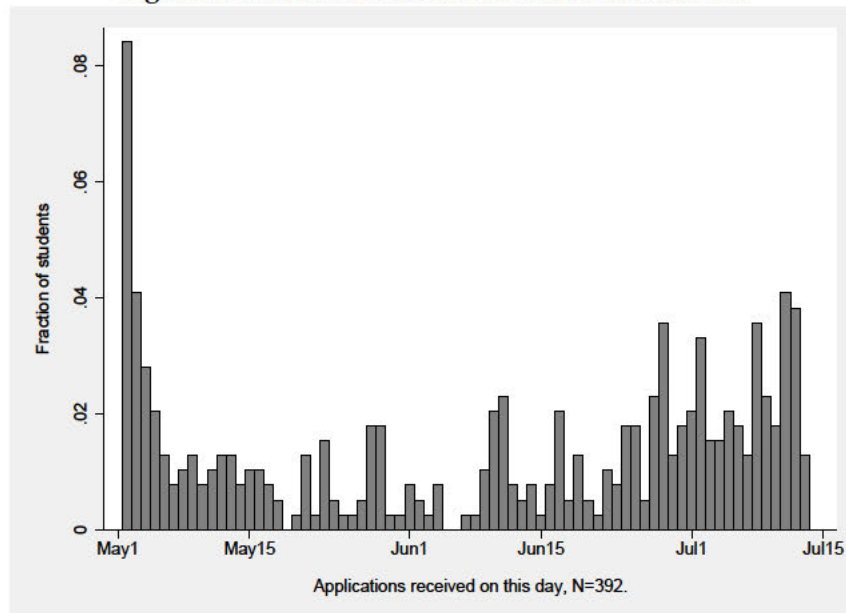
Note: Application times of the incoming business administration students. The application period ran from May 2 to July 12.

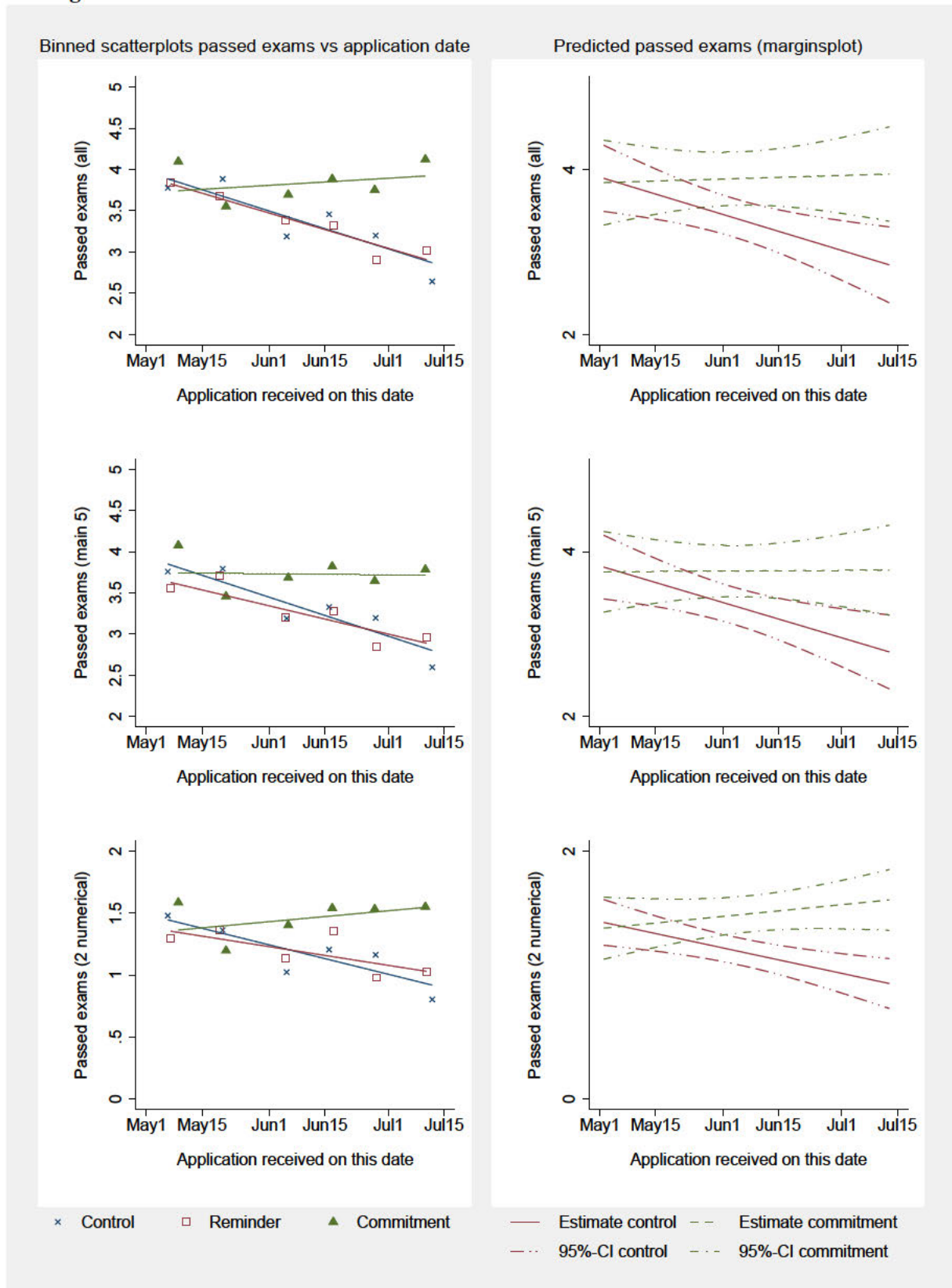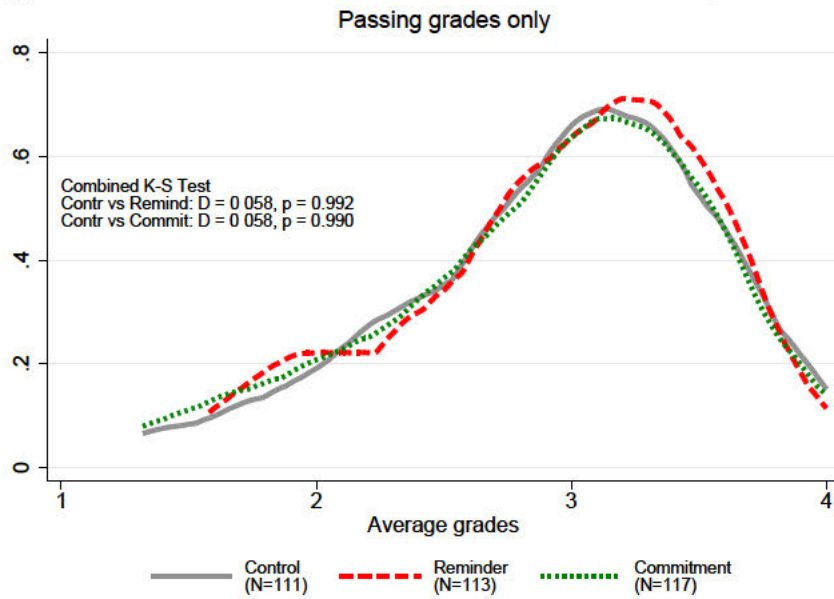Figure 10: EFFECTS ON PROCRASTINATORS – INTERACTIONS WITH APPLICATION DATE.

Note: The *left* column shows binned scatterplots of the relationship between application date and the passing of exams. Each marker within a group represents one sixth of the observations in the group. The plots are residual scatterplots, i.e. they control for the full set of control variables: sex, high school GPA, fresh degree, foreigner, degree type, reminder via email, age fixed effects, state fixed effects. The *right* column shows the predicted number of exams at each application date. These marginsplots also include the 95%-confidence intervals. For clarity of exposition, we only show the control and the commitment device group.

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Figure 11: AVERAGE GRADES AFTER THE FIRST SEMESTER, BY GROUP.

Note: The graph shows kernel density estimates of the distribution of passing grades in the three groups (lowest passing grade is 4.0, highest passing grade is 1.0). Kolmogorov-Smirnov tests of the equality of these distributions are also reported. N is smaller than the respective group size, because some students did not pass any exams in the semester and do not show up here.

Figure 12: INTERPOLATION OF APPLICATION TIME FROM APPLICATION NUMBER.
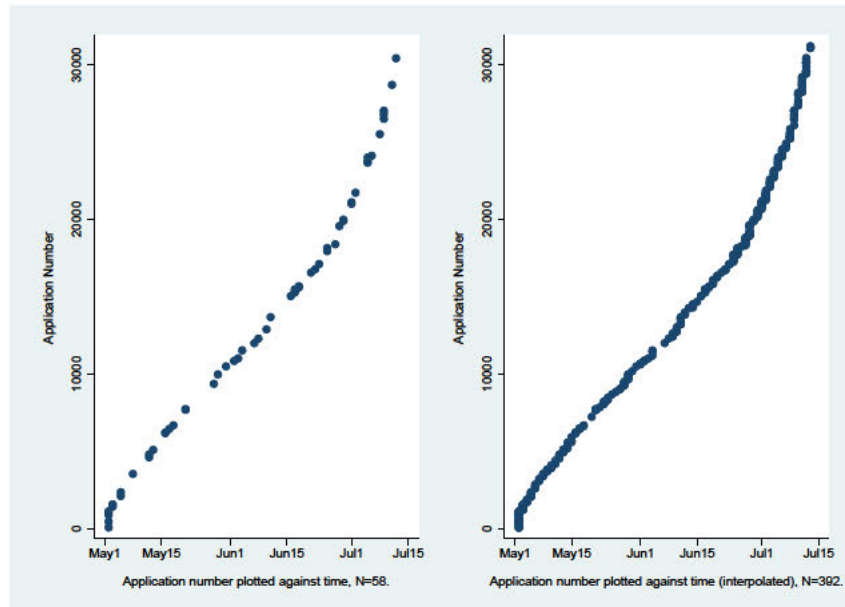
Note: Left panel are the application times plotted against application number, for students who took an assessment center after the submission of documents. The right panel displays the linearly interpolated times, as predicted by the application numbers, which are available for all students. The non-linear relationship reflects that most applications arrive at the beginning and towards the end of the application period.

Figure 13: COVER LETTER, INTRODUCTORY LECTURE ALL GROUPS (ENGLISH).

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STUDIEREN MIT PLAN
an der Fakultät Wirtschaftswissenschaften

Ihre Zeichen/Ihre Nachricht vom	Unser Zeichen	Zimmer

Study with a Plan

Dear Mr/Ms «first name» «last name»,

we are delighted that you have decided to study Business Administration at our university, and we welcome you in ▮▮▮▮. Today we want to introduce you to the program *Study with a Plan*. As the name gives away, it is aimed at helping you to optimally organize your studies.

To this end you will find on the next page an **Exam Plan**, which will enable you to study successfully and without overlapping courses during the first four semesters. After the fourth semester, the intern semester marks an important milestone in the course of your studies. *Study with a Plan* means that you are „**exam free**" after the fourth semester. Therefore, you can enter **without „obligations"** into your internship in the fifth semester, and the following second study period.

Study with a Plan has a number of additional advantages, which we will point out to you in today's lecture. We hope that this information will help you in your studies from the start

In addition you can today give us feedback on the first two weeks at the university. We would appreciate it if you could fill out the attached questionnaire.

We wish you a good and successful start at our department!

With kind regards
Your

Prof. Dr. ▮▮▮▮▮

Vice Dean

Figure 14: COVER LETTER, INTRODUCTORY LECTURE ALL GROUPS (ORIGINAL).

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Studieren mit Plan

Sehr geehrter Herr «vorname» «nachname»,

wir freuen uns, dass Sie sich für ein BWL-Studium an unserer Hochschule entschieden haben, und heißen Sie nochmals herzlich wil kommen in ▓▓▓. Heute möchten wir Ihnen das Programm *Studieren mit Plan* vorstellen. Wie der Name schon verrät, hilft es Ihnen, Ihr Studium optimal zu gestalten.

Zu diesem Zweck finden Sie auf der nächsten Seite einen **Klausurenplan**, der ein erfolgreiches und überschneidungsfreies Studium während der ersten vier Semester ermöglicht. Nach dem 4. Semester stellt das Praxissemester eine Zäsur im Studienablauf dar. *Studieren mit Plan* bedeutet, dass Sie nach dem 4. Semester „klausurfrei" sind. So können Sie das Praxissemester im 5. Semester und den danach folgenden zweiten Studienabschnitt **ohne „Altlasten"** antreten.

Studium nach Plan bringt eine Reihe weiterer Vorteile mit sich, die wir Ihnen in der heutigen Veranstaltung aufzeigen. Wir hoffen, Ihnen mit diesen Hinweisen von Anfang an eine gute Hilfestellung zu geben.

Darüber hinaus erhalten Sie heute die Möglichkeit, uns Feedback zu Ihren ersten zwei Wochen an der Hochschule zu geben. Es würde uns daher freuen, wenn Sie den beiliegenden Fragebogen ausfüllen.

Wir wünschen Ihnen einen guten und erfolgreichen Start an unserer Fakultät!

Mit freundlichen Grüßen
Ihr

Prof. Dr. ▓▓▓

Prodekan

Figure 15: EXAM PLAN, INTRODUCTORY LECTURE ALL GROUPS (ENGLISH).

I.　Study with a Plan – Exam plan for successful studies.

1. Semester

Class	Acronym	Hours	Credit Points (CP)	Passed
Statistik und mathematische Grundlagen	MATH	4	6 CP	☐
Allgemeine Betriebswirtschaftslehre	ABWL	4	6 CP	☐
Organisation	ORGA	4	6 CP	☐
Wirtschaftsprivatrecht	WIPR	4	6 CP	☐
Buchführung und Bilanzierung	BUBI	4	6 CP	☐

CP after 1st Semester　　　　　　　　　　　Target: 30 CP　　Actual:　　CP

2. Semester

Class	Acronym	Hours	Credit Points (CP)	Passed
Volkswirtschaftslehre	VOWL	4	6 CP	☐
Arbeitsrecht	ARBR	4	6 CP	☐
Personal	PERS	4	6 CP	☐
Kosten- und Leistungsrechnung	KOLR	4	6 CP	☐
Steuern	STEU	4	6 CP	☐
PC Praktikum	PCP	Has to be passed before end of 3rd Semester		☐

CP after 2nd Semester　　　　　　　　　　　Target: 60 CP　　Actual:　　CP

3. Semester

Class	Acronym	Hours	Credit Points (CP)	Passed
Marketing	MARK	6	6 CP	☐
Operation Management	OPMG	4	6 CP	☐
Wirtschaftsinformatik	WINF	4	6 CP	☐
Finanzierung und Investition	FINI	6	6 CP	☐
Controlling	CONT	4	6 CP	☐
Englisch	ENGL	Proof of English proficiency before end of 3rd Sem.		☐

CP after 3rd Semester　　　　　　　　　　　Target: 90 CP　　Actual:　　CP

4. Semester

Class	Acronym	Hours	Credit Points (CP)	Passed
Angewandte Volkswirtschaftslehre	AVWL	4	6 CP	☐
Seminar / Planspiel	SEMA/PLSP	4	6 CP	☐
Anwendung BWL-Methoden	ABWM	4	6 CP	☐
Wirtschaftsenglisch	WENG	4	6 CP	☐
Fachbezogene Wahlpflichtfächer	FWPF	4	6 CP	☐

CP after 4th Semester　　　　　　　　　　　Target: 120 CP　　Actual:　　CP

In the rightmost column of this summary you can document your progress in your studies. Check off the exams you have already passed and note the obtained Credit Points. Over the course of your studies this allows you to evaluate whether you are still "on track". If you are, this should motivate you to continue to „Study with a Plan". Otherwise, if needed you can correct your course in time by (re)taking the missing exams.

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Figure 16: EXAM PLAN, INTRODUCTORY LECTURE ALL GROUPS (ORIGINAL).

I.   STUDIEREN MIT PLAN – Klausurenplan für ein erfolgreiches Studium.

	Fach	Abkürzung	SWS	Credit Points (CP)		Bestanden
1. Semester	Statistik und mathematische Grundlagen	MATH	4	6 CP		☐
	Allgemeine Betriebswirtschaftslehre	ABWL	4	6 CP		☐
	Organisation	ORGA	4	6 CP		☐
	Wirtschaftsprivatrecht	WIPR	4	6 CP		☐
	Buchführung und Bilanzierung	BUBI	4	6 CP		☐
	CP nach dem 1. Semester			Soll: 30 CP	Ist:	CP
2. Semester	Volkswirtschaftslehre	VOWL	4	6 CP		☐
	Arbeitsrecht	ARBR	4	6 CP		☐
	Personal	PERS	4	6 CP		☐
	Kosten- und Leistungsrechnung	KOLR	4	6 CP		☐
	Steuern	STEU	4	6 CP		☐
	PC Praktikum	PCP	Muss bis Ende 3. Semester bestanden sein			☐
	CP nach dem 2. Semester			Soll: 60 CP	Ist:	CP
3. Semester	Marketing	MARK	6	6 CP		☐
	Operation Management	OPMG	4	6 CP		☐
	Wirtschaftsinformatik	WINF	4	6 CP		☐
	Finanzierung und Investition	FINI	6	6 CP		☐
	Controlling	CONT	4	6 CP		☐
	Englisch	ENGL	Nachweis Englischkenntnisse bis Ende 3. Semester			☐
	CP nach dem 3. Semester			Soll: 90 CP	Ist:	CP
4. Semester	Angewandte Volkswirtschaftslehre	AVWL	4	6 CP		☐
	Seminar / Planspiel	SEMA/PLSP	4	6 CP		☐
	Anwendung BWL-Methoden	ABWM	4	6 CP		☐
	Wirtschaftsenglisch	WENG	4	6 CP		☐
	Fachbezogene Wahlpflichtfächer	FWPF	4	6 CP		☐
	CP nach dem 4. Semester			Soll: 120 CP	Ist:	CP

In der letzten Spalte dieser Übersicht können Sie Ihren Fortschritt im Studium selbst protokollieren. Haken Sie bestandene Klausuren ab, und notieren Sie die erreichten Credit Points. Im Verlauf des Studiums können Sie so immer wieder prüfen, ob Sie noch „im Plan" sind. Ist dies der Fall, sollten Sie daraus Motivation schöpfen weiterhin „mit Plan zu studieren" – andernfalls können Sie bei Bedarf rechtzeitig gegensteuern und die verpasste(n) Prüfung(en) nachholen.

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Figure 17: Info material, introductory lecture all groups (English).

III. Leaflet addendum to the Exam Plan for successful studies.

a) Why a target agreement?

Agreeing on targets is an instrument that is widely used in business contexts. Specifying goals and writing them down leads to a higher probability of reaching these goals. With the attached target agreement you set for yourself the goal of "Studying with a Plan". Specifically, this means: with the target agreement you and the department aim at studying successfully, according to the Study Plan.

The agreement is therefore a measure by which you make it salient to yourself that you really „take your studies seriously". You get to keep one copy of the agreement for your records, so that you can later remind yourself of the targets that you set for yourself when you started your studies. The intention is to motivate yourself to check the progress you are making in your studies against the study plan, and if necessary to take appropriate actions if you are not progressing as you had planned.

By signing the agreement you are subject to the same consequences that already arise from the official examination rules. In this respect, you can only be better off by signing the contract.

b) Adhering to the study plan – You can do it!

According to the study plan you should expect a workload of 30 Credit Points or 900 hours in every semester (1 CP = 30 hours). This amounts to roughly 45 hours per week over a period of 20 weeks, and it includes the weeks with classes as well as the period of preparing for exams. The workload therefore approximates that of a "regular employee". Under typical circumstances, this is doable!

Accordingly, a 6 CP class comes with a workload of 180 hours, of which 45 hours (15 weeks*3hours class) are reserved for the classes. The remaining 135 hours are your responsibility and are spent independently studying. This corresponds to 6-7 hours per week (assuming 20 weeks including exam preparation). Of course this can only give some rough orientation, and the individual workload can deviate from these numbers.

c) The study plan takes into account the sequence of classes.

Some classes build on other classes, i.e. the lecturers will assume that you have attended introductory classes. This means that certain fundamentals will not be covered again in the more advanced classes.

Some advanced classes (especially in later semesters) can only be taken after certain credit point thresholds have been cleared, or after certain prerequisite exams have been passed. The reason is that only if you have understood the basics these classes can proceed to convey advanced knowledge in an efficient manner.

d) The study plan allows for studying without overlapping classes

Only if you adhere to the study plane it is guaranteed that there will be no overlapping classes. All classes in a specific semester are scheduled in a way that they do not overlap. As soon as you take classes from different semesters, e.g. because you have to retake a class, the times of your classes will almost certainly clash.

e) Plan ahead: core classes.

Core classes are only offered once a year. It is important that you consider this when planning your studies. The best course of action is to adhere to the study plan – the plan makes sure that there will be no lost time, which would ultimately delay your graduation.

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Figure 18: Info material, introductory lecture all groups (Original).

III. Merkblatt zum Klausurenplan für ein erfolgreiches Studium.

a) Warum eine Zielvereinbarung?

Die Vereinbarung von Zielen ist ein Instrument, das verbre tet in Unternehmen zum Einsatz kommt. Das konkrete Ausformulieren und das schriftliche Bestätigen von Zielen führt zu einer höheren Erfolgsquote bei der Erreichung eben dieser Ziele. Sie setzen s ch mit der vorliegenden Vereinbarung das Ziel, „Mit Plan zu studieren". Konkret bedeutet das: Sie selbst und die Fakultät möchten mit der Vereinbarung erreichen, dass Sie erfolgreich nach dem Studienplan studieren.

Die Vereinbarung ist also eine Maßnahme, mit deren Hilfe Sie sich selbst vor Augen führen, dass Sie es „ernst meinen" mit dem Studium. Sie erhalten ein Exemplar der Vereinbarung für Ihre Unterlagen, so dass Sie s ch auch später im Studium immer wieder in Erinnerung rufen, mit welchen Zielen Sie in das Studium gestartet sind. Dies soll Sie motivieren, den Stand Ihres Studiums, d. h. Ihre Fortschritte bei der Zielerreichung mit dem Studienplan abzugleichen, zu evaluieren, und gegebenenfalls Fehlentw cklungen rechtze tig entgegenzusteuern.

Aus der Unterzeichnung der Vereinbarung ergeben sich die selben Konsequenzen, die ohnehin durch die für Sie geltende Prüfungsordnung vorgegeben sind. Insofern können Sie sich durch die Unterschrift nur besser stellen.

b) Den Studienplan einhalten – Sie schaffen das!

In jedem Semester ist laut Studienplan eine Arbeitsbelastung von 30 Cred t Points oder 900 Stunden vorgesehen (1 CP = 30 Stunden). Dies entspricht ca. 45 Stunden pro Woche über einen Ze traum von 20 Wochen und beinhaltet Vorlesungsphase plus Klausurvorbereitung. Damit ergibt sich in etwa die Arbe tsbelastung eines „normalen" Arbeitnehmers. Das ist daher in der Regel gut machbar!

Eine 6 CP Veranstaltung erfordert demnach einen Arbeitsaufwand von 180 Stunden, wovon 45 Stunden (15 Vorlesungswochen*3 Stunden Vorlesung) auf die Vorlesung entfallen. Die restl chen 135 Stunden erbringen Sie eigenverantwortl ch als Selbstlernanteil, was einem Ze taufwand von 6-7 Wochenstunden entspricht (bei angenommenen 20 Wochen inklusive Klausurvorbereitung). Selbstverständlich kann dies nur ein grober Anhaltspunkt sein, und die tatsächl che Lernbelastung im Einzelfall abwe chen.

c) Der Studienplan berücksichtigt die Modulabfolge.

Die Module bauen teilweise aufeinander auf, d. h. die Dozenten setzen bestimmte Kenntnisse voraus. Diese Grundlagen sind dann auch n cht nochmals Bestandteil der fortgeschrittenen Module.

Einige Module (insbesondere in höheren Semestern) dürfen erst nach Erfüllung bestimmter Vorrückungsschwellen bzw. der Erbringung bestimmter Leistungsnachweise absolviert werden. Grund ist der oben genannte: nur wenn gewisse Grundkenntnisse vorhanden sind, können die darauf aufbauenden Inhalte sinnvoll vermittelt werden.

d) Der Studienplan ermöglicht ein überschneidungsfreies Studium.

Nur die Einhaltung des Studienplanes garantiert ein überschneidungsfreies Studium. Die Vorlesungen in den einzelnen Semestern sind ze tlich aufeinander abgestimmt. Sobald Sie Module aus unterschiedlichen Semestern besuchen müssen – z. B. aufgrund einer nicht bestandenen Prüfung – wird es fast zwangsläufig zu Konflikten in Ihren Vorlesungsterminen kommen.

e) Planen Sie voraus: die Teilschwerpunkte.

Teilschwerpunkte werden in der Regel nur einmal pro Jahr angeboten. Es ist w chtig, dass Sie die eigene Studienplanung darauf abstimmen. Am besten gelingt dies, indem Sie den Studienplan befolgen – dieser garantiert, dass Leerlaufzeiten, welche den Studienabschluss verzögern, erst gar nicht entstehen.

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Figure 19: COMMITMENT AGREEMENT (ENGLISH).

II. Target Agreement „Study with a Plan".

By signing this target agreement I declare that in order to successfully graduate I will adhere to the study plan. **In particular, I will take the exams according to the „Exam plan for successful studying", as shown in section I.**

This agreement is between **«first name» «last name»**, and the Economics Department at the University of Applied Sciences ███████████.

_____   _____
Prof. Dr. ████████, Vice Dean   Date, «first name» «last name»

Figure 20: COMMITMENT AGREEMENT (ORIGINAL).

II. Zielvereinbarung „Studieren mit Plan".

Mit der Unterzeichnung dieser Zielvereinbarung erkläre ich, dass ich zum Zweck eines erfolgreichen Studienabschlusses den Studienplan einhalten werde. **Insbesondere werde ich die Klausuren gemäß dem oben unter Punkt I. dargelegten „Klausurenplan für ein erfolgreiches Studium" ablegen.**

Diese Vereinbarung wird getroffen zwischen **«vorname» «nachname»**, und der Wirtschaftswissenschaftlichen Fakultät an der Hochschule für angewandte Wissenschaften ███████████.

_____   _____
Prof. Dr. ████████, Prodekan   Datum, «vorname» «nachname»

Figure 21: Sign-up Letter – Reminder (English).

Hochschule für angewandte Wissenschaften

Herr
«Vorname» «Nachname»
«Strasse»
«PLZ» «Ort»

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Wirtschaftswissenschaften
Dekanat

Ihre Zeichen/Ihre Nachricht vom   Unser Zeichen   Zimmer

Study with a Plan

Dear Mr/Ms «Last Name»,

surely you remember the introductory lecture to *Study with a Plan* which took place in the context of the statistics class. In this lecture you were given important information on how to best organize your studies.

The exam sign-up period for the winter semester is coming up shortly. **In the context of** *Study with a Plan* **we recommend: In the period from 18.11. - 29.11. please use the university website to sign up for at least the following exams:**

Statistics and Mathematics	**MATH**
Business Administration	**ABWL**
Organization	**ORGA**
Civil law	**WIPR**
Accounting	**BUBI**

We hope you enjoy your time at our department and wish you all the best.

Kind regards
Your

Prof. Dr.   , *Vice Dean*

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Figure 22: Sign-up Letter – Commitment (English). Text added to Reminder letter in grey.

Hochschule für angewandte Wissenschaften

Frau
«Vorname» «Nachname»
«Strasse»
«PLZ» «Ort»

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Ihre Zeichen/Ihre Nachricht vom	Unser Zeichen	Telefon	Zimmer

Study with a Plan

Dear Mr/Ms «Last Name»,

surely you remember the introductory lecture to *Study with a Plan* which took place in the context of the statistics class. In this lecture you were given important information on how to best organize your studies and you have signed a target agreement with us.

The exam sign-up period for the winter semester is coming up shortly. **In the context of *Study with a Plan* we recommend: In the period from 18.11. - 29.11. please use the university website to sign up for at least the following exams:**

Statistics and Mathematics	MATH
Business Administration	ABWL
Organization	ORGA
Civil law	WIPR
Accounting	BUBI

We hope you enjoy your time at our department and wish you all the best.

Kind regards
Your

Prof. Dr. ▮▮▮▮▮▮▮, *Vice Dean*

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Figure 23: Sɪɢɴ-ᴜᴘ Lᴇᴛᴛᴇʀ – Rᴇᴍɪɴᴅᴇʀ (Oʀɪɢɪɴᴀʟ).

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Hochschule für angewandte Wissenschaften

Herr
«Vorname» «Nachname»
«Strasse»
«PLZ» «Ort»

Ihre Zeichen/Ihre Nachricht vom   Unser Zeichen   Zimmer

Studieren mit Plan 💡

Sehr geehrter Herr «Nachname»,

sicher erinnern Sie sich an die Einführung in das Programm *Studieren mit Plan* im Rahmen der Statistikvorlesung. In dieser Veranstaltung haben Sie wichtige Tipps zum Studienverlauf erhalten.

Der Anmeldezeitraum für die Prüfungen des Wintersemesters steht unmitte bar bevor. **Im Rahmen von** *Studieren mit Plan* **empfehlen wir: Melden Sie sich bitte im Zeitraum vom 18.11. - 29.11. über die Webseite der Hochschule mindestens zu den folgenden Prüfungen an:**

Statistik und mathematische Grundlagen	MATH
Allgemeine Betriebswirtschaftslehre	ABWL
Organisation	ORGA
Wirtschaftsprivatrecht	WIPR
Buchführung und Bilanzierung	BUBI

Wir wünschen Ihnen weiterhin viel Spaß und Erfolg beim Studieren an unserer Fakultät.

Mit freundlichen Grüßen
Ihr

Prof. Dr.   , *Prodekan*

Figure 24: SIGN-UP LETTER – COMMITMENT (ORIGINAL). TEXT ADDED TO REMINDER LETTER IN GREY.

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Hochschule für angewandte Wissenschaften

Frau
«Vorname» «Nachname»
«Strasse»
«PLZ» «Ort»

Ihre Zeichen/Ihre Nachricht vom   Unser Zeichen   Telefon ████   Zimmer

Studieren mit Plan

Sehr geehrte Frau «Nachname»,

sicher erinnern Sie sich an die Einführung in das Programm *Studieren mit Plan* im Rahmen der Statistikvorlesung. In dieser Veranstaltung haben Sie wichtige Tipps zum Studienaufbau erhalten und mit uns eine Zielvereinbarung geschlossen.

Der Anmeldezeitraum für die Prüfungen des Wintersemesters steht unmittelbar bevor. **Im Rahmen von** *Studieren mit Plan* **empfehlen wir: Melden Sie sich bitte im Zeitraum vom 18.11. - 29.11. über die Webseite der Hochschule mindestens zu den folgenden Prüfungen an:**

Statistik und mathematische Grundlagen	MATH
Allgemeine Betriebswirtschaftslehre	ABWL
Organisation	ORGA
Wirtschaftsprivatrecht	WIPR
Buchführung und Bilanzierung	BUBI

Wir wünschen Ihnen weiterhin viel Spaß und Erfolg beim Studieren an unserer Fakultät.

Mit freundlichen Grüßen
Ihr

Prof. Dr. ████████, *Prodekan*

Figure 25: S<small>TUDY</small> L<small>ETTER</small> – R<small>EMINDER</small> (E<small>NGLISH</small>).

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Study with a Plan 💡

Dear Mr/Ms «First Name» «Last Name»,

Christmas and the New Year are just around the corner. We wish you a peaceful time and a happy new year. Enjoy the upcoming holidays with your family and friends. Please also remember that the exam period starts shortly after the turn of the year.

In the context of *Study with a Plan* we recommend that you start the necessary preparations before the Christmas break. The exam plan prescribes that in the first semester you successfully participate in at least the following exams:

Statistics and Mathematics	MATH
Business Administration	ABWL
Organization	ORGA
Civil law	WIPR
Accounting	BUBI

We wish you all the best for the exams!

Kind regards
Your

Prof. Dr.   , *Vice Dean*

Figure 26: STUDY LETTER – COMMITMENT (ENGLISH). TEXT ADDED TO REMINDER LETTER IN GREY.

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Ihre Zeichen/Ihre Nachricht vom   Unser Zeichen   Telefon ▮   Zimmer ▮

Study with a Plan 💡

Dear Mr/Ms «First Name» «Last Name»,

Christmas and the New Year are just around the corner. We wish you a peaceful time and a happy new year. Enjoy the upcoming holidays with your family and friends. Please also remember that the exam period starts shortly after the turn of the year

On October 10th you have signed a target agreement by which you commit to taking exams according to the „Exam plan for successful studies".

In the context of *Study with a Plan* we recommend that you start the necessary preparations before the Christmas break. The exam plan prescribes that in the first semester you successfully participate in at least the following exams:

Statistics and Mathematics	MATH
Business Administration	ABWL
Organization	ORGA
Civil law	WIPR
Accounting	BUBI

We wish you all the best for the exams!

Kind regards
Your

Prof. Dr. ▮, *Vice Dean*   61

Figure 27: STUDY LETTER – REMINDER (ORIGINAL).

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Studieren mit Plan 💡

Sehr geehrter Herr «vorname» «nachname»,

Weihnachten und der Jahreswechsel stehen vor der Tür. Wir wünschen Ihnen eine besinnliche Zeit und ein glückliches neues Jahr. Genießen Sie die bevorstehenden Feiertage im Kreis Ihrer Familie und mit Freunden. Bitte denken Sie auch daran, dass kurz nach dem Jahreswechsel die Prüfungszeit ansteht.

Im Rahmen von *Studieren mit Plan* empfehlen wir Ihnen, noch vor der Weihnachtspause mit den notwendigen Vorbereitungen zu beginnen. Der Klausurenplan sieht vor, dass Sie im ersten Semester mindestens die folgenden Prüfungen erfolgreich ablegen:

Statistik und mathematische Grundlagen	MATH
Allgemeine Betriebswirtschaftslehre	ABWL
Organisation	ORGA
Wirtschaftsprivatrecht	WIPR
Buchführung und Bilanzierung	BUBI

Wir wünschen Ihnen viel Erfolg für die Prüfungen!

Mit freundlichen Grüßen
Ihr

Prof. Dr. ████████, *Prodekan*

Figure 28: STUDY LETTER – COMMITMENT (ORIGINAL). TEXT ADDED TO REMINDER LETTER IN GREY.

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Studieren mit Plan 💡

Sehr geehrter Herr «vorname» «nachname»,

Weihnachten und der Jahreswechsel stehen vor der Tür. Wir wünschen Ihnen eine besinnliche Zeit und ein glückliches neues Jahr. Genießen Sie die bevorstehenden Feiertage im Kreis Ihrer Familie und mit Freunden. Bitte denken Sie auch daran, dass kurz nach dem Jahreswechsel die Prüfungszeit ansteht.

Sie haben am 10. Oktober eine Zielvereinbarung unterzeichnet, in der Sie sich selbst verpflichten, Ihre Prüfungen gemäß dem „Klausurenplan für ein erfolgreiches Studium" abzulegen.

Im Rahmen von *Studieren mit Plan* empfehlen wir Ihnen, noch vor der Weihnachtspause mit den notwendigen Vorbereitungen zu beginnen. Der Klausurenplan sieht vor, dass Sie im ersten Semester mindestens die folgenden Prüfungen erfolgreich ablegen:

Statistik und mathematische Grundlagen	MATH
Allgemeine Betriebswirtschaftslehre	ABWL
Organisation	ORGA
Wirtschaftsprivatrecht	WIPR
Buchführung und Bilanzierung	BUBI

Wir wünschen Ihnen viel Erfolg für die Prüfungen!

Mit freundlichen Grüßen
Ihr

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Prof. Dr. ████████, *Prodekan*

Appendix: Robustness of the model

This section discusses the robustness of the model we analyzed in Section 2.

Reward and the soft commitment device. The soft commitment device may not only raise the student's utility of taking the exam, but also her reward of passing the exam. Formally, the student's payoff in case she succeeds, R_i, may increase. As we can see from formulas (3) and (5), by the Envelope Theorem, $du_i(w_i = 1)/dR_i = \partial u_i(w_i = 1)/\partial R_i = \beta_i \delta_i^\tau \bar{p}_i > 0$, while $du_i(w_i = 0)/dR_i = 0$. Thus, as long as $\bar{p}_i R_i + (1 - \bar{p}_i)L_i > 0$ and $\underline{p}_i R_i + (1 - \underline{p}_i)L_i < 0$ hold true[45] – i.e., taking the exam is only optimal in case of learning – raising R_i has exactly the same effect as raising Z_i.

The case $\bar{p}_i R_i + (1 - \bar{p}_i)L_i \leq 0$. We have previously concentrated on the scenario where students prefer to take the exam when they have studied. If this is not true, i.e., $\bar{p}_i R_i + (1 - \bar{p}_i)L_i \leq 0$, the following results are immediate. This type of students does not take the exam without a soft commitment device (even if preferences are time-consistent), but might be motivated to study and take the exam with the soft commitment device. Thus, as with other types of students, the soft commitment device at least weakly increases the study effort and willingness to take the exam.

More outcomes. Suppose there are $K > 2$ possible outcomes for the student if she takes the exam. We denote student i's payoff for outcome $y_k \in \{y_1, ..., y_K\}$ by $\Psi_{i,k}$. Let the probability of outcome y_k when she invests effort $e_i = 1$ be $\bar{\pi}_{i,k}$, while it is $\underline{\pi}_{i,k}$ if her effort is $e_i = 0$. We can then rewrite (3) as

$$u_i(w_i = 1) = \beta_i \delta_i^\tau \sum_{k=1}^{K} \bar{\pi}_{i,k} \Psi_{i,k} - c_i. \tag{20}$$

The thresholds are thus

$$\bar{\beta}_i = \frac{c_i}{\delta_i^\tau \sum_{k=1}^{K} \bar{\pi}_{i,k} \Psi_{i,k}} \quad \text{and} \quad \bar{\beta}_i\big|_{\text{SCD}} = \frac{c_i}{\delta_i^\tau \left[\sum_{k=1}^{K} \bar{\pi}_{i,k} \Psi_{i,k} + Z_i\right]}. \tag{21}$$

Hence, as in case of two outcomes, it holds that $0 < \bar{\beta}_i\big|_{\text{SCD}} < \bar{\beta}_i < 1$, which is why the previously derived insights stay qualitatively unchanged.

Continuous effort. If effort is continuous, i.e., $e_i \in \mathbb{R}^+$, the first-order condition of the student's effort choice problem, given that she wants to take the exam, is

$$\frac{du_i(w_i = 1, e_i)}{de_i} = \beta_i \delta_i^\tau \frac{d\text{prob}_i\left(y_i = 1 | w_i = 1, e_i\right)}{de_i}(R_i - L_i) - \chi_i'(e_i) = 0. \tag{22}$$

The optimal effort level $e_i^*(w_i = 1)$ is a solution of the first-order condition. It exists, is positive, and unique under the following regularity conditions: (i) the effort cost function $\chi(e_i)$ is

---

[45]If the soft commitment device causes that $\underline{p}_i R_i + (1 - \underline{p}_i)L_i \geq 0$, taking the exam is optimal for a student also if she does not study. The soft commitment device then increases the number of students that take the exam, but lowers the rate of success. This is not the case in our data.

increasing, convex, and satisfies $\chi_i'(0) = 0$ and (ii) the success function $\text{prob}_i\left(y_i = 1 | w_i = 1, e_i\right)$ is increasing and weakly concave in e_i. Note that $e_i^*(w_i = 0) = 0$, i.e., the student optimally invests zero effort if she does not want to take the exam. The student decides to invest study effort $e_i^*(w_i = 1)$ and take the exam if and only if[46]

$$u_i(w_i = 1, e_i^*(w_i = 1)) \geq u_i(w_i = 0, e_i^*(w_i = 0)). \tag{23}$$

It is readily shown that the soft commitment device leaves the two effort levels $e_i^*(w_i = 1)$ and $e_i^*(w_i = 0)$ unchanged. Thus, also with continuous effort, only two effort levels are relevant for the student. We can hence interpret the binary effort specification $e_i \in \{0, 1\}$ as a reduced form of the continuous effort specification.

Soft commitment device and effort. In the base model as well as in the extensions we considered above, the soft commitment device may motivate students to take the exam and thus to increase their efforts, but students that take the exam invest a constant level of effort. This implies that the probability of passing an exam is not influenced by the soft commitment device. To see that the soft commitment device may also change the effort of students conditional on taking the exam, consider the model with continuous effort and suppose that the soft commitment device raises the student's reward of passing the exam. Implicitly differentiating the first-order condition (22) reveals that also conditionally on taking the exam does the soft commitment device increase students' efforts and thus the probability of passing:

$$\frac{de_i^*(w_i = 1)}{dR_i} = -\frac{\beta_i \delta_i^\tau \frac{d\text{prob}_i\left(y_i=1|w_i=1,e_i^*(w_i=1)\right)}{de_i}}{\beta_i \delta_i^\tau \frac{d^2\text{prob}_i\left(y_i=1|w_i=1,e_i^*(w_i=1)\right)}{de_i^2}(R_i - L_i) - \chi_i''(e_i^*(w_i = 1))} > 0. \tag{24}$$

[46]Note that as in case effort is binary, $e_i \in \{0, 1\}$, it is indeed optimal for the student to take the exam if she has planed to take the exam and invested effort $e_i^*(w_i = 1)$. Technically, since effort costs are sunk at this time, whenever $u_i(w_i = 1, e_i^*(w_i = 1)) \geq u_i(w_i = 0, e_i^*(w_i = 0))$ holds true, $\text{prob}_i\left(y_i = 1 | w_i = 1, e_i^*(w_i = 1)\right)R_i + \left(1 - \text{prob}_i\left(y_i = 1 | w_i = 1, e_i^*(w_i = 1)\right)\right)L_i > 0$.