

# Every Book You Take

## Evaluating Compliance Behavior in an Information Commons

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### Abstract

There has been a heated debate related to the effects of business background on ethical behavior. According to some authors, students majoring in business courses – such as accounting, economics, and management – would be more likely to free ride or defect from coalitions in collective action situations, given the emphasis of such courses on individualistic values. Other authors have challenged that view, presenting empirical evidence that questions the link between business education and opportunistic behaviors. The present paper revisits this debate, by studying the impact of business education on rule compliance in a specific type of information commons (libraries). Employing a novel dataset related to more than 700,000 library transactions during a 10-year period (2006-2015), I correlate business background with users' compliance behavior, while controlling for their time-invariant characteristics. I find no evidence of a significant effect of business education on rule compliance in this specific setting. The results reported in the paper have important implications for ethical theories in business and economics, with an emphasis on standard explanations of organizational behavior.

**JEL Classification:** A12, A13, Z13.

**Keywords:** business ethics; economists' behavior; information commons; organizational behavior; rule compliance.

## 1. INTRODUCTION

“Books are the best things, well used: abused, among the worst.”

– Ralph Waldo Emerson, *American Scholar*, 1837

During the last decades, some authors emphasized the individualistic approach followed by economists and business students. In particular, there is the possibility that undergraduates who major in business would be more likely to free ride or defect from coalitions in collective action situations (Carter & Irons, 1991; Frank et al., 1993; Marwell & Ames, 1981). One implication of this line of reasoning is that studying economics may affect cooperation, or ethical behavior, broadly defined (Ruske 2015; Frey and Meier 2003; 2005). On the other hand, contributions published since the mid-nineties have challenged that view, by presenting empirical evidence that questions the link between business education and opportunistic behaviors (Delis, Hasan, and Iosifidi 2019; Godos-Díez, Fernández-Gago, and Cabeza-García 2015; Frey and Meier 2003, 2005; Meier and Frey 2004; Yezer, Goldfarb, and Poppen 1996).

The present paper revisits this debate, by evaluating the impacts of business education on compliance behavior in a specific type of common-pool resource, an information commons (Hess & Ostrom, 2007a, 2007b; Rosen & Carr, 1997). I study the behavior of library users covering more than 700,000 transactions during a 10-year period. Specifically, I have access to confidential daily data related to library users of a private university in São Paulo, Brazil, containing detailed information on 16,232 individual users, covering 723,171 daily transactions for the 2006-2015 period. The observational data used in this paper presents three advantages for testing the effects of a business education on behavior, when compared to previous contributions. The first advantage relates to its longitudinal aspect: since I am able to follow individual users across time, I present econometric estimations in which I can control for their time-invariant characteristics (fixed effects), an important source of non-observable bias in some settings, as suggested by previous research (Delis et al., 2019). The second advantage refers to the possibility of comparing the behavior of business students to a broader group of students, when compared to previous studies which focused on specific

groups (Cadsby & Maynes, 1998; Frank et al., 1993; Yezer et al., 1996). Finally, the third advantage corresponds to the possibility of tracking the behavior of distinct categories of library users (students, professors, and employees) over time, an advantage in terms of external validity, given the usual criticisms on laboratory experiments based exclusively on student subjects (Fréchette, 2015; Kagel, 2009).

Libraries arguably constitute an ideal setting for studying rule compliance, since they clearly establish specific return dates for items checked out by users, and send electronic reminders before (and after) they are due back (Apesteguia et al., 2013). The existence of a number of variables related to library loans – such as dates of devolution, and number of books per user – allows me to build simple performance measures to evaluate compliance in this setting, such as frequency of delays, and the number of books borrowed by individual users, for example (more details below). Additionally, given the nature of the data, I am able to track users according to their personal information, such as identification number, university category (high school, undergraduate, masters, MBA, former student, professor, and employee), and area of study (management, accounting, economics, international relations, advertising, and secretariat). These features of the data allow me to explore distinct combinations of background and user category, while not being limited to student behavior, only.

The main result of the paper is the following: when estimating the effects of business background on compliance behavior in libraries, I cannot find a significant effect in this specific setting. That is, library users with a business background – such as accounting, economics, or management – do not present statistically significant differences when compared to users with other backgrounds. This result is robust to several specification issues, such as sample selection, estimation techniques, and omitted variable bias. The paper's main result is in line with recent contributions in business ethics that question the influence of business education on individual orientations and political views (Delis et al., 2019; Godos-Díez et al., 2015). More than that, they have important implications for diverse areas, such as political economy (Beach & Jones, 2016; Ruske, 2015b), and ethical theories of management (Arikan, 2018; Melé, 2009; Surprenant, 2017), for example. The results

reported in this paper suggest that compliance behavior is a hypothesis that is context-dependent, and may need to be reformulated in some occasions.

The remainder of the paper proceeds as follows. Section 2 presents a selective description of the related literature, as well as its relation to the contributions in this paper. Section 3 describes the institutional setting under study, while section 4 describes the data and research design employed in the empirical analysis. Section 5 contains the paper's main results, as well as several related robustness checks. Finally, section 6 concludes.

## **2. RELATED LITERATURE**

In this section, I discuss some of the contributions related to the debate regarding the influence of business background on behavior. In doing so, I have two goals: (i) to highlight this paper's specific contributions to distinct literatures, and (ii) to motivate the main hypotheses under test in the empirical section of the paper.

### *Contributions*

This paper brings four main contributions to distinct literatures. First, the results here reported relate to a sparse set of contributions focused on the behavior of economists in laboratory and field settings (Carter & Irons, 1991; Frank et al., 1993; Marwell & Ames, 1981; Yezer et al., 1996). While the latter contributions focus on the sole behavior of economists, the present paper evaluates the interactions of library users from distinct areas of knowledge, such as management, accounting, international relations, advertising, and secretariat, following recent contributions that relate the effects of a business education on observed behavior (Delis et al., 2019; Godos-Díez et al., 2015). These results contribute to the literature by contextualizing economists' behavior in a naturally occurring situation, when compared to other areas (Bauman and Rose 2011; Cadsby and Maynes 1998; Fosgaard, Fosgaard, and Foss 2017; Frey and Meier 2003, 2005; Meier and Frey 2004; Rubinstein 2006). By emphasizing differences based on area of expertise, the results in this paper contribute to a better understanding of the effects of specific social factors – such as identity, culture, and

social norms – on observed behavior (Acemoglu & Jackson, 2017; Akerlof & Kranton, 2000, 2005; Alesina & Giuliano, 2015; Bénabou & Tirole, 2011; Henrich et al., 2001).

Second, given that library users may face sanctions for late items in the libraries under study, the results here presented dialogue with the economic literature on crime, and its applications (G. S. Becker, 1968; Chalfin & McCrary, 2017; Polinsky & Shavell, 2000). An important discussion in the field of law and economics relates to the merits of alternative ways to deter illicit behavior. The classical economic model of crime predicts that, either monetary sanctions – such as fines – or non-monetary sanctions – such as imprisonment – can work as a deterrence factor for illicit activities (G. S. Becker, 1968; Stigler, 1974). While most contributions in the economics literature focused on the deterrent effects of imprisonment, the tradeoff among distinct types of punishment has received far less attention (Piehl & Williams, 2011). In fact, discussions comparing fines to imprisonment suggest that, under certain conditions, the former may be preferred over the latter, especially in terms of economic efficiency, since they correspond to mere transfers of money across society (Polinsky & Shavell, 2000)<sup>i</sup>.

Third, when comparing the behavior of users subject to different kinds of sanctions (monetary and non-monetary), the present paper adds to a transdisciplinary literature on the importance of distinct types of incentives. In fact, there is not a clear consensus among social scientists in terms of the superiority of monetary sanctions over other forms of punishment (Gneezy et al., 2011; Kamenica, 2012; Surprenant, 2017). Although there exists some evidence from laboratory experiments suggesting that different types of sanctions can affect behavior through distinct channels (Fehr & Gächter, 2000; Masclet, Noussair, Tucker, & Villeval, 2003), the available evidence presents mixed results, either in terms of naturally occurring situations (Bar-Ilan & Sacerdote, 2004; Frey & Meier, 2003, 2004; Gneezy & Rustichini, 2000a; Meier & Frey, 2004) or field experiments (Apesteguia et al., 2013; Bandiera et al., 2011; Cárdenas & Ostrom, 2004; Chetty et al., 2014; Haselhuhn et al., 2012; Huck & Rasul, 2010). In this sense, the present paper brings new results to an open debate, by evaluating the behavior of users that respond to distinct types of incentives in a naturally occurring setting<sup>ii</sup>.

Finally, the results here presented dialogue with an established literature related to social dilemmas, with a special emphasis on common-pool resource management (Demsetz, 1967; Hardin, 1968; Olson, 1965; Ostrom, 1990, 1999, 2010). Although there exists a large volume of evidence related to social dilemmas in artificial settings – such as laboratory experiments (Dawes and Thaler 1988; Falk and Heckman 2009; Kagel 2009) – the present paper reports results in a naturally occurring setting, along the lines of recent studies (Bauman & Rose, 2011; Fehr & Leibbrandt, 2011; Frey & Meier, 2003, 2004; Gneezy et al., 2016). Most previous contributions in the literature emphasized examples related to themes such as forests, fisheries, and wildlife in general (Cárdenas, 2003; Dietz et al., 2003; Fehr & Leibbrandt, 2011; Ostrom, 2007; Rustagi et al., 2010). Here I present an example of application related to an information commons. It is also worth noting that most contributions related to the inner workings of libraries have not explored collective action problems, such as those related to public goods provision, and common-pool resource management (Apesteguia, Funk, and Iriberry 2013; Getz 1989; Koechlin 2010; Paloheimo, Lettenmeier, and Waris 2015). This paper differs from previous contributions by expanding the scope of analysis and focusing on the internal dynamics of an information commons (Bollier 2007; Hess and Ostrom 2007a; 2007b).

### *Testable Hypotheses*

The main hypotheses to be tested in this paper come from previous contributions related to the behavior of economists in laboratory and field settings. In a seminal paper, Marwell and Ames (1981) ran laboratory experiments testing the behavior of economists in public goods games. The authors reported the results of twelve experiments testing two versions of the free rider hypothesis. They concluded that economists, when represented by graduate students, tend to free ride considerably more than other subjects, with reported differences in contributions being statistically significant. According to the authors, there were two possible explanations for their results: first, students worried about economic incentives might self-select in economics (“selection hypothesis”); second, as time goes by, economics students may adapt their behavior to the theories they study (“indoctrination hypothesis”).

Carter and Irons (1991) explored the robustness of Marwell and Ames' (1981) results by implementing a simple ultimatum bargaining game experiment to test whether economics students behave accordingly to the predictions of rational choice models. The authors reported a result in which economics students, when playing the role of 'responders' in ultimatum games, accepted less money offers, while keeping more when in the role of 'proposers'. They also presented empirical evidence trying to disentangle "selection" and "indoctrination" effects among the experiment's subjects. In this case, results were mixed: while self-selection seemed to play a role in the choices reported, the same was not true for indoctrination effects. Overall, the authors concluded that, although the evidence is not conclusive, "(...) *economists are different*" (Carter & Irons, 1991, p.177).

Frank, Gilovich, and Reagan (1993) investigated if exposure to self-interest models commonly used in economics affected students' behavior. The authors presented extensive evidence related to situations in which economics students might behave opportunistically when compared to students from other areas. For example, in one occasion, the authors ran 267 prisoners' dilemma experiments involving economics majors, as well as non-majors. When comparing defection rates between the two groups, they reported a 60.4% defection rate for economics majors, which was considerably higher than the value reported for non-majors (38.8%). Interestingly, the authors also noticed that overall defection rates declined significantly as students advanced in school. They concluded that: (i) there were large differences in the extent to which economists and non-economists behaved self-interestedly; (ii) however, there were occasions when economists behaved in traditionally communitarian ways; and (iii) there were some evidence suggesting that differences in cooperativeness were caused in part by economics courses.

Yezer, Goldfarb and Poppen (1996) questioned the validity of Frank, Gilovich and Regan's (1993) study. According to the former authors, it was not obvious that exposure to economics would encourage less cooperative behavior. In particular, they emphasized the importance of drawing inferences based on subjects' behavior in actual (as opposed to hypothetical) situations. The authors presented the results of an interesting experiment, in which they dropped envelopes containing money in classrooms before classes begun (the 'lost-letter experiment'). In this case, the return rate on lost letters was used as a measure of cooperation.

The results of such an experiment suggested a considerable difference in cooperation rates between economics and non-economics majors. Contrarily to the evidence presented by Frank, Gilovich and Regan (1993) and other authors, Yezer, Goldfarb and Poppen's (1996) results suggest that economics students are far more cooperative than students from other disciplines.

Given the above contributions, I test two alternative hypotheses in a library setting<sup>iii</sup>:

Hypothesis 1 (*Selection Hypothesis*). Library users who present lower rates of rule compliance tend to choose business courses.

In the case of the first hypothesis, we would expect that this type of user – as reflected partly by their choice of study – would have, on average, a different type of compliance behavior even when personal characteristics are controlled for. That is, users with lower compliance levels would self-select into business courses.

Hypothesis 2 (*Indoctrination Hypothesis*). Library users with a business background – such as accounting, economics, and management – tend to be indoctrinated by the exposition to business courses.

In the case of the later hypothesis, we would expect that rule compliance differences between business and non-business users would increase as the first group would receive more training in business theories. That is, exposition to business concepts and theories would indoctrinate users in the sense of affecting their compliance behavior.

It is worth noting that the main goal of this paper is to correlate library users' business background with their rule compliance behavior. Contrarily to some of the previously cited contributions, the present paper does not focus on opportunistic behaviors, such as free-riding. Given that the delays of some users may generate negative externalities to others in a library setting, the results here reported may be interpreted as a contribution to social dilemmas, with an emphasis on rule compliance, as mentioned above.



### 3. INSTITUTIONAL BACKGROUND

In this paper, I study the behavior of library users covering more than 700,000 transactions during a 10-year period. I have access to confidential daily data related to library users of a private university in São Paulo, Brazil, for the 2006-2015 period. Specifically, the data contain detailed information on 16,232 individual users, covering 723,171 daily transactions. This corresponds to an unbalanced panel, since each user may borrow different numbers of specific library items at distinct moments. For example, one user may borrow two books on March 1<sup>st</sup>, and then borrow one more book on March 3<sup>rd</sup>, before returning previous items.

The private university under study has a long-standing tradition of offering business courses – such as accounting, economics, and management – at several levels, such as high school, undergraduate, graduate, and MBA courses. In terms of its undergraduate catalog, the university also offers additional courses, that I label as “non-business”, such as international relations, advertising, and secretariat. The university has three campi in distinct locations of São Paulo. One important information regarding the libraries studied in this paper relates to their location and size. These libraries belong to different *campi* of the same university, two located in central neighborhoods in São Paulo (named units 1 and 2, for confidentiality reasons), and one located in an upper-class neighborhood (unit 3). Unit 1 is the oldest and largest library of the three: founded in 1902, it contained 31,193 books in the 2015 year. In the case of unit 2, it dates from 2006, and contains 2,883 books. Finally, unit 3 dates back to 2011, having 883 books.

The data contain information on users’ socioeconomic characteristics – such as gender, date of birth, and address – as well as library’s confidential information, with each user’s identification number, university category (high school, undergraduate, master’s, MBA, former student, professor, and employee) and area of study (management, accounting, economics, international relations, advertising, and secretariat). For each user in the data, I am able to identify her department and category. This information allows me to build additional performance measures for each user in the sample, such as the number of items that she borrows every time she goes to the library, as well as measures of delays over time

(equal to the difference between the predicted and effective devolution dates for each item borrowed). I also build measures of early returns (in the case of users who return books before the predicted date), and books' usage (equal to the number of times that users pick a specific book). I complement the data with academic calendar information related to exam weeks occurred in the university over time.

The data also contain the dates when each user borrowed specific items from the library, as well as each item's code, and title. Based on the latter information, I build a measure of area of expertise for each book in the sample, based on the Dewey Decimal Classification (DDC). Specifically, I label all the books in the data according to ten specific classes: (i) "000 – Computer science, information and general works"; (ii) "100 – Philosophy and psychology"; (iii) "200 – Religion"; (iv) "300 – Social sciences"; (v) "400 – Language"; (vi) "500 – Pure science"; (vii) "600 – Technology"; (viii) "700 – Arts & recreation"; (ix) "800 – Literature", and (x) "900 – History & geography"<sup>iv</sup>.

I also have access to libraries' official yearly reports. These reports contain rich institutional information related to the internal workings of all libraries under study. Based on this information, I am able to calculate the predicted devolution date for each user in the sample. Table 1 presents information related to the workings of the libraries studied in this paper. The table's first column contains information on the number of library items that each user can borrow, based on the category that she belongs (named "Item Counts"). The table's second and third columns contain the number of loan days per user category ("Loan Days"), as well as the distinct types of sanctions they face in the case of delays ("Sanction Type"), respectively:

**[INSERT TABLE 1 HERE]**

In this specific case, the library's electronic system imposes a rule of 15 days for professors and masters' students, and seven days, for all other users. Each user can renew books after the predicted devolution date expires, conditional on a waiting list managed by library staff. Although I do not have access to information on such lists' content, I can observe when users

renew library items by comparing the dates of loans of the same item over time. There are also differences in terms of the number of items that each user can borrow from the library: while professors and masters' students can borrow a maximum limit of seven items, students can borrow a maximum of five, and university employees can borrow three items, only.

Another important information related to the libraries under study concerns the sanctions deployed to avoid item delays, as well as its enforcement. Basically, the libraries employ two types of sanctions: (i) fines, and (ii) daily suspensions. In the case of the first type of sanctions (fines), they are valid for specific user categories, such as high school, undergraduate, graduate students, and former students (who are allowed to use the libraries after graduation). Specifically, in the case of delays, users in the above categories should pay a daily fine of R\$ 2.00 ("dois reais", or approximately US\$ 0.35, in 2021 dollars) for each delayed item. For example, if an undergraduate student returns two books with a delay of one day each, she has to pay a total value of R\$ 4.00 in fines. On the other hand, in the case of the second type of sanctions (daily suspensions), they are valid for professors, as well as university employees. In the latter case, users with delays face a penalty of three days for each delayed item. For example, if a professor returns two books with a delay of one day each, she has to face a suspension of six days from library services.

During the research stage for this paper, I had several official reunions with the libraries' staff, as well as informal conversations with some of its members. Based on those reunions, I was informed that the enforcement of sanctions by the staff was not perfect. That is, the fact that a user has delays in returning library items does not necessarily imply that she would effectively pay a corresponding fine or face daily suspensions. Additionally, in the case of one type of sanctions (fines), its nominal value remained the same (R\$ 2.00) for a period of approximate ten years (2006-2015). That is, the fines imposed by the library lost value in real terms, given the occurrence of a positive rate of inflation during the sample period under study. Although I try to control for such possibilities in the econometric estimations below, it is worth noting that they probably have important consequences in terms of the incentives faced by library users in this setting (more details below)<sup>v</sup>.

## 4. MATERIAL AND METHODS

### *Empirical Specification and Testable Hypotheses*

In this section I describe the empirical strategy employed in the paper. To assess the importance of business background on compliance behavior in the present setting, I estimate (1) via Ordinary Least Squares (OLS):

$$(1) \quad Y_{ist} = \alpha + \beta(\text{Business}) + X_{ist}\gamma + Z_{st}\lambda + \delta_t + \theta_{st} + \varepsilon_{ist}$$

In the case of the above specification,  $Y_{ist}$  represents the delay for an individual user  $i$ , in library  $s$ , at instant  $t$ . The term “*Business*” corresponds to an indicator variable, which assumes unity value for users with a business background, and 0, otherwise. I include users’, books’, and libraries’ dummies as controls in the regressions below (captured by the term  $\alpha$ ), as well as month-year interactions to capture the effects of aggregate events ( $\delta_t$ ). In the case of the term  $\varepsilon_{ist}$ , it has a conditional mean of zero ( $E(\varepsilon_{ist} | s, t) = 0$ ). The parameter of interest in this context is  $\beta$ , which measures the effects of business background on compliance behavior. It is important to note that the estimates reported here do not have a causal interpretation<sup>vi</sup>.

## 5. RESULTS

In this section, I present the results of the empirical analysis developed in the paper. The section contains three subsections: (i) descriptive statistics, (ii) main results, and (iii) robustness checks. I discuss each of these subsections in greater detail below.

### *Descriptive Statistics*

Table 2 presents descriptive statistics for the main variables used in the paper. The table’s first and second columns display mean values for each variable, as well as the associated

standard deviations, respectively. The table considers the total sample, as well as its main subsamples (“business” and “non-business” users).

**[INSERT TABLE 2 HERE]**

For the main period of analysis in this paper (2006-2015), I observe 723,171 library transactions, made by more than 16,000 users. These users are, on average, 26 years old, with similar proportions in terms of gender. Among these users, 22% are in their first year in college, while 37% holds a scholarship. In terms of categories, most library users are either undergraduates (66%) or MBA students (21%). In terms of performance measures, users borrow, on average, 2.65 library items, while keeping them for an approximate period of 7.42 days. Book delays are around 1.42 days, with their frequency being around 40% (there is a similar proportion – in terms of magnitude – for early returns). In terms of areas of study, the vast majority of users have a background in either accounting (36%), management (33%), or economics (14%), with a total proportion of 84% users with a business background. The other users have a background in international relations (5%), advertising (4%), and secretariat (2%), as well as other courses which do not have a precise business definition. This is an intuitive result, given the fact that the university in which the libraries are located corresponds to a business school. On the other hand, it is worth noting that there are significant differences – in terms of descriptive statistics – between the business and non-business samples, which could bias some of the conclusions discussed below. I investigate the effects of such differences in the robustness section.

Graph 1 presents boxplots based on the subsamples under study. I build this graph to facilitate the visualization of the main differences among business and non-business users<sup>vii</sup>.

**[INSERT GRAPH 1 HERE]**

### *Main Results*

In this section, I present the results of the empirical analysis performed in the paper. Table 3 contains the results of OLS estimations for the 2006-2015 period. In the table, the dependent

variable corresponds to delays per user in the period, measured in days. The table's first column corresponds to an econometric specification for equation (1) with no controls. In the table's second column, I add a rich set of user dummies to capture their time-invariant characteristics: gender, age group, area of study, and time at school. In the third column, I also include library dummies, such as their location, staff size, as well as books' DDC classifications. In the fourth and fifth columns, I repeat the previous specification, but I include month-year dummies, in order to control for the impacts of aggregate shocks that may affect the results, given the extended period covered in the sample (2006-2015). In the case of all estimations, I cluster standard errors by the number of library users in the sample<sup>viii</sup>.

**[INSERT TABLE 3 HERE]**

One main result emerges from the table: there is not a statistically significant effect of library users' business background on rule compliance, as measured by book delays. Although there are differences in terms of the adequacy of each specification – given by the values of the adjusted coefficient of determination,  $R^2$  – I find no effect of business background on delays. That is, contrarily to previous contributions relating business background to opportunistic behaviors (Bauman & Rose, 2011; Carter & Irons, 1991; Ruske, 2015), I cannot find a significant effect of such a background on compliance behavior. This result is in line with recent contributions in economics and business ethics that question the influence of business education on important behavioral traits, such as individual orientation, cooperation, and political views, for example (Delis et al., 2019; Frey & Meier, 2003, 2005; Godos-Díez et al., 2015; Meier & Frey, 2004). Although these are interesting results, they could be biased for several reasons, such as the choice of specific estimation techniques, sample selection issues, and omitted variable bias, for example. Given these possibilities, I present the results of several robustness checks in the next section.

### *Robustness Checks*

In the previous section, I reported a result in which business background does not affect compliance behavior in a library setting. Although this is an interesting result, it may be biased for several reasons. In this section, I present results from distinct robustness tests to validate the main results reported above<sup>ix</sup>.

Table 4 presents the results of estimations focused on testing the alternative hypotheses described above (“selection” and “indoctrination”), as originally suggested by previous studies in the literature. Specifically, following the contributions of Frey and Meier (2003, 2004, 2005), I run probit regressions for a specific subsample including undergraduate students only, in which the dependent variable corresponds either to (i) the frequency of delays (denoted “Freq(Late)”), or (ii) the frequency of early book returns (“Early”). I do this to evaluate the effects of business background on the compliance behavior of specific users. If selection effects prevail in this setting, then one should expect a result in which undergraduates who were not exposed to economic concepts (such as freshmen) would present a worst performance – in terms of compliance behavior – when compared to others (such as seniors and main stage students). On the other hand, if indoctrination effects prevail, then one would expect a situation in which undergraduates who were more exposed to economic concepts (such as seniors and main stage students) would present a worst performance, when compared to freshmen.

**[INSERT TABLE 4 HERE]**

The results obtained from such an experiment suggest that, on average, freshmen present a worst performance, in terms of rule compliance, when compared to other undergraduates. Specifically, students in their first year of college present a higher frequency of delays in returning books, when compared to more advanced students, at the same time that present a lower frequency of early returns. In general terms, these results favor the “selection hypothesis”; that is, business students tend to self-select in such courses. Additionally, these

results suggest that business background does not affect the compliance measures considered in the table, in accordance with previous results reported in the paper.

In Table 5, I present estimates in which I substitute the dependent variable with alternative measures of library users' compliance. These variables are the following: the effective duration of loans (in days), the proportion of early devolutions, the frequency of delays, the number of books borrowed by each user, and the number of fines imposed on them. Given the distinct nature of each one of these dependent variables, I employ different estimation methods. In the first column of the table, I present the results of OLS estimations, correlating business background and loans' effective duration. In the second and third columns, I present results of Probit estimations, since the dependent variables in these columns correspond to a proportion between zero and one. In the fourth and fifth columns, I employ count-data models, based on the Negative Binomial distribution. I employ such models, since the dependent variables in these columns correspond to count data (non-negative integer numbers), with overdispersion patterns.

In the second part of the table – columns (6) to (9) – I redo the estimations containing delays as the dependent variable, but employing different estimation methods. In this specific case, given the fact that library delays correspond to a count data variable with a large proportion of zeros, I present estimations based on the Poisson and Negative Binomial models, as well as its zero-inflated versions (in which the term “ZIP” denotes “Zero-inflated Poisson”, while the term “ZINB” denotes “Zero-inflated Negative Binomial”). In the case of each specification, I include the same set of covariates as before. Two interesting patterns emerge from the results in the table: first, there is not a significant correlation between business background and compliance behavior in the case of these performance measures; second, in the case of count data models, as well as its zero-inflated versions, there is a negative correlation among business background and rule compliance, which suggests that library users with such a background present a better performance – in terms of compliance behavior – when compared with other users.



In all cases depicted in the table, I cannot find a significant effect of business background over alternative compliance measures, regardless of performance measure or estimation method considered<sup>x</sup>.

**[INSERT TABLE 5 HERE]**

Table 6 presents robustness checks based on different subsamples. I do this to verify if the previous results are robust to alternative sample definitions. Each column in the table considers a different sample. In the first two columns, I consider samples based on undergraduates, and students (undergraduates, masters, MBA, and graduate students), only. Since most contributions in the literature focus on the behavior of university students, I replicate the above analysis with these samples to see if the use of specific user categories could affect my results. Results remain the same in this case, indicating that the empirical patterns here reported do not depend on user categories.

In the third column, I present estimates in which I keep exam weeks in the sample, only. I consider this specific sample as a test for opportunistic behavior in a library setting. Specifically, if users with a business background are more opportunist than similar users with different backgrounds, then one would expect a higher proportion of delays in times when the competition for books is higher, such as exam weeks, for example. Even in the case of this reduced sample, I cannot find a significant effect of business education on compliance.

In the fourth and fifth columns of the table, I test the possibility that my results may be driven by psychological biases of users, such as inattention patterns (Gabaix, 2019). Given the increasing amount of information that most people face today, as well as their cognitive limitations, it is not feasible to simultaneously focus their attention on all events they face (Simon, 1955). As a result, inattention behavior may arise in different situations, even when people receive constant reminders to behave in a different manner. Although reminders can work in promoting rule compliance (Apesteguia et al., 2013), there is evidence suggesting that individuals may not meet a deadline even when it is profitable to do so. If inattention affects delays in this setting, then one should expect a higher proportion of delays on dates in which procrastination play a predominant role, such as days before weekends or holydays,

as suggested by previous contributions in behavioral finance (Barber & Odean, 2008; DellaVigna & Pollet, 2009; Hirshleifer et al., 2009), for example. This is the reason why I consider samples based on days before holydays (fourth column), as well as Fridays (fifth column).

**[INSERT TABLE 6 HERE]**

In table 7, I evaluate the effects of different university backgrounds on compliance behavior. Given that the two main classifications employed here – “business” and “non-business” – encompass distinct courses, it is worth exploring if differences in compliance rates are due to differences in the specific training of library users. In doing so, I estimate saturated regressions for a subsample including only undergraduates from the university’s main majors: (i) accounting, (ii) economics, (iii) management, (iv) advertising, (v) international relations, and (vi) secretariat. Once again, I progressively include users’, libraries’, books’, and month-year dummies to control for factors that could bias estimates.

**[INSERT TABLE 7 HERE]**

The results reported in the table suggest that, although there are a few differences among university majors, in terms of magnitudes, such differences disappear once I control for users’, books’, and libraries’ characteristics, as well as aggregate shocks. In particular, the table’s results suggest that users majoring in economics and international relations present, on average, less delays than other majors, which reinforces some of the previous results<sup>xi</sup>.

One possible source of bias in the present context relates to the specific setting under study. Given that some users go to the library often; they may have more incentives to comply with library rules. In principle, this possibility could bias the results here reported: more frequent users, representing the vast majority of the sample, would present a more adequate behavior, in terms of rule compliance. To investigate such a possibility, I consider a subsample which contains users who went to the library one single time during the 2006-2015 period. The resulting subsample contains 1,183 observations. Table 8 presents the results of such an experiment, for different specifications of equation (1). The results reported in the table

suggest that there are no effects of business background on rule compliance in the case of this specific subsample.

**[INSERT TABLE 8 HERE]**

One possible source of bias in the present setting relates to preexisting differences between business and non-business users, which could affect the above estimate. Specifically, given the differences between business and non-business groups of library users – in terms of their main covariates – there is the possibility that such groups are not entirely comparable, since the choice of business major may not be random. To address such a possibility, I follow Galiani et al. (2005), and employ a double-robust propensity score matching (PSM) method to estimate average treatment effects (ATE), as well as fixed-effects estimates, relating business background and compliance behavior<sup>xii</sup>.

In the case of the first step of this method, I employ a logit model to estimate the probability that library users belong to the treatment group (business), and build a common support for the observations in the sample which have similar propensity score values. In the second step of the method, I estimate a panel fixed effects regression in which I weight each observation in the sample by their respective propensity scores. Table 9 presents balancing results for the matched and unmatched samples, while table 10 contains the main results of estimations for ATE and ATT effects:

**INSERT TABLE 9 HERE]**

**[INSERT TABLE 10 HERE]**

The results reported in the table suggest that, although I cannot fully control for unobserved differences among business and non-business groups, there is not a significant effect of business background on compliance behavior, in this case. That is, even when considering groups of library users with similar observed characteristics, I do not find a statistically significant correlation between the main variables of interest.

Another possible source of bias in the present setting relates to the influence of omitted variables affecting the OLS estimates previously presented. Specifically, there is the possibility that an omitted variable – such as wealth, for example – which correlates with major choice might bias the main estimates relating business background and compliance behavior. Given that the libraries under study issue monetary sanctions (fines) for delayed items, richer users could face different incentives when compared to poorer users. For example, richer students could choose business majors more often than poorer ones, making them less responsive to library fines. This possibility could, in principle, bias estimates of the effects of business background on compliance behavior.

To address such a possibility, I present below the results of instrumental variables (IV) estimations, in which I instrument users' background with a proxy for income. Since I do not have a direct measure of income in the data, I employ *per capita* income estimates for São Paulo's main districts, obtained from *Fundação Sistema Estadual de Análise de Dados* (SEADE). In doing so, I merge library and income data, based on users' ZIP code (when available). Table 11 reports the results for first-stage and two-stage least square regressors (2SLS), as well as related tests.

**[INSERT TABLE 11 HERE]**

The table's results suggest a few troubling patterns, in terms of instrumental variables estimates. First, it is worth noting that none of the second-stage estimates is statistically significant at conventional levels, with some of them being imprecisely estimated, given their respective standard errors. On the other hand, although second-stage regressions are jointly significant (given the reported F-values), the same is not true for most first-stage specifications (given the reported values for the  $\chi^2$  statistic). Second, when looking at first-stage estimates, one notes that wealth – as currently *proxied* by SEADE's per capita measures – does not correlate with business major choice. In fact, the results of endogeneity tests reported in the table (p-values) suggest the rejection of their null hypothesis, which states that the regressor of interest – representing business background – is exogenous.

In general, a first inspection of the robustness checks presented in this section confirms that previous results remain virtually the same, in the case of alternative samples. These results lend confidence to the claim that there is not a significant effect of business education on compliance behavior in the library setting studied in this paper.

## **6. CONCLUSIONS AND DISCUSSION**

The present paper studied the impacts of business background on rule compliance in an information commons (libraries). Employing a novel dataset related to more than 700,000 transactions in distinct libraries during a 10-year period (2006-2015), I estimate the effects of a business major on library performance measures, by comparing the behavior of distinct categories of users (students, professors, and employees) over time, while controlling for their time-invariant characteristics. The results obtained suggest that there is no evidence of a significant effect of business education on compliance behavior in this specific setting. These results are in line with recent contributions in business ethics that question the influence of business education on important behavioral traits, such as individual orientation, cooperation and political views (Delis et al., 2019; Frey & Meier, 2003, 2005; Godos-Díez et al., 2015; Meier & Frey, 2004).

In terms of strengths, this paper is probably one of the first attempts to evaluate individual behavior in an information common. While most of the literature on the theme concentrated on determining precise definitions of related terms (Bollier, 2007; Hess & Ostrom, 2007a, 2007b; Rosen & Carr, 1997) – such as the new role of libraries in the digital age, or the diffusion of the Internet – there were few efforts aimed at empirically testing the predictions derived from the characteristics of an information commons. Additionally, it is worth noting that the repeated-measure nature of the phenomenon here studied constitutes a strength of this paper (since users borrow different library items over time), given that most collective-action situations reported in laboratory and field experiments involve repeated interaction (Andreoni & Croson, 2008; Cárdenas & Ostrom, 2004; Ostrom, 2000). In fact, contrarily to most research related to laboratory experiments, in which there is the possibility that part of the subject pool start gaming the experimenter – generating “experimenter demand effects”

– the longitudinal data used in this paper allow me to observe individual behavior in a real-world setting during distinct moments of time, not being subject to such a bias.

In terms of limitations, the results here presented may lack external validity, since I study user behavior in different libraries of the same university. Although there seems to be considerable diversity among library units and their users, one may argue that these results reflect a very specific institutional setting. Similarly, there is a well-known criticism related to laboratory experiments, stating that their exclusive reliance on student behavior may compromise external validity (Fréchette, 2015; Kagel, 2009; List, 2011). In this case, one advantage of the present findings is that they focus on the behavior of distinct users, such as professors, high school, undergraduate, and graduate students, as well as university employees. This feature of the data lends confidence against such criticisms, at the same time that presents some of the advantages related to behavior observed in field and naturally-occurring settings (Apesteguia et al., 2013; Fehr & Leibbrandt, 2011; Frey & Meier, 2003, 2004; Goeree et al., 2010; Haselhuhn et al., 2012; Meier & Frey, 2004).

Future research could benefit from an increasing focus on behavior in distinct settings. Although there were significant contributions in this direction coming from the work of Elinor Ostrom and coauthors (Dietz et al., 2003; Ostrom, 1990, 1999, 2005, 2010; Volland & Ostrom, 2010), there is still room for improvement, either in terms of field or natural experiments. In this case, it is worth citing two novel contributions. Fehr and Leibbrandt (2011) present results of laboratory and field experiments focused on the behavior of Brazilian anglers in a lake, a typical example of a common-pool resource. In a similar spirit, Gneezy, Leibbrandt, and List (2013) study the evolution of social norms among anglers, conditional on their working routines. In both cases, the authors stress the importance of psychological traits predicting observed behavior in the field, as well as the importance of jointly considering the results of laboratory and field experiments, when evaluating social dilemmas. While there is a growing literature on experiments in several areas, such as economics and business (Falk & Heckman, 2009; Kagel, 2009; Smith, 1989), it seems clear that the current research on common-pool resource management could benefit from a tendency to blend the results of laboratory and field experiments.

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## TABLES

Table 1  
Library rules by user category, 2006-2015

USER CATEGORY	Item Counts	Loan Days	Sanction Type
High School Student	5	7	Fine
Undergraduate Student	5	7	Fine
Masters Student	7	15	Fine
MBA Student	5	7	Fine
Former Student	2	7	Fine
University Employee	3	7	Daily Suspension
Professor	7	15	Daily Suspension

Source: authors' calculations, based on library data.

Notes: (a) Observations correspond to the 2006-2015 period, covering 723,171 transactions by 16,232 library users.



Table 2  
Main variables' descriptive statistics, 2006-2015

Sample Variable	Total		Business		Non-business	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Business	0.83	0.38	1.00	0.00	0.00	0.00
Female	0.53	0.50	0.51	0.50	0.68	0.47
Scholarship	0.37	0.48	0.36	0.48	0.42	0.49
18 to 23 years	0.44	0.50	0.43	0.50	0.50	0.50
24 to 30 years	0.33	0.47	0.35	0.48	0.23	0.42
31 to 40 years	0.15	0.36	0.15	0.36	0.12	0.33
41 to 50 years	0.05	0.21	0.05	0.21	0.03	0.18
51 to 60 years	0.01	0.12	0.01	0.11	0.01	0.12
60+ years	0.00	0.04	0.00	0.04	0.00	0.06
0 to 4 years in College	0.89	0.31	0.91	0.28	0.86	0.35
Delays	1.42	8.16	1.40	7.56	1.51	10.69
Frequency (Delays)	0.40	0.49	0.40	0.49	0.39	0.49
Loans' Effective Duration	7.42	8.89	7.36	8.25	7.33	11.4
Arts and Recreation Books	0.02	0.15	0.02	0.12	0.06	0.23
History and Geography Books	0.01	0.11	0.01	0.09	0.04	0.19
Language Books	0.02	0.14	0.01	0.12	0.05	0.21
Literature Books	0.04	0.19	0.03	0.16	0.10	0.30
Philosophy and Psyc. Books	0.02	0.16	0.02	0.15	0.03	0.16
Religion Books	0.00	0.02	0.00	0.02	0.00	0.04
Science Books	0.08	0.27	0.08	0.27	0.06	0.24
Social Science Books	0.28	0.45	0.27	0.45	0.33	0.47
Technology Books	0.48	0.50	0.52	0.50	0.31	0.46
Observations	723,171		592,675		122,946	

Source: authors' calculations, based on library data.

Notes: (a) Observations correspond to the 2006-2015 period, covering 723,171 transactions by 16,232 library users.

Table 3  
Effects of Business Background on Delays  
OLS Estimates, 2006-2015

VARIABLES	(1) Delays (OLS)	(2) Delays (OLS)	(3) Delays (OLS)	(4) Delays (OLS)	(5) Delays (OLS)
Business	-0.00 (0.037)	-0.01 (0.020)	-0.02 (0.020)	-0.02 (0.021)	-0.02 (0.021)
User Dummies	No	Yes	Yes	Yes	Yes
Library Dummies	No	No	Yes	Yes	Yes
Book Dummies	No	No	No	Yes	Yes
Months x Years	No	No	No	No	Yes
Observations	723,171	723,171	723,171	723,171	723,171
Adj. R-squared	0.000	0.191	0.192	0.219	0.229

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user in each library studied in this paper. (b) Standard errors clustered by user (reported in parentheses). (c) “User Dummies” correspond to a set of dummies for users’ gender (female = 1), academic financial support (scholarship = 1), group ages (18-23, 24-30, 31-40, 41-50, 51-60, 60+), category (undergraduate, masters’, graduate, and former student, employee, and professor), and time at school (0 to 4 years). (d) “Library Dummies” correspond to a set of dummies for each library in the sample, as well as their books (management, accounting, economics, and law). (e) “Book Dummies” correspond to a set of dummies representing the Dewey Decimal Classification (CDC) system. (f) “Months x Years” correspond to dummies representing interactions between months and years. (g) Statistical significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 4  
Robustness: “Selection” and “Indoctrination” Effects  
Probit Estimates, 2006-2015

VARIABLES	(1) Freq(Late)	(2) Freq(Late)	(3) Early	(4) Early
Freshmen	0.15*** (0.023)	0.05 (0.036)	-0.16*** (0.057)	
Seniors	0.02 (0.027)	-0.01 (0.042)	-0.12** (0.054)	-0.05 (0.069)
Main Stage			-0.06 (0.052)	-0.02 (0.050)
Business		-0.04 (0.032)		0.01 (0.035)
Freshmen x Business		0.02 (0.036)		
Seniors x Business		-0.05 (0.045)		0.10 (0.074)
Main Stage x Business				0.06 (0.055)
Semesters	-0.75*** (0.063)	-0.01** (0.006)	0.51*** (0.064)	0.03*** (0.006)
(Semesters) <sup>2</sup>	0.00 (0.001)	0.00*** (0.000)	-0.00** (0.001)	-0.00*** (0.001)
Observations	683,581	682,466	683,581	682,466

Notes: (a) The dependent variables in the specifications corresponds to the frequency of delays per user (first and second columns), and the proportion of early devolutions (third and fourth columns). (b) Standard errors clustered by user (reported in parentheses). (c) Statistical significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 5  
Effects of Business Background on Library Compliance Measures  
OLS, Probit, Poisson, Negative Binomial, Zero-Inflated Poisson (ZIP),  
and Zero-Inflated Negative Binomial (ZINB) Estimates, 2006-2015

VARIABLES	(1) Eff.Duration (OLS)	(2) Early Devolution (Probit)	(3) Freq.(Delays) (Probit)	(4) Number of Books (Neg.Binomial)	(5) Number of Fines (Neg.Binomial)	(6) Delays (Poisson)	(7) Delays (Neg.Binomial)	(8) Delays (ZIP)	(9) Delays (ZINB)
Business	-0.01 (0.015)	0.05 (0.036)	-0.05* (0.027)	-0.02 (0.015)	-0.00 (0.046)	-0.11*** (0.042)	-0.10*** (0.036)	-0.08** (0.036)	-0.09*** (0.029)
User Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Library Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Book Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Months x Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	714,646	714,646	714,646	714,646	714,646	714,646	714,646	714,646	714,646
Adj. R-squared	0.0691								
Pseudo R-squared		0.0404	0.0378						
Log-Likelihood				-1219569.9	-305333.61	-1835523.7	-1045609.5	-1378461	-1023675

Notes: (a) The dependent variable in the specifications corresponds to the effective duration of library loans (in days) per user (first column), the proportion of early devolutions (second column), the frequency of delays per user (third column), the number of books borrowed per user (fourth column), the number of fines per user (fifth column), and delays per user (sixth to ninth columns). (b) Standard errors clustered by user (reported in parentheses). (c) “User Dummies” correspond to a set of dummies for users’ gender (female = 1), academic financial support (scholarship = 1), group ages (18-23, 24-30, 31-40, 41-50, 51-60, 60+), category (undergraduate, masters’, graduate, and former student, employee, and professor), and time at school (0 to 4 years). (d) “Library Dummies” correspond to a set of dummies for each library in the sample, as well as their books (management, accounting, economics, and law). (e) “Book Dummies” correspond to a set of dummies representing the Dewey Decimal Classification (CDC) system. (f) “Months x Years” correspond to dummies representing interactions between months and years. (g) Statistical significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 6  
Robustness: Selected Samples  
OLS Estimates, 2006-2015

VARIABLES	(1) Undergraduates Only	(2) Students Only	(3) Exam Weeks	(4) Holydays (t – 1)	(5) Fridays
Business	-0.02 (0.027)	-0.02 (0.021)	-0.00 (0.032)	-0.04 (0.025)	-0.03 (0.018)
User Dummies	Yes	Yes	Yes	Yes	Yes
Library Dummies	Yes	Yes	Yes	Yes	Yes
Book Dummies	Yes	Yes	Yes	Yes	Yes
Months x Years	Yes	Yes	Yes	Yes	Yes
Observations	474,148	672,133	75,940	7,032	104,304
Adj. R-squared	0.206	0.228	0.250	0.240	0.248

Notes: see Table 3 above.

Table 7  
Robustness: Undergraduate Majors  
OLS Estimates, 2006-2015

VARIABLES	(1) Delays (OLS)	(2) Delays (OLS)	(3) Delays (OLS)	(4) Delays (OLS)	(5) Delays (OLS)
Accounting	-0.01 (0.043)	-0.01 (0.047)	-0.01 (0.045)	-0.00 (0.043)	-0.02 (0.045)
Economics	-0.06 (0.044)	-0.07 (0.047)	-0.07 (0.045)	-0.06 (0.043)	-0.08* (0.046)
Management	-0.04 (0.043)	-0.05 (0.047)	-0.05 (0.045)	-0.05 (0.043)	-0.05 (0.045)
Advertising	0.04 (0.045)	0.04 (0.049)	0.07 (0.048)	0.07 (0.046)	0.07 (0.048)
Int. Relations	-0.12** (0.050)	-0.11** (0.053)	-0.11** (0.052)	-0.11** (0.050)	-0.12** (0.050)
Secretariat	0.03 (0.047)	0.03 (0.051)	0.03 (0.049)	0.03 (0.047)	0.03 (0.048)
User Dummies	No	Yes	Yes	Yes	Yes
Library Dummies	No	No	Yes	Yes	Yes
Book Dummies	No	No	No	Yes	Yes
Months x Years	No	No	No	No	Yes
Observations	474,098	474,098	473,513	473,513	473,513
Adj. R-squared	0.00255	0.00579	0.0106	0.0545	0.114

Notes: see table 3 above.

Table 8  
Robustness: One-time Library Users  
OLS Estimates, 2006-2015

VARIABLES	(1) Delays (OLS)	(2) Delays (OLS)	(3) Delays (OLS)	(4) Delays (OLS)	(5) Delays (OLS)
Business	-0.03 (0.073)	-0.01 (0.106)	-0.07 (0.109)	-0.14 (0.093)	-0.15 (0.094)
User Dummies	No	Yes	Yes	Yes	Yes
Library Dummies	No	No	Yes	Yes	Yes
Book Dummies	No	No	No	Yes	Yes
Months x Years	No	No	No	No	Yes
Observations	1,111	1,111	1,107	1,107	1,107
Adj. R-squared	-0.000787	0.0199	0.0389	0.273	0.307

Notes: see table 3 above.

Table 9  
Robustness: Balancing Properties  
Business and Non-business Library Users, 2006-2015

Variable	Difference	
	Unmatched Sample	Matched Sample
Female	-0.174***	-0.002
Scholarship	-0.059***	-0.004**
18 to 23 years	-0.0703***	-0.003
24 to 30 years	0.126***	0.000
31 to 40 years	0.028***	-0.001
41 to 50 years	0.013***	0.001*
51 to 60 years	-0.001***	0.001***
60+ years	-0.002***	0.001***
0 to 4 years in College	0.054***	-0.001
Arts and Recreation Books	-0.042***	-0.000
History and Geography Books	-0.029***	0.001*
Language Books	-0.033***	-0.000
Literature Books	-0.069***	0.003***
Philosophy and Psych. Books	-0.003***	-0.000
Religion Books	-0.001***	0.000
Science Books	0.022***	0.004***
Social Science Books	-0.059***	-0.005***
Technology Books	0.205***	-0.002
Library Unit 1	-0.058***	-0.001
Library Unit 3	0.002***	-0.000

Source: authors' calculations, based on library data.

Notes: (a) Observations correspond to the 2006-2015 period, covering 723,171 transactions by 16,232 library users. (b) The double-robust propensity score matching (PSM) procedure here employed follows Galiani et al. (2005). (c) Statistical significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



Table 10  
Robustness: Matched Sample (PSM)  
Fixed Effects Estimates, 2006-2015

VARIABLES	(1) Delays (ATE)	(2) Delays (FE)
Business	-0.17 (0.125)	0.02 (0.030)
User Dummies	Yes	Yes
Library Dummies	Yes	Yes
Book Dummies	Yes	Yes
Months x Years	Yes	Yes
Observations	667,389	667,389
Adj. R-squared	0.282	0.096

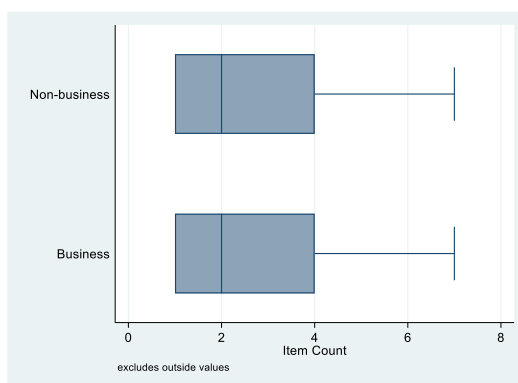
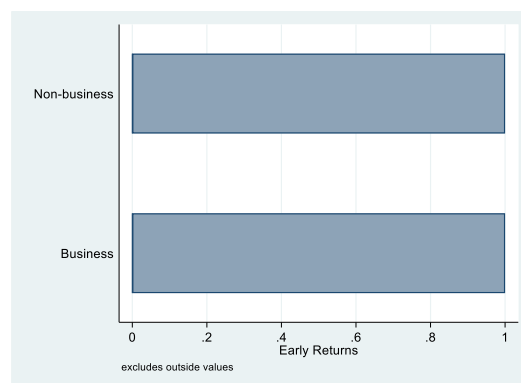
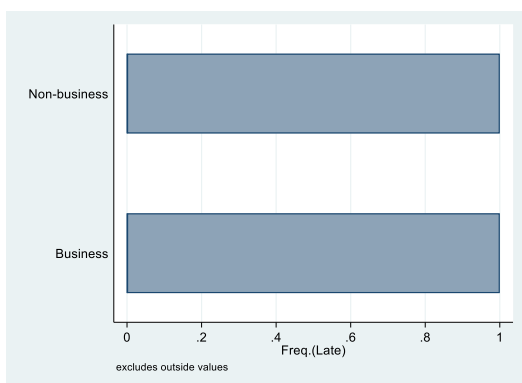
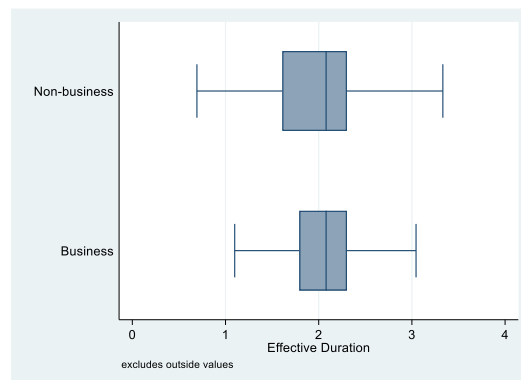
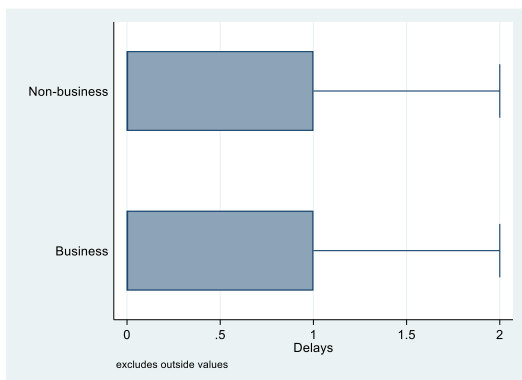
Notes: see Table 9 above.

Table 11  
Effects of Business Background on Delays  
Instrumental Variables (IV) Estimates, 2006-2015

VARIABLES	(1) Delays (IV)	(2) Delays (IV)	(3) Delays (IV)	(4) Delays (IV)	(5) Delays (IV)
Second Stage: dependent variable is Delays					
Business	0.11 (0.273)	-62.20 (8,966.524)	-4.83 (48.36)	-4.57 (43.89)	-3.64 (25.97)
Endogeneity test (p-value)	0.71	0.46	0.41	0.41	0.36
F-test (p-value)	0.03**	0.00***	0.00***	0.00***	0.00***
First Stage: dependent variable is Business					
Wealth	-0.00** (0.000)	0.00 (0.000)	0.00 (0.000)	0.00 (0.000)	0.00 (0.000)
User Dummies	No	Yes	Yes	Yes	Yes
Library Dummies	No	No	Yes	Yes	Yes
Book Dummies	No	No	No	Yes	Yes
Months x Years	No	No	No	No	Yes
$\chi^2$ test (p-value)	0.69	1.00	0.30	0.01**	0.00***
Observations	579,001	579,001	578,185	578,185	578,185

Notes: (a) The dependent variable in the specifications corresponds to the average delays (in days) per user (upper panel), and business background (lower panel). (b) Standard errors clustered by user (reported in parentheses). (c) “User Dummies” correspond to a set of dummies for users’ gender (female = 1), academic financial support (scholarship = 1), group ages (18-23, 24-30, 31-40, 41-50, 51-60, 60+), category (undergraduate, masters’, graduate, and former student, employee, and professor), and time at school (0 to 4 years). (d) “Library Dummies” correspond to a set of dummies for each library in the sample, as well as their books (management, accounting, economics, and law). (e) “Book Dummies” correspond to a set of dummies representing the Dewey Decimal Classification (CDC) system. (f) “Months x Years” correspond to dummies representing interactions between months and years. (g) Statistical significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Figure 1  
Boxplots  
Performance Measures by Group, 2006-2015



## FOOTNOTES

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<sup>i</sup> I thank an anonymous referee for suggesting the inclusion of references related to the economics of crime in the revised version of the paper. See Chalfin & McCrary (2017), Levitt & Miles (2006), Piehl & Williams (2011), and Polinsky & Shavell (2000) for examples of surveys on the theme.

<sup>ii</sup> See Chaudhuri (2011), Ledyard (1995), and Perc et al. (2017) for extensive surveys related to public goods experiments. Zelmer (2003) corresponds to a meta-analysis on the theme.

<sup>iii</sup> See Bauman and Rose (2011), Frey and Meier (2003, 2004, 2005), and Meier and Frey (2004) for a detailed discussion related to these hypotheses.

<sup>iv</sup> I thank Josiene Silva and Iruama Silva for providing the data necessary for such a classification, as well as several discussions related to the Dewey Decimal Classification (DDC) system.

<sup>v</sup> I thank two anonymous referees for suggesting the inclusion of parts describing the sanctions employed in the libraries under study in this paper.

<sup>vi</sup> When performing robustness checks, I consider alternative methods of estimation, as well as causality issues (more details below). I thank the anonymous referees for suggestions along these lines.

<sup>vii</sup> I thank an anonymous referee for suggesting such an inclusion.

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<sup>viii</sup> In the original version of the paper, I clustered standard errors by the number of courses offered at the university. The main results here reported do not change in the case of such a procedure. I thank an anonymous referee for suggesting me to cluster standard errors by the number of library users.

<sup>ix</sup> I thank the anonymous referees for suggesting most of the robustness checks reported in this section, which greatly improved the revised version of the paper.

<sup>x</sup> For more details related to count data models, see Blevins et al. (2015), Cameron & Trivedi (1990, 2009), and Trivedi (2010). In the case of zero-inflated count data models, see Desmarais & Harden (2013), Long & Freese (2001), and Vuong (1989). See also Guimarães & Portugal (2010) for a description of an iterative approach for the estimation of linear regression models with high-dimensional fixed effects. I thank an anonymous referee for the latter reference, as well as suggesting the inclusion of count data models in the revised version of the paper.

<sup>xi</sup> See Angrist & Pischke (2009, cap. 3) for a brief discussion on saturated regression models.

<sup>xii</sup> I thank Fernando Postali for suggesting this empirical strategy, as well as the related references (see Carnicelli & Postali, 2012). See also Abadie et al. (2004), Becker and Ichino (2002), and Dehejia and Wahba (2002) for expositions related to the implementation of matching estimators for average treatment effects. Li (2012) corresponds to a detailed survey on applications based on the propensity score method (PSM), with an emphasis on the estimation of causal effects.