The Effectiveness of Information Disclosure Policies as Policy Instruments: Evidence from Private Postsecondary Education

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Abstract

While the impact of information disclosure policies has been widely discussed both theoretically and empirically in the context of environmental policies, the empirical impact of these programs remain understudied in different policy settings. This study evaluates information disclosure strategies as a tool for reducing both irresponsible financial practices of private postsecondary institutions as well as protecting consumers from making a risky investment decision due to asymmetric information. I do so by leveraging the Department of Education’s Financial Responsibility Composite Scores – a relatively aggressive form of information disclosure. Given the recent expansion of regulation-through-information policies – as opposed to traditional command-and-control approaches – this study contributes to the growing body of literature assessing the effectiveness of information disclosure policies while also providing insight into the risk taking behaviors of postsecondary institutions. Using a panel data set of Title-IV eligible private non-profit and for-profit institutions, several novel empirical strategies are employed in order to estimate average treatment effects. Results indicate that a lower financial score leads to increased tuition-levels at non-profit institutions and decreased tuition-levels at for-profit institutions. The implications of these findings for policy instrument design as well as directions for future research are discussed.

Introduction

A great amount of scholarly – as well as journalistic – attention has been devoted to the topic of college affordability as it relates to public postsecondary institutions; relatively fewer studies, however, have examined the relationship between public policy and private postsecondary institutions (Delaney & Kearney, 2015; Jaquette & Hillman, 2015). Given the substantial growth in the cost of attending for-profit institutions in recent years, emerging evidence that students attending for-profit institutions earn less than their public and non-profit counterparts, and rising borrowing and default rates in the for-profit sector, scholars and policymakers alike have begun expressing interested in the relationship between public policy and the costs of for-profit institutions (Cellini & Daroila, 2013; Cellini & Turner, 2016). Despite the growing concern over college affordability – especially as it relates to for-profit institutions – there exists no clear consensus
regarding the factors associated with tuition levels in the private sector. In attempts to examine possible
drivers of for-profit institution tuition levels, this study leverages an under utilized resource: the Department

Established to offer protection to taxpayers and students, an institution’s score serves as a *regulatory
transparency policy*: a form of information disclosure that attempts to correct market failures while improv-
ing welfare (Weil, Fung, Graham, & Fagatto, 2006). Although the impact of information disclosure policies
are widely discussed in the realm of environmental policy, the empirical impact of these programs remains
understudied in different policy settings (Bae, 2012; Delmas, Mario & Shimshack, 2010). Given the recent
expansion of regulation-through-information policies – as opposed to traditional command-and-control ap-
proaches – this study attempts to provide insight into effectiveness of information disclosure policies when
applied to education policy issues as well as the various strengths and weaknesses of information disclosure
and similar regulation-through-information strategies broadly speaking. As such, this study contributes to
the growing body of literature examining the intricacies of various policy instruments as well as providing
insight into the differential behavior of private postsecondary institutions – specifically for-profit institutions.
To do so, I discuss the goals of the FRCS and similar information disclosure policies, briefly survey previous
research on the tuition setting behaviors of postsecondary institutions, followed by an econometric analysis
of the impact of an institution’s score on tuition levels using several methods to control for endogeneity
before finally discussing the implications of this study’s results for both postsecondary education policy as
well as policy instrument design broadly speaking.

**Financial Responsibility Composite Scores as Policy Instruments**

Reflecting the relative financial health of private non-profit and for-profit postsecondary institutions, an
institution’s score helps the Department of Education determine whether an institution maintains the fin-
cancial standards necessary to participate in Title-IV programs – the primary source of federal funding for
higher education.\(^1\) Although similar to traditional command and control regulations – the scores allow the
government to monitor institutional compliance with a federally mandated standard of financial health with
non-compliance punished through the removal of Title-IV eligibility – the scores are in actuality regulatory
transparency policies. Seeking to change the behavior of users and/or sellers in specific ways, regulatory
transparency policies – such as the FRCS – attempt to remedy an instance of information asymmetry known
as the “consumer protection problem.” the FRCS attempt to incentivize financially responsible practices of
institutions while also attempting to insure that potentially uninformed parties – such as students and/or
their parents – are adequately informed regarding the good they are purchasing (Dill & Soo, 2004; Fraas &

\(^1\) Title-IV programs include loans (e.g. Direct Loans), grants (e.g. Pell Grants), as well as the federal work study program.
Specifically, each score is calculated from three ratios taking into account the financial health of an institution:

1. An institution’s Primary Reserve Ratio – a measure of viability and liquidity – is an institution’s adjusted equity divided by total expenses.

2. An institution’s Equity Ratio – a measure of capital resources and ability to borrow – is an institution’s modified equity divided by modified expenses.

3. An institution’s Net Income Ratio – a measure of profitability – is an institution’s income before taxes divided by total revenues.

Following the weighted sum of the above ratios, each institution’s score ranges from -1.0 to 3.0. Institution’s receiving a score of less than 1 are considered “not financially responsible” and are subject to provisional Title-IV certification and cash monitoring; institutions receiving between 1.0 and 1.4 are considered financially responsible but require additional oversight; institutions receiving a score between 1.5 and 3.0 are considered financially responsible and require no further oversight. While the language forwarded by the policy suggest that an institution’s score is in both theory and practice a command-and-control policy, there has – at the time of this study – been no known case of an institution being stripped of its Title-IV eligibility as a result of the policy (Fain, 2017). As such, the FRCS is a de facto information disclosure instrument. The logic of the FRCS as a form of information provision, however, rests on a long and complex causal chain – a chain resulting in the use of information by users purchasing a good or service (Dill, 1997). Research on information disclosure policies, however, suggests that regulatory disclosure policies have an impact on firms regardless of whether the information conveyed by the policies is used by consumers through three separate avenues: market pressures, political pressures, and internal pressures. (Bennear & Coglianese, 2012).

Considering the market and political pressures in tandem, from a political economic perspective the mandating of information disclosure may signal the state’s willingness to impose future regulations on a sector of the economy unless firms self-regulate (Delmas, Mario, & Shimshack, 2010). From this perspective, the policy as currently implemented may itself act as an incentive to prevent shirking on the behalf of institutions lest the state impose a traditional command and control policy under which an institution’s Title-IV eligibility would be revoked once an institution is deemed financially irresponsible. In order for this threat to be valid, however, an institution must have both the incentive and capacity to comply with the mandated standards (Lane & Kivistö, 2008). In the current context, both an institution’s sector as well as the composition of an institution’s student body may influence both the capacity and incentive to adhere – if only symbolically – with the mandated standards in a related manner. In terms of enrollment composition
those institution’s serving predominately disadvantaged, part-time populations are likely to have less
incentive to comply with the mandated standards due to the assumption that such students often make
enrollment decisions in terms of convenience factors as opposed to matters related to institutional reputation
(Iloh & Tierney, 2014). Similarly, for-profit and non-profit institutions writ-large must appeal to different
stakeholder constituencies. Whereas non-profits are assumed to use their finances in a responsible manner
that helps them realize their mission – however defined – they are also expected to provide their “investors”
(e.g. donors) with access to a mechanism through which to influence investment and management decisions.
For-profit firms, on the other hand, rarely encounter “activist investors” and are less concerned with external
stakeholders attempting to keep the firm “on mission” (Doshi, Dowell, & Toffel, 2013; Toutkoushian &
Raghav, 2017; Tuckman & Chang, 1992). Such a discrepancy is compounded by the fact that for-profits –
or those firms often not expected to produce a good that also furthers a broader mission – predominantly
serve those consumers less likely to use information to begin with. Given this discussion, the question to be
asked then is does the mandatory disclosure of an institution’s financial health lead to responsible institutional
behaviors? To help answer this question, the discussion now turns to previous research examining the impact
of similar information disclosure policies.

While the relatively low cost of information disclosure strategies has made such policies attractive com-
pared to traditional command and control regulations, there is growing debate as to whether such policies
may be counterproductive (Bae, 2016). Although supports of information disclosure policies assert that
the provision of information corrects for market failures in the form of information asymmetry, skeptics of
information disclosure strategies not only point to the lack of systematic evidence regarding the effectiveness
of information disclosure but also suggest that information disclosures may exacerbate the “information gap”
(Bae, 2012; Dranove, Kessler, McLellan, & Satterwaite, 2003). For while information disclosure strategies
are fundamentally designed to correct the information asymmetries between transaction parties, the strate-
gies often favor those groups that can incur search costs in gathering information (Graham, 2002; McEwen,
1978; Stigler, 1961). Stated differently: those students more likely to use the information – typically white,
relatively wealthy students and their parents – are able to afford the transaction costs associated with finding
and comparing institutions on selected information criteria (Lovenheim & Walsh, 2017). Given that firms
will only respond to any legally mandated standard if the their stakeholders care enough about the infor-
mation being released, it can be assumed that firms with a larger portion of those students less inclined to
make use of information disclosure policies are more likely to respond to regulation in less-than-ideal ways.
Despite the different theoretical expectations regarding the effectiveness of information disclosure policies,
two aspects of information disclosure policies must be recognized. First, there is little systematic empirical
research on the impact of information disclosure policies on social welfare outside of the environmental pol-
icy arena (Delmas, Mario, & Shimshack, 2010; Fraas & Lutter, 2016). Although the environmental policy literature has contributed greatly to our understanding of the various intricacies of information disclosure, this literature relies heavily on data from the Toxics Release Inventory (TRI); a body of literature which has produced no clear consensus regarding the effectiveness of information-based policy instruments (Taylor, Pollard, Rocks, & Angus, 2012). Furthermore, despite being widely used inferences drawn from the TRI and similar right-to-know policies have been called into question due to regulatory nuances – such as reporting thresholds – leading to biased estimates (Benear, 2008). Furthermore, the effects of information disclosure on the behavior of regulated firms – as opposed to the behavior of consumers – remains unclear (Benear & Olmstead, 2008). An analysis of the FRCS program is a fruitful lens through which to address both of these issue – as well as speak to the broader issue of college affordability – in several ways.

First, information disclosure policies are most effective when applied to experience goods: goods and/or services whose value can only be determined by consuming or experience it (Vining & Weimer, 1988; Silvestre, 2012). Specifically, information disclosure policies may minimize the deadweight loss associated with additional regulatory intervention by correcting information asymmetries prior to a consumer selecting a good and/or service (Micheli, Pancak, and Sirmans, 1996). As an experience good, postsecondary education offers a theoretically appropriate and econometrically convenient context in which to examine the impact of information disclosure policies. Second, an examination of changes in the tuition of postsecondary institution allows for an explicit measurement of the costs information disclosure policies impose on firms (Romansky, Telang, & Acquisti, 2011). Third, the examination of the tuition-setting behaviors of postsecondary institutions – as it relates to information disclosure strategies – allows for an examination of the unforeseen consequences of regulations and the differential impact of these consequences across sector and demographic groups (Ambrose & Diop, 2006). Prior to discussing the impact of regulations on postsecondary tuition, however, it is necessary to review the previous research on the drivers of tuition levels in private postsecondary institutions.

Postsecondary Education and Tuition Setting Behaviors

Studies examining postsecondary policies often do so to evaluate the effectiveness of performance-based funding policies that policymakers will hope motivate institutions to increase postsecondary degree production (Hillman, Tandberg, & Fryar, 2015; Rutherford & Rabovsky, 2014). Far fewer studies examine the impact of public policies on the tuition setting behaviors of private postsecondary institutions (Kelchen & Stedark, 2016).² Most of the research which does examine the tuition setting behaviors of private postsecondary

²Note the emphasis on private postsecondary institutions. While there are a number studies examining tuition levels in public institutions, private institutions receive relatively little attention (Zumeta, 1992).
institutions tend to rely on the *Bennett Hypothesis* — or the idea that increase in governmental aid will lead to tuition increases across all higher education institutions (Bennett, 1987; Gillen, 2012). Specifically, the *Bennett Hypothesis* posits that even if financial aid leads to lower prices for students, institutions will raise overall tuition costs in order to offset the loss of revenue (Dynarski & Scott-Clayton, 2013). Despite not being empirically proven, analysts continue to rely on the *Bennett Hypothesis* as an explanation for institutional behaviors with more nuanced approaches suggesting that the relationship between governmental aid and tuition levels is dependent on institutional type even within the private sector (Delaney & Kearney, 2015).

While Singell and Stone (2007) find that each increase in federal financial aid received by institutions is matched nearly one-for-one with an increase in tuition only by private non-profits, Cellini and Goldin (2014) illustrate that Title-IV eligible for-profit institutions are priced 78 percent higher than comparable institutions who cannot accept financial aid. A major contribution of Cellini and Goldin’s study comes from the authors’ identification strategy: acknowledging the potential sample selection problems due to nonrandom, meaningful differences between those institutions eligible for Title IV funding and those who are not eligible, the authors restrict their sample to institutions offering programs comparable among as many dimensions as possible such as credit hour requirements in addition to institution fixed effects. Using similar sample restriction techniques — such as excluding specialized vocational schools and institution fixed effects — Gibbs and Marksteiner (2016) find that a $1,279 loss in Cal Grants — California’s version of Pell Grants — leads to a sticker price decrease of approximately $1,000. While both Cellini and Goldin as well as Gibbs and Marksteiner illustrate the need to address the nonrandom heterogeneity within the for-profit sector, neither study directly examines the behavior of institutions *while* they are being regulated. In one of the few studies examining institutions while they are being regulated, Kelchen (2016) found that for-profit institutions with sanctionable loan default rates might charge students less in an effort to reduce borrowing levels. Kelchen’s use of regression discontinuity, however, assumes that institution’s approaching the sanctionable cutoff are unable to change their behaviors in order to avoid sanctions and further regulation. Given the lack of empirical evidence on the ways in which firms behave under regulation, such an assumption is disputable.

In order to assess the impact of the FCRS — as a form of regulation — on the behavior of firms — operationalized tuition levels — an objective function of firm behavior must be explicated.

**Conceptual Framework and Hypotheses**

While early literature on the objective function of postsecondary institutions rejected the notion that institutions behave to maximize financial profit, the rise of the for-profit institution has lead to a segment of the postsecondary market with an explicitly profit-maximizing objective function (Coates & Humphreys,
2000; Rothschild & White, 1995; Winston, 1997). As such it is assumed that for-profit institutions seek to maximize profits while non-profit institutions seek to maximize social welfare given a budget constraint. Since it is impossible for for-profit institutions to pursue other objectives at the expense of profit-maximization, it is assumed that proprietary institutions are solely profit maximizers and engage only in behaviors they believe are profitable (Wheeler & Clement, 1990). Moreover, whereas the costs incurred by for-profits are simply a function of producing a good, non-profit institutions incur both the costs of producing the good as well as the cost of producing a specific mission (Erus & Weisbrod, 2003). Given these differing objective functions, as well as the previous discussion on sector and consumer characteristics, it is possible that information disclosure as a form of regulation may simply exacerbate the differences in regulated firms (Delmas, Montes-Sanchom, & Shimshack, 2010; Netz, 1998). As such, I hypothesize the following:

**Hypothesis 1**: Tuition will be higher at for-profit institutions than non-profit institutions with the same FRC score.

**Hypothesis 2**: Following the publication of a “poor” score, for-profit institutions will increase tuition and non-profit institutions will lower their tuition.

Seeking to alter the behavior of institutions through information provision, the FRCS program may inadvertently lead to increases in tuition levels at for-profit institutions (Dill, 1997; 2001). While non-profits will fear the harm a tuition increase may incur on their “trust capital” with their specific stakeholder groups – such as alumni and donors – for-profit institutions make this decision simply in terms of monetary costs (Silverman & Skinner, 2001). In order to illustrate these assumptions, imagine the following scenario:

Suppose two institutions – one non-profit, one for-profit – are both labeled “not financially responsible” under the FRCS program. Under the assumptions outlined above, by producing a mission good – whether that be social welfare or prestige for the institution – non-profits are constrained in terms of seeking additional sources of revenue in the form of tuition increases. Stated differently, the stakeholder groups served by non-profit institutions would accept a tuition increase only if they believed that the additional revenue will ultimately be used to support the mission of the institution (Hansmann, 1986; Tuckman & Chang, 1992). Conversely, for-profit institutions are indifferent to the traits of their consumers and lack “activist” stakeholders (Harrison & Antweiler, 2003; Winston, 2003). Therefore, if the marginal gains associated with increasing tuition outweigh the costs of being subjected to government regulations, for-profit institutions will do so.

Discussion now turns to testing the proposed hypotheses.
Research Design

Data

Title-IV eligible private non-profit and for-profit institutions are the primary unit of analysis for this study. While public community colleges traditionally serve as a control group against which to compare for-profit institutions, the finances and costs of for-profit institutions are more similar to private non-profit institutions than community colleges (Gibbs & Marksteiner, 2016; Kutz, 2010). The Delta Cost Project provides institutional-level data for all institutions within the final sample. The Office of Federal Student Financial Aid provides the composite score of each institution.

Estimation Strategy

The objective of the proposed study is the examination of the impact of information disclosure policies on the behavior of regulated firms as captured through tuition setting behaviors of postsecondary institutions. The outcome of interest is the change in an institution’s total tuition and fees. As with most empirical examinations of the effects of information disclosure policies – especially as it relates to a heterogeneous product – it is difficult to establish the degree to which information disclosure influences the revealed preferences of individual consumers (Delmas, Montes-Sanchom, & Shimshack, 2010). It is, however, possible to examine the effect of disclosure on the behavior of regulated firms – an under examined aspect of information disclosure policies (Bennear & Ohmstead, 2008). In this regard, the FCRS exhibit two features desirable for econometric identification. First, as previously mentioned, an institution’s score not only conveys a level of risk to potential consumers, each score corresponds to a specific dosage of oversight administered by the federal government. Second, an institution’s score is temporally dynamic: scores vary over time, allowing for differential effects not only across institutions but also within institutions over time.

In order to address the above hypotheses, predictor variables were selected in order to approximate the various marginal costs and marginal gains associated with compliance. As such, I first examine the regulation-tuition relationship by estimating the following fixed-effects model:

\[
\Delta \text{Tuition}_{it} = \alpha_0 + \beta_{1it} \text{TREAT}_{it} + \beta_{2it} \text{SECTOR}_{it} \\
+ \beta_{3it} (\text{TREAT}_{it} \ast \text{SECTOR}_{it}) + \beta_{4it} X_{it} + \beta_{5i} (tU_i) + d_i + \varepsilon_{it}
\]  

(1)

where the dependent variable \(\Delta \text{Tuition}_{it}\) is the percent change in real dollar tuition at institution \(i\) in time \(t\) from real dollar tuition at institution \(i\) in time \(t-1\); \(\text{TREAT}\) in an interval variable representing the various degrees of financial oversight corresponding to an institution’s FRCS; \(\text{SECTOR}\) takes on a value of 0 for private non-profit institutions and 1 for for-profit institutions; \(\text{TREAT} \ast \text{SECTOR}\) is the interaction between
TREAT and SECTOR allowing for an examination of whether for-profit institutions have a differential response to information disclosure; $X$ is a vector of institutional controls; $tU$ is the interaction between state fixed effects and a time trend allowing for any trends that would impact institutions to vary by state over time; $d$ is a set of institution fixed-effects; and $\varepsilon$ is the error term. Summary statistics for all variables can be found in Table 1.

<table>
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<th>Table 1: Summary Statistics</th>
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<tr>
<td></td>
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<tr>
<td><strong>mean</strong></td>
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<tr>
<td>Tuition Change</td>
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<td>Sector</td>
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<td>Treatment</td>
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<tr>
<td>Ln(Grant)</td>
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<tr>
<td>Ln(Size)</td>
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<td>Ln(Intensity)</td>
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<tr>
<td>Ln(Diversity)</td>
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<tr>
<td>Observations</td>
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</table>

The explanatory variable TREAT is an interval measure taking on three values: 0, 1, and 2 with each value corresponding to an institution’s score and subsequent oversight where:

- **TREAT** takes on a value of 0 if an institution’s score falls between 1.5 and 3.0; corresponding to a status of “financially responsible” and no oversight.

- **TREAT** takes on a value of 1 if an institution’s score falls between 1.0 and 1.4; corresponding to a status of “financially responsible” and minimal oversight.

- **TREAT** takes on a value of 2 if an institution’s score falls between -1.0 and 0.9; corresponding to a status of “not financially responsible” and provisional Title-IV certification and cash monitoring.

The interval measure, as opposed to an institution’s raw score, is used since this study is interested in variation across categories not within a score category. Additionally, the use of an institution’s raw score offers no utility over the interval measure since in terms of information disclosure, since it terms of the policy a score of -1 is no different than a score of 0.5: both scores convey the same status of “not financially responsible” to stakeholder groups.

Turning to Hypotheses 1 and 2: while previous studies find that for-profit institutions may lower tuition costs in attempt to recruit students less likely to engage in risky financial behaviors, other research notes that students selecting into for-profit colleges are willing to pay higher prices for the convenience and flexibility of for-profit institutions regardless of the risks associated with doing so (Iloh & Tierney, 2014; Kelchen, 2016). The broader information on information disclosure, however, suggests that both public and non-profit institutions are more susceptible to stakeholder pressures when it comes to financial behaviors suggesting
for-profit institutions will charge more than their non-profit counterparts (Kofoed, 2013; Sloan, 2005). In order to isolate the impact of information disclosure policies on tuition levels, several other covariates are included in Eq. (1). An additional source of revenue – \textit{FEDGRANT} – is also included to measure the reliance of institutions on government funding. In line with the Bennett Hypothesis, it is assumed that institutions – both non-profit and for-profit – will increase tuition levels in response to greater federal funding (Cellini & Goldin, 2014; Singell & Stone, 2007; Turner, 2014). Additionally, an institution’s capacity (e.g. profile of students) may influence an institution’s response to specific policies (Fryar & Hawes, 2011; Hillman, 2012; Hillman, Tandberg, & Gross, 2014). As such, three measures of student characteristics are included: \textit{SIZE}, \textit{INTENSITY}, and \textit{DIVERSITY}.

\textit{SIZE} – or the total enrollment of an institution – is included due to the ability of size to moderate a firm’s sensitivity to the pressures generated by information disclosure (Doshi, Dowell, & Toffell, 2013). Conversely, \textit{PART} – the proportion of an institution’s student enrolled part time – captures both the the differing revenue and cost structure of institution’s with large part-time enrolling as well as the fact that part time students often have a different level of committment to their institution (Toutkoushian & Raghav, 2017). As such, it can be expected that institutions with large amounts of part time students are less likely to face pressures from their stakeholders (e.g. alumni) in terms of management decisions (Konar & Cohen, 1997). Finally, \textit{DIVERSITY} – or the proportion of an institution’s students who are not an ethnic minority – captures the degree to which an institution’s students have the propensity to use the disclosed information (Decker, Nielsen, & Sindt, 2005; Teske, Fitzpatrick, & Kaplan, 2006). The expectation is that as \textit{DIVERSITY} decreases – or the proportion of white students decreases – institutions have less incentive to respond responsibly to regulation-through-information policies.

A significant challenge of any empirical study comparing for-profit and non-profit institutions – as it relates to the effectiveness of a specific policy – is the problem of omitted variable bias and the failure to model the mechanism of selection into the treatment or control groups. In the present context, “selection bias” arises out of the unobserved characteristics affecting both the likelihood of an institution being a for-profit institution and the response of an institution to the FRCS program. Without accounting for the selection mechanism, an institution’s error term ($\varepsilon_{it}$) will be correlated with explanatory variables and bias parameter estimates. As such, this study accounts for selection bias in two ways: a Heckman two-step estimator for panel data and a doubly robust propensity score estimator. The appropriateness of each of these estimators, however, is a function of the treatment effect of interest.

If an analyst is interested in estimating whether a treatment has an effect on the population to which the treatment is applied – the average treatment on the treated (ATT) – propensity score matching (PSM) or similar matching methods are the appropriate estimators. If, on the other hand, the analyst is interest
in the potential effects of a treatment when expanded to other units in the greater population – the average treatment effect (ATE) – a Heckman-like model is appropriate (Carley, 2012). Given the interest of the present analysis in the impact of information disclosure as a policy instrument, discussion will focus on the ATE but estimators for the ATT are also presented. None of the estimates presented are local average treatment effects (LATE) which can only be estimated via instrumental variable methods.3

Heckman Correction

When applied correctly, a Heckman correction can yield unbiased estimates of potential outcomes by modeling the systematic differences between groups (Carley, 2012). The Heckman correction, however, has been applied almost exclusively to cross-sectional or pooled regression estimates, posing an empirical challenge when it comes to panel estimation (Rochina-Barrachina, 1999). In the present analysis, a Heckman-like correction is estimated by applying the logic of control function approaches to endogeneity. The correction is applied in three steps: 1) estimate via a probit model the likelihood of an institution being either a for-profit or non-profit institution, 2) calculate the inverse mills ratio ($\lambda$) for each observation, and 3) estimate the outcome equation using $\lambda$ as a predictor (Wooldridge, 2009). Formally, this can be represented as the following equation:

$$
\Delta \text{Tuition}_{it} = \alpha_0 + \beta_{1i} TREAT_{it} + \beta_{2it} SECTOR_{it} + \beta_{3it} (TREAT_{it} \ast SECTOR_{it}) + \beta_{4it} X_{it} + \beta_{5i} (U_i) + \beta_{6it}[\lambda(\text{SECTOR}_{it}) - \lambda(-\text{SECTOR}_{it})] + \varepsilon_{it}
$$

where $\lambda$ is produced from the following probit mode:

$$
Pr(SECTOR_{it} > 0) = \Upsilon_0 + Z_{it} + d_t + d_i + \nu_{it}
$$

where $Z$ is a vector of institutional characteristics described above as well as an indicator variable representing whether or not institutions report their information under one parent institution as opposed to multiple single institution information. Well-documented among users of the Delta Cost Project, this variable satisfies the “exclusion restriction” necessary to estimate a Heckman Correction Model (Millimet & Tchernis, 2013). Similar to the logic in identifying a valid instrumental variable, in the present analysis the exclusion restriction necessitates a variable that is related to the sector of an institution while unrelated to changed in tuition. As documented in the Delta Cost Project Database, for-profit institutions are more likely to report their information under one “parent” campus than their non-profit counterparts (Lenihan, 2012). The reporting variable also satisfies the second aspect of the exclusion restriction: based on a Spearman rank correlation test I find no evidence that grouped reporting is related to changes in tuition levels. Results of the Heckman model are presented in Table 2.

3For a recent treatment of LATEs see: Barua and Lang (2016).
Table 2: Average Treatment Effects

<table>
<thead>
<tr>
<th></th>
<th>Fixed Effects</th>
<th>Doubly Robust</th>
<th>Heckman Correction</th>
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<tbody>
<tr>
<td></td>
<td>Ref.</td>
<td>Cat.</td>
<td>Ref.</td>
</tr>
<tr>
<td>Non-Profit * No Oversight</td>
<td>1.012</td>
<td>(0.660)</td>
<td>0.798</td>
</tr>
<tr>
<td>Non-Profit * Some Oversight</td>
<td>1.828**</td>
<td>(0.594)</td>
<td>0.918</td>
</tr>
<tr>
<td>Non-Profit * Cash Monitoring</td>
<td>1.037</td>
<td>(0.660)</td>
<td>1.855**</td>
</tr>
<tr>
<td>Proprietary * No Oversight</td>
<td>-1.669</td>
<td>(1.093)</td>
<td>-2.697</td>
</tr>
<tr>
<td>Proprietary * Some Oversight</td>
<td>-4.048**</td>
<td>(2.160)</td>
<td>-6.431**</td>
</tr>
<tr>
<td>Ln(Grant)</td>
<td>0.688</td>
<td>(0.493)</td>
<td>-0.436</td>
</tr>
<tr>
<td>Ln(Size)</td>
<td>-2.296*</td>
<td>(1.270)</td>
<td>-3.362</td>
</tr>
<tr>
<td>Ln(Intensity)</td>
<td>0.228</td>
<td>(0.261)</td>
<td>-0.561</td>
</tr>
<tr>
<td>Ln(Diversity)</td>
<td>-0.540</td>
<td>(1.132)</td>
<td>-1.934</td>
</tr>
<tr>
<td>Inverse Mills</td>
<td>-3.116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>16.091</td>
<td>(10.977)</td>
<td>39.804*</td>
</tr>
</tbody>
</table>

N 6326.000 6326.000 6305.000
r2 0.032 0.339 0.032
F . . .

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Doubly Robust Estimates

Combining two approaches to estimating the casual impact of a treatment on an outcome of interest, doubly robust estimation combines traditional regression estimation with propensity score reweighting. In order to derive the doubly robust estimator, an analyst first estimates the propensity of an observation receiving a treatment and then reweights the outcome regression using the inverse of the conditional probability that an individual received said treatment (Funk et al., 2011; Nicols, 2008). Whereas the outcome equation remains the same as in Eq. (1) above, it is now reweighed using the propensity scores derived from the following logit model where $X$ is a vector of institutional controls as outlined above:

$$Pr(SECTOR_{it} > 0) = \beta_0 + \beta_{1it}X_{it} + \varepsilon_{it}$$ (4)

Although initially resembling the Heckman correction model outlined above, there are notable differences between the two estimators. First, although doubly robust estimates are—as the name suggests—robust to most forms of misspecification, the underlying assumption of propensity score models is that the only differences between sectors are observable (Titus, 2007). In the instance that there are unobservable differences that are not perfectly correlated with the observables, the propensity score model is misspecified and the outcome regression will produce biased estimates. Unlike the Heckman correction, which is biased toward zero, the direction of bias in propensity score models is unknown (Jung & Pirog, 2014; Vandenberghe & Robin, 2004). Additionally, while the Heckman model allows for an examination of the Average Treatment Effect (ATE), doubly robust models estimate the average treatment-on-the-treated (ATT). Whereas the ATE provides information on the effect of a treatment when expanded to other units within the greater popula-
tion, the ATT only provides information on the impact of information disclosure policies on Title-IV eligible for-profit institutions in the present sample (Carley, 2012). Given the interest of this study in speaking to the broader implications of information disclosure policies, the ATE estimates are preferred; the results of the doubly robust estimates, however, are still presented in Table 2.

Results

All three model specifications presented in Table 2 indicate a significant, differential impact of the FRCS on the tuition setting behaviors of postsecondary institutions across the various “doses” of oversight and categories of financial responsibility. Across all three models, for-profit institutions lower tuition costs when subjected to additional financial oversight and a “worse” label. The magnitude of this difference, however, varies by the selection model utilized. Whereas estimates derived via the Heckman correction suggests that for-profit institutions lower their tuition by approximately 4.7%, the doubly robust estimates suggest that for-profit institutions lower their tuition by approximately 7.4%. The difference in magnitude, however, is expected: Heckman model treatment estimates are biased toward zero (Puhani, 2000). Due to the dangers of overestimating the impact of policies when conducting policy analysis, the remainder of this analysis will focus on the estimates produced by the Heckman correction model (Currie, 2003; Manski, 2011).4

In addition to for-profit institutions decreasing tuition prices when labelled as “financially responsible but requiring additional oversight”, results from the Heckman correction model indicate that non-profit institutions increase their tuition by approximately 1.8% ($p < 0.01$) when faced with cash monitoring and labelled as “financially irresponsible.”5 While these results are in the opposite direction than as expected in Hypotheses 1 and 2 stated above, the findings are consistent with the broader economics literature that has yet to agree upon the differential behaviors of non-profit and for-profit organizations such as hospitals in response to external pressures (Horwitz & Nichols, 2007). Turning to institutional controls, only one variable is statistically significant in the Heckman model: federal grant aid. Specifically, for each percentage increase in the amount of federal grant aid received by an institution, tuition increases by 1.2%. While not a large change, this estimate finds support for the Bennett Hypothesis (Fried, 2011; Singell & Stone, 2007; Turner, 2014).

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4While there are dangers in underestimating the impact of policies, these dangers are typically associated with the ethical ramifications of not implementing policies which may benefit some members of society. Given the focus of this study is analyzing information provision from an economic viewpoint rather than an ethical one, the dangers associated with wasting government resources is assumed to be of more concern (Bougherara, Grolleau, & Mzoughi, 2005).

5The statistical difference across both sectors and “treatment groups” was determined using a Wald test of equality of coefficients, which yielded $F = 4.29$ and $p < 0.01$. 
Discussion and Conclusion

Evaluating the impact of information disclosure policies on the behaviors of regulated firms, this study exploits the Department of Education’s Financial Responsibility scores, which – in terms of information disclosure policies – is a relatively aggressive measure. Not only does an institution’s score convey information to potential consumers regarding an institution’s financial behaviors, an institution’s score also dictates the amount of oversight an institution could, in the future, be subject to. Whereas many studies attempt to assess the effectiveness of information disclosure policies they are often unable to establish a causal connection between consumer’s use of information and the reaction of a firm to consumer use. Leveraging the FRCS alleviates this limitation but also speaks to two related but under examined aspects of policy instruments:

1. To what degree are the impacts of information disclosure policies on regulated firms different between the for-profit and non-profit sectors?

2. To what degree are the impacts of information disclosure policies on regulated firms a function of the composition of a firm’s stakeholders?

Results illustrate that both for-profit and non-profit institutions exhibit significant changes in tuition prices: whereas for-profit institutions subject to additional oversight and a “poor” label decrease tuition, non-profit institutions subject to oversight and a “poor” label increase tuition. The question remains, however, what explains the differential impact of this specific information disclosure policy across dosages and sector? One possible explanation is the nature of the FRCS as a policy instrument combined with the unique characteristics of postsecondary markets – such as an institution’s stakeholders.

Predicated on the assumption that consumers (e.g. students and parents) can make informed decisions about a good, information policies – as discussed – do not necessarily have to be understood or utilized by the intended population in order to have an effect (Goshorn, 1996). First, even if individual consumers are not responding to information disclosure it can be assumed that an institution’s executives are aware of an institution’s score and respond appropriately (Deckler, Nielsen, & Sindt, 2005). In the crudest sense, this may occur at the level of public relations where executives will put pressure on lower-level administrators to respond to the ratings in a matter that does not negatively influence their reputation (Craig, Imberman, & Perdue, 2015). It is through this concern for reputation to stakeholders such as alumni and donors that allows a second process to occur. Whereas prospective students may not possess perfect information regarding the financial health of institutions, the reactions of institutions to information disclosure may signal to consumers the information institutions wish to convey. In an overly heterogenous market – in terms of both providers and consumer preferences – information asymmetries favor the providers of an education
over the recipients (Arrow, 1963; Vining & Weimer, 1988). In this process, the non-profit providers are
at a distinct advantage over their for-profit counterparts: in a sector where students serve as both inputs
and consumers, non-profit institutions tend to serve a relatively elite clientele with for-profit institutions
representing the low-price/low-quality end of the postsecondary market (Hansmann, 1987; Rothschild &
White, 1993).

From the processes outlined above, for-profit institutions are more likely to suffer reputational damage
because of a lower FRCS. In the instance that a non-profit is sanctioned, the non-profit’s “trust capital” may
buffer adverse effects of information disclosure; stated differently, there’s an inherent trust among alumni and
donors that the financial decisions – such as the raising of tuition – of non-profit institutions are necessary for
a non-profit to successfully fulfill and pursue its mission (Tuckman & Chang, 1992). For-profit institutions,
however, are more likely to be labeled as low quality when labeled as financially irresponsible; even when
not labeled as financially irresponsible, for-profit institutions may signal a lower probability of success and
lower lifetime benefits to prospective students (Cellini, Daroila, & Turner, 2016). One way to circumvent
this from the perspective of a for-profit institution is to lower tuition costs in order to increase the return
on investment for students. To illustrate the effect of the FRCS on for-profit tuition levels, consider the

\[
U_{ij} = \alpha_0 I(X_i) - P(X_i, Z_j, S_j) + \alpha_1 A(Z_i, S_j, S_{jc}) + \alpha_2 D_{ij} + \gamma X_i + \varepsilon_{ij}
\]

Where institutions are characterized by their expected out-of-pocket price paid by student \(P_{ij}\) with prices
varying both within and across institutions dependent on student characteristics \(X_i\) (i.e. family income,
academic ability) and college characteristics \(Z_i\) (e.g. listed tuition, sector, reputation). Therefore, institutions
that are deemed financially irresponsible must them increase the student’s utility (\(U\)) of selecting their specific
institution (\(j_k\)). Whereas the time invariant – or nearly time invariant – characteristics of institutions such
as sector and reputation may buffer institutions from the impact of a low score on an institution’s longterm
reputation, a mechanism through which for-profit institutions are able to increase a student’s utility of
attending is by decreasing tuition. Put plainly, by decreasing tuition for-profit institutions are decreasing
the pecuniary costs of students attending their institution and thereby increasing the utility of a student
doing so. Conversely, in the non-profit sector a decrease in tuition would lead to a perceived decrease in
quality by specific stakeholder groups – an action that may have a larger negative impact on the institution’s
reputation than being labeled as financially irresponsible (Dills & Rotthoff, 2013; Winston, 2000). While
this behavior initially is in conflict with the hypotheses posited above, a for-profit institution’s primary goal
is one of survival; so when faced with the threat of decreased enrollments and ceasing operations – as a result
of the information disclosure policies – for-profit institutions will lower tuition levels to attract students who
may have otherwise non enrolled in their programs. Although this assessment of college choice explains the
reason for differential impacts of information disclosure policies on firm behavior, such an assessment does not evaluate the degree to which the FRCS are an effective policy instrument for correcting information asymmetries.

Explicitly stating that one of the goals of the FRCS is to protect consumers from making a poor financial investment, estimates reveal that in light of regulation-through-information policies, for-profit institutions decrease tuition levels. While this may increase the utility of a for-profit institution – and signal a return-on-investment to students – such a response may exacerbate the information gap associated with information disclosure policies broadly speaking. Specifically, information gaps tend to be the widest at the lowest rung of the socioeconomic ladder – a population served primarily by for-profit institutions (Cellini, 2005; Teske, Fitzpatrick, & Kaplan, 2006). While the lowering of tuition may signal a greater return on investment (e.g. utility) of choosing a for-profit institution, this effect has no impact on the the quality of or the risk associated with attending an individual institution; therefore, the market failure is not corrected (Mocan, 2007). Although not intended to assess the quality of education within an institution, the FRCS program may still influence the decisions of students who are shown to make postsecondary enrollment decisions based on quality as well as cost; a relationship that is highly differentiated across demographic groups (Perna & Titus, 2004). In the context of for-profit institutions, the convenience of for-profit institutions is often greater utility to students than the quality of the education they may receive (Iloh & Tierney, 2014). As such, these results hold several implications for the role of policy instruments and design in both the postsecondary realm and broadly speaking.

First, the use of information disclosure policies must take into account the utility functions of both consumers as well as regulated firms. In the case of for-profit institutions, the publication of the FCRS has the inadvertent effect of increasingly the utility of institutions through an increase in the short term utility of students – an increase that in the long term will lead to welfare losses. Second, while previous research has noted that increased public oversight – similar to that embedded in the FRCS – leads to more responsible financial management practices in the non-profit sector, little research has examined the same call for accountability in mixed-markets (Calabrese, 2011; St. Clair, 2016). Given that the results presented here display differential impacts of information disclosure across the private sector, more research may prove fruitful. Finally, little research on the impact of information disclosure policies has been conducted across policy realms; with a vast majority of research taking place in the environmental policy realm. By assessing the impact – or lack of impact – of such policies in the education domain, this study is able to paint a broader picture of the various intricacies of information disclosure and similar regulation-through-information strategies.
References


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[84] Turner, L. J. (2014). *The Road to Pell is Paved with Good Intentions: The Economic Incidence of Federal Student Grant Aid*.


