Competitive Behavior Between For-Profit and Comparable Public Institutions in the Postsecondary Education Market

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For . I have been blessed with the gift of parents as loving and selfless as you both. My accomplishments to date are solely because of your efforts.

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I would like to thank
. Their knowledge from working on the business side of higher education has shown me that increasing postsecondary prices and material irrelevance is a growing problem. It is and will certainly be market-based solutions that create new and affordable education models to left-behind students.

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Abstract

Students that attend for-profit postsecondary schools exhibit higher debt levels and default rates than their community college counterparts. Advocates of for-profit schools often claim that for-profit students are not comparable to community college students, but much of the economic literature to date has compared the labor market outcomes of both types of students. Using IPEDS institutional panel data from 1991-2008, this paper represents the first attempt to understand if students across the nation view two-year private schools (the majority of which are for-profit) and lower-tier public schools as substitutes. I find that a 10% increase in comparable in-state public prices causes an increase in in-state for-profit freshmen of 5% and an increase of approximately 5% of the fraction of for-profit freshmen to total freshmen. Using other price measures such as public community colleges and a price differential; I find that a 10% increase in prices causes an increase of 2% to 4.5% in the above for-profit enrollment metrics. Public enrollment does not change from previous years which is evidence that some of the increase in for-profit students may be explained by an influx of students that would not have entered the education market without an increase in public prices. These results are evidence that some students do view the two types of schools as substitutes and are responsive to price changes.

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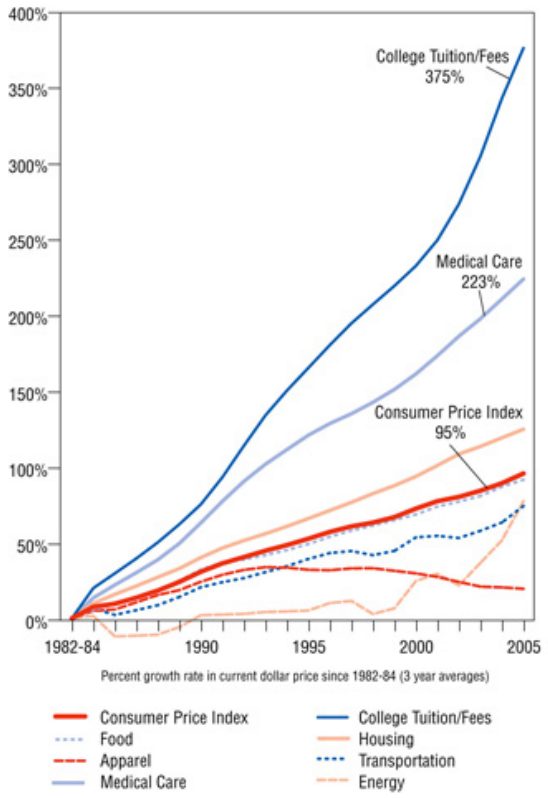
I. Introduction

Since the 1980's, rising college prices, increased student debt, and the emergence of for-profit educational institutions have been interrelated developments in the United States. For-profit students exhibit higher default rates and indebtedness than other types of students, which has spurred the department of education to conduct an investigation of fraud and consumer abuse. This investigation resulted in stricter regulation of these schools (Kutz 2010). Increased government, financial, and media attention has also caused education and labor economists to formally analyze the sector. The majority of empirical work on the subject to date is minimal and relatively homogenous; it is safe to say that the topic is graduating from an infancy stage. Most of the empirical work on the subject has dealt with measuring the returns to a for-profit two-year associate degree in relation to the returns to a public community college degree. This approach is guided by the implicit assumption that for-profits are similar to public community colleges. Yet many advocates of the for-profit market claim that the two types of schools have disparate student bodies making comparisons futile. In response to these claims, this paper will use a unique methodology that observes how public prices affect for-profit enrollment. The results will provide insight on how for-profits are changing the postsecondary education market and if economists are asking the right questions about the for-profit industry.

Similar to other patterns such as income inequality, the sticker price of college has been on the rise since the 1980's. Since then, the price of college has

risen four times faster than inflation and has outpaced well-publicized medical costs (Education Trust 2011). Figure 1 drawn from *Measuring Up: The National Report Card on Higher Education* shows the trend (Callan 2006).

Figure 1: Price Growth Rates in 2006 dollars



While Ivy League schools are able to keep the net price relatively constant due to large endowments, the majority of schools cannot keep the net price down.[1] Since the demand for education is relatively inelastic, students are forced to spend a higher proportion of income on schooling which has led to increased student debt.

It is hard not to notice the relationship between tuition increases and the emergence of the for-profit school. While correlation is by no means causation, there does initially seem to be an interesting relationship between tuition levels and the

[1] Net price is equal to list price less student aid.

growth of the for-profit education industry. The hypothesis guiding this paper is that some students faced with higher public prices will think of for-profits as a viable alternative which is evidence that for-profits and public community colleges are comparable. With this in mind, it is necessary to review the theory put forth to explain price increases and the development and workings of for-profit institutions.

i. Rising Prices and the Emergence of For-Profits

For-profits depend on sophisticated student credit markets to finance their higher prices. William Bennett, President Ronald Reagan's Secretary of Education, argued that the rise in government aid allowed institutions to increase their list price and this supply side argument has become known as the "Bennett Hypothesis". He argued in a well-known New York Times op-ed:

> "If anything, increases in financial aid in recent years have enabled colleges and universities blithely to raise their tuitions, confident that Federal loan subsidies would help cushion the increase. In 1978, subsidies became available to a greatly expanded number of students. In 1980, college tuitions began rising year after year at a rate that exceeded inflation. Federal student aid policies do not cause college price inflation, but there is little doubt that they help make it possible" (Bennett 1987).

While William Bennett was not referring to for-profit education, the Bennett Hypothesis is especially relevant to the emergence of a for-profit sector because these schools are more dependent on federal grants and loans than non-profits. Under Title IV, for-profit institutions cannot have more than 90% of their revenue

coming from Federal grants. It is well documented that these schools strive to be right at the 90% mark and often will sell proprietary education loans to constitute the remaining 10% (Loonin 2011). The various sources of credit enable students to consider for-profits as viable alternatives to traditional college.

Apart from a credit market explanation, many other economic theories have been put forth to explain increasing postsecondary prices. In 1967, the economist William Baumol developed a theory predicting that high productivity industries would force prices up in lower productivity industries. In *Macroeconomics of Unbalanced Growth – the Anatomy of Urban Crises*, Baumol points out that there are industries that can use labor indefinitely to increase productivity (manufacturing) and there are other industries that have a limit to how productive the labor can be (education). According to fundamentals, wages will rise in the manufacturing sector (due to increases in productivity), and wages will remain stagnant in the education sector. Yet, in order to remain competitive, wages and costs will also have to rise in the education sector which ultimately will drive prices up (Baumol 1967). Other theories try to analyze the college market through supply and demand factors. As a result of skill-bias technological change, the demand for educated workers has increased the college wage premium. Inversely, other economists argue that skill-bias change has been constant and that the supply of students has been the dominant factor in changing wage premiums and prices (Goldin and Katz 2008).

There is much debate in explaining rising education prices, but increased college costs are certainly a significant factor. While computers and IT expenditures are a large component, other factors include higher salaries, decreased federal

support and increased financial aid (Ehrenberg and Murphy 1993). Anecdotally, people often cite the "three R's" as the reason for rising college prices, Research, Real-Estate, and Rankings, to describe how expenditures have increased in order to compete for students with a relatively inelastic demand curve.

While traditional non-profit schools are caught up in "an arms race" (Archibald and Feldman 2010) to attract students, there is a large student market that is not being served. This market is derived of traditionally lower income, often working individuals who demand vocational training rather than a traditional educational experience. The rising education prices presented an opportunity to serve these "left behind" consumers.

ii. For-Profit Institutions

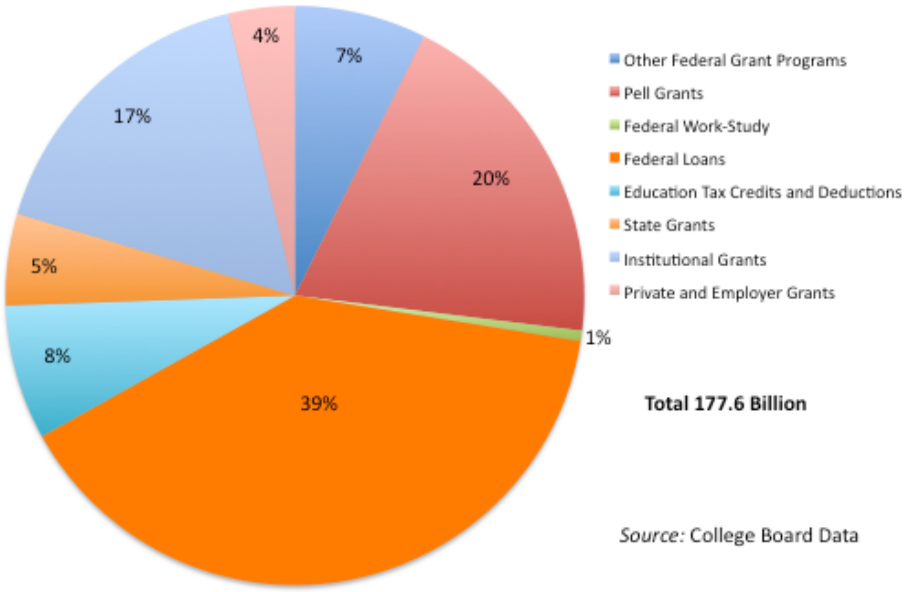
In the midst of rising college prices, for-profits have exhibited tremendous growth. From 1986 to 2008, the for-profit sector increased its enrollment from approximately 300,000 to 1.8 million students. Over the same period the non-profit sector grew at 1.5% per year and the for-profit sector grew at 8.4% per year. Furthermore, 2.4% of post-secondary students were enrolled in for-profits in 1986 and by 2008 this same statistic grew to 9.2% (Bennett, Lucchesi, Vedder 2010).

For-profit growth is of interest to policy makers and economists because the education market, education credit market, and hiring process are ripe with asymmetric information and signaling problems.[2] For-profits are dependent on student aid and their students exhibit higher indebtedness and default rates. Figure

[2] For more theory and empirical work on signaling theory see Spence 1973 and Clark and See 2011.

2, on the next page, shows the various sources of aid available to students. Despite enrolling less than 10% of the college market, for-profits claim 25% of the federal loans (Eisman 2010). Not only do for-profits command a high proportion of student credit, for-profit students are more likely to default than non-profit students.

Figure 2: Total Undergraduate Student Aid by Source and Type (in Billions), 2010-11 Undergraduate



Source: College Board Data

According to analysts, the three-year cohort default rate in 2008 was 24.9% for for-profits in comparison to 10.8 and 7.6% for public schools and private non-profits, respectively (Steinerman, Volshteyn, McGarret 2011).[3] One could imagine a situation in which career oriented students graduate from for-profit schools, increase their expected income and are able to pay back their loans. One could also imagine a situation where for-profits do not provide any education of value, but rather are aggressive marketing schemes targeted at underprivileged students which transform government (tax-payer) loans and grants into income on their 10-

[3] The three-year cohort default rate is the percent of student loan borrowers that default by the end of the second following fiscal year (Demming, Katz, Goldin 2011).

K. Furthermore, for-profits increase student debt since they charge higher prices on an order of magnitude to low-income students.[4] The fact that tax-payers, the government and students are potentially at risk to market failures creates a powerful incentive for economists to understand this market better.

Who are the students enrolling in these for-profit institutions? Baum and Payea provide an analysis on the demographic statistics. In 2007, students over twenty-five accounted for more than 50% of for-profit students, while the same demographic accounted for less than 33.3% for non-profits. Not only are the students older, but racial minorities represent a larger proportion of the student body at for-profits than at non-profits. According to the U.S. Department of Education, students that were black, Hispanic, Asian, or Native American accounted for 40% of for-profit enrollment and approximately 30% in non-profit institutions. In 2007, women accounted for 64% of for-profit students while only 57-58% of non-profit enrollment. For-profits provide career-oriented training or certification programs and as such students tend to be in a lower income bracket and are often minorities (Baum and Payea 2011).

The make-up of for-profit students is critical to the issue of whether for-profit and non-profit institutions are even comparable. This is an important question to analyze because the answer is often ambiguously assumed. More specifically, proponents of for-profits argue that for-profit and public universities

[4] See Demming, Katz, Goldin (2011).

target different types of students and therefore cannot be compared.[5] On the other hand, much of the empirical work on the for-profit sector compares the labor market outcomes of students from for-profits to students from public community colleges.

This paper will attempt to empirically contextualize the competitive behavior of two-year for-profits and public schools over the past twenty years. In particular, this paper will look at how rising public tuition affects in-state enrollment in the for-profit sector. This is a unique approach to the economic research on the topic and will shed light not only on the for-profit market, but on how we should begin to think of for-profits relative to traditional institutions. Ultimately, this paper hopes to contribute to the otherwise empirically shallow research on the topic and to stimulate further research.

[5] Proponents take this stance to explain or neutralize the apparent indebtedness of for-profit students (I.E. if for-profit students are "higher risk" students than non-profit students, then one would expect them to default more) (Swaill 2009).

II. Literature Review

Most of the empirical literature uses individual level panel data to compare the labor market outcomes of students attending for-profit and non-profit institutions. This paper will employ institutional level data to examine how the for-profit and non-profit schools compete for students. However, this paper will follow the previous literature in classifying private two-year community colleges as for-profit.[6]

The work of Hoxby (1997) is a unique attempt to analyze transformations in post-secondary education and the effects on the overall market. She uses conventional industrial organization theory to examine the effects of increased competition due to reduced student transportation. In other words, students have increasingly been able to travel out-of-state to attend college which has allowed universities to engage in competitive behavior for a larger group of consumers. The theory predicts that as the education market transforms from autarkies to integrated competitors the following can be expected: 1) a loss of monopoly power will increase student quality and thus student subsidies, 2) the increase in quality will correspond with an increase in average price and 3) an increased diversity among colleges and homogeneity within colleges will result. Hoxby uses institutional data from the Higher Education General Information Survey and the Integrated Postsecondary Education Data System (IPEDS). From this data, Hoxby builds a Herfindahl index for the independent variable and a proxy for market

[6] Due to data constraints, it is difficult to analyze for-profit institutions. One solution is to categorize private two-year institutions as for-profit since the vast majority of these schools are for-profit (see Cellini and Chaudhary's 2011).

competition. The Herfindhal index is constructed to equal one if a college enrollment is solely from in-state. The independent variables are average institution SAT score, log of list tuition, log of in-state tuition, log of average subsidy, and log of tuition revenue. The model suggests that a decrease in .2 of the Herfindahl Index (more competition) increases tuition and subsidies by 59.3% and 12.3%, respectively.

The industrial organization ideas behind Hoxby's paper are influential for this paper. While Hoxby looks at the effect of reduced transportation costs, this paper looks at the effect that for-profits have had on institutional competition. Hoxby is mostly interested in out-of-state enrollment, but this paper analyzes in-state competition. The for-profit economic literature has not answered this question to date, and has been more interested in valuing the returns to a for-profit degree.

Arguably the first work done on the for-profit sector was Grubb (1993). Grubb attempts to quantify the labor market benefits of for-profit institutions. Grubb uses data from the High School and Beyond (HS&B) survey and National Longitudinal Survey of Youth (NLSY) 1972 to examine individuals that attended public community colleges and private community colleges. The HS&B survey provides data on members of the 1980 high school class and the NLSY-72 follows high school students from the class of 1972. These two data sets allow Grubb to estimate more recent and longer-term effects of for-profit education. Grubb does not employ regression analysis, but rather looks at simple cross tabulations of wages based upon type of post-secondary education. The data shows that public community colleges provide labor market benefits, but this did not hold true for for-profit associate degrees. For-profit degrees did not seem to provide a significant

advantage over the typical high-school graduate. Grubb's results support regulation and potentially the eradication of the government's role in financing for-profits. This logic has set the tone for the following empirical work and for the negative media attention on the for-profit industry. This work is somewhat simplistic and does not account for any demographic differences among the individuals. As a result, these findings should be read with caution.

Anna Chung (2009) builds upon Grubb (1993) using more recent data and attempts to use an OLS model that controls for individual characteristics. Chung obtains her dependent variables of employment and wage outcomes using data from the National Educational Longitudinal Survey (NELS) of individuals from 1988-2000. Chung uses the Post-Secondary Education Transcript Study (PETS) to obtain data on credentials which she uses as her independent variables. An adjusted Mincer model was used to evaluate the effect of credentials, which included dummy variables for the highest degree received and type of institution. The model also contained variables to control for characteristics such as: age, location, family background, and academic skills. The model finds a large statistically significant difference between the average salaries of for-profit and non-profit graduates; for-profit graduates had lower salaries than non-profit graduates. There is no statistical difference between for-profit graduates and those without a degree; the lower bound of the means were $29,648 and $27,293 for the two groups, respectively. While this result does control for observable characteristics, these results should be interpreted with caution since selection bias and error term correlation is a serious problem in the standard education model. Finding proper instruments and model

specification can be daunting and inaccurate to say the least.[7] For this reason, the institutional level fixed effects model used in this paper is seen as more robust to these problems of endogeneity.

Cellini and Chaudhary's (2011) also compare the labor market returns to for-profit and non-profit schools. However, the authors use even more recent data, restricting their sample to individuals that attended two-year universities. They also employ a different methodology. Cellini and Chaudhary use data from NLSY 97 which conducts annual surveys of 9,000 youths that were 12-16 years old in 1997; the data ends after 2008. Unlike many of the other studies, the authors do not use a Mincer model, but rather use dummy variables for whether the student enrolled in public or private institution and whether the student received a degree. The variables of interest are the interaction variable between private and post and the single dummy for post. The interaction term equals one for students that went to a for-profit school and received a degree. The dependent variable is a measure of student outcome such as employment and wages. Most importantly, the authors use an individual fixed effects error component model to control for unobservable individual and time components. Unlike Chung 2009, this construction should mitigate any endogeneity problem. The authors find that obtaining a degree from a for-profit or a public community college increases earnings by about 8% per year of education. The point estimates show that obtaining a for-profit degree may increase one's earnings relative to a public community college by 3 percentage points; this result is not statistically significant. As the authors point out, their data shows that a

[7] See Angrist and Krueger (1991) for more on instrumental variables and standard education models.

for-profit degree does not decrease earnings relative to a community college. However, the lack of significance in the results should not be passed over as it leads one to believe that for-profit schools are potentially overpriced.

Due to unreliable data, it has been difficult to analyze student debt outcomes at for-profit institutions. Demming, Katz, and Goldin (2011) provide the first economic paper to tackle this issue. The authors use data from the Beginning Postsecondary (BPS) longitudinal data set. This data set surveys students who entered college in 2003 and re-surveys them three and six years after their first year. The authors employ OLS with clustered standard errors to estimate the effects of institution type (dummy variable) on labor market outcomes such as cohort default rates, student debt level, and employment. In addition to OLS, the authors divide the data into for-profits and non-profits which are designated as the treatment and control groups, respectively. The authors find that for-profit students are more likely to graduate from certificate and AA programs, but less likely to go on to higher forms of education. More importantly, the authors find that for-profit students are more likely to default on their debt. 26% of for-profit students with $5,001-$10,000 defaulted compared to 10% of community college students and 7% of four-year non-profit students. Furthermore, the authors find that for-profit students have incomes 8% lower than what the model predicts they would earn had they gone to non-profit schools. The main question in this study addresses how effective the demographic controls and matching technique are at accounting for significant differences between for-profit and non-profit students.

While much of the empirical work has focused on estimating the returns to for-profit education, recent papers have analyzed different questions. Cellini and Goldin (2012) attempt to examine the Bennett hypothesis within the for-profit sector. While previous economic work has not found significant results in favor of the Bennett hypothesis, no paper has limited their sample to for-profit schools. This is a natural extension of the issue because, as noted above, many for-profit schools receive close to 90% of their revenue in government credit, and as such their prices may be more responsive to credit changes. Their paper uses administrative data on for-profit schools within Florida, Michigan, Missouri, Tennessee, and Wisconsin. Up until now the empirical literature has only analyzed for-profit school eligible for Title IV government funding. This was mainly due to data limitations and the idea that the for-profit business model is dependent on Title IV funding. While this is certainly true for many schools, the administrative data gathered in this paper allows the authors to examine for-profit schools that do not receive Title IV funding. The authors regress the natural log of school tuition (by school, program, year, and country) on a binary variable indicating Title IV eligibility and a vector of school characteristics. The results indicate that Title IV eligibility increases for-profit tuition by 75%. The fact that empirical evidence has not supported the Bennett hypothesis for overall post-secondary institutions, but clearly supports it for for-profits, is strong evidence that loans and grants prop up for-profit prices. This finding is a strong assumption in our model that students may view the two types of schools as substitutes due to large amounts of student credit available.

If for-profit associate colleges are more expensive versions of public community colleges, it is important to clearly understand what affects a student's chance of choosing a for-profit. Chung (2009) attempts to answer how students self-select into for-profit institutions. Chung uses data from the National Education Longitudinal Study of 1988 (NELS 88) and PETS to construct a multinomial logit model. The model assumes that students maximize their utility when choosing a college. This is highly suspect under the known information asymmetries in the education and especially for-profit market. The model was run four times for the following dependent variables: did not attend college, attended for-profit college, attended a non-profit two-year college, and attended a non-profit four-year college. These variables were regressed on demographic characteristics, family resources, parents' attendance of college, cognitive skills, and in-state tuition in community colleges. The results of the study confirm and provide new information on for-profit schools. For one, the results show that gender is a significant determinate in enrolling in a for-profit school. This is not surprising since approximately 60% of the for-profit student body is female. However, the study does not find race to be a significant factor in predicting whether a student enrolls in a for-profit. This undermines the consensus that for-profit schools are pipelines for racial minorities to enter the labor force. Chung argues that the large proportion of racial minorities in the for-profit sector is a result of there being more for-profit schools in urban environments. The most interesting determinate is the cost of public community colleges which is used as a proxy for opportunity cost. The study found that an increase in community college tuition from $1,000 to $1,400 or 40% increases the

probability of attending a for-profit college by 1%. Chung (2009) signifies one of the first attempts to analyze how for-profits and non-profits compete. From Chung (2009), this paper will draw heavily upon the idea that public community college costs represent an opportunity cost for for-profit students.

The relationship between two-year private and public community colleges analyzed in much of the previously mentioned literature is based upon the assumption that two-year private and public community colleges are substitutes. But is this the case? Cellini (2009) searches for crowding-out effects between public expenditure and private enrollment, the logic being that if a crowding-out effect is significant then these types of schools are substitutes. Cellini uses California administrative data on for-profit institutions and community college bond-referendum voting results. To mitigate endogeneity problems, Cellini uses a regression discontinuity model, that focuses solely on counties in which the bond passed or failed by a narrow margin. Cellini finds that an increase of $100 million in public school funding corresponds with 2% of community college students transferring to public associate programs. This result leads one to believe that the two-year for-profit and non-profit schools are indeed competitors. This work represents the first formal analysis on the competition between for-profits and two-year community colleges. The question of whether students view the two types of schools as relevant competitors or substitutes is highly influential for this paper. However, this paper is not confined to the sub-baccalaureate level and looks at data from across the nation. Furthermore, a different model is constructed to address this question.

This paper adds to the economic literature on the for-profit education market by analyzing the competitive nature of for-profit and public institutions across the United States. This paper will analyze, specifically, the effects of public school price increases on in-state for-profit enrollment. While almost all of the for-profit education work has been conducted on an individual level, this study attempts to understand the market competition at an institutional level.

III. Data and Summary Statistics

The main variables used in this study are listed below and are drawn from the Integrated Postsecondary Education Data System (IPEDS).[8] The Higher Education Act of 1965 mandates that any institution participating in federal financial aid (this part of the act is known as Title IV) must report certain information. Title IV participating institutions number more than 6,700 and range from for-profit community colleges to Ivy League Universities. A significant challenge was constructing a relevant dataset that narrows in on the type of student that would be faced with a choice between attending a for-profit or a public school. All associate (community colleges and certification programs) institutions are included, along with lower-tier baccalaureate institutions. As a result, the statistics shown below do not reflect a nation-wide sample of all institutions, but a customized data set focused on institutions that contain students who are likely to be targeted by both for-profits and their relevant competitors. The end goal of the methodology will be to determine if there is market competition.

It is also important to note that there are many for-profit institutions that do not participate in Title IV (Cellini and Goldin 2012), but this study is only concerned with those for-profits that do receive federal grant money from their students. This is seen as reasonable since many for-profits rely on student grants and loans to subsidize their higher costs.

[8] More specifically, the data was drawn from CASPAR, which is a panel version of the IPEDS data, but is often easier to work with.

Price

Associate and baccalaureate in-state tuition prices for the full academic year are drawn at the institutional level from the IPEDS databases. The database uses the 2010 Carnegie classification system to define the type of school. Not all baccalaureate or two-year community colleges are classified under the same category and table I in the appendix displays the different Carnegie definitions. To create this data set, institutions classified as "Research Universities-High Research Activity" and "Not Classified" were redefined as "baccalaureate" and "associate".[9] The reason for this is that "Research Universities-High Research Activity" tend to be large, public, but not premier state schools and "Not Classified" tend to be two-year community colleges (many of which are for-profit) and need to be included in the analysis.

Prices were drawn from 1991-2008 spanning a total of 32,444 observations (institutions over the time frame).[10] The data contains approximately 375 for-profit institutions per year in comparison to approximately 900 community colleges per year. While the sample size differential is of some concern, the for-profit sample is still larger than much of the previous for-profit work that has used longitudinal data on an individual level. As a result, the sample size is considered appropriate for providing reasonable OLS estimates.

[9] There were 1,976 observations of private "not classified" that were reclassified as private associate and 1,180 observations of public research-high research activity" that were reclassified as public baccalaureate.
[10] All prices were normalized for 2005 dollars.

Figure 3: National Public Prices

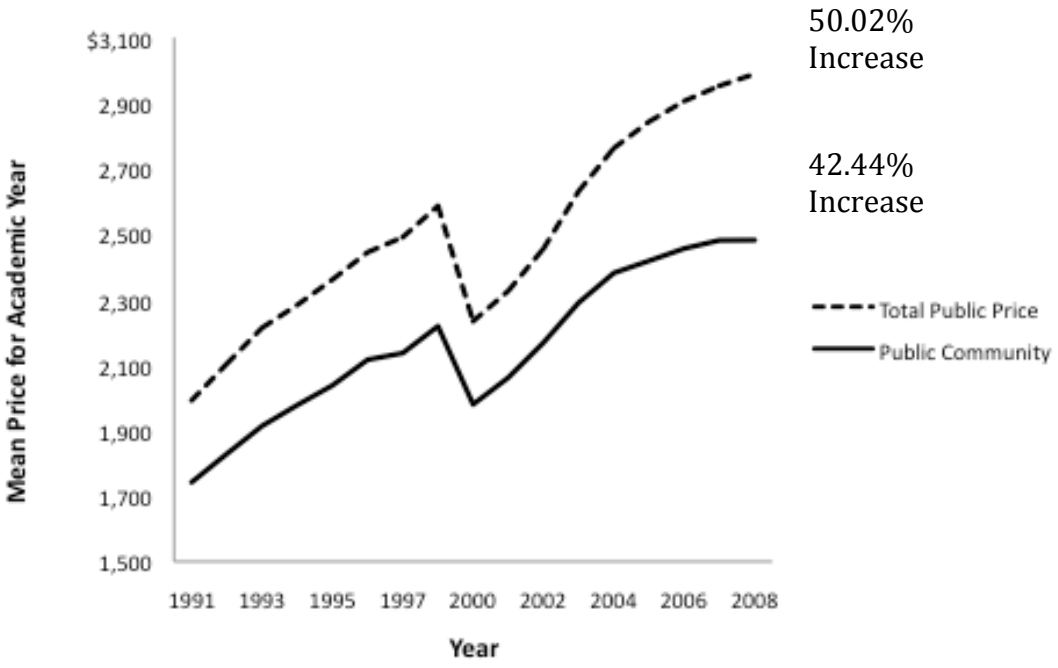


Figure 3 shows the data set's average public prices for the nation over the time frame. The two public prices track each other closely with total public prices being slightly more expensive because they include baccalaureate institutions. The obvious trend is that total public prices and public community college prices have increased over the time frame by 50.02% and 42.44%, respectively. It should be noted that for-profit prices have increased 57.88% in the time-frame, but are not included in the chart because this study is focused more on the effects of the above trend.[11]

[11] Tables II-IV in the appendix presents the data for figure 3 along with the for-profit prices as well.

Since this study is interested in state by year comparisons, observations are collapsed to obtain the average prices for public and private baccalaureate and associate institutions by state and year. The collapsed data results in a total of 3,211 observations.[12] Table 1 shows descriptive statistics for the resulting data.

Table 1: Average In-State Prices by State from 1991-2008

Variable	Obs.	Mean	Median	Std.	Min	Max
2-Year For-Profit	735	9234.62	8437	5128.62	1433.5	39578.6
Public Community College	832	2158.56	1971.84	1024.86	185.9	5571.49
Total Public Prices	849	2504.75	2235.8	1293.72	223.5	7951.23

From 1991-2008, the average cost of for-profit schools is $9,234 in comparison to the average cost of public community colleges of $2,158. If the rises in public sector prices, shown above, induce students to transfer into for-profit schools, these students are likely to incur additional debt to cover a cost on average 4.2 times higher than their previous cost.

To account for outliers, the natural logarithm of in-state prices is created.

Table 2: Logarithmic In-State Prices from 1991-2008

Variable	Obs.	Mean	Median	Std.	Min	Max
Log of For-Profit	735	9	9.04	0.509	7.27	10.59
Log of For-Profit Lag	690	9	9.02	0.5	7.4	10.55
Log of Public Community College	832	7.56	7.59	0.5	5.23	8.63
Log of Public Community College Lag	783	7.55	7.57	0.5	5.23	8.62
Log of Total Public Colleges	849	7.7	7.7	0.52	5.41	8.98
Log of Total Public Colleges Lag	799	7.69	7.7	0.52	5.41	8.96

[12] 19 observations had prices equal to $0. This can be problematic when taking the log of prices, so 1$ has been added to all prices.

Table 2 shows the summary statistics of this variable for for-profit and community colleges. It should be noted that data was not available for 1999 due to omissions in the IPEDS data set.

Natural questions arise from these two observations. If for-profit schools are more expensive, than how can they be competing for the same type of students? In addition, if for-profit schools target significantly disadvantaged students in relation to public community colleges, then how can they charge on average 4.2 times more let alone increase their prices slightly more? The answer to this is that students manage the cost of for-profits via Pell grants, various types of government loans, and often proprietary loans to cover the difference. The conceptual hypothesis for this paper is that faced with an abundant supply of credit and sophisticated marketing for the for-profit schools, the choice between for-profits and public community colleges becomes reasonable. The purpose of this paper is to analyze if and to what extent that choice is made.

Log Price Differential Lag

Table 3: Price Differential (For-Profit less 2-year Public) from 1991-2008

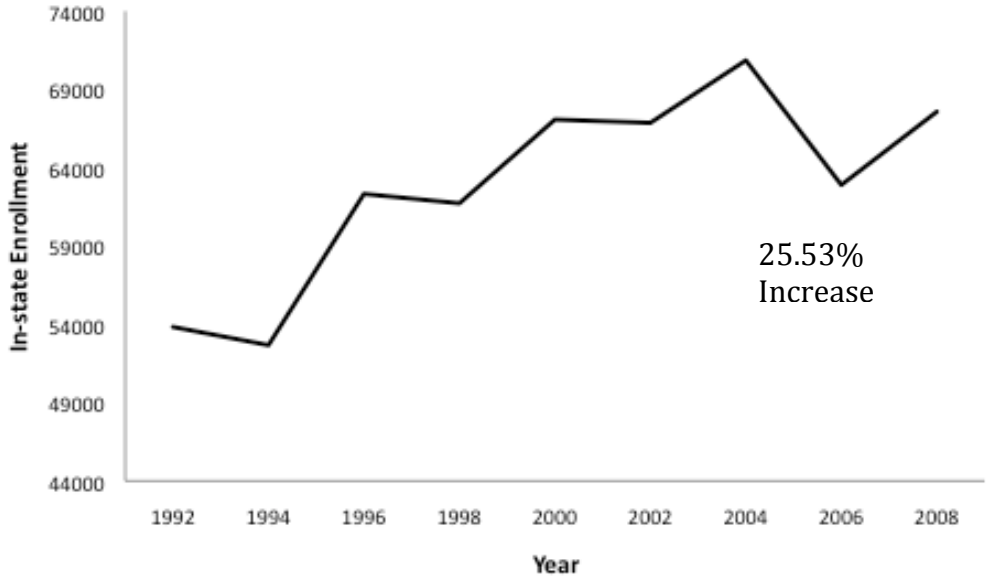
Variable	Obs.	Mean	Median	Std.	Min	Max
Price_Differential	701	1.43	1.36	0.622	-0.171	3.899
Price_Differential Lag	666	1.43	1.36	0.612	-0.17	3.89

In order to account for movement in both the for-profit price and public price, a lagged priced differential is used. This represents the logged for-profit price less the logged public community college price at t-1. The summary statistics are presented in Table 3.

In-state Freshmen: Total Enrollment

The Resident and Migration survey is a subset of the IPEDS data which collects residence information on freshmen for every even year. Table V in the appendix shows the classification of the raw enrollment data. Similar to the price data, institutions are filtered to create a customized data set focused on the relevant student. To this end, all baccalaureate and associate institutions were chosen and schools classified as "Research 1 Institutions" were reclassified and included in our baccalaureate sample.[13] The entire data set of institutions from 1992-2008 is comprised of 16,953 observations. Similar to the price data, there is a larger sample of public community colleges in comparison to for-profit schools, which may introduce bias. Figure 4 shows that two-year instate enrollment in for-profits has increased 25.53% over the time frame.

Figure 4: For-Profit Freshmen Enrollment



[13] From 1992-2008, there were 2,228 observations of public "Research I Universities" that were reclassified as public baccalaureate and 949 private "Not Classified" that were reclassified as private associate programs.

The enrollment data was collapsed and summed by state and year to get the total number of in-state freshmen attending each type of school. Table 4 shows the summary statistics on in-state enrollment of for-profit freshmen, public community college freshmen, and total freshmen by state and year.

Table 5: Enrollment Statistics from 1991-2008 by State and Year

Variable	Obs.	Mean	Median	Std.	Min	Max
For-Profit Freshmen	393	1439.75	758	1826.51	17	9986
Log of For-Profit Freshmen	393	6.56	6.63	1.31	2.833	9.21
Public Community College Freshmen	449	19547.24	12407	27580.41	31	261735
Log of Community College Freshmen	449	9.11	9.43	1.45	3.43	12.48
Total Freshmen	459	25577	17213	32678.52	35	292962
Log of Total Freshmen	459	9.39	9.753	1.52	3.56	12.59

The log values are useful for calculating elasticity and robustness and are further discussed in the methodology.

From this data, the following enrollment fractions are constructed**:** (1) for-profit freshmen / total community college freshmen[14] (2) for-profit freshmen / total freshmen (3) public associate freshmen / total freshmen. These fractions allow one to examine how students matriculate into each type of school and serve as dependent variables in the model. Table 6 provides summary statistics for each type of fraction.

Table 6: Enrollment Fractions from 1991-2008

Variable	Obs.	Mean	Median	Std.	Min	Max
Fraction 1	393	0.1276	0.073	0.186	0.002	1
Fraction 2	393	0.076	0.05	0.11	0.001	0.89
Fraction 3	440	0.66	0.68	0.17	0.021	1

[14] This includes for-profit as well as public community colleges.

One can see that the mean of fraction (1) is .127 signifying that in our sample 12.7% of in-state freshmen attending associate programs enroll in for-profit programs. The mean of fraction (2) is .076 signifying that 7.6% of all freshmen in our sample enroll in for-profit schools. The mean of fraction (3) is .66 signifying that 66% of freshmen in our sample attend a public community college. Table VII in the appendix shows that the national average of these fractions does not seem to have changed significantly over the time frame. This is not unusual since the national average (of the state average) diminishes almost all of the variance. Furthermore, the fact that a majority of the students attend a public community college is also expected since the sample was focused on the type of student that a for-profit would compete with. Lastly, there are 393 observations of fractions (1) and (2) compared to 440 observations of fraction (3), which may introduce bias.

Youth

Population data was obtained from the Missouri Census Data Center to control for the amount of students that are most likely to choose between a community college and a for-profit school. Since for-profit schools tend to enroll an older student demographic, the population of students ages 18-28 is used as a control. Table **7** shows summary statistics for the absolute number of residents ages 18-28 and the percent of residents ages 18-28.

Table 7: State Population 18-28 from 1991-2008

Variable	Obs.	Mean	Median	Std.	Min	Max
18-28	918	848248.5	617140	962916.9	65575	5919604
% of Total Population	918	15.54	15.4	1.37	12.5	22

The absolute number is useful for weighting regressions, and the percent of youth is useful as a control, which is further discussed in the methodology section of the paper.

Concluding Note Concerning Data

From the data, it is clear that public community college prices have increased along with for-profit enrollment. This trend provides the motivation in analyzing the potential relationship between rising public prices and for-profit enrollment. It should also be noted that converting institutional price data into averages by state and year will surely lose variation. Thus, any effect that is found is perhaps dampened due to the lack of variation in the data. Furthermore, much of the growth in for-profit enrollment has occurred in the four-year sector. Due to data limitations, this study is only concerned with the two-year for-profit sector that has not exhibited as strong of a growth in comparison. Thus, any trends found on the two-year for-profit sector may be exaggerated in the four-year sector because the four-year for-profits are generally more sophisticated companies than the two-year associate programs.

IV. Methodology

This paper attempts to analyze the effect of rising public prices on for-profit enrollment and implicitly the competition between for-profit and public community colleges. To do this, OLS is employed on a longitudinal data set where there are observations for each state (i) and year (t). The data analysis above shows that there are likely many state or year specific variables correlated with the enrollment fractions. To control for endogeneity, an error component model is constructed using year and state fixed effects. Specifically, state and year dummies are used to control for time and state idiosyncrasies. An error component model using random effects does not seem logical since the specific state and year are most likely correlated with the error term. As a result, the appropriate Haussmann test will not be tested. The benefit of the fixed effects approach is that it is not necessary to search for multiple control variables or complex instruments because all the state or year specific effects are incorporated in the dummy variables. A downside of this approach is that it chews up degrees of freedom, but this is seen as a necessary cost in order to obtain reliable OLS estimators. The fixed effects approach is similar to observing case studies for each state observed over time and taking the average relationship between public price and enrollment in all states. As such, the model constructed tests relationships on a national level.

In addition to this standard model, it is necessary to check that small states with idiosyncratic dynamics do not distort the results. To control for this, regressions are also run weighted by the total youth population ages 18-28. These weighted regressions are shown in the appendix. If the regression results do not

change drastically due to weight, then the estimators are robust to any idiosyncratic influences of small states.

i. Construction

If there is an overlap in the students that for-profit, public community colleges, and public baccalaureate target, then one may expect more students to enroll in for-profit schools given a dollar increase in public colleges. This paper constructs a model that attempts to analyze this hypothesis. The standard model used is:

I) $Y_{i,t} = ß_0 + ß_1(\text{PriceMeasure})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$

Where $\mathbf{Y_{i,t}}$ is a measure of enrollment discussed above and **PriceMeasure** is a measure of public prices. Specifications of this standard model are employed and are as follows:

1. $(\text{Fraction I})_{i,t} = ß_0 + ß_1(\text{ln\_pricein\_lag})_{i,t} + ß_2(\text{PctYouth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
2. $(\text{Fraction II})_{i,t} = ß_0 + ß_1(\text{ln\_pricein\_lag})_{i,t} + ß_2(\text{PctYouth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
3. $(\text{Fraction III})_{i,t} = ß_0 + ß_1(\text{ln\_pricein\_lag})_{i,t} + ß_2(\text{PctYouth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
4. $\ln(\text{For-Profit Freshmen})_{i,t} = ß_0 + ß_1(\text{ln\_pricein\_lag})_{i,t} + ß_2(\text{PctYouth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
5. $\ln(\text{Public Associate Freshmen})_{i,t} = ß_0 + ß_1(\text{ln\_pricein\_lag})_{i,t} + ß_2(\text{PctYouth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$

ln_pricein_lag represents the natural log of the lagged public school price at t-1. Regressions are first run using total public prices. However, it is expected that the price of public community colleges has a greater effect on for-profit enrollment because these prices more directly effect the target group of students. To this end,

regressions are also run using solely the price of public community colleges. The lagged price is used because it is this price that weighs on the student decision whether to attend a for-profit or public school. The lagged price is also used to diminish reverse causality effects. One dollar has been added to all of the prices to account for the fact that 19 of the price observations are not included in the log variables because the price is equal to zero.

In order to narrow in on demographic differences, **PctYouth** is a variable that equals the percent of total state population that are ages 18-28. This variable controls for the size of the population that is most likely to attend a for-profit or public community college.

The fixed effect dummies are represented by $\boldsymbol{\alpha_i}$ and $\boldsymbol{\lambda_t}$. $\boldsymbol{\alpha_i}$ is a vector of state dummies to control for inter-state differences that may be correlated with the enrollment fractions. Such differences include: demographics, urban layout, commercial industries, regulations, and a variety of other state specific factors. $\boldsymbol{\lambda_t}$ is a vector of year dummies to control for correlations through time. As shown above, price is correlated with time and this vector will absorb these time trends. $e_{i,t}$ is the residual term that measures the unexplained portion of the model.

Since the data consists of observations across states and time, the model is likely to exhibit heteroskedasticity, which will be formally tested. More specifically, it is likely that the individual error term within each type of group will exhibit interclass correlation. To account for this, standard errors will be clustered by state. While the cluster technique works best for a large amount of groups, 40 or more states is considered appropriate for clustered standard errors. The resulting

coefficients of the model will then be accurate OLS estimators for a clustered data set.

In addition to the above regressions, two methods are used to account for the for-profit price. The first method runs regressions 1-5 with an additional regressor that represents the log of the lagged for-profit price. The second method uses the price differential as the dependent variable. As noted above, the price differential is defined as the log of the lagged for-profit price less the log of the lagged public two-year community college.[15] These regressions focus on how the two changes in price effect enrollment. Below are the five regressions using the lagged price-differential dependent variable.

6. $(\text{Fraction I})_{i,t} = ß_0 + ß_1(\text{Price\_diff\_lag})_{i,t} + ß_2(\text{Youth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
7. $(\text{Fraction II})_{i,t} = ß_0 + ß_1(\text{Price\_diff\_lag})_{i,t} + ß_2(\text{Youth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
8. $(\text{Fraction III})_{i,t} = ß_0 + ß_1(\text{Price\_diff\_lag})_{i,t} + ß_2(\text{Youth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
9. $\ln(\text{For-Profit Freshmen})_{i,t} = ß_0 + ß_1(\text{Price\_diff\_lag})_{i,t} + ß_2(\text{Youth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$
10. $\ln(\text{Public Associate Freshmen})_{i,t} = ß_0 + ß_1(\text{Price\_diff\_lag})_{i,t} + ß_2(\text{Youth})_{i,t} + \alpha_i + \lambda_t + e_{i,t}$

A final note about these regressions is that the denominator is a possible source of error and it is necessary to analyze potential denominator changes in order to isolate the numerator. Regressions 5 and 10 are useful in understanding the denominator since they analyze the elasticity to public enrollment. The interpretation, hypothesis and expectation of these 10 regressions are discussed below.

[15] Log(For-Profit Lag) – Log(Public Community College Lag) or Log(For-Profit Lag/Public Community College Lag)

ii. Interpretation and Expectation

$ß_1$ measures the effect of public prices on enrollment and as such is the coefficient of interest. One hypothesis is that public prices do not have any effect on for-profit enrollment because for-profits cater to a disadvantaged market. This is the hypothesis that the for-profit supporters widely offer as an explanation for higher default rates. If this is the case, then one would expect the coefficient $ß_1$ to have an insignificant effect. On the other hand, if one expects that for-profit community colleges are relatively similar to the public schools then one would expect $ß_1$ to have a significant positive effect on for-profit enrollment. This is the hypothesis that much of the previous economic work has implicitly assumed by comparing labor market outcomes of for-profits and public community colleges. The conceptual hypothesis for this paper is that faced with rising public community college prices some students will decide to enroll in for-profits rather than public community colleges. This is likely due to for-profit marketing and the large availability of student credit.

As a result, it is expected that $ß_1$ has a positive and significant effect on for-profit enrollment and a negative effect on public enrollment. More specifically, it is expected that $ß_1$ is positive for regressions 1, 2, and 4 and negative for regressions 3 and 5. Since regression 1 narrows the dependent variable to only community college students, the coefficient is expected to be larger than the other regressions. It is important to include regressions 3 and 5 as logic checks to make sure that public enrollment does in fact decrease as a result of rises in price. Thus, $ß_1$ is expected to

be negative for regressions 3 and 5. This relationship would provide evidence that for-profits do indeed cut into the market of the public schools.

For the price differential regressions (regressions 6-10), the coefficient on $ß_1$ is expected to reverse. In other words, $ß_1$ is expected to have a positive effect for regressions 8 and 10 but a negative effect for regressions 6, 7, and 9. Since for-profits are on average 4.2 times the price of public community colleges, the price differential (for-profit – public community college) is generally positive. When the price differential contracts, more students are expected to attend for-profits because they have become cheaper relative to public community colleges.

V. Results

Table 8. Effect of Total Public Prices on In-State Freshmen Enrollment

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(1)	(2)	(3)	(4)	(5)
Ln(Price Lag)	0.051***	.045***	-.043**	.455***	-.007
	[.02]	[.014]	[.02]	[.162]	[.101]
PctYouth	0.001	0.003	0.001	.165*	-.0
	[.006]	[.003]	[.008]	[.084]	[.047]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.964	0.92	0.939	0.873	0.972
No. States	45	45	49	45	49
No. Observations	393	393	440	393	440
Weighted	No	No	No	No	No

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

Table 8 displays the results using total public prices as the independent variable. For regressions 1,2, and 4, the following states/areas were not included: Delaware, Washington D.C., Hawaii, Montana, Nevada and North Dakota. The reason for this was simply that there was no data on private associate institutions. As a result, there were no institutions that could be characterized as for-profit. For regressions 3 and 5, Washington D.C. and South Dakota were not included because there was no data on public associate enrollment. These omissions are not seen as

biasing because the states omitted do not represent a large part of the population. Furthermore, the states are relatively different from one another.

ß$_1$ for regression 1 is .051 and significant at the 1% level. A 10% increase in total public prices increases the fraction of for-profit freshmen to total community college freshmen .005 or .5 percentage points on a basis of .127,[16] which sums to .132. In other words, a 10% increase in public prices increases the fraction of for-profit freshmen to total community college freshmen from 12.7% to 13.21%. This is an increase of 4.0%. As expected, ß$_1$ for regression 2 is slightly smaller because the denominator in the dependent variable includes baccalaureate students who may be less likely to switch into two-year for-profit schools. ß$_1$ for regression 2 is equal to .045 and is also significant at the 1% level. A 10% increase in public prices increases the fraction of for-profit freshmen to total community college freshmen .0045 on a basis of .076. Similar to the above logic, a 10% increase in prices will lead to an increase of fraction 2 from 7.6% to 8.1%. This is an increase of 6.6%. The elasticity regressions focus on the numerator in the enrollment fractions. The results show that the elasticity of for-profit enrollment to public prices, regression 4, is very close to the coefficients in regressions 1 and 2. The elasticity is interpreted as a 10% increase in public prices increases the total number of for-profit freshmen by 4.5%; this is significant at the 1% level.

As noted above, regressions 3 and 5 are checks to observe price effects on public enrollment. The interpretation of regression 3 is that a 10% increase in public prices decreases the fraction of public associate enrollment to total

[16] As noted in the data section, the basis is equal to the mean of the fraction.

enrollment by .0043 on a basis of .66 and this is significant at the 5% level. In other words, a 10% increase in public prices decreases fraction 3 .43 percentage points from 66% to 65.5%. This is a decrease of .5%. ß$_1$ for regression 5 equals -.007 and demonstrates the expected sign. Interestingly, this coefficient is not statistically significant which suggests that public price increases do not decrease community college enrollment on an absolute basis.

With the exception of regression 5, all the results in table 8 depict a picture in which for-profit enrollment increases relative to public community college enrollment in the midst of rising public prices. Not only are these results significant at 1% and 5% confidence levels, but they are robust to potentially over weighted smaller states. Table VIII shows the weighted results and one can see that the interpretation does not change. While the effects become slightly smaller (with the exception of regression 4), the results are all significant at the 1% level. To further check for robustness, the regressions are run using the natural log of the lagged for-profit price. The results to these regressions are presented in table IX in the appendix. Even if one controls for the for-profit price, the coefficients do not change drastically and in some cases become more significant. To summarize, the relationship between total public prices and for profit enrollment presented in table 8 is considered to be robust since the interpretation does not change based on the weight or the for-profit price.

The above regressions use total public prices (baccalaureate and community colleges), but for-profit enrollment may be more sensitive to price changes exclusive

to the public community colleges. Table 9 displays the results using the price of public community colleges as the dependent variable.

Table 9: Effect of Public Community College Prices on In-state Freshmen Enrollment

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(1)	(2)	(3)	(4)	(5)
Ln(Price Lag)	0.04244*	.0384***	-.038**	0.5***	0.0321
	[.022]	[.014]	[.021]	[.163]	[.127]
PctYouth	-0.00059	0.0017	0.0016	0.121	0
	[.007]	[.004]	[.008]	[.079]	[.047]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.924	0.9194	0.938	0.886	0.972
No. States	44	44	49	44	49
No. Observations	384	384	440	384	440
Weighted	No	No	No	No	No

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

For regressions 1, 2, and 4, the same states were not included along with South Dakota because there was no data on for-profit enrollment or public prices. For regressions 3 and 5 the same states were not included. A 10% increase in the price of public community colleges corresponds with an increase of fraction 1 by .0042 or .4 percentage points from .127 to .131 and this is significant at a 10% confidence level. This is an increase of 3.15% As expected, the effect is slightly smaller for regression 2. A 10% increase in community college prices corresponds with an

increase of fraction 2 from .076 to approximately .08, an increase of 5.3%, and this is significant at the 1% level. The elasticity regression, regression 4, demonstrates virtually the same effect as the regression using total public prices. A 10% increase in price is associated with an increase in the total amount for-profit freshmen enrolled in the state by 5% and this is significant at the 1% level.

Furthermore, these results show that while for-profit enrollment increases with public community college prices, the fraction of public community college freshmen to total freshmen decreases. $ß_1$ for regression 3 is -.038 and is significant at the 5% level. Thus, a 10% increase in the price of public community colleges reduces the fraction of public community college freshmen to total freshmen enrollment from .66 to .656. A decrease of .6%. The elasticity of public associate freshmen to public associate prices is once again not significant (even though it does exhibit a negative sign).

Table 9 supports the hypothesis that rises in the price of public community colleges increase for-profit enrollment and decrease public enrollment relative to total freshmen enrollment. Furthermore, table X in the appendix presents the weighted results as a robustness check for erratic small state behavior. One can see that the coefficients become significant at the 1% level with the exception of regression 5 which remains insignificant. Regression 4 in the weighted results shows that an increase in community college prices by 10% increases for-profit freshmen by 5.7 %. As another robustness check, table XI in the appendix presents the results controlling for the lagged for-profit price. $ß_1$ for regression 1 ceases to be statistically significant, but the other regressions do not change and in some cases

the effect is stronger. From this, one can conclude that effect of total public prices and public community college prices have a robust and significantly positive effect on for-profit enrollment relative to public enrollment. While these results have the same interpretation as those presented in table 8, for-profit enrollment is slightly more responsive to total public prices rather than just public community college prices. This was not expected and is further discussed in the discussion section.

The price differential variable is also used as a technique to analyze the relationship between the two prices. Table 10 shows the results when the price differential is used as the dependent variable. For regressions 6, 7, and 9, the following states/areas were not included: Delaware, Washington D.C., Hawaii, Montana, Nevada, North Dakota and South Dakota because data was not available for the relevant schools. For regressions 8 and 10, Hawaii was included in the regressions. While $ß_1$ exhibits the expected signs for regressions 6-10, only regressions 7 and 9 demonstrate statistical significance. Regression 7 shows that a 10% increase in the price differential decreases fraction 2 by .0016 on a basis of .076 (7.6%). This is a decrease of 2% and is significant at the 5% level. The reverse interpretation is that a 10% decrease in the price differential increases fraction 2 from 7.6% to 7.7%. The coefficient of regression 9 is -.278 and is significant at the 10% level. This shows that a 10% decrease in the price differential leads to a 2.7% increase in for-profit freshmen. Similar to the other regressions the enrollment fractions 1 and 2 seem to decline by about the same amount as the elasticity of for-profit students to public prices. Given the small basis of 12.6% or 7.6% , this is evidence that the change is most likely due to the increase in for-profit students.

Table 10: Effect of Price-Differential on In-State Freshmen Enrollment

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(6)	(7)	(8)	(9)	(10)
Price Differential lag	-.019	-.016**	0.008	-.278*	-.007
	[012]	[.007]	[.012]	[.166]	[.071]
PctYouth	-.006	-0.007	-.006	0.069	-.002
	[.012]	[.011]	[.011]	[.087]	[.068]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.922	0.92	0.937	0.889	0.971
No. States	44	44	45	44	45
No. Observations	319	319	332	359	332
Weighted	No	No	No	No	No

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

The weighted price differential regressions listed in table XII of the appendix exhibit larger coefficients and all regressions (except regression 10) are significant at the 5% level. While the coefficients are smaller than the results presented in table 8 and 9, the regressions all demonstrate the expected signs and the effect on fraction 2 is still slightly smaller than the effect on fraction 1.

VI. Implications

The statistical significance of the results is strong evidence that for-profit enrollment is responsive to public prices. This is observed in the enrollment fractions and elasticity regressions using total public price and public community college prices. The magnitudes of the for-profit elasticity and enrollment fractions are virtually the same, which suggests that it is for-profit enrollment determining the fraction change given the small start basis of 12.7% and 7.6% for fractions 1 and 2, respectively. It is also evident that while public enrollment declines relative to total freshmen enrollment (fractions 3 and 8), public enrollment does not seem to decline in absolute terms. The elasticity of public associate enrollment is not significant in any of the regressions, although if any effect is present it is a negative effect. The price differential regressions reconfirm the above interpretation albeit a smaller effect. What follows is a brief discussion of the results and possible sources of error.

The observation that the total public price has a larger effect on for-profit enrollment than the price of public community colleges is an unexpected result. It was expected that the price of public community colleges would have a larger effect because the students may be more comparable to for-profit students. One explanation for this is that the price of total public schools is higher and has risen more recently than the price of community colleges. The higher prices of public community colleges may induce more students to enroll in for-profits. Furthermore, the total public price data includes lower-tier baccalaureate students. These results

point to the fact that lower tier baccalaureate students also consider two-year for-profits as educational substitutes.

While the above results are significant, is this a large effect? The basis, or mean fraction, is critical in order to contextualize the magnitude and significance. The results show that a 10% increase in public prices raises the for-profit enrollment fractions by about 5% on a basis of 12.5% or 7.6%. A statistically significant and robust half 5% increase on a basis of 12.5% or 7.6% is considered to be a sizable effect. This is evidence that students think of for-profits and these public schools as comparable institutions. As a result, this confirms the economic approach of authors like Grubb, Chung and Cellini who have focused on comparing the labor market outcomes of the different students. The findings also seem larger than the effect found in Chung 2009. In her study, a 40% increase in public community college tuition increased the probability of attending a for-profit by 1%. In this study, a 10% increase in public subsidies increases the amount of for-profit enrollment relative to community college enrollment by about 5% for the average state.

Furthermore, the results show that the elasticity of for-profit enrollment to 10% increases in public prices is approximately 5%. In some cases, the elasticity does not match the enrollment fraction change; this is expected since the enrollment fraction introduces a denominator subject to fluctuation. However, it is comforting to know that these changes are often equal and close to one another. Since the public elasticity to public prices is not significant and if anything is negative, it seems that the denominator is not affected by public enrollment. From this, it is

deduced that the change in the fractions is primarily due to the increase in for-profit freshmen.

The negligible elasticity of public community college freshmen enrollment to public prices is an important and unexpected result. This observation is reoccurring for all regressions and leads one to believe that public enrollment does not decline due to rising prices. The model is not built to specifically analyze public enrollment and as such theories can only be put forth to explain this result. It does seem clear that since for-profit enrollment increases significantly, students that may have entered public schools decide to enter for-profits, but public enrollment may not significantly decrease from current levels (due to the large basis). The result also leads one to believe that increases in public prices cause some students to enroll in for-profits who otherwise would not have entered the education market. For-profit schools invest much of their profit in sophisticated marketing techniques (Kutz 2010). If public prices increase relative to for-profit prices, marketers may use this diminished spread to induce further students to enroll in for-profits. Our results show that a 10% decrease in the spread will cause about 2.8 % more students to enroll in for-profits. This is one explanation for the negligible elasticity of public enrollment to public prices.

VII. Limitations and Future Research

The implications of these results should be understood in the context of the data used. The data used is aggregate data by state and year which most likely diminished the effects due to the decline in variation. While the effects may be diminished, there are sources of error that should also be kept in mind. For one, the sample size of the for-profits relative to the public community colleges was significantly less which may introduce biased estimates. In addition, there may be unexplained changes in the denominator that distort the interpretation of the enrollment fractions. However, the elasticity regressions show that numbers of for-profit freshmen (the numerator) still increase about 5% with increases in public prices. This drops to 4.5% after controlling for for-profit prices.

Reverse causality may also be present in the regressions in which the enrollment causes the prices to change. The lagged price specification is one way to control for this. It is reasonable to assume that this year's enrollment does not cause last year's prices to change. A final source of error concerns the nature of the for-profit data. Due to data constraints, it is not possible to observe data for two-year for-profits only. This paper, as well as previous economic literature (see Cellini, Chaudhary 2011), characterizes private two-year colleges as for-profit since the vast majority of these schools are for-profit. However, it is not possible to know exactly the make-up of this group and therefore it is a source of error.

A goal of this paper is to stimulate further economic research on for-profit education and the results certainly pose further questions. An area that has not been discussed is the signaling value of a for-profit education. Since for-profits pride

themselves as career oriented institutions, it would be useful to know how hiring companies perceive the value of a for-profit degree. One way to do this would be to obtain data on individuals that attended a four year for-profit and data on if these individuals graduated. Using a discontinuity approach, one could provide a reasonable estimate for the signaling return to a for-profit degree.

As demonstrated above, the results show that public enrollment does not decline in a statistically significant way from public price increases. Further economic work should develop a model that specifically focuses on public enrollment and how it changes in response to prices and for-profit enrollment. This would help distinguish between students who would not have entered the education market but decide to enroll in for-profits and students who would have enrolled in public schools, but choose to enroll in for-profits. Any analysis of this type will need to take into account the types of schools, for-profit marketing, credit availability and other relevant factors. In addition, economic work that takes into account debt levels and four-year for-profits needs to be further conducted; however, this is severely constrained due to data limitations. Lastly, an extension of this paper should be conducted with better data on for-profit institutions. If data could be gathered that clearly distinguishes for-profit status, then it would not be necessary to conduct a study solely on two-year private associate institutions. This not only would provide more accurate estimates, but would allow one to compare the competitive nature of two-year and four-year institutions.

VIII. Conclusion

Upon reading the analysis above one may question why it matters that for-profits operate as they do? This is not a policy paper, but the empirical results above show signs of inefficiency in the education market. The results refute the claim that for-profit debt statistics are irrelevant because the type of student in question is not comparable to those of public community colleges. Higher debt and default levels for the for-profit industry are not explainable based on student demographics. On average, for-profit enrollment increases 5% due to a 10% increase in public prices and this is a robust result. Some students do consider for-profits to be substitutes for not only public community colleges, but also for lower tier baccalaureate institutions. Since these schools are substitutes, for-profit institutions should have prices that reflect their labor market outcomes. Considering the large discrepancy between for-profit and community college prices, it is clear that for-profit prices do not reflect equilibrium conditions. The two reasons for this market failure are information asymmetry (namely for-profit advertising) and the availability of student credit. In order to correct this, stricter regulations would need to be enforced to lower for-profit prices. However, in order to do so, more data would need to become available regarding the incentives of these four-year and two-year for-profit education companies.

This paper recognizes the value of for-profit education as one solution to the challenges posed by the post-secondary education market. For-profit education using distance-learning and other technologies to offer relevant career education in convenient settings. These market based solutions and education focused venture

capital firms are surely the forces that will produce the disruptive technologies today and in the future. The traditional educational model has proved to be too expensive and impractical for a growing number of people. However, it does matter that many of the for-profit players charge prices that are on average 4.2 times those of community colleges. It does matter that often 90% of these companies' revenues are derived from government loans that often go into default. Government regulation and increased transparency would provide incentives for for-profit educators to keep their prices in line with labor market outcomes. This way, for-profits could come closer to becoming the providers of a cutting edge and affordable education.

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B. Appendix

Table I: Price Master Data Classification

Carnegie Classification	Freq	Percent
Associate's Colleges	16,884	31.30
Baccalaureate Colleges	10,628	19.70
Doctoral/Research	1,359	2.52
Masters	10,471	19.41
Not Classified	3,091	5.73
Research-Universities-High Research	1,563	2.90
Research Univeristies-Very High Research	1,711	3.17
Specifal Focus Institutions-Medical School	689	1.28
Special Focus Institutions-Other	7,057	13.08
Special Focus Institutions-Engineering	98	0.18
Tribal	387	0.72
Total	**53,938**	**100**

Table II: Total Public Prices

Year	mean	sd	min	max
1991	1992.21	974.85	223.51	5088.54
1992	2103.96	1019.37	403.73	5258.68
1993	2213.71	1067.02	495.24	5364.99
1994	2283.34	1101.98	524.06	5472.57
1995	2360.93	1141.72	510.86	5664.69
1996	2444.41	1189.76	496.77	5881.58
1997	2490.48	1222.63	486.96	5941.42
1998	2585.98	1272.83	509.86	6075.08
1999	***	***	***	***
2000	2233.73	1243.28	266.35	6010.34
2001	2326.53	1234.18	257.73	6193.36
2002	2455.61	1295.22	258.61	6691.88
2003	2630.94	1365.72	443.63	7212.73
2004	2762.35	1429.29	647.73	7549.52
2005	2843.28	1446.03	615.15	7724.37
2006	2905.99	1444.62	571.02	7710.85
2007	2952.68	1473.09	477.02	7796.02
2008	2988.74	1514.24	463.12	7951.23
Total	**2504.40**	**1260.93**	**450.08**	**6446.34**

Table III: For-Profit Prices

Year	mean	sd	min	max
1991	7159.44	2641.34	2445.55	19657.90
1992	7545.83	2600.94	2383.40	20371.85
1993	7774.42	2861.08	2331.80	21339.80
1994	7861.54	3033.80	2327.15	21724.50
1995	7506.93	3524.98	1983.13	22391.30
1996	8555.42	3909.41	2217.70	23088.00
1997	8595.20	3722.87	2260.20	23590.35
1998	8716.71	4003.09	2336.40	24189.25
1999	***	***	***	***
2000	8768.92	4089.96	1620.00	24715.95
2001	9614.95	5635.50	1661.70	34509.30
2002	10101.96	6240.41	1829.40	36760.70
2003	10670.10	6617.51	2058.90	37068.40
2004	11377.23	6659.68	2193.30	37174.70
2005	11190.32	6669.92	2232.00	37000.00
2006	10586.91	5943.50	2262.60	37226.80
2007	10923.77	6443.18	2198.60	38053.20
2008	11303.22	7005.56	1432.50	39577.60
Total	**9308.99**	**4800.16**	**2104.37**	**29319.98**

Table IV: Public Community College Prices

Year	mean	sd	min	max
1991	1742.225	816.2428	185.9093	4143.57
1992	1828.901	836.9612	360.9729	4289.544
1993	1913.938	868.3491	441.3737	4361.575
1994	1977.654	902.8594	463.28	4428.794
1995	2037.81	946.465	462.6506	4687.575
1996	2116.297	973.1828	447.9134	4796.244
1997	2136.581	1006.909	442.4932	4989.395
1998	2218.642	1067.969	473.8235	5285.698
1999	***	***	***	***
2000	1979.947	1038.719	272.474	5533.38
2001	2061.685	1017.37	263.6429	5217.693
2002	2168.521	1050.116	264.4896	5333.65
2003	2290.54	1042.512	453.2398	5122.562
2004	2381.223	1089.803	660.9528	5364.69
2005	2418.305	1100.39	627.8666	5331
2006	2455.835	1094.573	582.8914	5310.283
2007	2480.896	1115.983	487.1105	5433.626
2008	2481.574	1112.081	472.9362	5571.493
Total	**2158.27**	**1004.73**	**433.18**	**5011.81**

Table V: Enrollment Master Data Classification

Carnegie Classification	**Freq**	**Percent**
Art, Music and Design	2,125	2.08
Associateof Arts/Two Year	36,341	35.63
Baccalaureate/Liberal Arts I	5,946	5.83
Baccalaureate/Liberal Arts II	15,609	15.31
Business	1,529	1.5
Doctoral	1,811	1.78
Doctoral II	2,162	2.12
Engineering	937	0.92
Health	842	0.83
Law	163	0.16
Master's/Comprehensive	15,373	15.07
Master's/Comprehensive II	3,214	3.15
Medical	501	0.49
Not Classified	3,708	3.64
Other	784	0.77
Research	3,320	3.26
Research II	1,404	1.38
Teachers	138	0.14
Theological/Bible/Religion	5,533	5.43
Tribal	546	0.54
Total	**101,986**	**100**

Table VI: In-state Enrollment

Year	For-Profit	Public community
1992	53832	880241
1994	52669	886375
1996	62327	891344
1998	61726	780401
2000	67074	834550
2002	66865	936371
2004	70853	924296
2006	62901	950924
2008	67575	1126385
Average	**62869.1111**	**912320.778**

Table VII: Average Enrollment Fraction

Year	Fraction 1	Fraction 2	Fraction 3
1992	0.12	0.07	0.67
1994	0.13	0.08	0.66
1996	0.13	0.08	0.66
1998	0.14	0.08	0.64
2000	0.13	0.08	0.65
2002	0.12	0.07	0.67
2004	0.13	0.07	0.66
2006	0.12	0.07	0.67
2008	0.12	0.08	0.67
Average	**0.128**	**0.076**	**0.66**

Table VIII: Effect of Total Public Prices on In-State Freshmen Enrollment - Weighted

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(1)	(2)	(3)	(4)	(5)
Ln(Price Lag)	.041***	.030***	-.04***	.51***	-.041
	[.012]	[.007]	[.014]	[.133]	[.078]
PctYouth	0.008*	0.006**	-0.011	.214**	-.044
	[.004]	[.003]	[.009]	[.092]	[.055]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.922	0.884	0.927	0.837	0.969
No. States	45	45	49	45	49
No. Observations	393	393	440	393	440
Weighted	Yes	Yes	Yes	Yes	Yes

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

Table IX: Effect of Total Public Prices on In-State Freshmen Enrollment

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(1)	(2)	(3)	(4)	(5)
Ln(Price Lag)	0.045**	.045***	-.047**	.477***	-.039
	[.021]	[.021]]	[.02]	[.162]	[.104]
Ln(For-Profit Price Lag)	-.011	-.013	.004	-.188	-.024
	[.009]	[.007]	[.015]	[.203]	[.096]
PctYouth	-0.003	-.006	-.007	.144**	-.006
	[.011]	[.01]	[.01]	[.074]	[.059]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.965	0.965	0.939	0.88	0.972
No. States	45	45	45	45	45
No. Observations	368	368	373	368	373
Weighted	No	No	No	No	No

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

Table X: Effect of Public Community College Prices on In-State Freshmen Enrollment - Weighted

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(1)	(2)	(3)	(4)	(5)
Ln(Price Lag)	0.04***	.03***	-.042***	.567***	-.038
	[.0127]	[.007]	[.012]	[.127]	[.071]
PctYouth	0.008*	0.006*	-.011	0.167**	-.044
	[.005]	[.003]	[.09]	[.089]	[.055]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.88	0.884	0.927	0.914	0.97
No. States	44	44	49	44	49
No. Observations	384	384	440	384	440
Weighted	Yes	Yes	Yes	Yes	Yes

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

Table XI: Effect of Public Community College Prices on In-state Freshmen Enrollment

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(1)	(2)	(3)	(4)	(5)
Ln(Price Lag)	0.038	.031***	-.044**	.501***	-.03
	[.023]	[.12]	[.02]	[.162]	[.117]
Ln(For-Profit Price Lag)	-.011	-.012	-.004	-.202	-.023
	[.009]	[.007]	[.014]	[.203]	[.096]
PctYouth	-0.005	-.007	-0.008	0.078	-.006
	[.011]	[.011]	[.01]	[.085]	[.059]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.92	0.92	0.939	0.89	0.972
No. States	44	44	45	44	45
No. Observations	359	359	373	359	373
Weighted	No	No	No	No	No

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

Table XII: Effect of Price-Differential on In-State Freshmen Enrollment - Weighted

	Fraction 1	Fraction 2	Fraction 3	ln(F.P. Freshmen)	ln(P.A. Freshmen)
	(6)	(7)	(8)	(9)	(10)
Price Differential Lag	-.022**	-.015**	.02**	-.312**	0.053
	[.009]	[5.33e-07]	[.009]	[.144]	[.052]
PctYouth	.007	0.004	-0.016	0.154	-0.058
	[.006]	[.004]	[.011]	[.104]	[.068]
State / Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.86	0.884	0.924	0.91	0.967
No. States	44	44	45	44	45
No. Observations	319	319	332	319	332
Weighted	Yes	Yes	Yes	Yes	Yes

Clustered Standard Errors in Brackets. ***p<.01, **p<.05, *p<.1
Fraction 1 is defined as (for-profit freshmen / total community college freshmen)
Fraction 2 is defined as (for-profit freshmen / total in-state freshmen)
Fraction 3 is defined as (public associate freshmen / total freshmen)
F.P. stands for For-Profit
P.A. stands for Public Associate

Pledge

This paper represents my own work in accordance with University regulations.