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Publication Date

2013

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UNIVERSITY OF CALIFORNIA

Los Angeles

SHIFTING DEMAND OR JUST MOVING PRICE?:

A multi-level analysis of student price demand
for college education and state policy preferences

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Education

by

Hironao Okahana

2013

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ABSTRACT OF THE DISSERTATION

SHIFTING DEMAND OR JUST MOVING PRICE?:

A multi-level analysis of student price demand
for college education and state policy preferences

By

Hironao Okahana

Doctor of Philosophy in Education

University of California, Los Angeles, 2013

Professor José Luis Santos, Chair

College affordability and rising tuition and fees are a topic of national interest. While a number of recent studies examine this subject separately from state policy and individual student perspectives, the body of scholarship that reviews the intersection of two components of supply and demand for higher education is relatively small. My focus for this dissertation is to amplify the understanding of how individual characteristics of students explain differences in their price demand for college education in their first year at four-year public and private not-for-profit colleges and universities. I am also interested in analyzing how state policy preferences, namely state postsecondary education efforts and proportional shares of need-based state student grant aid, mitigate such individual differentials. Drawing from previous studies, my study is guided by a combination of the human capital investment perspective, student price responsiveness to

college education, and college choice framework. I contend that the price tag of college education—either sticker or net—is roughly where a student’s price demand meets a supply of college education. I also argue that a student’s price demand for college education is shaped by different forms of capital (e.g., cultural, monetary, and social capital) that each student possesses; thus, some students have more willingness and ability to pay for college education than others. Further, public policy has a role in offsetting such differences in individual capital, thereby making college-going options more equitable regardless of socioeconomic status. I ran several multi-level analyses using the National Postsecondary Student Aid Survey (NPSAS) datasets of the 1999-00, 2003-04, and 2007-08 cohorts as well as institutional- and state-level data drawn from various sources. The result confirms the presence of “sticker shocks,” or significant differences in student price demand for college, based on socioeconomic characteristics. The result also suggests that state postsecondary education efforts negatively correlate with sticker and net tuition and fees for students at public colleges and universities; however, this was not the case for states offering more need-based aid. Therefore, while state postsecondary education efforts offset individual differences in price demand for college education, the same was not true for direct student aid awards.

The dissertation of Hironao Okahana is approved.

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José Luis Santos, Committee Chair

University of California, Los Angeles

2013

*To all the teachers in my life,
whose patience and guidance nurtured
my intellectual curiosity to flourish.*

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ACKNOWLEDGEMENT

The doctoral study is like a marathon. At times, it seems as if it is an act of solitude, but it really is a team sport and communal experience. You are the runner, but there are many other runners around you, many more people on the roadside cheering; someone hands you a sports drink, someone hands your snacks, someone takes care of you if you fall, and when you cross the finish line, everyone shares the accomplishment as a whole.

First of all, I want to acknowledge my parents, *Hirokazu Okahana* and *Midori Ueda-Okahana* for their tireless devotion and all the sacrifice they made for educational opportunities for both my sister, *Yuri Okahana*, and me. Between the two of us, we spent sixteen years of schooling outside Japan, and without my parents and their foresight for the value and appreciation of education, none of this would be possible. Also, my wife, *Saleha Bholat*—there are not enough words to thank her for her constant love, understanding and patience with me. Her encouragement and support kept me strong, and let me cross this finish line in a high spirit.

I was very fortunate to have such a great and inspiring committee of faculty members to supervise my dissertation study. President *F. King Alexander* of California State University, Long Beach—his timely arrival at CSULB in 2006 really influenced my academic and career trajectory. I am deeply touched by and appreciative of him agreeing to be a part of my doctoral committee and adding strong content expertise to my work. I wish him the very best in his new post, the presidency and chancellorship at the Louisiana State University system and its flagship campus. The very first class in the Higher Education and Organizational Change division was Professor *Mitchell Chang*'s diversity in higher education class in Winter 2008. He gave this public policy student who wandered into HEOC a proper and kind introduction to the division. My doctoral endeavor was not a smooth ride, and perhaps next to my adviser, Professor *Chang* has been responsible for helping me navigate some rough water. I cannot thank him enough for

his encouragement and guidance. I am also very grateful for Professor *Michael Seltzer* for agreeing to be a part of my doctoral committee. His expertise in multi-level modeling indeed helped shape my study and outline a sound presentation of key results. I am very thankful for him being very accessible and generous with his time in offering me helpful feedback and comments.

Many faculty and university leaders at CSULB have influenced my decision to pursue higher education policy as my chosen profession, especially Dr. *Douglas W. Robinson*, vice president for student services, whose mentorship has guided me since my days as the student body vice president there. Known as “*Uncle Doug*” among his mentees, I am very fortunate to be a part of *the family* and thankful for his counsel. Friends and colleagues—from back home, the Associated Students, Inc. at CSULB, AMCLI, Associated Students UCLA Board of Directors, 2011-2012 HEOC Student Representatives, Associated Students, Inc. at California State University, Fullerton, Moore Hall, IIOC and even some random places, like a parking lot at pre-dawn hours—their success has inspired me to do my very best in what I do. Although some of them might have wondered why in the world I am still in school over a decade since I started college, their support and encouragement have always kept me going.

Also, this dissertation study would not have been possible without the Higher Education Research Institute at UCLA extending me its license to access restricted use data sets from the National Center for Education Statistics. I cannot thank HERI enough for the generosity of Professor *Sylvia Hurtado*, HERI director, as well as technical support from *Matthew Case*, its senior data manager. I also would like to extend deep appreciation to *Noor Alhakawati* and *Cortney Ronald Nguyen* for editing help at the proposal phase and to *Lesley McBain* for copy editing, valuable commentaries, and some sarcasm during the final phase of dissertation writing.

Last, but definitely not least, I would like to acknowledge my faculty adviser and dissertation committee chair, Professor *José Luis Santos*. My first interaction with him was when I took his higher education finance class in Spring 2008, and since then he has been a great mentor and supporter in my doctoral endeavor at UCLA. Back then I probably had little understanding of what it would be like to be in a PhD program and he probably had little understanding of what it would be like to have me as his student. I am very grateful for his guidance and patience for the last five years, and look forward to continue our friendship and scholarly work in years to come. I also wish him, his wife and his kids the very best in their future endeavors.

None of this could be accomplished if not for all the people I have been blessed to have in my life. I can not possibly list every one of you here, but please know that I am thankful that we have met and you have impacted my life. All good in my life, including this dissertation and my doctoral endeavor, have been and will be reflections of these people, and all shortcomings are mine, alone. Now, one race is done, just about to cross the finish line, and we share a moment of relief and rejoice, but if you are a runner, you know this—you are already itching for the next race. So off to the next one, I am.

VITA

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Chapter One

Introduction and Statement of the Problem

The central aim of this study is to discuss the role of state government policies in setting college tuition and fees, thus meeting student price demand for college education. As a microeconomic transaction, the pursuit of postsecondary education is a function of the demand for it, or the willingness of a student to pay for it. Individual demand for college education varies by various factors including one's ability to pay; however, in simple terms, it is dictated by its utility¹ to the consumer, or return on investment for the student. Each student makes some type of economic decisions based on this formula, and various fixed effects surrounding students (e.g., academic preparedness of students, family backgrounds, financial resources, K-12 educational quality, etc.) lead them to different pathways. Some choose to attend college, and some do not. Some choose to attend a public school and some pursue their education at a private institution. Some attend more competitive schools and some do not. This is because each student has different utility functions and demand curves for college education, as well as because each college and university sets their tuition and fee charges differently.

It is in this sense that I contend, from a social justice paradigm, that government policies should facilitate equitable access to postsecondary education; in other words, they should mitigate the differences in utility functions and demand curves of individual students. One aspect of investment in higher education by various government sectors is direct student financial aid, which is a hallmark of an "equity-oriented direction" (Hauptman & Krop, 2001, p. 149) in American higher education. As such, direct student aid policies are called upon to make college affordable and attractive to all students who are willing and capable regardless of financial need.

¹ An economic assumption is that each rationale individual has a goal to pursue utility maximization; that is, they work toward making themselves as happy as they can, given resource constraints (Ehrenberg & Smith, 2006).

Another aspect of government investment in higher education is direct subsidy to colleges and universities.

Since the end of the Second World War (WWII), various facets of American higher education have diversified in many ways – such as in programmatic scope, audience, and funding, to name a few. The gross spending of the federal and state governments on postsecondary education in the United States is rising. In 1992, total revenue from the federal government received by institutions of higher education was a little over 21 billion dollars; state and local governments also contributed about 45.7 billion dollars (National Center for Education Statistics, 1995). The same totals grew to about 64.3 billion dollars for federal sources and a little over 75.2 billion dollars for state and local sources (NCES, 2010a) in 2008. In other words, more is being invested into higher education by government; in particular, the federal role in financing postsecondary education has grown proportionally larger. However, college costs persistently rise and an affordable college education for everyone regardless of their financial background seems to be an ever more elusive goal. To this end, in this dissertation, I intend to explore individual variance of student price demand for college education and roles of public policy in mitigating individual differences in such demands.

Increased Number of College Graduates and Earnings Premium

Colleges and universities play an important role in our society. One cannot discuss the history of contemporary American higher education without discussing its contribution to individuals' upward mobility (Cohen, 1998; Thelin, 2004). The total number of colleges and universities in the United States increased significantly after WWII. What was once open only to society's elites is now widely available to the masses (Cohen, 1998). A diversity of institutional characteristics and types has emerged over the past half century. This diversity allows more

access and options for students in the United States to pursue postsecondary education, thereby giving many individuals the ability to improve their economic standing (Birnbaum, 1983). Today the college degree attainment rate surpasses 30 percent, which is the highest in United States history (US Census Bureau, 2012). Since 1980, Americans between 20 and 24 years of age possessing undergraduate degrees or higher have increased from 22.5 percent to 31.7 percent in 2010 (NCES, 2011). This paints an optimistic picture for the prosperity of the country to some extent, since both the public and private sectors benefit from postsecondary education (Leslie & Brinkman, 1993; McMahon, 2009). While many of those benefits materialize in the long run, they are difficult to measure in the short run.

On the other hand, private or individual benefits from earning college degrees are more easily quantifiable, and thus often highlighted in the public discourse. Recent statistics show that the average college degree recipient earns far more than their counterpart with only a high school diploma (Baum, Ma, & Payea, 2010; US Census Bureau, 2011) and a synthetic analysis of lifetime income demonstrates that college education has a large income payoff for individuals (Day & Newburger, 2002). Many higher education researchers have debated the issue of the added income effects of baccalaureate degree attainment, commonly referred to as the college earnings premium. Indeed, college graduates enjoy greater lifetime earnings than those without (Dale & Krueger, 2002 & 2011; Grubb, 1992; Hoekstra, 2009; Leslie & Brinkman, 1988; Murphy & Weleh, 1989; Paulsen, 2001; Perna, 2003). This is also apparent when comparing the college earnings premium of students receiving baccalaureate degrees from more selective colleges and universities to students receiving baccalaureate degrees from their less selective counterparts. Graduates of selective schools have an even greater earnings premium (Dale & Krueger, 2002 & 2011; Hoektstra, 2009; Thomas, 2003).

The heavy emphasis on the college earnings premium deters public debate about the public benefits of higher education. This debate should be focused on both monetary and non-monetary returns of a college education. In fact, it can be a great challenge for higher education researchers and advocates to make the case for increased public investment in postsecondary education. The shift in federal student aid programs from a grant-in-aid-centric policy to a loan-centric one in the 1980s (Hauptman & Krop, 2001) manifested the belief that college education benefits individuals more than it benefits the public. Increasingly, the cost burden has shifted from the public to the individual by means of “cost-sharing” (Johnstone, 2004). Parts of college costs that used to be subsidized by general taxpayers, which also include students and their families, have now been passed on to individual consumers of college education, students and their families, alone. Therefore, it is no surprise that state appropriations for public universities per student have continued to decrease while the cost of college education continues to rise (Baum & Ma, 2011; Desrochers & Wellman, 2011). In other words, the share of revenues from state support has diminished over time in relation to the total expenditures of colleges and universities (Santos, 2007).

Equity Unachieved

Despite the increase in baccalaureate degree attainment and the increased earnings premium associated with college completion, American society is becoming more and more unequal. In fact, the gap between the wealthiest and poorest Americans is wider than ever. A study by the Congressional Budget Office (2011) revealed that from 1979 to 2007, the average household income after federal taxes grew by 275 percent for those in the top 1 percent of the nation’s income bracket, 65 percent for the next 20 percentiles, and 40 percent for the middle 60 percent, while the bottom 20 percentile only saw an 18 percent increase in their real income. The

United States is regarded as one of the hardest countries for the poor to rise to prosperity (DeParle, 2012). Considering one role of colleges and universities is to provide upward economic mobility, this grim picture raises a question as to how well colleges and universities are fulfilling this particular role.

A widening income disparity despite an increasing college attainment rate calls for a more refined examination of what these rates really mean. In the past four decades, the college attainment rate among Americans 25 years and older has risen; however, the educational achievement gap between racial/ethnic groups has not narrowed as much. Descriptive statistics suggest the increases are attributed to a surge in the overall number of female college graduates as well as increases in degree attainment by students who are racial/ethnic minorities. However, these increases are due to steady increases of headcounts, and do not necessarily reflect a narrowing of historical gaps between traditionally underrepresented minority groups and majority groups. While college completion rates have risen steadily for all racial/ethnic groups, achievement gaps still persist. For instance, in 2010, Asians recorded a 55.9 percent college attainment rate, while Hispanics recorded a 13.5 percent completion rate (NCES, 2011). In 1980, the percentage point difference between White, non-Hispanics age 25 and over and their Black and Hispanic counterparts were respectively nine percentage points each. In 2011, they were 14.1 percentage points and 19.1 percentage points respectively (US Census, 2012). Even more troubling is that college attainment gaps expanded, while comparative high school graduation rates between racial/ethnic groups were maintained or narrowed (US Census, 2012). This suggests that traditionally underrepresented minorities, in fact, have lost ground in earning baccalaureate degrees.

College affordability and access to financial aid have been discussed as important factors that determine minority access to and persistence in postsecondary education (Paulsen & St. John, 1997 & 2002; St. John, Paulsen, & Carter, 2005; St. John, Paulsen, & Starkey, 1996). In the past decades, college has become less affordable for many, as the cost of attendance increased at a much faster rate than inflation and income growth (Baum & Ma, 2011). This was particularly evident for students at public universities, whose tuition and fees rose by 5.6 percent beyond the rate of inflation over the last decade (Baum & Ma, 2011). Well-documented effects of “sticker shock” (Fisher, 1990; Hearn & Longanecker, 1985) disproportionately affect students from underrepresented minority backgrounds. Thus perhaps the obstacles to higher education access for minority students cannot be attributed only to a less than optimal fiscal outlook and affordability concerns. In fact, “chilling effects” (Orfield, 1998) are also said to discourage students of color from seeking college education, as legal debates over affirmative action still persist. Studies clearly show that minority students are at a disadvantage in accessing college education, and the situation is getting worse (Sáenz, Oseguera, & Hurtado, 2007; Santos, Cabrera, & Forsnacht, 2010). While the state of college access for minority students, in terms of monetary² and social capital as well as cultural capital, still appears gloomy, the ever-increasing sticker price of a baccalaureate degree is hindering minority access even more and, perhaps, perpetuating inequality in higher education achievement.

The Role of Government

While some consider economic transactions associated with one’s pursuit of postsecondary education as a type of market economy, it is far from a perfect one. Although higher education produces considerable private return on investment and offers the freedom of

² In this dissertation, I use the term, “monetary capital” to reference monetary assets and resources of individual and/or family that can be applied toward college-going, such as parental incomes and home equity.

individual choice, as a market, it does not fulfill requirements to be a perfect one. The basic tenet of market economy dictates that all players must have perfect information and freedom of exit and entry (Krugman & Wells, 2004). In the case of postsecondary education, participants (i.e., students) do not necessarily have perfect information about goods (i.e., college education and subsidiary benefits). This disparity of information about higher education is often associated with race/ethnicity and socioeconomic status of students (Perna, 2006) as well as the different types of cultural and social capital that each individual brings to the decision-making process (Bourdieu, 1977).

Two sides in the public policy debate often center on the government's role in the market economy. On one side, libertarians in the United States tend to believe that the government should not interfere with market decisions or individual choices. On the other hand, a more progressive view tends to advocate for government interventions in economic and social transactions to mitigate inequity and injustice. Precisely, this view often calls for the enactment of interventionist government policies in order to remedy disparities of opportunity and information associated with race/ethnicity and other socioeconomic factors. In fact, the federal student financial aid programs were developed under the premise of "equity-oriented direction" (Hauptman & Krop, 2001, p. 149), thus promoting healthy, fair competition and economic transactions in higher education.

However, student aid programs are not the only government methods of creating equitable financial access to higher education. Subsidized higher education is a way for the government to intervene in the imperfect higher education market (McMahon, 2009; Paulsen, 2001). Several hypotheses examine the effectiveness of each government method in achieving equitable provision of postsecondary educational opportunities: the Hansen-Wiesbrod (1969)

hypothesis, Peltzman (1973) hypothesis, and the Bennett (1987) hypothesis. Both the Hansen-Wiesbrod hypothesis and Peltzman hypothesis posit that direct student financial aid would be a more effective policy solution for college affordability than public subsidy for higher education. The Hansen-Wiesbrod hypothesis argues that highly subsidized postsecondary education inefficiently distributes resources, since students with financial capability would also enjoy a low-cost college education. The Peltzman hypothesis argues that highly subsidized public higher education would kill the competitive marketplace for private colleges and universities. On the other hand, the Bennett hypothesis contends that direct student financial aid gives colleges and universities incentives to raise their tuition and fees, thus making financial aid an ineffective tool to keep college affordable. Presently, the prevailing policy direction at the federal level, and increasingly at the state level, is to provide direct student aid support rather than subsidize institutions of higher education.

While financial aid programs undoubtedly increase affordability for individual students, a discussion of how efficiently such direct student aid programs facilitate equitable distribution of resources is absent. In fact, government aid for college students has increased by 617 percent in the last four decades (Baum & Ma, 2011). As the cost of attending college rises, the populist policy is to match financial aid programs with rising tuition and fees (Ehrenberg, 2000). A few elite private universities, however, are able to offer a so-called “need-blind” system where they admit students regardless of their financial need and provide substantial amounts of institutional financial aid and employ tuition discounting mechanisms that are backed by enormous endowments. Responding to such an aggressive tuition discounting strategy, public universities also engage in some type of tuition discounting by means of state-supported aid programs, cross-subsidized institutional aid programs, and privately endowed aid programs that are becoming

popular public policies. Still, the question remains: If traditionally underrepresented minority students are losing ground in terms of attaining college degrees while government spending for postsecondary education is increasing, where are those increased student aid monies being spent? Where and how has the government played its role in facilitating distribution of postsecondary educational opportunity and participation?

Recent Policy Discourse on Cost and Accountability

Policymakers and researchers are in fact paying attention to social and individual returns on higher education, but they are doing so by focusing on costs, especially tuition and fees. As published tuition and fees at public four-year universities rose more than 360 percent on average, after adjusting for inflation, between 1981-92 and 2011-12 (Baum & Ma, 2011), public and legislative scrutiny over how colleges and universities spend their money and the types of outcomes yielded by their expenditures is intensifying. In fact, college access and affordability were mentioned in the State of the Union addresses by President Barack H. Obama in 2009 and 2013. However, policymakers are focusing their efforts on formulating accountability measures that assess so-called student success outcomes, such as graduation and retention rates, as well as job placement rates. Certainly, this has been the case in recent state-level policy discussions in Texas, Michigan and elsewhere, as well as the focus of a 2009 Delta Cost Project study (see Kelly, 2009).

This trend, however, is not without some criticism. Recently, experts in the field suggested that there simply is no easy way to come up with simple, yet sensible measures of assessment for college accountability (Basken, 2012). The narrow focus on accountability, in terms of measuring it by “graduation” or “completion,” has encouraged policy makers to put too much emphasis on what appear to be low-hanging fruits to achieve so-called “efficient” models

for higher education. Increasingly, government policies respond to short-sighted interests driven by private sector workforce needs that influence how resources are routed to those more likely to “succeed” rather than those needing the upward mobility colleges and universities offer (Rhoads, 2012).

Moreover, I contend that the ongoing debate about accountability and direct student aid rather hastily lumps two separate policy issues—access to educational opportunities and quality of education itself—into one. Some policy discussions consider direct financial aid or institutional subsidies as a part of public policy that incentivizes colleges and universities to produce more college degrees, thus creating an educated workforce, rather than creates incentives for individual students to pursue college education. While the former is an equally important part of the discussion, however, an overemphasis on the products of college education sometimes distracts attention from issues of access and affordability that we still face at the input phase. The policy discussion of whether government spending on higher education has achieved the optimal price demand for college education for students from all walks of life is remarkably lacking.

Price Demand for College Education and Government Interventions

Federal and state financial aid programs often attempt to match tuition increases and trends to make sure that students from the lowest socioeconomic status are protected. In other words, they aim to mitigate negative price responses by students resulting from tuition increases. Yet, until the recent efforts by the Bill and Melinda Gates Foundation to explore options for federal financial aid reforms, as well as heightened focus on for-profit universities and federal and state student aid practices related to them in the last several years, not much airtime has been devoted to discussion of where federal student aid dollars go. In fact, the benefits of federal and

state financial aid, in terms of per-student award amounts received, are often high for expensive schools (Baum & Ma, 2011). This should come as no surprise, as attending more expensive schools creates even greater financial need on students' part; thus, it is only logical that students be awarded higher amounts of financial aid when they meet need-based eligibility criteria. However, some suggest that colleges and universities take advantage of this mechanism, whereby student aid dollars match up with rising tuition and fees and thus offer no incentives for schools to lower cost of attendance. This is commonly known as the Bennett hypothesis.

The question of where and how we, as a society and as individuals, make investments in higher education (largely by means of student aid) is not discussed as much. From a human capital investment perspective (Becker, 1993), as well as from that of previous studies on social benefits of higher education (Alexander, 1976; Leslie & Brinkman, 1993; McMahon, 2009), social benefits of higher education seem to be uncontested even if policymakers cannot determine a simple unit of measurement. However, when looking at the apparent socioeconomic disparity that the United States faces, such policy interventions are not achieving nearly enough of an even distribution of postsecondary education opportunities to students. In that case, the key policy question should be to examine whether or not the current policy stimulates “right” or “efficient” outcomes in terms of mitigating student price demand for college education and yield an intended outcome of postsecondary education—to promote social equity. In fact, Goldin and Katz (2007) argue and Acemoglu and Autor (2012) affirm, in their studies of the Current Population Survey since the 1960s, that the slow pace of investment in education, and thus human capital, caused widening gaps in the United States. Their core argument is that U.S. educational policy did not sufficiently invest in human capital, which is necessary for an equitable society (Acemoglu & Autor, 2012; Goldin & Katz, 2007). This poses an important

question about how current public policy that allots financial resources to individual students, as well as to colleges and universities, facilitates efficient human capital investments in postsecondary education.

Scope and Motivation of the Study and Its Significance

My purpose in this dissertation is to better understand student price demand for college education and roles of public policy in mitigating individual differences in such demands. A price demand for college education is shaped by varying capital (e.g., cultural, monetary and social, etc.) that each individual student possesses. As a result, some students may have a higher preference for college education than others, and some may have less price demand than others, regardless of their academic merit or potential. I therefore contend that the role of public policy should be to mitigate differences caused by individual student circumstances, including but not limited to socioeconomic status and financial need of students. Therefore, this study seeks to amplify the understanding of student price demand for college education, as explained using perspectives stemming from human capital investments (Becker, 1963), as well as student price responsiveness (Heller, 1997; Leslie & Brinkman, 1987; McPherson & Schapiro, 1998). The focus of this study is to explore how individual characteristics of students shape price demand for college education and how state policy preferences also play a role in explaining such demand.

In the following chapter, I outline relevant literature that helps situate this study within an appropriate theoretical framework and previous studies, as well as my research questions. Followed by this are a chapter that introduces analytical and statistical framework of this study, then in Chapter Four, I report results of statistical analyses. In Chapter Five, I discuss results of statistical analyses in the context of my research questions, and finally conclude with a

discussion of the policy implications of my findings and some ideas for future research. This is a timely subject both at national and state levels, as college costs and affordability receive increased national attention and as the U.S. Congress takes up the reauthorization of the Higher Education Act of 1965, as its 2008 version, the Higher Education Opportunity Act (HEOA) expires. Recent studies on college tuition and fees have focused largely on institutional-level or state-level analysis; this study, however, offers a student-level analysis and will enrich scholarship by providing another analytical dimension.

Chapter Two

Review and Discussion of Relevant Previous Studies

This dissertation aims to better understand student price demand for college education and roles of public policy in mitigating individual differences in the demand. As such, first, it is important to establish a theoretical grounding regarding price demands of students for college education, as well as the human capital investment perspective and college choice framework. I also discuss social and private returns of higher education, which students as well as other parties who invest in college education perceive as benefits. These concepts lay the groundwork for examining the pursuit of postsecondary education as a microeconomic transaction based on benefit and cost analyses.

Following the survey of theoretical frameworks, I turn to a discussion about the development of contemporary direct student aid policies in the United States. Then, I outline how those policies came about after World War II and discuss what implications have been observed in terms of shaping demand for college education, as well as how they interplay with student responses to tuition costs and “sticker shocks.” I also explore competing hypotheses around wisdom that informs the public policy discussion of student financial aid programs and institutional subsidies for postsecondary education: the Hansen-Wiesbrod hypothesis, Peltzer hypothesis, and Bennett hypothesis. Moreover, I review the literature on the costs of higher education and how students respond to financial aid and tuition and fees. Finally, I close this chapter by outlining my research questions for this dissertation.

Human Capital Investment and Higher Education

Spending for postsecondary education is very different from purchasing a consumer good like an apple or an orange. Buying an apple or an orange gives you an immediate return upon

consumption of that good—nutritional intake and hunger satisfaction. However, obtaining higher education is a different form of transaction, much like making an investment in a stock, in which a monetary return on investment is anticipated. Economists characterize this notion as human capital investment (Becker, 1993). In this framework, individuals or employers make investments in training or education with the anticipation that there will be returns in forms of increased efficiency in production of goods and/or higher earning potentials.

An illustration of such economic transaction in the case of postsecondary education pursuit is that an individual chooses to invest in human capital when the areas labeled as “A: College earning premiums” and “B: Non-monetary returns” exceed the size of the area labeled as “Costs” in Figure 2.1 (McMahon, 2009; Paulsen, 2001). In the chart, the point “E” represents the time of enrollment in college, the point “G” represents the time of college graduation, and the

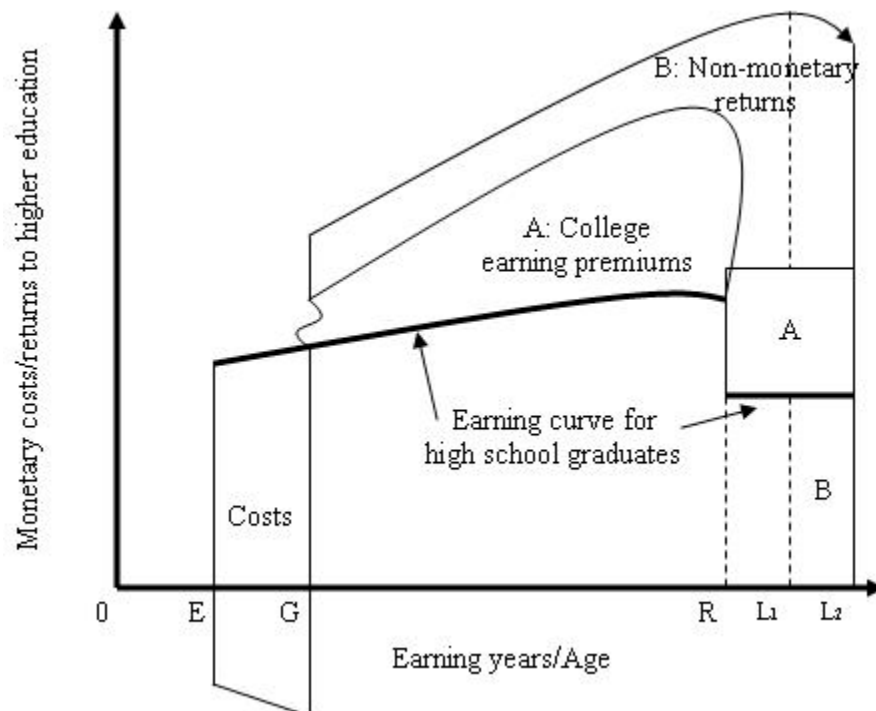


Figure 2.1. Investment in education and returns over the lifecycle.

(McMahon, 2009; Paulsen, 2001)

point “R” represents the time of retirement from the workforce. Since college graduates are said to have greater longevity compared to their counterparts without college education (McMahon, 2009), the illustration contains two sets of lifespan labeled as L1 and L2. In terms of monetary returns, since college graduates earn more in their career, they also receive higher retirement benefits; they also enjoy longer terms of receipts of such benefits. They also enjoy nonmonetary returns, such as better health and longevity and better quality of life (McMahon, 2009).

The Nobel laureate economist Gary S. Becker (1993) contends that as a form of investment in human capital, education and training are the most important means of investment. They yield higher income for those who attained an advanced education compared to those who did not. Returns on investment are often conceptualized as higher earnings for individuals, as well as emotional and physical health (Becker, 1993). It is said that the aim for human capital investment is to yield an overall productive workforce as a result of better educated/trained workers (Becker, 1993). Unlike investments in stock or property, the costs of human capital investments go beyond monetary expenditures. One must factor in opportunity costs and net present values to accurately reflect the true returns on such investments (Becker, 1993). One assumption is that while investing in human capital, individuals are not engaging in income-generating activity as much as their current ability and skills allow. In the case of education as human capital investment, the concept of opportunity costs is often conceptualized in terms of students’ foregone earnings. In other words, opportunity costs are wages that students could be collecting if they remained in the workforce, instead of pursuing postsecondary education (Becker, 1993; Ehrenberg & Smith, 2005; McMahon, 2009; Paulsen, 2001). Also, how much a dollar is worth to individuals in present terms affects how much they may be willing to invest in human capital. How the individual values a dollar differs because of economic circumstances;

this difference creates varying cost assessments for making investments in human capital (Becker, 1993). While those from affluent backgrounds may have enough disposable income for human capital investments, others from less affluent families have a more difficult choice—food on the table or education. Even though returns on higher education may be clear, the costs would simply be too high for the impoverished family.

Human capital investments in higher education and their dividends roll in at a slow pace. An individual's timing in deciding to pursue higher education has implications for costs and returns. Ehrenberg and Smith (2005) hypothesize that the demand for higher education, or willingness to invest in higher education, is higher for younger people and an increase in price would decrease demand. The demand for higher education would likely be higher from younger people because they would have a much longer time to collect returns from their investments, as well as much lower foregone earnings than those with an established career in the workforce. College attendance will increase if the gap widens between the earnings of college graduates and high school graduates. Although the cost of higher education has recently increased, gaps between earning potentials of college graduates and non-college graduates are also growing. Especially in this economic time, college graduates have better employment prospects than their counterparts without college degrees. This adds more incentive for individuals to pursue a college education despite rising costs.

The costs associated with investing in higher education can be somewhat complex and stretch beyond out-of-pocket expenses. McMahon (2009) contends that nonmonetary costs associated with college education are often neglected in discussing investments in higher education. Given his assertion, investments in college education can be characterized in two broad forms. One is the monetary expense of pursuing college education (i.e., tuition and fees,

textbooks, and living expenses) and the other is foregone earnings (Ehrenberg & Smith, 2005; McMahon, 2009). Foregone earnings can be calculated by the length of college education and average wage earned by similar counterparts in the workforce (McMahon, 2009).

McMahon posits that foregone student earnings, which are a part of “Costs” in Figure 2.1, can be offset by work and scholarship, thus reducing opportunity costs associated with investment in higher education. From this perspective, financial aid awards shrink the region, which is represented as “Costs” in Figure 2.1, thus favorably shifting the demand equation for those people who are less likely to spend money for postsecondary education and improving access and affordability for the less affluent. Ehrenberg and Smith (2005) suggest that each student, depending on their life circumstances and other factors, has a different level of willingness to invest in higher education. Just as in other economic transactions, there is a role for the government to intervene and level the playing field. Government interventions in the form of vouchers or subsidies can shift differing demand curves as well as supply curves to promote an optimal level of outputs (Rosen, 2004). Student financial aid awards and subsidies are often seen as *de facto* voucher programs for postsecondary education (Alexander, 2001b). State governments give these vouchers to public colleges and universities, which in theory keeps college affordable. Similarly, lowering tuition and fees can also reduce the size of the region labeled as “Costs” in Figure 2.1, thereby increasing the relative size of return for students.

In the following sections, I introduce previous studies on the price responsiveness of college students, financial aid awards, and college-going, as well as the policy debate between direct student aid policies and direct institutional subsidies. But first, I highlight further examinations of returns on investment in higher education as human capital investments, and how researchers conceptualize and quantify such returns. This way, I can better contextualize

how one's willingness to invest in higher education and the size of that investment matters to potential returns.

Returns on investment in higher education. If asked, many people will say that education is important for the future of our society. The key term here is “future,” which suggests that benefits from education are not necessarily felt immediately, but after some time. Although the importance of education is somewhat abstract and difficult to conceptualize, it is widely acknowledged. Some researchers go in depth to discuss and introduce ways to measure such benefits of education. In the field of postsecondary education, pieces by Leslie and Brinkman (1993) and McMahon (2009) paint a bigger picture of the benefits of and returns on higher education.

Although it is sometimes difficult to quantify, McMahon (2009) highlights that investment in higher education yields both private and social returns; such returns come in both monetary and non-monetary forms. One widely known form of return is what is varyingly called the college earnings premium, the college wage premium, or simply the college premium. The college premium increases the lifetime earning potential of individuals who attain college degrees. (See Figure 2.1) I will discuss this particular aspect of return on higher education later, but first I will outline some of the social benefits McMahon (2009) proposes.

Social returns on higher education. Human capital investment suggests that education or additional training make workers more efficient in production of desired outcomes, thus, making the workforce more efficient. Researchers contend that higher education also has similar effects (see Leslie & Brinkman, 1993 and McMahon, 2009). While some may say that such returns on higher education to the greater society are a positive spillover effect of individual transactions, McMahon (2009) asserts that social return on higher education is much larger than a mere

discharge. Specific aspects of social return include democratization, increased longevity of life, decreased violent crimes, lower welfare, health care and prison costs, increased social capital, greater quality of life, and greater efficiency (McMahon, 2009). Universities contribute to the society by creating greater efficiency, which is a result of new technology developed by university research, as well as by producing graduates who have acquired the skills and understanding needed to utilize newly developed technology (McMahon, 2009).

Although comprehensive, McMahon's analysis of higher education's social returns focuses on the national level, and does not address regional disparities within the United States. His findings confirm similar studies and support the notion that positive benefits and returns on higher education exist and are relatively underestimated in policy discussions. However, it should also be noted that postsecondary education in the United States is very much decentralized and the current state of the economy makes one skeptical of how widely such social returns spread across geographical boundaries within the country. Social returns on higher education are also long-term effects, which are more difficult for policymakers and the public to comprehend and incorporate into policy and financial decisions. In fact, McMahon (2009) suggests that this very nature of social returns makes the concept difficult to quantify and therefore makes it vulnerable to underinvestment.

Moreover, social returns on higher education are often considered side effects of private investment. In other words, while society may benefit from college graduates, it is believed that the primary effects of investment in higher education come from private transactions of human capital investment. The idea that individuals are the ones who benefit from postsecondary education opportunities creates the case for an increased shift of college cost burden to students

and their families, the phenomenon known as “cost-sharing” (Johnstone, 2004). Now, I will turn to discussing private monetary benefits of higher education.

Individual monetary returns on higher education. While the analysis of social returns on higher education is rather difficult and understudied by researchers and policymakers, private returns on higher education are often placed in the forefront of the policy debate surrounding the financing of postsecondary education. Not only that, the individual monetary return is highly regarded when an individual student weighs the costs and benefits of pursuing college education. Private monetary returns on a college education are very evident, as they are often seen as increased potential lifetime earnings. Many studies quantify such effects, which, as noted before, are commonly referred to as the college earnings premium, and many studies indicate that having a college degree gives a graduate a better chance to earn more money (Dale & Krueger, 2002 & 2011; Eckstein & Nagypal, 2004; Grogger & Eide, 1995; Grubb, 1992; Hoekstra, 2009; Leslie & Brinkman, 1988; McMahon, 2009; Murphy & Weleh, 1989; Paulsen, 2001; Perna, 2003).

Some, however, also attribute growing earnings inequality in the United States to the college earnings premium. Researchers note the rise of both the college wage premium and income inequality (Eckstein & Nagypal, 2004; Goldin & Katz, 2009). In particular, the 1980s increased demand for an educated workforce, which created widening wage inequality in the United States (Goldin & Katz, 2009). Since 1981, earnings premiums of college graduates have risen substantially. The analysis of Current Population Surveys suggest that earning increases of college graduates outpaced those of non-college-graduate counterparts between 1981 and 2002 (Eckstein & Nagypal, 2004). More specifically, male college graduates earned on average an 1.8:1 ratio over their high school graduate counterparts in 2002, which was 1.4:1 ratio in 1981 (Eckstein & Nagypal, 2004). This gap was larger for men with master’s or equivalent degrees, as

they earned a 2.6:1 ratio over men with up to a high school education or \$100,000 more on average, which was an increase from the previous ratio of 1.8:1 in 1981 (Eckstein & Nagypal, 2004). Often this is referenced as why more investment in education is so critical to the overall economic prosperity of this country. This increasing wage inequality between levels of education attainment is attributed not only to technological changes that drove a growing demand for an educated workforce, but also to the slow growth of education attainment in the United States (Goldin & Katz, 2009). While it is a welcoming note that the college wage premium is increasing, if access and opportunities for sufficient investment in postsecondary education are not made available to many, inequality will not only further persist, but expand. In other words, the college earnings premium can be a double-edged sword if there is not a proper policy in place. In order to cash in the premium, one must be able to get a college degree, and to do so one must have appreciation of the values of a college education.

Not all college degrees are made equal. It is also very important *where* students are making their investment in higher education. It is equally important to note that not all college degrees are made equal. Where and how much each student invests also matters to their educational returns. This is especially true for elite and more selective universities yielding an increased college earnings premium (Brewer, Eide, & Ehernberg, 1999; Dale & Krueger, 2002 & 2011; Hoekstra, 2009; Monks, 2000; Thomas, 2003). This often highlights and reinforces views that higher education yields more private goods than public goods. For instance, Hoekstra (2009) examines the effect of attending a flagship state university on post-graduate earnings. An analysis of college graduates from a public flagship university and their counterparts indicates that White male graduates, in fact, earn more by attending such a university (Hoekstra, 2009). In

this study, White male students attending more selective public universities made 20 percent higher earnings than their counterparts (Hoekstra, 2009).

While Hoekstra (2009) only focuses on one school, Dale and Krueger (2002) provide a more comprehensive view on this matter. They use the 1976 cohort in the College and Beyond (C&B) Survey, which covers a much broader range of colleges and universities. By using fixed effects models to determine influence of institutional selectivity in post-college earnings of students, the study finds that selectivity has no significant relationship with post-college salaries of graduates; however, it finds that increased tuition and fees are related to subsequent earnings of college graduates (Dale & Krueger, 2002). Later, Dale and Krueger expanded their study (2011) by following up with the 1976 cohort as well as including the 1989 cohort of the C&B survey. The latter study finds that institutional selectivity raises post-college earnings of students when only controlling for variables that represent students' abilities; when considering characteristics of colleges they did not attend, institutional selectivity loses its statistical significance (Dale & Krueger, 2011). However, their finding also suggests that traditionally underrepresented minority students have sizeable power to affect their subsequent earnings by attending more selective colleges (Dale & Krueger, 2011). This has important implications in discussing not only college access as a broad concept, but the types of college to which students are afforded access, particularly when focusing on minority students.

Selective universities often have higher price tags than nonselective counterparts. When examining returns on elite higher education, one must also consider how such returns may be offset by the high prices that students must pay to attend such selective institutions. An analysis of the Baccalaureate & Beyond: 93/97 (B&B: 93/97) study by Thomas (2003) finds strong evidence linking post-college earnings of graduates and selectivity and institutional controls. The

finding found, after controlling for individual characteristics such as family backgrounds, a 9 percent increase in earnings by students who graduated from mid-level selective private universities and a 12 percent increase in earnings by graduates of highly selective private universities (Thomas, 2003). Although, Thomas (2003) does not control for students' ability as elaborately as Dale and Krueger, the finding still merits serious consideration, as one of the few that paint a picture of college earnings premium and institutional quality with a nationally representative sample. It also confirms findings of a previous nationally representative sample study with the 1972 cohort of National Longitudinal Study of the High School, the 1980 and 1982 cohorts of the High School and Beyond data (Brewer, et al., 1999), and the 1979 cohort of the National Longitudinal Survey of Youth data (Monks, 2000).

However, these high returns on elite and selective higher education do not come without cost to students. Thomas (2003) also finds that debt-to-earnings ratio of college graduates from selective universities are much higher, as his study notes a 55 percent increase in debt-to-earnings ratio of students who graduated from highly selective private universities, in comparison to those who graduated from less selective public institutions. When a difference in earnings is only 12 percent, the increase of debt-to-earnings ratio by 55 percent is perhaps too much of a price to pay. Since student loans are needed after students exhaust other resources (e.g., grant aid and family contributions) this is an important factor in discussing financial aid. If student financial aid awards are not meeting financial need for students from low-income backgrounds, the consequence is that those students simply cannot afford to go to more selective and highly priced colleges and universities. Conversely, even if they are able to go, it will mean incurring a large debt and thus their earnings premium will, effectively, be washed out in the long run.

Student Price Response, College Choice, and Policy Interventions

In the previous section, I discussed private and social returns on college education and the literature that suggests having a college degree makes students more likely to be financially prosperous in the long run. However, one caveat to this proposition is that students must have some means and willingness to be able to invest in this human capital. Price response of students within higher education and the aid response of students are important concepts to be considered here; in fact, they are the main point of discussion for this dissertation. Cabrera and La Nasa (2000) offer a useful summary of literature on the interplay between tuition and fees and student financial aid for low-income students. Students from low-income backgrounds are much more susceptible to changes in student financial aid than to that of tuition and fees (Cabrera & La Nasa, 2000). In other words, while students may negatively react to increase in tuition and fees, if comparable direct student aid awards are offered, then low-income students are still willing to pursue a college education. This highlights the importance of financial aid policy in keeping college accessible and affordable for students from traditionally underrepresented backgrounds.

Student price responsiveness. Learning how responsive students may be to price increases is a good starting point for this discussion. The price responsiveness of students is well documented in literature (Heller, 1997; Leslie & Brinkman, 1987; McPherson & Schapiro, 1998), but is somewhat dated. Meta-analysis of student price responsiveness in the 1980s and 1990s both affirm that every hundred-dollar increase in tuition results in approximately a 0.5 to 1 percentage point decrease in enrollment (Heller 1997; Leslie & Brinkman, 1987). This price sensitivity is higher for financially disadvantaged students, as McPherson and Schapiro (1998) found that a net price increase of college education by \$150 results in a 1.6 percentage point decline of college enrollment among low-income students. Heller (1997) asserts similar findings.

Low-income students are more sensitive to tuition increases than their counterparts from high- and mid-income tiers. The findings also show that African American students are more sensitive than their White counterparts when tuition and fees increase. Disproportionate rates of price response among students render the roles of student financial aid important in making college affordable for students with different backgrounds.

Researchers note that financial aid awards serve important roles in mitigating students' price responsiveness. The same meta-analysis finds that student demand is also responsive to availability of student financial aid (Heller, 1997). Heller (1997) conceptualizes the effect of student financial aid as creating a different demand curve for eligible students by shifting the

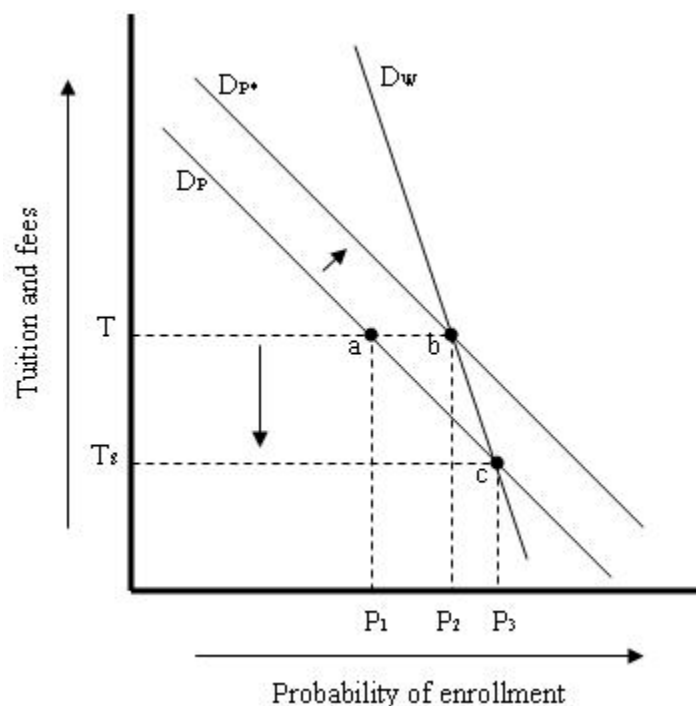


Figure 2.2. Higher education demand of poor and wealthy students, showing effect of financial aid and subsidy. (Heller, 1997)

demand curve upward (Figure 2.2). Since students from different income backgrounds have different price responsiveness, they each have different demand curves that represent their price

preferences for a college education, which are labeled as D_P for the demand curve for low-income students and D_W for the demand curve for high-income students. By providing student financial aid for low-income students, their demand curve can be shifted upward, as illustrated as D_{P^*} in Figure 2.2, thus, probability of going to college can be raised to the point b, which is equal to that of higher income counterparts at a given tuition point, T (Heller, 1997). A similar effect can be achieved by lowering tuition and fees by means of institutional subsidy. In Figure 2.2, by setting tuition and fees to lower point, T_S , now both high-income and low-income students have the same probability to enroll at the point c.

Conceptually, this can be true for different subgroups of students by race/ethnicity and income backgrounds. The idea is to visualize the theoretical role of student financial aid awards. However, each subgroup has a different rate of response to financial aid awards. For instance, Heller (1997) observes that low-income students and African American students are particularly sensitive to changes in tuition and fees, as well as student financial aid awards. Findings from a study of the 1987 cohort of the National Postsecondary Student Aid Study (NPSAS) dataset suggest a particular role that the availability of direct financial aid plays in the college-going decisions as well as in the persistence of African American students (Paulsen & St. John, 2002). Similarly, a study of the Beginning Postsecondary Students 1996/2001 finds that direct student financial aid awards improve attainment of college degrees for underrepresented minority students (Chen & DesJardins, 2010). Empirical results find that students of different characteristics respond differently to tuition and fees and total costs of college education. Financial aid awards affect their varied decisions. The question now is how differences between students can be explained conceptually when it comes to college choices.

College choice framework. The economic model of the relationship between the price of college education and probability of enrollment is simple. It is a line that represents the decreasing probability of enrollment as the price of college goes up. In actuality, the probability of a student choosing to pursue postsecondary education is much more complex and involves various factors such as race/ethnicity and socioeconomic status. Laura Perna (2006) asserts that an economic model for human capital investment is a useful concept to help comprehend the decisions of students at an individual level; however, it is insufficient to understand all the various facets that differentiate estimated costs and returns for all students. Her model, in turn, incorporates other factors such as social and cultural capital variables, as well as geographical contexts, to describe the overall college choice model for students (Perna, 2006). A student's choosing to pursue a college education is a cost-benefit analysis (Becker, 1993; Heller, 1997; Perna, 2006), which means that if that student chooses a college, his or her estimated costs of pursuing higher education must not exceed what that student perceives as returns on higher education. To that end, Laura Perna's model is a useful model to understand how students might weigh and balance different factors that constitute the costs and benefits of pursuing college education. This allows researchers to view both monetary and nonmonetary returns on higher education against out-of-pocket costs and foregone earnings, while controlling for various individual and institutional characteristics (Figure 2.3).

Perna (2006) summarizes previous studies around college choices and notes that many pay attention to student-level data; however, the studies she references center around choices of institutional types and sectors, but not the amount of investments made by students. The application of this framework can inform how students might assign monetary values to higher education. Based on her framework, those students who choose to pursue a college education

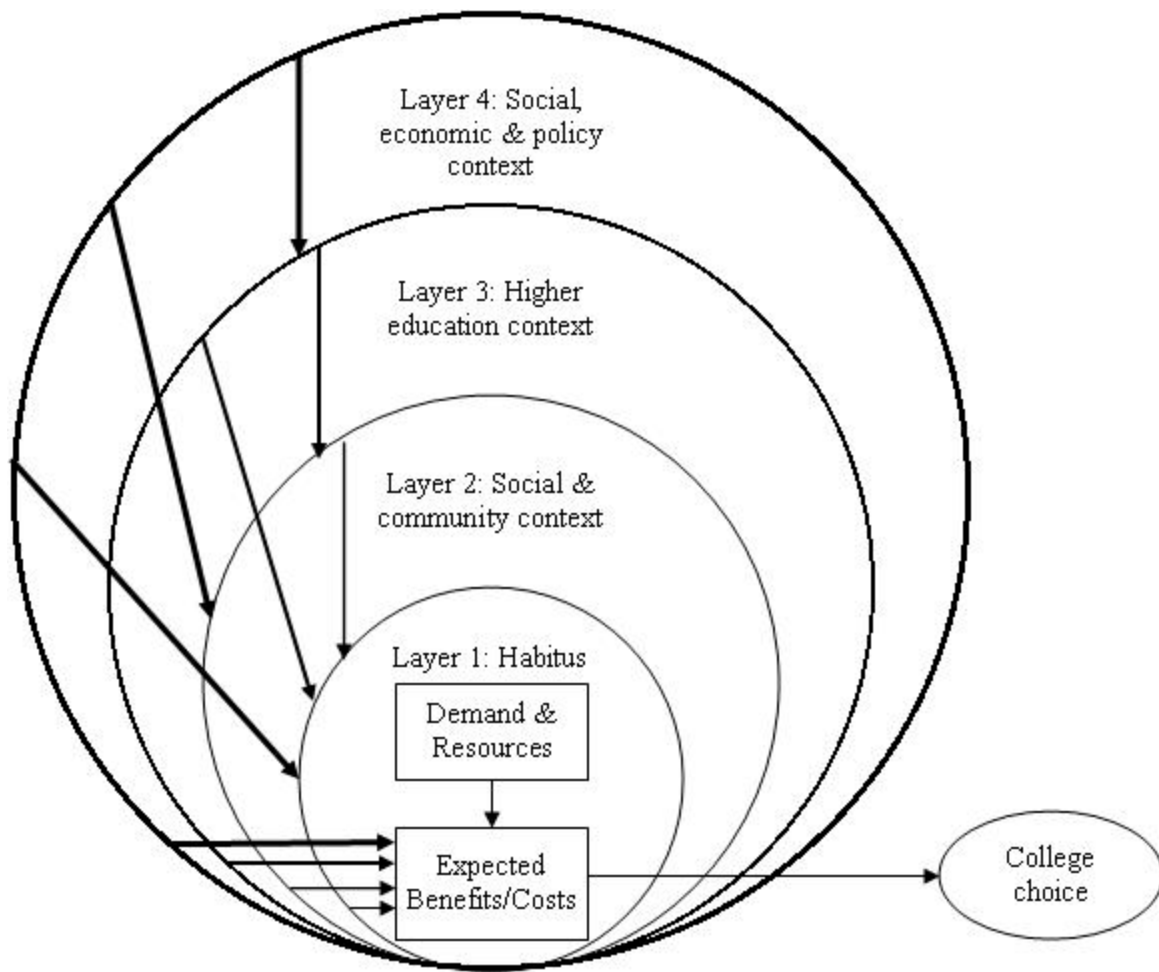


Figure 2.3. Perna's conceptual model of student college choice. (Perna, 2006)

must have estimated their returns on higher education to be greater than or equal to the estimated costs of doing so. Thus, control factors Perna introduces for her college choice model can also inform how and what factors might explain students' estimated minimum returns on their investments in higher education, as well as what roles anticipated financial assistance might play.

From the human capital investment perspective, student price response to college costs plays an important role. Although it does not reflect the college education investment cost for its entirety, it shows in part how students decide whether or not to pursue a college education. The role of student financial aid can also be understood from human capital perspective as means to reduce costs of such investment. Recalling Figure 2.1, the area labeled as "Costs" can be reduced

by direct student financial aid awards, which lower net price for college education, or lowering of the price tag of college itself. Those are represented in Figure 2.3 as resources in “Layer 1: Habitus,” as well as “Layer 4: Social, economic and policy contexts” of college choice decisions. Social, economic, and policy contexts are particularly important when discussing public colleges and universities, as tuition and fee setting authority—or determinants of price tags for college education—is often given to elected and/or appointed public officials. A recent study suggests that political ideology of states as well as state direct student aid availability matter in terms of tuition levels (Doyle, 2012), which has an implication for students’ out-of-pocket costs. Similarly, other studies suggest that political ideology, governance structures, and other policy and political contexts matter in terms of levels of state appropriations for postsecondary education (Nicholson-Crotty & Meier, 2003; Tandberg, 2010). Perna’s conceptual framework is a solid guide for controlling variables to investigate the role of public policy and policy environment in relation to student price demand for college education. The question remains whether direct student aid can facilitate investments in higher education beyond the challenge, mentioned earlier, that Bourdieu, Perna and their like assert “sticker shock” poses to students from underrepresented minority backgrounds. And are policymakers asking such questions when debating student financial aid programs?

Development of Direct Student Aid Policies

Although colleges and universities are autonomous in terms of their governance, the federal and state governments have played significant roles in financing postsecondary education. Even during the early parts of United States history, private colleges and universities benefitted from land grants, tax breaks and other means provided by governments to build their financial viability (Cohn & Leslie, 1980). The federal role in higher education has since

expanded, especially since the Morrill Land-Grant College Act of 1862 that established land-grant universities, and they continue to play a major role in many aspects of American higher education (Gladieux, Hauptman, & Knapp, 2010). Today, aside from some high-profile court cases regarding affirmative action, the vast majority of federal government intervention in higher education stems from its monetary investment in it. Individual state governments are the major public funding sources for public colleges and universities, both via state subsidies and state direct financial aid programs. However, the federal government provides large sums of financing for university-based research and development projects, as well as direct student aid programs that award grants and give loans (Gladieux et al., 2010). Direct student aid policies play particularly crucial roles in almost all sectors of postsecondary education, since such funding can be allotted to virtually all accredited colleges and universities as long as students attend.

In this section, I will discuss how government policy interventions play roles in making college affordable. Specifically, the discussion centers around the Higher Education Act of 1965, which created federal need-based direct student aid programs, and the 1980 amendments to that legislation, which shifted the focus of federal assistance to student loan programs. I acknowledge that there are state-sponsored direct student aid programs, such as the Cal Grant program in California and Georgia HOPE scholarship program; however, in this section I will focus on the development of federal policies because they have a greater influence on policy approaches of individual states.

The inception of federal policy intervention for college affordability and educational opportunities. Ensuring affordability of higher education is one of the key areas within education in which the federal government plays a role. Since WWII and the dawn of the Mass Higher Education era, the U.S. government has provided some form of direct financial assistance

for students as a means of support. Now, nearly every institution of postsecondary education receives funding from direct student assistance (Gladieux et al., 2010).

In 1946, the Truman Commission drafted the first attempt to democratize American higher education by outlining governmental policies meant to broaden access to educational opportunities (Thelin, 2004). Preceding this idea was the Servicemen's Readjustment Act of 1944, commonly known as the G.I. Bill, which created, among other benefits, a massive pool of financial assistance for World War II veterans to pursue postsecondary education (Thelin, 2004). Following this successful model of direct student aid programs, the idea of providing financial assistance to the masses started to flourish. However, it did not come immediately. Thelin (2004) reflects that while the recommendations of the Truman Commission were largely visionary, they were published at a politically unfavorable time; therefore, many of the affordability recommendations were not adopted. As a result, individual states took initiative. A nationwide policy intervention to increase college affordability was not realized until almost two decades later when President Johnson took the helm of his Great Society.

Public Law 89-329, commonly known as the Higher Education Act of 1965 (or HEA), was signed by then-President Lyndon B. Johnson as part of measures to advance his vision for the Great Society. The 1965 Act established the Basic Education Opportunity Grant (BEOG), which was renamed the Pell Grant in the subsequent version of the Act in 1972, as well as direct student financial aid programs now collectively known as Title IV funding (Cohen, 1998). This legislation is subject to periodic renewal and reauthorization (Cohen, 1998), which creates political contention and influences the direction of American higher education. The original act was adopted largely as a response to the boom of college-age children born post-WW II as well as the dramatic shift in the demographics of the United States (Hauptman & Krop, 2001). The

Johnson administration had to meet the changing face of American society by making colleges and universities accessible to people from a broad range of socioeconomic backgrounds.

Under the premise of “*prosperity and growth*” (Hauptman & Krop, 2001, p. 148; italicized in original), the Johnson administration and Congressional leaders enacted and solidified a number of financial assistance measures that are still present in American higher education today. Original measures in the 1965 HEA included the College Work Study program and what is now called the Supplemental Educational Opportunity Grants program, as well as Guaranteed Student Loan programs, and were intended as an “equity-oriented direction” (Hauptman & Krop, 2001, p. 149), providing financial assistance to those with need. In that regard, the most important features of the Pell Grant (originally called BEOG) created by the 1972 reauthorization and other direct assistance programs are: 1) they are entitlement programs, and 2) they provide direct assistance to students, not to institutions. The Pell Grant program, which was the belated fulfillment of the 1946 Truman Report, provided grants to any students who met minimum requirements for financial awards; wherever students chose to go, financial assistance followed (Thelin, 2004). This approach of providing direct student financial aid to those in need helped create access for many. Manski and Wise (1983) reports that the Pell Grant, then called BEOG program, boosted college enrollment of students whose family income is below the median income by more than double-digit percentage points in the late 1970s.

This federal policy also has trickled down to public policies at the state level. In the 1970s, after various court cases that challenged the legality of taxpayers’ support of student financial aid to private schools, states quickly adopted their own versions of direct student aid programs. By 1976, such state programs had been adopted in 36 states (Alexander, 2001b). Indeed, the establishment of the federal direct student aid program changed the course of

government intervention in providing a means to make higher education affordable. However, in the 1980s, the federal government had a tremendous impact on shifting how financial assistance was conceptualized. During this period, to accommodate their rising operating costs, tuition and fees dramatically increased at both public and private universities in the United States. To address the rising financial need of students and their families, the federal government policy response was to expand its student loan programs (Hauptman & Krop, 2001). This change marked an increased reliance on loans, but not a decline of grant aid. Nevertheless, student loan programs continue to have a much larger share of the overall federal direct student aid programs.

Student loans vs. grant aid, and shifting away from the neediest of all. As college costs soar, the question arises who should bear the burden of paying for college education. It is a complex question. Even though a college education is not per se a pure public good, it has some such traits (Paulsen, 2001; Rosen, 2002). This challenges policymakers to find the right formula for college tuition and public subsidy. The concept of student loans is embedded in the principle that the cost for a college education must be shared between students and society (Johnstone, 2004). The fact that college graduates have higher potential earnings than non-college-graduates generates quite the sound bite for those who advocate that higher education is in fact a private good before it is a public good. This notion fuels the concept of postsecondary education cost-sharing (Johnstone, 2004) and shifts more of the cost burden to students and their families. However, unlike other durable goods or real properties, which people often acquire loans to purchase, when a person defaults on borrowing for a college education, there is no item to repossess.

The idea that students are the main benefactors of a college education (primarily through the wage premium, as well as access to networks and other social capital benefits) justifies the

shifting of the cost burden to students (Johnstone, 2004). The concept of cost-sharing allows the pursuit of higher education to be more of a private transaction. Despite the social returns discussed earlier, an increased earning potential provides ammunition to increase the cost burden for students and their families. Consequently, the debate around public financing of postsecondary education becomes more a discussion of government aid in private investments in higher education rather than a promotion of societal investment for postsecondary education. In fact, a previous study suggests that the shift toward loans and the movement of college education into the consumer economy during the 1980s reveals that a college education has increasingly been seen as a private good (Hauptman & Krop, 2001). However, there is a major obstacle in making college, as a private good, readily available to all. College education is not affordable for everyone. And, even if students borrow for college education, as alluded to in the earlier findings of Thomas (2003), it paints a cautionary picture about the implications of increased cost burden to students and the burdens' quickly diminishing potential returns.

In the framework of human capital investment, there are two types of gain from college education: monetary gain for the individual and increased productivity for the workforce and society as a whole (Becker, 1993). The former suggests that attaining a college-level education puts an individual in a better monetary position than those who do not have postsecondary education. From this notion, the argument can be made that the cost of a college education should be borne by students and their families. When deciding whether or not to attend a college, the perceived return on investment must exceed cost, including the opportunity loss from attendance. It also means that students must be able to see a return on investment in taking out a student loan, in addition to other foregone earnings.

Perhaps the greatest concern regarding student loan programs is the debt loads that students face upon graduation from college, and how those total debts might affect their post-college career and life decisions. In fact, the total student debt accumulated in the United States is at an all-time high. The graduating class of 2010 from four-year public universities and private not-for-profit universities accumulated over \$25,000 student loan debt on average, with state averages ranging between \$15,500 and \$31,050 (The Institute for College Access & Success, 2011). It is recorded to be over one hundred billion dollars and expected to exceed one trillion dollars this year (Cauchon, 2011). The ever growing accumulation of student debt creates concerns about loan default as well as limits on future life decisions for college graduates. Policymakers recently reacted by adopting the Student Aid and Fiscal Responsibility Act of 2010 (Congressional Research Service, 2009) and made the federal government a direct lender for student loans, thus reducing costs of having private middlemen. However, aside from this shift, the key parts that make college affordable, such as loan interest rates, still remain a political football.

However, previous studies of post-college career and graduate school aspirations yielded mixed findings in this regard and it is not yet clear if undergraduate debt loads negatively affect or limit future options and career aspirations (Hill, 2008; Joyner, 1998; Kim & Eyermann, 2006; Millett, 2003). More importantly, attention should be paid to the debt aversion tendencies of underrepresented minority students, which could lead this population of aspiring college-going students to opt out of college. Some groups of underrepresented minority students are more loan-averse (St. John, Paulsen, & Carter, 2005) and may lose the competitive edge in purchasing power of federal direct support programs, thus impeding college affordability (St. John, Hu, & Weber, 2001). Other studies also suggest that underrepresented minority students (Chen &

DesJardins, 2010) and students from low socioeconomic backgrounds (Callender & Jackson, 2005) may not see student loan programs and grant-in-aid programs in the same way. Since the pursuit of college education is often seen as debt, rather than as an investment, unless it is financed by free money—grant-in-aid—these students are less likely to take out a loan to finance their college education. Therefore, from the human capital investment approach, it is less likely for those potential students to take out loans and forego potential earnings.

Not only do loan-centric policies disadvantage racial and ethnic minority students, they also detour federal policy intervention for college affordability away from students from lower socioeconomic backgrounds. Chen & DesJardins (2010) characterize the policy shift from direct grant programs toward student loan programs as a shift of policy priority toward the middle class. These findings demonstrate that federal policies on college affordability and student loan programs have drifted away from the neediest of students. Although I acknowledge the financial needs of middle class students, this shift still raises an interesting question as to what the focus and objective of direct student aid programs are. As mentioned earlier, the “equity-oriented direction” is the approach at the federal level, but it is unclear, with the focus being deterred from the neediest students, how such a notion can be achieved. In the next section, I will discuss how direct student financial aid policies are viewed as public policy.

Direct Student Financial Aid as a Public Policy

A public policy requires some sort of a desired outcome or outcomes. Its effectiveness is often evaluated by how an adopted policy produces desired outcomes. It is a rational process that attempts to measure the attainment of its objectives (Stone, 2002). Several goals for public policy exist. Deborah Stone (2002) argues that generally speaking, those goals seek one or more of the following: equity, efficiency, security, liberty, and community. These concepts have implications

for the discussion of benefits of higher education, particularly the subjects of equity and efficiency. Equity argues for distribution of resources with regards to fairness, which may not necessarily be an equitable or inequitable distribution, while efficiency argues for achievement of certain intended outcomes with the least amount of resources devoted to them (Stone, 2002). As noted earlier, at the federal level, financial aid policies are in an “equity-oriented direction,” and thus one aim is to make college entry affordable regardless of one’s financial need. However, another interpretation is that its aim should be achieving equity, in terms of quality and quantity, of returns from higher education irrespective of pre-college financial need. These aims can be described as desired outcomes of need-based student financial aid as a public policy. Likewise, policymakers can resolve to seek to maximize production of public benefits of higher education with the least amount of resources allocated to it and the most optimal inputs. To this end, policy-makers may choose to award financial aid to students who are likely to succeed, or in other words, provide merit-based financial aid.

As a means to facilitate desired outcomes that otherwise cannot be achieved by the market or voluntary acts of consumers, government intervenes with public policy decisions. Grants and subsidies are other options that governments provide to encourage further participation, as well as wealth effects that distribute wealth where needed (Bardach, 2011). Grants and subsidies for higher education can be twofold: institutional and individual. The former provides subsidies and grants to colleges and universities and the latter provides them directly to students. Subsidized postsecondary education aims to offer a quality education without burdening its users with high prices, while direct aid to students offers financial incentives that encourage postsecondary participation based on the need and/or merit of individual students. In the discussion of subsidies and grants as public policy interventions to

improve the affordability and access to American higher education, three competing hypotheses are often discussed: the Bennett hypothesis (1987), Hansen-Wiesbrod hypothesis (1969), and Peltzman hypothesis (1973). All hypotheses attempt to evaluate public financing in postsecondary education.

The Hansen-Wiesbrod hypothesis argues that highly subsidized postsecondary education is an inefficient model of equitable distribution of resources, since postsecondary access is already limited for many traditionally underrepresented minorities (Hansen & Wiesbrod, 1969). Hansen and Wiesbrod (1969) argue that highly subsidized postsecondary education will disproportionately benefit more affluent students who have the advantage in attaining higher education. While subsidized education may offer much a cheaper price tag, Hansen and Wiesbrod (1969) contend that low-income students encounter other obstacles that prevent a higher education. They assert that the highly subsidized colleges and universities give low-cost higher education to more affluent students, while taxing the less affluent and non-college-bound students and family. This notion was countered by Johnson (2006), who argues that the net redistribution effect is still proportional across different income groups. The analysis of the National Longitudinal Study of Youth in 1980 suggests that since parents of affluent students pay higher taxes and low-income students do not reach subsidized higher education at the same rate as their counterparts, it is still a proportionate distribution of access and opportunities (Johnson, 2006).

However, subsidized postsecondary education was not favored as the federal-level policy intervention when the Higher Education Act was reauthorized in the 1970s. Instead direct student aid programs, or a “need-based voucher approach,” became the federal programs to finance postsecondary education and therefore boomed (Alexander, 2001b). Proponents of direct student

aid programs argue that subsidized education creates expenditure-restriction effects, whereby students and families who are capable of investing more in higher education have less incentive to do so and opt for low-cost subsidized education (Peltzman, 1973; Long, 2004). This Peltzman hypothesis also argues that highly subsidized postsecondary education effectively kills the competitive marketplace for private colleges and universities (Stuart, 1980). Stuart (1980) argues that in fact, subsidized postsecondary education is an inequitable policy for students at private colleges and universities. He contends that college degrees from private colleges and universities have an equal, if not more important, role in producing social returns on higher education, yet students are expected to bear the cost as if it were solely a private good. This argument eventually prevailed and led the federal-level policy to be variations of direct-student aid programs; many states still follow similar policies.

The direct-student-aid policy does not go without criticism, however. William Bennett (1987), the Reagan administration's education secretary, asserts that federal direct student aid programs give incentives for colleges and universities to increase tuition and fees so that revenue potentials are maximized from student aid awards, thus creating a *de facto* subsidy program. However, studies regarding the Bennett hypothesis and its applicability to grant aid policies appear to be mixed. Some argue that it only applies to public universities' tuition policy (McPherson & Shapiro, 1991 & 2006) and others assert that in fact, the hypothesis applies to private universities' tuition policies as well as public universities' out-of-state tuition strategies (Singell & Stone, 2007).

In addition to the Bennett hypothesis, well documented effects of "sticker shock" (Fisher, 1990; Hearn & Longanecker, 1985) highlight the weakness of direct student aid policy. As tuition "sticker prices" continue to rise, they disproportionately affect students from

underrepresented minority backgrounds despite the availability of federal, state, and institutional financial aid programs as well as some private scholarship funds. There is a disparity of information about higher education's values and resources associated with race/ethnicity and socioeconomic status of students (Perna, 2006) and how students bring different types of cultural and social capital to their decision-making processes (Bourdieu, 1977). This raises concerns that students from traditionally underrepresented minority backgrounds might not take advantage of available financial assistance; thus, as a policy, direct student aid programs might not sufficiently encourage students.

One basic weakness of either type of public policy, subsidized education or direct student financial aid, is that it only benefits those who achieve college admission. Researchers such as Perna (2006) suggest that the choice to pursue college is not based solely on students' academic achievement. Another weakness is that benefits from subsidies and direct aid also depend on what types of college education students pursue. Financial assistance might help a student attend college, but without that student placing a correct value upon his or her pursuit of higher education, the student might not take advantage of financial aid awards to the fullest extent. For example, assuming that student A and student B have identical academic achievements and financial need, but for some reason (e.g., social and cultural capital around college choice), if student A has the foresight to place his or her price demand for college education higher than student B, then Student A will likely receive a larger sum of need-based aid awards. This can be said for other institutional characteristics such as reputation, academic rigor, and employment prospects for graduates.

Current issues with direct student aid policy. There may not be enough discussion of how student financial aid facilitates equitable human capital investment. Current federal policy

lacks a cohesive approach in providing various types of student financial assistance (Perna, Rowan-Kenyon, Bell, & Thomas, 2008). Additionally, since the adoption of the original Higher Education Act of 1965, little discussion has taken place about the fundamental idea behind making college affordable to students, although there have been incremental changes made in recent years. Absence of assertive actions and reaffirmation of the idea that college should be affordable by the federal government leaves individual states to mold financial aid strategies of their own, which are sometimes inconsistent with the vision of an “equity-oriented” policy. In fact, in the last two decades state merit-based grant aid programs increased from less than ten percentage points to nearly a quarter of all types of state financial aid programs (Baum & Payea, 2011b). This calls for renewed commitment from federal policymakers to return the focus to an “equity-oriented” policy that facilitates college affordability and access.

Another alarming trend is that in 2007-08, private for-profit university students received nearly twice as much federal grant aid as their counterparts in private not-for-profit and public universities. Yet, four-, five-, and six-year graduation rates at private for-profit schools are the lowest among all sectors of postsecondary education institutions (Baum & Payea, 2011a). These statistics suggest that for-profit universities are disproportionately benefiting from federal direct student aid sources, and even worse, they do not provide the much-needed upward mobility to students attending those schools. It is apparent that the original idea of “equity orientation” is absent in the current practice of federal direct student aid programs. Policymakers need new and thoughtful approaches in order to refocus the federal-level efforts into an “equity-oriented direction” for college affordability measures and their implementations.

The function of U.S. student financial aid programs can generally be divided into two roles: to meet need and reward the deserving. Researchers have discussed at length how student

financial aid policies in the United States developed after WWII (Cohen, 1998; Hauptman & Krop, 2001; Thelin, 2004), particularly regarding the roles of direct student aid programs in encouraging participation by traditionally underrepresented minorities (Chen & DesJardins, 2010; Paulsen & St. John, 2002; Perna, 2006). By and large, government policies for student aid programs have centered on helping those in need.

Increasingly concerns are arising about the government strategy for student aid programs and whether they encourage the “right” investment decisions for higher education. These concerns merit consideration, since most federal and state student aid funding follows students to their chosen institution of higher education, which gives incentives to high-priced institutions (Alexander, 1998; Alexander, 2001a; McPherson & Schapiro, 1998). This is particularly concerning since price responsiveness of students and the role of student aid programs in mitigating such responsiveness are well documented (Leslie & Brinkman, 1987; Heller, 1997; Manski & Wise, 1983) and low-income students are inclined to attend low-cost universities (Alexander, 2001a; McPherson & Schapiro, 1998), thus receiving a disproportionately low amount of student aid funding (Alexander, 2001a). While various student college-going models describe direct student aid as a potential equalizer for access to higher education (Paulsen & St. John, 2002; Perna, 2006), its actual effect in increasing the economic diversity of the college student body may be challenged. A study of nearly 850 master’s- or doctoral-granting universities found that a strong negative relationship exists between institutional selectivity and socioeconomic diversity as measured by prevalence among Pell Grant recipients (Steinberg, Piraino, & Haveman, 2009). In other words, Pell Grants may not necessarily be promoting enrollment of low-income students in highly selective universities.

These critics of student aid policies raise an important question in relation to government's role in facilitating human capital investment that yields wider distribution of individual and social benefits of higher education. It begs the question whether or not investment in higher education is made irrespective of one's financial needs and capacity. More importantly, the critics ask whether public and private investments in higher education strike a balance that encourages the type of human capital investments promoting wider distribution of both private and public returns on higher education.

Birnbaum (1983) contends that "institutional diversity with systematic integration" (p. 117) creates social mobility for students. However, in the current model of federal direct aid programs, those students who choose to attend low-cost institutions, many of whom are of a lower socioeconomic status, are disproportionately disadvantaged (Alexander, 2001a). Thus, it appears that the Pell Grant program falls short of providing opportunities to integrate students from different socioeconomic backgrounds into a diverse range of colleges and universities to facilitate upward mobility for lower-income students. Moreover, the system favors students who have the ability to attend more selective and expensive colleges and universities, thus leading to an inequitable distribution of direct federal assistance for college students (Alexander, 2001a; Alexander, 2001b). In fact, Golding and Katz (2007) and Acemoglu and Autor (2012) argue that the slow pace of investment for education and, thus, for human capital have caused widening gaps in the United States. They contend that human capital investment is a necessity for an equitable society; their core argument is that U.S. policy has not done so for the last three decades. This poses an important question about how current student financial aid policy fares in terms of facilitating equitable distribution of public and private resources to pursue higher education and human capital investment.

Summary of the Literature Review

In the preceding sections, I have discussed the theoretical framework of human capital investment and its application in understanding private and public investment and returns on postsecondary education. While social returns on higher education are discussed and demonstrated by researchers, discussion in the broad political and public policy sphere focuses on private returns on higher education and how social benefits are merely side effects. As a matter of public policy, government financing of postsecondary education is aimed at creating broader access and opportunities for individual transactions to pursue an advanced education, while social returns are seen more as a long-run consequence rather than policy objectives.

It is widely acknowledged that college degrees are attributed to higher earning potentials for students; however, when only one in ten individuals in the United States reach that point in the educational pathway and minorities are still disproportionately underrepresented in cohorts of graduates, this raises large policy questions. Moreover, not all college degrees yield the same returns and literature suggests that institutional quality matters.

Development of direct financial aid policy speaks to such a notion, as it was created to aid returning service members' life success, and followed by the creation of many need-based student aid systems or subsidized low-cost public higher education. As I highlighted, direct student aid policies eventually prevailed as the solution to the debate on what the public financing of higher education ought to look like. The Peltzman hypothesis posits that direct student financial aid encourages private investments in postsecondary education and gives students a range of options for colleges and universities, as opposed to subsidized public higher education that could put private institutions out of business.

I have also described the effects of student financial aid awards in facilitating college access for traditionally underrepresented students. This is an important function that the government performs by keeping college affordable and creating more opportunities for students from disadvantaged backgrounds in terms of social mobility. However, I have also highlighted that students' choice of college does matter for their returns on investment in postsecondary education. College quality and selectivity matter in future earnings, which are the most widely reflected returns on higher education investment. The question should be asked not only whether financial aid is making college more affordable, but also whether direct student aid awards encourage students to make adequate human capital investments, or in other words, make the distribution of student price demand for college education equitable.

Given that social capital plays a role in college choices as well as the well-known notion of "sticker shock," and particularly in focusing on traditionally underrepresented minority students, evaluation of student financial aid needs to go beyond individual effects. As I referenced earlier, inadequate human capital investment creates more disparity of wealth. To that end, it is important to understand whether direct student financial aid and/or institutional subsidy actually facilitates investments in human capital beyond the differences of financial means of students and other factors that proposed in Perna's college choice conceptual model. It is important to understand whether various policy interventions that aims for college affordability in fact mitigate differences in student price demand for college education resulting from students' socioeconomic status.

Research Questions

In this dissertation, I intend to better understand student price demand for college education and the roles of public policy in mitigating individual differences in such demand. My

study is generally guided by the frameworks of the human capital investment perspective and college choice, as well as microeconomic understanding of price demand of individual students. Drawing from reviews and discussion of previous studies outlined in this chapter, I ask, in general terms, the following research questions (RQs) for this dissertation:

- Are there individual-, institutional-, and/or state-level characteristics that explain price demand for college education of individual students?
- How have answers to RQ1 changed over time, as the policy environment of postsecondary education has shifted?

In the next chapter, I offer an analytic and statistical framework in approaching these research questions, as well as explain how I operationalize the term “price demand for college education of individual students” to apply my statistical analyses.

Chapter Three

Research Method

The central focus of this dissertation is to explain tuition and fees, net tuition and fees, and student Pell Grant awards. I approach this topic from student price responsiveness and human capital investment perspectives, where students presumably make cost-benefit analyses in their choosing of colleges and universities. I am interested in understanding what attributes—individual-, institutional-, and/or state-level characteristics—explain and make differences in student price demand for college education. To do so, I first lay out the analytical framework of this study to explain the cost-benefit analysis of college-going, and price demand for college education of individual students.

Analytical Framework

Decisions to pursue college are often characterized as a result of a cost-benefit decision-making process. How much a student spends for her college education is a uniquely calculated cost for each student, given expected benefits that the student anticipates. However, benefits of higher education constitute both monetary benefits, or the college earnings premium, and nonmonetary benefits accumulated over time (McMahon, 2009). (See Figure 2.1, p. 24) Thus, benefits of higher education for the i th college student can be expressed as:

$$B_i = (B|(P, N) t) \quad (1)$$

where a benefit, B , is a function of P , which is the amount of monetary return on higher education, such as the college earnings premium, and N is the amount of non-monetary returns on higher education, such as good health and longevity. The amount of return on higher education is also a function of time, t , since the longer a student lives the opportunities to accumulate benefits increase. While a student is enrolled in college, their costs associated with

higher education are real; however, the benefits of higher education are merely speculative values. Students anticipate collecting a return on their college degrees; however, the actual benefits cannot be collected instantly. Thus, the estimated benefits of higher education can be rewritten as:

$$B_i = (B|(P,N)t) \approx B_i^* \quad (2)$$

where B_i^* is the estimated return on higher education of the i th college student. In order for this i th student to choose to enroll in a college, the assumption is that the following condition between an expected benefit, B_i^* , and his/her cost to attend college, C_i must be met.

$$B_i^* \geq C_i \quad (3)$$

In other words, for the i th student to pursue college education, his or her expected benefit from higher education, B_i^* , must be greater than or equal to the cost to attend college, C_i . Therefore, college choice of the i th college student can be expressed in terms of a probability function:

$$\Pr (B_i^* - C_i \geq 0) \quad (4)$$

that is, a probability that an estimated benefit to attend college exceeds a cost of attending college. Probabilities of students' choosing college enrollment are influenced by a number of factors. For instance, financial aid awards increase probability of college enrollment (See Figure 2.2, p. 34). Financial aid awards can reduce costs to students, thus increasing the chance of them meeting the condition, which is expressed in equation (3) above, thus their probability of college enrollment.

An estimated benefit to attend college for the i th student, B_i^* , drives the demand side of postsecondary education pricing. In a macroeconomic sense, tuition and fees—sticker or net—or a more abstract notion of college cost for the i th student, C_i , is roughly where willingness and ability of that student to pay for college, or priced demand for college education, D_i , meet

(Heller, 1997). The willingness and ability of students to pay for postsecondary education varies by individual, as choices to pursue college education are individual decisions. As such, a demand function for the i th college student to attend college can be explained as follows:

$$D_i = (D | I_i) \quad (5)$$

where, D_i = Willingness and/or ability of the i th college student to pay
for college education

I_i = Characteristics of the i th college student

Willingness and ability of students to pay for college education are shaped by different forms of capital (e.g., cultural, monetary and social).

One perspective to explain these individual preferences is the human capital investment framework (Becker, 1963). This framework explains that students' decisions to pursue college, thus pay for monetary costs and accept opportunity costs are results of cost-benefit analyses based on their perceived returns on higher education versus its costs (Becker, 1963; McMahon, 2009; Paulsen, 2001). Perna's (2006) college-choice framework further adds more context to this rather simple economic concept. The more nuanced approach of the college-choice framework considers different types of capital, such as social capital and cultural capital (Perna, 2006).

Thus, the right-hand side of equation (5) is a combination of various student-level characteristics and can be revised in the following equation:

$$D_i = (D | R_i, M_i, S_i) \quad (6)$$

where, D_i = Willingness and/or ability of the i th college student to pay
for college education

R_i = Cultural capital that the i th college student possesses

M_i = Monetary capital that the i th college student possesses

S_i = Social capital that the i th college student possesses

Additionally, institutional- and state-level variables also play roles in student price demand for college education. As explained in the earlier mentioned college-choice literature, policy contexts create a layer of influence on college choice (Perna, 2006). In more practical terms, it is manifested as government subsidies to colleges and universities, which lower costs across the board, and direct student aid awards, which lower prices of college education for individual students. Thus, both policy actions aim to augment people's willingness and/or ability to pay for college education. As such the righthand side of equation (6) also should account for state- and institutional-level variables. Therefore, the final analytic model for this study that includes effects of institutional- and state-level policy decisions is expressed as follows:

$$D_i = (D | R_i, M_i, S_i, P_i) \quad (7)$$

where, D_i = Willingness and/or ability of the i th college student to pay
for college education

R_i = Cultural capital that the i th college student possesses

M_i = Monetary capital that the i th college student possesses

S_i = Social capital that the i th college student possesses

P_i = Policy preferences of the i th college student's institution and

state

Just as the demand side of college education is a complex concept, the cost for the i th college student to attend college, C_i , requires equal consideration of multiple aspects. Costs of higher education are partially realized when students enroll in colleges and universities. Tuition and living expenses have clear price tags to indicate their costs; however, concepts such as foregone earnings are much blurrier. Suggested both by Perna (2006) and McMahon (2009),

costs for college education consider various factors. Deriving from McMahon's (2009) conceptual drawing of individual costs and returns on higher education (see Figure 2.1, p. 24), as well as Perna's (2006) conceptual model (See Figure 2.3, p. 36), a cost of higher education for the i th college student and C_i can be expressed in the following function:

$$C_i = (C|(T_i, F_i, E_i, W_i)t) \quad (8)$$

where, T_i = Total monetary costs for higher education for the i th college student

F_i = Financial assistance that the student received

E_i = Forgone earnings that the student incurred to pursue college education instead of entering the workforce

W_i = Wages the student will collect while being a college student

t = The duration of the student's enrollment in a college

A cost of higher education for the i th college student depends on monetary costs or a "sticker price" of higher education, such as tuition and fees charged and living expenses incurred, financial assistance received by the student, earnings that the student forewent to pursue a college education instead of entering the workforce, and wages the student will collect while being a college student, as well as the duration of the i th college student's enrollment in college.

This function can be summarized in the following equation:

$$C_i = T_{i,t} - F_{i,t} + E_{i,t} - W_{i,t} \quad (9)$$

where the cost, C_i is explained as the sum of $T_{i,t}$, which is monetary costs for higher education incurred by the i th student in the t th year, $F_{i,t}$, which is financial assistance received by the student, $E_{i,t}$, which is the student's foregone earning, and $W_{i,t}$, which is income from a job that the student has while in school. However, the cost-benefit relation of students' persistence

requires a different understanding. At the time when students make an initial decision to choose college education, their estimation of total costs, C_i has a large emphasis on costs for the initial year and costs for subsequent years, except actual tuition and fees, are marginal. Thus I assume that students' estimated costs are largely reflected in their initial year budget.

Since what the i th college student chooses to expend as his or her estimation of total costs, C_i is roughly where the demand for that i th college student meets his or her willingness and/or ability to pay for college education, by combining equations (7) and (9), I now have the following:

$$C_i = T_i - F_i + E_i - W_i \approx D_i = (D | R_i, M_i, S_i, P_i) \quad (10)$$

where, C_i = Total monetary costs for higher education for the i th college student

T_i = Total monetary costs for higher education for the i th college student

F_i = Financial assistance that the student received

E_i = Forgone earnings that the student incurred to pursue college education instead of entering the workforce

W_i = Wages the student will collect while being a college student

D_i = Willingness and/or ability of the i th college student to pay for college education

R_i = Cultural capital that the i th college student possesses

M_i = Monetary capital that the i th college student possesses

S_i = Social capital that the i th college student possesses

P_i = Policy preferences of the i th college student's institution and
state

While students already realize some costs at the time of college enrollment in actual dollar amounts, some costs are speculative figures. For instance, foregone earnings are an estimate of what students might have earned should they choose not to pursue a college education. Likewise, students who are entering college do not necessarily know if and how much they will be earning from jobs while pursuing a college education. These speculative parts of cost estimation depend on individual students. Some have more information than others to make better assessment, while some do not have enough information to make accurate estimation of such forgone costs (McMahon, 2009). Thus, I argue that these are more or less a part of the demand-side equation, since students conceptualize them based on their knowledge and understanding or various forms of capital (e.g., cultural, monetary and social capital) of potential forgone earnings or future earnings. Therefore, I rewrite equation (10) by dropping forgone earnings that the i th college student incurred to pursue college education instead of entering the workforce, E_i and wages that student will collect while being a college student, W_i as follows:

$$C_i = T_i - F_i \approx D_i = (D | R_i, M_i, S_i, P_i) \quad (11)$$

Equation (11) explains that monetary costs of pursuing college education for the i th college student, that is, total monetary costs minus all available student aid awards, is roughly equal to his or her price demand for college education, which is a function of cultural, monetary, and social capital that the student has, as well as policy preferences of that student's institution and state. Monetary costs can cover a wide range of variables, not only tuition and fees, but also living expenses, textbooks, and other educational and co-educational expenses associated with attending colleges and universities. Students make college-going decisions based on such costs

in their entirety or partially, and/or by sticker prices or net prices. The previously mentioned literature on “sticker shock” (Fisher, 1990; Hearn & Longanecker, 1985) indeed suggests that for some students, decisions are based on price tags of college education; in other words, their price demand for college education is roughly where tuition and fees are. But for some, where net tuition and fees are is where their price demand is.

For the purpose of this study, however, I focused specifically on two aspects of costs for the i th college student: tuition and fees, A_i , which are “sticker prices” for colleges and universities, and net tuition and fees, N_i , which are sticker prices minus grant aid awarded to students. Therefore, my RQ1 is operationalized as the following two subsidiary questions:

- 1.1 Are there individual-, institutional-, and/or state-level characteristics that explain tuition and fees of individual students?
- 1.2 Are there individual-, institutional-, and/or state-level characteristics that explain net tuition and fees of individual students?

This does not capture the costs of college education in their entirety, but covers the most basic parts of college costs, tuition and fees. By analyzing for both tuition and fees and net tuition and fees, I am also able to see if fixed effects of different forms of capital (e.g., cultural, monetary, and social) and socioeconomic characteristics as well as institutional- and state-level policy characteristics vary depending on how costs of college education are operationalized. Therefore, my final analytic models can be expressed as:

$$A_i \approx D_i = (D | R_i, M_i, S_i, P_i) \quad (12)$$

$$N_i \approx D_i = (D | R_i, M_i, S_i, P_i) \quad (13)$$

where, A_i = Tuition and fees for the i th college student

N_i = Net tuition and fees for the i th college student

D_i = Willingness and/or ability of the i th college student to pay
for college education

R_i = Cultural capital that the i th college student possesses

M_i = Monetary capital that the i th college student possesses

S_i = Social capital that the i th college student possesses

P_i = Policy preferences of the i th college student's institution and
state

Equation (12) explains that tuition and fees charged to the i th college student is roughly equal to price demand of college education for that student, which is a function of the student's cultural, monetary, and social capital, as well as policy preferences of that student's institution and state. Similarly, equation (13) explains that net tuition and fees paid by the i th college student is roughly equal to that.

In addition, I also focused on financial need of students. I used Pell Grant award amounts as a proxy for financial need, since Pell Grant awards are determined by the difference between institutional cost of attendance and the student's Estimated Family Contribution (EFC), when the institutional cost of attendance is greater than the EFC (U.S. Department of Education, n.d.).

While Pell Grant awards do not cover all financial needs of students, it is still a good indicator of financial need. Thus, my RQ1 has the following third subsidiary question:

- 1.3 Are there individual-, institutional-, and/or state-level characteristics that explain Pell Grant awards of individual students?

Seeing the Pell Grant as a means of covering costs for college education, it is the cost of college education paid by the federal government on behalf of students and thus can be expressed as follows:

$$G_i \approx D_i = (D | C_i, M_i, S_i, P_i) \quad (14)$$

where G_i is the Pell Grant award amount for the i th college student. Based on these three analytic frameworks expressed in equations (12), (13) and (14), I conducted statistical analyses to answer research questions. In the following section, I discuss specifics of the datasets and statistical models that I employed for this study.

Statistical Approach

I answered the proposed research questions mainly by multilevel analysis derived from the analytic models presented in this chapter. Given the complexity of the analytic model, the multilevel approach is an appropriate model, since it allows researchers to explore how individual-level and state-level explanatory variables may influence outcome variables of interests expressed in equations (12), (13), and (14) (Raudenbush & Bryk, 2002). I elaborate more on the statistical model later. The model includes student-level data nested by state and explains how explanatory variables make a difference in:

- DV1. Tuition and fees (RQ1.1)
- DV2. Net tuition and fees (RQ1.2)
- DV3. Tuition discounting rates (RQ1.2)
- DV4. Pell Grant award amounts (RQ1.3)
- DV5. Pell Grant award amounts to tuition and fees ratios (RQ1.3)

Table 3.1 pairs up DVs with proposed research questions. DV1 helps answer RQ1.1, “Are there individual-, institutional, and/or state-level characteristics that explain tuition and fees that students are charged?” DV2 and DV3 help answer RQ1.2, “Are there individual-, institutional, and/or state-level characteristics that explain net tuition and fees of individual students?” DV3 standardizes amounts of grant aid individual students receive toward offsetting tuition and fees

as percentage ratios. DV4 and DV5 help respond to RQ1.3, “Are there individual-, institutional, and/or state-level characteristics that explain Pell Grant awards of individual students?” DV5 standardizes impacts of Pell Grant awards in offsetting tuition and fees as percentage ratios. In the multilevel model, I controlled for individual characteristics and other characteristics that serve as different forms of capital represented in equations (12), (13), and (14).

In addition, I ran statistical models for different time points to explore whether shifts in student financial aid policies changed relationships between financial aid award amounts and outcome variables of interests over time. Comparisons of these different cross-sections of data help answer RQ4, “How have answers to RQ1, RQ2, and RQ3 changed over time as the policy environment of postsecondary education has shifted?”

Table 3.1
Paired list of operationalized research questions & dependent variables

Research questions	Statistical method	Dependent variable
RQ1: Are there any individual-, institutional-, and/or state-level characteristics that explain price demand for college education of individual students?		
RQ1.1: Are there any individual-, institutional-, and/or state-level characteristics that explain tuition and fees of individual students?	HLM	Tuition and fees
RQ1.2: Are there any individual-, institutional-, and/or state-level characteristics that explain net tuition and fees of individual students?	HLM	Tuition and fees, Tuition discounting rates
RQ1.3: Are there any individual-, institutional-, and/or state-level characteristics that explain Pell Grant awards of individual students?	HLM	Pell Grant award amounts, Pell Grant-to- tuition ratios
RQ2: How have answers to RQ1, RQ2 and RQ3 changed over time, as policy environment and other surrounding environment of postsecondary education may have shifted?	Comparison	

Data. Student-level data are drawn from the restricted use dataset of the National Postsecondary Student Aid Study (NPSAS) (License Control Number: 05121038), which is a national representative survey of student financial aid that collects information from students at all institutions receiving Title IV funding. Title IV funding includes student financial aid programs administered by the U.S. Department of Education; in order for colleges and universities to be eligible to receive Title IV funding, they must be accredited as institutions of higher learning. NPSAS has collected data every three to four years starting in 1987. Cross-

sectional samples of college students who enrolled in colleges and universities participating in the Title IV program were then conducted in 1990, 1993, 1996, 2000, 2004, and 2008. All students in these studies were matriculated students in the previous financial aid award year (e.g., July 1 to June 30). For this study, I used three cohorts of data: 1999-00, 2003-04 and 2007-08 cohorts (NCES, 2002, 2006, & 2010b); of students in those three cohorts, I focused on those students enrolled in four-year public or private not-for-profit colleges and universities as first-year students. I excluded those students enrolled in for-profit colleges and universities, since it is only recently that enrollment counts at proprietary institutions have risen. For this study, I am interested only in freshman students, since that is the first year in which students assign their values of higher education without predispositions to actual college-level programs.

The scope and objectives of NPSAS make it an appropriate data set for this dissertation, as it asks the following questions:

“How do students and their families finance postsecondary education? How does the process of financial aid work, in terms of both who applies and who receives aid? What are the effects of financial aid on students and their families?” (NCES, 2006, p. 2)

This fits with the present study’s research questions. The setting of these surveys is fairly consistent throughout seven different points in time, thus making NPSAS a very effective tool to observe different themes that might emerge as a result of policy changes over the years.

Additional data were obtained from NCES’s Integrated Postsecondary Education Data System (IPEDS) as well as the U.S. Bureau of Economic Analysis, *Grapevine: An Annual Compilation of Data on State Fiscal Support for Higher Education*, the National Association of State Student Grant and Aid Programs (NASSGAP), and other sources. These additional data account for policy preferences of institutions and states in which students are enrolled and

Table 3.2

List of variables

Variable name	Conceptual application	Computation	Priori	Data source
<i>Dependent variables</i>				
Tuition fees	Sticker price	In US\$, in Natural Log		NPSAS
Net tuition fees	Out-of-pocket cost for college tuition	In US\$, in Natural Log		NPSAS
Net tuition discount ratio	Measure of tuition discounting	In percentage points		NPSAS
Pell grant award amount		In US\$, in Natural Log		NPSAS
Pell Grant-to-tuition ratio		In percentage points		NPSAS
<i>Level-1: Student-level variables</i>				
Race/ethnicity	Social & cultural capital for college-choice	0 = White, non-Hispanic, 1 = Asian, 2 = Black, non-Hispanic, 3 = Latino or Hispanic, 4 = Others, multi-racial or unknown	Lower demand/willingness to pay	NPSAS
What is the gender of a respondent?		0 = Male, 1 = Female		NPSAS
Mother's highest education	Social & cultural capital for college-choice	0 = BA, 1 = GED or below, 2 = AA or some college education, 3 = Post-BA	Lower demand/willingness to pay	NPSAS
Is a respondent a resident of the state where his/her NPSAS institution is located?	Social capital for college-going	0 = Yes, 1 = No, and the respondent is a domestic, out-of-state students, 2 = No, and the respondent is an international student.	Increase willingness to pay	NPSAS
A respondent is dependent	Ability to pay for college	0 = Yes, 1 = No, the respondent is independent.	Lower demand/willingness to pay	NPSAS
Estimated Family Contributions (EFC)	Ability to pay for college	In US\$, in Natural Log	Increase willingness to pay	NPSAS
Selectivity	Institutional characteristics, Pricing strategy	0 = Open admission, 1 = Minimally selective, 2 = Moderately selective, 3 = Very selective, 4 = Most selective	Increase price	IPEDS
A respondent is at a private not-for-profit institution	Direct government subsidy for operation	0 = public, 1 = private, not-for-profit	Increase price	IPEDS
Pell Grant revenues-to-operating revenues ratio of the institution of attendance	Institutional reliance on de facto federal subsidy	In percentage points	Increase price	IPEDS
<i>Level-2: State-level variables</i>				
State appropriation for postsecondary education	State efforts for postsecondary education	In US\$ for every \$1,000 of personal incomes	Decrease price	BEA/Grapevine
Need based aid to total state aid ratio	State policy for direct student aid programs	In percentage points	Increase price	NASSGAP
Government ideology measure	Liberal attitude of state governments	Continuous variable; higher, the more liberal	Decrease price	Berry, et al.
Average distance between any two members of lower state houses	Measure of polarization in state's lower houses of legislature	Continuous variable; higher, the more polarized	Increase price	Shor & McCarty

Source: National Postsecondary Student Aid Study survey data (NPSAS), Integrated Postsecondary Education Data System (IPEDS), U.S. Bureau of Economic Analysis (BEA), Grapevine: An annual compilation of data on state fiscal support for higher education, National Association of State Student Grant & Aid Program (NASSGAP), Berry, et al., and Shor & McCarty

variables match with the corresponding NPSAS years. The list of variables is shown in Table 3.2.

Student-level variables. This study includes the following dependent variables: tuition and fees, net tuition and fees, tuition discounting rates, Pell Grant award amounts, and Pell Grant award amount to tuition and fees ratios of each respondent. Tuition and fees, net tuition and fees, Pell Grant award amounts are in natural logarithm in order to allow me to compute regression coefficients in terms of percent changes instead of dollar amounts. Tuition and fees variables in NPSAS datasets are reported by individual institutions, if not collected from the IPEDS dataset (NCES, 2002, 2006, & 2010b). Net tuition and fees are also provided in the NPSAS dataset as tuition and fees amount minus all grants (NCES, 2002, 2006, & 2010b). Tuition discounting rates are computed as a percentage ratio of differences between net tuition and fees and tuition and fees. The higher the tuition discount rate is, the more grant aid a student received toward his or her tuition and fees. Pell Grant award amount to tuition and fees ratios are computed as percentage ratios. The higher the percentage ratio is, the more of a student's tuition and fees are covered by Pell Grant awards. For example, when Pell Grant to tuition ratio is 50, a half of that student's tuition and fees are covered by his or her Pell Grant award; when it is 100, all of tuition and fees are covered by the Pell Grant award.

For each of the dependent variables, I ran a separate statistical analysis. I also ran separate statistical analyses by institutional controls; that is, I ran analyses only for students in public colleges and universities, and other analyses only for students who attended private colleges and universities. All analyses are duplicated for the three different NPSAS cohorts included in this study.

Besides dependent variables, several student-level variables said to represent various forms of capital (e.g., cultural, monetary and social), as well as socioeconomic statuses of students that influence college-going decisions of students, or in other words, the price demand for college education, were included in my statistical model. Race/ethnicity of students offer insights on both cultural and social capital of students. I recoded the race/ethnicity variable in the NPSAS dataset to five categories: “Asian,” “Black, non-Hispanic³,” “Hispanic or Latino,” “American Indian/Alaskan Native, Native Hawaiian/other Pacific Islander, others, multiracial and unknown,” and “White, non-Hispanic.” White, non-Hispanic serves as the reference group for this variable. Also, I controlled for gender of students by having “male” as a reference group.

In addition to the race/ethnicity variables, mother’s highest education level is another variable that controls for monetary as well as social capital aspects of this model. I recoded this variable into four categories as follows: “technical/vocational certificate, equivalent of a high school diploma or below,” “associate’s degree or some college,” “bachelor’s degree or its equivalent,” “master’s degree, doctoral degree or other post-baccalaureate degree.” Having a bachelor’s degree serves as a reference category for this variable. I also controlled for residency status of students with three categories: “domestic, in-state,” “domestic, out-of-state,” and “international.” For this variable, domestic, in-state students are the reference category. Dependency status of students is controlled by having “being independent” as the reference group. Estimated Family Contributions (EFCs) of students in natural logarithm are also included as continuous variables.

Selectivity is a variable that represents academic achievement of students as well as institutional types. For the 1999-00 and 2003-04 cohorts, this variable is recoded into five

³ In the preceding chapters, I refer to this group of students as “African American”; however, since NPSAS datasets code this group as “Black, non-Hispanic” in the race/ethnicity variables, hereafter this group is referenced as “Black, non-Hispanic.”

categories: “most selective,” “very selective,” “moderately selective,” “minimally selective,” and “open admission,” and open admission institutions were the reference group. However, the 2007-08 NPSAS data does not provide a five-category institutional selectivity measure; thus, for the 2007-08 dataset, there is no “most selective” category. Institutional control was also included in the model, having “public colleges and universities” as the reference category. Finally, there was a continuous variable for institutional reliance on Pell Grant revenues. This variable was computed based on IPEDS data that reports revenues from Pell Grant awards colleges and universities receive on behalf of their students and overall core operating revenues of institutions, and is in the form of percentage ratios.

State-level variables. State-level variables address state policy preferences that affect subsidy and direct student aid for postsecondary education. The first variable is state postsecondary education efforts. This variable is operationalized as state appropriations for postsecondary education for every \$1,000 in per capita income. This is computed using the data gathered by U.S. Bureau of Economic Analysis (2002, 2004, & 2009) and *Grapevine: An Annual Compilation of Data on State Fiscal Support for Higher Education* (Palmer, 2000, 2004, & 2008). Percentage shares of state need-based grant awards within all state sponsored direct student grant awards are computed based on the data made available by the National Association of State Student Grant & Aid Programs (NASSGAP) (2001, 2005, & 2009). Finally, the state government ideology indicator reported in the *revised 1960-2008 citizen ideology series* (Berry, Ringquist, Fording & Hanson, 1998) and degrees of polarization within state lower houses (Shor & McCarty, 2012) are included as well. All the other state-level variables correspond directly to NPSAS cohort years; however, the state government ideology indicator and degrees of polarization within state lower houses are from 1998, 2002 and 2006, representing the closest

election years to corresponding NPSAS cohort years. All these variables are included as continuous variables.

Time series. The models were run separately for different cross sections of NPSAS datasets in order to capture any differences in how dependent variables interact with control variables, including student financial aid awards. College tuition and fees have risen substantially in recent decades (Baum & Ma, 2011); public higher education financing strategies, especially federal financial aid policies, have changed over the years (Johnstone, 2004). The analyses for this study cover nearly a decade: 1999-00, 2003-04, and 2007-08. While there are some changes in variables recorded, depending on NPSAS years, variables selected for this study remain similar across different data points. State-level datasets are also gathered from long-standing cross-sectional studies; therefore, I am able to run comparable models for each of the above three points in time.

Statistical model. I ran several cross-tabulation tables of dependent variables by key independent variables. This will allow me to examine characteristics of financial aid recipients and average award amounts. Hierarchical linear modeling (HLM) will be used to understand relationships between individual and state-level explanatory variables and each of following dependent variables: DV1: Tuition and fees, DV2: Net tuition and fees, DV3: Tuition discounting rates, DV4: Pell Grant award amounts and DV5: Pell Grant award amounts to tuition and fees ratios.

As shown in the analytic equations, higher education costs for individual students are explained with some complexity, particularly when explaining the willingness and ability of students to pay for college education. There are some variables explained by individual responses of students, but there are also factors that are better explained at a more macro level.

The nature and scope of my dissertation makes HLM a suitable statistical method. The multilevel approach allows researchers to make more precise estimates of how individual-level and state-level explanatory variables may be contributing to outcome variables of interest (Raudenbush & Bryk, 2002). Given the complexity that study and understanding of higher education requires, HLM is becoming a more popular research method, particularly for studies with broad public policy implications such as college choices (Perna & Titus, 2004 & 2005; Titus, 2006), returns on investment in higher education (Thomas, 2003), and economic diversity in higher education (Steinberg et al., 2009). Based on the analytic approach of this study, dependent variables are generally explained by the following multilevel model:

Level-1 model:

$$DV_{i,j} = \beta_{0,j} + \beta_{1,j} * (Student's\ cultural\ capital)_{i,j} + \beta_{2,j} * (Student's\ monetary\ capital)_{i,j} + \beta_{3,j} * (Student's\ social\ capital)_{i,j} + \beta_{4,j} * (Institutional\ choices)_{i,j} + e_{i,j}, \quad (15)$$

Level-2 model:

$$\beta_{0,j} = \gamma_{00} + \gamma_{01,j} * (State\ policy\ characteristics)_j + r_{0,j} \quad (16)$$

where, $DV_{i,j}$ = Dependent variable of the i th college student in the j th

state

i = the i th student

j = the j th state

Now, given the availability of variables for the purpose of this study, the statistical model can be expressed in more specific terms as follows:

Level-1 model:

$$\begin{aligned}
DV_{i,j} = & \beta_{0,j} + \beta_{1,j} * (Race/ethnicity)_{i,j} + \beta_{2,j} * (Gender)_{i,j} + \beta_{3,j} * \\
& (Mother's\ highest\ education\ levels)_{i,j} + \beta_{4,j} * (Residency\ status)_{i,j} + \beta_{5,j} * \\
& (Dependency\ status)_{i,j} + \beta_{6,j} * (Estimated\ Family\ Contributions)_{i,j} + \beta_{7,j} * \\
& (Institutional\ selectivity)_{i,j} + \beta_{8,j} * (Institutional\ control)_{i,j} + \beta_{9,j} * \\
& (Institutional\ reliance\ on\ Pell\ revenues)_{i,j} + e_{i,j},
\end{aligned} \tag{17}$$

Level-2 model:

$$\begin{aligned}
\beta_{0,j} = & Y_{00} + Y_{01,j} * (State\ higher\ education\ efforts)_j + Y_{02,j} * (Need\ based\ aid\ ratios)_j + \\
& Y_{03,j} * (State\ government\ ideology)_j + Y_{04,j} * (State\ lower\ house\ polarization)_j + r_{0,j}
\end{aligned} \tag{18}$$

where, $DV_{i,j}$ = Dependent variable of the i th college student in the j th state

i = the i th student

j = the j th state

For actual analyses, I used HLM6: Hierarchical Linear and Nonlinear Modeling (Raudenbush, Bryk, & Congdon, 2000). Fixed effects for each of the explanatory variables provide estimated differences in dependent variables when a unit change in that independent variable occurs and holding other variables constant. All variables are centered to their respective grand means. This way, variance components for level-1 intercept, $\beta_{0,j}$, represents the difference between states in the adjusted means (Raudenbush & Bryk, 2002). Thus I am able to account for differences in outcomes across state-level explanatory variables with differences of student-level variables. This is a useful statistics to understand effects of state-level variables. To measure the fitness of the models in this dissertation, I also computed proportions of within-state variances

and between-state variances of each model. These statistics report proportions of student-level and state-level variances accounted, respectively, by variables included in the models (Raudenbush and Bryk, 2002). Given the focus of this study on analyzing the extent to which state policy characteristics explain tuition and fees, net tuition and fees, tuition discounting rates, Pell Grant awards and Pell Grant to tuition ratios of students is an important aspect. Thus, based on estimated variance components reported from statistical analyses, I computed the proportion of variance explained by level-1 intercept, $\beta_{0,j}$, or intraclass correlation coefficients (Raudenbush and Bryk, 2002).

In addition, I also computed, for selected cohorts, residual files by using HLM6 in order to calculate OLS estimated adjusted means by states. This estimation, which is a sum of ordinary least square intercepts and average intercepts, is plotted against selected state-level independent variables. This way I can visualize state-level variance as well as correlation, thus aiding my interpretation and discussion of statistical analyses.

For each of five dependent variables, I ran a HLM analysis based on this basic model for each of three NPSAS cohorts in this study. In addition, I ran separate HLM analyses with samples segregated by institutional controls in order to isolate large variances of tuition and fees associated with institutional sectors of colleges and universities. In the following chapter, I outline results from this series of statistical analyses.

Chapter Four

Results of the Statistical Analyses

This study examined how individual- and state-level characteristics explain tuition charges, net tuition fees, tuition discount rates, and Pell Grant awards for students who started at four-year public or private not-for-profit colleges and universities in 1999-00, 2003-04, and 2007-08. To this end, I ran several multilevel regression analyses; in this section, I describe results of those statistical analyses. This chapter starts by outlining key descriptive statistics of the sample datasets and is divided into subsections by dependent variables: tuition and fees, net tuition and fees, tuition discounting rates, Pell Grant award amounts, and Pell Grant award amounts to tuition and fees ratios. Each subsection includes results of data analyses by institutional controls: all samples, public colleges and universities only, and private not-for-profit colleges and universities only, as well as by NPSAS years 1999-00, 2003-04, and 2007-08. The purpose of this chapter is to report results from multi-level analyses and thus largely consists of narratives of various tables included in the following sections. As such, nuances and contexts are not included in this section; however, results reported in this section are discussed in depth in the following section.

Descriptive Statistics

Key descriptive statistics for individual-level variables are reported in Tables 4.1, 4.2, and 4.3. The baseline sample sizes of students in each NPSAS cohort are: 4,028, 7,304, and 8,398, respectively for the 1999-00, 2003-04, and 2007-08 cohorts, which are the numbers of first-year undergraduate students at four-year public or private not-for-profit colleges and universities. More than a majority of the study samples are White, non-Hispanic students. Comparing to other cohorts, the 2007-08 cohort had the highest proportional share of students

from racial/ethnic minority backgrounds, as well as of students whose mother had a technical/vocational certificate or equivalent of a high school diploma or below. This suggests that the 2007-08 cohort is much more diverse both in terms of race/ethnicity and socioeconomic status.

Table 4.1

Summary of descriptive statistics: Percentage distributions of the sample and Average Estimated Family Contributions, by race/ethnicity and by mother's highest education level, by institutional control, 1999-00, 2003-04 and 2007-08

Variable name	Percentage distributions (%)			Estimated Family Contributions (US\$)		
	1999-00	2003-04	2007-08	1999-00	2003-04	2007-08
Race/ethnicity						
Asian	5.00	5.20	5.55	\$9,350	\$9,776	\$11,456
Public	5.37	5.48	5.22	\$8,679	\$9,394	\$9,896
Private not-for-profit	4.23	4.94	6.02	\$10,915	\$10,326	\$13,644
Black, non-Hispanic	11.40	9.80	14.98	\$4,976	\$5,660	\$4,957
Public	10.81	10.21	15.13	\$5,059	\$5,077	\$4,741
Private not-for-profit	12.54	9.34	14.73	\$4,844	\$6,488	\$5,321
Hispanic or Latino	10.90	7.00	14.13	\$4,882	\$8,535	\$6,765
Public	9.43	7.47	14.29	\$5,572	\$8,165	\$6,492
Private not-for-profit	13.74	6.35	13.89	\$4,012	\$9,101	\$7,224
Others, multi-racial or unknown	4.60	4.40	4.32	\$7,665	\$13,180	\$8,561
Public	3.76	4.70	4.47	\$8,026	\$12,372	\$7,937
Private not-for-profit	6.13	3.90	4.08	\$7,258	\$14,443	\$9,678
White, non-Hispanic	68.10	73.60	61.01	\$11,969	\$15,594	\$15,452
Public	70.64	72.15	60.89	\$11,064	\$14,249	\$15,009
Private not-for-profit	63.35	75.46	61.22	\$13,825	\$17,263	\$16,170
Mother's highest education						
GED or below	32.73	37.30	45.89	\$7,953	\$8,548	\$7,816
Public	33.49	39.47	47.81	\$7,763	\$8,276	\$7,663
Private not-for-profit	31.26	34.45	42.76	\$8,352	\$8,954	\$8,094
AA or some college education	41.23	20.60	21.58	\$8,956	\$12,746	\$11,861
Public	41.63	21.55	21.47	\$8,712	\$12,507	\$11,870
Private not-for-profit	40.51	19.41	21.76	\$9,445	\$13,090	\$11,847
BA degrees	17.63	25.60	21.06	\$15,034	\$17,431	\$17,677
Public	17.27	24.78	20.45	\$13,876	\$16,185	\$17,253
Private not-for-profit	17.75	26.64	22.07	\$17,268	\$13,960	\$18,319
Post-BA degrees	8.38	16.50	11.47	\$16,211	\$20,830	\$19,731
Public	7.31	14.21	10.27	\$14,930	\$17,828	\$18,642
Private not-for-profit	10.48	19.50	13.42	\$17,952	\$23,667	\$21,092

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data

White, non-Hispanic students consistently recorded the highest average Estimated Family Contributions (EFC), and their average rose by the largest margin among all race/ethnicity categories from 1999-00 to 2007-08. While a gap in EFC between White, non-Hispanic students

and Hispanic/Latino students appears to have narrowed, the gap between White, non-Hispanic students and Black, non-Hispanic students has widened. The average EFC for White, non-Hispanic students in 1999-00 was approximately 2.4 times more than that of Black, non-Hispanic students; however, in 2007-08, it was 3.1 times more than that of their Black, non-Hispanic counterparts. Also, while the EFC of students whose mother attained an associate's degree or above rose over time, the average EFC of students whose mother only had a technical/vocational certificate or equivalent of a high school diploma or below declined slightly. This suggests that, while the racial/ethnic and socioeconomic diversity of the student composition may have improved over time, gaps between students in terms of available resources to pursue college education still persist, and indeed may have worsened.

Table 4.2
Summary of descriptive statistics: Average tuition and fees, average net tuition and fees, and average tuition discounting rates, by race/ethnicity and by mother's highest education level, by institutional control, 1999-00, 2003-04 and 2007-08

Variable name	Tuition and fees (US\$)			Net tuition and fees (US\$)			Tuition Discounting Rates (%)		
	1999-00	2003-04	2007-08	1999-00	2003-04	2007-08	1999-00	2003-04	2007-08
Race/ethnicity									
Asian	\$7,142	\$13,570	\$13,359	\$4,804	\$7,414	\$7,669	32.47	53.63	44.56
Public	\$3,693	\$6,201	\$7,034	\$2,645	\$3,081	\$4,272	32.16	59.49	45.98
Private not-for-profit	\$15,189	\$24,177	\$22,227	\$9,840	\$13,650	\$12,431	33.19	45.18	42.56
Black, non-Hispanic	\$4,717	\$9,856	\$8,749	\$2,245	\$3,832	\$3,575	51.20	66.18	59.16
Public	\$2,840	\$5,417	\$5,360	\$1,256	\$2,082	\$1,957	55.12	69.78	62.92
Private not-for-profit	\$7,692	\$16,148	\$14,431	\$3,811	\$6,311	\$6,289	44.98	61.07	52.86
Hispanic or Latino	\$3,629	\$10,555	\$7,917	\$1,720	\$4,748	\$3,297	56.86	60.79	60.97
Public	\$1,964	\$4,797	\$5,260	\$971	\$2,090	\$1,548	52.33	63.47	61.27
Private not-for-profit	\$5,729	\$19,334	\$14,715	\$2,665	\$8,800	\$6,235	62.58	56.70	60.47
Others, multi-racial or unknown	\$6,142	\$11,291	\$10,169	\$3,507	\$6,535	\$4,664	43.50	47.49	56.38
Public	\$2,730	\$5,262	\$5,260	\$1,722	\$2,987	\$2,445	40.35	48.79	57.03
Private not-for-profit	\$9,986	\$20,724	\$18,968	\$5,518	\$11,052	\$8,642	47.06	50.18	55.22
White, non-Hispanic	\$6,368	\$11,985	\$11,179	\$3,935	\$7,027	\$6,171	36.12	43.30	42.67
Public	\$3,243	\$5,659	\$5,909	\$2,236	\$3,596	\$3,659	48.14	41.20	39.56
Private not-for-profit	\$12,773	\$19,833	\$19,737	\$7,419	\$11,283	\$10,249	43.08	45.91	47.72
Mother's highest education									
GED or below	\$4,956	\$10,091	\$8,730	\$2,393	\$4,756	\$3,944	47.91	55.13	53.76
Public	\$2,777	\$5,110	\$5,057	\$1,509	\$2,559	\$2,433	46.28	55.00	53.67
Private not-for-profit	\$9,512	\$17,497	\$15,436	\$4,241	\$8,022	\$6,702	51.32	53.10	53.93
AA or some college education	\$5,410	\$10,841	\$10,538	\$2,699	\$5,790	\$5,228	46.36	49.55	49.55
Public	\$3,055	\$5,394	\$5,447	\$1,749	\$3,063	\$2,899	43.61	49.03	48.02
Private not-for-profit	\$10,131	\$18,688	\$18,738	\$4,601	\$9,719	\$8,979	51.86	50.29	52.00
BA degrees	\$8,059	\$12,832	\$12,501	\$4,945	\$7,733	\$7,229	38.78	41.23	40.74
Public	\$3,854	\$5,909	\$6,419	\$2,667	\$3,914	\$4,164	35.72	38.82	37.34
Private not-for-profit	\$16,177	\$21,185	\$21,701	\$9,343	\$12,342	\$11,865	44.69	44.13	45.88
Post-BA degrees	\$9,416	\$14,827	\$13,240	\$6,383	\$9,623	\$8,139	36.42	37.90	39.08
Public	\$3,994	\$6,602	\$6,471	\$2,912	\$4,451	\$4,289	34.89	36.93	36.10
Private not-for-profit	\$16,791	\$22,600	\$21,701	\$11,105	\$14,512	\$12,951	38.50	38.81	42.80

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data

In Table 4.2, I reported average tuition and fees, average net tuition and fees, and average tuition discounting rates by race/ethnicity as well as by mother's highest education levels. Asian students consistently have the highest average tuition and fees, as well as net tuition and fees, amongst all racial/ethnic groups in this study. Average tuition and fees at public colleges and universities nearly doubled for all groups between 1999-00 and 2007-08, which appears to be consistent with the national trend in rising college tuition and fees over the last decade and more, while increases in tuition and fees at private not-for-profit colleges and universities are more moderate. The average tuition and fees of Hispanic/Latino students at private not-for-profit colleges and universities rose by 257 percent between 1999-00 and 2007-08, which suggests that more Hispanic/Latino students are reaching high-priced private institutions. In terms of average tuition discounting rates, Black, non-Hispanic students and Hispanic/Latino students have the highest rates, which is around 60 percent for the 2007-08 cohort. While their average tuition discounting rates for students at public colleges and universities are roughly the same, for students who attend private not-for-profit colleges and universities, Hispanic/Latino students have, on average, 7.5 percent more tuition discounting than their Black, non-Hispanic counterparts. When comparing by mother's highest education levels, an undergraduate degree seems to draw some artificial line, as those students whose mothers do not have a bachelor's degree, on average, receive around 50 percent in tuition discounting and those with mothers who have a bachelor's degree or above, on average, receive less than 50 percent in tuition discounting.

Table 4.3 reports average Pell Grant award amounts and Pell Grant award to tuition and fees ratios by race/ethnicity, as well as by mother's highest education levels of students. On average, Black, non-Hispanic and Hispanic/Latino students receive much higher Pell Grant

awards than their White, non-Hispanic counterparts. Also, on average, mother's highest level of education appears to have a negative correlation with students' Pell Grant award amounts. This comes as no surprise, as Pell Grant award amounts are determined by students' financial needs for college education in relation to costs and family contributions. Changes in Pell Grant award amount to tuition and fees ratios varied by groups. The highest among race/ethnic groups are Hispanic/Latino students. Although the coverage dropped significantly from 1999-00, still on

Table 4.3

Summary of descriptive statistics: Average Pell Grant award amounts, and average Pell Grant award to tuition and fees ratios, by race/ethnicity and by mother's highest education level, by institutional control, 1999-00, 2003-04 and 2007-08

Variable name	Pell Grant Award Amounts (US\$)			Pell Grant Award to Tuition and Fees Ratios (%)		
	1999-00	2003-04	2007-08	1999-00	2003-04	2007-08
Race/ethnicity						
Asian	\$625	\$1,212	\$1,177	18.52	21.00	17.52
Public	\$650	\$1,437	\$1,309	24.39	32.00	26.52
Private not-for-profit	\$602	\$880	\$993	4.82	4.00	4.90
Black, non-Hispanic	\$946	\$1,922	\$1,891	34.32	33.00	36.46
Public	\$990	\$2,043	\$1,992	47.22	46.00	47.69
Private not-for-profit	\$877	\$1,927	\$1,721	13.88	15.00	17.64
Hispanic or Latino	\$1,205	\$1,577	\$1,826	98.54	30.00	52.90
Public	\$988	\$1,645	\$1,742	138.16	43.00	67.85
Private not-for-profit	\$1,480	\$1,474	\$1,966	48.55	9.00	27.79
Others, multi-racial or unknown	\$636	\$806	\$1,357	25.69	14.00	43.06
Public	\$612	\$824	\$1,367	31.77	19.00	62.50
Private not-for-profit	\$664	\$923	\$1,341	18.84	5.00	8.23
White, non-Hispanic	\$343	\$550	\$737	11.75	9.00	11.51
Public	\$879	\$571	\$696	15.29	13.00	15.00
Private not-for-profit	\$351	\$524	\$804	4.48	4.00	5.67
Mother's highest education						
GED or below	\$654	\$1,265	\$1,464	40.89	22.00	31.30
Public	\$673	\$1,248	\$1,457	56.09	31.00	40.26
Private not-for-profit	\$612	\$1,290	\$1,477	9.12	9.00	14.94
AA or some college education	\$595	\$827	\$1,134	21.39	14.00	21.05
Public	\$602	\$912	\$1,034	27.47	21.00	27.23
Private not-for-profit	\$579	\$710	\$1,296	9.20	5.00	11.09
BA degrees	\$457	\$448	\$653	17.60	7.00	12.55
Public	\$521	\$462	\$648	16.66	23.00	17.55
Private not-for-profit	\$319	\$431	\$660	3.89	3.00	4.99
Post-BA degrees	\$188	\$319	\$533	5.57	4.00	10.86
Public	\$516	\$361	\$514	8.17	22.00	15.58
Private not-for-profit	\$188	\$280	\$557	2.04	2.00	4.95

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data

average, two-thirds of tuition and fees for Hispanic/Latino students who attended public colleges and universities in 2007-08 are covered by Pell Grant awards.

Key descriptive statistics for the state-level variables are reported in Table 4.4. The average of state higher education efforts, operationalized in this study as a state's postsecondary education appropriation in terms of every \$1,000 earned as personal income, for the 1999-00 cohort was \$8.11, with the highest being \$16.07 for Mississippi and the lowest being \$2.57 for New Hampshire. For the 2003-04 cohort, the average was \$7.30, with the highest being \$13.43 for New Mexico and the lowest being \$2.51 for New Hampshire, and for the 2007-08 cohort, the average was \$7.28, with the highest being \$14.16, again for New Mexico and the lowest being \$2.26, again for New Hampshire.

The average proportional share of need-based state-sponsored direct student aid in all the state-sponsored grant aid programs is 75 percent for the 1999-00 cohort, with 13 states (Arizona, California, Hawaii, Maine, Michigan, Nebraska, Nevada, Oregon, Pennsylvania, Rhode Island, Texas, West Virginia, and Wyoming) only offering need-based grants and an additional four states (Iowa, Minnesota, New Hampshire, and Vermont) offered 99 percent of their grant aid as need-based, while three states offered no need-based grant (Alaska, Georgia, and South Dakota). For the 2003-04 cohort, the average proportional share was again about 75 percent. Ten states (Arizona, California, Hawaii, Kansas, Maine, Montana, Nebraska, Oregon, Rhode Island, and Wyoming) offered need-based grants only and six states (Connecticut, Iowa, Massachusetts, Minnesota, New Hampshire, and Pennsylvania) offered 99 percent or more of state grant aid as need-based, while Alaska was the sole state that offered no need-based state grant and Georgia offered a third of a percent in need-based state grant aid. The average proportional share for the 2007-08 cohort, too, was about 75 percent. Nine states (Alaska, California, Hawaii, Maine,

Table 4.4

Summary descriptive statistics: State postsecondary education appropriations, and percentage shares of need-based grant, by state, 1999-00, 2003-04, and 2007-08

State	State postsecondary education appropriations (Per \$1,000 in per capita personal income)			Percentage share of need-based grant in total state grant aid (%)		
	1999-00	2003-04	2007-08	1999-00	2003-04	2007-08
Alabama	\$10.856	\$9.814	\$12.834	24.84	67.67	75.83
Alaska	\$9.953	\$9.998	\$10.753	0.00	0.00	100.00
Arizona	\$7.089	\$5.687	\$6.029	100.00	100.00	99.84
Arkansas	\$10.805	\$9.860	\$10.036	80.84	66.76	64.35
California	\$7.723	\$7.169	\$7.227	100.00	100.00	100.00
Colorado	\$5.553	\$3.723	\$3.674	76.18	80.44	88.05
Connecticut	\$5.384	\$4.962	\$5.115	98.93	99.08	99.55
Delaware	\$7.535	\$6.992	\$7.005	79.79	90.75	79.50
Florida	\$6.542	\$5.477	\$5.340	19.88	27.82	28.73
Georgia	\$7.332	\$6.555	\$7.510	0.00	0.34	0.30
Hawaii	\$10.240	\$10.334	\$10.966	100.00	100.00	100.00
Idaho	\$9.469	\$8.953	\$8.345	73.65	18.96	40.90
Illinois	\$6.740	\$6.413	\$5.531	93.57	91.25	94.14
Indiana	\$7.896	\$7.596	\$7.236	98.65	61.34	95.51
Iowa	\$11.230	\$8.984	\$8.386	99.09	99.09	99.23
Kansas	\$8.842	\$8.490	\$8.118	98.94	100.00	99.34
Kentucky	\$10.004	\$10.225	\$10.252	82.81	47.49	49.34
Louisiana	\$8.883	\$9.335	\$10.642	2.03	1.29	13.53
Maine	\$6.680	\$6.317	\$6.115	100.00	100.00	100.00
Maryland	\$6.221	\$5.502	\$6.001	86.76	93.04	94.84
Massachusetts	\$4.688	\$3.079	\$3.304	98.79	99.97	99.97
Michigan	\$7.459	\$6.587	\$5.880	100.00	58.01	49.09
Minnesota	\$8.753	\$7.399	\$7.366	99.97	99.95	99.97
Mississippi	\$16.067	\$11.799	\$12.325	7.74	80.50	13.92
Missouri	\$6.815	\$5.033	\$4.657	61.01	60.89	66.10
Montana	\$7.127	\$6.317	\$5.917	67.39	100.00	100.00
Nebraska	\$10.442	\$9.385	\$9.485	100.00	100.00	100.00
Nevada	\$5.547	\$6.790	\$6.262	100.00	21.79	39.09
New Hampshire	\$2.568	\$2.507	\$2.263	99.40	99.84	99.89
New Jersey	\$5.197	\$4.984	\$4.630	89.82	87.94	89.83
New Mexico	\$14.084	\$13.430	\$14.153	47.33	31.59	33.40
New York	\$5.022	\$5.305	\$5.315	97.76	97.61	97.52
North Carolina	\$11.529	\$10.239	\$11.063	38.93	68.79	78.61
North Dakota	\$12.928	\$10.967	\$9.272	85.40	76.65	84.44
Ohio	\$6.735	\$6.069	\$5.994	49.91	71.99	75.24

(Cont.)

Table 4.4 (Cont.)

Summary descriptive statistics: State postsecondary education appropriations, and percentage shares of need-based grant, by state, 1999-00, 2003-04, and 2007-08

State	State postsecondary education appropriations (Per \$1,000 in per capita personal income)			Percentage share of need-based grant in total state grant aid (%)		
	1999-00	2003-04	2007-08	1999-00	2003-04	2007-08
Oklahoma	\$9.651	\$7.792	\$7.962	67.90	71.63	86.90
Oregon	\$7.160	\$5.711	\$5.447	100.00	100.00	99.04
Pennsylvania	\$5.425	\$4.918	\$4.530	100.00	99.96	99.89
Rhode Island	\$5.070	\$5.016	\$4.351	100.00	100.00	100.00
South Carolina	\$8.852	\$6.121	\$6.231	37.38	18.15	18.83
South Dakota	\$7.141	\$7.000	\$6.107	0.00	--	0.00
Tennessee	\$6.956	\$6.241	\$6.610	95.30	98.67	26.23
Texas	\$7.648	\$7.503	\$6.806	100.00	98.60	100.00
Utah	\$10.882	\$10.131	\$9.963	73.13	80.22	77.50
Vermont	\$4.090	\$4.051	\$3.768	99.44	98.40	99.55
Virginia	\$7.287	\$5.375	\$5.782	56.67	74.12	59.34
Washington	\$6.967	\$6.384	\$6.645	94.95	93.91	98.36
West Virginia	\$9.798	\$7.996	\$7.291	100.00	42.57	41.82
Wisconsin	\$7.406	\$6.621	\$6.249	86.61	95.86	96.91
Wyoming	\$11.089	\$11.790	\$11.311	100.00	100.00	100.00

Source: BEA, Grapevine, NASSGAP

Montana, Nebraska, Rhode Island, Texas, Wyoming) offered only need-based grant aid and an additional 10 states (Arizona, Connecticut, Iowa, Kansas, Massachusetts, Minnesota, New Hampshire, Oregon, Pennsylvania, and Vermont) offered 99 percent or more of their state grant aids as need-based, while South Dakota was the sole state without need-based grant aid and Georgia offered about three tenths of a percent in need-based state grant aid.

It should be noted that some states that only provide need-based grant aid also provide a large amount of non-grant aid programs, such as loans, loan assumptions, conditional grants, work-study, tuition waivers, and special purpose scholarships (NASSGAP, 2000 & 2005). For instance, Alaska in 2007-08 offered no non-need-based grant aid; however, the bulk of student aid programs are disbursed as non-grant aid. This is also true for Hawaii and Nebraska.

Additionally, the average Government Ideology Measure in 1998 was 44 points, with Maryland being the most liberal and South Dakota being the most conservative. In 2002, the average score remains around 44 points, with Maryland still holding its position as the most liberal state government, but Idaho as the most conservative-leaning state government. In 2006, the average score rises to 49 points, with New Mexico being the most liberal and South Carolina as the most conservative-leaning state governments.

Tuition and Fees

Estimated fixed effects of two-level hierarchical linear model analyses of tuition and fees for students in the 1999-00, 2003-04, and 2007-08 NPSAS cohorts are reported in Table 4.5. For each cohort, I reported results from analyses of the total sample as well as by institutional controls, which are represented by different columns in the tables. For both the 1999-00 and 2003-04 cohorts, race/ethnicity of students has little to no correlation with tuition and fees that students are charged by their colleges and universities, except for Asian students in the 1999-00 cohort. Asian students in the 1999-00 cohort attending public colleges and universities are more likely to have higher tuition and fees ($p = 0.020$) than their White, non-Hispanic counterparts when controlling for other variables. This was also the case for Asian students in the 2007-08 cohort ($p = 0.011$). Also, Hispanic or Latino students in the 2007-08 cohort who attended public colleges and universities ($p = 0.003$) had lower tuition and fees than their White, non-Hispanic counterparts.

The highest education level of respondents' mothers correlates with tuition and fees of students at public colleges and universities. For all three NPSAS cohorts in this study, students at public colleges and universities whose mothers had a technical/vocational certificate or equivalent of high school diploma or below, are likely to have lower tuition and fees ($p = 0.011$,

Table 4.5

Estimated fixed effects with robust standard errors of grand-mean centered 2-level HLM analysis for tuition, 1999-00, 2003-04, and 2007-08

Variable name	Tuition (US\$: LN) in 1999-00			Tuition (US\$: LN) in 2003-04			Tuition (US\$: LN) in 2007-08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
	b	b	b	b	b	b	b	b	b
Intercept	8.0643 (0.000)	7.6944 (0.000)	8.9031 (0.000)	8.9322 (0.000)	8.4512 (0.000)	9.7430 (0.000)	8.7570 (0.000)	8.3802 (0.000)	9.4911 (0.000)
<i>Level-1: Student-level variables</i>									
Race/ethnicity									
Asian	0.0934 (0.050)	0.1145 (0.020)	0.0822 (0.583)	-0.0036 (0.912)	0.0341 (0.216)	0.0277 (0.112)	0.0409 (0.161)	0.0900 (0.011)	0.0361 (0.500)
Black, non-Hispanic	0.0071 (0.879)	0.0818 (0.150)	-0.0040 (0.978)	0.0239 (0.439)	0.0052 (0.818)	0.0090 (0.840)	-0.0431 (0.029)	-0.0133 (0.680)	-0.0700 (0.122)
Hispanic or Latino	-0.0877 (0.146)	-0.0183 (0.792)	-0.0578 (0.538)	0.0079 (0.648)	-0.0198 (0.256)	-0.0174 (0.655)	-0.0816 (0.000)	-0.0651 (0.003)	0.0244 (0.567)
Others, multi-racial or unknown	-0.0504 (0.415)	-0.0931 (0.221)	0.0858 (0.235)	-0.0040 (0.826)	-0.0020 (0.921)	-0.0008 (0.964)	-0.0914 (0.163)	-0.0969 (0.237)	-0.0892 (0.131)
A respondent is female.	0.0303 (0.363)	0.0304 (0.447)	0.0424 (0.323)	-0.0010 (0.924)	-0.0106 (0.161)	0.0170 (0.044)	0.0025 (0.860)	0.0006 (0.974)	0.0067 (0.769)
Mother's highest education									
GED or below	-0.0995 (0.008)	-0.0875 (0.011)	-0.0281 (0.771)	-0.0189 (0.024)	-0.0232 (0.008)	-0.0078 (0.452)	-0.0792 (0.000)	-0.0720 (0.002)	-0.0523 (0.064)
AA or some college education	0.1040 (0.006)	0.0837 (0.038)	0.1189 (0.128)	-0.0169 (0.198)	-0.0124 (0.308)	-0.0034 (0.687)	-0.0753 (0.000)	-0.0799 (0.000)	-0.0472 (0.172)
Post-BA degrees	0.0177 (0.795)	0.0322 (0.604)	-0.0223 (0.860)	0.0307 (0.016)	0.0267 (0.051)	0.0107 (0.435)	-0.0092 (0.649)	-0.0372 (0.163)	0.0181 (0.535)
Is a respondent a resident of the state where his/her NPSAS institution is located?									
No; Domestic, out-of-state	0.4532 (0.000)	0.6455 (0.000)	0.0333 (0.650)	0.3388 (0.000)	0.8608 (0.000)	0.0171 (0.233)	0.2382 (0.000)	0.4879 (0.000)	0.0796 (0.002)
No; International	0.0397 (0.813)	-0.0669 (0.750)	0.0645 (0.618)	0.4872 (0.000)	1.0232 (0.000)	0.0280 (0.390)	0.3480 (0.001)	0.5050 (0.000)	0.0330 (0.704)
A respondent is dependent	0.8522 (0.000)	0.7444 (0.000)	1.3477 (0.000)	0.0664 (0.167)	0.0215 (0.570)	0.2090 (0.037)	0.8137 (0.000)	0.5518 (0.000)	1.1453 (0.000)
Estimated Family Contribution (LN)	-0.0242 (0.000)	-0.0241 (0.009)	-0.0182 (0.176)	0.0030 (0.127)	-0.0011 (0.610)	0.0053 (0.052)	-0.0178 (0.000)	-0.0156 (0.001)	-0.0173 (0.000)
Selectivity of the institution of attendance									
Most selective	0.6613 (0.000)	0.2936 (0.197)	0.7580 (0.000)	0.4586 (0.000)	0.1745 (0.056)	0.4594 (0.000)			
Very selective	0.3793 (0.030)	0.3447 (0.002)	0.3570 (0.062)	0.3079 (0.003)	0.0964 (0.206)	0.3218 (0.001)	0.7216 (0.000)	0.8302 (0.000)	0.6414 (0.000)
Moderately selective	0.1534 (0.187)	0.0770 (0.002)	0.0782 (0.583)	0.1746 (0.067)	-0.0076 (0.914)	0.1401 (0.156)	0.4586 (0.000)	0.5506 (0.000)	0.3774 (0.001)
Minimally selective	-0.1528 (0.280)	-0.2262 (0.080)	-0.0635 (0.771)	0.0908 (0.298)	0.0207 (0.817)	-0.0155 (0.843)	0.3000 (0.004)	0.3151 (0.003)	0.1091 (0.404)
A respondent is at a private not-for-profit institution	1.0919 (0.000)			1.0371 (0.000)			1.0642 (0.000)		
Pell Grant revenues-to-operating revenues ratio of the institution of attendance	-0.0289 (0.005)	-0.0435 (0.000)	-0.0098 (0.027)	-0.0208 (0.000)	-0.0169 (0.000)	-0.0398 (0.000)	0.0013 (0.480)	0.0004 (0.731)	-0.0010 (0.713)
<i>Level-2: State-level variables</i>									
State appropriation for postsecondary education (in every \$1,000 in incomes)	-0.0137 (0.386)	-0.0186 (0.282)	-0.0345 (0.264)	-0.0774 (0.001)	-0.0570 (0.010)	-0.0312 (0.033)	-0.0522 (0.010)	-0.0639 (0.001)	-0.0395 (0.259)
Need based aid to total state aid ratio	0.0023 (0.097)	0.0278 (0.062)	-0.0014 (0.407)	0.0041 (0.022)	0.0027 (0.012)	0.0016 (0.432)	0.0001 (0.927)	0.0006 (0.717)	-0.0018 (0.445)
Government ideology measure	-0.0020 (0.230)	-0.0002 (0.908)	-0.0032 (0.304)	0.0011 (0.531)	0.0015 (0.285)	0.0022 (0.170)	0.0040 (0.020)	0.0022 (0.139)	0.0091 (0.012)
Average distance between any two members of lower state houses	-0.0010 (0.531)	-0.0001 (0.953)	-0.0050 (0.295)	-0.0020 (0.270)	-0.0006 (0.579)	0.0010 (0.484)	0.0008 (0.461)	-0.0004 (0.698)	0.0045 (0.016)

****Bold** indicates statistical significance with 5% confidence***Italic* indicates statistical significance with 10% confidenceSource: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty
Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

$p = 0.008$, and $p = 0.002$ respectively) than their counterparts with mothers who had a bachelor's degree or its equivalent, when controlling for other variables. For the 1999-00 cohort and the 2007-08 cohort, when respondents' mothers had an associate's degree or some college education, students at public colleges and universities are more likely to have higher tuition and fees ($p = 0.038$ and $p = 0.000$, respectively) than their counterparts whose mothers had a bachelor's degree or its equivalent. However, this was not the case for the 2003-04 cohort and the results shows no statistically significant relationship for students whose mothers had an associate's degree or some college education. For the 2003-04 cohort, the result suggests that students at public colleges and universities whose mothers have a post-baccalaureate degree are more likely to have higher tuition and fees than their counterparts whose mothers had a bachelor or equivalent degree ($p = 0.051$). There was no statistically significant relationship in explaining tuition and fees of students who attend private not-for-profit colleges and universities, except for the 2007-08 cohort. Students in that cohort whose mothers had a technical/vocational certificate or equivalent of high school diploma or below ($p = 0.064$) had lower tuition and fees than their counterparts whose mothers had a bachelor's degree or its equivalent, when controlling for other variables.

Being a domestic out-of-state or international student at a private not-for-profit college or university has no statistically significant relationship with tuition and fees of students in any of the three NPSAS cohorts in this study, except those domestic, out-of-state students in the 2007-08 cohort ($p = 0.002$). This makes good sense, as at many private not-for-profit colleges and universities tuition and fees are levied on students equally regardless of their residency status, although some institutions charge special fees for international students. In contrast, being a domestic out-of-state or international student at a public college or university has a statistically

significant relationship with tuition and fees of students. For the 1999-00 cohort, being a domestic out-of-state student increases tuition and fees compared to their counterparts who attend colleges and universities in their states of legal residency ($p = 0.000$). For the 2003-04 and 2007-08 cohorts, being a domestic out-of-state ($p = 0.000$ and $p = 0.000$, respectively) or international student ($p = 0.000$ and $p = 0.000$, respectively) raises tuition and fees for students compared to their counterparts who attend in-state schools within their legal state of residence. This, too, makes good sense, since public colleges and universities tend to levy surcharges on nonresident and international students.

The result shows a statistically significant correlation between EFC and tuition and fees for students in the 1999-00 cohort at public colleges and universities ($p = 0.009$), as well as ones in the 2007-08 cohort ($p = 0.000$). The result suggests that students in both cohorts who have a higher EFC are likely to have lower tuition and fees. However, the result shows no statistically significant relationship between EFC and tuition and fees for students at public colleges and universities in the 2003-04 cohort. This correlation between EFC and tuition and fees appears differently for students at private not-for-profit colleges and universities. While, EFC had no statistically significant relationship with tuition and fees for students in the 1999-00 cohort, for those in the 2003-04 cohort at private not-for-profit colleges and universities, higher EFC estimates higher tuition and fees ($p = 0.052$) and the fixed effect is reversed for those in the 2007-08 cohort ($p = 0.000$).

Institutional selectivity of colleges and universities that respondents attend has a statistically significant correlation in explaining tuition and fees for students. For all three NPSAS cohorts in the study, students who attend private not-for-profit colleges and universities that are the most selective ($p = 0.000$ and $p = 0.000$, respectively) and very selective ($p = 0.062$

and $p = 0.001$, and 0.000 , respectively) are likely to have higher tuition and fees than their counterparts who attend open admission colleges and universities. For students who attend public colleges and universities, however, statistical differences in tuition and fees associated with institutional selectivity present a different pattern. For the 1999-00 cohort of students who are at public colleges and universities, attending very selective ($p = 0.002$) and moderately selective schools ($p = 0.002$) raises their tuition and fees compared to their counterparts attending open admission colleges and universities, when controlling for all other variables. Also, students who attend minimally selective public colleges and universities are likely to pay less than their counterparts at open admission schools. For the 2003-04 cohort, only the students who attend most selective public colleges and universities ($p = 0.056$) are likely to have tuition and fees higher than their counterparts at open admission institutions when all other variables are equal. Fixed effects of all three institutional selectivity variables for students in the 2007-08 cohort who attended public colleges and universities are statistically significant ($p = 0.000$, $p = 0.000$, and $p = 0.003$, respectively) and the result suggests a higher magnitude of effects for more selective institutions.

Reliance on Pell Grant revenues at colleges and universities to which students attend has a statistically significant relationship in explaining tuition and fees that students are charged. Attending colleges and universities that have a higher share of Pell Grant revenues in their overall operating revenues is likely to lower tuition and fees for students when controlling for other variables. This is true for both students in the 1999-00 cohort ($p = 0.005$) and 2003-04 cohort ($p = 0.000$), and those who are at public colleges and universities ($p = 0.000$ and $p = 0.000$, respectively) and at private not-for-profit colleges and universities ($p = 0.027$ and $p = 0.000$, respectively). For the 1999-00 cohort, the regression coefficient for this variable was

greater for students at public colleges and universities than that for their counterparts at private not-for-profit colleges and universities. This relationship is reversed for the 2003-04 cohort, making the magnitude of change in tuition and fees for a unit increase in institutional Pell Grant reliance at private not-for-profit colleges and universities twice as much as that of students at their public counterparts. However, for the 2007-08 cohort of students, Pell Grant revenue to operation revenues ratios had no statistically significant fixed effects in explaining tuition and fees for students at either public or private not-for-profit colleges and universities.

The result suggests that state higher education efforts, operationalized in this study as a state's postsecondary education appropriation in terms of every \$1,000 earned as personal income, have a statistically significant correlation with tuition and fees of students in the 2003-04 cohort, but not for those in the 1999-00 cohort. Both students who attend public colleges and universities ($p = 0.010$) and private not-for-profit institutions ($p = 0.033$) are likely to have lower tuition and fees when the state in which their colleges and universities are located increases its higher education efforts. This was also the case for students in the 2007-08 cohort who attended public colleges and universities ($p = 0.001$), but not for those who attended private not-for-profit institutions. The result also suggests that when a student attends a public college or university located in a state with a higher proportion of need-based aid in all state-sponsored student grant programs, tuition and fees for the student are likely to be higher. This was the case for both the 1999-00 ($p = 0.062$) and 2003-04 cohorts ($p = 0.012$), but not for those students in the 2007-08 cohort. However, the same was not true for students in the 1999-00 or 2003-04 cohort attending private not-for-profit colleges and universities. Measurements of state government ideology, as well as polarization in state lower houses of legislators, had no statistically significant relationship with the tuition and fees of students in the earlier two cohorts. However, for the

2007-08 cohort, when a student attends a private not-for-profit college or university in a state where the state government is more liberal-leaning ($p = 0.012$) or the state lower house of legislators is more polarized ($p = 0.016$), tuition and fees are likely to be higher for that student when holding other variables constant.

Table 4.6
Estimated variance components of 2-level HLM analysis for tuition, 1999-00, 2003-04, and 2007-08

Variable name	Tuition (US\$: LN) in 1999-00			Tuition (US\$: LN) in 2003-04			Tuition (US\$: LN) in 2007-08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
Estimated variance components	0.073	0.074	0.252	0.102	0.042	0.082	0.065	0.073	0.185
Standard deviation	0.270	0.272	0.509	0.319	0.205	0.286	0.255	0.270	0.430
P-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Estimated within variance	0.462	0.448	0.315	0.097	0.057	0.049	0.375	0.286	0.365
Standard deviation	0.680	0.669	0.561	0.312	0.239	0.221	0.612	0.534	0.604
Within-state variance	0.520	0.274	0.624	0.799	0.629	0.497	0.531	0.312	0.427
Between-state variance	0.745	0.607	0.312	0.588	0.602	0.618	0.740	0.556	0.357

****Bold** indicates statistical significance with 5% confidence

***Italic* indicates statistical significance with 10% confidence

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty

Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

In Table 4.6, I reported estimated variance components for two-level hierarchical linear model analyses of tuition and fees for students in the 1999-00, 2003-04, and 2007-08 NPSAS cohorts. Proportional variances explained for both student-level and state-level controls suggest that overall, the final models have a reasonable degree of fitness. Among the 1999-00 and 2007-08 cohorts, for those students who attended public colleges and universities, the result suggests a stronger association between state-level controls and tuition and fees than that of student-level controls and tuition and fees, while the opposite relationships seem to be true for those students who attended private not-for-profit colleges and universities. The result is very intuitive, given the nature of tuition and fees setting. The result suggests that differences between states are statistically significant both for cohorts and by institutional sectors. For the 1999-00 cohort, 14 percent of the differences in tuition and fees for students at public colleges and universities ($p = 0.000$) are between states, while 44 percent of the differences for students at private not-for-profit colleges and universities ($p = 0.000$) are between states. For the 2003-04 cohort, the result

suggests larger variances in tuition and fees between states. Forty-two percent of difference in tuition and fees for students who attended public colleges and universities are between states, and 63 percent of the difference for their counterparts at private not-for-profit colleges and universities are between states. Finally, for the 2007-08 cohort, 20 percent of difference in tuition and fees for students who attended public colleges and universities is between states, while 34 percent of the difference is between states for those at the private not-for-profit institutions.

Net Tuition and Fees

Table 4.7 reports fixed effects of two-level hierarchical linear model analyses of net tuition and fees for students in the 1999-00, 2003-04, and 2007-08 NPSAS cohorts. Net tuition and fees are computed as tuition and fees minus all grants students received. For each cohort, I reported results from analyses of the full sample as well as by institutional controls, which are represented by different columns in the tables. The result suggests that the race/ethnicity of students has a statistically significant relationship with their net tuition and fees.

For students in the 1999-00 cohort who attended public colleges and universities, being Black, non-Hispanic ($p = 0.097$) or Hispanic/Latino ($p = 0.040$) lowered their net tuition and fees compared to their White, non-Hispanic counterparts, when controlling for other variables. For the 2003-04 cohort and 2007-08 cohort, the same is true for Black, non-Hispanic ($p = 0.000$ and $p = 0.058$, respectively) and Hispanic/Latino students ($p = 0.000$ and $p = 0.002$, respectively). In addition, Asian students in the 2003-04 cohort ($p = 0.023$) are also likely to have lower net tuition and fees compared to their White, non-Hispanic counterparts at public colleges and universities, when holding other variables constant. However, for students who attend private not-for-profit colleges and universities in both cohorts, race/ethnicity has no statistically significant relationship to their net tuition and fees except for Black, non-Hispanic students in the

Table 4.7

Estimated fixed effects with robust standard errors of grand-mean centered 2-level HLM analysis for net tuition, 1999-00, 2003-04, and 2007-08

Variable name	Net Tuition (US\$: LN) in 1999-00			Net Tuition (US\$: LN) in 2003-04			Net Tuition (US\$: LN) in 2007-08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
	b	b	b	b	b	b	b	b	b
Intercept	6.4822 (0.000)	6.1544 (0.000)	7.2477 (0.000)	7.0430 (0.000)	6.2622 (0.000)	8.2449 (0.000)	6.8418 (0.000)	6.7022 (0.000)	7.8257 (0.000)
<i>Level-1: Student-level variables</i>									
Race/ethnicity									
Asian	0.0782 (0.752)	-0.0148 (0.960)	0.3512 (0.124)	-0.3923 (0.041)	-0.4669 (0.023)	-0.0164 (0.940)	0.0623 (0.681)	-0.0421 (0.839)	0.3093 (0.002)
Black, non-Hispanic	-0.2490 (0.096)	-0.3220 (0.097)	0.0131 (0.962)	-0.4053 (0.021)	-0.5093 (0.000)	-0.4005 (0.036)	-0.2171 (0.069)	-0.3229 (0.058)	-0.0271 (0.862)
Hispanic or Latino	-0.2860 (0.011)	-0.2930 (0.040)	0.0676 (0.833)	-0.4929 (0.000)	-0.6907 (0.000)	-0.2563 (0.223)	-0.4475 (0.004)	-0.5844 (0.002)	-0.0029 (0.989)
Others, multi-racial or unknown	-0.2405 (0.361)	-0.2658 (0.422)	0.0691 (0.864)	-0.0995 (0.516)	-0.1821 (0.511)	0.0824 (0.531)	-0.4720 (0.001)	-0.5277 (0.007)	-0.3942 (0.116)
A respondent is female.	-0.0752 (0.384)	-0.0929 (0.355)	0.0094 (0.961)	<i>-0.1082</i> (0.067)	-0.1191 (0.107)	-0.0976 (0.292)	-0.1363 (0.520)	-0.0962 (0.212)	-0.2179 (0.017)
Mother's highest education									
GED or below	-0.4232 (0.004)	-0.3679 (0.018)	-0.5355 (0.039)	-0.0756 (0.394)	-0.1259 (0.288)	0.0080 (0.934)	-0.3398 (0.000)	-0.3850 (0.000)	-0.2020 (0.026)
AA or some college education	-0.0975 (0.438)	-1.6789 (0.234)	-0.0143 (0.946)	<i>-0.1422</i> (0.083)	-0.2670 (0.039)	0.0934 (0.182)	-0.2353 (0.003)	-0.3833 (0.001)	0.0026 (0.985)
Post-BA degrees	-0.2175 (0.313)	-0.3174 (0.172)	0.1059 (0.750)	0.6075 (0.439)	0.1399 (0.197)	0.0113 (0.903)	-0.0214 (0.808)	-0.1384 (0.272)	0.1707 (0.164)
Is a respondent a resident of the state where his/her NPSAS institution is located?									
No; Domestic, out-of-state	0.8075 (0.000)	1.0277 (0.000)	0.3878 (0.035)	0.9736 (0.000)	1.7327 (0.000)	0.4724 (0.000)	0.1241 (0.358)	0.5870 (0.008)	-0.1095 (0.421)
No; International	0.9699 (0.000)	0.7640 (0.018)	1.2292 (0.003)	1.6407 (0.000)	2.4710 (0.000)	0.5691 (0.133)	1.5872 (0.000)	2.2537 (0.000)	0.4478 (0.371)
A respondent is dependent	0.0359 (0.819)	0.0100 (0.957)	0.2460 (0.214)	-0.6109 (0.000)	-0.5492 (0.000)	-0.6586 (0.017)	-0.0293 (0.806)	-0.5128 (0.000)	0.5816 (0.000)
Estimated Family Contribution (LN)	0.3139 (0.000)	0.3574 (0.000)	0.2872 (0.000)	0.3824 (0.000)	0.4528 (0.000)	0.2806 (0.000)	0.3294 (0.000)	0.4093 (0.000)	0.1780 (0.000)
Selectivity of the institution of attendance									
Most selective	0.1951 (0.338)	-0.2340 (0.559)	0.0836 (0.846)	-0.0071 (0.978)	<i>-0.8272</i> (0.078)	0.1269 (0.544)			
Very selective	-0.0365 (0.866)	0.1743 (0.427)	-0.7917 (0.043)	-0.3501 (0.188)	-0.4249 (0.354)	-0.3096 (0.290)	0.2075 (0.307)	-0.0685 (0.811)	0.6197 (0.047)
Moderately selective	-0.1875 (0.242)	-0.1337 (0.344)	<i>-0.6120</i> (0.085)	-0.1880 (0.454)	-0.0929 (0.828)	<i>-0.4881</i> (0.054)	0.1914 (0.288)	0.2842 (0.236)	0.2813 (0.296)
Minimally selective	-0.1459 (0.373)	-0.0135 (0.928)	-1.5229 (0.022)	-0.1028 (0.652)	-0.1145 (0.735)	-0.2279 (0.362)	0.1759 (0.333)	0.1914 (0.416)	0.0684 (0.826)
A respondent is at a private not-for-profit institution	1.0131 (0.000)			1.2939 (0.000)			1.5757 (0.000)		
Pell Grant revenues-to-operating revenues ratio of the institution of attendance	-0.0265 (0.005)	-0.0366 (0.006)	-0.0193 (0.034)	-0.0393 (0.000)	-0.0162 (0.233)	-0.0843 (0.000)	0.0004 (0.936)	<i>0.0049</i> (0.092)	-0.0100 (0.216)
<i>Level-2: State-level variables</i>									
State appropriation for postsecondary education (in every \$1,000 in incomes)	-0.0693 (0.078)	-0.0762 (0.067)	-0.0538 (0.548)	-0.1310 (0.000)	-0.0807 (0.044)	-0.1377 (0.002)	-0.0831 (0.024)	-0.1125 (0.005)	-0.0441 (0.420)
Need based aid to total state aid ratio	0.0063 (0.023)	0.0067 (0.049)	0.0001 (0.981)	0.0123 (0.002)	0.0119 (0.039)	0.0084 (0.000)	0.0062 (0.024)	0.0076 (0.030)	0.0006 (0.883)
Government ideology measure	-0.0050 (0.091)	-0.0057 (0.113)	-0.0022 (0.770)	0.0005 (0.878)	-0.0001 (0.979)	-0.0027 (0.390)	0.0020 (0.565)	-0.0004 (0.928)	0.0118 (0.027)
Average distance between any two members of lower state houses	-0.0064 (0.052)	-0.0066 (0.043)	-0.0044 (0.495)	-0.0023 (0.355)	-0.0019 (0.561)	<i>0.0058</i> (0.062)	-0.0007 (0.753)	-0.0017 (0.599)	0.0035 (0.331)

****Bold** indicates statistical significance with 5% confidence***Italic* indicates statistical significance with 10% confidenceSource: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty
Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

2003-04 cohort ($p = 0.036$) and Asian students in the 2007-08 cohort ($p = 0.002$). The former are likely to have lower net tuition and fees compared to their White, non-Hispanic counterparts when controlling for other variables, and the latter are likely to have higher net tuition and fees than White, non-Hispanic students.

The highest education level attained by a respondent's mother has some statistically significant relationship with net tuition and fees of students. When their mother's highest education level is equivalent to a technical/vocation certificate or equivalent of a high school diploma or below, net tuition and fees for students in the 1999-00 cohort who attend public colleges and universities ($p = 0.018$) and those who attend private not-for-profit institutions ($p = 0.039$) are likely to be lower than their counterparts whose mothers have a bachelor's degree or its equivalent when controlling for other variables. For the 2007-08 cohort, the result shows a statistically significant fixed effects for mother's highest education being a technical/vocational certificate or equivalent of a high school diploma or below ($p = 0.000$ and $p = 0.026$, respectively). In addition students in the 2003-04 and 2007-08 cohorts who attended public colleges and universities and whose mothers have an associate's degree or some college education ($p = 0.039$ and $p = 0.001$, respectively) have lower net tuition and fees than those of students whose mothers have a bachelor's degree or its equivalent, when holding other variables constant.

The result also suggests that correlation between students' residency statuses and net tuition and fees largely mirror the result for tuition and fees reported in the previous section. For all three NPSAS cohorts, domestic nonresident students ($p = 0.000$, $p = 0.000$, and $p = 0.008$, respectively), as well as international students ($p = 0.018$, $p = 0.000$, and $p = 0.000$, respectively) at public colleges and universities paid more in net tuition and fees than their in-state

counterparts. Domestic nonresident students in the earlier two cohorts who attended private not-for-profit colleges and universities ($p = 0.035$ and $p = 0.000$, respectively) paid more in net tuition and fees than their in-state counterparts. Also, international students at private not-for-profit institutions in the 1999-00 cohort paid more in net tuition and fees ($p = 0.003$) than their in-state counterparts, but not students in the 2003-04 or 2007-08 cohort. The result also suggests that percentage differences in net tuition and fees of being a domestic nonresident student or international student are the greatest for the 2003-04 cohort of students.

The EFC of students has a statistically significant correlation with net tuition and fees for students in the both cohorts. For students in all three NPSAS cohorts, 1999-00 ($p = 0.000$), 2003-04 ($p = 0.000$) and 2007-08 cohorts ($p = 0.000$), who attend public colleges and universities, their net tuition and fees increase as their EFC rises. More precisely, a 10 percent increase in EFC explains 3.4 percent increase in net tuition and fees for students in the 1999-00 cohort, while the same would result in 4.4 percent and 4.0 percent increases respectively for students in the 2003-04 and 2007-08 cohorts. This is also true for students who attended private not-for-profit institutions ($p = 0.000$, $p = 0.000$, and $p = 0.000$, respectively). In these cases, a 10 percent increase in EFC equates to a 2.8 percent increase in net tuition and fees of students in the 1999-00 cohort, while the same would result in 2.7 percent and 1.7 percent respectively for students in the later two cohorts.

Institutional selectivity of colleges and universities that students attend has a statistically significant relationship for those who attended public colleges and universities in all three NPSAS cohorts except those students in the 1999-00 cohort who attend the most selective institutions. The result suggests that they are likely to pay less in net tuition and fees than their counterparts who attended open admission schools ($p = 0.078$). More fixed effects are

statistically significant for those students who attended private not-for-profit colleges and universities. For students in the 1999-00 cohort who attended private not-for-profit institutions, attending very selective ($p = 0.043$), moderately selective ($p = 0.085$) or minimally selective colleges and universities ($p = 0.022$) decreases their net tuition and fees compared to their counterparts who attended open admission institutions, when controlling for all other variables. Also, for the 2003-04 cohort, students who attended moderately selective private not-for-profit colleges and universities are likely to have lower net tuition and fees ($p = 0.054$) than their counterparts at open admission schools, assuming all other variables are equal. Finally, students in the 2007-08 cohort who attended very selective private institutions ($p = 0.047$) are likely to pay more in net tuition and fees than their counterparts who attended open admission colleges and universities when holding all the other variables constant.

Reliance on Pell Grant revenues at colleges and universities to which students attend has a statistically significant relationship in explaining their net tuition and fees for the earlier two cohorts, but not for the 2007-08 cohort. The result suggests that students in the 1999-00 ($p = 0.034$) and 2003-04 cohorts ($p = 0.000$) who attended private not-for-profit colleges and universities that have a higher share of Pell Grant revenues in their overall operating revenues are likely to have lower net tuition and fees when controlling for other variables. However, this was not the case for the 2007-08 cohort. For those students who attended public colleges and universities, institutions' reliance on Pell Grant revenues was statistically significant for the 1999-00 cohort ($p = 0.006$) and 2007-08 cohort ($p = 0.092$). For the former cohort, students who attended colleges and universities with a higher share of Pell Grant revenues had lower net tuition and fees; however, the result was opposite for students in the 2007-08 cohort. The

magnitude of fixed effects for the 2007-08 cohort was much smaller than those of the 1999-00 and 2003-04 cohorts.

For the 1999-00 cohort, increases of state postsecondary education expenditures by \$1 in every \$1,000 earned as personal income equates to a 7.3 percent decline in net tuition and fees for students who attend public colleges and universities in that state ($p = 0.067$). For the 2003-04 cohort, the same equates to the 7.8 percent drop in students' net tuition and fees ($p = 0.044$) and the fixed effect was even greater for students in the 2007-08 cohort, as the same equates to a 10.6 percent drop in net tuition and fees ($p = 0.005$). In addition, for the 2003-04 cohort, students who attended private not-for-profit colleges and universities have a statistically significant fixed effect from this variable. The same \$1 increase in state postsecondary education expenditures for that cohort equates to roughly an 12.9 percent drop in net tuition and fees for students.

The result also suggests that when a student attends a public college or university that is located in a state with a higher proportion of need-based aid in all state-sponsored student grant programs, net tuition and fees for the student are likely to be higher. This was the case for all three NPSAS cohorts in this study ($p = 0.049$, $p = 0.039$, and $p = 0.030$, respectively). For students who attended private not-for-profit institutions, this variable was not statistically significant for either the 1999-00 cohort or 2003-04 cohort; however, for the 2003-04 cohort, the result suggests that attending a school in a state with a higher proportion of need-based aid in all state-sponsored student grant programs increases net tuition and fees for students, when controlling for other variables.

The measurement of state government ideology appears to have little to no statistically significant relationship with net tuition and fees for students, except that for the overall 1999-00 cohort, a state government being more liberal equates to lower net tuition and fees for students

who attend colleges and universities in that state ($p = 0.091$). Students in the 2007-08 cohort who attended private not-for-profit colleges and universities in states which are more liberal-leaning are likely to have higher net tuition and fees ($p = 0.027$). The measurement of polarization in state lower houses of legislators shows some statistically significant relationships with net tuition and fees of students. The result suggests that for the 1999-00 cohort, students who attended public colleges and universities in a state whose lower house of legislators is more polarized are likely to have lower net tuition and fees ($p = 0.043$), when holding other variables constant. However, for the 2003-04 cohort, the result suggests that students who attended private not-for-profit colleges and universities in a state whose lower house of legislators is more polarized are likely to have higher net tuition and fees ($p = 0.062$), when controlling for all other variables. There was no statistically significant fixed effect for this variable for students in the 2007-08 cohort.

Table 4.8
Estimated variance components of 2-level HLM analysis for net tuition, 1999-00, 2003-04, and 2007-08

Variable name	Net Tuition (US\$: LN) in 1999-00			Net Tuition (US\$: LN) in 2003-04			Net Tuition (US\$: LN) in 2007-08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
Estimated variance components	0.229	0.270	0.291	0.226	0.369	0.127	0.195	0.295	0.334
Standard deviation	0.479	0.519	0.540	0.475	0.608	0.356	0.442	0.543	0.578
P-value	(0.000)	(0.000)	(0.021)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Estimated within variance	4.092	3.928	4.371	4.602	4.869	3.678	5.523	5.304	5.019
Standard deviation	2.023	1.982	2.091	2.145	2.206	1.918	0.442	2.303	2.240
Within-state variance	0.256	0.235	0.180	0.319	0.294	0.182	0.247	0.256	0.060
Between-state variance	0.693	0.612	0.602	0.768	0.563	0.796	0.609	0.498	0.360

****Bold** indicates statistical significance with 5% confidence

****Italic* indicates statistical significance with 10% confidence

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty

Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

In Table 4.8, I reported estimated variance components for two-level hierarchical linear model analyses of net tuition and fees for students in the 1999-00, 2003-04, and 2007-08 NPSAS cohorts. The proportional variances explained shows a fairly high explanatory power of the level-2 model, while those for the level-1 model are not as high. This result suggests a stronger association between state-level variables and net tuition and fees than that of student-level

variables and the dependent variables. This is somewhat counterintuitive, since net tuition and fees are influenced by grant aid awarded to individual students; thus, a logical assumption would be that the outcome variable is more heavily associated with student-level characteristics than with state-level variables. The result suggests that differences between states are statistically significant both for cohorts and by institutional sectors. Unlike tuition and fees reported in the previous section, the result for net tuition and fees suggests a much smaller variation between states. For the 1999-00 cohort, 6.4 percent of differences in net tuition and fees for students attended at public colleges and universities ($p = 0.000$) are between states, while 6.2 percent of the differences for students at private not-for-profit colleges and universities ($p = 0.021$) are between states. For the 2003-04 cohort, 7.1 percent of differences in net tuition and fees for students who attended public colleges and universities ($p = 0.000$) are between states, and 3.3 percent of the differences for their counterparts at private not-for-profit colleges and universities ($p = 0.000$) are between states. Finally, for the 2007-08 cohort, 5.3 percent of the differences for students at public colleges and universities ($p = 0.000$) and 6.2 percent of the differences for private school students ($p = 0.000$) are between states.

Tuition Discounting Rates

In Table 4.9, I reported estimated fixed effects of two-level hierarchical linear model analyses of tuition discounting rates for students in the 1999-00, 2003-04, and 2007-08 NPSAS cohorts. Tuition discounting rates are computed as percentage ratios of net tuition and fees to tuition and fees and subtracted by 100. Net tuition and fees are computed as tuition and fees minus all grants students received. For each cohort, I reported results from analyses of the full sample as well as by institutional controls, which are represented by different columns in the

Table 4.9

Estimated fixed effects with robust standard errors of grand-mean centered 2-level HLM analysis for tuition discounting rates, 1999-00, 2003-04, and 2007-08

Variable name	Tuition Discounting (%) in 1999- 00			Tuition Discounting (%) in 2003- 04			Tuition Discounting (%) in 2007- 08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
	b	b	b	b	b	b	b	b	b
Intercept	40.4015 (0.000)	37.2678 (0.000)	45.1869 (0.000)	48.8236 (0.000)	48.4504 (0.000)	49.5950 (0.000)	47.3888 (0.000)	45.6129 (0.000)	51.0089 (0.000)
<i>Level-1: Student-level variables</i>									
Race/ethnicity									
Asian	-2.8100 (0.504)	-3.2932 (0.509)	2.2264 (0.628)	6.1715 (0.022)	6.2527 (0.001)	2.5707 (0.368)	-2.6630 (0.194)	-0.3455 (0.912)	-5.8013 (0.004)
Black, non-Hispanic	5.6025 (0.028)	8.1478 (0.006)	1.4262 (0.753)	6.3431 (0.027)	8.7486 (0.006)	4.7043 (0.140)	1.8982 (0.355)	4.4191 (0.159)	-0.6452 (0.785)
Hispanic or Latino	5.4376 (0.004)	5.9959 (0.010)	0.8809 (0.877)	6.6490 (0.003)	8.5204 (0.001)	3.8405 (0.125)	6.0595 (0.002)	7.7226 (0.003)	1.9828 (0.422)
Others, multi-racial or unknown	4.2367 (0.340)	5.1024 (0.390)	-0.7950 (0.911)	2.3593 (0.368)	2.9835 (0.469)	1.5722 (0.560)	7.5116 (0.000)	8.5696 (0.004)	5.8082 (0.081)
A respondent is female.	4.3799 (0.001)	4.0734 (0.004)	5.2885 (0.019)	1.7467 (0.114)	1.8273 (0.112)	1.7338 (0.324)	3.9735 (0.000)	2.3507 (0.050)	6.6214 (0.000)
Mother's highest education									
GED or below	6.4861 (0.029)	5.8359 (0.046)	9.9937 (0.082)	1.7686 (0.191)	2.8021 (0.140)	0.1168 (0.948)	4.9048 (0.000)	6.0073 (0.001)	3.1610 (0.074)
AA or some college education	5.6821 (0.014)	5.6265 (0.028)	6.8852 (0.086)	2.7734 (0.013)	4.1438 (0.030)	0.2408 (0.781)	3.3546 (0.006)	5.3313 (0.002)	0.5164 (0.814)
Post-BA degrees	4.3692 (0.189)	7.5645 (0.047)	-4.8464 (0.261)	-1.6287 (0.198)	-1.3472 (0.456)	-2.4741 (0.135)	-0.1916 (0.915)	1.4488 (0.553)	-3.5073 (0.102)
Is a respondent a resident of the state where his/her NPSAS institution is located?									
No; Domestic, out-of-state	-5.9565 (0.021)	-5.9912 (0.001)	-7.9113 (0.011)	-10.2480 (0.000)	-15.0400 (0.000)	-6.7472 (0.000)	3.1109 (0.104)	0.4605 (0.892)	4.0384 (0.037)
No; International	-22.5052 (0.000)	-18.1206 (0.001)	-33.7664 (0.000)	-29.5552 (0.000)	-32.6535 (0.000)	-21.0799 (0.000)	-23.0480 (0.000)	-29.0115 (0.000)	-14.2986 (0.101)
A respondent is dependent	17.4348 (0.000)	14.5109 (0.000)	29.6100 (0.000)	9.9995 (0.000)	5.4531 (0.009)	17.0906 (0.000)	16.4717 (0.000)	5.8770 (0.000)	17.4078 (0.000)
Estimated Family Contribution (LN)	-6.9479 (0.000)	-7.2117 (0.000)	-5.5274 (0.000)	-6.3078 (0.000)	-7.4246 (0.000)	-4.7773 (0.000)	-6.0131 (0.000)	-7.0930 (0.000)	-3.7885 (0.000)
Selectivity of the institution of attendance									
Most selective	1.7519 (0.539)	6.2568 (0.289)	8.6297 (0.136)	3.3593 (0.519)	14.5350 (0.031)	-0.2753 (0.967)			
Very selective	3.0262 (0.323)	0.7783 (0.836)	17.3867 (0.000)	11.5383 (0.014)	7.3715 (0.242)	<i>11.8723</i> (0.073)	<i>5.8646</i> (0.071)	12.4616 (0.008)	-0.3390 (0.941)
Moderately selective	3.3311 (0.155)	2.1174 (0.357)	14.5802 (0.005)	<i>7.7370</i> (0.051)	-0.2240 (0.967)	14.4042 (0.005)	4.6137 (0.037)	5.6615 (0.067)	3.6877 (0.423)
Minimally selective	-3.4586 (0.275)	-6.6504 (0.026)	23.4772 (0.013)	5.4553 (0.171)	0.7455 (0.889)	7.5962 (0.177)	0.5681 (0.785)	3.5823 (0.252)	-1.0825 (0.816)
A respondent is at a private not-for-profit institution	9.7062 (0.000)			9.1085 (0.000)			5.1565 (0.018)		
Pell Grant revenues-to-operating revenues ratio of the institution of attendance	-0.0703 (0.597)	0.0157 (0.947)	-0.0897 (0.524)	0.2247 (0.153)	-0.0538 (0.794)	0.3729 (0.196)	0.0089 (0.909)	-0.0526 (0.378)	0.1091 (0.318)
<i>Level-2: State-level variables</i>									
State appropriation for postsecondary education (in every \$1,000 in incomes)	<i>1.4058</i> (0.083)	1.2082 (0.167)	1.4446 (0.018)	<i>1.1006</i> (0.055)	<i>1.0713</i> (0.057)	1.5931 (0.037)	<i>0.0746</i> (0.073)	<i>0.9227</i> (0.056)	0.3427 (0.607)
Need based aid to total state aid ratio	-0.0788 (0.214)	-0.0923 (0.195)	0.0141 (0.714)	-0.0102 (0.150)	-0.1785 (0.035)	-0.1053 (0.008)	-0.1078 (0.005)	-0.1469 (0.002)	-0.0160 (0.746)
Government ideology measure	<i>0.0797</i> (0.097)	<i>0.1122</i> (0.046)	0.0064 (0.922)	-0.0426 (0.439)	-0.0100 (0.886)	-0.0100 (0.845)	0.0202 (0.629)	0.0032 (0.949)	-0.0297 (0.631)
Average distance between any two members of lower state houses	0.1040 (0.115)	0.1295 (0.104)	-0.0124 (0.802)	-0.0003 (0.994)	0.0392 (0.399)	-0.0681 (0.165)	0.0064 (0.818)	-0.0073 (0.822)	0.0349 (0.494)

****Bold** indicates statistical significance with 5% confidence***Italic* indicates statistical significance with 10% confidenceSource: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty
Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

tables. The result more or less mirrors that of net tuition and fees, the results of which are reported in the previous section.

The result suggests that tuition discounting rates for students who attended private not-for-profit colleges and universities have no statistically significant relationship with their race/ethnicity for both the 1999-00 cohort and 2003-04 cohort. However, for the 2007-08 cohort, some race/ethnicity variables have statistically significant fixed effects in explaining tuition discounting rates. Asian students in the 2007-08 cohort who attended private not-for-profit colleges and universities ($p = 0.004$) were more likely to have lower tuition discounting rates than their White, non-Hispanic counterparts, while students who identified themselves as other, multiracial or unknown ($p = 0.081$) were more likely to have higher rates. In contrast, the race/ethnicity of students who attended public colleges and universities shows a statistically significant correlation with tuition discounting rates for all three cohorts. Asian students in the 2003-04 cohort ($p = 0.001$) were more likely to have higher tuition discounting rates. Black, non-Hispanic students in the 1999-00 ($p = 0.006$) and 2003-04 cohorts ($p = 0.001$) who attended public colleges and universities were more likely to receive higher tuition discounting rates than their White, non-Hispanic counterparts, when holding other variables constant. Hispanic/Latino students were more likely to have higher tuition discounting rates in all three NPSAS cohorts in this study ($p = 0.010$, $p = 0.001$, and $p = 0.003$, respectively). Finally, students in the 2007-08 cohort who identified themselves as other, multi-racial or unknown ($p = 0.004$) were more likely to have higher tuition discounting rates than White, non-Hispanic students in the same cohort, when holding other variables constant.

The result also shows that the difference of estimated fixed effects of being a Black, non-Hispanic student and a Hispanic or Latino student has narrowed when comparing results for the

1999-00 cohort and 2003-04 cohort. While tuition discounting rates for Hispanic/Latino students still appear statistically different from that of White, non-Hispanic students, the result suggests that rates for Black, non-Hispanic students are not statistically different from their White, non-Hispanic counterparts in the 2007-08 cohort. Female students in the 1999-00 cohort had higher tuition discounting rates than their male counterparts at both public colleges and universities ($p = 0.004$) and private not-for-profit institutions ($p = 0.019$). The same is true for the 2007-08 cohort; however, in the 2003-04 cohort, the gender variable held no statistically significant relationship to tuition discounting rates of students.

The result shows some statistically significant fixed effects in relation to mother's highest education levels. Students whose mothers had a technical/vocational certificate, the equivalent of a high school diploma, or below were likely to have higher tuition discounting rates than their counterparts whose mothers had a bachelor's degree or its equivalent. This was true for students in the 1999-00 and 2007-08 cohort who attended public colleges and universities ($p = 0.046$ and $p = 0.001$, respectively), as well as those who attended private not-for-profit institutions ($p = 0.082$ and $p = 0.074$, respectively). Student whose mothers had an associate's degree or some college education also had higher tuition discounting rates when controlling for other variables. This was the case for students who attended public colleges and universities in either one of all three NPSAS cohorts ($p = 0.028$, $p = 0.030$, and $p = 0.002$, respectively), as well as those students in the 1999-00 cohort who attended private not-for-profit schools ($p = 0.086$). In addition, students in the 1999-00 cohort attending public colleges and universities whose mothers had a post-baccalaureate degree also had higher tuition discounting rates ($p = 0.047$) than their counterparts with college educated mothers.

Estimated fixed effects from institutional selectivity vary at public colleges and universities and their private not-for-profit counterparts. The result suggests that for the 1999-00 cohort, students who attended minimally selective public colleges and universities ($p = 0.026$) are likely to have lower tuition discounting rates than their counterparts who attended open admission institutions. However, for the 2003-04 cohort, the same was not the case; instead, students who attended the most selective public colleges and universities ($p = 0.031$) had higher tuition discounting rates than their counterparts who attended public open admission institutions. In contrast, students in the 1999-00 cohort who attended very selective ($p = 0.000$), moderately selective ($p = 0.005$) and minimally selective private colleges and universities ($p = 0.013$) had higher tuition discounting rates than their counterparts who attended open admission private institutions. Of those, the fixed effect was the largest for students who attended minimally selective colleges and universities. Similarly, for the 2003-04 cohort, students who attended very selective ($p = 0.072$) and moderately selective private colleges and universities ($p = 0.005$) had higher tuition discounting rates than their open admission counterparts. For the 2007-08 cohort, students who attended public not-for-profit colleges and universities had no statistically significant fixed effects from institutional selectivity; however, students who attended very selective ($p = 0.008$) and moderately selective public institutions ($p = 0.067$) were more likely to have higher tuition discounting rates than their counterparts who attended public open admission schools.

Reliance on Pell Grant revenues at colleges and universities that students attended has no statistical significance in explaining students' tuition discounting rates for any of the NPSAS cohorts in this study. However, the result suggests that state higher education efforts have a statistically significant correlation with tuition discounting rates for students in all three cohorts.

The students who attended public colleges and universities in the 2003-04 cohort ($p = 0.057$), as well as in the 2007-08 cohort ($p = 0.056$) had higher tuition discounting rates correlated to increases in state higher education efforts. For students who attended private not-for-profit institutions, increases in state higher education efforts explain higher tuition discounting rates for both the 1999-00 cohort ($p = 0.018$) and 2003-04 cohort ($p = 0.037$).

Also, the result for the 2003-04 cohort suggests that when a student attends a public ($p = 0.021$) or private not-for-profit college or university ($p = 0.001$) that is located in a state with a higher proportion of need-based aid in all state-sponsored student grant programs, tuition discounting rates are likely to be lower. While this was not the case for the 1999-00 cohort, and this variable bears no statistical significance in explaining tuition discounting rates for that cohort, in the 2007-08 cohort, when a student attends a public college or university in a state with a higher proportion of need-based aid, tuition discounting rates are likely to be lower.

For the 1999-00 cohort, a state government being more liberal equates to higher tuition discounting rates for students who attend public colleges and universities in that state, after controlling for all other variables. However, the result suggests that this was not true for students at private not-for-profit colleges and universities in the same cohort, or students in the 2003-04 or 2007-08 cohorts. The measurement of polarization in state lower houses of legislators had no statistically significant relationship in explaining tuition discounting rates for students in any NPSAS cohorts in this study.

In Table 4.10, I reported estimated variance components for two-level hierarchical linear model analyses of tuition discounting rates for students in the 1999-00, 2003-04, and 2007-08 NPSAS cohorts. The result suggests that differences between states are statistically significant for the all three cohorts and by institutional sectors, except students in the 1999-00 cohort who

attended private not-for-profit colleges and universities. Proportional variances explained suggest that the model has similar degrees of fitness as it does for the analyses of net tuition and fees. Similar to the result for net tuition and fees reported in the previous section, variance in tuition discounting rates between states are relatively small. For the 1999-00 cohort, 6.7 percent of differences in tuition discounting rates for students attended at public colleges and universities ($p = 0.000$) are between states, while the variance for students who attended private colleges and universities is not statistically significant ($p > 0.500$). For the 2003-04 cohort, 6.2 percent of differences in tuition discounting rates for students who attended public colleges and universities ($p = 0.000$) are between states, and 4.8 percent of the difference for their counterparts at private not-for-profit colleges and universities ($p = 0.000$) are between states. Finally, for the 2007-08 cohort, 2.6 percent of the differences for students at public institutions ($p = 0.000$) are between states, and 5.2 percent of the differences for their private not-for-profit counterparts ($p = 0.000$) are between states.

Table 4.10
Estimated variance components of 2-level HLM analysis for tuition discounting rates, 1999-00, 2003-04, and 2007-08

Variable name	Tuition Discounting (%) in 1999- 00			Tuition Discounting (%) in 2003- 04			Tuition Discounting (%) in 2007- 08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
Estimated variance components	75.466	96.346	0.381	60.936	83.146	42.201	30.599	36.807	55.047
Standard deviation	8.687	9.816	0.617	7.806	9.118	6.496	5.532	6.067	7.419
P-value	(0.000)	(0.000)	(> .500)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Estimated within variance	1313.079	1343.773	1097.625	112.109	1257.754	833.468	1302.792	1395.641	1005.283
Standard deviation	36.236	36.658	33.130	33.498	35.465	28.870	36.094	37.358	31.706
Within-state variance	0.223	0.249	**	0.923	0.269	0.205	0.215	0.262	0.138
Between-state variance	0.241	0.136	**	0.509	0.532	0.573	0.487	0.596	0.159

****Bold** indicates statistical significance with 5% confidence

***Italic* indicates statistical significance with 10% confidence

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty

Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

Pell Grant Awards

Estimated fixed effects for two-level hierarchical linear analyses for Pell Grant awards of students in the 1999-00, 2003-04, and 2007-08 NPSAS cohorts are reported in Table 4.11. For each cohort, I reported results from analyses of the full sample, as well as by institutional

Table 4.11

Estimated fixed effects with robust standard errors of grand-mean centered 2-level HLM analysis for Pell Grant Awards, 1999-00, 2003-04, and 2007-08

	Pell Grant Awards (US\$: LN) in 1999-00			Pell Grant Awards (US\$: LB) in 2003-04			Pell Grant Awards (US\$: LB) in 2007-08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
Variable name	b	b	b	b	b	b	b	b	b
Intercept	3.6000 (0.000)	3.5277 (0.000)	3.7692 (0.000)	3.5657 (0.000)	3.7138 (0.000)	3.5129 (0.000)	4.3169 (0.000)	4.2769 (0.000)	4.4172 (0.000)
<i>Level-1: Student-level variables</i>									
Race/ethnicity									
Asian	0.0829 (0.657)	0.0264 (0.893)	0.0308 (0.258)	0.5291 (0.000)	0.5189 (0.013)	0.4919 (0.001)	0.0402 (0.792)	0.1930 (0.261)	-0.1907 (0.321)
Black, non-Hispanic	0.3772 (0.015)	0.4741 (0.003)	0.0479 (0.847)	0.7660 (0.000)	0.7510 (0.002)	0.7640 (0.000)	0.5021 (0.000)	0.6790 (0.000)	0.2387 (0.061)
Hispanic or Latino	0.2222 (0.103)	0.2154 (0.127)	0.3465 (0.343)	0.4937 (0.000)	0.5316 (0.002)	0.3648 (0.005)	0.3364 (0.001)	0.3779 (0.002)	0.3203 (0.020)
Others, multi-racial or unknown	0.4564 (0.405)	0.0172 (0.946)	0.3061 (0.138)	0.1595 (0.285)	0.0098 (0.962)	0.3673 (0.081)	0.2348 (0.004)	0.2597 (0.045)	0.2306 (0.217)
A respondent is female.	4.3799 (0.008)	4.3799 (0.011)	4.3799 (0.887)	4.3799 (0.239)	4.3799 (0.257)	4.3799 (0.529)	4.3799 (0.000)	4.3799 (0.005)	4.3799 (0.000)
Mother's highest education									
GED or below	0.2221 (0.024)	0.2467 (0.028)	0.1750 (0.494)	0.2525 (0.000)	0.2868 (0.001)	0.1548 (0.046)	0.4061 (0.000)	0.4108 (0.000)	0.4137 (0.000)
AA or some college education	0.1155 (0.267)	0.0979 (0.403)	0.2239 (0.168)	0.2226 (0.001)	0.3661 (0.001)	0.0100 (0.892)	0.2424 (0.002)	0.1713 (0.031)	0.3611 (0.001)
Post-BA degrees	-0.1328 (0.227)	-0.1396 (0.319)	-0.0567 (0.787)	-0.0778 (0.145)	-0.0611 (0.396)	-0.1214 (0.062)	-0.0930 (0.144)	-0.0715 (0.375)	-0.1009 (0.356)
Is a respondent a resident of the state where his/her NPSAS institution is located?									
No; Domestic, out-of-state	-0.1309 (0.133)	-0.1676 (0.081)	-0.0364 (0.000)	-0.0108 (0.866)	-0.0406 (0.663)	-0.0048 (0.951)	0.3144 (0.000)	0.5145 (0.000)	0.1481 (0.171)
No; International	-1.1722 (0.000)	-1.2453 (0.000)	-1.0328 (0.000)	-2.4348 (0.000)	-1.9011 (0.000)	-2.7830 (0.000)	-2.1473 (0.000)	-2.2551 (0.000)	-2.0421 (0.000)
A respondent is dependent	0.7915 (0.000)	0.7274 (0.000)	0.9438 (0.000)	0.2198 (0.211)	0.2064 (0.384)	0.2409 (0.315)	1.1499 (0.000)	0.9743 (0.000)	1.3647 (0.000)
Estimated Family Contribution (LN)	-0.5322 (0.000)	-0.5252 (0.000)	-0.5555 (0.000)	-0.6092 (0.000)	-0.6265 (0.000)	-0.6265 (0.000)	-0.6219 (0.000)	-0.6114 (0.000)	-0.6323 (0.000)
Selectivity of the institution of attendance									
Most selective	-0.1152 (0.581)	0.2463 (0.492)	-0.8544 (0.005)	0.4479 (0.045)	1.5357 (0.000)	0.3520 (0.197)			
Very selective	-0.2408 (0.328)	-0.1153 (0.703)	-0.8440 (0.016)	0.4068 (0.045)	0.6684 (0.156)	0.4710 (0.093)	-0.1047 (0.415)	0.1062 (0.474)	-0.3186 (0.216)
Moderately selective	-0.2206 (0.205)	-0.0732 (0.722)	-0.8405 (0.011)	0.2677 (0.253)	0.3342 (0.464)	0.3544 (0.182)	-0.0405 (0.661)	0.0075 (0.945)	-0.0999 (0.651)
Minimally selective	-0.2327 (0.184)	-0.1405 (0.501)	-0.8965 (0.059)	0.1871 (0.325)	0.3200 (0.427)	-0.0241 (0.962)	-0.0204 (0.855)	0.0111 (0.934)	-0.0925 (0.719)
A respondent is at a private not-for-profit institution	0.0453 (0.628)			0.2496 (0.047)			0.2189 (0.001)		
Pell Grant revenues-to-operating revenues ratio of the institution of attendance	0.0122 (0.018)	0.0193 (0.161)	0.0025 (0.615)	0.0268 (0.001)	0.0416 (0.001)	0.0298 (0.407)	0.0026 (0.185)	0.0011 (0.652)	0.0037 (0.253)
<i>Level-2: State-level variables</i>									
State appropriation for postsecondary education (in every \$1,000 in incomes)	0.0026 (0.877)	-0.0006 (0.975)	0.0465 (0.392)	0.0313 (0.380)	0.0863 (0.087)	-0.0309 (0.501)	0.0001 (0.995)	0.0036 (0.854)	-0.0003 (0.994)
Need based aid to total state aid ratio	0.0013 (0.232)	0.0018 (0.125)	-0.0010 (0.625)	0.0008 (0.804)	0.0038 (0.313)	-0.0040 (0.183)	-0.0024 (0.107)	-0.0015 (0.290)	-0.0038 (0.109)
Government ideology measure	0.0015 (0.342)	0.0015 (0.407)	-0.0016 (0.649)	-0.0061 (0.121)	-0.0069 (0.161)	-0.0041 (0.387)	0.0045 (0.006)	0.0026 (0.096)	0.0056 (0.053)
Average distance between any two members of lower state houses	-0.0012 (0.399)	-0.0005 (0.727)	-0.0038 (0.179)	0.0013 (0.756)	0.0018 (0.682)	0.0005 (0.920)	0.0014 (0.187)	0.0024 (0.217)	0.0017 (0.498)

****Bold** indicates statistical significance with 5% confidence***Italic* indicates statistical significance with 10% confidenceSource: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty
Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

controls, which are represented by different columns in the tables. Unlike the earlier three dependent variables, there is not much variation in intercepts between cohorts or institutional sectors for one cohort, which suggests that grand means of Pell Grant awards are similar across cohorts and institutional controls. This may be due to the fact that Pell Grant awards are dictated by federal policy and award amounts are regulated by the Estimated Family Contribution (EFC) of students calculated via financial data reported on the Free Application for Federal Student Aid, commonly referred to as FAFSA.

Black, non-Hispanic students who attended public colleges and universities were likely to receive more in Pell Grant awards than their White, non-Hispanic counterparts in all three NPSAS cohorts ($p = 0.003$, $p = 0.002$, and $p = 0.000$), when controlling for other variables. Similarly, Black, non-Hispanic students who attended private not-for-profit colleges and universities were also likely to receive more in Pell awards than their White, non-Hispanic counterparts in the 2003-04 ($p = 0.000$) and 2007-08 cohorts ($p = 0.061$), when holding other variables constant. However, the fixed effects were much smaller for students in the 2007-08 cohort. Hispanic/Latino students in the 2003-04 and 2007-08 cohorts who attended public colleges and universities ($p = 0.002$ and $p = 0.002$, respectively) and private not-for-profit institutions ($p = 0.005$ and $p = 0.020$, respectively) were both more likely to receive higher Pell awards than their White, non-Hispanic counterparts when controlling for other variables. Asian students in the 2003-04 cohort at both sectors of colleges and universities, too, were more likely to have higher Pell awards ($p = 0.013$ and $p = 0.001$, respectively); however, the same was not true for students in the 1999-00 and 2007-08 cohorts. Finally, students who identified themselves as other, multi-racial or unknown and attended private not-for-profit colleges and universities in the 2003-04 cohort ($p = 0.081$) and public institutions in the 2007-08 cohort ($p = 0.045$) were

both more likely to receive higher Pell Grant awards than their White, non-Hispanic counterparts.

Students at public colleges and universities in the 1999-00 cohort whose mothers had the equivalent of a technical/vocational certificate, high school diploma, or below ($p = 0.028$), received higher Pell Grant award amounts than their counterparts whose mothers had an undergraduate degree or its equivalent. This was the case for students in the 2003-04 cohort ($p = 0.001$), as well as those in the 2007-08 cohort ($p = 0.000$) and the fixed effects are at a greater magnitude for later cohorts. Those students who attended public colleges and universities and whose mothers had an associate's degree or some college education also had positive fixed effects in the 2003-04 ($p = 0.001$) and 2007-08 cohorts ($p = 0.031$). However, in this case, the fixed effects were greater for the former cohort.

For those students who attended private not-for-profit colleges and universities, there was no fixed effect associated with mother's highest education level in the 1999-00 cohort. However, those students in either one of the latter two cohorts whose mothers had the equivalent of a technical/vocational certificate, high school diploma, or below ($p = 0.046$ and $p = 0.000$, respectively) had higher Pell Grant awards than their counterparts whose mothers had a bachelor's degree, when holding other variables constant. The fixed effects were greater for the 2007-08 cohort of students. Those students in the 2007-08 cohort and whose mother has an associate's degree or some college education ($p = 0.001$) were more likely to have higher Pell awards as well. In contrast, however, students who attended private not-for-profit colleges and universities whose mothers had a post-baccalaureate degree ($p = 0.062$) received less in Pell Grant awards than their counterparts whose mothers only had a college degree, when controlling for all other variables.

Domestic out-of-state students in the 1999-00 cohort who attended public colleges and universities ($p = 0.081$) and private not-for-profit institutions ($p = 0.000$) both received less in Pell Grant awards than their counterparts who attended colleges and universities in their states of legal residence. This, too, makes some sense, since students' socioeconomic statuses influence their decisions to pursue postsecondary education opportunities outside their home states (Kyung, 1996). Thus, presumably, Pell Grant recipients are not as geographically mobile. However, interestingly, being a domestic, nonresident student has no statistically significant difference in terms of amount received in Pell Grant funds for the 2003-04 cohort. Further, the result suggests that domestic, out-of-state students in the 2007-08 cohort who attended public colleges and universities ($p = 0.000$) were more likely to receive higher Pell Grant awards than their in-state counterparts. EFC of students in all three cohorts, the 1999-00 cohort ($p = 0.000$), 2003-04 cohort ($p = 0.000$), and 2007-08 cohort ($p = 0.000$), are negatively correlated with amounts received in Pell Grant awards. This is also true for analyses by institutional sectors. Since Pell Grant awards are determined by the EFC of students, this result comes as no surprise.

Fixed effects for institutional selectivity as well as for institutional controls paint an interesting picture. Students in the 1999-00 cohort who attended the most selective ($p = 0.005$), very selective ($p = 0.016$), moderately selective ($p = 0.011$), and minimally selective private not-for-profit colleges and universities ($p = 0.059$) received less in Pell Grant awards than their counterparts who attended open admission private institutions, when controlling for other variables. However, there were no statistically significant fixed effects from institutional selectivity for students attending their public counterparts. There also was no statistical difference in Pell Grant award amounts explained by institutional controls for students in the 1999-00 cohort.

In contrast, students in the 2003-04 cohort who attended private not-for-profit colleges and universities ($p = 0.040$) received more in Pell Grant awards than their counterparts who attended public colleges and universities. Unlike the 1999-00 cohort, the result suggests that for the 2003-04 cohort of students, attending more selective institutions in some cases positively correlated with Pell Grant award amounts. Students in the latter cohort who attended the most selective public colleges and universities ($p = 0.009$) received more in Pell Grant awards than their counterparts who attended open admission public institutions. Also, students who attended very selective private not-for-profit colleges and universities ($p = 0.094$) received higher amounts of Pell Grant awards than their counterparts who attended open admission schools. However, for the 2007-08 cohort, there was no statistically significant fixed effects in relation to institutional selectivity that explain Pell Grant awards.

State-level variables have little to no statistically significant relationship with students' Pell Grant award amounts. An exception was that for students in the 2003-04 cohort, increase in government ideology of a state in which their colleges and universities are located estimated lower Pell Grant awards ($p = 0.090$). However, when analyzing the data by institutional control, its statistical significance was lost for students either at public colleges and universities or their private not-for-profit counterparts. Also, students in that cohort who attended public colleges and universities in a state providing more in state higher education efforts have higher Pell Grant awards ($p = 0.056$). More specifically, one dollar increase of state appropriations toward postsecondary education for every \$1,000 in personal incomes equates to a 12 percent increase in Pell Grant awards. Finally, the result suggests that students in the 2007-08 cohort who attended colleges and universities in more liberal-leaning states are likely to receive more in Pell Grant

awards ($p = 0.006$). This was true for both students at public colleges and universities ($p = 0.096$) and at private not-for-profit institutions ($p = 0.053$).

Table 4.12

Estimated variance components of 2-level HLM analysis for Pell Grant awards, 1999-00, 2003-04, and 2007-08

	Pell Grant Awards (US\$: LN) in 1999-00			Pell Grant Awards (US\$: LB) in 2003-04			Pell Grant Awards (US\$: LB) in 2007-08		
Variable name	All b	Public b	Private NFP b	All b	Public b	Private NFP b	All b	Public b	Private NFP b
Estimated variance components	0.003	0.001	0.047	0.494	0.666	0.401	0.032	0.031	0.082
Standard deviation	0.053	0.030	0.216	0.703	0.816	0.633	0.178	0.176	0.286
P-value	(0.430)	(> .500)	(0.245)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Estimated within variance	2.597	2.703	2.232	3.491	3.590	3.171	3.346	3.297	3.373
Standard deviation	1.612	1.644	1.494	1.868	1.895	1.781	1.829	1.816	1.837
Within-state variance	0.464	**	0.526	0.464	0.462	0.468	0.529	0.534	0.520
Between-state variance	0.993	**	0.934	0.090	0.024	0.323	0.707	0.731	0.662

****Bold** indicates statistical significance with 5% confidence

***Italic* indicates statistical significance with 10% confidence

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty

Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

In Table 4.12, I report estimated variance components for two-level hierarchical linear model analyses of Pell Grant awards for students, by NPSAS cohorts. The result suggests that differences between states are statistically significant for the 2003-04 and 2007-08 cohorts, but not for the 1999-00 cohort for both analyses of the overall sample, as well as by institutional controls. For the latter two cohorts, the proportional variances explained for student-level and state-level variables explained are fairly good, except for students in the 2003-04 cohort who attended public colleges and universities.

The state-level differences for that group of students were not well captured by the model, it appears. For the 2003-04 cohort, 15 percent of differences in Pell Grant awards for students who attended public colleges and universities ($p = 0.000$) are between states, and 11 percent of the differences for their counterparts at private not-for-profit colleges and universities ($p = 0.000$) are between states. For the 2007-08 cohort, differences between states were very small, as less than one percent of differences in Pell awards for students at public colleges and universities ($p = 0.000$) were between states, and for students at private not-for-profit institutions, it was 2.4 percent ($p = 0.000$).

Pell Grant to Tuition and Fees Ratios

In Table 4.13, I reported estimated fixed effects of two-level hierarchical linear model analyses of Pell Grant award to tuition and fees ratios of students, by NPSAS cohorts. Pell to tuition ratios are computed as percentage ratios of Pell Grant award amounts to tuition and fees. For each cohort, I reported results from analyses of the full sample, as well as by institutional controls, which are represented by different columns in the tables. The result more or less mirrors those of Pell Grant awards, which are reported in the previous section. When the ratio is higher for a student, a greater share of his or her tuition and fees is covered by Pell Grant funds, thus lowering their out-of-pocket expenses for tuition and fees. When the Pell to tuition and fees ratio is above 100, a student is awarded Pell Grant monies above his or her tuition and fees charge.

The result suggests that there was little to no fixed effect of race/ethnicity on Pell to tuition ratios for students attended private not-for-profit colleges and universities in any of three NPSAS cohorts in this study. Only Black, non-Hispanic students in the 2003-04 cohort who attended private not-for-profit colleges and universities ($p = 0.001$) had statistically significant differences compared to their White, non-Hispanic counterparts. In contrast, being a traditionally underrepresented ethnic minority has some statistically significant correlation for students in both cohorts who attended public colleges and universities. Hispanic/Latino students in both the 1999-00 ($p = 0.000$) and 2003-04 cohorts ($p = 0.000$) had higher Pell to tuition ratios than their White, non-Hispanic counterparts. Black, non-Hispanic students in these two cohorts had contrasting results, as students in the 1999-00 cohort had lower Pell to tuition ratios ($p = 0.082$) than their White, non-Hispanic counterparts but students in the 2003-04 cohort had higher Pell to tuition ratios ($p = 0.011$) than their White, non-Hispanic counterparts. For Asian students, only students in the 2003-04 cohort had a statistically significant correlation ($p = 0.053$) and had

Table 4.13

Estimated fixed effects with robust standard errors of grand-mean centered 2-level HLM analysis for Pell to tuition rates, 1999-00, 2003-04, and 2007-08

Variable name	Pell to Tuition (%) in 1999-00			Pell to Tuition (%) in 2003-04			Pell to Tuition (%) in 2007-08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
	b	b	b	b	b	b	b	b	b
Intercept	32.1438 (0.001)	40.4646 (0.000)	12.7125 (0.000)	15.5381 (0.000)	22.1924 (0.000)	5.9061 (0.000)	21.7332 (0.000)	29.3583 (0.000)	8.3695 (0.000)
<i>Level-1: Student-level variables</i>									
Race/ethnicity									
Asian	-10.9792 (0.293)	-18.9928 (0.223)	-0.6041 (0.708)	4.7352 (0.016)	5.4336 (0.053)	-0.0374 (0.413)	1.7600 (0.566)	1.5356 (0.690)	-1.6213 (0.171)
Black, non-Hispanic	-13.8211 (0.131)	-21.6665 (0.082)	-0.8625 (0.686)	5.4023 (0.022)	8.2253 (0.011)	2.8395 (0.001)	3.8276 (0.297)	5.1211 (0.393)	2.9825 (0.077)
Hispanic or Latino	61.3456 (0.004)	57.0783 (0.000)	3.7900 (0.130)	6.4978 (0.007)	10.1814 (0.000)	0.7854 (0.413)	6.7450 (0.052)	6.9991 (0.123)	-1.1687 (0.136)
Others, multi-racial or unknown	2.7719 (0.519)	-9.5767 (0.233)	1.0906 (0.661)	-0.4859 (0.755)	0.4255 (0.854)	-0.7337 (0.415)	25.2363 (0.224)	36.3647 (0.226)	0.6109 (0.627)
A respondent is female.	-10.2961 (0.437)	-12.9245 (0.442)	1.1121 (0.345)	-0.7826 (0.200)	-0.8853 (0.349)	-0.6667 (0.048)	0.2679 (0.917)	-0.6630 (0.851)	1.6772 (0.002)
Mother's highest education									
GED or below	52.0469 (0.219)	65.9636 (0.192)	-1.4392 (0.514)	1.5588 (0.026)	3.2350 (0.003)	0.4506 (0.145)	1.3112 (0.419)	2.3165 (0.273)	0.2416 (0.670)
AA or some college education	-42.0439 (0.245)	-53.2482 (0.228)	0.2831 (0.903)	1.6752 (0.045)	3.3445 (0.006)	-0.4444 (0.268)	-0.8720 (0.587)	-0.4450 (0.858)	0.6653 (0.230)
Post-BA degrees	-4.5664 (0.118)	-3.1668 (0.386)	-0.4681 (0.637)	-0.3012 (0.611)	-1.4260 (0.205)	0.0469 (0.878)	2.6758 (0.325)	2.2150 (0.570)	0.5257 (0.423)
Is a respondent a resident of the state where his/her NPSAS institution is located?									
No; Domestic, out-of-state	-0.5384 (0.872)	-3.3133 (0.513)	0.1931 (0.792)	-0.6205 (0.424)	-5.2760 (0.000)	0.4525 (0.199)	-2.4350 (0.178)	-9.4553 (0.012)	-0.6755 (0.258)
No; International	-25.2231 (0.040)	-28.9260 (0.049)	-3.5620 (0.009)	-21.6135 (0.000)	-27.1458 (0.002)	-9.7692 (0.000)	-8.1481 (0.000)	-41.4619 (0.000)	-8.0462 (0.000)
A respondent is dependent	30.2878 (0.158)	43.5825 (0.121)	0.9735 (0.387)	-1.3828 (0.592)	0.8269 (0.829)	-4.7219 (0.100)	3.7508 (0.022)	7.7472 (0.001)	-1.4221 (0.258)
Estimated Family Contribution (LN)	-15.1384 (0.007)	-18.7333 (0.008)	-3.4519 (0.000)	-6.8778 (0.000)	-9.6127 (0.000)	-2.8989 (0.000)	-7.8109 (0.000)	-10.2619 (0.000)	-2.9118 (0.000)
Selectivity of the institution of attendance									
Most selective	-72.6733 (0.091)	-53.4992 (0.126)	-4.1315 (0.087)	9.1432 (0.065)	10.6009 (0.223)	0.5371 (0.703)			
Very selective	-83.8868 (0.070)	-65.9423 (0.086)	-6.4076 (0.067)	3.9827 (0.436)	2.3187 (0.783)	-0.5566 (0.665)	-26.5644 (0.041)	-36.1145 (0.082)	-4.7940 (0.116)
Moderately selective	-80.5734 (0.064)	-61.4134 (0.062)	-5.1015 (0.070)	1.2798 (0.800)	-1.8336 (0.821)	-0.0361 (0.978)	-23.7359 (0.035)	-28.3185 (0.052)	-3.3170 (0.270)
Minimally selective	-78.7638 (0.091)	-68.8978 (0.530)	-1.1952 (0.875)	-2.8434 (0.620)	-5.5078 (0.549)	-1.7080 (0.433)	-24.3642 (0.032)	-24.3646 (0.051)	-3.2894 (0.306)
A respondent is at a private not-for-profit institution	-17.9383 (0.000)			-6.1807 (0.000)			-15.0930 (0.000)		
Pell Grant revenues-to-operating revenues ratio of the institution of attendance	1.1989 (0.367)	5.9563 (0.114)	0.7030 (0.000)	1.3213 (0.000)	1.1725 (0.000)	0.5267 (0.079)	-0.0081 (0.902)	0.0325 (0.739)	0.0134 (0.648)
<i>Level-2: State-level variables</i>									
State appropriation for postsecondary education (in every \$1,000 in incomes)	0.3878 (0.751)	1.4702 (0.390)	-0.0869 (0.714)	1.2670 (0.002)	1.2949 (0.021)	0.2661 (0.269)	0.7335 (0.317)	0.8265 (0.362)	0.1969 (0.293)
Need based aid to total state aid ratio	0.0603 (0.449)	0.1003 (0.245)	-0.0156 (0.449)	-0.0540 (0.173)	-0.0613 (0.152)	-0.0501 (0.273)	0.0153 (0.874)	0.0173 (0.889)	-0.0390 (0.060)
Government ideology measure	0.1964 (0.144)	0.1940 (0.153)	-0.0344 (0.285)	-0.0374 (0.352)	-0.0634 (0.277)	-0.0309 (0.336)	0.0364 (0.484)	0.0950 (0.341)	-0.0161 (0.508)
Average distance between any two members of lower state houses	-0.1439 (0.202)	-0.1842 (0.057)	-0.0201 (0.286)	0.0187 (0.617)	0.0137 (0.801)	-0.0118 (0.544)	0.0256 (0.408)	0.0472 (0.284)	-0.0049 (0.700)

****Bold** indicates statistical significance with 5% confidence***Italic* indicates statistical significance with 10% confidenceSource: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty
Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

higher Pell to tuition ratios than their White, non-Hispanic counterparts when controlling for all other variables. There was no statistically significant fixed effect associated with race/ethnicity of students in the 2007-08 cohort when analyzed separately by institutional sectors.

Mothers' highest education levels only show statistically significant fixed effects for students in the 2003-04 cohort who attended public colleges and universities and whose mothers had the equivalent of a high school diploma or below ($p = 0.003$), or an associate's degree or some college education ($p = 0.006$), when holding other variables constant. The result suggests no statistically significant correlation for students in the 1999-00 cohort or 2007-08 cohort, or students in the 2003-04 cohort who attended private not-for-profit colleges and universities. In addition, for both cohorts and across the institutional controls, increases in Estimated Family Contributions of students lower estimated Pell to tuition ratios.

Domestic, nonresident students in the 2003-04 cohort who attended public colleges and universities had lower Pell to tuition ratios than their counterparts who attended schools in their states of legal residence ($p = 0.000$), when controlling for other variables. This was also true for students in the 2007-08 cohort ($p = 0.012$) with a greater magnitude of fixed effect. Residency status of the students in any of the three NPSAS cohorts in this study who attended private not-for-profit colleges and universities have no statistically significant correlation to Pell to tuition ratios. International students had lower Pell to tuition ratio for both cohorts as well as across the institutional sectors, compared to their domestic, in-state counterparts, which makes good sense, since only U.S. citizens and permanent residents are eligible for Pell Grant awards. The result for domestic, nonresident students at public colleges and universities is interesting when comparing the three cohorts. It suggests that between those three time points, tuition and fees for domestic,

out-of-state students at public colleges and universities rose; thus, students in the 2007-08 cohort had lower Pell to tuition ratios than their in-state counterparts.

The result suggests that for the 1999-00 cohort, institutional selectivity had a statistically significant correlation with students' Pell to tuition ratios. Students who attended very selective ($p = 0.086$) or moderately selective public colleges and universities ($p = 0.062$) had lower Pell to tuition ratios than their counterparts who attended open admission schools. Those students who attended the most selective ($p = 0.087$), very selective ($p = 0.067$), or moderately selective private not-for-profit colleges and universities ($p = 0.070$) also had lower Pell to tuition ratios than their counterparts who attended private not-for-profit open admission institutions. However, for students in the 2003-04 cohort, there was no statistically significant relationship between institutional selectivity and Pell to tuition ratios when HLM analyses were run by institutional sectors. The result of the HLM analyses for the entire 2003-04 cohort, however, suggests that students attending the most selectivity institutions are estimated to have about nine percent more ($p = 0.063$) Pell to tuition ratios than their counterparts attending open admission colleges and universities. For students in the 2007-08 cohort, fixed effects from institutional selectivity are statistically significant only for those students who attended public colleges and universities. For them, institutional selectivity negatively correlates with Pell to tuition ratios, as students at very selective ($p = 0.082$), moderately selective ($p = 0.052$), and minimally selective institutions ($p = 0.051$) all are likely to have lower Pell to tuition ratios than their counterparts at open admission institutions, when controlling for other variables. The result also suggests that institutional controls have a statistically significant relationship with Pell to tuition ratios. Students in all three cohorts—the 1999-00 cohort ($p = 0.000$) 2003-04 cohort ($p = 0.000$), and 2007-08 cohort ($p =$

0.000)—who attended private not-for-profit colleges and universities all had lower Pell to tuition ratios.

Estimated fixed effects of state-level variables are statistically significant for some variables for students in the 2003-04 cohort who attended public colleges and universities. Students who attended public colleges and universities located in states that spend more on higher education efforts are likely to have higher Pell to tuition ratios ($p = 0.007$). Increases of one dollar in state postsecondary education appropriations for every \$1,000 earned as personal incomes equates to an estimated increase of Pell to tuition ratios for students by about four percent. Also, students who attended public colleges and universities in a state where proportionally higher amounts of need-based grant aid are offered are likely to have lower Pell to tuition ratios. There were no statistically significant correlations with state-level variables for students in any of three NPSAS cohorts in this study and who attended private not-for-profit colleges and universities, except the 2007-08 cohort. Those students in the 2007-08 cohort whose colleges and universities were in states that spend proportionally more on need-based grant aid were likely to have lower Pell to tuition ratios ($p = 0.060$).

Table 4.14
Estimated variance components of 2-level HLM analysis for Pell to tuition rates, 1999-00, 2003-04, and 2007-08

Variable name	Pell to Tuition (%) in 1999-00			Pell to Tuition (%) in 2003-04			Pell to Tuition (%) in 2007-08		
	All	Public	Private NFP	All	Public	Private NFP	All	Public	Private NFP
	b	b	b	b	b	b	b	b	b
Estimated variance components	24.110	22.246	0.372	48.966	86.948	28.924	354.369	653.997	5.423
Standard deviation	4.910	4.717	0.610	6.998	9.325	5.378	18.825	25.573	2.329
P-value	(> .500)	(> .500)	(> .500)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)
Estimated within variance	130174.462	166123.150	214.226	564.433	773.131	73.704	2954.883	4122.467	268.558
Standard deviation	360.797	407.582	14.636	23.758	27.805	8.585	54.359	64.206	16.388
Within-state variance	**	**	**	0.459	0.523	0.474	0.188	0.210	0.233
Between-state variance	**	**	**	0.724	0.605	0.566	0.040	0.000	0.589

****Bold** indicates statistical significance with 5% confidence

****Italic** indicates statistical significance with 10% confidence

Source: Analysis of NPSAS 1999-00, 2003-04, and 2007-08 survey data, IPEDS, BEA, Grapevine, NASSGAP, Berry, et al., and Shor & McCarty

Statistical package: Raudenbush, S., Bryk, T., & Congdon, R. (2000). HLM 6 Hierarchical Linear and Nonlinear Modeling

In Table 4.14, I report estimated variance components for two-level hierarchical linear model analyses of Pell Grant award amounts to tuition and fees ratios for students by NPSAS

cohorts. The result suggests that differences between states are statistically significant for the 2003-04 and 2007-08 cohorts, but not for the 1999-00 cohort for both analyses of the overall sample, as well as by institutional control. For the latter two cohorts, proportional variances explained for student-level and state-level variables are fairly good, except for students in the 2007-08 cohort who attended public colleges and universities. The state-level differences for that group of students were not well captured by the model, it appears. For the 2003-04 cohort, 9.5 percent of differences in Pell Grant to tuition ratios for students who attended public colleges and universities ($p = 0.000$) are between states, and 28 percent of the differences for their counterparts at private not-for-profit colleges and universities ($p = 0.000$) are between states. For the 2007-08 cohort, the result suggests that 13.7 percent of the differences for students at public institutions ($p = 0.000$) are between states; however, for private school students, only 2.0 percent of the differences are between states.

Chapter Summary

In this chapter, I reported in detail on the results of statistical analyses conducted for this study. The HLM analyses for the three NPSAS cohorts(1999-00, 2003-04, and 2007-08) as well as separate analyses by institutional controls yielded varying fixed effect estimators. Some directions of regression coefficients seem to fall within the conventional wisdom of understanding tuition and fees as well as Pell Grant awards; however, there are some puzzling results reported in this chapter. In the following chapter, I revisit my research questions and address them by incorporating results outlined in this chapter, thus adding more contexts and nuances to the results of the statistical analyses.

Chapter Five

Discussion of the Results from the Statistical Analyses

This undertaking attempts to better understand student price demand for college education, as well as the roles of public policy in mitigating individual variance of such demand. To do so, I operationalized student price demand as tuition and fees, net tuition and fees and tuition discounting rates, and Pell Grant award amounts and Pell Grant award amounts to tuition and fees ratios. With these dependent variables, I ran statistical analyses to see what individual and/or state-level characteristics may explain them. I also attempt to examine if answers to those three research questions have changed over time, as policy environment and other surrounding environment of postsecondary education may have shifted.

I employed multi-level modeling to analyze data for the 1999-00, 2003-04, and 2007-08 cohorts of students included in National Center for Educational Statistics' (NCES) National Postsecondary Student Aid Study (NPSAS). Additional variables from NCES's Integrated Postsecondary Education Data System (IPEDS) as well as other sources were merged with student-level datasets derived from NPSAS data and created multi-level datasets, which consist of student-level and state-level datasets. Some institutional characteristics are included as student-level variables as a part of choices made by students in relation to the types of colleges and universities in which they enroll.

The descriptive statistics for student-level variables suggest that there are sizeable differences in students' monetary capital expressed in terms of Estimated Family Contributions (EFC) by race/ethnicity, as well as by institutional controls. The average tuition fees, net tuition fees, and tuition discounting rates also differ by race/ethnicity of students and by institutional controls, as does the average net tuition to income ratio. Likewise, the descriptive statistics for

state-level variables show some variations in policy preferences of states toward postsecondary education, operationalized for the purpose of this study as state higher education efforts and proportional shares of need-based grant aid programs in the overall direct student grant aid programs.

The multi-level analyses provide more precise estimations of fixed effects of each variable to dependent variables; in this section, I outline interpretations and discussion of key results of the statistical analyses reported in the previous chapter. I first start with discussion on results for tuition and fees; following sections are organized in the order of: net tuition and fees, tuition discounting rates, Pell Grant award amounts, and Pell Grant award amounts to tuition and fees ratios. Finally, I close this chapter by discussing the limitations of this study.

Tuition and Fees

Recalling the conceptual and analytic model of this study, tuition and fees are roughly where the price demand of a student meets the price set by a college or university of their choice, which varies by his or her individual characteristics. Colleges and universities' tuition and fee setting policies are influenced by various factors, as well. Theoretically, a student's ability to pay and other socioeconomic characteristics not based on academic merit should not influence tuition and fees to which students are charged. Instead, the vast number of differences in tuition and fees should be explained by institutional characteristics, as well as policy and political environments in which colleges and universities are situated. Thus, in this section, I am interested to see what individual characteristics of students are likely to shift the price demand curve for a particular student, as well as what institutional- and state-level characteristics may move price points set by individual colleges and universities.

Signs of “sticker shock.” The notion of “sticker shock” suggests that certain socioeconomic characteristics of students would discourage students from going to colleges and universities with higher price tags, before any grant or financial aid award is factored in for their net payment amounts (Fisher, 1990; Hearn & Longanecker, 1985). Also, in the earlier chapter, I discussed traditionally underrepresented minority students being more sensitive to college tuition and fees. These point to an assumption that there are fixed effects associated with variables that represent socioeconomic characteristics, as well as the race/ethnicity of students, in estimating tuition and fees. In fact, the result points to statistically significant fixed effects attributed to individual characteristics, namely mother’s highest education levels, and EFC of students; therefore the results corroborate the idea of “sticker shock” among students from lower socioeconomic statuses.

Estimated fixed effects of mother’s highest education levels. Mothers’ education levels, on the other hand, show statistically significant relationships with tuition and fees. Students from all three NPSAS cohorts in this study who attended public colleges and universities and whose mothers had a technical/vocational certificate, equivalent of high school diploma, or below were charged less in tuition and fees. Also, the same was true for students in the last cohort who attended private not-for-profit colleges and universities. Average EFCs of students whose mothers had a technical/vocational certificate, equivalent of high school diploma, or below are consistently below those of their counterparts whose mothers attained higher levels of education. For students in the 2007-08 cohort, on average, there was nearly a \$10,000 difference in EFC between those students whose mothers had a technical/vocational certificate, equivalent of high school diploma, or below and those with a bachelor’s degree or its equivalent. This gap is the widest among all three cohorts; in addition, the average EFC of those students did not rise over

time as the average EFC of students in other groups did. The proportional share of students who fall in this category was the highest in the 2007-08 cohort. These students presumably lack both financial resources and college-going culture; thus, their price demand may be less than their counterparts with more monetary and social capital. This role of socioeconomic status in explaining college-going and price demand is consistent with the college choice framework (Perna, 2006), as well as with a previous study, which discusses the sensitivity of low-income students to changes in tuition and fees (Cabrera & La Nasa, 2000)

Similarly, students in the 2007-08 cohort who attended public colleges and universities and whose mothers had an associate's degree or some college education are also likely to attend institutions with lower tuition and fees than their counterparts whose mothers had a bachelor's degree or its equivalent. This is a shift from the result for the 1999-00 and 2007-08 cohorts; however, it also makes good sense as their average EFC is still lower than their counterparts with higher education levels by about \$6,000. There was no statistically significant fixed effect for students whose mothers had a post-baccalaureate degree, except for those in the 2003-04 cohort who attended public colleges and universities, but that is partly because the average EFC for this group of students is rather close to that of students whose mothers had a bachelor's degree or its equivalent. In summary, the result suggests that fixed effects of mothers' highest education levels in relation to tuition and fees charged to students, and corroborates previous studies on "sticker shock" and roles of monetary and social capital in determining a student's price demand for college education.

Estimated fixed effects from EFC and race/ethnicity. Although some are statistically significant, the estimated fixed effects of EFC alone do not necessarily have a strong influence on tuition and fees for students when controlling for other variables. For instance, the EFC of

students in the 1999-00 cohort who attended public colleges and universities is negatively correlated with tuition and fees. However, a 10 percent increase in EFC only translates to less than a one percent decline in tuition and fees students are charged. Likewise, while EFCs of students in the 2007-08 cohort who attended public institutions are positively correlated with their tuition and fees, a 10 percent increase in EFC only translates to a half of a percent increase in tuition and fees charged. Also, for students who attended private not-for-profit colleges and universities, the same only equates to less than a fifth of a percent decline in tuition and fees. Thus, estimated fixed effects of EFC appear rather marginal to tuition and fees students are charged. This finding, however, is an interesting one, as the direction of regression coefficients point to negative; this does not necessarily support the notion of “sticker shock,” where students from lower socioeconomic status tend to avert higher price tags. However, this may be due in part to the fact that EFC only represents one dimension of different forms of capital that affect student price demand for college education.

Also, quite interestingly, the result suggests that the race/ethnicity of students has little fixed effect in predicting statistically significant differences in tuition and fees for minority students compared to their White, non-Hispanic counterparts, except Asian students in the 1999-00 cohort and in the 2007-08 cohort, as well as Hispanic/Latino students in the 2007-08 cohort who attended public colleges and universities. Asian students, in fact, paid higher sticker price tuition and fees on average than their White, non-Hispanic counterparts, suggesting that they are not as susceptible to “sticker shock” as other traditionally underrepresented minority students may be, and behave more like White, non-Hispanic students when it comes to price responsiveness. This finding corroborates findings from previous studies (Heller, 1997; Paulsen & St. John, 2002), and is less surprising. However, it should be noted that the NPSAS variable

for Asian students is aggregation of various Asian ethnic backgrounds. I acknowledge that this result should not be over generalized for all Asian students, given socioeconomic disparities within that group of students. A study on difference in student price demand for college education among the Asian population has its own merit, should disaggregated data of Asian students become available.

What is rather counterintuitive is that when controlling for other variables, being students belonging to a traditionally underrepresented minority does not make a difference in tuition and fees they are charged at their choices of colleges and universities. This is an interesting finding that, on the surface, does not corroborate previous studies. However, it may just be that race/ethnicity variables are a good proxy for other socioeconomic characteristics, and since the model for this study includes multiple variables that represent socioeconomic characteristics of students, race/ethnicity may lose its predicting power in the overall model. Perhaps more troubling is that even after controlling for mother's highest education levels and EFC, Hispanic or Latino students still observe "sticker shocks" in 2007-08, when compared to White, non-Hispanic students. In previous studies, Hispanic or Latino students have been said to have similar price responsiveness as Black, non-Hispanic students (Heller, 1997; Paulsen & St. John, 2002), however, it seems that the pattern may have been recently broken. This, perhaps, indicates the growing socioeconomic diversity within traditionally underrepresented minority populations in higher education.

Hispanic or Latino representation in postsecondary education has grown steadily in recent years, while Black, non-Hispanic participation remains rather stagnant over time (NCES, 2011; Santos & Sáenz, 2013; US Census, 2012). In fact, the concern over the growing population of Hispanic or Latino students and shortcomings of policy solutions that cater to their needs are

well articulated by Santos and Sáenz (2013). They argue that Hispanic or Latino students are not benefiting from current student aid policies, and building on the work of Leslie and Brinkman (1987) and Heller (1997), they further assert that recent increases of tuition and fees, or as they put it, a “college tuition spiral,” has more greatly harmed this population than other race/ethnic groups (Santos & Sáenz, 2013). The finding of this study corroborates their findings, as the sign of “sticker shock” for Hispanic or Latino students become more evident in the recent cohort. It further corroborates their calls for more nuanced policy approaches for the Hispanic or Latino population that can address their unique needs regarding college access and affordability.

State-level variance of tuition and fees. It should be noted that price demand of students are, in general, elastic, or rather flexible to changes in tuition and fees; thus, changes in college enrollment due to tuition and fee increases are relatively small (Hemelt & Marcotte, 2011). And, since tuition and fees are set by colleges and universities, and in cases of some public institutions, by states, fixed effects of student-level variables may be small. The analyses of variance components suggest that indeed, a large part of differences in tuition and fees are shown between states. For students who attended public colleges and universities, 14 percent of differences in the 1999-00 cohort, 43 percent of differences in the 2003-04 cohort, and 20 percent of difference in the 2007-08 cohort were between states; for their private not-for-profit counterparts, 43 percent, 63 percent, and 34 percent of differences, respectively, were between states. For public colleges and universities, the sizeable differences accounted for between states make logical sense, since tuition and fees are often subject to state policy decisions.

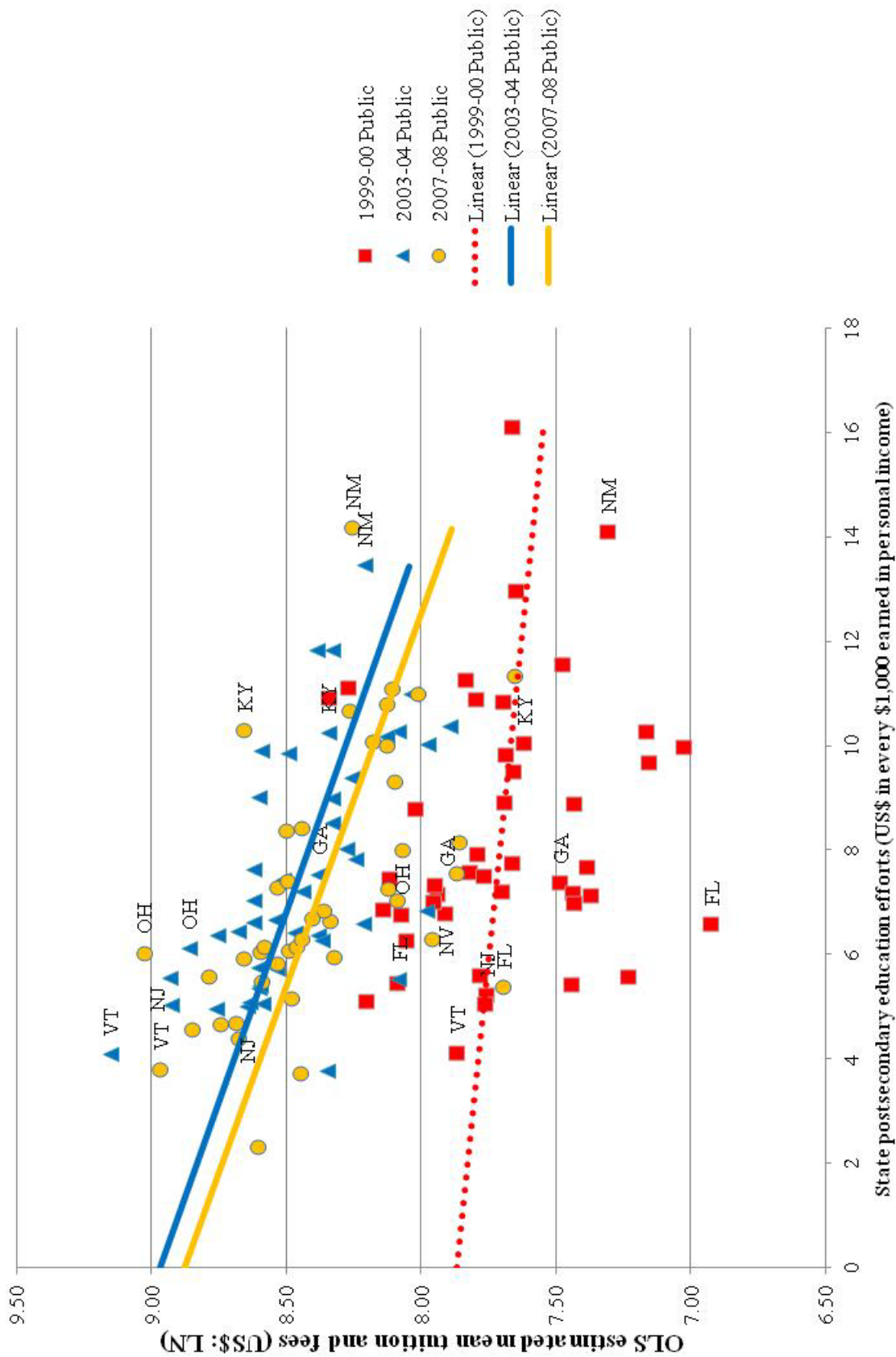
Interestingly, when running multi-level analyses for students who attended private not-for-profit colleges and universities, more differences are proportionally accounted for between states than those for students who went to public institutions. However, in terms of fixed effects of state-

level independent variables, for the most part, only students at public colleges and universities observed statistically significant effects.

State postsecondary education efforts matter. In Figure 5.1, I plotted state postsecondary education efforts against OLS estimated means for tuition and fees at public colleges and universities in natural log for each state. As displayed in the figure, generally, state postsecondary education efforts negatively correlated with tuition and fees for both sectors of colleges and universities. While estimated mean tuition and fees for the 2003-04 and 2007-08 cohorts are relatively close with each other, the 1999-00 cohort has much lower estimated means, overall. This pattern conforms to recent and on-going surge of college tuition and fees nationwide, which started in the early part 2000s.

Some states emerged as upward outliers in the Figure 5.1, namely Kentucky, New Jersey, New Mexico, Ohio and Vermont. In all these states, state legislatures do not have the primary authority for establishing tuition and fees, unlike states such as California and Texas (Boartman & L'Orange, 2006). Instead, in New Jersey, New Mexico, and Ohio, tuition and fees are primarily set by individual institutions; in Vermont, the system governing board sets tuition and fees; and in Kentucky, the statewide coordinating board sets tuition and fees (Boatman & L'Orange, 2006). Conversely, Florida consistently appears as a downward outlier in Figure 5.1, and in that state, the state legislature holds the primary authority to set tuition and fees (Boartman & L'Orange, 2006). In fact, several states whose primary tuition and fees setting authority is within individual institutions appear to be plotted above the trend lines. This suggests that in order to keep tuition and fees lower for students, in addition to state postsecondary education efforts, states' authority in setting tuition and fees is also a crucial factor. Although the

Figure 5.1 State postsecondary education effort v. Tuition and fees, by states, by NPSAS cohorts, for public colleges and universities



governing structure and tuition setting authority are not controlled for in this dissertation, this finding comes as no surprise, as several previous studies point to interactions of state governments and higher education governing structures in influencing tuition and fees setting as well as state postsecondary education appropriations (Doyle, 2012; Nicholson-Crotty & Meier, 2003; Tandberg, 2010).

In terms of estimated fixed effects of state postsecondary education efforts, students in the 1999-00 cohort, however, did not have statistically significant fixed effects of state postsecondary education efforts, operationalized in this study as a state's postsecondary education appropriation in terms of every \$1,000 earned as personal income. However, for the 2003-04 cohort, one-dollar increases in state postsecondary education appropriations meant a 5.5 percent decline in tuition and fees for students who attended public colleges and universities in that state and a 3.1 percent decline in tuition and fees for their counterparts at private not-for-profit colleges and universities. The average state postsecondary education efforts for the 2003-04 cohort was \$7.30; thus, a one-dollar increase translates to, on average, a 14 percent increase in state postsecondary education efforts. For students in the 2007-08 cohort who attended public colleges and universities, the fixed effects were even greater, as the same would result in a 6.2 percent decline in tuition and fees when controlling for other variables. However, this was not the case for those students who attended private not-for-profit colleges and universities. The result largely makes sense, since at public colleges and universities, tuition and fees often depend on state appropriations for postsecondary education. It confirms that the role of state postsecondary education efforts, or public dollars put toward subsidized postsecondary education, plays a key role in mitigating price demand for college education of students.

State student grant preference. States' student grant programs also have some influence on tuition and fees for students. Attending a public college or university located in a state with a higher proportion of need-based grant aid in all state-sponsored student grant programs meant higher tuition and fees for the students in the 1999-00 and 2003-04 cohorts. Five percent increases in proportional share of state need-based grant aid meant approximately 15 percent increases in tuition and fees. On average, 75 percent of state-sponsored grant programs were distributed as need-based grants for the 1999-00 cohort. Although to a smaller extent, for those students in the 2003-04 cohort, five percent increases in proportional share of state need-based grant aid meant approximately 1.6 percent increases in tuition and fees. There was no statistically significant difference in tuition and fees for students in the 2007-08 cohort, which is attributed to proportional shares of need-based aid. This result for the earlier two cohorts of students at public colleges and universities are largely consistent with outcomes of high-tuition, high-aid models. Also, the absent fixed effects for the 2007-08 cohort may suggest that states are increasingly becoming more sensitive to public outcries to lower the cost of college education; thus, grant aid policies are no longer tied as closely to changes in tuition and fees.

Estimated fixed effects of institutional selectivity and Pell revenues. Institutional characteristics appear to have a more sizeable correlation with tuition and fees charged to students. There is a large variance between institutional sectors, which makes sense, as public four-year and private not-for-profit four-year colleges and universities have large variability in tuition and fees charged. Thus, I ran separate analyses by institutional controls. For public colleges and universities, fixed effects for institutional selectivity diminished for the 2003-04 cohort, although the most selective public institutions still charged higher tuition and fees than their open admission counterparts. For the 2007-08 cohort, students who attended more selective

institutions, both public and private not-for-profit ones, are likely to be charged higher tuition and fees. Since some of the most selective public colleges and universities are often flagship institutions, they tend to charge higher tuition and fees than their non-flagship counterparts. This is also true for more selective private not-for-profit colleges and universities, as some of the most competitive private schools have higher price tags.

For both public and private colleges and universities, as well as for the earlier two NPSAS cohorts, more reliance on Pell Grant revenues in their operating budget decreases tuition and fees. This result suggests that Pell Grant awards and recipients were concentrated in colleges and universities with lower price tags. Also, this finding appears to counter the popularly known Bennett hypothesis (Bennett, 1987), which asserts that colleges and universities take advantage of Pell Grant revenues by inflating their tuition and fees. For the first two cohorts, findings from this study suggest that colleges and universities charge lower tuition and fees to students when they rely on a proportionally larger share of operating revenues from Pell Grant awards. The result suggests that higher reliance on Pell Grant revenues for operating revenues for colleges and universities are not an outcome of higher sticker prices, but more likely to be connected with larger numbers of Pell recipients at their institutions. However, the fixed effects were not statistically significant for the 2007-08 cohort. In other words, the Pell reliance of the institution that a student attends has no predictive power for their tuition and fees in the last cohort; thus, high Pell reliance is not concentrated only on low sticker price institutions. Since Pell Grant awards are directed toward students from low-income backgrounds, this result may signify an increased economic diversity at colleges and universities, irrespective of their price tags.

Summary for fixed effects explaining tuition and fees. In summary, the result suggests that sticker shock, or price demand differentials of individual students for college education

attributed to non-academic factors, exists in the current state of higher education. Mothers' highest education levels, which appear to capture both monetary and social capital of students, have some predicting power of students' price demand for college education and therefore the tuition and fees charged to students. In addition, at the state level, while state higher education appropriations help keep tuition and fees at public colleges and universities lower, greater reliance on need-based financial aid programs tends to raise tuition and fees for students.

A priori for this study was that institutional characteristics as well as, for public colleges and universities, state postsecondary education efforts, carry some statistically significant fixed effects in explaining tuition and fees, since states and institutions have the ability to set sticker prices. Also, if "sticker shock" does not exist, and the theoretical model of student price demand and direct student aid (Heller, 1997) indeed applies, then, sticker prices of tuition and fees are not expected to have significant differences attributed to socioeconomic characteristics of students. However, the result corroborates the findings of Cabrera and La Nasa (2000), in a sense that students from lower socioeconomic backgrounds are more sensitive to sticker prices, as manifested in statistically significant differences in tuition and fees. This pattern of "sticker shock" persists in all three cohorts of this dissertation, suggesting a deep-rooted problem, and perhaps, even the lack of a decisive policy direction to counteract it. In fact, the study corroborates the findings of Santos and Sáenz (2013) to the extent that Hispanic or Latino students face a growing challenge for college access in the face of the current public policy surrounding postsecondary education access and affordability.

Net Tuition Fees and Tuition Discount Rates

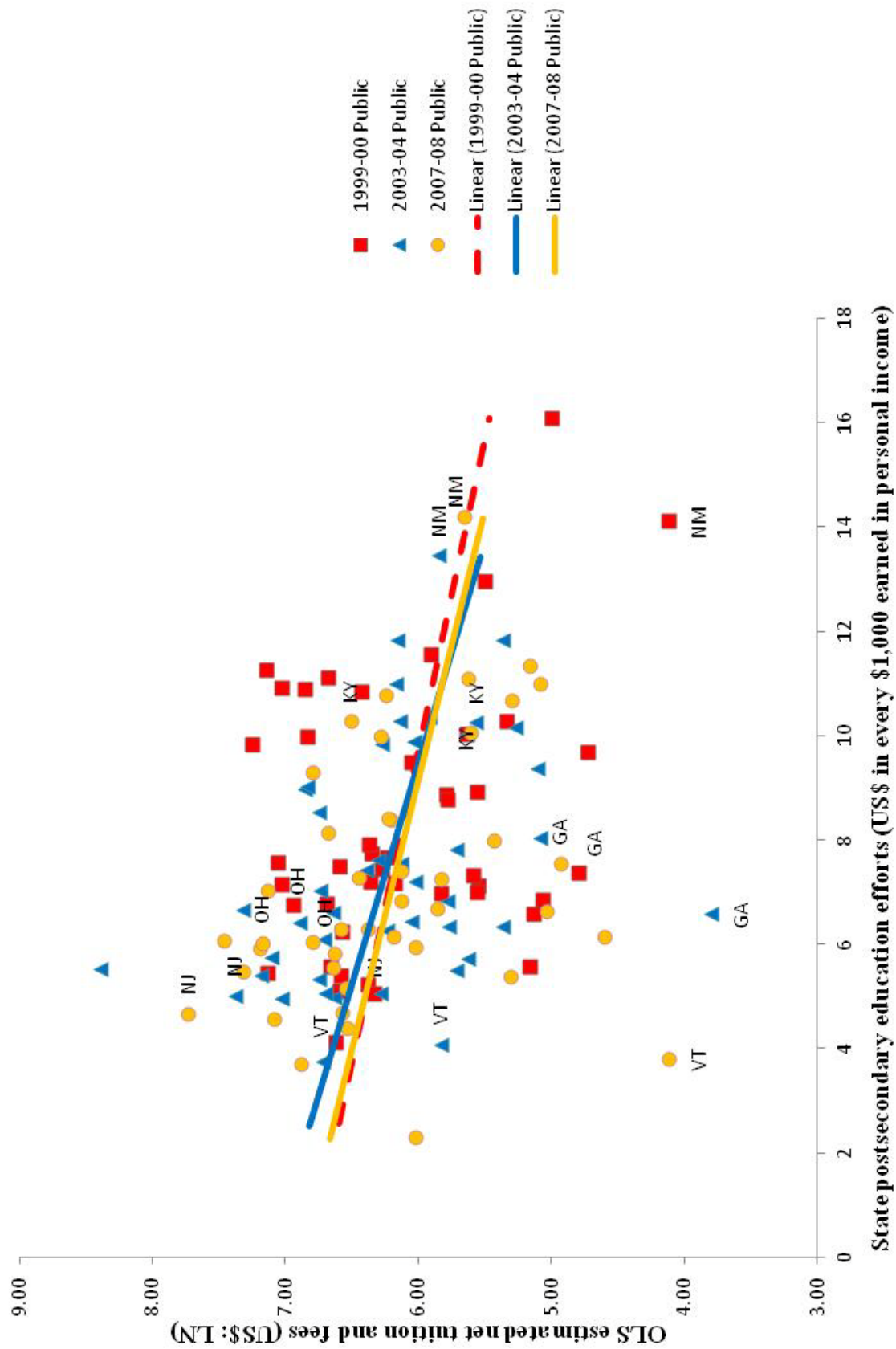
Net tuition and fees are balances of tuition and fees after grant aid is applied to students. Many students receive grant aid based on financial need and/or academic merit from varying

sources, including states, federal government, institutions, and private organizations. Therefore students often do not pay “sticker prices,” but rather only pay a portion of tuition and fees, or net tuition and fees. The results suggest that by and large, estimated fixed effects of both individual-level and state-level characteristics for net tuition and fees are larger than that for the analyses of tuition and fees. However, it should be noted that some of these larger fixed effects may be due to differences already present at sticker price for students. For example, if sticker price of tuition and fees are already lower for a student, then naturally, net tuition and fees for students are relatively lower than others.

For the purpose of this study, tuition discounting rates are defined as percentage ratios of differences between tuition and fees charged to students and net tuition and fees students paid. Therefore, tuition discounting rates may represent either a part of students’ financial need mitigated by grant aid and/or that their academic merit warranted monetary incentives to attend a particular school. Assuming that students are making decisions to attend colleges and universities not based on sticker prices but rather based on net tuition and fees, they are rough estimates of where price demands of students for college education meet the prices of college education itself. Or, tuition discounting rates represent a distance along which “sticker price” shifts to meet where student price demand for college education is located.

State-level variance in net tuition and fees, and tuition discounting rates. There are sizeable differences in net tuition and fees, as well as for tuition discounting rates explained between states, particularly for students who attended public colleges and universities. Figure 5.2 displays scatter plots of state postsecondary education efforts against OLS estimated means of net tuition and fees in natural log for students at public colleges and universities by states. As

Figure 5.2 State postsecondary education efforts v. Net tuition and fees, by states, by NPSAS cohort, for public colleges and universities

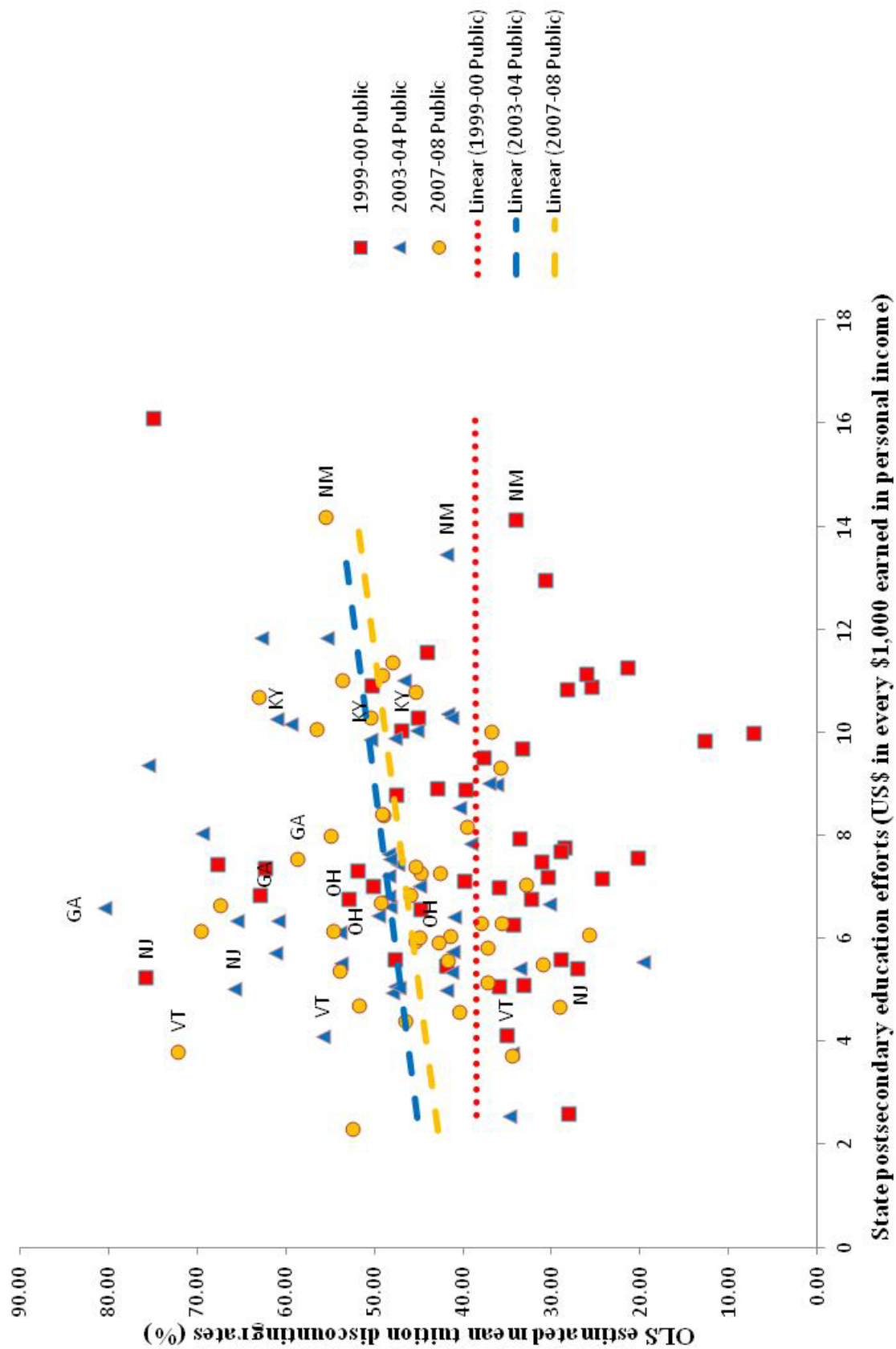


shown in the figure, state postsecondary education efforts have negative correlation with net tuition and fees, but compared to that of tuition and fees (Figure 5.1), the trend lines are much tighter, suggesting that net tuition and fees for students at public colleges and universities have not risen as much over time despite increases in their sticker prices.

High fee, high aid and low fee, high aid. Comparing both Figure 5.1 and Figure 5.2, Vermont stands out as a unique case, as it is an upward outlier for tuition and fees, yet is a downward outlier for net tuition and fees. Vermont offers nearly 100 percent of its state grant aid for students as need-based aid, which is called “Vermont Incentive Grants.” Vermont residents who are accepted or enrolled as a full-time students in an undergraduate degree program are eligible (Vermont Student Aid Corporation, n.d.); Vermont’s program is one of the most generous program among all states and the maximum amount in 2007-08 was \$10,600 (NASSGAP, 2008). In Figure 5.3, I plotted state postsecondary education efforts against OLS estimated mean for tuition discounting rates by states, and Vermont is also an upward outlier in this graph. This makes a point that a “high fee, high aid” model could work to keep college affordable, when the state offers a large enough student aid program; however, it should also be noted that Vermont is an outlier in this case, or an extreme example.

There also is a case of a “low fee, high aid” model. Georgia has OLS estimated mean tuition and fees lower than the trend line, and net tuition and fees are somewhat downward outliers, despite relatively low state postsecondary education efforts, as well as its OLS estimated mean tuition discounting rates being upward outliers. Georgia has a well-known Georgia HOPE Scholarship program, which awards full-ride scholarships to Georgia residents meeting certain academic merit standards. In total dollar amounts, Georgia appropriated the largest sum of state sponsored non-need based student grant in the United States, and in 2007-08, it was nearly a half

Figure 5.3 State postsecondary education efforts v. Tuition discounting rates, by states, by NPSAS cohort, for public colleges and universities

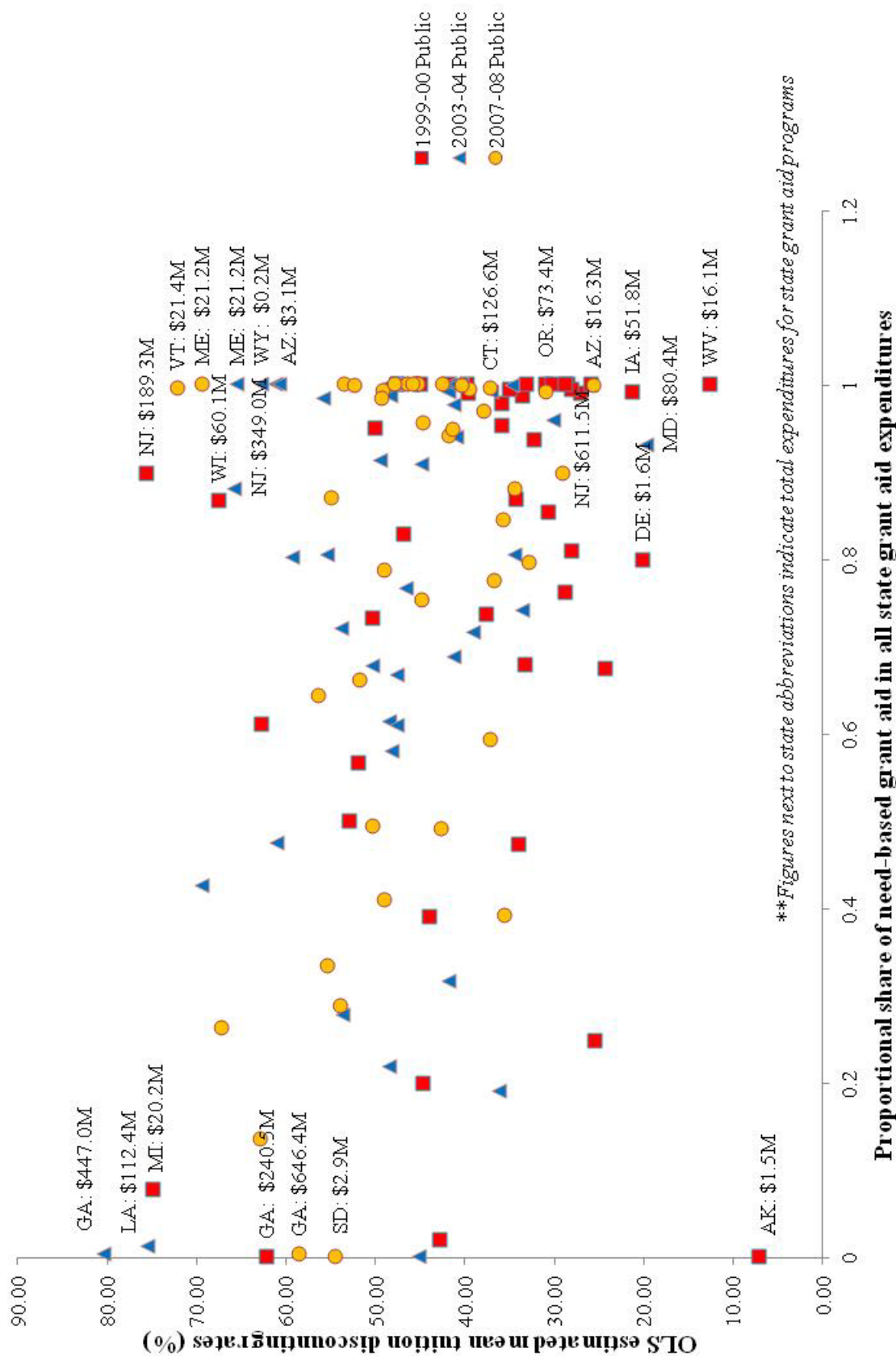


a billion dollars (NASSGAP, 2001, 2005 & 2009). Consequently, Georgia has relatively low tuition and fees, both in sticker and net prices, as well as higher-than-the-norm tuition discounting rates.

Tuition discounting and state policy preferences. However these two examples are rather extreme cases in the entire study sample. While net tuition and fees for public colleges and universities show a rather clear negative correlation with state postsecondary education efforts, some effects may be carried over from differences in, as well as correlation with, sticker price tuition and fees. In fact, Figure 5.3 offers a rather mixed picture of how tuition discounting rates, or difference between sticker price tuition and fees and net prices, may be correlated with state postsecondary education. As a general trend, it appears that tuition discounting rates for public colleges and universities shifted upward since the 1999-00 cohort. This conforms to the overall trend of tuition and fees and net tuition and fees displayed in Figure 5.1 and Figure 5.2. OLS estimated means for tuition and fees generally shifted upward over time, yet Figure 5.2 suggests that OLS estimated net tuition and fees have generally not moved over the three cohorts. This is consistent with national trends in rising tuition and fees at public colleges and universities, as well as the rise of a “high fee, high aid” model across the nation.

Yet how states offer tuition discounting to students does not appear to be correlated with either state postsecondary education efforts or state preferences between need-based and non-need-based grant aid. Figure 5.4 plots proportional shares of need-based grant aid in all state student grant expenditures against OLS estimated mean tuition discounting rates of states. This is largely true for the case of students at private not-for-profit colleges and universities as well. As displayed in this figure, even among the states which offer nearly all grant aid as need-based, there is a wide variation of average tuition discounting rates, and these averages do not

Figure 5.4 Proportional share of state need-based aid v. Tuition discounting rates, by states, by NPSAS cohorts, for public colleges and universities



necessarily correspond to overall aid expenditures. In contrast, states with more non-need based grant aid programs tend to have higher tuition discounting rates on average. What appears to be the key for higher tuition discounting rates and lower net tuition and fees is the overall generosity of aid programs offered, as observed in the cases of Vermont and Georgia.

Estimated fixed effects of race/ethnicity of students. Unlike sticker price of tuition and fees, the race/ethnicity of students has statistically significant fixed effects in explaining net tuition and fees. This is, perhaps, because there are student financial aid programs that directly or indirectly target students who are racial/ethnic minorities.

Net tuition and fees for Black, non-Hispanic students and Hispanic/Latino students who attended public colleges and universities were consistently lower than that of White, non-Hispanic students. However, there was no statistically significant difference in their net tuition and fees at private not-for-profit institutions, except for Black, non-Hispanic students in the 2003-04 cohort. For the 2007-08 cohort, on average, White, non-Hispanic students have an EFC that is 3.2 times greater than that of Black, non-Hispanic students and 2.3 times greater than that of Hispanic/Latino students. In turn, net tuition and fees for Black, non-Hispanic students are 28 percent less and for Hispanic/Latino students are 44 percent less than that of their White, non-Hispanic counterparts when controlling for other variables. Public colleges and universities often offer need-based grants for students; since on average EFCs for both Black, non-Hispanic students and Hispanic/Latino students are lower than that of White, non-Hispanic students, the result makes good sense. However, this also raises a question as to why Hispanic/Latino students have a greater magnitude of negative fixed effects for net tuition and fees, despite, on average, their EFCs being higher than that of Black, non-Hispanic counterparts. In fact, the analysis of tuition discounting rates shows no statistically significant difference between Black, non-

Hispanic students and White, non-Hispanic students; however, Hispanic/Latino students have higher tuition discounting rates by 7.7 percent than their White, non-Hispanic counterparts when holding other variables constant. This suggests that Hispanic/Latino students have access to more options for tuition discounting aside from those based on EFC.

Also, interestingly, the result suggests statistically significant fixed effects for students in the 2007-08 cohort who identified as other, multiracial, or unknown. For those who attended public colleges and universities, their net tuition and fees were lower by 41 percent than their White, non-Hispanic counterparts. Similar effects were not shown for the previous two cohorts, and there was no sizeable change in a proportional share of students in this group over time. However, over time, the average EFC for this group remained rather steady; thus, it is likely that their relative financial need became significant enough to make a difference in net tuition and fees compared to their White, non-Hispanic counterparts. However, similar to Hispanic/Latino students, even though their average EFC is greater than the other two racial/ethnic minority groups, the magnitude of the fixed effects are much larger than that of Black, non-Hispanic students. Their tuition discounting rates were higher by 8.6 percent than that of their White, non-Hispanic counterparts, which is also a greater magnitude of fixed effect than that of Hispanic/Latino students. In addition, tuition discounting rates for those students who attended private not-for-profit colleges and universities are also greater by 5.8 percent than their White, non-Hispanic counterparts, while tuition discounting rates for either Black, non-Hispanic students or Hispanic/Latino students have no statistically significant difference when holding other variables constant. Thus, the result suggests that this group, too, has some access to more options for tuition discounting aside from those based on EFC to which other minority students do not necessarily have access.

Among race/ethnic groups, on average, Asian students had the highest net tuition and fees for all three NPSAS cohorts in this study and their tuition discounting rates conform more with White, non-Hispanic students than other racial/ethnic minority groups. In fact, their average tuition discounting rates, for those who attended private not-for-profit colleges and universities in 1999-00 and 2007-08, were lower than that of their White, non-Hispanic counterparts. Consequently, Asian students in the 2007-08 cohort who attended private not-for-profit institutions had higher net tuition and fees than their White, non-Hispanic counterparts when controlling for other variables. This is interesting, since the average EFCs for White, non-Hispanic students are still greater than that of Asian students by approximately \$2,500. In fact, the statistical analysis indicates that their tuition discounting rates are lower by 5.8 percent than White, non-Hispanic students, even after controlling for other variables. The result suggests that Asian students do not have access to non-EFC-based aid that may be available to their White, non-Hispanic counterparts.

For the most part, however, fixed effects of race/ethnicity of students are not statistically significant for those who attended private not-for-profit colleges and universities. The result suggests that when controlling for other variables, there is no statistically significant difference in net tuition and fees or tuition discounting rates for students from racial/ethnic minority groups and that of White, non-Hispanic students. This is despite the fact that the average EFCs for White, non-Hispanic students are far greater than that of minority students. This result suggests that net tuition and fees, as well as tuition discounting rates at private not-for-profit institutions, are not sensitive to financial needs of students manifested by race/ethnicity variables. However, as I noted in the earlier section, race/ethnicity might not be comprehensive enough to capture different forms of capital that determine student price demands.

In fact, unlike race/ethnicity variables, mothers' highest education levels have statistically significant fixed effects for net tuition and fees as well as tuition discounting rates for both students who attended private not-for-profit colleges and universities and those who attended public colleges and universities. The result largely suggests that the lower the mothers' highest education level is, the higher tuition discounting rates students receive, thus resulting in lower net tuition and fees. This was the case for students in the 1999-00 and 2007-08 cohorts at both sectors of colleges and universities, when their mothers' highest education level was at a technical/vocational certificate, equivalent of a high school diploma, or below. For students in the 1999-00 cohort, net tuition and fees were lower by 31 percent for students at public colleges and universities and by 41 percent for those at private not-for-profit institutions than their counterparts. In 2007-08, their net tuition and fees were lower by 32 percent for students at public colleges and universities, but by 18 percent for those at private institutions.

This is an interesting result, since the difference in average EFC expanded between the 1999-00 cohort and 2007-08 cohort. For the earlier cohort of students who attended private institutions, the difference on average EFC was about \$8,900, but for the 2007-08 cohort, the gap expanded to over \$10,000. This suggests that while public colleges and universities remain sensitive to financial needs of students, private not-for-profit institutions are not as accommodating in reducing tuition and fees for those students with greater financial need. In fact, the fixed effects for tuition discounting rates also are smaller for the 2007-08 cohort than for the 1999-00 cohort. Students in the 1999-00 cohort who attended private colleges and universities had 10 percent more in tuition discounting rates than their counterparts whose mothers had a bachelor's degree or its equivalent; however, in the 2007-08 cohort, the difference was only 3.2 percent when holding other variables constant. Public colleges and universities, on

the other hand, appear to be more sensitive to students' financial needs. Net tuition and fees are lower for those students whose mothers had less than a bachelor's degree, and their tuition discounting rates are higher than that of those students whose mothers had an undergraduate degree or its equivalent.

Residency status of students. Generally, domestic, out-of-state students and international students have higher net tuition and fees as well as lower tuition discounting rates than their in-state counterparts. This makes sense for public colleges and universities, since available state-supported aid programs often require students to establish in-state residency first. Accordingly, fixed effects for both net tuition and fees and tuition discounting rates are smaller for private not-for-profit institutions. This is, perhaps, because for the purpose of this study, sources of tuition discounting are aggregated and not separated by sources. Some grant aid programs for students at private institutions may have residency requirements, and some may not. However, interestingly, net tuition and fees for international students at private not-for-profit colleges and universities had no statistically significant difference compared to that of in-state students in the 2003-04 and 2007-08 cohorts. Also, the tuition discounting rates for those students in the 2007-08 cohort were not statistically different from that of their in-state counterparts. In that same cohort, the net tuition and fees, as well as tuition discounting rates for domestic, out-of-state students were not statistically different from those of in-state students. Since state-sponsored grant programs often are limited only to state residents, one possible explanation is that there was more financial aid from non-state sources (e.g., institutional and private sources) offered for the 2007-08 cohort at private not-for-profit colleges and universities. This hints at a greater effort by enrollment management at those institutions to recruit talents from out of state.

Institutional characteristics, and net tuition and fees and tuition discounting. A few key institutional characteristics explain net tuition fees. Private colleges and universities offer, on average, more tuition discounting than their public counterparts. Highly selective colleges and universities do not have statistically significant differences in tuition discounting rates or net tuition fees; however, tuition discounting rates are higher on average at colleges and universities in the second and third tier of selectivity. This perhaps is due to those institutions using tuition discounting as a way to attract academically competitive students. The results show that students who forwent their first choice school for financial reasons received, on average, higher tuition discounts, which suggests that additional aid awards may sway students to consider their second and third choice schools. However, for the 2007-08 cohort, there was little to no statistically significant difference in net tuition and fees attributed to institutional selectivity when holding other variables constant. While students who attended very selective private colleges and universities had higher net tuition and fees than their open admission counterparts, for others, there was no statistical difference. Interestingly, for students in that cohort who attended private not-for-profit colleges and universities, there was no statistical difference in tuition discounting rates either when holding all other variables constant. This result contrasts with the results from the earlier two cohorts. For students at public colleges and universities, however, tuition discounting rates correlate with institutional selectivity, although there is no statistical difference for net tuition and fees. This result suggests that public colleges and universities offer sufficient tuition discounting to mitigate price differences between institution types.

Summary for fixed effects explaining net tuition and fees, and tuition discounting rates. Similar to tuition and fees, state postsecondary education efforts explain lower net tuition and fees for students. Although, since tuition discounting rates are not as well explained by these

efforts, it is rather difficult to conclude that more state subsidy to postsecondary education equates to lower net tuition and fees for students, except to the extent it lowers sticker price tuition and fees. State preference in grant aid types also paints a mixed picture regarding its effect in explaining tuition discounting for students, thus, its role in explain net tuition and fees. The result suggests that for net tuition discount rates and net tuition and fees for students, more specifics about grant aid programs at each state may matter, such as coverage of aid awards.

At the individual level, estimated fixed effects from statistical analyses suggest that students have various opportunities to receive some financial assistance, either need-based or non-need-based. This is consistent with the general understanding of how direct student aid works in the United States. However, there is an alarming trend observed from the result of this study, particularly at private not-for-profit colleges and universities. At public colleges and universities, traditionally underrepresented minority students tend to have higher tuition discounting rates, as well as lower net tuition and fees; however, this was not the case at private not-for-profit institutions. Since descriptive statistics suggests a sizeable difference in EFC, net tuition and fees as well as tuition discounting rates should reflect variance in individual students' means of affording a college education. Absent such effects in the result, this suggests that there is not enough socioeconomic diversity at our private not-for-profit colleges and universities.

Pell Grant Awards and Pell Grant Award Amounts to Tuition and Fees Ratios

Results suggest that Pell Grants awards are largely explained by students' ability to pay for college, which makes perfect sense as the Pell Grant program is designed as a need-based direct financial aid program. Fixed effects of race/ethnicity as well as mothers' highest education levels to Pell Grant award amounts increased over time for students who attended private not-for-profit colleges and universities. While there was no statistically significant difference in Pell

Grant awards by race/ethnicity or mothers' highest education levels for students in the 1999-00 cohort, for the latter two cohorts, students from traditionally underrepresented minority backgrounds received more in Pell Grant awards at private institutions. This result suggests that socioeconomic diversity at private not-for-profit colleges and universities may have increased over time, and more students from underrepresented minority backgrounds are attending private institutions.

The estimated fixed effects for institutional selectivity also tell a similar story. Students in the 1999-00 cohort who attended more selective private not-for-profit colleges and universities received less in Pell Grant awards when controlling for other variables. However, for the 2007-08 cohort, there was no statistical difference in Pell award amounts by institutional selectivity for both students at public and private not-for-profit institutions. This result suggests that students with financial needs are not concentrated at certain types of colleges and universities.

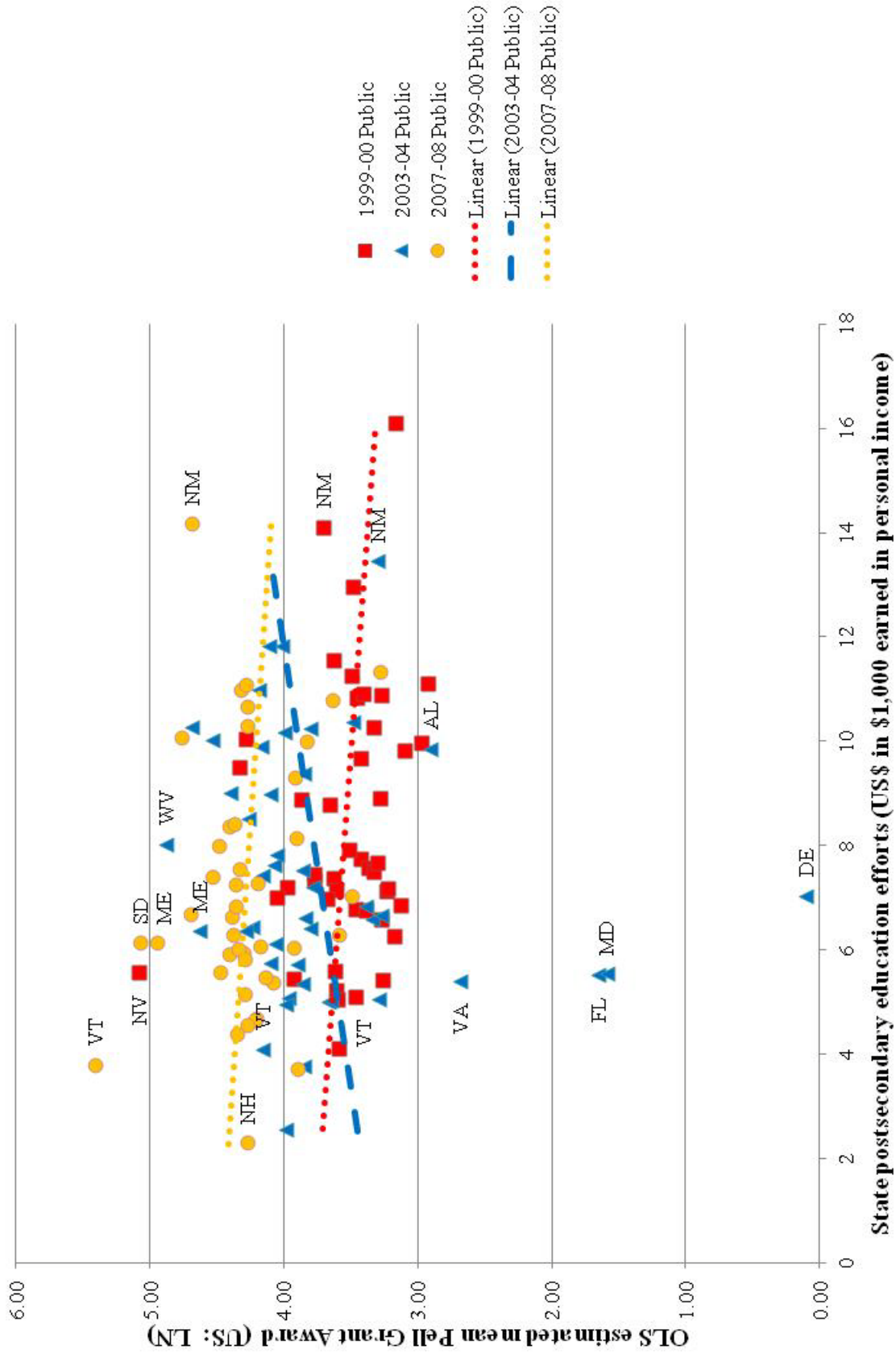
Changes in fixed effects for students' residency status also present an interesting story. Domestic, out-of-state students in the 1999-00 cohort received less in Pell Grant awards than their in-state counterparts, while there was no statistical difference for those in the 2003-04 cohort. However, those in the 2007-08 cohort who attended public colleges and universities received more in Pell Grant funds than their in-state counterparts when controlling for other variables. Since a Pell Grant award follows students based on their financial need defined by EFC, regardless of in which states they pursue their college education, award amounts should not vary by residency status. One explanation for the result of the 1999-00 cohort is because students who leave their home state to pursue postsecondary education are likely to be from more affluent socioeconomic backgrounds (Kyung, 1996). In that case, they are likely to be receiving less for Pell Grant awards. However, this does not necessarily explain the result for the 2003-04 and

2007-08 cohorts, unless the profile of students who out-migrate from their home states has shifted since the 1999-00 NPSAS year and options to pursue college education outside of their home states have become more readily available. Another possible explanation is that nonresident surcharges at public colleges and universities have increased the cost of attendance high enough to affect Pell Grant eligibility of students.

State-level variance in Pell Grant awards and Pell to tuition ratios. In Figure 5.5, I plotted state postsecondary education efforts against OLS estimated mean of Pell Grant awards by states for public colleges and universities. There is no statistical correlation between Pell Grant awards and state postsecondary education efforts, or state subsidy, except for the 2003-04 cohort. However, the 2003-04 cohort has a few outlier states, as displayed in Figure 5.5. Besides Delaware, Florida, Maryland and Virginia, the results are rather tightly clustered. Thus, the result suggests that Pell Grant awards are not used as a substitute for state postsecondary education efforts and subsequent tuition and fee increases. This counters the Bennett hypothesis (Bennett, 1987), which indicates that institutions (thus, in some cases, states) take advantage of federal direct student grant awards by raising tuition and fees. The result suggests that this is not necessarily the case. However, it should also be noted that Vermont again appears as an upward outlier, where the state receives much higher average Pell Grant awards.

Except Florida, tuition and fees, as well as net tuition and fees, in the three states discussed are relatively close to the trend lines, and their tuition discounting rates are relatively lower than the norm. None of their in-state need-based grant programs offer extraordinarily generous awards. These outlier states show somewhat puzzling results, and since these showings for the 2003-04 cohort are outliers in the overall study sample, it is difficult to conclude precisely what may have caused these states to have such low Pell Grant awards for this particular cohort.

Figure 5.5 State postsecondary education efforts v. Pell Grant awards, by states, by NPSAS cohort, for public colleges and universities



Government ideology and Pell awards. Those students in the 2007-08 cohort who attended colleges and universities in more liberal-leaning states received higher Pell Grant awards, although the margins are rather small. For students at public colleges and universities, a 10-point shift toward further liberal leaning translates to a 2.6 percent increase in Pell Grant award amounts, and for students at private not-for-profit colleges and universities, the same equates to 5.6 percent increase in Pell Grant award amounts. Similar fixed effects were not shown for the earlier two cohorts. In the earlier section, I noted that students in this cohort who attended private not-for-profit colleges and universities in more liberal-leaning states are likely to have higher tuition and fees, as well as net tuition and fees.

More precisely, a 10-point shift toward further liberal leaning translates to a 9.1 percent increase in tuition and fees and 12 percent increase in net tuition and fees, when controlling for other variables. It appears that students in more liberal-leaning states have higher financial need than those who are not; thus, it makes sense that they have higher Pell Grant awards. However, this does not necessarily explain the result for students at public colleges and universities. This, too, does not have a good explanation, as government ideology does not have a statistically significant relationship in explaining tuition and fees and thus financial need for students based on the price. Another possible explanation is that in liberal leaning states, more less affluent students pursue college education, thus, greater financial needs are present.

It may also be that government ideology is not a good predictor in the statistical model of this dissertation, after all. While previous studies suggest roles of government ideology in explaining tuition and fees (Doyle, 2012), as well as state postsecondary education appropriations (Nicholson-Crotty & Meier, 2003; Tandberg, 2010), the unit of analysis for these studies are institutions and states, respectively. What this suggests is that government ideology

may be a construct for state policy preferences (i.e., state postsecondary education appropriations) that explains tuition and fees, or Pell awards. Since state postsecondary education efforts are controlled separately in my statistical model, the true effects of government ideology may be absorbed in them instead.

Summary for fixed effects explaining Pell Grant awards. The result suggests that Pell Grant awards are largely explained by individual characteristics of students, and appear to be attributed to their financial needs. This should be a somewhat welcome finding for Pell Grant administrators, since the awards are intended to help students with the greatest financial needs. The result also suggests that Pell awards are not necessarily substituting for less state postsecondary education efforts, or at least, not at the statistically significant level. This may or may not be good news for postsecondary education access and price demand of students, since it may also mean that Pell Grant awards are insufficient to mitigate rising costs of tuition and fees at the state level. This difference between “is not substituting” and “cannot substitute” has greater policy implications, which I discuss in the next chapter.

The result, however, also suggests limited effects of Pell Grant awards beyond mere discounting of tuition and fees. Pell Grant awards to tuition and fees ratios show no statistical difference between race/ethnicity of students, as well as mother’s highest education levels in the most recent cohort in this dissertation. For example, Hispanic or Latino students who attended public colleges and universities in the 1999-00 and 2003-04 cohorts had, on average, higher Pell Grant awards to tuition and fees ratios compared to their White, non-Hispanic students; however, the effect disappears for the 2007-08 cohort. Theoretically, students with greater financial need should have a larger Pell Grant awards to tuition and fees ratio than those without financial need when attending the same school. This is a supposed function of student aid awards to mitigate

different price demand for a college education (Heller, 1997); however, the result suggests that this hypothetical function has not been fulfilled for the 2007-08 cohort. This further confirms the finding of Santos and Sáenz (2013) in the sense that current financial aid policy does not necessarily advance Hispanic or Latino students in postsecondary education. This finding makes a strong case that the notion of “sticker shocks” appears for Hispanic or Latino students and direct student grant awards fall short in counteracting it for them.

Potential Limitations of This Study

While the statistical analyses in this study attempts to explain student price demand for college education via tuition and fees, net tuition and fees and Pell Grant awards of individual students for three different time points, this study does not offer a time-series analysis for those dependent variables. However, by comparing three different cross-sections of students over time, I was able to offer in this study some discussion of potential trends or shifts in fixed effects. Given that NPSAS is the largest and periodically administered nationally representative study of student financial aid, comparison of three cross-sections still offers a good insight for researchers.

Because of the nature of NPSAS datasets, the results discussed in this paper are based on cross-sectional samples of students who are already in college. Therefore, this study does not offer insight on how individual students’ price responsiveness and price demand for college education determined their decisions to pursue postsecondary education or their decisions to enroll in one college over another. However, this study is still able to dissect tuition and fees charged to students, as well as net tuition and fees students paid, by controlling for variables that are said to influence price responsiveness and price demand of students. Although the study cannot determine causal inferences, it can point researchers to likely characteristics that explain

student price demand for college education as well as policies that can mitigate individual differentials attributed non-academic characteristics.

College costs for students are a complex phenomenon that involves not only tuition and fees, but also living expenses, other educational expenses (such as textbooks and learning technology), and forgone earnings. This dissertation only focuses on a part of such costs, tuition and fees; therefore, its finding cannot be generalized for the entire costs of students. However, tuition and fees are at the core of the college affordability discussion; thus the finding of this dissertation still has great relevance and falls within the norm of the scholarship surrounding student price responsiveness.

Much like college costs for students, college student aid also refers to several different types of programs, namely need-based grants, non-need based grants, subsidized loans, unsubsidized loans, and tax credits. For this dissertation, I focused only on grants, or free money for students to directly reduce their college costs. Loans were not included, since they do not reduce college costs, but instead simply postpone payments by mortgaging students' potential earnings. They warrant separate analysis. Tax credits were not included in this study, since their application and award disbursement are much different from that of grants, and reliable student unit record data is not readily available. This, too, warrants a separate analysis beyond the scope of this dissertation.

Chapter Summary

In this chapter, I discussed results from statistical analyses of this study. State higher education efforts, which are operationalized as state appropriations for postsecondary education in every \$1,000 earned as personal incomes, consistently noted statistically significant fixed effects for tuition and fees, net tuition and fees, and tuition discounting for students at public

colleges and universities; they work in favor of lower price tags of college education. However, having states dispersing more grant aid awards based on financial need, as opposed to non-need-based grants do not necessarily lower average net tuition and fees for students, or, worse, do not help boost tuition discounting rates for students. While there is an extreme example of a successful “high fee, high aid” model, however, the devil is in the details. Given the examples of Georgia and Vermont, both non-need-based and need-based grant aid can offer greater tuition discounting rates for students; however, it also depends on how generous award programs are. The fixed effects for private not-for-profit colleges and universities, however, were limited; although, when they are statistically significant, the effects conform to that of public colleges and universities. These findings pose some implications and consideration for state postsecondary education policies, which I discuss in the next chapter.

At the individual level, although students who are from less traditionally college-bound backgrounds appear to receive higher tuition discounting rates, and pay less in net tuition and fees, the “sticker prices” of their choices of colleges and universities are lower than their more affluent and traditionally college-bound counterparts. The quality of colleges and universities cannot be judged based on their price tags; however, the result suggests a potential division in types of college access afforded to students based on their cultural, monetary, and/or social capital. This, too, is an important consideration for postsecondary education policies around issues of access and affordability. In the next chapter, I further discuss the policy implications of findings outlined in this study.

Chapter Six

Policy Implications and Conclusion

My aim in this dissertation is to better understand student price demand for college education, and roles of public policy in mitigating individual differences in such demand. I approach this study from the human capital investment perspective and college choice framework, as well as from the understanding of student price responsiveness to college costs. The results of my statistical analyses and subsequent discussion of what individual and state-level fixed effects may mean in explaining price demand for college education of individual students lead to several policy implications both at state and federal levels. As I conclude my dissertation, in this chapter I first outline potential implications to public policy of postsecondary education drawn from this study, and then make a brief note about directions of future studies.

Policy Implications

There are several potential policy implications of this dissertation, and in this section, I divide them into two general categories of discussion. One is at a state level, which primarily discusses postsecondary education efforts for each state, as well as state preferences regarding grant aid programs. Based on the findings of this study, I argue that sticker shock, defined as the price demand differentials attributed to student's socioeconomic background, exists, and that state postsecondary education appropriations and subsidies are a more effective policy option than need-based grant aid. The other one is at the federal level, which concerns the Pell Grant, as well as federal policy interventions in states. Drawing from the results of this dissertation, I contend that Pell Grant awards are distributed to those with financial need. However, I argue that the Pell Grant program, as public policy in its current form, does not shift price demand for college education of students; thus it weakly facilitates equitable access to postsecondary

education opportunities. Finally, I ask what the role or roles of direct student aid policy, as well as institutional subsidy, should be. I offer more detailed discussion about potential policy implications in the following sections.

State postsecondary education efforts. This finding is rather intuitive and obvious; however, state appropriations for operations of postsecondary education—or state postsecondary education efforts, as operationalized in this dissertation—plays an important role in both keeping price tags and net tuition and fees lower for students. The effects were mostly observed for students at public colleges and universities, but higher subsidies to postsecondary education at the state level serve to lower tuition and fees as well as net tuition and fees for students. Therefore, such a subsidy remedies individual differences in student price demand for college education. In fact, state postsecondary education efforts do a better job in explaining lower tuition and fees, both sticker prices and net prices, than do state preferences regarding direct student grant aid programs.

In contrast to state subsidy for higher education, offering proportionally more need-based grant aid alone does not necessarily explain lower tuition and fees for students. Instead, the result suggests that, more or less, students in states with a higher proportion of need-based student grants have higher tuition and fees, as well as lower tuition discounting rates. In other words, a “high tuition, high aid” model does not necessarily lower net tuition and fees or offer adequate tuition discounting for students on average. This has an important implication for adopting tuition and fees policies that work in tandem with cross-subsidized institutional student aid, as well as the reliance of colleges and universities, and states, on revenues from tuition and fees in lieu of declining state postsecondary education appropriations.

There is a well-documented and alarming trend that state support for higher education has declined over time and tuition and fees for students have risen (Baum & Ma, 2011; Desrochers & Wellman, 2011; Heller, 2006; Santos, 2007; St. John, Daun-Barnett, & Moronski-Chapman, 2013). Often colleges and universities, as well as individual states, justify tuition increases by making more need-based grant aid available. Also, since the price elasticity of demand for college tuition and fees is largely believed to be high, this makes it somewhat easier to increase tuition and fees. However, considering the result of this dissertation, which suggests a sizeable difference in price demand for college tuition and fees by student socioeconomic status, relying on grant aid to achieve both affordability and accessibility goals may not be sufficient. Although those students from underprivileged backgrounds appear to have lower net tuition and fees as well as, to an extent, higher tuition discounting rates, the fact still remains that their sticker prices, too, are somewhat lower. This means that tuition discounting may be helping them to afford their final choices of colleges and universities, but is not mitigating their initial price demand for college education by bringing those students to colleges and universities in a higher price bracket. Therefore, the impact must be made at the sticker price level by means of institutional subsidy to shift the price of colleges and universities to where it meets price demand of underprivileged students.

Visually, the intended policy implications of need-based direct financial aid programs and institutional subsidy can be displayed as Figure 6.1. Theoretically, direct student financial aid programs shift the price demand for low-income students, D_p , upward to D_{p*} , therefore equalizing the probability of enrollment at tuition and fees, T , for both low-income and high-income students. This upward shift is labeled as l_H in Figure 6.1. However, the result of this study suggests, as labeled as l_R in Figure 6.2, that direct student aid programs do not shift the

price demand for low-income students, D_P , upward, but instead simply lower net tuition and fees to T_N , without increasing the probability of enrollment for low-income students. On the other

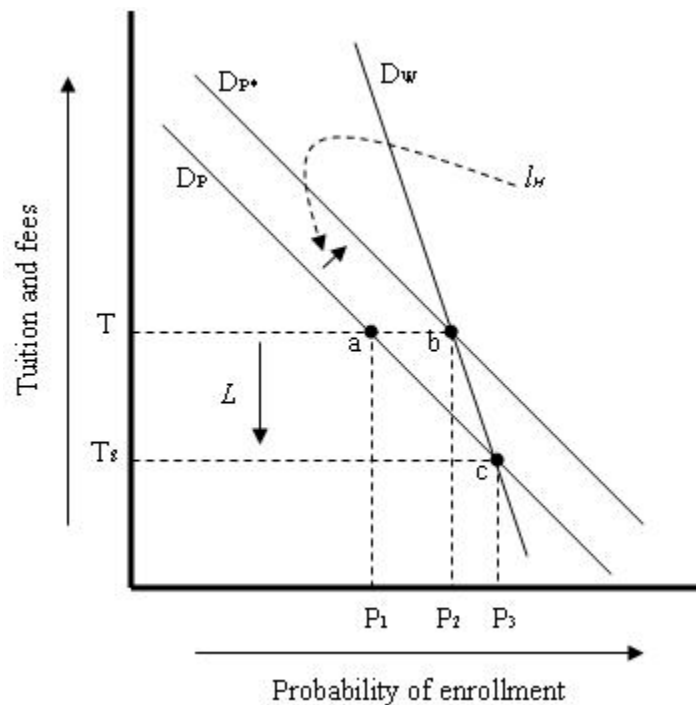


Figure 6.1 Hypothetical effects of direct student aid and institutional subsidy on student's price demand for college education (Heller, 1997)

hand, state postsecondary education efforts, or subsidies, can lower tuition and fees to T_S , where the probabilities of enrollment for price demands of both low-income students and high-income students meet. This shift is labeled as L in both Figures 6.1 and 6.2. Therefore, the policy implications of more state postsecondary education subsidies achieve a more equitable access to college education.

One policy solution to ensure an adequate level of state postsecondary education efforts, or state subsidy to higher education, is Maintenance of Effort (MOE) provisions at the federal-level. This policy sets a minimum threshold for state postsecondary education efforts or subsidy for higher education, which is also a part of state eligibility requirements to receive certain

federal financial incentives (Alexander, Harnisch, Hurley, & Moran, 2010). In other words, this is a form of policy inducement that is fairly typical for the federal government to enact when

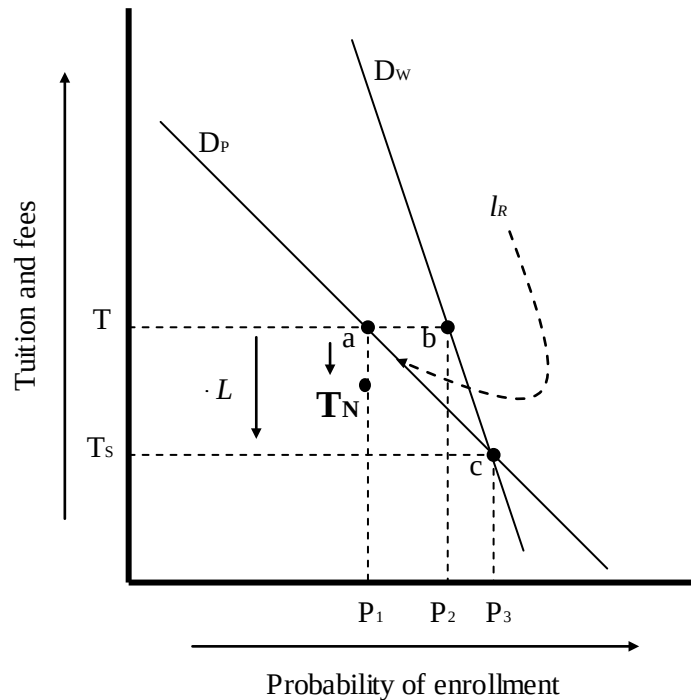


Figure 6.2 Effects of direct student aid and institutional subsidy on student's price demand for college education, based on the study result

it is compelled to impose a certain policy decision to states within the Union (Stone, 2002).

While this is a common practice seen in programs such as Medicaid and interstate freeways as well as affordable housing projects (Stone, 2002), and K-12 education finance has a MOE-like arrangement, tying MOE to state subsidies for postsecondary education programs is a relatively new concept (Alexander, et al., 2010). It should also be noted that the concept of federal policy intervention for higher education is not entirely a foreign concept; in fact, there is a successful precedent. An earlier form of state-sponsored direct student grants is attributed to federal incentives for state governments. A program established in the 1972 Higher Education Act amendments was the State Student Incentive Grants (SSIG), which provided federal matching

funds for state student grant programs (Alexander, 2001b). The number of states offering direct student grants increased by over thirty states in the first four years of this amendment being enacted, including Colorado, Florida, Georgia, Massachusetts and Virginia, whose state constitutions were amended to allow offering direct aid and loan programs (Alexander, 2001b). In addition, an analysis of an early attempt that was enacted in conjunction with the American Recovery and Reinvestment Act (ARRA) of 2009 shows that the MOE provision successfully induced maintenance of state postsecondary education efforts compared to the previous fiscal year and tuition and fees level for students (Alexander, et al., 2010).

The result of this dissertation suggests that, in order to mediate differences in price demand for college education of individual students, there still needs to be an effort at the sticker-price level. While increasing the proportion of need-based grants does not appear to lower either net tuition and fees or increase tuition discounting for students, increasing state postsecondary education subsidies emerges from this study as a policy alternative to keep tuition and fees, both in terms of sticker prices and net prices for students. Thus implementing a policy solution such as MOE provisions can have a significant impact in augmenting price demand for college education for students from underrepresented minority backgrounds. In a time when states struggle to provide for postsecondary education, the idea that the state should provide more subsidy to higher education may sound easier said than done; however, the earlier mentioned outcome of the ARRA of 2009 shows encouraging potential for the MOE provision. There are also attempts to create new revenues for state postsecondary education and distribute via grant aid programs, such as the Middle Class Scholarship Program proposed by the California Legislature in 2011. Having MOE provisions enacted can change the course of state-

level discourse, and encourage states to reinvest in postsecondary education in a way that can have greater impact.

Pell Grant awards are not substituting for state higher education efforts. There is no statistically significant relationship that suggests state postsecondary education efforts are being substituted for by increased Pell Grant awards for students. Also, attending college and universities with higher reliance on Pell Grant revenues does not necessarily mean that students are charged high tuition and fees, as the Bennett hypothesis suggests. My analyses instead suggest that individual fixed effects from socioeconomic characteristics of students have a statistically significant relationship in explaining Pell Grant awards for individual students. Students with characteristics of traditionally underrepresented minorities in postsecondary education tend to receive higher Pell Grant awards, which is consistent with the intent of this particular program. In other words, the finding of this study suggests that Pell Grant awards are directed where they are intended. Further, there is no evidence to conclude that either colleges and universities or states are taking advantage of what is often considered as a *de facto* federal subsidy for higher education.

This may or may not be good news for those students with greater financial need. Since tuition and fees are correlated with state postsecondary education efforts, Pell Grant award amounts not moving along with them may mean that Pell awards are insufficient to mitigate growing needs of students resulted by rising tuition and fees. It is no secret that the purchasing power of the Pell Grant has declined over time; thus, should state postsecondary education subsidies continue to decline, the Pell Grant must be increased even more substantially.

Pell Grant role in mitigating student price demand. However, when considering Pell Grant award amounts to tuition and fees ratios, there are somewhat concerning results. The result

suggests that there are not many statistical differences between the proportion of tuition and fees students were charged and what is covered by Pell Grant awards, either between race/ethnicity or mother's highest education level. If students are attending similarly priced colleges and universities, this proportion should have some statistically significant differences. As in, assuming two students with different financial needs attend the same college, the Pell Grant award amount to tuition and fees ratio of these two students should be significantly different. However, absent such variance, this suggests that students are attending colleges and universities with sticker prices proportionate to their financial resources. Therefore, the result of this study suggests that price demand for college education is not necessarily shifted by the Pell Grant, in the sense that the Pell Grant is encouraging students with greater financial constraints to pursue college education at a higher price bracket. This poses a critical challenge to the role of Pell Grant and direct student aid programs in mitigating differences in individual student price demand for college education. Pell Grant awards may be making college education affordable in terms of adjusting one's ability to pay for a college, but as a policy, Pell Grants may not be sufficient to shift price demand for college education. Perhaps the timing of the award determination, which is based on prior year income information from tax returns and thus occurs after college application and admission decisions are made, may be limiting its reach as a policy intervention or in a economics term, an incentive, for broader college access and affordability measures.

In fact, this study is not the first to make such suggestions. Several previous studies pose questions regarding the effects of direct student financial aid programs beyond means for college affordability, and their breaking barriers to college access, by critiquing the timing and process of award disbursements (See Deming & Dynarski, 2010; Dynarski & Scott-Clayton, 2008; Long

& Riley, 2007, etc.). While a series of policy reports around federal financial aid reforms have emerged from the recent effort by the Bill and Melinda Gates Foundation, most focus on direct student aid programs as incentives for the college completion agenda. I argue that there is still much room for discussion at the front end of this conversation, or the access piece. The role of federal student aid programs as economic incentives to shift price demand for college education must be considered more thoughtfully and in parallel to the ongoing conversation around the completion and workforce development agenda.

Revisiting roles of direct student aid and the imperfect market of higher education.

In this study, I took the position that direct student aid, as well as institutional subsidy and other policy alternatives, are not merely measures of college affordability. Instead, from the equity perspective, I framed these public policies as measures to achieve equity in postsecondary education opportunities not just in the sense of college-going versus not going to college, but the type of college education students can pursue. In other words, I view financial aid policies, as well as state postsecondary education efforts, not as measures to help students afford their choice of college education after their decision has been made, but instead, as measures that influence the types of decisions students make. I argue, based on the finding of this dissertation, that public policy falls short in achieving such an objective. Stratification of higher education opportunities (see Birnbaum, 1983) is not a new concept. But especially given the introduction of a “new” class of postsecondary offering, or an online platform, we should anticipate even further stratification of educational opportunities and their quality. Thus policymakers should be more concerned about not just helping students afford their chosen paths, but focusing on how to navigate and incentivize students’ pursuit of quality postsecondary education opportunities regardless of students’ cultural, monetary, or social capital. The overall finding of this

dissertation suggests that current policy does not do enough to influence students' choices within postsecondary opportunities.

This assertion, which calls for more rigorous government policy intervention to influence student price demand for college education, poses a challenge to the principle of the free market economy; however, it should be noted that the notion that postsecondary education is working within the confines of a free market is not necessarily an accurate assumption to begin with. McMahon (2009) asserts that poor or imperfect information about benefits of postsecondary education, making the market inefficient and resulting in underinvestment, results in the market failure of higher education. This nature of postsecondary education as an imperfect market economy should not be taken lightly in policy discourse.

The finding of this dissertation around the notion of “sticker shocks” counters the assumption and reliance on a “rationality of human capital investment” that grant aid programs hold (St. John, et al., 2013). In fact, this finding and confirmation of “sticker shocks” affirms the irrational and more nuanced nature of college-going and college choice decisions, and should caution against policy makers relying on a “rationality of human capital investment” approach. Absent perfect information surrounding college going and college choice decisions, including availability of student grant aid, public policy that can be applied widely, namely through subsidy, is more suitable and likely to be more effective.

Future Studies

As it is true for any manuscript, this dissertation is only a small piece in the continuum of scholarship. For each door I attempted to open in this study, it seems as if many more doors appeared in front of me. The more I read the results of my statistical analyses and the more I think about my discussion, countless more questions arise that intrigue my curiosity. The

statistical analyses introduced in this study can be refined; however, more broadly, the following areas emerge as potential topics for future studies.

More nuanced study on college choice. There needs to be a more nuanced approach to college choice. While the scholarship of college choice and profile of college-bound students are well established, there is a need to study stratification within the college-going population. This dissertation suggests sticker shock among students, or price demand differentials that are attributed to socioeconomic characteristics of students. As the stratification of higher education persists, it is important to understand how the price demand for college may influence students' decisions to choose one college opportunity over another. Especially since returns of higher education are not equal across the board, in order for postsecondary education to be truly be the vehicle of social mobility, this discussion is pertinent. Beyond explaining which students go to college and which do not, and how public policy can facilitate college-going, research must continue to address what public policy facilitates pursuit of what type of postsecondary education, as well as to explore factors and constructs of college choice and student price demand.

Geography and student price demand for college education. The geography in shaping price demand for college education of individual students is also an interesting follow-up to this dissertation. Where students live relative to location of particular types of colleges and universities play a role in their choices. Students generally do not have a choice in where they live or receive initial schooling, as much as they have no say in choosing their parents and those parents' education levels. Exogenous variance options resulting from the geographical proximity of students to colleges and universities exist for college choice college-going decisions (Card,

1993). The role of geography in shaping student price demand and how public policy can help mediate such exogenous difference caused by geography is a worthy area of future study.

Efficiency and wisdom of policy interventions for students and institutions. As a discussion looms over federal financial aid reform as well as the costs and accountability of postsecondary education, we find ourselves trying to address multiple fronts with a “silver bullet” solution. For example, financial aid reform debate seems to focus on direct aid’s role to increase affordability, make college more accessible, and to encourage good performance of students. In a sense, we are attempting to use one carrot to make multiple horses run. Both the Hansen-Wiesbrod hypothesis and Peltzman hypothesis argue the economic inefficiency of subsidized postsecondary education, but these viewpoints are grounded in the perspective that tuition and fees are merely a source of revenue for colleges and universities. However, when a policy aims to achieve multiple goals, an “efficient” outcome may not be able to meet those goals from one perspective alone. Specifically, it would be an interesting undertaking to compare efficiency and outcomes of individual policy from multiple viewpoints.

Concluding Remarks

In this dissertation, I intended to better understand student price demand for college education and roles of public policy in mitigating such demand of individual students. In summary, I find that sticker shock for college tuition and fees exists for students from traditionally underrepresented minority backgrounds. While I contend that Pell Grant and other measures of tuition discounting are indeed directed toward those college students with financial needs to afford college education, I argue that they do not necessarily shift the price demand for college education of those students upward. These policies may fulfill their very basic objective to achieve college affordability; however, they fall short in making distribution of college

opportunity equitable, thus failing to be the vehicle of upward social mobility. More needs to be done, and policy approaches must be revisited for public policy to play an effective role in facilitating equitable college access and participation.

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