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# Essays in Applied Microeconomics: Dissertation Summary

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In the United States, like many developed countries, government provides substantial support for primary, secondary, and postsecondary education. In 2011, expenditures on education are expected to equal 7.6 percent of GDP (National Center for Education Statistics

2011). At the postsecondary level, federal grants and loans for college students aim to ameliorate credit market imperfections. Publicly provided K–12 education insures universal access to human capital development for all children. The three essays that make up this dissertation broadly focus on the role government should play in financing and providing education.

## Chapter 1

### The Incidence of Student Financial Aid: Evidence from the Pell Grant Program

The first chapter estimates the economic incidence of need-based student aid. The federal Pell Grant program provides billions of dollars in subsidies to low-income college students to increase affordability and access to higher education. Although students are the statutory recipients of this aid, its economic incidence may fall partially on schools (Fullerton and Metcalf

2002). Specifically, schools may strategically increase recipients' effective prices, crowding out federal aid by reducing discounts provided through institutional aid. Concurrent tuition and student aid increases combined with substantial growth in the for-profit sector of higher education underscore the importance of evaluating federal aid crowd out.

Using regression discontinuity (RD) and regression kink (RK) designs (Angrist and Lavy 1999; Card, Lee, and Pei 2009; Hahn, Todd, and Van der Klauuw 2001;; Nielsen, Sørensen, and Taber 2010) and detailed student-level data from the National Postsecondary Student Aid Study, I show that 16 percent of all Pell Grant aid is passed through from students to schools in the form of higher effective prices. In 2011, the federal government distributed \$35 billion in Pell Grants to 9.5 million students. My results suggest that institutions captured \$6 billion of this aid.

My identification strategy takes advantage of nonlinearities in the relationship between Pell Grant aid and the federal government's measure of need, which lead to discontinuous changes in both the level and the slope of the program's schedule. RK and RD designs yield conflicting estimates of the impact of Pell Grant aid on college pricing, with RK estimates suggesting that schools capture Pell Grant aid and

RD estimates implying that schools supplement Pell Grants with increased institutional aid. I reconcile these disparate estimates using a framework in which the "treatment" of Pell Grant receipt is multidimensional. Specifically, students at the margin of Pell Grant eligibility receive an extra dollar of outside aid but are also given the label of being a Pell Grant recipient, which may change some institutions' willingness to direct resources toward them.

I develop a combined RD/RK approach to separately identify schools' willingness to pay for students categorized as needy and the pricing response to outside subsidies. The RD design only identifies the reduced form impact of these two dimensions, and for RD estimates, schools' willingness to pay dominates their ability to capture outside aid. Using the combined RD/RK approach, I estimate that less than one-third of Pell Grant recipients benefit from these transfers, since schools' ability to capture Pell Grant aid quickly overtakes their willingness to pay for needy students. Although the Pell Grant program provides an especially stark example of how a multidimensional treatment affects RD estimates, in other circumstances where both a discontinuity and a kink are present, my results suggest that additional information can potentially be gained from using a combined RD/RK approach.

Finally, this chapter provides insight into the industrial organization of higher education. I show how schools' responses to Pell Grant aid illustrate differences in schools' objectives and market power across sectors. Only public institutions demonstrate a positive willingness to pay for Pell Grant recipients. Overall, selective nonprofit institutions capture close to 80 percent of their students' Pell Grants. Across different student demographic groups, I estimate a similar degree of capture students attending selective nonprofits, suggesting that these schools' extensive ability to appropriate Pell Grant aid stems from a greater degree of market power rather than differences in student demand. Finally, I find no evidence that for-profit institutions behave differently from other nonselective schools in the private sector in their response to Pell Grant aid, and combined, schools in this sector capture just 18 percent of their students' Pell Grant aid.

## Chapter 2

### The Returns to Higher Education for Marginal Students

The second chapter of my dissertation examines whether government programs providing financial support to low-income families should explicitly support or deny access to higher education. I estimate the impact of college credits and credentials on the labor market outcomes of several cohorts of current and former welfare recipients in Colorado. I use an event-study approach to control for time-invariant individual characteristics, such as differences in ability

and motivation. Women who are induced to attend college after entering welfare experience large and significant earnings gains; however, these returns are driven by credential receipt, and when sub-associate's degree credentials are unobservable, positive earnings gains will be inappropriately attributed to college attendance alone.

Public two-year colleges serve an increasingly important role in meeting the growing demand for an educated workforce in the United States. The two-year sector of higher education absorbed much of the growth in college attendance over the past several decades, and students induced to go to college by changes in the costs or returns to higher education are more likely to attend a two-year institution (Bound, Lovenheim, and Turner 2010). Numerous studies provide evidence of substantial labor market returns to community college credits and credentials, with estimated earnings gains as high as 13 percent for each year of attendance and 30 percent for associate's degree receipt (e.g., Jacobson, LaLonde, and Sullivan 2005; Kane and Rouse 1995). However, the marginal individual induced to enter college by changes in costs or returns may differ substantially from the average college student, and it is unclear whether these individuals will experience equally large returns from attending a two-year institution.

In this chapter, I focus on a group of students in Colorado who are likely especially constrained in their ability to finance college attendance—mothers who are current and former welfare recipients. Mothers at risk for welfare receipt are an especially relevant group given their generally low levels of income, education, and limits on lifetime cash assistance. Using information on earnings trajectories before and following entry into Colorado's welfare program and taking advantage of variation in preexisting county policies that affect the cost of college-going for several cohorts of women, I estimate medium-term impacts of community college attendance, credits, and credential receipt on employment and earnings.

I find that women who are induced to attend college following welfare entry experience large and significant earnings gains; however, these effects are primarily driven by credential receipt. Women appear to benefit from all community college credentials, including short-term certificates and career-oriented associate's degrees; the only exceptions to this finding are associate's of arts or general studies degrees. These credentials, while potentially facilitating transfers to a four-year program, do not appear to lead to increases in employment or earnings alone.

My identification strategy uses an event-study framework to deal with concerns of selection bias. If college-going women only differ in unobservable characteristics, such as ability or motivation, these estimates will represent the causal impact of higher education on labor market outcomes. Consistent with prior studies, my results suggest that women earning degrees in health, science, or technical fields

experience the largest benefits in the labor market, but even those who earn short-term certificates in nontechnical fields experience an increase in earnings following degree receipt. I document that failure to account for sub-associate's credentials results in falsely attributing positive earnings gains to college attendance in the absence of degree receipt. Measures of educational attainment in most major surveys (e.g., decennial census, Current Population Survey) do not include certificate receipt, suggesting that the large category generally classified as "some college" includes a heterogeneous group of individuals.

Finally, I use information on direct and indirect costs of college attendance and reliance on public assistance to illustrate the potential short-run private and social returns college attendance. In the short-run, when foregone earnings and the direct costs of college attendance are taken into consideration, the private rate of return to certificates and most degrees is negative, providing a rationale as to why so few women complete credentials, even in light of the large impacts on earnings in the medium term. I also find suggestive evidence of small negative (albeit marginally significant) impacts on welfare receipt in the short run.

My findings speak to the question of whether state and federal welfare policy should support formal human capital development. Both the Obama administration and the Gates Foundation have directed substantial attention and funds toward community college. Additionally, community college students are more likely to benefit from increases in federal aid generosity. Grant aid provided through the Pell Grant Program, the largest source of need-based aid in the United States, grew from \$7.2 billion to \$30 billion between 2000 and 2010, with the percentage of recipients attending community colleges increasing from 36 to 57 percent. My results suggest that supports for credential completion are as important, if not more so, than funding directed toward increasing college attendance.

### *Chapter 3*

#### **The Design of Teacher Incentive Pay and Educational Outcomes**

The final chapter of my dissertation, written jointly with Sarena Goodman, addresses the question of how to efficiently provide education at the primary and secondary levels. In many sectors, performance-based pay enhances effort, output, and other desirable outcomes. Evidence from Israel and India suggests that properly structured teacher incentive pay programs can benefit students (Lavy 2002, 2009; Muralidharan and Sundararaman 2011). However, in the United States, teacher compensation schemes are often criticized for lacking a performance-based component. Proponents argue that teacher incentive pay can raise student achievement and stimulate systemwide innovation.

In this chapter, we examine a group-based teacher incentive scheme implemented in New York City and investigate whether specific features of the program contributed to its ineffectiveness.

We provide suggestive evidence that the group-based structure of the program may have been detrimental in the majority of schools where the number of teachers responsible for tested students is large. Conversely, the program improved math achievement in schools with fewer teachers responsible for tested students or a more cohesive group of teachers. A lack of monitoring as well as the diffusion of responsibility for test score gains among many teachers may have diluted the incentives of the opportunity to earn bonuses. Our results are consistent with the long-standing literature in economics on the importance of taking into consideration free-riding, joint production, and monitoring when designing incentive systems and suggest that a one-size-fits-all approach may not be the most effective when implementing incentive pay schemes within a school district.

Currently, the U.S. government provides significant funding through the Race to the Top program. Eligibility for Race to the Top funding depends on districts' ability and willingness to link student achievement to individual teachers and use this data in teacher evaluations, but grants districts a great deal of discretion in designing performance pay systems. In 2010, 62 school districts and nonprofit groups received over \$400 million in funding from the federal Teacher Incentive Fund. Our results underscore the importance of the structure of performance pay in education. Policy innovations in this area should be carefully considered, taking into account personnel economics theory and research.

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