

Matching Pell Grants: Implications for College Debt and Parental Transfers

By PATRICIA BEESON, DANIELE COEN-PIRANI, JESSICA LAVOICE, MARLA RIPOLL*

The rising cost of college in the last few decades has brought the issues of student debt and student labor supply to the forefront of public policy and academic debates on college affordability. Applied work has often exploited natural experiments or design features of Federal financial aid policy to estimate the impact of grants on students' in-college and post-college outcomes, such as debt accumulation, academic performance, graduation, career choices, and tax payments.¹ A smaller complementary literature in macro and public economics has emphasized the importance of the endogenous response of parental transfers to financial aid targeted to students for a full understanding of the effect of public policies.²

In this paper we exploit a financial aid policy change enacted by a large public U.S. university (from now on referred to as LPU) to assess the impact of a plausibly exogenous and relatively large reduction in college costs for Pell students on their debt accumulation, and measures of parental transfers received

and labor supply. We interpret the results in light of a simple model of investment in human capital with debt and parental transfers and discuss how our results relate to findings in the two literatures mentioned above.

LPU is a public institution composed of five campuses - a flagship campus and four regional campuses - with separate admissions. In the academic years we studied, AY 2016-17 to AY 2019-20, the flagship campus enrolled about 19,000 undergraduate students per year and the regional campuses about 6,000. An important characteristic of LPU's flagship campus is that its selectivity and net price make it more similar to a private four-year university than to a public university.³ Because of its relatively high net price, the fraction of Pell grant students with Federal, private and Parent PLUS loans is much larger than that of the U.S. population of undergraduate students enrolled at four-year public institutions and comparable (or higher) than for students enrolled in private non-for-profit four-year institutions (see Table 1). This is important because Parent PLUS loans are a legal obligation of parents and so provide some insight into the reaction of inter vivos transfers to exogenous changes in financial aid.

I. Background and Policy

Attending LPU requires students to finance a cost of attendance (COA), represented in the first row of Table 2 for Pell and

³Based on IPEDS data, the net price at the flagship campus is in the top 1% among public four-year institutions and approximately average among private not-for-profit four-year institutions. The regional campuses' average net price places them in the top 10% among public institutions and makes them more expensive than about 30 percent of private not-for-profit four-year institutions. See Online Appendix for a systematic comparison.

* Beeson: University of Pittsburgh, Department of Economics (email: beeson@pitt.edu). Coen-Pirani: University of Pittsburgh, Department of Economics (email: coen@pitt.edu). La Voice: Bowdoin College, Department of Economics, (email: jlavoice@bowdoin.edu). Ripoll: University of Pittsburgh, Department of Economics (email: ripoll@pitt.edu). The authors gratefully acknowledge the generous help of Janet McLaughlin, Mike Seidel, Randy McCready and Chelsea Kluczkowski for their research support and insights into the admissions and financial aid process. Thanks also to Benjamin Marx (our discussant), Lesley Turner, Lance Lochner and seminar participants at the University of Pittsburgh and SUNY Buffalo for helpful comments. All remaining errors are our own.

¹This vast literature is reviewed by Dynarski, Page and Scott-Clayton (2022). An incomplete list of papers especially related to ours includes Rothstein and Rouse (2011), Marx and Turner (2018), Denning, Marx and Turner (2019), Scott-Clayton and Zafar (2019), Bettinger et al. (2019).

²The most relevant references are Abbott et al. (2019), Hotz et al. (2017), and Colas, Findeisen and Sachs (2021).

TABLE 1—EXTENSIVE MARGIN OF STUDENT DEBT FOR PELL STUDENTS AT LPU, PUBLIC AND PRIVATE UNIVERSITIES

	LPU	Public (4 -year)	Private (4-year, not-for-profit)
Any Loan (student or parent)	85	67	81
Student Federal Loans	85	65	80
Student Private Loans	15	5	9
Parent Plus Loans	18	7	11
% Pell	18	39	37

Note: Percentage of Pell students with debt by type of debt. Data on loans at LPU is based on authors' calculations for academic year 2016-17. Data on loans at other institutions are from the National Post-Secondary Student Aid Study (2016).

non-Pell students by type of campus.⁴ In this table and in the rest of the paper we restrict attention to the sample of full-time returning college students at LPU.⁵ The sample is further restricted to Pell students and a control group comprised of non-Pell students whose parental income is smaller than \$91,000.⁶ The COA at the flagship campus is about \$37,000 for both groups. Depending on their specific circumstances, students may not have to pay the full COA, but rather a discounted amount, thanks to grants, fellowships, and scholarships funded by LPU (institutional aid), by local, state, and federal governments, and private organizations.⁷ The residual cost of attendance (RCOA) is partially funded by student loans, parent plus loans - our measure of parental transfers - and the Federal Work Study program. After taking those into account, students still need to fund a residual, which amounted to about \$19,200 for non-Pell students and \$14,200 for Pell students prior to 2019. This is achieved through a mix of other parental transfers, pre-college savings, and labor supply that we cannot measure di-

rectly. In order to shed light on the sources of student funding, in the summer of 2019 we conducted a survey of all students, which we later matched to our sample of Pell and non-Pell students. The survey results show that, aside from loans and grants, the family is the major source of student funding, especially for non-Pell students, followed by students' savings and earnings.⁸

Beginning in the 2019-2020 academic year, LPU instituted a major restructuring of its financial aid program. The aspect of this restructuring we focus on in this paper is a match of federal Pell grants: each Pell-eligible student would receive extra institutional aid equal to the amount awarded to them by the federal government. We refer to this component as the Pell match program, or PM. Our paper evaluates the impact of the PM program on Pell recipients relative to the control group comprised of non-Pell students whose parental income is less than \$91,000. The impact of the PM program is transparent from the statistics in Table 2. In AY 2019-20, Pell recipients experienced an increase in institutional grants of \$4,800 (\$4,400) in the flagship (regional) campus relative to the average of the prior three years. By contrast, non-Pell recipients experienced an increase of a few hundred dollars in institutional aid. This expansion of institutional aid led to a decline in the RCOA of Pell students. The latter is associated with a decline in combined student

⁴The COA covers tuition, room and board, a book allowance, miscellaneous expenditures and fees.

⁵We exclude freshmen from the analysis because, in academic year 2019-20, LPU also capped a first-time incoming freshmen student's unmet need to \$20,000 by means of targeted institutional aid. Excluding freshmen allows us to focus on LPU's policy of matching Pell grants.

⁶This figure represents the upper bound of the empirical income distribution for Pell grant recipients and the 25th percentile of the income distribution for students who do not receive a Pell grant.

⁷Pell grants, the largest federal grant program, target students from low-income households (Dynarski, Page and Scott-Clayton (2022)).

⁸Based on the survey data, Pell recipients also report working about two hours per week more than non-Pell students and spending one hour less studying. These differences are statistically significant at conventional levels. See the Online Appendix for details on the survey.

and parent loans, by about 32 (35) cents per dollar decline in RCOA at the flagship campus (regional campuses), and in the residual amount students and families have to cover.

II. Theoretical Framework

To set ideas we introduce a simple model of student education investment, borrowing, and parental transfers. There are two agents, a parent (p) and their college student-child (s). The student funds the cost of attendance net of grants, including Pell grants, denoted by τ (the RCOA), through a combination of parental transfers (x), student debt (b), and earnings ($1 - h$), where h denotes time spent studying while in college and the wage per unit of time is normalized to one. The student's budget equation is then:

$$(1) \quad \tau = x + b + 1 - h.$$

The student's objective is to maximize consumption c_s after graduation by selecting (b, h) , taking parental transfers x as given:

$$c_s(x) = \max_{h,b} f(h) - R(b) \text{ s.t. eq.(1),}$$

where $f(h) = ah - 0.5h^2/\delta$ denotes earnings after college and $R(b) = (1+r)b + 0.5\eta b^2$ is the cost of repaying principal and interests student debt. A student who can borrow at the constant rate $r > 0$ any amount b is considered unconstrained, while $\eta > 0$ parametrizes the extent to which borrowing costs increase with b .⁹ The parameter $\delta > 0$ determines the degree of diminishing returns to time spent studying while in college. The student's parent cares about their own consumption c_p and the consumption of the student according to:

$$U(c_p, c_s) = c_p - 0.5c_p^2 + \gamma c_s,$$

where $\gamma > 0$ denotes parental altruism. The parent has some initial resources $y < 1$ and consumes $c_p = y - x$, i.e. what is left after

transferring x to the student. The timing is such that the parent selects x first and the student selects (h, b) taking x as given. The parent anticipates how its choice of x affects the student's subsequent choices and their consumption $c_s(x)$. The parent's problem is therefore:

$$\max_{c_p, x} U(c_p, c_s(x)) \text{ s.t. } c_p = y - x.$$

The equilibrium of the model specifies debt, time dedicated to human capital investment, and parental transfers as a function of τ (see Online Appendix for a derivation):

$$(2) \quad b^*(\tau) = \bar{b} + \pi_b \tau,$$

$$(3) \quad h^*(\tau) = \bar{h} - \delta\eta\pi_b\tau,$$

$$(4) \quad x^*(\tau) = \bar{x} + \gamma\eta\pi_b\tau,$$

where \bar{b} , \bar{h} , \bar{x} are constants that do not depend on τ and $\pi_b = (1 + \delta\eta + \gamma\eta)^{-1}$. In a world without financial frictions ($\eta = 0$), a higher level of τ is absorbed entirely by an increase in debt ($\pi_b = 1$) and human capital investment remains constant at the point that equalizes the marginal return $f'(h)$ to the baseline interest rate $1 + r$. With financial frictions ($\eta > 0$), the adjustment to a higher τ also involves an increase in parental transfers and labor supply. Thus, in this model, as in Abbott et al. (2019), a key role of parental transfers is to alleviate the financial constraints of children attending college. The labor supply channel is relatively less important if there are strongly diminishing returns to human capital accumulation, i.e., δ close to zero.

III. Empirical Approach and Results

The empirical counterpart of equations (2)-(4) takes the form:

$$(5) \quad Y_{ia} = \pi RCOA_{ia} + \beta X_{ia} + \alpha_i + \alpha_a + \varepsilon_{ia},$$

where Y_{ia} is an outcome variable (e.g., student loans) for individual i , observed during academic year a ; $RCOA_{ia}$ denotes residual cost of attendance and is the main regressor of interest; X_{ia} is a vector of observables that

⁹This way of modelling financial frictions is analytically convenient, but abstracts from hard limits on Federal borrowing.

TABLE 2—FINANCING THE COST OF ATTENDANCE AT LPU

	Flagship campus				Regional campuses			
	2016-18		2019		2016-18		2019	
	No Pell	Pell	No Pell	Pell	No Pell	Pell	No Pell	Pell
Cost of Attendance (COA)	37.0	36.9	37.9	36.9	28.8	29.1	28.1	28.9
Total Grants	7.6	13.6	7.8	18.1	5.9	11.7	6.1	15.8
Institutional Grants	5.4	5.7	6.2	10.5	4.0	3.5	4.4	7.9
Residual COA	29.4	23.2	30.1	18.8	22.9	17.4	22.0	13.1
Funding Sources								
Loans	9.5	8.1	9.4	6.7	9.3	7.5	9.7	6.0
Federal Work Study	0.7	0.9	0.8	1.2	0.6	0.8	0.7	1.0
Other	19.2	14.2	19.8	11.0	13.0	9.2	11.6	6.2
Mean Parental Income	69.1	30.8	68.7	31.2	70.0	30.8	70.3	31.9
Observations	3,166	3,749	921	1,147	1,869	3,010	584	888

Note: Source: authors' calculations. Entries are in thousands of 2016 dollars. Sample of full-time returning students enrolled at LPU with complete FASFA form. The "No Pell" group includes students whose parental income is lower than \$91,000. Loans refers to student and parent loans combined.

vary over time for a given student (Pell grant recipient status, family income, squared family income, family cash savings, number of years enrolled at LPU); α_i and α_a denote student and academic year fixed effects; ε_{ia} is a residual. Since $RCOA_{ia}$ is likely to be endogenous, we instrument it by the interaction of a dummy for academic year 2019-20 (when the PM program was put in place) and a student's Pell status. Identification of π relies on comparing the evolution of debt and other variables of interest for Pell and non-Pell grant recipients before and after the introduction of the PM policy by LPU, a difference-in-difference approach.¹⁰ The IV regression results, obtained by pooling students from all campuses, are summarized in Table 3.

The table shows that for each dollar de-

¹⁰The latter yields a consistent estimate of π as long as the parallel trends assumption holds, i.e., that absent the PM policy intervention the evolution of debt and credit hours across academic years, would have been statistically the same for recipients of Pell grants and other students. Notice that, by the onset of Covid-19 in early spring 2020, the borrowing decisions of LPU's students had already been made. The Online Appendix presents a pre-trend analysis for each dependent variable and also addresses the potential impact of the PM policy on continuing students' fall retention (we find no significant effects).

cline in RCOA, students' Federal and private borrowing decline by about 17 cents each and parent PLUS loans also decline by a similar amount. Federal work study earnings decline by less than 2 cents, and we cannot reject the null that this effect is equal to zero. Given that the sum of student and parent borrowing is capped by the RCOA, a decline in RCOA may lead to a mechanical dollar-for-dollar reduction in borrowing for those who borrow close to the entire RCOA. For those borrowers, the regression might be informative on the type of debt they select to cut first. We therefore add an interaction between $RCOA_{ia}$ and an indicator for whether a student is a "high borrower" to equation (5). The latter is defined as a student for whom the sum of borrowing (including parental loans) and Federal work study earnings in the previous academic year is larger than the difference between their RCOA and Pell grant, also in the prior year. Intuitively, a high borrower is a student for whom the PM program causes a reduction in RCOA that is sufficiently large to force them to cut their borrowing because they cannot violate the condition that borrowing cannot be higher than RCOA. We use the prior academic year to construct this indi-

cator to minimize endogeneity issues. The results in columns (2), (4) and (6) of Table 3 reveal that, for high borrowers, parent PLUS loans respond more to a decline in RCOA than private loans and the latter react more than Federal loans. This pattern suggests that high borrowers and their families choose to first cut PLUS loans, then private student loans and finally Federal loans in response to a decline in RCOA.

IV. Discussion and Conclusions

From the perspective of the model of Section II, the results of Section III can be interpreted as follows. The student debt coefficient π_b in equation (2) is approximately equal to 0.34. The fact that $\pi_b < 1$ is consistent with the existence of borrowing frictions ($\eta > 0$). The estimated response of Federal work study is at most 0.02, implying that there are strongly diminishing returns to school effort (δ is relatively small).¹¹ The lower bound on parental transfer adjustment (parent PLUS loans) is 0.17, consistent with a positive parental altruism parameter γ .¹² If 0.02 was the entire student earnings response, parental transfers would absorb 64 cents on the dollar (calculated as $1 - 0.34 - 0.02$) of the decline in RCOA. However, this is an upper bound because we do not observe other forms of students' labor supply or potential changes in students' consumption.

It is useful to compare these results with the literature and put them in perspective. Denning, Marx and Turner (2019) estimate an increase in yearly credits of 0.4 for each \$1,000 increase in financial aid, leading to an implied coefficient τ in equation (3) of about 0.34.¹³ They also estimate

¹¹We also find that credit hours fall by 0.011 per \$1,000 of dollars increase of RCOA, and this small reduction is not statistically different from zero (see the online Appendix for details).

¹²Notice that we cannot point-identify each of the three parameters (δ, γ, η) that account for the response to a change in τ in the model because we only have two independent moments, and they appear in equations (2)-(4) as the products $\delta\eta$ and $\gamma\eta$.

¹³Each credit hour corresponds to about 3 actual hours per week, so 0.4 credits corresponds to 1.2 hours per week. The academic year at LPU is comprised

an implied impact of financial aid on student debt reduction equal to 52 cents on the dollar, while Marx and Turner (2018) estimate an effect of Pell grant aid on student borrowing equal to 43-51 cents on the dollar. Taken together, these papers imply a smaller adjustment of parental transfers, in the range 0.14 – 0.23. A potential explanation for this difference is that tuition at the four-year institutions studied by Marx and Turner (2018) (CUNY) and Denning, Marx and Turner (2019) (Texas public universities) is well below the national average for public universities while LPU's tuition is about twice that average.

In the structural literature, Abbott et al. (2019) study the implications of expanding Federal grants using a dynamic structural model of college attendance, debt and endogenous parental transfers. Their model is calibrated to match the tuition and education expenses of the "average" full-time student enrolled at four-year institutions. In partial equilibrium, they find (see Table J.15 of their online appendix) that for each \$1 of expansion of grants, student earnings while in college fall by 10 cents, while inter vivos transfers fall differentially for households with different levels of income and wealth. For relatively poor households with income below \$55,000 - close to the students in our sample - the decline in parental transfers is 82 cents on the dollar, while for households with higher levels of income the offset is about 53 cents on the dollar. Therefore, these results tend to support changes in parental transfers close to (or even exceeding) the upper bound of our estimates.

In light of this discussion, we conclude that parental transfers are likely to absorb a significant portion of more generous institutional and governmental financial aid policies, especially at relatively more expensive public institutions and private ones.

of 28 weeks. If each hour is valued at \$10, we obtain $0.34 \approx 3 \times 0.4 \times 28 \times 10/1000$. Marx and Turner (2018) find small and insignificant effects of Pell grant aid on credits attempted and earned, with the exception of first-year students who increase credits attempted by 0.5 per \$1,000 of Pell grant aid.

TABLE 3—IMPACT OF LPU’S FINANCIAL AID PROGRAM. INSTRUMENTAL VARIABLES ESTIMATES.

Dependent variables	Student Loans				Parent Plus		Federal Work Study	
	Federal		Private		Loans		Earnings	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Residual COA	0.168 (0.026)	0.133 (0.029)	0.175 (0.050)	0.120 (0.054)	0.172 (0.049)	0.072 (0.051)	0.015 (0.015)	0.011 (0.017)
Residual COA × I[high borrower]		0.082 (0.030)		0.126 (0.046)		0.230 (0.054)		0.008 (0.016)
Outcome mean	5.895	5.895	1.897	1.897	2.421	2.421	0.873	0.873
Observations	11,223	11,223	11,223	11,223	11,223	11,223	11,223	11,223
Students	4,711	4,711	4,711	4,711	4,711	4,711	4,711	4,711
Adj. R^2	0.052	0.065	0.072	0.059	0.075	0.047	0.180	0.181
K-P F-statistic	322.289	120.025	322.289	120.025	322.289	120.025	322.289	120.025

Note: Instrumental variables estimates. A high borrower is defined as in the text. Regressions are run on pooled students data from flagship and regional campuses. The sample includes full-time returning students with parental income below \$91,000. Standard errors are in parentheses and clustered at the student level. All regressions include students’ fixed effects, academic year-by-flagship campus dummies, parental income and squared parental income, family cash savings, number of years the student has been at LPU. RCOA and the dependent variables are measures in thousands of \$US. Outcome mean refers to the average value of the dependent variable among Pell students in 2016-18.

REFERENCES

- Abbott, Brant, Giovanni Gallipoli, Costas Meghir, and Giovanni L. Violante.** 2019. “Education Policy and Intergenerational Transfers in Equilibrium.” *Journal of Political Economy*, 127(6).
- Bettinger, Eric, Oded Gurantz, Laura Kawano, Bruce Sacerdote, and Michael Stevens.** 2019. “The Long-Run Impacts of Financial Aid: Evidence from California’s Cal Grant.” *American Economic Journal: Economic Policy*, 11(1): 64–94.
- Colas, Mark, Sebastian Findeisen, and Dominik Sachs.** 2021. “Optimal need-based financial aid.” *Journal of Political Economy*.
- Denning, Jeffrey, Benjamin M. Marx, and Lesley J. Turner.** 2019. “Propelled: The effects of grants on graduation, earnings, and welfare.” *American Economic Journal: Applied Economics*, 11(3): 193–224.
- Dynarski, Susan, Lindsay C. Page, and Judith Scott-Clayton.** 2022. “College Costs, Financial Aid and Student Decisions.” *NBER Working Paper 30275*.
- Hotz, V. J., J. Rasmussen, E. Wiemers, and K.M. Koegel.** 2017. “The Role of Parental Wealth Income in Financing Children’s College Attendance Its Consequences.”
- Marx, Benjamin, and Lesley Turner.** 2018. “Borrowing Trouble? Human Capital Investment with Opt-In Costs and Implications for the Effectiveness of Grant Aid.” *American Economic Journal: Applied Economics*, 10(2): 163–201.
- Rothstein, Jesse, and Cecilia Elena Rouse.** 2011. “Constrained after college: Student loans and early-career occupational choices.” *Journal of Public Economics*, 95(1-2): 149–163.
- Scott-Clayton, Judith, and Basit Zafar.** 2019. “Financial aid, debt management, and socioeconomic outcomes: Post-college effects of merit-based aid.” *Journal of Public Economics*, 170: 68–82.