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MARGINAL PRICING AND STUDENT INVESTMENT IN HIGHER EDUCATION

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ABSTRACT

This paper examines the effect of marginal price on students' educational investments using rich administrative data on students at Michigan public universities. Students facing zero marginal price for credits above the full-time minimum (i.e., 12 credits) attempt and complete about the same average number of credits as those whose institutions charge per credit. Zero marginal price induces a modest share of students (i.e., 7 percent) to attempt up to one additional class (i.e., 3 credits) but also increases withdrawals, resulting in little impact on earned credits or the likelihood of meeting "on-time" benchmarks toward college completion. Consistent with theory, the moderate impact on attempted credits is largest among students who would otherwise locate at the full-time minimum, which include lower-achieving and socio-economically disadvantaged students.

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I. Introduction

Only slightly more than half of recent college entrants graduate within six years (Shapiro et al., 2013) and time-to-degree has increased particularly for students from low-income families (Bound, Lovenheim, & Turner, 2012). Such statistics have propelled those in federal, state, and local policy circles to call for proposals aimed at increasing rates of degree completion and shortening time-to-degree among college-goers (e.g., National Conference of State Legislatures, 2010). Indeed, recent proposals from the Obama administration suggest tying federal aid to graduation rates and timely degree completion (Lewin, 2013).

In the face of such pressure, many institutions have looked at changes in tuition policies as a means of generating revenue while also maintaining or improving student success. Marginal price is one potentially important dimension of institutions' pricing structures about which little is known. By marginal price, we mean the price students are charged incrementally for each additional course (or credit) they take in a given semester. Many students only take the minimum course load to achieve full-time status (i.e., 12 credits), which at most institutions would translate to earning a Bachelor's degree in five years or more. At some institutions, the marginal price of credits taken above 12 is zero; others have a linear, per-credit marginal price for all credit levels. Indeed, some institutions have adopted "flat" pricing (i.e., zero marginal cost for credits above 12) in explicit expectation that students will respond by attempting and earning more credits and graduating faster.

How individuals react to nonlinear price schedules is central to many areas of economics and policymaking, as proposals in a variety of domains are predicated on the microeconomic principle that individuals respond to marginal price. The design of the Earned Income Tax Credit (EITC), many savings and retirement programs, and public health insurance programs all incorporate nonlinear price schedules to achieve policy goals, as do pricing schedules in many consumer markets such as phone and energy services.

Whether and how individuals respond to these marginal incentives remains largely an open question with recent empirical evidence from other contexts mixed and no evidence from the setting of education.[1] A weak evidence base has not prevented colleges from touting nonlinear pricing as one solution to colleges' goals of increasing timely graduation rates. For example, Adams State in Colorado recently made such a switch from per-credit (linear) to flat (nonlinear) pricing, citing this shift as the reason average credit hours have increased in just two years (Mumper, 2012). Similar policy shifts have been observed at Montana State, the University of Texas, and many other institutions (Baum, Conklin, & Johnson, 2013). However, whether nonlinear pricing alters students' investment intensity as predicted by economic theory is not known.

This paper is the first to examine the effect of marginal price on educational investment. We focus on the effect of exposure to a "flat" pricing scheme at university, wherein the marginal price of additional credits above the full-time minimum is zero, relative to a linear tuition pricing scheme. Our contributions are fourfold. First, we add to the growing evidence base on whether individuals respond to the marginal incentives embedded in nonlinear price schedules, albeit in a new and policy-important context. As human capital investment is one of the most important economic decisions individuals make, evidence about whether the standard model applies to this setting is useful. Second, we exploit variation in the pricing structure faced by similar individuals

[1] Saez (2010) finds that the self-employed respond to the first kink in the nonlinear EITC schedule, but the response to subsequent kinks and for wage and salary workers is minimal. Ito (2013, 2014) finds that electricity and water consumers respond to average price, not the marginal price embedded in the nonlinear price schedules they face. For evidence from other settings, see Hausman (1981) for Federal income tax, Friedberg (2000) for retirement savings plans, Kowalski (2012) for health insurance, Olmstead, Hanemann, and Stavins (2007) for water, and Borenstein (2012) for energy services. Moffitt (1990) reviews the early literature on nonlinear pricing.

in very similar choice contexts. Much of the previous literature on nonlinear budget constraints focuses on contexts in which similar individuals face the same price structure (e.g., the Federal tax code), which creates numerous econometric problems such as the fact that tax rates (and thus marginal incentives) are endogenous or that individuals with different marginal incentives may be quite different.[2] Third, we provide the first evidence on the effects of a policy that many higher education institutions and states have turned to as a way to boost timely degree completion. Identifying effective policies has become critical as federal and state funding is increasingly tied to graduation rates and timely degree completion (National Conference of State Legislatures, 2010; Lewin, 2013). Finally, our study informs the revenue consequences of institutions' pricing regimes. Public institutions increasingly rely on tuition revenue to supplant declines in state appropriations and many have avoided across-the-board tuition increases, instead altering other features of their pricing policies.

We assess the effect of marginal price using administrative data on all Michigan public high school graduates in the classes of 2008 through 2011 who attended one of the state's public universities. Michigan is a compelling setting to study, as there is substantial policy variation across very similar institutions, which is not present in other states. Figure 1 depicts the price schedule at Michigan's fifteen public universities. Eight charge students per credit taken, while students at the other seven pay little additional tuition for courses taken beyond the full-time minimum.[3] The subsidy embedded in this non-linear price structure is substantial: 20 percent of the direct costs of college among those who take five classes in a semester ($740 to $1,260 for each additional 3-credit course). Though there are some differences in the characteristics of

[2] Ito (2013, 2014) are exceptions. Moffitt (1990) reviews several of the econometric problems and Saez, Slemrod, and Giertz (2012) discuss similar issues in the context of taxable income.
[3] Flat pricing institutions typically charge additional tuition beyond some upper threshold (typically 18 credits) and two charge very modest additional tuition beyond 12 credits.

students attending institutions with per-credit pricing and those with flat pricing (the latter students typically being a bit more advantaged), there is considerable overlap between these two groups. For instance, Central Michigan and Western Michigan Universities have identical interquartile ranges of student ACT scores and similar levels of resources, though different marginal pricing policies. We rely on this overlap, along with the assumption of selection on a rich set of observed characteristics, to identify the causal effect of marginal price on credit accumulation.

We find that exposure to flat tuition pricing has small to no effect on the average number of credits attempted or earned in a semester and our results are precise enough to rule out even small effects (i.e., of a bit less than 1 credit). When we look at the effects of flat tuition pricing on the share of students meeting various discrete credit thresholds, we see evidence that flat pricing induces a modest share of students to attempt a few more credits (i.e., up to one course, or 3 credits, more). Yet, we find little evidence that these additional attempted credits translate into more earned credits in a semester. Students facing no marginal price are more likely to withdraw from or possibly fail at least one course. Accordingly, flat pricing is not associated with increased cumulative credits earned, greater persistence, or reduced time-to-degree, though estimates of these latter long-term outcomes are admittedly imprecise. As predicted by theory, we also find the greatest attempted credit response among students who would take the full-time minimum under linear pricing (students in the bottom of the achievement distribution and those economically disadvantaged). There is no evidence to suggest that this pricing structure influences students' decisions to enroll part- versus full-time, likely because any marginal pricing effect is swamped by discontinuities in financial aid eligibility or other considerations. Various approaches to eliminating observed differences – rich controls, sample restrictions, propensity score re-weighting, exact matching on observables – all suggest similar qualitative results.

Our results suggest that eliminating the marginal price associated with credit intensity will minimally affect students' rate of progress towards degree and on-time degree completion and may thus be a non-distortionary way of raising revenue. However, our analysis does not fully address other possible effects of marginal pricing, including major choice, interest exploration, financial burden, or academic performance.

This paper proceeds as follows. The next section discusses previous literature, with a focus on the relationship between tuition pricing and progress through college. Section III provides background on university pricing in the Michigan context. Section IV presents a simple theoretical framework to guide our empirical work and help with the interpretation of results. Section V describes the data used in the analyses and our empirical strategy. Section VI presents results on credit-taking and explores their robustness, while Section VII discusses external validity. Section VIII concludes.

II. Previous Literature

There is a large body of evidence showing that students' enrollment, persistence, and college choices are influenced by net college price. A consensus estimate is that a $1,000 change in college price (1990 dollars) is associated with a 3 to 5 percentage point difference in enrollment rates (Kane, 2006; Dynarski, 2003). Evidence on the effect of college price on persistence and degree completion is rarer, but most studies suggest that persistence and completion are modestly responsive to prices for at least some groups (Bettinger, 2004; Turner, 2004; Dynarski, 2008; DesJardins & McCall, 2010; Goldrick-Rab et al., 2011; Castleman & Long, 2013). Price also appears to be a strong predictor of the specific college students choose to attend (Long, 2004; Jacob, McCall, & Stange, 2013), institution-level enrollment (Hemelt & Marcotte, 2011), and major choice (Stange, 2012). While suggestive of price response in educational investment, this literature does not speak to whether students respond to changes in marginal, as opposed to average, price.

We are aware of only one study that examines the relationship between marginal pricing and student outcomes. In a working paper, Bound, Lovenheim, and Turner (2010) found that 4-year public institutions with per-credit pricing had lower 4-year graduation rates than institutions with flat pricing. Further, much of the increase in time-to-degree between 1972 and 1992 occurred at institutions that charge on a per-credit basis.[4] While suggestive, this relationship may have a number of explanations other than the causal effect of marginal pricing on student progression through college.

At the same time, a number of interventions have been found to increase students' credit loads, either intentionally or inadvertently. For instance, the Promise Scholarship in West Virginia explicitly tied aid to number of credits (and GPA), and resulted in more students taking 15 credits rather than the full-time minimum (Scott-Clayton, 2010). A similar result was found for a scholarship program at the University of New Mexico (Miller, Binder, Harris, & Krause, 2011). Yet, work on Georgia's HOPE scholarship, which tied eligibility and retention of funds to maintaining a 3.0 GPA, found that HOPE reduced the likelihood that students took full course-loads and increased their propensity to withdraw from classes and divert credits to the summer (Cornwell et al., 2005).

Other conditional aid grant programs (often in conjunction with advising or coaching) have also had impacts on students' credit loads. For instance, Richburg-Hayes et al. (2009) found

[4] The analysis of per-credit versus flat pricing appeared in two footnotes and was not central to their main analysis so was dropped in the subsequent published version of the paper.

that a performance-based scholarship at community colleges in New Orleans increased credit loads, as did an intervention that combined financial incentives and academic support services at a Canadian university (Angrist, Lang, & Oreopoulos, 2009). At a large Italian university, Garibaldi, Giavazzi, Ichino, and Rettore (2012) found that charging students extra for taking too long to graduate speeds up time-to-degree.

Together, these studies make clear that particular features of scholarship and grant programs can have appreciable effects (positive or negative) on students' credit loads and progression through college. We look at marginal pricing policy as another potential lever capable of influencing students' credit loads – and ultimately their rates of college completion and average time-to-degree. Since the interventions described above often tie awards explicitly to credit-taking behavior and also typically target select student subgroups, they may not be indicative of the broader potential effects of marginal pricing.

III. Background on University Pricing in Michigan

During the 2011-2012 academic year, eight of Michigan's fifteen public 4-year universities charged full-time undergraduate students differently based on the number of credits. In these schools, tuition is a linear function of the number of credits taken, ranging from a low of $246 per credit at Saginaw Valley State to a high of $421 at Michigan Technological University. By contrast, the tuition schedule at the other seven institutions has a flat or near-flat range at full-time status (12 credits). Students at these institutions pay a per-credit amount if part-time, but almost no additional monetary cost from taking an additional course once they have reached full-time status.[5] The upper limit for which the zero marginal price applies varies from 16 to 18 credits. While per-credit pricing is generally more common at less selective institutions (all of

[5] Appendix Table A1 includes more details about the pricing practices of the fifteen institutions. Two institutions, UM-Dearborn and UM-Flint, charge a substantially lower per-credit fee ($80) once students reach full-time status. We characterize these institutions has having "flat" pricing in our analysis.

the state's community colleges charge per-credit while the state flagship university, University of Michigan – Ann Arbor, does not), this is not always the case. Further, some institutions have explicitly adopted flat pricing models to encourage students to take 15 credits, while others have switched from the use of flat pricing to charging per credit (e.g., Ferris State in 2008-2009).

Tuition fees apply to any credits attempted in a semester after the course "drop date," regardless of outcome of the course (pass, fail, withdrawal, etc.). Students are generally given one or two weeks to withdraw from classes while still receiving a full (or near full) refund of tuition and fees. There does not seem to be any systematic difference in these policies by pricing practice. Flat-pricing institutions in Michigan do not appear to be disproportionately more generous (or strict) in their refund polices than do their per-credit pricing peers.

Marginal pricing is just one feature of pricing policies at these institutions. During the 2011-2012 academic year, seven charged differentially based on undergraduate level and three charged differently for certain programs or majors (Presidents Council, State Universities of Michigan, 2011). In this regard, Michigan institutions have pricing policies that are quite similar to institutions nationally (Cornell Higher Education Research Institute, 2011; Ehrenberg, 2012).

IV. Theoretical Framework

We adapt a standard static (single-period) labor supply model to our setting in which the tuition pricing schedule creates a kinked budget constraint on school intensity choice. We also briefly sketch extensions to this basic model and discuss their implications.

A. Single-period model

Individual utility depends positively on lifetime consumption c and on time spent not in school, n. Thus school attendance incurs effort cost. Individuals choose time spent in school, z, to maximize utility $u(c,n)$ subject to a nonlinear budget constraint and a standard time constraint.[6] The budget constraint states that consumption equals the sum of endowed income (I) and lifetime earnings minus tuition: $c = I + E(z) - T(z)$. In the single-period model, we simplify things by assuming that each increment of schooling increases earning potential by a fixed amount w, thus $E(z) = wz$. This simplification allows us to abstract from effects of nonlinearities in the returns to college education and to focus on schooling decisions in a single period.[7] Tuition is a nonlinear function of credit load:

$$T(z) = \begin{cases} t_0 + t_1 z \ if \ z < z^* \\ t_0 + t_1 z^* + t_2(z - z^*) \ if \ z \geq z^* \end{cases},$$

where typically $t_1 > t_2$.[8] Together these elements generate the nonlinear budget constraint depicted by the solid line in Figure 2. Below z* (i.e., the full-time minimum credit load), each increment of schooling investment increases lifetime consumption by (w - t_1). Above z*, the net return to each unit of investment is higher and thus the "price" of non-school time is also higher. The dashed line depicts a linear (per-credit) tuition schedule.

How individuals respond to nonlinear budget constraints is complex, as reviewed in Moffitt (1990). One finding is that a policy shift from a linear (dashed) to flat (solid) pricing schedule will generate quite heterogeneous responses across students. Students that would locate at z* when facing a linear pricing schedule (denoted by B) experience only a substitution effect (non-school time has become more expensive) and would be predicted to increase their credit intensity. However, students initially choosing to enroll beyond the full-time minimum (denoted by A) also experience an income effect, thus the net effect for this group is ambiguous. Part-time

[6] The time constraint is that total time spent in (z) and out (n) of school equals total time available, H: $n + z = H$.
[7] Stange (2012) discusses the evidence on and implications of nonlinearities in returns and the dynamic nature of schooling investment. Ignoring the nonlinearities in returns is like ignoring "career concerns" in labor supply models, letting us treat schooling decisions made in different time periods independently. We discuss below how relaxing these assumptions may impact our results.
[8] We also ignore any increased marginal tuition for very high credit loads (typically 17 or 18 credits).

students who would locate below z* when pricing is linear (denoted C) will either remain on the first segment (zero response) or switch segments by increasing credit loads above full-time.[9] This simple budget set analysis suggests that response may be greatest for students who otherwise would choose to locate at the full-time minimum. In fact, continuous preferences would predict we observe a "hole" in the density of students at the non-convex kink B. Our empirical analysis explores this heterogeneity by stratifying our sample by students' predicted credits (based on baseline characteristics) when faced with a linear pricing scheme.

B. Extensions

The model described above omits four potentially important features of postsecondary schooling: investment over time, nonlinear returns, uncertainty, and investment "lumpiness."

Investment over time. Extending the analysis to more than one period, by itself, has little impact on our qualitative predictions. Suppose earnings are linear in total credits accumulated over multiple periods. If pricing is also linear, then the well-known consumption smoothing result prevails; students will choose the same credit load in each period. However, the introduction of nonlinear pricing separately in each period means that three possible outcomes satisfy the first-order conditions. Some students will choose equal credit loads across all periods at z_{low}, below full-time status (on the lower segment of the budget constraint). Others will choose equal credit loads across all periods at z_{high}, above full-time status. Some may also find it optimal to choose z_{high} in one period and z_{low} in another if this switching equilibrium dominates either of the constant ones. That is, utility may be maximized by exerting the extra effort cost and achieving the higher marginal return for one (but not all) periods.[10] As with the one-period

[9] Facing the new pricing schedule, there will be some people that are indifferent between the two segments.

[10] A switching optimum with $z_1 = z_{low}$ and $z_2 = z_{high}$ will satisfy the FOC as long as $\frac{\delta u / \delta z_1}{\delta u / \delta z_2} = \frac{w - t_1}{w - t_2}$. Whether this dominates the constant-credit outcomes depends on the utility function.

model, switching from a linear to flat pricing schedule will have the greatest impact on credits taken (in either period) for those who would otherwise locate at the full-time minimum.

Nonlinear returns. Perhaps the most controversial simplification of the model described above is that it assumed each course credit increases lifetime earnings by the same increment. This simplification permitted us to focus on the nonlinearities created by tuition policies. However, there is evidence that the return to college education is nonlinear due to strong "sheepskin" effects. The final credit earned to complete a degree has a much higher return than the first few credits earned toward the same degree. First consider a one-period model where each increment of schooling increases earning potential by a fixed amount w up to a threshold level $\bar{z}$, at which point earnings jump by a discrete amount θ and are constant thereafter. Thus $E(z) = (wz) \cdot 1(z < \bar{z}) + (w\bar{z} + \theta) \cdot 1(z \geq \bar{z})$. In this case, the nonlinear return will dominate intensity decisions. Students will bunch precisely at the $\bar{z}$ since it will never be optimal to choose a level $z > \bar{z}$.[11] Thus many students (who otherwise choose enough credits to achieve the nonlinear return) will be unaffected by a shift from linear to flat pricing. However, the shift will draw more people into the return kink, inducing them to acquire the degree. Again, those on the margin of graduating should be most impacted by this marginal price change. This same logic applies to the setting with multiple time periods, nonlinear returns, and no uncertainty. Since credits earned in different time periods are perfect substitutes in the earnings production function, students' choice problem is similar in all periods. Thus decisions will be similarly sensitive to marginal price in earlier or later time periods.

Uncertainty. The model assumes that people choose credit loads with perfect foresight about future preferences (e.g., effort costs), credit completion, enrollment, and degree

[11] If we permit additional credits beyond $\bar{z}$ to increase earnings, some students will locate at $z > \bar{z}$, but there will still be a mass of students at $\bar{z}$.

completion. Uncertainty along these dimensions alters the choice environment as it is resolved over time. For instance, freshmen may be uncertain about future life events that may cause them to drop out, enroll part-time, or otherwise switch budget constraint segments next year. Since the payoffs to current decisions depend, in part, on these uncertain future outcomes, current choices will be less responsive to price parameters when uncertainty is greatest, such as in the earliest years. Students in later years of college, facing less uncertainty, should respond more sharply to changes in price schedule.

Investment lumpiness. Lastly, the above discussion treats schooling intensity as continuous, though in practice the number of credits is finite and "lumpy" as most classes are worth either 3 or 4 credits. Such adjustment costs have been found to mute responses to nonlinear incentives in other contexts (Chetty et al., 2011).

V. Data and Empirical Approach

A. Data and Samples

We combine student-level data from several different administrative sources. From the Michigan Consortium for Education Research (MCER), we begin with information on the entire universe of Michigan public high school graduates from 2008 through 2011. These data include demographic information (sex, race, ethnicity, free and reduced-price lunch eligibility (FARM), LEP, special education), 11th grade achievement scores,[12] and high school. We then use data from the National Student Clearinghouse (NSC) to restrict our sample to students appearing in college (anywhere up to August 2012).[13]

[12] For these classes, we use a students' composite ACT score since the ACT became a mandatory part of Michigan's high school testing in 2007.

[13] For an extensive overview of the coverage and use of National Student Clearinghouse (NSC) data for research, please consult Dynarski, Hemelt, and Hyman (2013). For the state of Michigan during our timeframe, enrollment coverage is quite high (i.e., between 95 and 97 percent), and highest among 4-year public institutions (100 percent).

To examine credit accumulation at Michigan public institutions, we next merge these records of college-going Michigan high school graduates onto data from the Michigan Student Transcript and Academic Record Repository (STARR). STARR contains full, historical transcript records (course-level data) for all individuals enrolled in 2-year or 4-year public colleges in Michigan in the 2011-2012 academic year. While the state of Michigan mandated the collection of the entire transcripts of students enrolled at any Michigan public college during that year, there is some (small) variation in the degree to which institutions supplied course-taking information from prior years. Therefore, we focus on STARR data from the Fall of 2011 and Spring of 2012. These semesters occur at different points in an "on-time" college trajectory for students, depending on the year of their high school graduation. For example, the 2011-2012 academic year corresponds to the on-time third year of college for the high school class of 2009. Therefore, we examine whether students' postsecondary persistence (and relatedly, the composition of our sample) is related to flat pricing.

Our main analytic sample includes students from these high school cohorts (i.e., 2008 through 2011) who are enrolled full- or part-time in a Michigan public 4-year institution during the fall and/or spring of the 2011-2012 academic year. This results in 212,320 student-by-semester observations (over 112,000 unique students) across all high school cohorts. For some analyses we restrict our sample to only full-time students (194,391 observations) or to students not attending the University of Michigan – Ann Arbor (187,707 observations for all students; 170,466 full-time).

Table 1 presents mean demographic and achievement characteristics, as well as college-level credit outcomes for this sample by institutional pricing structure. There are some small to moderate differences in the average characteristics of students attending per-credit versus flat pricing institutions. Generally speaking, students attending flat pricing schools are more advantaged (less likely to be eligible for free or reduced-price meals, less likely to be minority) and have higher college admissions scores. Though, as illustrated by the final two columns in Table 1, the achievement advantage of students at flat schools is largely driven by the fact that the University of Michigan – Ann Arbor uses a flat tuition pricing schedule.

When we look to mean outcomes by pricing policy, we see that on average, credit loads of students at flat schools are a bit higher than those at per-credit schools. Indeed, the share of students attempting more than 12 credits in a semester is about 8 to 12 percentage points higher at flat schools than at per-credit institutions. Some mean differences vary more than others as a function of the sample: For example, the share earning 15 or more credits in a semester is about 11 percentage points higher at flat colleges; but, when the University of Michigan – Ann Arbor is excluded from the sample, this difference falls to only 3 percentage points. Obviously, these raw differences in means do not control for other attributes of students and schools that are likely correlated with course-taking behavior and progress through college.

B. Empirical Approach and Identification Strategy

Our basic approach is to compare the credits taken by students attending "flat" pricing schools (at which the marginal price is zero for credits above the full-time minimum) to those attending per-credit pricing schools using a linear probability model estimated via OLS:

$$Y_{ijct} = \alpha + \beta_1 Flat_j + \beta_2 X_{ijt} + \beta_3 Z_j + \delta_t + \theta_c + \varepsilon_{ijct} \quad (1)$$

In this specification, Y_{ijct} is a measure of credits attempted or earned by individual *i* from cohort *c* attending school *j* during semester *t*. Our primary outcome variables are total credit load and indicators for attempting or earning a credit load greater than certain thresholds (e.g., at least 13 credits or at least 15 credits). $Flat_j$ is an indicator for whether school *j* has flat pricing, X_{ijt} is a vector of student-level measures of achievement and demographics during high school, δ_t is a set of semester fixed effects, θ_c represents cohort fixed effects, and ε_{ijct} is a stochastic error term. Some specifications control for a limited number of institution-level covariates (Z_j). The primary coefficient of interest is β_1, the effect of flat pricing on student credit-taking. To account for correlation in the errors among students at the same college, we cluster standard errors at the institution level.[14]

We address three main possible sources of bias in the basic model. First, students attending "flat" schools may possess different characteristics that are correlated with college performance than those attending per-credit schools. While this is certainly true overall, it is worth noting that there is considerable student overlap on observable characteristics across institutions. Figure 3 depicts the inter-quartile range of ACT scores for all fifteen institutions. With the exception of the University of Michigan – Ann Arbor (a flat pricing school), every flat school has several non-flat schools with considerable test score overlap. Further, we control for a rich array of student-level characteristics. Our sample size permits us to do this extremely flexibly by, for instance, looking within student groups defined very narrowly by full interactions between these characteristics. In addition, we estimate models that instrument for pricing structure using the policy of the nearest university to students' high schools.

Second, it is theoretically possible that additional financial aid would offset the additional tuition and fees associated with additional credits, diminishing the treatment. Grant programs may explicitly increase in value as number of credits increase or cost-of-attendance could be adjusted upwards (increasing eligibility) when additional credits are taken. Max Pell amount

[14] Our main estimates account for the potential lack of independence between students attending the same college by estimating cluster-robust standard errors that generalize the White (1980) heteroskedasticity-robust OLS standard errors. Given concerns in the literature about the performance of such clustering when the number of clusters is small (Cameron, Gelbach, & Miller, 2008), we also examine alternative methods for statistical inference.

increases discretely at quarter-time, half-time, three-quarters-time, and full-time, but does not increase in value beyond 12 credits. Further, most students are receiving the maximum Pell grant, so increases in their costs of attending will not increase the amount of grant aid for which they are eligible. We are not aware of any institution, state, or federal programs that explicitly increase aid for additional credits taken beyond 12.

Finally, it is possible that schools' pricing schemes coincide with other college-level attributes or policies that may influence outcomes, such as resources or advising. Our focus on one sector in one state eliminates many institutional differences that correlate with pricing structure nationally, but we cannot entirely rule out this possibility. We have four approaches for addressing it. First, we include an institution-level control for median ACT composite scores of incoming freshman or for per-student spending on instruction. Second, we examine differences in credit-taking among students taking less than a full-time load (whose behavior should be minimally affected by the pricing scheme for full-time students) as a falsification test. Third, we exclude University of Michigan – Ann Arbor, which is an outlier both in terms of student characteristics and institutional resources. Finally, we can identify students eligible to receive the Kalamazoo Promise scholarship, which pays all tuition and fees at public Michigan institutions. These students should be insensitive to marginal price and thus serve as a control group in a difference-in-differences analysis, permitting us to account for other non-price institutional factors that may be correlated with both marginal pricing policies and credit-taking outcomes.

It is worth contrasting our simple approach to those employed in other settings with non-linear pricing. Often similar individuals face the same price structure (e.g., the Federal tax code), which creates numerous econometric problems. For instance, since tax rates are determined by income, marginal incentives are endogenous and individuals with different marginal incentives may be quite different. A number of empirical strategies have been developed for these settings, such as measuring "bunching" at budget set kinks (Saez, 2010), instrumenting for tax rates using changes in the tax rate structure (reviewed in Saez, Slemrod, and Giertz, 2012), or structural approaches (Hausman, 1985). Relative to these other methods, our setting permits a very transparent comparison between observably identical students that face quite different marginal incentives.[15]

VI. Results

A. Distribution of Credits Attempted and Earned

Figure 4 plots the fraction of all students at or above each credit threshold, separately by pricing policy for our full sample. We see little difference in the distribution of credits taken (and earned) by part-time students regardless of pricing policy – but, modest differences emerge right at the point where the marginal price diverges between the two sets of institutions (i.e., 12 credits). Students that face no marginal tuition price of a heavier course load are more likely to take (and possibly earn) credits beyond the full-time minimum. At first glance, these patterns suggest that marginal pricing policy may have some impact on course-taking and credit accumulation.

B. Main Results

The raw difference reported in Figure 4 may overstate the true causal effect of flat pricing because students attending flat pricing schools are slightly more higher achieving and advantaged, which likely have independent effects on course-taking. Table 2 presents our main regression estimates, which control for a rich set of individual covariates and median institution-

[15] We assume that students do not choose a university based on the marginal pricing policy conditional on our rich set of individual controls. A two-stage least squares approach using the pricing policy of the nearest university also addresses this source of bias, though our 2SLS estimates are imprecise.

level ACT scores.[16] In this table and throughout much of the paper we focus on full-time students. Flat pricing does not appear to impact the decision to enroll full-time (i.e., 12 or more credits) and the inclusion of part-time students does not meaningfully change our point estimates for any outcome (columns 4 and 8).[17] However, including part-time students reduces precision by adding residual variation to our outcomes.

We see minimal evidence of an impact of flat pricing on average credits attempted and even less evidence that flat pricing affects average credits earned. This conclusion is robust to institutional controls and excluding University of Michigan – Ann Arbor from the sample. Further, the estimates are quite precise and our standard errors on these null findings imply that we could detect an effect of around 0.5 to 0.6 credits attempted or earned.

However, flat tuition pricing is associated with an increase in the likelihood that students attempt at least 13 credits (more than the full-time minimum) of about 7 or 8 percentage points (relative to a base of 80 percent). Since estimates at both the 13 and 15 attempted credit thresholds are similar, this implies that these students are attempting about 3 additional credits, or approximately one course.[18] Student must earn 15 credits each semester in order to graduate within four years. However, the impact of flat pricing on earned credits is much weaker (i.e., half the magnitude or less of the effect on credits attempted), sometimes "wrong-signed," and

[16] The coefficients on the individual covariates are as expected from previous literature: male, non-white, poor, limited English, special education, and students with low ACT all attempt fewer credits. Including many subject tests rather than the ACT composite produces nearly identical results, quantitatively and qualitatively.

[17] The null effect on full-time status also provides as a falsification check: given financial aid and other discontinuities at the full-time threshold, flat pricing should not induce many part-time students to enroll full-time. If we were to find an "effect" of flat pricing at this margin, we might be concerned about other unobserved, college-level attributes correlated with both flat pricing and students' credits load decisions driving any other results.

[18] We also used the re-weighting approach described by DiNardo, Fortin, and Lemieux (1996) to construct counterfactuals of the entire distributions of credits attempted and earned, weighting students at per-credit schools to mirror the observable characteristics of students at flat-pricing institutions. This procedure produces very similar results: Marginal price has its largest effect on the likelihood of attempting up to 15 credits, but has a much more modest impact on the likelihood of earning credits. Furthermore, there are only small (and insignificant) differences in the distribution of credits attempted and earned by less-than-full-time students. These results are available from the authors upon request.

insignificant. Therefore, additional attempted credits do not appear to translate into more credits earned.

The inability to translate attempted credits into earned ones is largely explained by course withdrawal and, to a lesser extent, course failure. Table 3 examines effects on course withdrawal and failure, both for all students and just full-time students. In a given semester, flat pricing increases the likelihood that students withdraw from at least one class by about 7 percentage points and the likelihood of course failure by 3 to 4 percentage points. Since students at flat pricing schools do not bear the financial cost of enrolling in a course and withdrawing after the drop deadline, they appear to do so much more frequently.[19] The effect on course failure suggests one of two things: a) some students may simply stop showing up and never withdraw from a class, when doing so imposes no direct financial cost (even if course failure has other consequences); or b) students perform more poorly because of too heavy a credit load. Since effort is not observed, our data do not permit us to separately identify these two channels. Regardless, these findings suggest that the increased likelihood of course withdrawal (and to a lesser extent failure) is what dampens the impact of flat pricing on credits earned.

C. Robustness

Table 4 examines the robustness of our main findings to various changes in sample, specification, institutional controls, and statistical inference. Our full sample includes all college students enrolled in 2011-2012, including students that have chosen to persist beyond the first year. This may introduce sample selection bias if marginal price impacts persistence. Yet, estimates focused on just freshmen (2011 high school graduates) are quite similar (column 2) to the full sample for all outcomes.

[19] Estimates from models which include UM-AA or do not control for institution-level ACT are similar.

Having data on the full universe of all students in public universities in the state permits us to control for individual characteristics quite flexibly. Controlling for individual ACT score non-linearly (column 3)[20] or including separate fixed effects for the large number of demographic groups defined by the six-way interaction of ACT score (each single point separately), female, race/ethnicity, FARM, LEP, and special education status (column 4) produces estimates that are nearly identical to our baseline specification.[21]

The next two columns attempt to address the possibility that institutions with flat pricing may differ along other dimensions that may influence course-taking. Controlling for instructional spending (rather than institution-level ACT score) does not alter our findings (column 5) on credits attempted or earned. Specification (6) uses eligibility for the Kalamazoo Promise (KP) Scholarship to construct difference-in-difference estimates as a way to control for institutional characteristics (observed and unobserved) that may correlate with pricing policy and students' credit-taking behavior. Since KP-eligible students do not pay tuition, they should be insensitive to the marginal pricing structure of the institution they attend, but would be affected by other college characteristics and policies. Their responsiveness to flat pricing can be used to net out the effects of these unobserved institutional characteristics.[22] The specification includes an indicator for Not KP-eligible, an interaction between Flat and Not KP-eligible, and institution fixed effects. Column (6) reports the coefficient on this interaction. Since Kalamazoo graduates are

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[20] That is, we include a dummy variable for each individual value of the ACT.

[21] To address the possibility that students may choose to attend flat-pricing institutions based on unobservable student characteristics, we also estimated 2SLS models in which we instrumented for flat pricing of institution attended with the pricing policy of the university closest to a student's high school. Point estimates are about two-thirds the size of base model estimates (i.e., about a 5 percentage point impact on the likelihood a student attempts 13 or more credits), but substantially less precise (standard errors double). These results are qualitatively in line with our overall pattern of findings. Results are available from the authors upon request.

[22] As described by Bartik and Lachowska (2012), the KP provides a scholarship that covers up to 100% of all tuition at public universities and colleges in Michigan, depending on how long a student was enrolled in Kalamazoo Public School system. The scholarship was announced in 2005, so all students from KPS in our study were potentially eligible.

quite different in characteristics and the institutions they attend from students generally, the latter are re-weighted to resemble Kalamazoo graduates (via the use of a first-stage logistic regression where we estimate the likelihood a student is KPS eligible as a function of our vector of student-level characteristics and institution fixed effects). For attempted credits, this specification is very consistent with our earlier results. However, here we find evidence that a modest share of students translate additional attempted credits into earned ones. Yet, we caution against reading too deeply into this result as this specification (largely) identifies a treatment effect by comparing credit-taking behavior of KP-eligible students to non-KP-eligible students at just two institutions: Michigan State University and Western Michigan University. [23] In addition, Kalamazoo high school graduates look quite different than the average student in our full sample: they are more likely to be black and eligible for free or reduced-price meals. Broadly, this specification assuages fears that our approach to estimating the effects of flat pricing on students' credits loads is substantially biased by unobserved, omitted characteristics of colleges that correlate with both flat pricing and students' course-taking behavior.

Finally, we examine alternative inference methods. Clustering standard errors at the college-by-cohort level increases precision considerably. Implementing the wild bootstrap procedure suggested by Cameron, Gelbach, and Miller (2008) reduces precision for some outcomes, but not for attempting more than 12 credits or for likelihood of withdrawal.

D. Heterogeneity

Our theoretical framework suggests that students who would otherwise locate at the full-time minimum of 12 credits would be most strongly affected by flat pricing. Such students experience only a substitution effect (non-school time has become more expensive) and are

[23] Nearly half of KP-eligible Kalamazoo students attend Western Michigan University, representing 64 percent of all KP-eligible students at flat institutions. Two-thirds of KP-eligible students at per-credit schools attend Michigan State University.

unambiguously predicted to increase their credit intensity. In fact, we should observe a "hole" in the density of students at the full-time minimum at flat-pricing schools if credit intensity were truly continuous. Since we cannot know the credit load that students at flat schools would choose when faced with linear pricing, we use students at per-credit schools with identical observed characteristics to form this counterfactual. We create a large number of mutually exclusive student groups defined by the six-way interaction of ACT score (each single point separately), female, race/ethnicity, FARM, LEP, and special education status. Within each of these groups we compare the credits attempted (earned) between students at per-credit and flat-pricing schools. Figure 5 shows these results graphically (and includes all students, part-time and full-time).[24] Groups are ordered according to the average number of credits attempted (earned) at per-credit institutions so that those furthest left are the groups most likely to attempt (earn) close the full-time minimum.[25] The vertical distance provides an estimate of the effect of flat pricing for each group. These comparisons are among very similar students (e.g., among black non-special-education non-LEP females who are eligible for free or reduced-price meals and scored a 23 on the ACT).

Consistent with the theory, we find that estimated treatment effects on credits attempted are largest for those students closest to the full-time minimum: students at flat schools attempt about one credit more, on average. Treatment effects diminish somewhat, as we move up the distribution of average attempted credits. Effects on credits earned are even smaller and close to zero for all but the bottom third of groups. This suggests that our main results are indeed being driven by impacts on credits attempted for those students who would locate near the 12-credit

[24] The pictures are similar and the conclusions unchanged if we limit our sample for Figure 5 to full-time students.
[25] The x-axis simply counts the number of student groups graphed where groups are ordered by the average credits taken in per-credit schools. Only groups containing at least 50 students in each type of school are shown in Figure 5, though the pattern is unchanged if more groups are included.

threshold under a per-credit pricing scheme. Students in the bottom 20 demographic subgroups in Figure 5 are overwhelmingly black (90%), FARM (40%), have an average ACT composite score of 16.4, and attempt 12.1 credits; while students in the top 20 demographic subgroups are non-black, non-FARM, score an average of 27.9 on the ACT, and attempt an average of 14.3 credits. We repeated our regression analysis separately by quintile of predicted credits attempted based on student characteristics with similar results.[26]

We also explored heterogeneity in our regression framework by explicitly contrasting effects by observable characteristics, such as sex, eligibility for free or reduced-price meals, and unique ACT score. This heterogeneity analysis was motivated by evidence of differential effects of other interventions for women versus men (e.g., Anderson, 2008), the overtaking of men by women in college entry and completion (Goldin, Katz, & Kuziemko, 2006), and the stronger response by low-income students to college prices relative to their more advantaged peers (Kane, 1994; Dynarski, 2002). These results (reported in Appendix Table A3) are very consistent with the pattern depicted in Figure 5: effects of flat pricing remain concentrated along the margin of attempted (not earned) credits and withdrawal and are largest for poor and male students. These are precisely the students who disproportionately populate the bottom demographic subgroups in Figure 5.

[26] These results are presented in Appendix Table A2. To construct quintiles we estimate a first-stage regression using data only on students at per-credit institutions where the outcome is credits attempted and the only covariates are student-level characteristics. We use coefficients from this model to predict the number of credits attempted for all students in our analytic sample and divide students in quintiles based on this prediction. Students in the bottom quintile are those closest to the 12-credit, full-time benchmark. Given recent concerns about the potential for this process to introduce systematic errors in the extremes of the prediction distribution, thereby biasing subgroup treatment effects (Abadie, Chingos, & West, 2013), we only include subgroups with more than 50 students per cell in Figure 5. In addition, our main sample sizes are quite large, mitigating bias-causing errors due to over-fitting in this prediction-based approach to exploring heterogeneity (Abadie, Chingos, & West, 2013, p. 4).

E. Interpreting the Effects of Flat Pricing

To examine effects of flat pricing on course-taking behavior by subject, we characterize each course taken into one of 12 broad subject areas based on CIP codes (available at some institutions), academic department/subject, and/or course title. Figure 6 illustrates our findings graphically. The left bar depicts the mean number of credits attempted in each subject area by all students at per-credit schools in the 2011-2012 academic year. The average course load includes about one course each in Humanities/English and Social Science and two or three other courses collectively across the other ten subjects. The right bar adds to this our subject-specific estimated treatment effect of flat pricing. Though students at flat pricing schools do take slightly more credits in these two main areas, the difference is modest and not statistically significant. Students at per-credit schools take more credits in Other Professional/Technical subjects, which appears to be driven by more credit-taking in communications and journalism at these schools. In results not reported, we found that additional credits are not disproportionately in subjects we categorize as "non-degree-related" and that there is little systematic substitution from 3- to 4-credit courses.[27] We conclude that the additional courses students are induced to take in response to a subsidized marginal price are not substantively different than their typical courses and, if anything, are in the core subjects of Humanities/English and Social Science.

F. Long-term Outcomes

We now explore the impact of marginal pricing on the longer-term outcomes of persistence and credit accumulation. We track entry into and persistence through postsecondary education using the National Student Clearinghouse (NSC). For each member of the high school

[27] Results available from authors upon request. "Non-degree-related" includes CIP codes 31 through 37, including Parks, Recreation, and Leisure Studies, Basic Skills/Remedial, Citizenship Activities, Health-related Knowledge and Skills, Interpersonal and Social Skills, Leisure and Recreational Activities, and Personal Awareness and Self-Improvement.

cohorts of 2008 through 2011, we identify students (of any intensity) that enrolled in a Michigan public 4-year university in the fall term immediately following high school graduation.[28] Figure 7 plots the fraction of these students enrolled in any college (Panel A) or a MI public 4-year university (Panel B) over time, separately by high school cohort and the pricing policy of the first institution attended. Across all institutions, 96% of students attend any college (including Michigan universities, community colleges, and private colleges) in their second semester, though enrollment drops to 83% by the start of the fourth academic year. Comparable rates for enrollment at a Michigan public university are 93.6% and 72%, respectively.

Rates of persistence beyond the first year at any college are slightly higher for students starting at institutions with flat (rather than per-credit) pricing. However, rates of persistence at Michigan public universities are considerably higher among students starting at flat-pricing schools (Panel B). These raw persistence patterns do not control for the characteristics of students. When we control for such traits, students at flat institutions have *lower* rates of persistence than would be predicted by their individual traits.[29] Thus we find little evidence that flat pricing improves students' rates of persistence, either overall (at any institution) or at MI public universities.

We now directly examine impacts on credits accumulated over several years. Recall that STARR data contain information about all courses taken in 2011-2012 and in all prior terms, among students still enrolled in the 2011-2012 academic year. Thus for all students in the 2008, 2009, and 2010 cohorts that persist to 2011-2012, we calculate cumulative credits attempted and

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[28] This sample includes 116,581 individuals, approximately 29,000 students from each of these four cohorts. Very few students enter one of these institutions in the spring term, so the fall enrollment restriction is not too binding. Students that delay entry into or eventually transfer to a Michigan public university from private or community colleges are also excluded to ensure that the sample is similar across cohorts, given that later cohorts would mechanically have few delayed or transfer entrants.

[29] Appendix Table A5 presents regression results that control for individual and college characteristics when looking at persistence.

earned as of Spring 2012. We make two important sample restrictions. First, we restrict our analysis to students enrolled (at least part time) in any Michigan public 4-year college in all fall and spring semesters since high school graduation (as indicated by the NSC).[30] This restriction permits us to abstract from students' decisions to persist and instead focus on credits accumulated among those that have decided to persist in all periods.[31] Second, we only keep students with complete consistency between their NSC and STARR records. [32] This restriction assures we accumulate all credits attempted and earned by an individual.[33]

In Table 5 we analyze cumulative credits attempted, cumulative credits earned, and whether cumulative credits earned are above the threshold for on-time, all as of Spring 2012. Since these on-time thresholds differ by student level (sophomore, junior, senior), we present estimates separately by cohort. Overall, we find little evidence that flat pricing encourages students to attempt or accumulate more credits over time. On average, students have attempted 58.3 credits and earned 54.9 by the end of their second year in college, but there is little difference between students at per-credit and flat pricing institutions. Nor are students at flat institutions more likely to have earned 60 credits, a marker for graduating within four years.[34] Results for the 2009 and 2008 cohorts are qualitatively similar: the typical student is attempting and earning fewer credits than the on-time benchmark and there is minimal difference between students at flat and per-credit schools. Any modest average attempted credit advantage seen

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[30] So members of the high school class of 2008 (2009, 2010) must be enrolled in a MI public university for all 8 (6, 4) fall and spring terms since high school graduation.

[31] Further, our intention is to construct markers of on-time credit accumulation that are only relevant for students that have already chosen to enroll. Given the minimal impact on persistence, we do not believe this restriction creates grave concerns about sample selection bias.

[32] Though NSC-STARR consistency is quite high in the 2011-2012 academic year (98%, similar for flat and per-credit schools), it deteriorates in earlier years and becomes slightly worse at per-credit institutions. Thus results for the 2008 and 2009 cohorts that rely on historical data (such as cumulative credits) should be interpreted with some caution.

[33] We find similar effects on credits attempted in 2011-2012 with this restricted sample as with the full sample reported earlier. These results are available from the authors upon request.

[34] Though not reported in the table, we find similar results for cumulative credits across fall and spring terms only (excluding summer) and if we exclude the University of Michigan – Ann Arbor.

among students at flat pricing institutions is eliminated (and in some cases reversed) when looking at credits earned.

VII. External Validity

Our study focuses on public universities in Michigan because of the availability of rich transcript data and because the state appears unique in having substantial policy variation among similar institutions, likely because tuition policy is not set centrally. While focusing on a single state and sector controls for many possible confounders, it raises the question of external validity. Unfortunately there is no systematic source of information of the current use of flat or per-credit pricing across many institutions nationally, so repeating our analysis for a wide range of schools is not possible.[35] As a check on external validity, in Table 6 we examine students at public universities in the states of Minnesota and Texas using data contained in the 2004 and 2008 National Postsecondary Student Aid Study (NPSAS). These states have nationally representative samples for students in public universities in both these years and, importantly, have some variation in pricing practices across institutions and over time.[36]

Within the University of Minnesota System, the Duluth and Crookston campuses transitioned from per-credit to flat pricing between 2004 and 2008, while the Twin Cities and Morris campuses were flat throughout. Three of the Minnesota State Universities had flat pricing and four had per-credit pricing in 2004, with one (Southwest State) going from per credit to flat between 2004 and 2008. Though cross-sectional models suggest a positive association between

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[35] Standard sources such as the Integrated Postsecondary Education Data System (IPEDS) by the U.S. Department of Education and the Annual Survey of Colleges by the College Board ask institutions to report the price for a typical full-time student, but do not currently report whether this price varies with credit load. This is a point also made by Baum et al (2013). IPEDS does contain an indicator for flat or per-credit pricing in 1993, but data from this period would have limited applicability to the external validity of our results in 2011.

[36] Other states with representative or large samples in NPSAS in 2004 and 2008 lack adequate variation in pricing practices across institutions. For instance, all public four-year universities in California, New York, Ohio, and North Carolina have flat pricing structures, as do most in Georgia. Flat pricing in Illinois is confined to the two most selective institutions (University of Illinois Urbana-Champaign and University of Illinois Chicago) with no change, making credible comparisons difficult. All public universities in Florida charge per credit hour.

flat pricing and credit intensity, including institution fixed effects eliminates this pattern. Though the Duluth and Crookston campuses adopted flat pricing, their students did not gain on those at the Twin Cities and Morris campuses where pricing policy was unchanged.[37] In Texas, flat pricing was introduced at five campuses in the wake of tuition deregulation in 2003: the University of North Texas (2007), UT Austin (2005), UT Arlington (2006), UT Brownsville (2006), and Texas A&M (2009). Prior to that, all institutions charged per credit. Again we find little evidence that credit intensity increased appreciably following the adoption of flat pricing, whether we examine the entire sample or restrict analysis to the UT System.

VIII. Discussion and Conclusions

As public colleges and universities replace lost state support with tuition revenue from students, many have re-examined the common practice of charging a flat rate regardless of students' credit load, level, or program. At the same time, pressure from policymakers and the public has compelled institutions to find ways to improve student progress and reduce time-to-degree. These twin objectives appear to be at odds: raising prices may generate revenue but could also deter enrollment, slow student progress, and ultimately reduce the number of college graduates. Charging full-time students differentially based on the number of credits taken – pricing at the margin – is one practice about which similar institutions have articulated different views. Some have stressed the detrimental effects of marginal price on student success by, for instance, reducing the marginal price to zero in order to get students to "Finish in Four," as Adam's State's plan is called. Others see marginal pricing as an equitable way of raising revenue from students who consume more resources; "flat" pricing is viewed as a subsidy to students

[37] Some cautions are warranted, however. The samples are very small and not representative at a school-level. Also, data cleaning measures used in 2008 eliminate 87% of the sample of students at the seven Minnesota State campuses during that year. These observations are dropped from all analysis and preferred specifications do not use Minnesota State campuses in 2008.

who would have taken large course loads anyway. These divergent views are unsurprising given the dearth of evidence on the subject.

This paper provides the first evidence on whether students' educational investments respond to these marginal price incentives. Using rich administrative data on all in-state students at the 15 public universities in Michigan, we estimate that marginal price (above the full-time minimum) has no detectable effect on the average number of credits attempted or earned in a semester. We find that exposure to flat pricing compels about 7 percent of students to attempt about one class more (i.e., up to 3 additional credits). This impact appears to be driven by relatively stronger effects among low-income, minority, and lower-achieving college students (i.e., point estimates are nearly twice as large for such groups). Yet, we see little evidence that these additional attempted credits translate into more credits earned in a semester or cumulatively, greater persistence, or reduced time-to-degree, though estimates of these longer-term outcomes are admittedly less precise. We argue that this disconnect between additional credits attempted and earned is due to the increased propensity of students exposed to flat-pricing to withdraw from (or fail) classes.

Based on these results, marginal pricing may be a non-distortionary way for institutions to raise revenue. Additional revenue could be used to finance other interventions with a stronger track record of improving student success, to increase financial aid, or possibly to lower the average tuition price faced by students taking lower credit loads.

Our null finding stands in contrast to the rather large literature that documents substantial student responses to price in other choice environments, such as the decision to enroll or the choice of college. Our results suggest a need to dig deeper into the choices students make after entering college, as price responsiveness at the enrollment margin does not appear to imply a comparable responsiveness once students are enrolled. Policies designed with large student price elasticities in mind (informed by the enrollment and college choice literature) may not translate well to the problem of supporting and hastening student progress with marginal incentives.

There are several possible explanations for this difference. First, it is plausible that the intensive credit-taking decision environment is quite different than at the extensive margin. Students may perceive more constraints on their credit-load choices than on their college choices. Second, the marginal price of intensity may simply be less salient than the overall (average) price, which determines enrollment and college choice. In Michigan, we see some variation in the salience of pricing policies (and its relation to cost savings and time-to-degree) across institutions. For example, Lake Superior State University exclaims in large, bold font at the top of its webpage on costs: "LSSU offers a flat tuition rate for those taking 12 to 17 credits. This means you can take 17 credit hours for the price of 12, a savings of over $4,100 per year, and over $16,400 in four years!"[38] Other colleges simply state the overall and/or per-credit tuition prices, sometimes buried in tables on registrar webpages. Lastly, it is possible that students respond to some other feature of price than marginal price, such as average or expected marginal price, as has been observed in other settings (Ito, 2013). A task for future work is to separate these explanations, possibly through an experimental information intervention along the lines of Chetty and Saez (2013). There are also several other possible effects of marginal price that we have not yet explored, namely major choice, financial burden, or interest exploration. These too are important questions for future research.

[38] Source: http://www.lssu.edu/costs/

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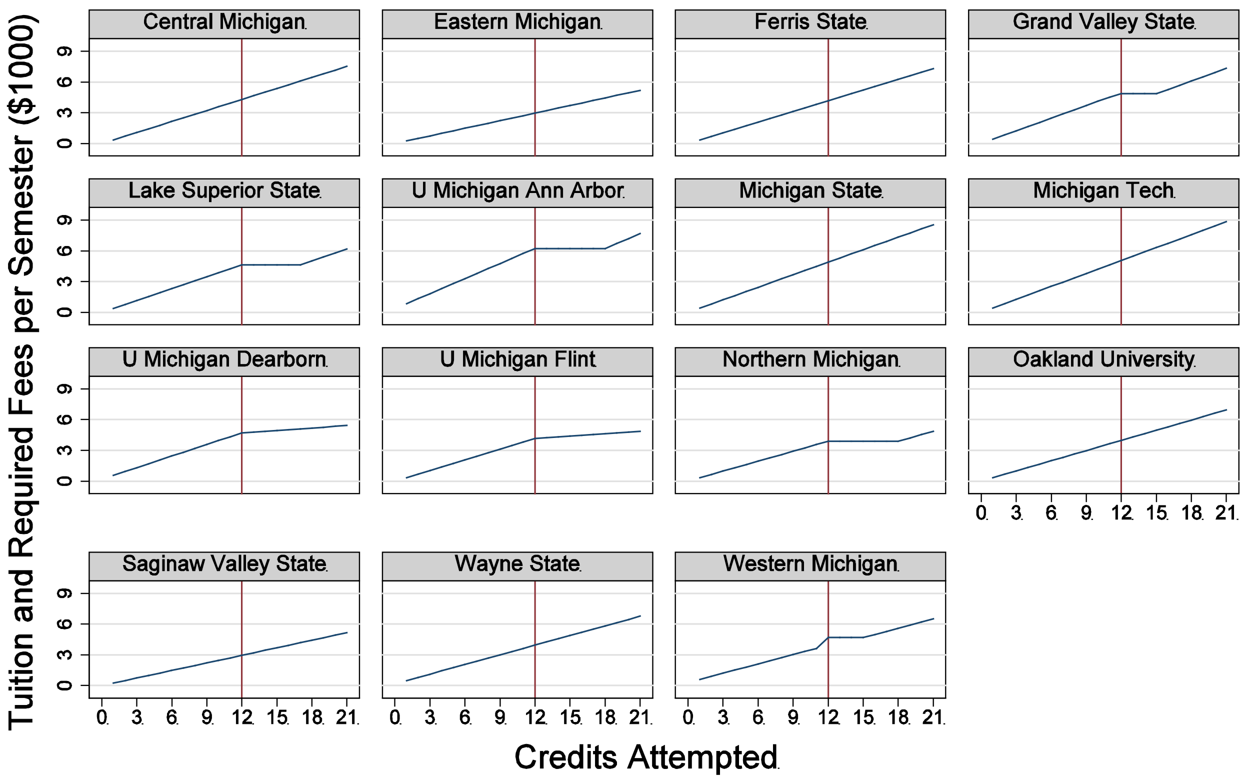
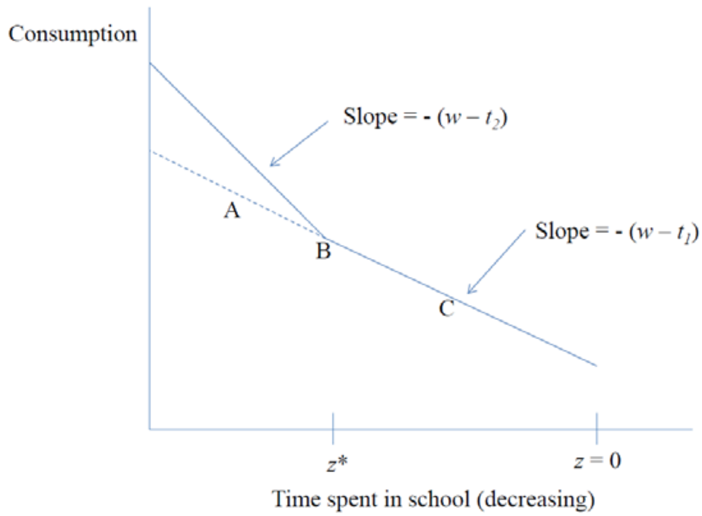
Figure 1. Sticker Price for Michigan Public Universities, Fall 2011

First-time in-state students in non-differentiated programs



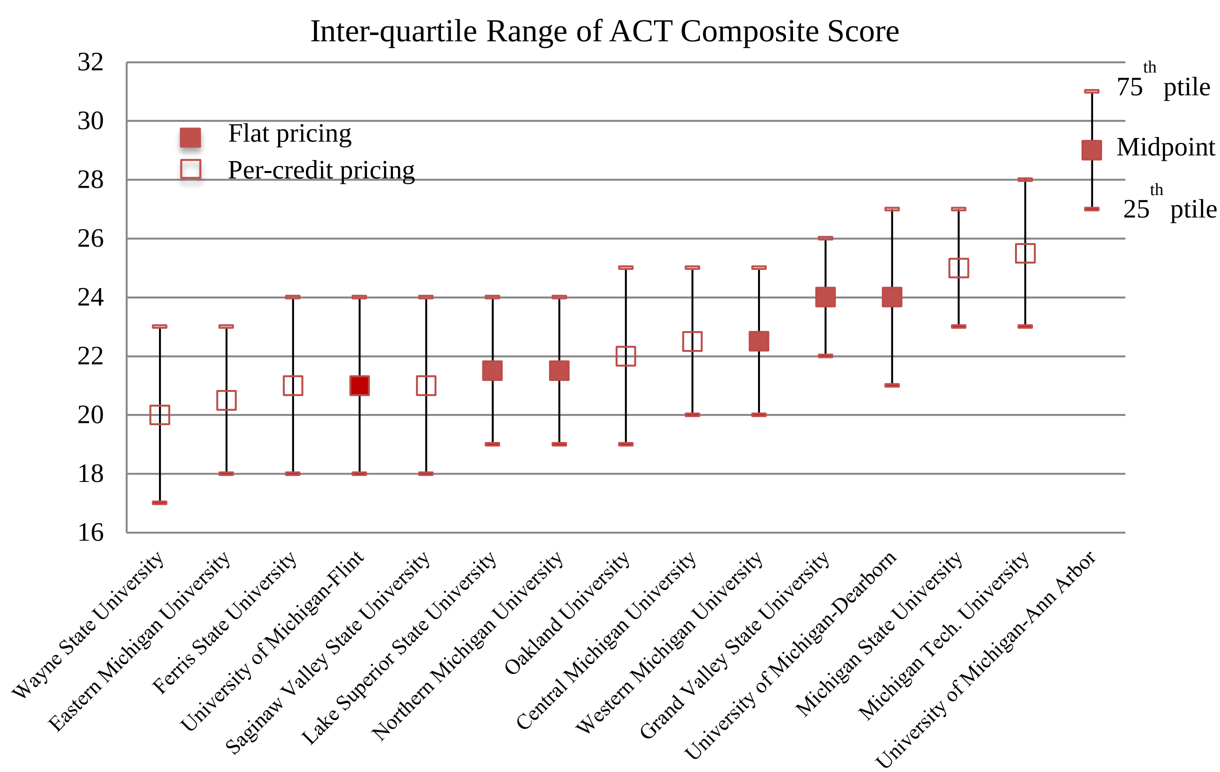
Source: Presidents Council, State Universities of Michigan, Report on Tuition and Fees 2011-2012.

Figure 2. Single-Period School Intensity Budget Constraint



Notes: Figure plots non-linear budget constraint (solid) for choice of school intensity if earnings increase linearly with intensity and per-credit tuition price is reduced (from t_1 to t_2) for intensity greater than z*. Linear budget constraint (dashed) is shown for reference.

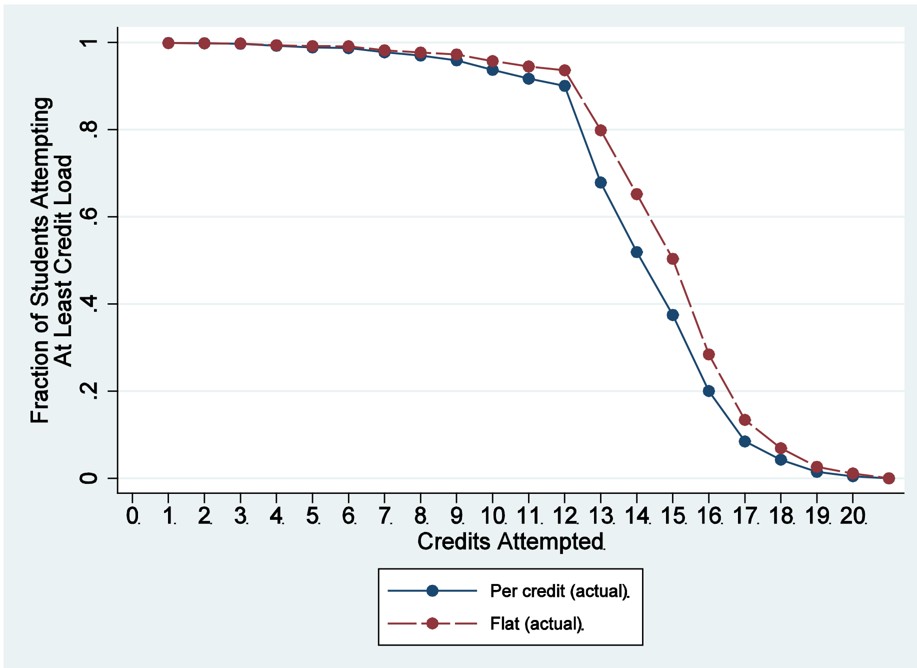
Figure 3. ACT Score Ranges at Michigan Public Universities, by Pricing Policy



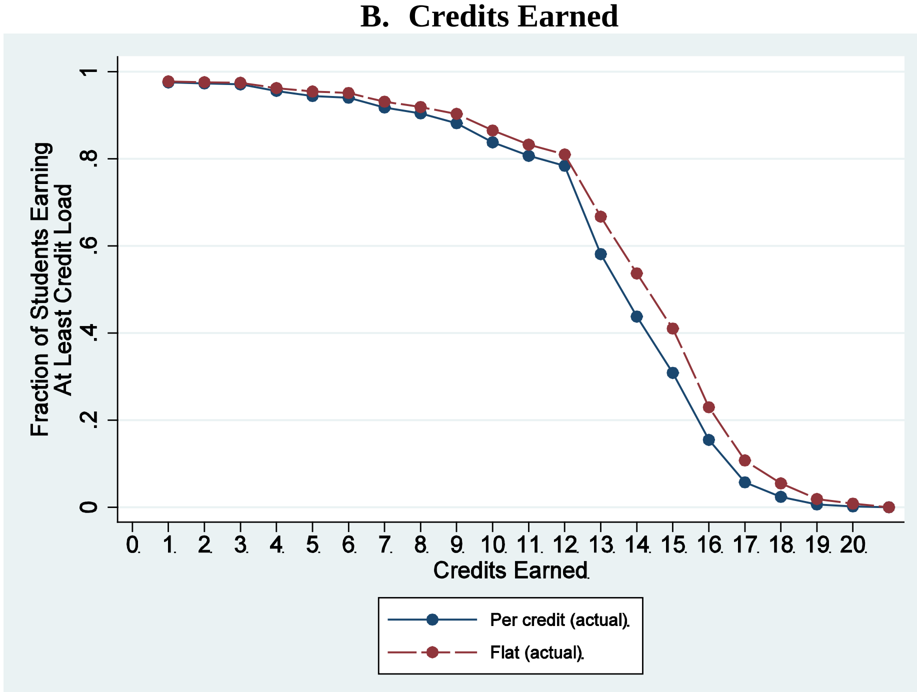
Source: Integrated Postsecondary Education Data System (IPEDS), data for 2009-2010 incoming class.

Figure 4. Fraction of Students at or above Credit Threshold at Michigan Public Universities

A. Credits Attempted



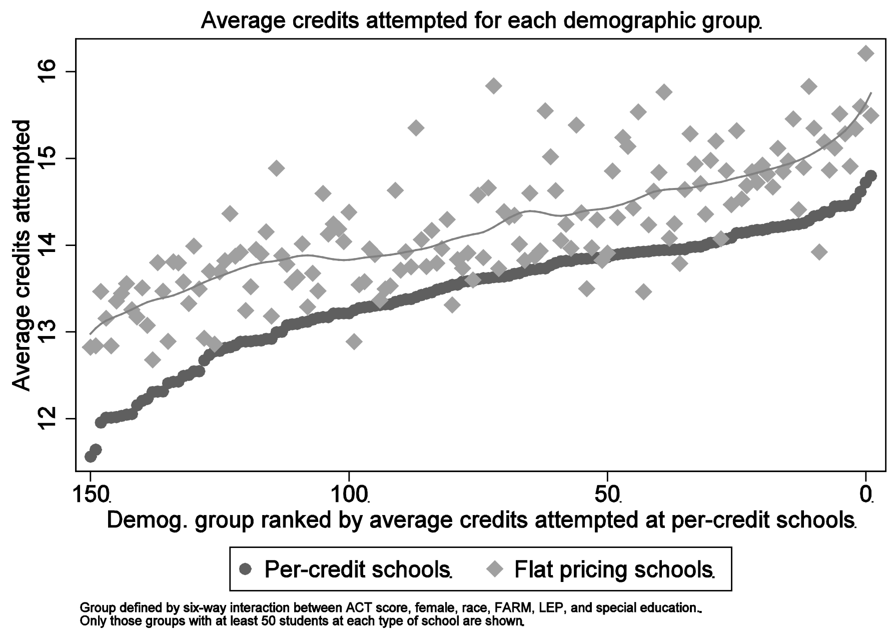
B. Credits Earned



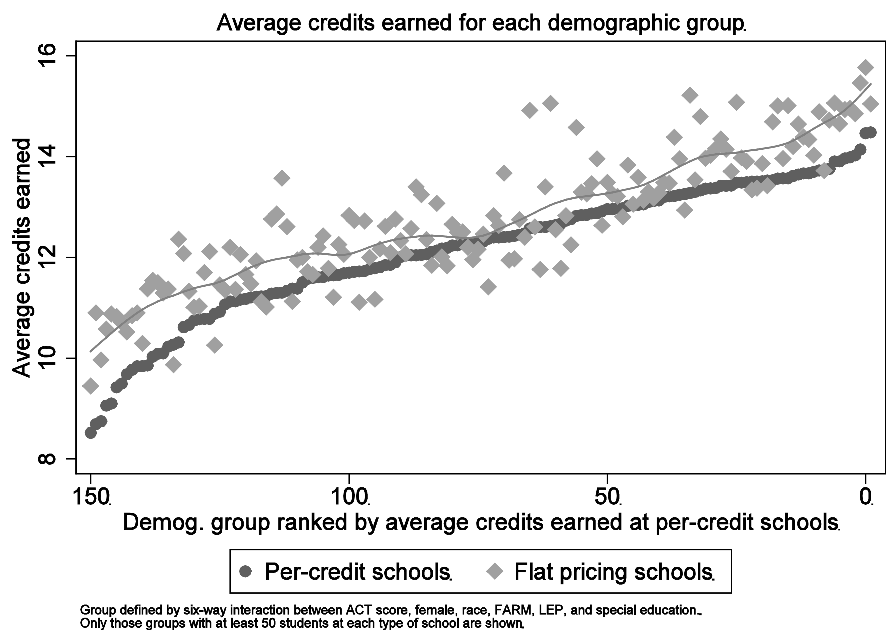
Notes: Figure plots the fraction of students at Michigan public universities that attempt (or earn) at least X credits in the semester, separately by the pricing structure of the university. Sample includes college-going Michigan high school graduates form the classes of 2008 through 2011. Credit-taking is observed in the fall and spring of the 2011-2012 academic year.

Figure 5. Heterogeneous Effects of Flat Pricing by Student Characteristics

A. Credits Attempted

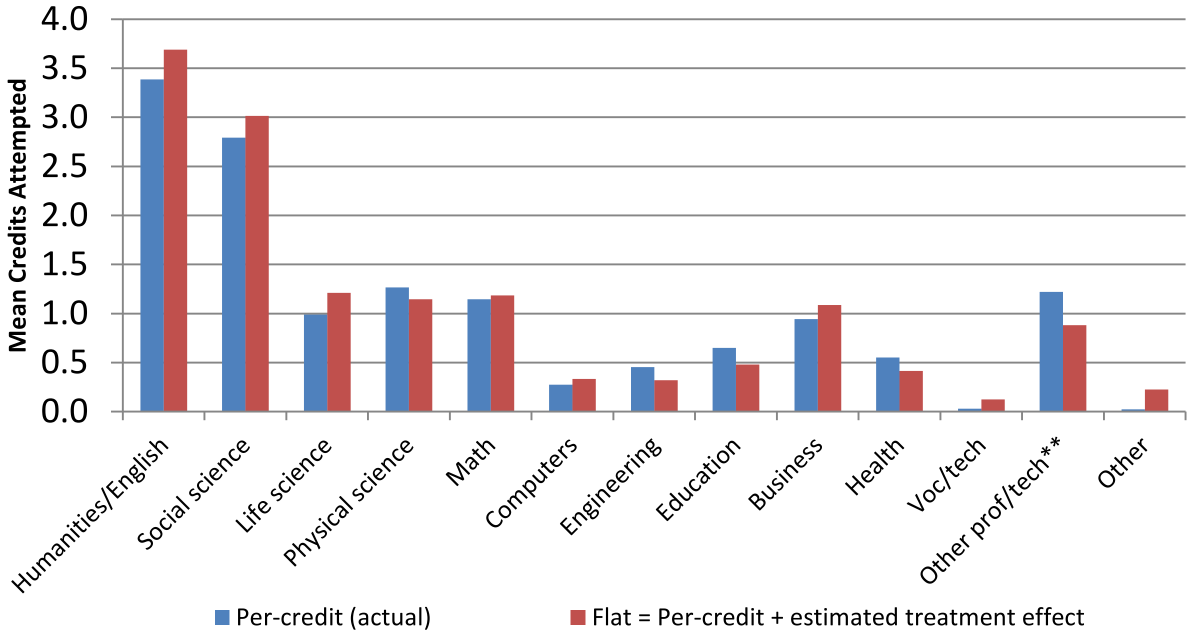


B. Credits Earned



Notes: Each demographic group is defined by a six-way interaction between ACT score, female, race/ethnicity, FARM, LEP, and special education status. Only those groups containing at least 50 students are shown. Credit-taking is observed in the fall and spring of the 2011-2012 academic year. See text for additional details.

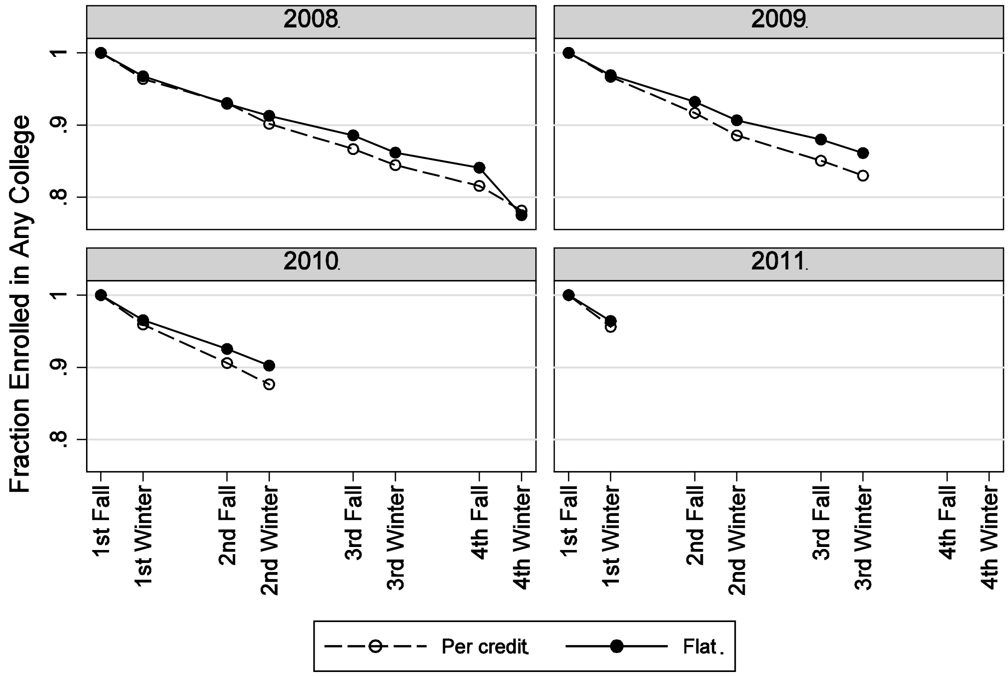
Figure 6. Effects on Mean Credits Attempted by Subject



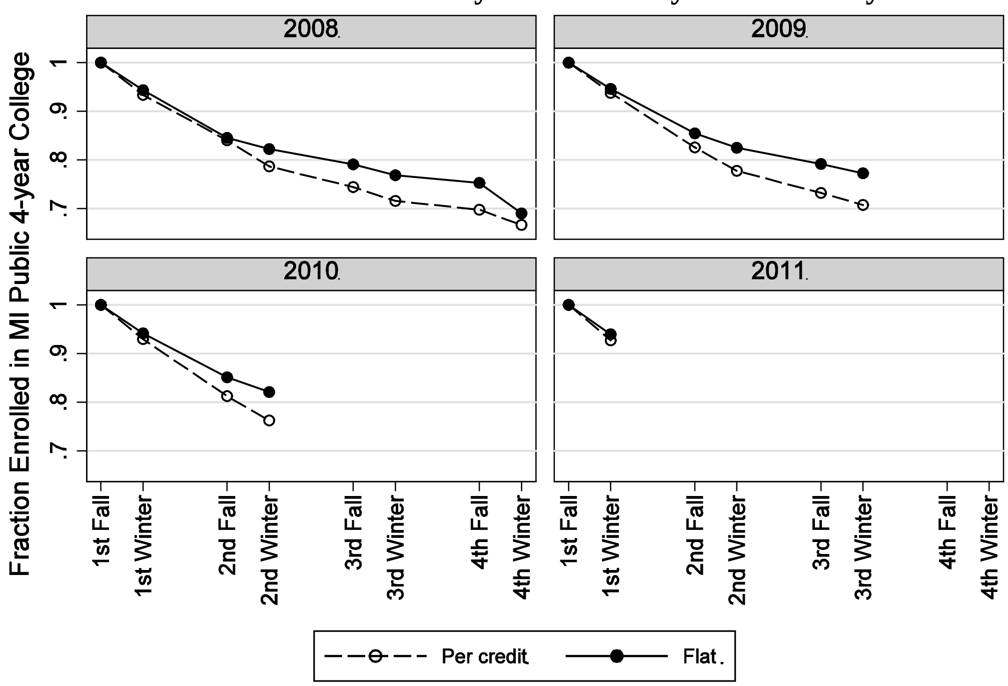
Notes: Per-credit mean is for all cohorts during 2011-2012 academic year. Flat (counterfactual) mean is per-credit mean plus estimated effect of flat pricing on average credits taken in subject. Model includes indicators for each unique term (e.g., Fall 2011), individual controls, institution-level ACT score, and cohort fixed effects. Sample includes only FT students and excludes University of Michigan – Ann Arbor. Estimates for other samples are similar. Standard errors (not reported) are clustered by institution. Significance of difference between flat and per-credit schools denoted: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Figure 7. Persistence Among Fall Enrollees at MI Public Universities, by High School Cohort and Pricing Policy

A. Persistence at Any College



B. Persistence at Any MI Public 4-year University



Notes: Figures plot the fraction of students enrolled in any college (Panel A) or a MI public university separately by high school cohort and pricing policy of first institution. Restricted to MI public high school graduates from 2008 to 2011 that enrolled in a MI public 4-year university in the fall immediately after high school.

Table 1. Student Sample Characteristics, by Marginal Pricing Practice
2008-2011 High School Graduates

		Include all flat schools		Exclude UM-Ann Arbor	
	Per-credit schools (PC)	Flat schools (F)	Difference (F - PC)	Flat schools (F)	Difference (F - PC)
Demographic and Achievement Characteristics:					
Female	0.554	0.549	-0.005	0.560	0.006
	(0.497)	(0.498)	(0.002)	(0.496)	(0.002)
Black	0.118	0.074	-0.044	0.079	-0.039
	(0.322)	(0.261)	(0.001)	(0.269)	(0.002)
Hispanic	0.016	0.021	0.005	0.022	0.006
	(0.124)	(0.142)	(0.001)	(0.146)	(0.001)
Other	0.041	0.062	0.022	0.033	-0.007
	(0.197)	(0.241)	(0.001)	(0.180)	(0.001)
White	0.826	0.843	0.018	0.866	0.040
	(0.379)	(0.363)	(0.002)	(0.340)	(0.002)
FARM	0.069	0.058	-0.011	0.069	0.000
	(0.254)	(0.234)	(0.001)	(0.253)	(0.001)
LEP	0.038	0.035	-0.003	0.028	-0.010
	(0.191)	(0.183)	(0.001)	(0.165)	(0.001)
Special Education	0.066	0.063	-0.003	0.074	0.008
	(0.248)	(0.243)	(0.001)	(0.261)	(0.001)
ACT Composite Score	22.084	23.612	1.528	21.912	-0.171
	(4.187)	(4.661)	(0.020)	(3.897)	(0.020)
College Outcomes:					
Credits Attempted	13.62	14.399	0.779	13.90	0.280
	(2.718)	(2.778)	(0.012)	(2.570)	(0.013)
Credits Earned	12.487	13.274	0.787	12.514	0.027
	(3.683)	(3.883)	(0.017)	(3.859)	(0.019)
Attempt at least 12 credits	0.901	0.937	0.036	0.923	0.022
	(0.298)	(0.242)	(0.001)	(0.266)	(0.001)
Earn at least 12 credits	0.785	0.814	0.029	0.765	-0.020
	(0.411)	(0.389)	(0.002)	(0.424)	(0.002)
Attempt more than 12 credits	0.682	0.803	0.121	0.766	0.084
	(0.466)	(0.398)	(0.002)	(0.423)	(0.002)
Earn more than 12 credits	0.583	0.674	0.091	0.606	0.023
	(0.493)	(0.469)	(0.002)	(0.489)	(0.002)
Attempt 15 or more credits	0.379	0.513	0.135	0.449	0.071
	(0.485)	(0.500)	(0.002)	(0.497)	(0.002)
Earn 15 or more credits	0.310	0.421	0.111	0.342	0.031
	(0.463)	(0.494)	(0.002)	(0.474)	(0.002)
N	128,552	83,768	--	59,155	--

Notes: Each observation is a student-by-semester, so most students are included twice. Sample includes all students during the 2011-2012 academic year. The "other" category includes students who identify as American Indian, Asian American, Hawaiian, or Multi-racial. Standard deviations (errors for difference) appear in parentheses.

Table 2. Marginal Tuition Pricing and College Credits Attempted and Earned

	Credits Attempted						Credits Earned					
	Full-time Students				All Students		Full-time Students				All Students	
Outcome	mean	(1)	(2)	(3)	mean	(4)	mean	(5)	(6)	(7)	mean	(8)
Average credits	14.46	0.487	0.340	0.186	13.93	0.237	13.36	0.335	-0.085	-0.130	12.80	-0.097
		(0.362)	(0.397)	(0.284)		(0.385)		(0.342)	(0.139)	(0.140)		(0.246)
12 or more credits					0.92	0.016					0.80	-0.035
						(0.025)						(0.022)
13 or more credits	0.80	0.083***	0.061**	0.068**	0.73	0.072	0.68	0.038	-0.012	0.001	0.62	0.007
		(0.026)	(0.027)	(0.029)		(0.043)		(0.041)	(0.027)	(0.020)		(0.027)
15 or more credits	0.47	0.103	0.088	0.066	0.43	0.066	0.39	0.074	0.044	0.025	0.35	0.026
		(0.068)	(0.079)	(0.064)		(0.067)		(0.048)	(0.050)	(0.037)		(0.040)
Institution controls		None	ACT composite	ACT composite		ACT composite		None	ACT composite	ACT composite		ACT composite
Institutional sample		All schools	All schools	Exclude UM-AA		Exclude UM-AA		All schools	All schools	Exclude UM-AA		Exclude UM-AA

Notes: Each cell reports the coefficient on indicator for "Flat Pricing" from a separate regression. All models include indicators for each unique term (e.g., Fall 2011), high school cohort, dummies for female, black, Hispanic, other race, LEP and FARM and composite ACT score. All student sample includes all in-state students enrolled in a Michigan public university in the 2011-2012 academic year, resulting in 212,320 student-term observations (187,707 excluding UM-Ann Arbor). Full-time sample includes 194,391 observations (170,466 excluding UM-Ann Arbor). Robust standard errors clustered at the college level appear in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Likelihood of Failing or Withdrawing from Course

Individual controls, institution-level ACT, excluding UM-Ann Arbor

	All Students	Full-time Students Only
	(1)	(2)
Panel A. Outcome = Withdrew from at least one class		
Flat pricing	0.067***	0.067***
	(0.020)	(0.019)
Outcome mean	0.110	0.109
Observations	187,420	170,328
Panel B: Outcome = Failed at least one class		
Flat pricing	0.036**	0.036**
	(0.016)	(0.017)
Outcome mean	0.111	0.104
Observations	185,069	169,081

Notes: Each cell reports the coefficient on indicator for "Flat Pricing" from a separate regression. All models include dummies for unique cohort and term, dummies for female, black, Hispanic, other race, LEP and FARM and composite ACT score of individual, midpoint ACT of the institution, and exclude UM-Ann Arbor. Sample sizes are smaller than Table 2 due to missing data for some students. Robust standard errors clustered at the college level appear in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Robustness of Main Results
Full-time Students

			Flexible controls		Institutional Characteristics		Inference	
	Base model (1)	2011 Cohort only (2)	ACT score flexibly (3)	Group FEs (4)	Control for spending (5)	Kzoo diff-in-diff (6)	Cluster cohort x college (7)	Wild bootstrap (8)
Panel A. Credits Attempted								
Average credits attempted	0.186	0.228	0.183	0.180	-0.047	0.256	0.186	0.186
	(0.284)	(0.278)	(0.284)	(0.283)	(0.323)	(0.189)	[0.204]	[0.42]
13 or more credits attempted	0.068**	0.073**	0.067**	0.066**	0.075*	0.065*	0.068***	0.068***
	(0.029)	(0.028)	(0.029)	(0.029)	(0.039)	(0.035)	[0.000]	[0.000]
15 or more credits attempted	0.066	0.040	0.065	0.064	0.004	0.092**	0.066*	0.066
	(0.064)	(0.075)	(0.064)	(0.064)	(0.065)	(0.039)	[0.052]	[0.24]
Panel B. Credits Earned								
Average credits earned	-0.130	-0.106	-0.136	-0.138	0.022	0.405	-0.130	-0.13
	(0.140)	(0.155)	(0.141)	(0.142)	(0.188)	(0.334)	[0.142]	[0.64]
13 or more credits earned	0.001	0.006	0.001	0.000	0.043	0.070*	0.001	0.001
	(0.020)	(0.022)	(0.020)	(0.020)	(0.033)	(0.038)	[0.916]	[0.74]
15 or more credits earned	0.025	0.003	0.024	0.024	-0.005	0.082**	0.025	0.025
	(0.037)	(0.051)	(0.037)	(0.037)	(0.038)	(0.031)	[0.239]	[0.42]
Panel C. Withdrawal or Fail								
Withdrew from at least one course	0.067***	0.056***	0.068***	0.068***	0.034*	-0.005	0.067***	0.067***
	(0.019)	(0.018)	(0.019)	(0.019)	(0.019)	(0.012)	[0.00]	[0.00]
Fail at least one course	0.036**	0.034	0.037**	0.037**	0.007	-0.015	0.036***	0.036
	(0.017)	(0.022)	(0.017)	(0.017)	(0.020)	(0.028)	[0.00]	[0.22]
Student controls?	Linear	Linear	Linear + ACT flexibly	Group FEs	Linear	Linear	Linear	Linear
Institution controls?	ACT composite	ACT composite	ACT composite	ACT composite	Instruct. $ per student	Fixed effects	ACT composite	ACT composite
Institutional sample	Exclude UM-AA	Exclude UM-AA	Exclude UM-AA	Exclude UM-AA	Exclude UM-AA	All	Exclude UM-AA	Exclude UM-AA

Notes: Each cell reports the coefficient on indicator for "Flat Pricing" from a separate regression. All models include indicators for each unique term (e.g., Fall 2011) and high school cohort. Student controls include dummies for female, black, Hispanic, other race, LEP and FARM and composite ACT score. Specification (6) includes an indicator for Not KPS eligible, an interaction between Flat and Not KPS eligible, and institutions fixed effects. The table reports the coefficient on this interaction. Sample sizes for specification (2) and (6) are 46,437 and 186,474 all others have a maximum sample size of 170,466. Robust standard errors clustered at the college level appear in parentheses. Specifications (7) and (8) report p-values in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Marginal Tuition Pricing and Cumulative College Credits Attempted and Earned as of Winter 2012
Individual controls, institution-level ACT, excluding UM-Ann Arbor

	Cumulative credits attempted	Cumulative credits earned	"On-time" cumulative credits earned
	(1)	(2)	(3)
Panel A. High school class of 2010			
"On-time" = 60 credits earned by Winter 2012, n = 17,352 students			
Flat pricing	0.777	0.204	0.010
	(1.408)	(0.885)	(0.040)
Outcome mean	58.36	54.21	0.284
Panel B. High school class of 2009			
"On-time" = 90 credits earned by Winter 2012, n = 13,260 students			
Flat pricing	1.549	0.680	-0.004
	(2.026)	(1.254)	(0.043)
Outcome mean	88.50	82.52	0.308
Panel C. High school class of 2008			
On-time" = 120 credits earned by Winter 2012, n = 8,782 students			
Flat pricing	3.653	2.277	0.020
	(3.266)	(2.410)	(0.076)
Outcome mean	119.01	111.18	0.341

Notes: Each cell reports the coefficient on indicator for "Flat Pricing" from a separate regression. Sample is restricted to students enrolled (part-time or full-time) in all fall and winter semesters since high school graduation and for which NSC and STARR data agree on enrollment history. Cumulative credits includes credits taken during summer terms. All models include dummies for female, black, Hispanic, other race, LEP and FARM and composite ACT score of individual, midpoint ACT of the institution, and exclude UM-Ann Arbor. Robust standard errors clustered at the college level appear in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Effect of Flat Pricing on Credits Attempted, Other States

Panel A. Minnesota			Credits Attempted		
Sample	Controls	Obs.	At least 13	At least 15	Average credits
All schools, All years	Full controls	1500	0.093***	0.120***	0.578***
			(0.031)	(0.044)	(0.176)
UMN System, All years	Full controls	900	0.075*	-0.023	0.256
			(0.043)	(0.065)	(0.252)
UMN System, All years	Full controls + Fixed effects	900	0.010	-0.117	-0.113
			(0.051)	(0.089)	(0.317)
Overall sample mean		1500	0.916	0.669	15.20

Panel B. Texas			Credits Attempted		
Sample	Controls		At least 13	At least 15	Average credits
All schools, 2008	Full controls	2900	0.014	-0.033	-0.098
			(0.030)	(0.031)	(0.109)
UT System, All years	Full controls	1600	0.019	-0.095**	-0.167
			(0.044)	(0.043)	(0.152)
UT System, All years	Full controls + Fixed effects	1600	-0.056	0.009	-0.048
			(0.060)	(0.061)	(0.211)
Overall sample mean		4800	0.677	0.407	13.90

Notes: Sample is drawn from the 2004 and 2008 NPSAS, which is representative of students at public 4-year institutions in these years. Sample sizes rounded to nearest 100. Each observation is a person-term, weighted by sample weights. Full controls include indicators for year and semester, age, indicator for Pell recipient, GPA, EFC, family income, undergraduate level, and system (UMN or UT). Standard errors clustered by person appear in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A1. Marginal Pricing Practices at Michigan's 4-year Public Universities

	Type	Per-credit price (2011/2012)	Flat range	Price differentials by… level (upper vs. lower)	Price differentials by… Program or school	Withdrawal Policy: Can receive full (or near full) refund of tuition and fees if withdraw by…
Central Michigan University	per credit	$358				second meeting of course
Eastern Michigan University	per credit	$247				one week into course
Ferris State University	per credit	$348				fourth day of the semester
Grand Valley State University	flat		12-16 credits	yes		end of first week of classes
Lake Superior State University	flat		12-17 credits			sixth day of the semester
Michigan State University	per credit	$407		yes	yes	one-fourth of term of the class*
Michigan Technological	per credit	$421				second Wednesday of semester
Northern Michigan University	flat		12-18 credit			one week into course
Oakland University	per credit	$331		yes		two weeks into course
Saginaw Valley State University	per credit	$246				end of first week of classes
University of Michigan-Ann	flat		12-18 credits	yes	yes	three weeks into course
University of Michigan-	flat		> 12			two weeks into course
University of Michigan-Flint	flat		> 12			three weeks into course
Wayne State University	per credit	$287		yes	yes	two weeks into course
Western Michigan University	flat		12-15 credits	yes		one week into course

Source: Presidents Council, State Universities of Michigan, *Report on Tuition and Fees 2011-2012*

Notes: UM-Dearborn and UM-Flint charge $80 for each credit above 12, though this is substantially lower than the rate charged per credit up to 12. Withdraw and refund policies come directly from each institution's registrar, business, and/or records websites. * = measured in weekdays not class days.

Table A2. Impacts by Quintile of Predicted Credits Attempted

Full-time students, individual controls, institution-level ACT, excluding UM-Ann Arbor

		Quintile of Predicted Credits Attempted				
	Overall	1 (low)	2	3	4	5 (high)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Credits Attempted						
Average credits attempted	0.186	0.321	0.077	0.105	0.119	0.185
	(0.284)	(0.223)	(0.306)	(0.304)	(0.304)	(0.323)
13 or more credits attempted	0.068**	0.119***	0.062*	0.044	0.050*	0.046**
	(0.029)	(0.035)	(0.033)	(0.030)	(0.028)	(0.021)
15 or more credits attempted	0.066	0.085	0.036	0.055	0.053	0.073
	(0.064)	(0.059)	(0.073)	(0.071)	(0.063)	(0.057)
Panel B. Credits Earned						
Average credits earned	-0.130	-0.179	-0.228	-0.195	-0.231	0.010
	(0.140)	(0.167)	(0.147)	(0.136)	(0.178)	(0.224)
13 or more credits earned	0.001	0.017	0.001	-0.016	-0.013	0.003
	(0.020)	(0.024)	(0.024)	(0.021)	(0.023)	(0.016)
15 or more credits earned	0.025	0.031	0.005	0.019	0.017	0.038
	(0.037)	(0.028)	(0.041)	(0.042)	(0.040)	(0.040)
Panel C. Withdrawal or Fail						
Withdrew from at least one course	0.067***	0.077**	0.069***	0.069***	0.070***	0.057***
	(0.019)	(0.029)	(0.021)	(0.019)	(0.016)	(0.013)
Failed at least one course	0.036**	0.061**	0.035	0.033*	0.044**	0.021**
	(0.017)	(0.025)	(0.022)	(0.017)	(0.015)	(0.009)

Notes: Each cell reports the coefficient on indicator for "Flat Pricing" from a separate regression. Students are grouped into quintiles based on their predicted number of credits attempted from a regression model applied to students at per-credit schools. All models include dummies for unique cohort and term, dummies for female, black, Hispanic, other race, LEP and FARM and composite ACT score of individual, midpoint ACT of the institution, and exclude UM-Ann Arbor. Robust standard errors clustered at the college level appear in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A3. Impacts by Student Gender and Poverty Status

Full-time students, individual controls, institution-level ACT, excluding UM-Ann Arbor

	All	Female	Male	Non-FARM	FARM
	(1)	(2)	(3)	(4)	(5)
Panel A. Credits Attempted					
Average credits attempted	0.186	0.199	0.172	0.171	0.352
	(0.284)	(0.322)	(0.243)	(0.286)	(0.256)
13 or more credits attempted	0.068**	0.071**	0.064**	0.064**	0.117***
	(0.029)	(0.031)	(0.029)	(0.029)	(0.037)
15 or more credits attempted	0.066	0.073	0.057	0.063	0.090
	(0.064)	(0.069)	(0.060)	(0.064)	(0.063)
Panel B. Credits Earned					
Average credits earned	-0.130	-0.010	-0.274	-0.132	-0.190
	(0.140)	(0.170)	(0.163)	(0.137)	(0.232)
13 or more credits earned	0.001	0.015	-0.016	0.000	0.017
	(0.020)	(0.021)	(0.024)	(0.019)	(0.025)
15 or more credits earned	0.025	0.035	0.012	0.024	0.034
	(0.037)	(0.042)	(0.035)	(0.038)	(0.033)
Panel C. Withdrawal or Fail					
Withdrew from at least one course	0.067***	0.061***	0.075***	0.067***	0.080**
	(0.019)	(0.018)	(0.021)	(0.018)	(0.032)
Fail at least one course	0.036**	0.029**	0.044*	0.035*	0.062*
	(0.017)	(0.010)	(0.025)	(0.016)	(0.031)

Notes: Each cell reports the coefficient on indicator for "Flat Pricing" from a separate regression. All models include dummies for unique cohort and term, dummies for female, black, Hispanic, other race, LEP and FARM and composite ACT score of individual, midpoint ACT of the institution, and exclude UM-Ann Arbor. Robust standard errors clustered at the college level appear in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A4. Colleges attended by Kalamazoo Promise-eligible vs. Other Students

	Kalamazoo-eligible students			All other students		
	#	Percent of total	Percent of group	#	Percent of total	Percent of group
Per-credit institutions						
Central Michigan	26	2%	7%	23,165	13%	20%
Eastern Michigan	25	2%	7%	10,595	6%	9%
Ferris State	27	2%	8%	10,371	6%	9%
Michigan State	235	20%	66%	35,394	19%	31%
Michigan Tech	13	1%	4%	5,071	3%	4%
Oakland University	6	1%	2%	11,965	6%	10%
Saginaw Valley State	1	0%	0%	8,178	4%	7%
Wayne State	23	2%	6%	10,769	6%	9%
Flat-pricing institutions						
Grand Valley State	59	5%	7%	19,045	10%	27%
Lake Superior State	4	0%	0%	2,306	1%	3%
U Michigan Ann Arbor	203	18%	25%	23,722	13%	34%
Northern Michigan	26	2%	3%	7,043	4%	10%
Western Michigan	510	44%	64%	17,692	10%	25%
Total	1,158			185,316		

Notes: Includes all full-time students enrolled in 2011/2012 academic year. There are no Kalamazoo-eligible students attending UM-Flint or UM-Dearborn (both flat schools), thus these are omitted from table and excluded from model and table.

Table A5. Marginal Tuition Pricing and College Persistence, First-time Fall Enrollees at MI Public Universities

	Outcome = Enrolled in Any College				Outcome = Enrolled in MI Public 4-year College			
	mean	(1)	(2)	(3)	mean	(4)	(5)	(6)
Enrolled 1st Spring	0.964	0.005	-0.002	-0.008	0.936	0.011	-0.001	-0.010
(max n = 115,876)		(0.015)	(0.011)	(0.011)		(0.023)	(0.014)	(0.011)
Enrolled 2nd Fall	0.922	0.011	-0.005	-0.018	0.836	0.024	-0.007	-0.033**
(max n = 87,108)		(0.029)	(0.018)	(0.015)		(0.055)	(0.030)	(0.015)
Enrolled 2nd Spring	0.896	0.019	-0.001	-0.017	0.794	0.047	0.009	-0.019
		(0.034)	(0.020)	(0.016)		(0.063)	(0.033)	(0.014)
Enrolled 3rd Fall	0.868	0.024	-0.002	-0.023	0.759	0.053	0.007	-0.027*
(max n = 57,997)		(0.043)	(0.024)	(0.017)		(0.073)	(0.037)	(0.014)
Enrolled 3rd Spring	0.847	0.024	-0.003	-0.024	0.735	0.059	0.012	-0.023
		(0.043)	(0.024)	(0.018)		(0.073)	(0.036)	(0.015)
Enrolled 4th Fall	0.826	0.025	-0.003	-0.028	0.720	0.055	0.009	-0.027
(max n = 29,364)		(0.050)	(0.027)	(0.018)		(0.078)	(0.039)	(0.016)
Enrolled 4th Spring	0.779	-0.006	-0.031	-0.063*	0.676	0.024	-0.018	-0.061*
		(0.051)	(0.032)	(0.031)		(0.075)	(0.040)	(0.031)
Individual characteristics			X	X			X	X
Institution ACT score				X				X
Exclude UM-Ann Arbor				X				X

Notes: Each cell reports the coefficient on indicator for "Flat Pricing" at first institution attended from a separate regression. Sample is restricted to MI public high school graduates from 2008 to 2011 that enrolled in a MI public university in the fall immediately after high school graduation. All models include cohort fixed effects. Individual controls include dummies for female, black, Hispanic, other race, LEP and FARM and composite ACT score. Robust standard errors clustered by first college appear in parentheses: *** p<0.01, ** p<0.05, * p<0.1.