The Impact of Merit Based Financial Aid and Price Illusion on College Enrollment: A Field Experiment

by

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Abstract

Merit based financial aid awards have becoming increasingly prevalent in the pricing policies of higher education institutions. This study utilizes an experiment to estimate the efficacy of merit aid awards in achieving the institutional objective of attracting the most academically desirable applicants. Additionally, the experimental setting of this paper allows for a test of whether students respond to the framing of price in making enrollment decisions (i.e. price illusion), holding net price constant. I find that merit aid has a statistically significant but inelastic effect on enrollment of high ability students, and there appears to be weak evidence of price illusion, particularly among female applicants.

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Introduction

The use of merit-based financial aid, versus need-based financial aid, has grown substantially in the past decade. Specifically, from academic year 1995-1996 to 2003-2004 need-based financial aid increased by 47 percent, from $4.5 to $6.5 billion, while merit-based aid increased 212 percent, from $2.4 to $7.6 billion, at U.S. tertiary institutions.[1] While in the past one's ability to pay was the primary determinant of how much financial assistance a college bound student would receive, increasingly one's desirability to an institution as a talented student is becoming more important in determining how much financial aid a student will receive. As a result, institutions are becoming increasingly creative in packaging (mixing loans, grants, and work-study) and awarding merit-based aid to those students they would most like to attract to their campuses. Higher education scholars and administrators often criticize merit-based aid programs as providing financial assistance to those individuals who need it the least and who would almost certainly attend college anyway (Baum and Lapovsky, 2006). Additionally, critics argue that merit-aid programs will ultimately channel financial aid resources away from need-based programs reducing educational opportunities for low-income students (Heller, 2006).

Lost in this discussion of the merits of merit-based financial aid is the efficacy of these programs in actually attracting high ability students to one's institution. Because it is often the case that only lower ranked institutions offer merit awards to their most desirable candidates, students often must choose between going to a lower ranked institution and receiving a merit award (and thus paying a lower price), or attending a better institution and paying a higher sticker price. Additionally, merit awards are only offered to those students that are identified as

[1] Donald E. Heller, "Merit Aid and College Access." Symposium on the Consequences of Merit-Based Student Aid, University of Wisconsin, Madison, March 2006.

most desirable by the institution and thus, recipients are selected based on certain characteristics and perhaps their likelihood of enrolling. As a result, merit awards are endogenous in the student enrollment equation, and estimates of the effects of merit aid programs on enrollment decisions often provide biased estimates of their effectiveness in attracting students because researchers are inferring their effects across institutions and students of unequal quality, attributes, and enrollment probabilities.

In addition to simply offering more merit awards many institutions are following a high tuition-high aid policy. This leads to raising the tuition for most full-paying students and offering more need-based and merit-based aid to high ability students. This sometimes results in students paying nearly identical (net) prices, but in one case paying the full sticker price and in another case receiving a merit-based award. There is an unsubstantiated conventional wisdom among financial aid and admissions administrators that there is a "scholarship" or "price illusion" effect. In other words, students are more likely to enroll if they receive a scholarship, even if the net price is unchanged. Numerous explanations for this perceived effect are often provided, such as a simple misunderstanding of the true costs, the perception that the higher sticker price signals higher quality so that the student is receiving a better education at a lower price, the belief that the student is particularly sought after by the institution and will continue to receive special treatment and attention upon enrolling, and even the appeal of cocktail party bragging rights by the parents ("Johnny received the Presidential Scholarship Award and will be attending University X in the fall.") (Avery and Hoxby, 2004).

This study will use a unique financial aid experiment conducted by a small, private, highly selective institution that because of budgetary constraints was only able to provide merit-based grants to a limited number of its most sought after applicants. As a result, it randomly

chose approximately two hundred of its top-rated admitted students, who were not receiving need-based financial aid or other merit-based aid, and offered them $7,000 Academic Recognition Awards (approximately 17 percent of tuition, fee, room, and board), while the remainder of this group did not receive any financial assistance. Because these awards were randomly allocated among the top rated applicants one is able to accurately estimate the impact of merit based aid dollars on enrollment decisions of high ability students. Additionally, because these $7,000 awards closely matched the institution's one time step up in tuition, fees, room, and board from the previous year, in real tuition inflation adjusted dollars, for that year's entering freshmen class, the net price for those students receiving the Academic Recognition Awards was approximately the same as the previous year's full sticker price. This paper will therefore also investigate whether there is a scholarship or price illusion effect by comparing the enrollment probabilities of those who received the awards to comparable students who did not in the previous year, both of whom paid almost identical real tuition prices.

Literature Review

There are a number of studies that have examined the importance of financial aid, both need-based and merit-based, in influencing enrollment decisions. The majority of these studies focus on the aggregate effects of additional aid on increasing enrollment in higher education, although some have used institution level data to infer the importance of the packaging or mix of aid between loans, grants, and work study. The following is an overview of the most recent literature addressing the importance of merit-based financial aid.

A number of recent studies focus on the importance of packaging of financial aid between merit-based, need-based, grants, loans and work-study (Long (2004), Stater (2004),

Avery and Hoxby (2004), Singell (2002), and Linsenmeier et al. (2002)). These analyses generally conclude that the mix of financial aid does in fact matter, as expected. These studies generally concluded that grant aid has the largest influence on a student's probability of enrollment followed by loans and work-study. Linsenmeier et al. (2002), however, find that while grants have a larger impact on enrollment than loans this difference is not statistically significant for most students. Additionally, most analyses find that merit-based awards have a larger impact on enrollment probabilities than need-based awards, conditional on the mix of grants, loans and work-study dollars. Avery and Hoxby (2004) find that while most students respond in a rational manner to grants and loans, some students display an irrational scholarship effect by responding to the receipt of a scholarship conditional on the net price.

A number of other studies have examined the influence of state-wide merit-based aid programs on enrollment probabilities. For example, Dynarski (2004), Singell et al. (2004) and Sridhar (2001) focus on the impact of the Georgia Hope scholarship program on increasing enrollment. This broad type of merit aid program that offers scholarships to all state residents above a specified high school grade point average, and others like it in other states, are increasingly popular and represent the largest merit aid programs in the country.

Other analyses of merit-aid programs have estimated the impact of merit-aid dollars on enrollment at an individual or limited number of institutions. For example, Stater (2004) estimates the impact of aid and the mix of aid at three large, public universities. Singell and Stone (2002) and Singell (2002) use data from a single, large, public university to examine the influence of aid amounts and aid-type on matriculation decisions. Singell (2002) finds that merit plays a significant role in determining the level of aid received, while Singell and Stone

(2002) conclude that merit aid has a larger enrollment effect than need-based aid, particularly among more affluent students.

Finally, other related studies have emphasized natural or quasi experiments in aid policy in order to estimate the effect of financial aid and net price on enrollment decisions. For example, Kane (2004) and Abraham et al. (2003) use the District of Columbia Tuition Assistance Grant Program as an exogenous change in policy that significantly lowered the price of tertiary education for D.C. residents to estimate the impact on college enrollment. Similarly, Kane (2003) investigates the impact of the CalGrant program on enrollment decisions of qualified students.

All of the above studies rely on estimation techniques or natural experimental settings to estimate the impact of financial aid, and in particular merit-based aid, on student enrollment decisions. This study is unique in that it is able to utilize an experiment in an actual setting to accurately identify the influence of merit-aid on the enrollment probabilities of high ability students.

Theoretical Framework

Most theoretical models of consumer choice in economics begin with the classical von Neumann-Morgenstern utility maximization problem subject to a budget constraint. In these types of models, utility is a function of the expected benefits or services rendered by the consumption of goods. Choices are limited by one's income, assets, and the prices of the goods. In this conceptual structure, the price of the good does not affect the utility received by that good, but rather plays the sole role of defining the consumer's choice set of goods. As a result, a price of $100, whether determined as a set "sticker price", or as a base price less some discount,

will result in the same level of consumption. It is only the actual, or net, price that is important in determining the utility maximizing level of consumption.

The classical utility maximizing model implies for tuition setting practices that students would be indifferent between a full price of $35,000, or a full price of $40,000 less a grant award of $5,000, for a net price of $35,000. Both price setting practices, low base price versus high price-high aid, would be predicted to lead to the same enrollment decision for a given individual. In other words, the construction or formation of the base price should not affect the enrollment decision of the student. This implies for the students in this experiment that the enrollment rates of individuals in the fall of 2004, who faced a "sticker price" of $31,910, should be approximately the same as the enrollment rate of the students in the fall of 2005, who faced a comparable real price but in the form of a "sticker price" of $40,510 less $7,000 scholarships.

There are, however, competing models of consumer behavior that argue that the framing and context of prices play a significant role in determining consumer responses to prices. These models, broadly defined as prospect theory, attempt to explain a range of behavior and practices that seem at odds with utility maximization models of consumer choice. For example, the practice of pricing many goods at 99 cents rather than at the whole dollar or other "odd pricing" policies seem to have an illogical impact on sales (Gendall et al., 1997). One study even found that 77.7 percent of a sample of prices advertised in U.S. newspapers in 1998 ended in either a zero, five, or nine (Suri, et al., 2004). Prospect theory argues that the context or framing of a price, and not just the net price alone, is important in determining consumer responses to that price. Kahneman and Tversky (1979) have shown that individuals respond to a number of price and probability outcomes differently depending on the description of those outcomes. In particular, their work emphasizes that individuals often respond to perceived changes in well-

being in making consumption choices. In other words, consumers evaluate whether an outcome is perceived to be a gain from some benchmark outcome or a loss relative to that benchmark. It is clear that the reference point or benchmark against which some outcome is being compared is important in influencing an individual's response to that outcome. Tversky and Kahneman (1986) provide convincing evidence that individuals must be compensated a great deal to give up something that they view as already belonging to them, relative to what they would be willing to pay to acquire the same level of that good (loss aversion). So whether one views a transaction as acquiring something new, or giving up something that is rightly theirs plays an important role in framing prices and consumer choices. For example, Thaler (1980) found that labeling a price as a surcharge versus a discount had a substantial impact on consumer responses to those prices. For example, consumers sometimes respond differently to a cash discount than they would to a credit card surcharge.

Prospect theory implies that the individuals in this college pricing experiment who received the $7,000 scholarships (price discounts) would be more likely to enroll relative to those individuals in the previous year's class who paid approximately the same real price, but did not receive a scholarship. Prospect theorists would argue that there is a pure scholarship or price-illusion effect.

This leaves two broad competing models of consumer responses to prices. In the utility maximizing model consumers do not respond to the framing of prices, but only to the net price itself. In the prospect theory models the framing of prices and choices is vitally important in determining how consumers will respond. It is often difficult to test these competing models because any differences in outcomes may be partly attributed to differences in tastes and preferences, or other unobservable factors in the market. Experimental settings provide a cleaner

environment in which to test for utility maximizing versus prospect theory (Plott, 1986). This paper will utilize the pricing experiment carried out at this particular institution to test whether individuals seemed to respond to the discount offered in the form of the merit aid award as consistent with prospect theory, or whether individuals only seemed influenced by the net price as predicted by utility theory. If individuals who received the scholarship enrolled in roughly comparable rates as those who did not, but who paid approximately the same amount in real terms, then this supports the utility maximizing model of consumer choice. On the other hand, if the individuals who received the scholarships enrolled at higher rates, then this supports the prospect theory of consumer choice.

Data

The data for this analysis was provided by a private, highly selective, east coast college with approximately 3,000 undergraduate students. In the fall of 2005 this institution chose to significantly increase its tuition, fee, room, and board for entering freshmen from $31,910 to $40,510, or approximately 27 percent. This college took advantage of this one time price increase to conduct a pricing experiment. It randomly chose 230 of its highest rated admitted applicants in the fall of 2005 who would not have received either need-based financial aid or any other merit-based aid and awarded them $7,000 Academic Recognition Awards (ARA; see appendix for a copy of the award letter). This left 319 of the highest rated admitted students in the same entering class who did not receive any institutional aid.[2] This meant that 319 full-paying students faced the sticker price of tuition, fee, room, and board of $40,510, while the ARA recipients faced a price of $33,510. Similarly, in the previous year in the fall of 2004

[2] All applicants used in this analysis are regular decision and did not apply early decision.

before the price increase there were 542 highest rated admitted students who were not offered institutional aid.

Because some of these students received outside sources of aid (private agencies, state and federal aid) the sample utilized in this study eliminated all applicants who received any aid from outside the institution. This resulted in 515 individuals in the fall of 2004 entering class and 538 individuals in the fall of 2005 entering class (314 in the no-aid group and 224 in the ARA group). Table 1 presents summary measures from the three applicant groups. The yield on the fall 2004 cohort was 5.2 percent. The yield in 2005 was 3.2 percent for the no-aid group and 7.1 percent for ARA recipients. The combined SAT scores were significantly (at the 1 percent level) higher in 2005 than in 2004, although the combined SAT scores were not significantly different across the two groups in 2005. Similarly, the academic profile was significantly lower (better) for the ARA recipients relative to the fall of 2004 applicants (at the 10 percent level). Also, the percentage of individuals self-reporting their race as White dropped from 94 percent in 2004 to 80 to 82 percent in 2005, reflecting an overall decrease in the percentage of applicants who reported their race on the admissions application. All other variables were not significantly different across the three groups.

Empirical Results

The two questions to be addressed in the empirical tests are: 1.) what impact, if any, does merit based grant aid have on enrollment decisions of high ability students?; and, 2.) do students make enrollment decisions based primarily on (net) price (in support of utility theory) or does the framing of the price in the form of a scholarship effect or price illusion influence enrollment

decisions (in support of prospect theory)? Table 2 provides simple z-tests of the equality of enrollment proportions across the various applicant groups.

First, focusing on the impact of merit awards on enrollment for the fall of 2005 applicant class rejects the null (at the 5 percent level) of equal enrollment proportions among the high ability, no-aid students versus the high ability students who were awarded $7,000 grants. The yield of 7.1 percent among the aided students is significantly higher than the yield of 3.2 percent among the no-aid students. As expected, based on both the utility theory and prospect theory models of consumer behavior, merit awards have a significant impact on enrollment decisions.

Second, turning our attention to a test of the price illusion effect of scholarships on enrollment fails to reject the null of equal enrollment proportions among the no-aid, high ability students from the fall 2004 entering class versus the aided, high ability students from the entering class of fall 2005. Recall that these two cohorts are paying approximately the same amount in real terms, but the fall 2004 class is paying the full stated tuition, fee, room, and board, while the fall of 2005 class faced a higher sticker-price, but received academic merit scholarships. The enrollment rate of 7.1 percent for the fall 2005 class is not significantly higher than the enrollment rate of 5.2 percent for the previous year's cohort.

These results seem to provide simple evidence of the importance of price in determining enrollment probabilities, but they do not support the importance of the framing of price in affecting enrollment probabilities. The summary measures of Tables 1 and 2 suggest that there may be some additional differences across the experimental groups that warrant controlling for before drawing strong conclusions. Additionally, while there is evidence that merit aid (or at least price) matters in determining enrollment decisions, the above tests do not reveal whether the experimental setting provides any insight that could not have been garnered from a non-

experimental setting using adequate controls for individual characteristics and aid awards. Figure 1 and Table 3 present estimates of the influence of merit aid on enrollment probabilities, controlling for individual characteristics on all admitted students to the institution who did not receive need-based aid. These estimates will then be compared to the estimates presented in Table 4 using just the experimental groups to see if significant differences occur across the two estimation strategies.

Figure 1 illustrates that enrollment probabilities climb dramatically with increasing levels of merit aid awards. Even modest levels of grant aid appear to influence enrollment decisions. Table 3 presents the results of a logit regression on enrollment (y=1 if the admitted applicant enrolls; 0 otherwise) for the fall 2004 and fall 2005 high ability, no need-based aid, admitted applicants, separately by year. Both cohorts reveal that students with higher SAT scores and minority students are significantly less like to enroll.[3] On the other hand, only in 2004, before the dramatic increase in sticker price are international students and students from New England significantly more likely to enroll than students from the mid-Atlantic states (the omitted region). Of primary interest to this study, merit aid awards have a significant impact on the enrollment decisions of high ability students in both years. Based on these estimated coefficients it would be predicted that offering $7,000 in merit aid to high ability students would be expected to increase their enrollment by approximately 10 percentage points in 2004 (from 5.2 percent to 15.1 percent), and by just under 6 percentage points in 2005 (from 3.2 percent to 8.9 percent). While these results present strong evidence of the importance of merit aid in influencing enrollment, part of the effect of these merit awards may be the non-pecuniary benefits that accrue

[3] Minority is defined as anyone whose self reported race was African-American, Hispanic, Asian, multi-racial, or other racial category; the omitted group is therefore White, non-Hispanic and race not reported.

with many of the merit awards offered in this non-experimental setting. For example, many of the awards offered to students in this sample come with a relaxation of the institution's liberal learning or general education requirements, priority in registering for classes and in housing selection, and mentorship opportunities with professors. It may be that much of the effect observed above comes from these non-pecuniary effects. On the other hand, because most of these merit awards go to the "best of the best" their impact may be under-estimated if there are not adequate controls for student ability or other factors to determine who among the most talented receive these awards.

A random distribution of merit awards among the most highly rated applicants that does not come with additional benefits beyond the value of the grant circumvents the problems outlined above. Table 4 presents logit estimates of the impact of randomly allocated $7,000 Academic Recognition Awards to the most highly rated admitted applicants for the fall of 2005. Column (1) simply includes the dummy variable for being in the aided group relative to the non-aid group and finds that the aided group is significantly more likely to enroll than the non-aid group (consistent with the z-test of Table 2). Column (2) includes additional controls for combined SAT scores, gender, and region of the country.[4] As expected, the higher one's SAT scores the less likely they are to enroll. None of the other individual characteristics were significant in explaining enrollment decisions. The inclusion of these additional variables did not significantly alter the impact of aid on enrollment. Finally, the male dummy variable was interacted with the aid award to determine if the impact of receiving this award varied based on gender. While the coefficient on the interaction effect is not statistically significant, the impact of receiving the aid award on matriculation probabilities is much greater for women than it is for

[4] The small number of minorities, international students, and students from the Southwest created collinearity problems and so controls for these groups were excluded.

men. Women are predicted to increase enrollment as a result of these awards by 3.3 percent while men are only expected to increase enrollment by .5 percent. Women appear much more sensitive to price and merit aid awards than men. In addition, these increases in enrollment rates are significantly smaller than the predicted enrollment rate increases from the non-experimental setting. This suggests that at least part of the merit award effects found in the non-experimental setting are due to the non-pecuniary elements associated with those awards and the selection of individuals for those awards, and that the monetary or price effects are much smaller than those estimated based on the non-random sample. In fact, the estimated elasticity from this experiment is only -.19 for women and -.03 for men; both are highly inelastic.

The above analysis only compares two cohorts from the same entering class and so can not identify how a change in the framing of or context of price influences enrollment. Table 5 provides logit results utilizing the no-aid applicants from the fall of 2004 compared to the merit award recipients from the fall of 2005. Both groups pay comparable real prices, but prices that were presented differently to the admitted students. The fall 2004 applicants face the full tuition, fee, room, and board, of $31,910, while the fall 2005 award recipients face a price of $33,510 ($40,510 in tuition, fee, room, and board less the $7,000 awards). The $1,600 difference in price across the two years is a 5 percent increase in price for the merit award winners, and equals the percentage increase in tuition, fee, room, and board for continuing students at this institution. The one time precipitous increase in tuition, fee, room, and board at this institution applied only to incoming freshmen and not continuing students. As a result, merit award recipients saw their price increase in line with the price increase for continuing students. Additionally, the past two years' price increases at this institution were 5 and 6 percent, respectively, and competitor prices increased by 5.7 percent at private, 4-year colleges for that year (College Board, 2005); thus real

tuition inflation adjusted prices are comparable across the two cohorts and only the framing of the price has changed. Column (1) reveals that the enrollment rate of the award recipients is not significantly higher than the enrollment rate of students paying the sticker price (consistent with the z-test of Table 2). Column (2) adds additional controls once again for the individual characteristics of SAT scores, gender, and region. The coefficient on the award recipient dummy variable now increases substantially and provides weak evidence (p-value=.12 in a two tailed test) that the framing of price may have some impact on enrollment decisions. While one is not able to reject the null at conventional levels that the enrollment probabilities are the same across the two price frameworks, there appears to be some support for the notion of a pure scholarship or price-illusion effect. Additionally, when interacted with gender, the coefficient on the aided group, reflecting the impact of the Academic Recognition Awards on women only, is significantly different from zero at the 10 percent level. Once again, the coefficient on the interaction of gender and the aid award is not significantly different from zero, but the estimated effect for men is dramatically smaller (and even negative) than it is for women. It appears that women respond much more to merit awards and the framing of prices, while men appear less responsive to the context of pricing. In this case, women are predicted to increase enrollment, conditional on SAT scores and region of residence, by approximately 3.5 percent as result of the $7,000 scholarships, holding price constant, while men are predicted to decrease enrollment by .4 percent as a result of a price neutral repackaging of sticker price and scholarships. There seems to be some support for a scholarship or price illusion effect among women.

Conclusion

These results suggest that price, in the form of merit aid awards, is significant in influencing enrollment probabilities among high ability applicants to selective institutions; however, the estimates of these effects are much smaller in an experimental setting than are found using a non-random sample of merit award recipients. Additionally, there appears to be weak evidence in support of the prospect theory of consumer behavior which argues that the context or framing of prices is important. This result translates to at least some support for the conventional wisdom of a pure scholarship effect or what might be called price illusion, where students are more likely to enroll if they receive a scholarship even if net price is left unchanged. The scholarship effect appears to be more pronounced among women than men, although one can not reject the null of equal effects across genders at conventional levels.

These results are derived from an experiment at a private, highly selective institution whose applicants by and large represent the top tail of the academic achieve distribution. As a result, inferences concerning the applicability of these results beyond other similarly selective institutions should be made with caution. In particular, it may be expected that these students are more sophisticated and better informed consumers than the typical college applicant and less susceptible to price illusion effects. Nonetheless, these results are important for higher education administrators and policy makers. These findings suggest that institutions (at least private, selective institutions) should practice price discrimination via high sticker prices and high aid; that part of the benefit of this policy would be an increase in enrollment that goes beyond a pure price effect; and that students view scholarship receipt as a benefit independent of price. The behavioral psychology behind this response is still an open question and warrants additional investigation before institutions practice wide scale price discounting in the form of artificially

raising their tuitions and then offering everyone scholarships, but there is anecdotal evidence that institutions understand this phenomenon. Breneman (1994, p. 32) argued that tuition levels were perceived as a signal of quality by consumers and so institutions were hesitant to lower their stated prices for fear of conveying a lack of educational quality. Similarly, Avery and Hoxby (2004) found that students appear to respond to named scholarships conditional on price and institutional quality. The results of this analysis support both these earlier conclusions. The underlying psychology explaining why students seem to respond irrationally to these effects remains an open question warranting further examination.

Appendix A

March 25, 2005

Dear:

You are among our admitted applicants who stand out as exceptionally talented even among a deep pool of outstanding and accomplished students. In you, we saw the promise for continued excellence and contribution in college. To honor your achievements, we have selected you to receive the Academic Recognition Award of $7,000.

The Academic Recognition Award of $7,000 will be equally disbursed over fall and spring semesters. This award is available to you for eight semesters of full-time enrollment during the regular academic year at _____ with the condition that you must make satisfactory academic progress. Any other scholarships you receive may reduce the amount of this assistance. You are responsible for notifying the Office of Financial Aid of such awards.

Congratulations on having earned the Academic Recognition Award to complement your admission to _____. Both offers are symbolic of our sincere desire to see you among our first-year students on campus next August. If you have questions about this award or about choosing _____, please feel free to contact the Office of Admission at _____.

Sincerely,

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Yield by Merit Aid Amount
Fall 2005

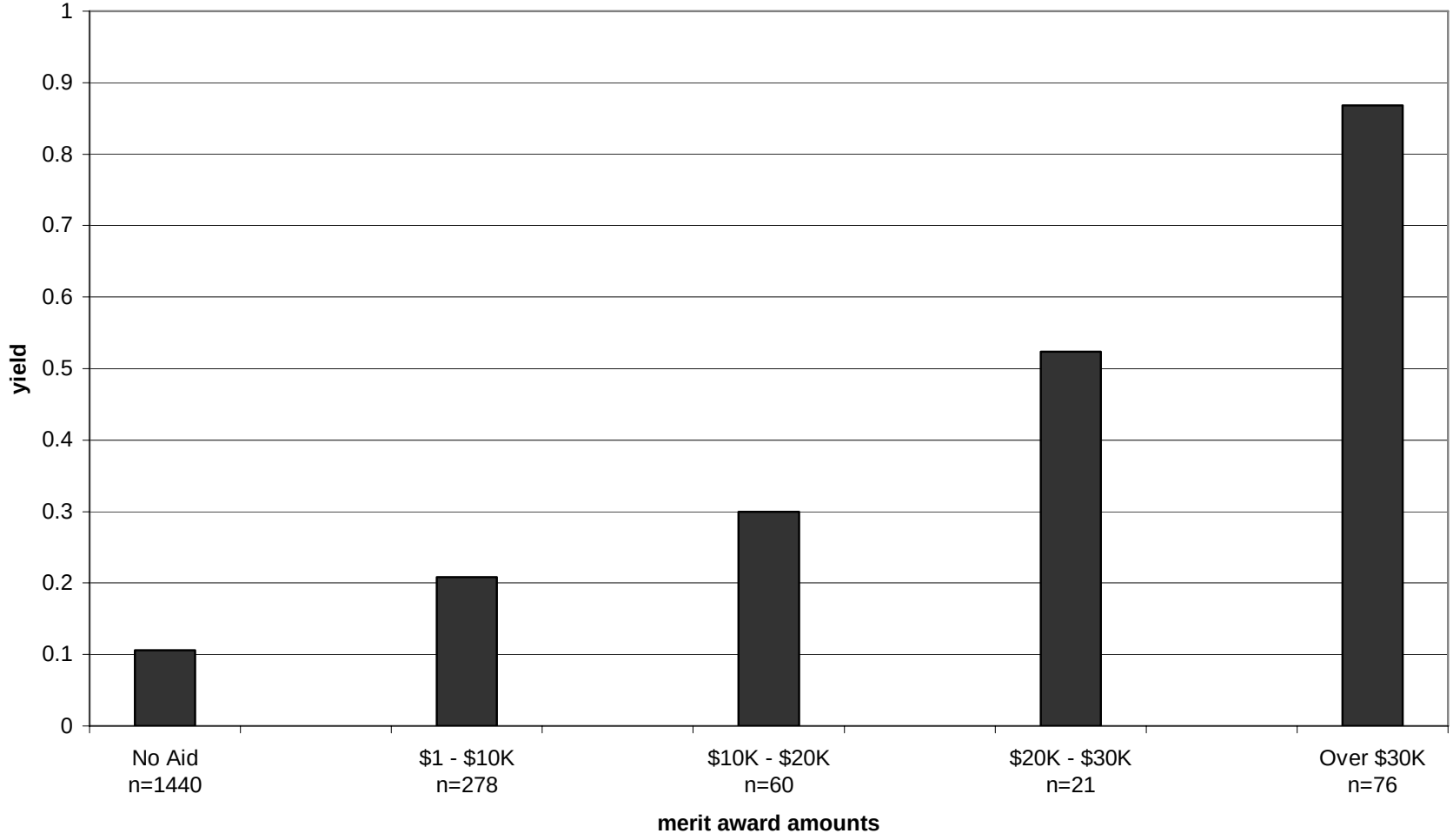

Table 1
Summary measures by year and aid group

	Fall 2004 No Aid	Fall 2005 No Aid	Fall 2005 Aid
Yield	5.2%	3.2%	7.1%
Tuition, Fee, Room and Board	$31,910	$40,510	$40,510
Combined SAT Scores	1397	1414 [a]	1417 [a], ***
Academic Profile	1.84	1.82	1.76 [a], *
Male	27%	32%	30%
White (self reported)	94%	82% [a]	80% [a], ***
Legacy	3%	4%	6%
International	1%	1%	2%
New England	8%	6%	8%
North East	32%	36%	36%
Mid-Atlantic	20%	22%	22%
South East	16%	16%	13%
South West	5%	5%	3%
West	5%	4%	7%
Mid-West	11%	8%	9%
No. of Observations	515	314	224

Notes:
*** (**, *) indicates significantly different across the three groups at the 1%, (5%, 10%) level.
[a] indicates significantly different from Fall 2004. In no cases were the two Fall 2005 groups significantly different from each other.

Table 2
Yield by year and aid group

	Fall 2004 No Aid		Fall 2005 No Aid		% diff. from '04	Fall 2005 Aid		% diff. from no aid	% diff. from '04
	No. Admits	Yield	No. Admits	Yield		No. Admits	Yield		
All observations	542	6.8%	319	4.1%	-2.8%	230	8.7%	4.6%	1.9%
No outside aid	515	5.2%	314	3.2%	-2.1%	224	7.1%	4.0%	1.9%

Merit-Aid Tests:

Z-test	-2.247	Test of equal proportions for those with $7000 in aid versus no institutional aid in ‘05.
p-value	0.025	
Z-test	-2.110	Test of equal proportions for those with $7000 in aid versus no institutional aid in ‘05, (no outside aid)
p-value	0.035	

Price-Illusion Tests:

Z-test	0.908	Test of equal proportions for those with $7000 in aid in '05 versus no institutional aid in ‘04.
p-value	0.364	
Z-test	1.014	Test of equal proportions for those with $7000 in aid in '05 versus no institutional aid in ‘04, (no outside aid).
p-value	0.311	

Table 3
Logit of enrollment
Non-experimental setting

	Fall 2004		Fall 2005	
Constant	-7.419		7.897	
	(0.017)		(0.011)	
Merit Aid Award	0.141	***	0.126	***
(thousands of $)	(0.0001)		(0.0001)	
Combined SAT Scores	-0.766	***	-0.802	***
	(0.001)		(0.001)	
Male	-.254		-0.264	
	(0.476)		(0.462)	
Minority	-1.239	**	-1.576	**
	(0.040)		(0.045)	
International	2.903	***	0.995	
	(0.001)		(0.259)	
New England	1.290	***	0.268	
	(0.023)		(0.689)	
North East	0.583		0.532	
	(0.190)		(0.216)	
South East	0.272		0.343	
	(0.611)		(0.503)	
South West	0.994		0.194	
	(0.135)		(0.791)	
West	1.044		0.726	
	(0.111)		(0.227)	
Mid-West	0.495		-1.156	
	(0.371)		(0.28)	
No. of Observations	622		624	
Pseudo R-square	.231		.252	

Notes:
p-values from Wald test are shown in parentheses.

Table 4
Merit aid experiment results, Fall 2005

	(1)		(2)		(3)	
Constant	3.414	***	-7.012	*	-6.927	*
	(0.0001)		(0.081)		(0.083)	
Aid Group Dummy Variable	0.849	**	0.892	**	1.098	**
	(0.04)		(0.034)		(0.025)	
Male*Aid Group			------		-0.843	
					(0.391)	
Male			-0.308		0.178	
			(0.529)		(0.803)	
Combined SAT Scores			-0.774	***	-0.779	***
			(0.008)		(0.007)	
New England			(1.194)		1.269	
			0.121		(0.103)	
North East			0.746		0.78	
			(0.177)		(0.16)	
South East			0.518		0.541	
			(0.459)		(0.441)	
West			-0.3		-0.337	
			(0.792)		(0.767)	
Mid-West			-0.35		-0.325	
			(0.753)		(0.771)	
No. of Observations	538					
Pseudo R-square	0.021		0.077		0.081	

Notes:
p-values from Wald test are shown in parentheses.

Table 5
Price Illusion (ie Fall 2004 No aid versus Fall 2005 $7K aid)

	(1)		(2)		(3)	
Constant	2.894	***	-8.63	***	-8.719	***
	(0.0001)		(0.008)		(0.008)	
Aid Group Dummy Variable	0.33		0.53		0.743	*
	(0.312)		(0.12)		(0.056)	
Male*Aid Group			------		-0.879	
					(0.284)	
Combined SAT Scores			-0.909	***	-0.924	***
			(0.0001)		(0.0001)	
Male			-0.091		0.232	
			(0.813)		(0.619)	
New England			1.903	***	1.96	***
			(0.005)		(0.004)	
North East			1.316	**	1.356	**
			(0.02)		(0.017)	
South East			0.839		0.901	
			(0.224)		(0.194)	
South West			0.602		0.655	
			(0.6)		(0.569)	
West			0.928		0.897	
			(0.247)		(0.265)	
Mid-West			1.053		1.097	
			(0.13)		(0.116)	
No. of Observations	739					
Pseudo R-square	0.003		0.078		0.082	

Notes:
p-values from Wald test are shown in parentheses.