NBER WORKING PAPERS SERIES

THE UNIVERSITY IN THE MARKETPLACE: SOME INSIGHTS AND SOME PUZZLES

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Working Paper No. 3853

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 1991

The authors would like to thank the participants in the NBER Conference on Higher Education, especially Charles Clotfelter, for useful comments and suggestions on an earlier draft; we also thank Peter Rousseau for research assistance on this project. This paper is part of NBER's research program in Taxation. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

NBER Working Paper #3853
September 1991

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ABSTRACT

Higher education has many of the attributes of a competitive industry. Many enterprises compete for inputs and sell similar outputs to a great variety of buyers. The competitive perspective has not been much used in the analysis of higher education. In this paper we find such a point of view yields both insights and puzzles. The familiar "stand alone" test from industrial organization casts doubt on the claim that undergraduate education subsidizes graduate education in the large research university; since institutions that sell both graduate and undergraduate education survive in competition with institutions that sell only undergraduate education, the claim of cross subsidization is hard to maintain. We note that the analysis of the use of prices to regulate admission to universities is complex because students are both inputs and outputs of the educational process. We note, but do not explain, some conspicuous failures of universities to use incentives and prices. Perhaps most interesting are the failures of research universities to reward excellent teaching (which has a clear market value) and the failure of elite institutions, particularly professional schools, to exploit their preeminent market positions by charging a tuition which begins to capture the rents that graduation confers.

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I. Introduction

The application of economics principles to the behavior of colleges and universities is a topic of substantial interest and importance. The literature on various aspects of "the economics of higher education" is large and growing rapidly.[1] The resources commanded by all institutions of higher learning are large. In 1989 the aggregate expenditures of all two and four-year undergraduate colleges and post-graduate institutions came to $131.4 billion. For purposes of comparison, this sum exceeded the sales of any three-digit manufacturing industry except petroleum refining and motor vehicles and of any three-digit service industry except hospitals.

Much of the application of economics principles to university behavior has focused on cost measurements and allocation issues. Surprisingly, there has been little attention given to the questions concerning the marketplace context of universities: how they compete for faculty ("inputs"), how they "position" themselves in the marketplace, how they decide on "prices" (tuition, room and board charges for resident students, etc.), how they decide on production levels (how many students to admit), when to enter new markets (e.g., offering new programs or degrees, establishing new professional schools), etc. Though a few authors briefly mention "competition" among universities,[2] none have analyzed this competitive process or made serious

[1] See, for example, the recent collection of surveys edited by Hoenack and Collins (1990).

[2] See, for example, Bok (1990, p.104), Bowen (1980), or Garvin (1980).

estimates of relevant parameters.

We believe that this absence of apparent interest in the market context may undermine -- or, at a minimum, mask some crucial assumptions in -- the cost or allocation analyses undertaken by some authors. For example, the "autonomous cost increase" model of Massy (1989) has embedded in it an implicit assumption that every university is a separate monopoly that faces an inelastic demand and that can raise its prices at will to cover all cost increases. Perhaps this is indeed the case; but, if so, an unaddressed issue in the Massy analysis is the question of why universities have been so slow to raise their prices and revenues and thereby raise their expenditures. In any event, an explicit statement of this assumption would make clearer the basis for the Massy analysis.

At the opposite extreme, the allocation analyses of James (1978, 1986) and James and Neuberger (1981) assume that tuition prices are pre-determined and beyond the control of the individual institution. Should we be comfortable with that basis for analysis?

As yet a third example, we note that a number of the authors providing estimates of the price elasticity of demand for higher education seem uninterested in whether they are measuring the price elasticity for higher education in aggregate or the cross-elasticity of some institutions vis-a-vis others.[3] Only a group of researchers who were uninterested in market contexts would fail to be interested in the distinction.

We believe that the market context of higher education -- whether universities compete, how they compete, and the consequences of that competition for university input, production, pricing, and output decisions -- is interesting in its own right and important for understanding the

[3] See the surveys in Leslie and Brinkman (1987) Becker (1990).

cost and allocation issues that have concerned most researchers. This paper cannot possibly answer all of the relevant questions concerning competition among universities. But we hope to deal with some of them and raise important questions and puzzles for others to pursue. Indeed we hope to provoke and challenge at least as much as we analyze and explain.

In Section II we address an allocation issue that has been raised by others (e.g., James, 1978, 1986). Is there "cross- subsidy" among a typical university's activities and specifically between undergraduate and graduate teaching? We introduce the "stand alone test" of Faulhaber (1975) to show that the previous claims of substantial "cross-subsidy" do not rest on a solid analytical foundation.

Section III analyzes issues of student quality and diversity in a university and their consequences for output and pricing. Suppose the mix of students affects the efficiency of teaching (e.g., for any average level of learning ability by students, the necessity for repetition or remedial effort will be less when the variance of learning abilities is less) or the quality of output (e.g., students' learning is enhanced by having fellow students with a diversity of backgrounds). An efficient university admissions policy would be to encourage a large pool of applicants (e.g., through apparent "under pricing") and then to accept students selectively and to price selectively (i.e., to practice price discrimination through selective scholarships) so as to achieve the efficiencies that accompany the mix and diversity characteristics. Simple market-clearing prices would not be as likely to achieve these efficiencies. In essence, the incoming students themselves are an important input to (and affect the efficiency of production of) the educational services output of the university, and the university's admission and pricing policies

are likely to reflect this special relationship between input and output.[4]

Section IV addresses some of the broader pricing, market, and competition questions. After noting that the preferences of the providers of non-tuition funds must be a part of the analysis of university behavior, we first examine some questions concerning input behavior (e.g., why are research universities reluctant to reward teaching performance?) and then largely focus on output pricing and market behavior: For example, why do universities pass up apparent opportunities to practice revenue-increasing price discrimination? Why do universities generally charge uniform tuition levels across different fields that appear to have substantially different marginal costs? Why do universities fail to price so as to capture the rents that attach to their brand name reputations? What motivates entry and exit among universities? For most of these (and other) questions we can offer insights and clarifications, but many basic puzzles remain.

Section V offers a brief conclusion.

II. The Criteria for "Cross-Subsidization"

The observation that in the modern research university, undergraduate education subsidizes graduate education and research is commonplace. Estelle James (1978, 1986, 1990) has been the most prominent and consistent proponent of this view. It is based on an analytic model of the goals of the university set down most precisely in a joint article with Egon Neuberger (James and Neuberger, 1981).

The simplest version of their argument runs as follows: Suppose that a university department's only revenue comes from teaching undergraduates and that its only expense is

[4] We can also draw the parallel here with the hiring policies of some companies that offer apparently "above market" wages in order to obtain a selective and stable work force.

buying (at the market price) faculty time. Faculty time may be allocated either to teaching undergraduates or to research. The department maximizes a utility function in which research is an argument subject to the constraint that expenditures may not exceed revenue. If any faculty time is spent doing research, then James would argue that undergraduate education is subsidizing research because undergraduate education produces revenues while research does not. A more sophisticated version of the argument allows the faculty to care about the quality (but not the quantity) of undergraduate education and allows for revenue from graduate students and research, but reaches the same conclusion because large undergraduate courses can be used to bring in revenue so that faculty can do more research. It is this sophisticated version of the argument that James takes as embodying cross-subsidization; "profits" from undergraduates subsidize graduate education and research that "usually do not bring in enough revenues to cover their costs."[5]

One of the predictions of James's model is that universities will produce undergraduate education with a different technology than institutions that do not have graduate students and that do not do research. Liberal arts colleges and community colleges have smaller classes on average than research universities and do not use graduate students as teachers. Since the former technology is cheaper than the latter, undergraduates subsidize graduate education.

James (1986) argues that consideration of the cross-subsidy issue should make one reconsider arguments about the effects of state educational policy on the distribution of income. Hansen and Weisbrod (1969) they argued that the California system of public education subsidizes higher income residents of that state, since the latter's children tend to go to institutions (universities) at which the cost per pupil is higher than the institutions (state and

[5] James (1986, p. 237).

community colleges) to which the poor send their children. By Jaems reckoning this is incorrect since the real cost of providing undergradaute education in a university is rather low.

Intuitively, there seems to be something wrong with the James argument because, unlike the privilege of sleeping under the bridges of Paris, admission to the University of California is restricted. Since there is evidence that consumers will pay more to attend universities than to attend community colleges, attendance at the former institutions must be worth more than enrollment at the latter. This observation is, in essence, the basis for our belief that undergraduate education does *not* subsidize graduate education and research. Undergraduate education is produced both as a joint product with graduate education (in research universities) and at the same time is the only product of some firms in the education business -- particularly liberal arts colleges and community colleges. Thus, undergraduate education produced as a joint product survives in a competitive market with undergraduate education produced as a sole product. The modern definition of cross-subsidization takes this fact as evidence that graduate education and research are *not* subsidized by undergraduate education.

A concise statement of the modern definition of cross- subsidization for the multi-product firm is due to Faulhaber (1975). It is a sophisticated version of the "stand-alone" test: Let there be N classes of consumers. Let $S = \{1,2,...,N\}$; then if $y \in \mathbf{R}^N$ produces revenue $\pi(y)$, there is no cross-subsidization if $\forall\, T \subseteq S \quad C(y^T) \leq \pi(y^T)$ where $y_i^T = \begin{cases} y_i & \text{if } i \in T \\ 0 & \text{if } i \notin T \end{cases}$ and $C(y^T)$ is the cost of producing y^T.

The application to education is immediate. Suppose that the three classes of consumers are undergraduates, graduates, and consumers of research. Then the fact that firms in the education industry that serve all three kinds of consumers survive in competition with firms that serve only one kind of customer is a demonstration that undergraduate education does not cross-subsidize graduate education and research.

Two arguments against this position must be considered. The first rests on the observation that the undergraduate education that students get from a liberal arts college is different from the undergraduate education that students at a "multiversity" (Kerr, 1964) receive. As we have observed, James states that a confirmed prediction of her theory is the fact that undergraduate colleges will have smaller class sizes than research universities. However, this seems to miss the point. Harvard and Swarthmore compete for the same students; so do UCLA and the Claremont colleges. Large research universities have larger classes than liberal arts colleges, but the different variants of the product survive in competition; Fords are different from Chevys, but both brands compete for the same customers.

Another objection is the observation that the zero profit constraint is inappropriate for institutions of higher education. This appears to have some force. Certainly, it is a bit difficult to state precisely the yearly budget constraint of a private non-profit institution with a large endowment, which receives many charitable contributions (some from alumni, which might be considered as deferred payments of tuition) and which sells research to many governmental agencies. Equally murky is the budget constraint of a public university that receives capitation fees for some students, sells research to governments, has an endowment, and can call on the state to fund its buildings with various kinds of bonds. However, it remains true that institutions

of higher education do face some kind of long run budget constraint; and this constraint is pretty much the same for institutions that produce only undergraduate education and for institutions that produce undergraduate education and graduate education and research.

While colleges that produce only undergraduate education are common, institutions that produce only graduate education and/or research are rare.[6] Even if they did not exist at all, it would, we think be incorrect to conclude that undergraduate education in the large research university subsidizes graduate education. While we can only offer partial evidence,[7] it is clear that there are economies of scope in higher education. Being part of a research university confers considerable benefits to undergraduates, benefits for which they are willing to pay, both in money and in the acceptance of what some deem a poorer educational technology -- larger classes and graduate student instructors. Some of the sources of these economies are obvious: library and computer facilities, the possibility of contact with the very latest research, sheer size, and diversity; doubtless there are many others. Undergraduates and their parents value these things.

III. Admissions Policies: Selectivity and Pricing

Prices ration access to many goods in our society. A conspicuous exception is the right to attend the best institutions of higher education. Cost considerations do affect where and whether people go to college. However, select colleges and universities (by definition) receive more applications than they can accept; many public colleges and universities will only admit

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[6] Rand, the Salk Institute, the Institute for Advanced Study, and Rockefellar University are examples. It is our casual impression that these institutions have somewhat more difficulty providing a steady flow of funds for their researchers than do institutions that produce undergraduate education as well as research and graduate education.

[7] The cost functions estimated by Cohen, Rhine, and Santos (1989) indicate significant economies of scope in universities.

students who achieve a particular academic standard. Why should this be so? The obvious answer is that it is not fair (in some sense) to let people buy their way into the best universities; access ought to be based on merit.[8] However, since in most other arenas the price system is an efficient way of allocating resources, it is interesting to examine whether or not the price system could in principle lead to an efficient allocation of students to different institutions of higher education.

A. The general problem.

Suppose there are sets $S = \{1,2,...,N\}$ of students and $C = \{1,2,...,T\}$ of colleges. An allocation A is an assignment of students to colleges, a mapping from S to C. Since one of the "colleges" in C can represent not going to college at all, the formulation is general. Under the allocation A, $A(s)$ is the college that student s attends. We summarize the benefit a student gets from a college in a single number $W_A(A(s))$; $W_A(A(s))$ is a net benefit; the real costs of attending college (mostly foregone earnings) are included; the price or tuition that the college charges is excluded. The subscript A indicates that benefits depend not only on the college attended but also on the complete allocation of students to colleges[9]. The total surplus of an

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[8] Rosovsky (1990) makes this argument eloquently.

[9] A large, and beautiful, literature in focuses on matching problems of this sort. The phenomena of college admissions motivated much of the work in this area. In fact, the title of the seminal paper is *College Admissions and the Stability of Marriage* (Gale and Shapley 1962).

Unfortunately the line of research which Gale and Shapley initiated can deal easily with only a restricted set of externalities. Perhaps the most convincing demonstration of the relevance of sophisticated game theory to real economic decisions is Roth's (1984) study of the matching problem for medical interns. Briefly Roth showed that the procedure (called the National Intern Matching Program NIMP) used since the early 1950s to assign interns to hospitals worked because it produced *stable* allocations in the following sense: given the allocation produced by the NIMP there did not exist a hospital and an intern not matched by the NIMP such that the

allocation A is just $B(A) = \sum_{s=0}^{S} W_A(A(s))$. An allocation is efficient if $B(A) \geq B(A')$ for all allocations A'.

Allocations differ in efficiency only if there is some synergy. If the costs that a college incurs are the same for all students and if attendance at that college increases a student's human capital by the same amount regardless of the ability or composition of the student body, then the specific identities of the students who attend that college are irrelevant. If all colleges are like this, then all allocations are efficient. For allocations to have different efficiencies it must be the case that students get different benefits from attending different colleges and that colleges' net contribution to their student's depends on the students themselves. We can only have a concern for the efficiency of different allocations if students themselves are an important input into the educational process. If students are inputs in this sense, then there are externalities in the higher

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intern preferred to be matched to the hospital and the hospital preferred the intern to an intern assigned to the hospital by the NIMP. The NIMP was stable because no hospital and intern can both improve their situation by defecting from the NIMP. This abstract result goes a long way to explain the remarkable success and stability of the entirely voluntary NIMP.

The proof that the NIMP produces stable allocations assumes preferences of hospitals for groups of interns and of interns for hospitals are very simple. Interns are assumed to have preferences only over hospitals and not to care about whom their fellow interns are. Hospital preferences over groups of interns have a property called *responsiveness* which means that they could be derived from a simple ranking by over interns and are essentially free of compositional effects. Absent these restrictions, the NIMP may not be stable; worse still stable matchings may not exist. Again this abstract result has empirical bite. If interns may marry one another and if they want to work near another (so that am assignment is not acceptable unless it allocates married interns to the same hospital, or at least to hospitals in the same city) then stable allocations may not exist. The medical community noted that defections from the NIMP started occurring in large numbers when more and more interns were married to one another. By and large the matching literature has produced results which state that its most powerful and positive conclusions do not apply when people care about whom they are matched with. Those who have studied the college admissions problem have relatively little to say when students care whom their classmates are and when colleges explicitly desire some sort of diversity. Roth and Sotomayor (1990) provide a lucid review of this research.

education industry.

Our general question is whether or not the price system will lead to an efficient allocation. We start with a trivial observation. Any allocation can be supported by a price system. A price system is just a listing of the prices that colleges charge students; that is, a price system is given by specifying $p(c,s)$, the price that college c charges student s. If

$$(1) \qquad p_A(c,s) = \begin{cases} x_s \text{ if } A(s) = c \\ \infty \text{ if } A(S) \neq c \end{cases},$$

where $x_s \leq \infty$, then $p_A(c,s)$ implements A. This price system may seem strange, yet it is in some respects close to the system that some colleges use. A denial of admission is the same as a price of ∞. We do not generally think of price systems as being so personalized. However, scholarships determine the net prices that students pay for colleges, and these scholarships depend on a great many personal characteristics. What is perhaps most strange about the price system in (1) is that it is not competitive; colleges must collude to implement it.

B. Benefits of homogeneity.

It is hard to teach a class when the students differ greatly in ability and background. We might surmise that an efficient allocation of students to colleges would group students of the same ability. Suppose the benefit that a college conferred on its students were an increasing function of average ability of the student body and a decreasing function of the variance of ability. An efficient price system would necessarily group students of similar ability together. It is natural to ask whether a price system can accomplish this.

If prices at each college are based on a student's ability the signalling models of Spence

(1974) and others can be brought to bear. In those models people differ in some characteristic t. People can purchase differing amounts of a commodity g; here g denotes the amount of the commodity that people buy. The surplus from an t person's consuming g is $W(g,t)$. However, the person must pay a price $p(g,t)$, so that the net benefit that accrues to him is just $w(g,t) = W(g,t) - p(g,t)$. In such a situation, a person of ability t will choose $g(t)$ to maximize $w(g,s)$. Under mild conditions on $w(g,s)$, $g(s)$ will be an increasing function of s; people with different skills consume different amounts of g. In the original signalling literature g was taken to be years of schooling but the structure of the argument does not depend on this interpretation. It is easy to devise a price system that will segregate people of different ability levels.

Two problems with such a price system must be mentioned. First, people differ in many characteristics, perhaps most importantly in liquidity or wealth. If capital markets are imperfect, then potential students may not be able to purchase the education that maximizes the present discounted value of future consumption. Second, if the benefit that a college education confers on its graduates depends on the mix of abilities of those graduates, and if each college sets $p(c,s)$ to compete for students, then the structure of the model is the same as the model of competition among insurance companies for customers that Rothschild and Stigltz (1976) and Wilson (1977) have analyzed. Such markets may lack equilibria -- or at least the most obvious kinds of equilibria do not exist.

C. Benefits of Diversity

It is sometimes argued that a diverse student body is desirable. A competitive price system will achieve diversity only with difficulty or by accident. The prices that companies charge can in some cases depend on the observable characteristics of customers. They cannot

depend simply on the identification of customers. However, without such prices it is not possible to achieve diversity.

Consider a very simple model. Suppose that four people are to be allocated among two colleges. Each college has a capacity of two students. We model the desire for diversity by presuming that students are risk averse and, that the students of a given college share equally in the college's output, which is simply the sum of the random inputs of its students. There are two kinds students. The input of students x_1 and x_2 is the random variable $\tilde{x}$ and the input of students y_1 and y_2 is the random variable $\tilde{y}$; $\tilde{x}$ and $\tilde{y}$ are independent, identically distributed random variables.

Clearly, the optimal allocation sends one x_i and one y_i to each college. An anonymous price system -- that is, one that ignores a person's observable characteristics -- could not accomplish this result. This is clearly a small numbers problem; if a college admits a large number of students, then the law of large numbers indicates that each college should be able to achieve approximately the right mix of students. Similarly, an insurance company expects that its customers' risks are uncorrelated.

Since the law of large numbers does require large numbers to work, colleges may feel that using a competitive price system (one in which supply equals demand), would leave them with less control over the composition of the student body than they would like. Do colleges use the excess demand, which their less-than-market clearing prices generate, to make efficient allocations? We do not know, and given the difficulty of assessing the effects of matching in our economy,[10] we doubt that it is easily knowable. Still, it is important to understand the

[10] See Hartigan and Wigdor (1989, Chapter 9) for a discussion of this issue in the context of job matching.

weaknesses in the *a priori* argument that competition will allocate students to colleges efficiently.

IV. Markets and Competition

In this section we address directly the question concerning the markets within which universities operate and the nature of the competition among universities. As will be clear, more often than not, we can only offer insights and raise questions and puzzles.

A. The Nature of the Enterprise

The standard economic model of anything is to assume it maximizes something subject to a resource constraint. This paradigm is hard to apply to higher education because it is difficult to state what is being maximized or what the resource constraint is. It is unclear who "the university" is, so it is not obvious who (or what) is doing the maximizing. This makes it difficult to state what is being maximized. The theory of the firm (in the absence of complete markets or perfect certainty) faces the same difficulty, but it is not difficult (in principle) to describe the different interests and prerogatives of the important actors (management, shareholders, and employees).

The goals of some members of the university community (faculty and students) are perhaps not too difficult to model, but the motivations of others (in particular, senior administrators, regents, and trustees) resist easy characterization. It is even harder to specify the prerogatives and bargaining power of the different constituents of the university. Faculty like to say (and to hear administrators say) that the faculty is the university. However, faculty often disagree among themselves. Biologists and historians may have very different views of the nature of the university and its goals and problems. Administrators and trustees make important

decisions about how the university is to run (and who is going to run it).

While institutions of higher education do face resource constraints (and as we note below, some actually go bankrupt and leave the business), it is (as we observed above) hard to state this budget constraint very easily.

One important simple observation is that almost all institutions of higher education are non-profit organizations[11] and that most rely significantly on other sources of revenue (e.g., governmental appropriations, alumni and corporate donations, research contracts and grants, etc.) to supplement tuition[12].

There are immediate implications: (a) The standard paradigm of profit-maximizing behavior as a motive for pricing, output, and/or entry decisions has only limited explanatory power; (b) the survivorship paradigm (Alchian, 1950; Winter, 1964, 1971; Nelson, Winter and Schuette, 1976), as a backstop to profit maximization, loses much of its force in explaining these decisions, since non-tuition contributors' goals will be important in determining a university's survival. In short, market pressures impose less discipline on the university than they do on the firm. Senior administrators, or more generally the decision processes of the university, operate

[11] For 1985-86, only 220 (6.6%) out of 3,340 institutions of higher learning listed by the U.S. Department of Education were in the category of "organized as profit making" (U.S. Department of Education, 1991, p. 229). Of this 220, over 86% (190) offered a program that extended for less than four years. It appears that a large fraction of this "for profit" group was trade and technical schools (U.S. Department of Education, 1991, p. 228).

[12] For public universities in 1986-87, tuition accounted for 14.7% of total "current-fund" revenues, and "sales and services" accounted for another 21.2%, leaving 64.1% to be covered from non-fee sources. For private universities, tuition accounted for 39.6% of revenues, and sales and services accounted for another 21.7%, leaving 38.7% to be covered from non-fee sources (U.S. Department of Education, 1991, pp. 295-6).

under conditions of considerable slack. This freedom leaves the university room to live its version of the quiet life or to pursue the funds (and thus necessarily the goals) of non-tuition contributors to the university.

The absence of profit-maximizing enterprises among universities is worthy of further consideration. Why should this be so? A simple claim that there are substantial asymmetric information (agent-principal) problems surrounding the instructor-student relationship -- which might make student "customers" suspicious of the motives of the instructors in a profit-seeking enterprise -- is not sufficient by itself[13]. Our society tolerates and supports profit-seeking trade schools, law firms, and medical practices, where agent-principal problems are substantial. The hospital sector has a mix of private non-profit, religious, and governmental operated enterprises (as is true of universities); but the hospital sector also includes for-profit enterprises. A better explanation than information asymmetry is the absence of good (human) capital markets. For most people higher education is a good investment; it would remain a good investment even if tuition were set equal to cost.[14] However, most young people cannot pay the full cost of an education; they cannot borrow the funds since they have no collateral. An interesting consequence of this shortfall between tuition and the costs of education is an attenuation of the ability of students (as "customers") to influence the ways in which universities behave.

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[13] A related, and more insidious possibility, is raised by Spencer (1991a; 1991b), who claims that college accreditation bodies are hostile toward for-profit educational enterprises.

[14] Human capital is even more of a bargain than it appears usually if one assumes that education not only improves productivity on the job (an effect that shows up in wages) but also increases the ability to use leisure time. See Jorgenson and Fraumeni (1991) for some astonishing calculations.

B. Inputs

We start with input markets,[15] primarily because the analysis seems clearest there. With the exception of the teacher (professor) inputs, universities are just one among many input users, and the markets are basically competitive. Further, with respect to professor inputs, universities clearly do compete among themselves to fill positions. The individual university demand curves for professors, though, warrant some further consideration. Those demand curves are, arguably, derived demand curves -- derived from the demand for the university's outputs. To some extent those demand curves do reflect the nature of universities' outputs: e.g., teaching colleges are more likely to look for good teachers; research universities are more likely to demand productive researchers. Still, research universities "sell" large amounts of undergraduate instruction education; the marginal revenue product of outstanding teachers would seem to be quite high. Why do good teachers command such small monetary (and other) rewards in large research universities? Why have research universities been so reluctant to establish job categories for outstanding teachers? Why has competition not operated in this dimension?

On this last point, we note that professional schools have been more responsive with respect to teaching. Many schools -- even those that pride themselves as research institutions -- have established "clinical professor" positions that often emphasize teaching or other non-research contributions of a faculty member. We suspect a reason for this is that in some professional schools -- particularly law and business schools -- a high proportion of gross receipts comes in the form of tuition and deferred tuition (alumni gifts). For such schools student satisfaction

[15] We exclude the analysis of incoming students as inputs, which was covered in Section III.

impinges more immediately on the school's budget constraint. (This argument, however, cannot explain the existence of clinical professors in medical schools.)

Finally, our casual impression is that university teaching has been resistant to technological change. Why is this so? Surely it is not the case in the age of the computer and the VCR that the technology of teaching is inherently incapable of significant technological improvement. It is also our casual impression that the education that takes place outside the higher education industry (businesses and the military, for example) has embraced technical change more rapidly than have colleges and universities.[16]

C. Outputs

Universities are clearly multi-product enterprises that operate in many markets. Among their outputs are educational services for undergraduate students, educational services for graduate students (arts and sciences, as well as professional education), research, room and board services for resident students, athletic entertainment services, etc. We will focus primarily on the market for educational services.

Do universities compete with each other in the market for educational services? Casual empiricism suggests that they do compete for students. The terms of this competition include the quality (somehow measured) of the university, the quality of the student body that the university attracts, the location and physical surroundings of the university, and the price (tuition) charged.

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[16] For brief discussions of efforts to provide higher education that is more responsive to "customers" demands, see Spencer (1991a;1991b) and Charlier (1991).

To support our claim that universities do compete on price, we offer the following: University deans (including heads of programs and heads of professional schools) do pay attention to the tuition levels of universities of similar quality and/or in similar locations and are concerned that their own tuition levels not diverge appreciably from those of their rivals. Further, the U.S. Department of Justice's Antitrust Division recently investigated alleged meetings by administrators from at least 23 prestigious East Coast colleges and universities that met annually to agree on the scholarship levels that would be offered to prospective freshmen (Jaschik, 1989; Putka, 1989; Salop and White, 1991).[17] [18] One participant in these meetings apparently feared that in their absence the universities "might be dragged into a kind of 'bidding

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[17] In May 1991, the Justice Department formally charged eight Ivy League schools and MIT with price fixing; the eight Ivies immediately settled the case with a consent decree (in which they did not admit any guilt, but they agreed to discontinue the meetings), but MIT declined to join the settlement and will likely face a trial on these charges. These investigations would require time-series cross-section panels that would either use individual university applications as the dependent variables (and include university tuition levels as a right hand side variable) or use individual student applications and acceptance choices as the dependent variables.

Spies (1990) has studied how family income affects the probability of applying to an expensive and selective private college or university. Spies found that the relationship between the probability of applying and income had a gentler slope for those who applied for financial aid than for those who did not. Without criticizing Spies' work (which is careful and involves the replication of the basic results over three different cohorts of applicants), we note that he did not pose his question (what determines the probability of applying to a particular kind of college?) as that of estimating a demand function. Price (gross or net tuition) is not included as a variable.

[18] McPherson and Winston (1991) develop a model in which universities compete but in which information asymmetries between sellers (universities) and buyers (students) cause the terms of competition to focus on costly symbols of quality and also cause buyers to judge quality on the basis of price (tuition); this latter effect would deter the sellers from cutting prices in order to compete and could even impart a price-raising bias to their behavior. McPherson and Winston offer no evidence to support their model. We believe that the evidence from the enrollment choice studies cited in the text, in which the coefficients on the tuition levels of rejected universities have positive signs, casts doubt on the validity of the McPherson-Winston hypothesis.

war' for the best students" (Cotter, 1989). It is interesting to note that another 33 universities that were under investigation for sharing information on scholarship aid included the Great Lakes Colleges Association (a group of twelve liberal arts colleges in Indiana, Michigan, and Ohio), a group of eight women's colleges (six of which are located in the South), and an additional group of twelve private universities that had very high tuition fees (Jaschik, 1989); within each of these three groups the schools would likely have perceived each other as direct competitors and would have been interested in restraining price competition.

This evidence is, at best, only indirect support for the claim that price competition among universities is a significant phenomenon. It is supported, however, by many of the studies fo student enrollment choices among universities. These studies often include as explanatory variables the tuition (and other fees) and scholarship amounts of both the selected university and those that were rejected. The coefficients on the tuition and scholarship amounts (or, in some studies, the net cost) offered by the rejected schools are usually significant and have the expected signs (e.g., the coefficient on the tuition level of a rejected university has a positive sign, etc.) (Radner and Miller, 1975; Miller and Radner, 1975; Hight, 1976; Fuller, Manski, and Wise, 1982; Corman, 1983; Manski and Wise, 1983; Ehrenberg and Sherman, 1984). Thus, students do seem to be sensitive to the prices of the alternatives open to them. (Unfortunately, we have not been able to uncover studies that examine the price cross-elasticity of demand among specific universities, which would provide us with a greater understanding of the specific nature of the competition among universities).

It seems unlikely that price competition among universities approaches the textbook model of the perfect competition among wheat farmers. Individual universities have perceived

quality differences and "brand name" reputations that surely influence student choice. Also, locational differences among universities imply transportation cost differences (as well as psychic "away from home" differences, which can be a plus or a minus for a university's attraction) for many students.[19] In sum, a form of oligopolistic or Chamberlinian competition seems to be the appropriate characterization.

Competition among universities appears to have both geographic-space and product-space dimensions.[20] High prestige schools probably compete in a nationwide market; e.g., in the market for freshman applicants Harvard and Stanford probably compete for roughly the same pool of students (and probably also compete for a common pool of applicants to their medical, business, and law schools and to most of their graduate programs in arts and sciences). Schools with lesser prestige are likely to compete among themselves on a regional basis; the lure of a specific national "brand name" is likely to be less important for students in this market segment, and the costs associated with regional location are likely to loom relatively larger. Finally, universities are likely to compete most intensively with universities in their same quality segment; e.g., Yale and Harvard are likely to consider each other as competitors, while neither is likely to think of the University of Bridgeport as a competitor.

We can now discuss a number of important topics related to competition among

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[19] In fall 1988 over 80% of freshman enrolled in a college or university in the same state in which they had previously resided (U. S. Department of Education, 1991, p. 196); this percentage has been remarkably stable over the past two decades (Harris 1972). In most of the demand studies, distance from home is a negative factor in a potential student's choice; see Honack and Weiler (1976); Fuller, Manski, and Wise (1982); Manski and Wise (1983); Ehrenberg and Sherman (1984); and McClain, Vance, and Wood (1984).

[20] Garvin (1980, ch.2) makes some of these same arguments.

universities:

1. Tuition levels and scholarship levels. Suppose a university charges a tuition level of X to all its i students and offers a vector of scholarships Y to those same i students ($0 \leq Y_i \leq X$). As a first approximation, if the university instead charged a tuition of X + $10,000 and offered a new vector of scholarships of Y + $10,000, nothing should change;[21] and, if the university -- because it asks for family financial information from all its applicants -- could selectively offer scholarship increments that were less than $10,000 to some students and still not lose those students, then the university's net revenues would increase.[22] In principle, the university's net revenues would continue to increase as it raised tuition levels and selectively increased scholarship amounts until all but one of its students were on partial or complete scholarship; in essence, the university would be practicing first degree price discrimination. Universities clearly do engage in price discrimination to some extent. Scholarship aid (including Pell Grants) amounted to 24% of aggregate tuition receipts by private universities and to 35% by public universities in 1986-87 (U.S. Department of Education, 1991, pp. 291-2). Still, one can ask why universities do not engage in more of it and why they do not make a greater effort to achieve the first degree price discrimination ideal described in the previous paragraph.

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[21] This is equivalent to an auto dealer's adding $10,000 to all list prices but also offering $10,000 "discounts".

[22] We abstract from any added administrative costs. Also, it is worth noting that the auto dealer would be unlikely to succeed with a similar price discrimination scheme because of competition among auto dealers and because auto dealers typically do not know a prospective buyer's income or other characteristics (though the dealer may learn them after the sale, while arranging for the financing of a purchase).

There are a number of possible answers to this question; but one of them, we believe, can immediately be discarded. It might be claimed that students would somehow perceive tuition increases matched by identical scholarship funding increases as not being neutral and that they would thereby be deterred by the tuition increase (Hearn and Longanecker, 1985). The available evidence, however, points strongly toward our equivalence hypothesis. Studies of student enrollment choices among types of universities sometimes include both tuition levels and scholarship amounts (offered by the chosen and rejected universities) as explanatory variables. These studies show that tuition levels and scholarship amounts have virtually identical coefficients (with opposite signs) in explaining student enrollment choices (Fuller, Manski, and Wise, 1982; Manski and Wise, 1983; Ehrenberg and Sherman, 1984). Thus, students who are offered scholarship aid do not seem to suffer from "tuition illusion," and claims of non-neutrality are unlikely to be adequate explanations for why universities do not practice price discrimination to a greater extent.

We are left with two possible answers to this question: The first is that price competition among universities would undercut and unravel this extreme form of price discrimination. The second is that the non-tuition funds providers would be offended by this apparent gouging by the university (i.e., the increases would not be neutral from their perspective), and their contributions would decrease, thereby reducing (or eliminating) the net revenue gain to the university from the price discrimination scheme. Among the most important contributors are future alumni whose generosity toward their alma mater could possibly be severely tempered by the memory that she had charged all that the traffic would bear. We currently do not know enough information about price competition among universities or about the behavior of non-tuition funds providers to

assess the relative importance of these explanations.

2. Scholarships and price competition. In Section III we suggested that a price discrimination scheme (i.e., selective scholarships) could allow the university to achieve a desired mix of students, which would enhance the efficiency and productivity of the university's educational output. Is this form of price discrimination compatible with competition among universities? Or does the university's desire for an optimal mix create a potential market failure that would argue for limits on competition and that could justify the alleged agreements on scholarship levels that the Justice Department investigated?

The case for a market failure does not appear to be strong. The externality of the "desirable" students is wholly internalized within the university. If, say, a "desirable" student enhances the educational experience of other students, then those other students should be willing to pay higher tuition to a university that offers this diversity; the externality is internalized. Though competition for "desirable" students, through larger price discounts (i.e., larger scholarships), reduces university net revenues, this is true of competition for all of the university's outputs.[23] Further, the experience of the last decade in the airline industry suggests that modest levels of price discrimination can survive in markets that are workably competitive.

3. Pricing within the university. Casual empiricism suggests that the marginal costs of educating an undergraduate in the sciences are substantially higher than the marginal costs of educating an undergraduate in the humanities. Nevertheless we generally see uniform tuition

[23] We see only one special problem that suggests special treatment for this industry. If, as we argued in the last part of Section III, diversity is a small numbers problem, then coordination among universities in allocating students may be desirable.

levels within a university across most majors (though different schools or programs within a university may charge modest fee differentials). Why is this so?

We have already (in Section II) dealt with the normative issue of whether such uniform pricing generates "cross-subsidies" among areas. There is still the positive question of why this uniformity occurs and persists.

In a multi-output (profit-maximizing) enterprise with common costs (economics of scope) and with differing marginal costs among the separate outputs, pricing is a complex phenomenon. A monopolist will look to the demand elasticities of its separate products, as well as its marginal costs, to determine its prices. A firm in competitive markets will seek a combination of prices and products that yield an adequate aggregate surplus over its separate marginal costs to cover its common costs. Though neither market structure necessarily generates an outcome in which the firm's prices correlate positively with its marginal costs, uniformity of prices for outputs with substantially different marginal costs would occur purely by chance (and would be highly unlikely to replicate itself in thousands of separate enterprises).[24] And, with marginal costs as the starting point for pricing under either form of market structure, there is a mild presumption that a positive correlation between prices and marginal costs should emerge.[25]

At first glance, then, tuition uniformity seems to be an oddity that is inconsistent with

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[24] Where marginal cost differences are small and the transactions costs of enforcing marginal cost pricing are high, we are likely to see uniform pricing. For example, restaurants typically charge a uniform price for coffee, regardless of whether a customer adds cream and/or sugar. On the other hand, delicatessens often charge extra for extra materials that can be ordered with a sandwich (e.g., lettuce, and/or tomato), presumably because the marginal costs are higher and the monitoring costs are small.

[25] Restaurants generally charge higher prices for their steaks than for their hamburgers and higher prices for their strawberry shortcake than for their donuts.

profit maximizing behavior in any market structure. One explanation might be as follows: Many undergraduate institutions do not charge per course or per credit but rather per semester or quarter. In principle all students can take all courses (or could if they so planned their programs). What is being sold is the ability to pick from a menu and this is no more strange than the observation that many salad bars charge per trip rather than per nutrient.

The salad bar analogy is strongest, however, where monitoring costs are high relative to the price of the items. This does not seem to be the case for student course enrollments. An alternative model would be that of two-part tariffs, in which customers are charged a lump sum entry fee and are then charged prices for individual services that approximate marginal costs (Oi, 1971). In this framework, then, we would expect to see all students pay a common "enrollment" fee (subject to the price discrimination possibilities discussed above) and then to be charged specific course fees that were roughly commensurate with the marginal costs of those courses.

We are thus left with the puzzle of uniform or near-uniform tuition levels in the presence of substantial marginal cost levels. Perhaps this is another area where the preferences and prejudices of non-tuition funds providers are important. Again, we believe that this is an area that warrants further research.

4. Pricing and prestige. Mercedes automobiles sell for appreciably more than Chevrolets; Rolex watches sell for appreciably more than Timexes. But, even among private universities, high prestige institutions often do not charge tuition levels that are substantially above those of lower prestige institutions. Why is this so? Why do high prestige institutions decline to try to capture most of the rents that are associated with their "brand names"?

A recent survey of graduate professional schools provides striking evidence to support this

picture of relative uniformity.[26] In Tables 1 and 2 we present the tuition levels and expected starting salaries for graduates of top ranked business schools and law schools. If we focus on the private universities in the rankings,[27] we find a picture of relative uniformity of tuitions among the leading schools. There is a mild positive correlation between a school's tuition and its rank: for business schools, the rank correlation is 0.58; for law schools it is 0.46. When we look at the correlation between tuition and expected annual starting salaries, there are again positive rank correlations: 0.56 for business schools and 0.71 for law schools. Simple OLS regressions of tuition levels (TL) on expected salaries (ES), however, yield the following (with t-statistics in parentheses):

Business schools: $TL = 11.59 + 0.085\ ES;\ r = 0.55;\ n = 16.$
(2.46)

Law schools: $TL = 9.05 + 0.095\ ES;\ r = 0.69;\ n = 15.$
(3.44)

These results indicate that students at business and law schools where expected starting salaries are higher do pay higher tuition, but those higher annual tuitions are less than 10% of the higher expected annual starting salary.[28]

Finally, the more limited data in table 3, for medical schools, show even less correlation

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[26] We do not have any immediate evidence concerning undergraduate institutions, but we are reasonably confident that a similar picture would emerge.

[27] State universities, with the exception of the University of Michigan, are charging tuition -- even to out-of-state students -- that have more to do with state legislatures' policies than with any notions of market pricing.

[28] These results are consistent with those found by Ehrenberg (1989).

(rank correlation = 0.09) between rank and tuition than for the business and law schools.

Again, we have a puzzle. The students, rather than the schools, are capturing the rents.[29] Even if schools only provide signals (Spence, 1974) or filters, is the filter worth this little? Are the preferences of non-tuition funds-providers important here? Again, we suggest that this is a fruitful area for future research.

5. Entry and exit. Entry and exit play important roles in the standard competitive model, helping to expand or contract supply and thereby hastening the elimination short-run rents or losses. Entry can occur de novo (by start-up firms) or through "product extensions" by existing firms.

Table 4 shows the number of two-year and four-year colleges and universities that have been in the market over the past 40 years. There has been substantial growth in these numbers; i.e., net entry has been considerable. (It should be noted that over time some two-year schools have converted to four-year schools and some schools in both categories have exited the market entirely, so gross entry in all categories has been larger than any net calculation would indicate.) Table 5, covering professional schools, tells the same story of substantial net entry.

What motivated these entry decisions? It is clear that the expanding population and rising

[29] It has been suggested to us that the higher starting salaries offered to the graduates of the leading law and business schools may be just a cost-of-living compensation adjustment; i.e., that the leading professional schools tend to be located in metropolitan areas with above-average living costs and that their graduates tend to work in these same pricey areas. If this were so, the students' net rents would be much smaller than the gross differentials in starting salaries indicate. Our casual impression from the cost-of-living comparison data gathered by Kramer (1989) for law school graduates is that the net rents accruing to the graduates of leading professional schools are still substantially positive. Without more complete data on the location choices of the graduates of the leading and lesser schools and of the cost-of-living differentials among these locations, however, we are unable to pursue this net rent hypothesis any further.

incomes of the U.S. economy created an increased demand for university education in the U.S.; the rising international reputation of U.S. universities also added to demand. Total student enrollments (the intersection of demand and supply) rose from 2.3 million in 1947 to 13.0[30] million in 1988 Still, this increase in output might have been accommodated solely through internal expansion of the 1,851 institutions that existed in 1949-50. Why did entry occur alongside internal expansion?[31] Even if we exclude the growth in the number of publicly controlled institutions (the causes of which might be harder to model), there were still increases of over 50% in the numbers of two-year[32] and four-year privately controlled institutions. Why did this entry occur? We would guess that the availability of private donations and endowments to provide the start-up capital for new private institutions (the equivalent of the owners' initial investments in any for-profit enterprise) was often an instrumental factor, but there were surely other factors as well. Research on university entry behavior (including "product extensions" -- i.e., new programs or schools begun by existing universities) would appear to be worthwhile.

One other feature of table 4 is worthy of notice: The data indicate that publicly controlled universities are much more likely to establish branch campuses than privately controlled universities. It is unclear to us why these private institutions believe that their brand names

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[30] This includes part-time students.

[31] It is worth noting that enrollments at publicly controlled universities expanded by over 780% between 1947 and 1988, while enrollments in privately controlled institutions expanded by over 240%; both of these expansions greatly exceeded the percentage increases in the numbers of institutions, so internal expansion clearly did accompany entry.

[32] Some of the increase occurred through entry by for-profit trade and technical schools.

cannot be extended to multiple locations.[33] This too appears to be an area that warrants research.

Finally, table 6 shows the number of colleges and universities that have "shut their doors" in the past three decades -- i.e., they have exited the education market.[34] The exit decision by for-profit firms in the private sector is not a well-researched area, so we have even less here to serve as a basis for explaining university behavior. Again, research would be worthwhile.[35]

C. Positioning in the Market.

How do universities position themselves in the market? Why do Harvard, Northeastern, Antioch, and Grinnell attract the specific groups of students that they do? How can they change their positioning (e.g., improve their perceived quality and prestige)? How often (and why) do universities attempt to change their positioning? When (and why) do they succeed (or fail)?

And as was true for entry, we suspect that availability of private and public contributions and endowments are important (this especially seems to be true for professional schools in the past two decades). Still, further research could surely shed useful light here.

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[33] State chartering restrictions appear to prevent universities from branching across state lines (much as is true for commercial banks). But the near absence of intra-state branching by private universities remains a puzzle. Why does the University of California have eight branch locations, while Stanford only has its "home office"? A few universities have established locations abroad and in Washington, D.C.; but these branch locations are usually designed for special programs of their students based at the "home" campuses, rather than as free-standing (full service) branches.

[34] In some instances private universities have, in essence, exited, but they have been superseded by public institutions.

[35] It has been suggested to us that the cloudy property rights that accompany the non-profit status of private universities may impede their ability to shut their doors and liquidate assets.

D. What About a Monopoly Model?

As we noted in the Introduction, the "autonomous cost increase" model advocated by Massy (1989) assumes that most (if not all) universities are separate monopolies that face inelastic demands and thus can raise their prices at will to accommodate rising costs.[36] We believe that the empirical evidence, scanty though it may be, throws substantial doubt on this basis for Massy's analysis.

Still, let us suppose that universities truly were monopolies. The theory of monopoly, of course, yields a prediction about the level of prices of a monopoly relative to those of an otherwise similar competitive industry. It says nothing about rates of price increases. If universities really were separate monopolies and could raise their prices at will, then the important question would be the following: Why have universities not raised their tuition earlier and faster?

We find it hard to believe that over 3,000 monopoly university administrators, year after year, would have consistently passed up opportunities to increase revenues substantially by raising tuition. Though it is possible that gouging perceptions by non-tuition funds-providers might have stayed the tuition-raising hands of some university administrators during some periods, we doubt that the gouging perceptions could have been a complete restraint at all times.

Could it be that universities are already pricing at monopoly levels and that it is these elevated prices that generate substantial cross-elasticities of demand and thus bring the

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[36] As we noted in footnote 20 above, McPherson and Winston (1991) offer an alternative model that might explain a pattern of secular cost increases: Asymetric information problems cause universities to compete through costly symbols of quality. As we explained there, however, we believe that the available evidence casts serious doubt on the McPherson-Winston hypothesis.

universities into competition with each other? If this proposition were true, it would mean that universities' prices are currently generating explicit or implicit rents and that there is a lower set of prices that would eliminate the rents and at which there would be low or zero demand cross-elasticities among the universities.[37]

The proper test of this proposition would require the measurement of universities' rents at current prices. Since universities currently charge tuition and other fees that cover only a fraction of their costs, and since universities' input prices are largely determined in competitive markets, the existence of explicit rents seem unlikely. Also, as we noted above, it appears that many high prestige universities are not even exploiting the rents associated with their brand names.

It is possible that universities are absorbing potential explicit rents in the form of production inefficiencies -- Leibenstein's (1966) X-inefficiency. With the presence of over 3,000 universities in the market, we consider it unlikely that X-inefficiency would uniformly hide the rents that would otherwise be accruing to these monopolies. Still, in the absence of a comparison model of an X-efficient university, we must remain somewhat agnostic on this point.

V. Conclusion

The analysis of university behavior in a market context has been an under-researched area

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[37] This is the proper test of a monopoly for antitrust purposes. In a major antitrust case that tried to determine whether DuPont had monopoly power in the sale of cellophane (*U.S. v. E.I. DuPont de Nemours and Co., 351 U.S. 377 [1956]*) the U.S. Supreme Court made the mistake of looking only at the cross-elasticities of the demand at the prevailing prices for cellophane and not asking about the rents that were accruing and about what the cross-elasticities and rents might have been at lower prices. As many commentators noted, if DuPont did have a monopoly in cellophane, profit maximizing behavior would call for it to raise its price to the point where significant cross-elasticities with other flexible wrapping materials had developed (Stocking and Mueller, 1955; Posner, 1976, p. 127-128).

in economics. In this paper we have argued that a competitive framework for analysis appears reasonable but that the non-profit status of universities and the major role of non-tuition funds-providers introduce special features into any competitive structure. We have offered some insights into university behavior and raised a number of interesting questions and puzzles. We suggest that these questions and puzzles provide a rich agenda for future research that will help us better understand market behavior in this important sector of the U.S. economy.

Table 1: USN&WR Rankings of Leading Business Schools

Rank/School	1990 Out-of-state tuition	Average starting salary	Excluding state universities Overall rank	Tuition rank	Salary rank
1. Harvard	$16.4K	$63.0K	1	9	1
2. Stanford	16.6	60.5	2	4.5	2
3. Penn	16.5	55.0	3	7	5
4. Northwestern	16.6	54.0	4	4.5	7
5. MIT	17.2	59.0	5	1	3
6. Chicago	16.7	54.5	6	3	6
7. Duke	16.2	51.0	7	11	11
8. Dartmouth	16.5	57.0	8	7	4
9. Virginia	11.7	55.3	-	-	-
10. Michigan	15.7	53.3	-	-	-
11. Columbia	16.3	52.0	9	10	10
12. Cornell	16.1	50.7	10	12	12
13. Carnegie	16.5	52.0	11	7	9
14. N. Carolina	5.6	50.8	-	-	-
15. UC Berkeley	7.8	50.0	-	-	-
16. UCLA	8.1	51.5	-	-	-
17. Texas	3.6	44.0	-	-	-
18. Indiana	8.2	44.1	-	-	-
19. NYU	15.5	53.2	12	13	8
20. Purdue	6.8	43.5	-	-	-
21. USC	14.4	49.1	13	16	13
22. Pittsburgh	16.9	43.5	14	2	16
23. Georgetown	14.5	45.2	15	15	14
24. Maryland	7.1	42.9	-	-	-
25. Rochester	14.7	44.5	16	14	15

Source: U.S. News & World Report, April 29, 1991, p. 68.

Table 2: USN&WR Rankings of Leading Law Schools

Rank/School	1990 Out-of-state tuition	Average starting salary	Excluding state universities		
			Overall rank	Tuition rank	Salary rank
1. Yale	$15.4K	$66.1K	1	7.5	7
2. Harvard	14.5	67.2	2	14	4
3. Chicago	15.7	71.0	3	5	3
4. Stanford	14.9	65.0	4	12	10
5. Columbia	16.1	78.3	5	3	1
6. Michigan	15.7	59.6	-	-	-
7. NYU	16.6	76.7	6	1	2
8. Virginia	10.1	63.0	-	-	-
9. Duke	15.3	60.2	7	9	13
10. Penn	15.1	64.6	8	11	11
11. Georgetown	15.4	66.0	9	7.5	8
12. UC Berkeley	8.8	58.0	-	-	-
13. Cornell	15.9	66.2	10	4	6
14. Northwestern	15.5	65.1	11	6	9
15. Texas	6.0	52.6	-	-	-
16. USC	16.4	66.7	12	2	5
17. Vanderbilt	14.8	55.0	13	13	15
18. UCLA	9.0	62.7	-	-	-
19. Iowa	7.7	50.0	-	-	-
20. UC Hastings	8.7	62.7	-	-	-
21. Wisconsin	9.1	47.5	-	-	-
22. G Washington	15.2	61.0	14	10	12
23. Minnesota	8.7	45.7	-	-	-
24. Notre Dame	13.0	56.9	15	15	14
25. N. Carolina	7.0	40.5	-	-	-

Source: U.S. News & World Report, April 29, 1991, p. 74.

Table 3: USN&WR Ranking of Leading Medical Schools

Rank/School	1990 Out-of-state Tuition	Excluding state universities Overall rank	Tuition rank
1. Harvard	$18.0K	1	3
2. John Hopkins	16.5	2	7
3. Duke	14.2	3	11
4. UC San Francisco	5.9	-	-
5. Yale	17.0	4	6
6. Washington University	14.9	5.5	9
7. Penn	18.3	5.5	2
8. Stanford	17.9	7	4
9. UCLA	8.0	-	-
10. Cornell	19.2	8	1
11. Michigan	20.4	-	-
12. Columbia	17.9	9	5
13. U. of Washington	12.5	-	-
14. Chicago	16.1	10	8
15. Vanderbilt	14.6	11	10

Source: U.S. News & World Report, April 29, 1991, p. 68.

Table 4: Institutions of Higher Education

	Excluding branch campuses				Including branch campuses			
	Publicly Controlled		Privately Controlled		Publicly Controlled		Privately Controlled	
	4-year	2-year	4-year	2-year	4-year	2-year	4-year	2-year
1949-50	344	297	983	227	n.a.	n.a.	n.a.	n.a.
1954-55	353	295	980	221	n.a.	n.a.	n.a.	n.a.
1959-60	367	328	1,055	254	n.a.	n.a.	n.a.	n.a.
1964-65	393	406	1,128	248	n.a.	n.a.	n.a.	n.a.
1969-70	426	634	1,213	252	n.a.	n.a.	n.a.	n.a.
1974-75	447	767	1,297	236	537	896	1,329	242
1979-80	464	846	1,399	266	549	926	1,408	269
1984-85	461	868	1,450	367[b]	566	935	1,459	371[b]
1989-90[a]	n.a.	n.a.	n.a.	n.a.	595	968	1,532	440

[a]Data for this year are not entirely comparable with earlier years, because of revised survey procedures.

[b]Large increases are due to the inclusion of trade and technical schools.

Source: U.S. Department of Education (1991, p. 228).

Table 5: Number of Institutions Conferring Professional Degrees

Year	Dentistry	Medicine	Law
1949-50	40	72	n.a.
1959-60	45	79	134
1969-70	48	86	145
1974-75	52	104	154
1979-80	58	112	179
1984-85	59	120	181
1987-88	55	120	180

Source: U.S. Department of Education (1991, p. 248).

Table 6: Institutions of Higher Education That Have "Closed Their Doors"

	Publicly Controlled		Privately Controlled	
	4-year	2-year	4-year	2-year
Excluding branch campuses, total, 1960-61 to 1989-90:	1	37	167	118
Including branch campuses, total, 1969-70 to 1989-90:	4	29	152	90

Source: U.S. Department of Education (1991, p. 231).

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