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Proposal for Affordable Flagship Excellence, Access, and State Economic Growth: Differential Pricing of Degrees in Business, Engineering, and Computer Science at UMCP

Executive Summary

The traditional approach to college pricing is "one-price-fits-all," regardless of field of study. UMCP proposes differential pricing that is market based for only three degrees—from among the scores of degrees offered—because they meet the stringent test of satisfying each of these five criteria: high demand by students, high cost to teach, high academic quality, high job salaries, and high impact on the state's economy. These are degrees in Business, Engineering, and Computer Science.

Many of our best students are in these majors. Demand for these majors has been soaring. Differential pricing will provide the means to enrich their education and increase the value of their degrees; attract more top in-state students; and strengthen the excellence and national standing the State's flagship university. These results will, in turn, help spur innovation and economic growth in Maryland.

The majority of public AAU universities have differential pricing. All Big Ten flagships—except UMCP—have differential pricing.

Our proposal is reasonable and equitable. First, the differential is benchmarked to the Big Ten median: $5,600 for the degree ($1,400/year X 4 years). This sum is invested in students in these majors to enhance their educational experiences and expand their educational opportunities.

Second, the differential is back-loaded in the junior and senior years. This is fair because students often change majors before their junior year. The differential will cover about 20% of undergraduates on campus.

Third, the differential is phased-in slowly—over four years—so students have time to plan and adjust for it in advance. Initially (FY16), the partial differential will be $700. By the start of the fourth year

(FY19) and thereafter, the full differential ($5,600) will be in effect.

Because of this phased-in schedule, the proposed differential pricing increases the cost of the degree in incremental steps, starting at a 2% increase for current juniors (FY16 graduates) and topping out at a 15% increase for future juniors and seniors (FY19 graduates and thereafter).

Even with the differential added, the price of the degree in these fields for UMCP students would still be near the bottom of that of Big Ten flagships.

Yet, the median annual household income of UMCP's resident freshmen ($120,000) is higher than the statewide median ($72,000), which is higher than the national median and the Big Ten states' median ($52,000). Most of our students graduate debt free. The others have debt and default rates that are much lower than the state and national averages.

The "cost" of attending college is also an "investment" that generates a financial return over a lifetime. Upon graduation, our students in Business and STEM (science, technology, engineering, mathematics) majors have higher job placement and starting salaries than their peers in other fields.

No Big Ten school reports any adverse impact from differential pricing on applications or enrollments in any major, including for underrepresented minority students. We do not expect the results at UMCP to be any different.

UMCP leads the state in STEM degrees awarded, including to underrepresented minorities. Over the past dozen years, UMCP has produced more degrees at a lower cost per degree, despite a substantial decline in state funding per degree and only a modest increase in tuition, both inflation-adjusted.

The projected gross revenue from differential pricing during the phase-in years is $4M in FY16 and $8M in FY17. After full implementation, it will be $16M/year. The benefits that students in these majors will get from differential pricing are the following:

- Enriched academic experience: 65% will be invested to hire about 23 new faculty members and reduce class sizes; expand career services, internships, and student research; and upgrade labs.
- More financial aid: 25% of the total will be reserved for grants for all very-low and low-income students as well as full scholarship students, thereby exempting them from the differential.
- Expanded enrollment: 10% will go to enroll 60 additional students and create two new minors for 700 students.

Differential pricing is an idea whose time has come. *We propose it because we believe it is good academic policy and good public policy, regardless of any State budgetary actions at any given time.*

The philosophical basis of this proposal is that public higher education is a public good and a private benefit. It is reasonable and fair to ask the beneficiaries of a flagship-quality education to make an added investment in selected fields of study that are high cost, high demand, highly compensated and of high value to society.

Differential pricing is also equitable because there will be less cross-subsidization of higher cost majors by lower cost majors. This will enable us to preserve the quality of other majors that are central to the University's educational and research missions but are less costly to teach.

The Case for Differential Pricing of Degrees

We pinpointed three majors for differential pricing on the basis of meeting all five criteria: (1) high cost of instruction; (2) high demand by students; (3) high national standing; (4) high placement rate and salary upon graduation; and (5) high economic impact on the state.

1. High cost of instruction

The cost of education for some majors varies substantially due to many factors, such as different faculty salaries, the cost of labs and equipment, etc. For example, the cost per credit-hour for undergraduates is $130 higher in Engineering and $85 higher in Business than the average of other majors.

2. High student demand

At UMCP, there is enormous demand for these majors. For example, over the last 6 years, the number of majors in Engineering has risen by 45% (from 2,800 to 4,000) and in Computer Science by 140% (from 900 to 2,200). The majors in Business have remained stable (2,900), but only because the business school caps its enrollment to preserve instructional quality. Business and Engineering turn away many highly qualified applicants.

In the "one-price-fits-all" approach, the higher cost to educate some majors is spread among all students. Therefore, we have reallocated funds from lower cost to higher cost programs. This partial cross-subsidization is constrained by the need to preserve academic quality in lower cost programs.

3. High national standing

These programs are among the most highly ranked nationally at UMCP, ranging from top 20 to top 10 among public research universities. Academic quality and institutional reputation are directly related to program support (e.g., expenditures per student, class size, etc.). Students are generally willing to invest more in a highly valued program and degree. Differential pricing will strengthen these programs' quality and the overall standing of the University.

4. High employment rate and high compensation

It is reasonable and fair that students who benefit from higher-cost education should bear these added costs, rather than spread them across all students in all majors, especially since graduates in these three majors have more job opportunities and higher starting salaries.

On average, the return on investment (ROI) on the cost of college is about $1M more in earnings over a lifetime compared to high school graduates. ROI is higher for graduates in these three majors (*Footnote 1, page 9*). Differential pricing will likely increase ROI because of the enhanced quality of the education and, hence, the added value to the UMCP degree.

At graduation, 85% of our Business, Engineering, and Computer Science majors have jobs or have been accepted into graduate studies. Their overall median starting salary is about $60,000. For all other majors, the corresponding figures are 70% and $35,000.

The National Association of Colleges and Employers report that these three majors are "the most profitable." The average lifetime earnings are as follows: Engineering, $3.5M; Business Management, $3.3M; Computer Science, $3.1M. (USA Today, January 31, 2015.) In our recently completed $1B fundraising campaign, 44% of the total came from donors in these three fields.

5. High impact on state economic development

Economic growth and job creation is a top state and UMCP priority. Most of the successful companies started by our students and alumni are from Business and STEM fields.

Pitch-Book, the California venture capital firm, recently ranked UMCP 10th among public universities and 30th among all universities in the number of new companies created by undergraduates and backed by venture capital. In recent years, 81 UMCP students started 72 companies that received a total of $362 million in venture capital. Last year, 100 undergraduates launched "Start-up Shell," an incubator and proto-typing lab. Already, it has spawned 34 new companies.

Differential pricing will strengthen UMCP's capabilities to educate the next generation of innovators and entrepreneurs who start successful businesses and not-for-profits.

Differential Pricing at Big Ten Flagship Universities

Of the 35 AAU public research universities in the country, most (60%) have differential pricing for various programs, including Business and select STEM majors. (*See Appendix A, page 11.)*

Every Big Ten flagship—except UMCP—has differential pricing for Business and Engineering; most have it for Computer Science as well. The median pricing differential at Big Ten peers is $5,600. This is on top of base tuition and fees that are already significantly higher than that of UMCP, which is $9,500/year for residents. (*Footnote 2, page 9*.) For example:

- Penn State (ranked 14th nationally), has a differential of $1,462/year for business, engineering, and sciences. This is on top of base in-state tuition and fees of $17,500/year for freshmen and sophomores and $18,800/year for juniors and seniors.
- University of Illinois (ranked 11th nationally) has differential of $5,004/year for business, engineering, computer science, and other fields. Its base in-state tuition and fees are $15,600/year.

Impact of Differential Pricing on Enrollments and on Low Income/Minority Students

We surveyed admissions directors of Big Ten schools. All reported that differential pricing had no negative impact on enrollment in any major, or on enrollment of low-income students and under-represented minorities.

Our Senior VP and Provost Mary Ann Rankin was Dean of Science at the University of Texas when it instituted differential pricing. Far from suppressing demand, she can attest that, thereafter, enrollments overall and enrollments of low-income students in these fields increased. This seemingly counter-intuitive result makes economic sense: differential pricing allowed the institution to expand capacity in high demand majors, improve program quality, and increase financial aid. (*Footnote 3, page 9*.)

We have no reason to expect the impact will be any different at UMCP, given the demographic profile of our undergraduates (described below, p.7) and high student demand in these fields.

UMCP's Proposed Differential Pricing

We propose a reasonable and equitable differential pricing plan that is (1) back-loaded to the junior and senior years, (2) benchmarked to Big Ten peers, and (3) phased-in incrementally over 4 years.

Differential is deferred to the junior and senior years in these three majors
It is equitable to "back-load" differential pricing because juniors and seniors are very likely to graduate. We do not apply the differential to freshmen and sophomores because many of them change their majors before the junior year. We also want to encourage these students to explore introductory courses in these three fields. They will also benefit from enhancements resulting from the differential.

Of the scores of other majors offered at UMCP, many majors (e.g., Physics, Music, Life Sciences, etc.) meet most but not all five selection criteria. Therefore, they were not included in this proposal.

Differential pricing will affect the 5,700 juniors and seniors in these three majors. They comprise about 20% of the entire undergraduate population.

Differential is benchmarked to the median differential of Big Ten flagships
The median differential—the 50th percentile—at Big Ten flagships is $5,600 spread over four years ($1,400/year X 4). We propose the same $5,600 differential but apply it only to majors who reach the junior and senior years ($2,800/year X 2). Students with double majors (e.g., engineering and computer science, or engineering and business) would pay the differential only once.

Differential is phased-in gradually over 4 years:
Cost of degree increases from 2% (at phase-in) to 15% (at full implementation)
To enable students in these three majors to plan in advance for differential pricing, it will be phased in incrementally. The differential will increase the cost of the degree (currently $38,000) as follows:

- FY16: current juniors (graduating class of '16): 2% increase.
  Partial differential is $700 in FY16 (senior year).
- FY16 and FY17: current sophomores (graduating class of '17): 6% increase.
  Partial differential is $700 in FY16 (junior year) and $1400 in FY17 (senior year).
- FY17 and FY18: current freshmen (graduating class of '18): 11% increase.
  Partial differential is $1,400 in FY17 (junior year) and full differential is $2,800 in FY18 (senior year). This is the transition year.
- FY19 and beyond: future students (starting with graduating class of '19): 15% increase.
  Full differential is $2,800 in FY18 (junior year) and $2,800 in FY19 (senior year).

Of course, the full educational benefits and the full enhanced value of the degree made possible by differential pricing would not be realized until the full differential is implemented. The differential in the future would rise proportionately with any increases in base tuition. Hence, the differential as a percentage of the base tuition and fees would remain the same.

Lower cost of UMCP degree compared to the median cost Big Ten flagship degree
The cost to acquire a UMCP degree in these fields—base tuition plus the differential—will still be substantially lower than the median cost of these degrees at Big Ten flagships.

For example, the in-state cost of a UMCP degree in Engineering would be $43,600 (= $38,000 + $5,600). The median in-state cost of an Engineering degree (including the differential) at a Big Ten flagship is $59,900. Hence, this UMD degree is about $16,000 less expensive.

Differential pricing and the total cost of education (tuition and fees plus state funding)
The total cost of educating a student is the sum of tuition and fees plus appropriations. In FY15, the total cost per student at UMCP is $118,800 over 4 years. In-state students pay tuition and fees of

$38,000 ($9,500/year X 4 years), or 32% of the total cost. The State provides a subsidy of $80,800 ($20,220/year X 4 years), or 68% of the total cost. Non-residents pay the entire total cost (no subsidy).

The full differential in FY19 increases the in-state student's share of the total cost to $43,600 (= $38,000 + $5,600). Hence, due to differential pricing, the student's share of the total cost rises from 32% to 37%. Conversely, the State's share of the total cost drops from 68% to 63%.

Business, Engineering, and Computer Science are among the fields of economic utility to society. Hence, graduates in these fields have lifetime opportunities because of their degree. The public policy issue is the appropriate balance between public and private financing of these degrees.

With differential pricing, an in-state student shoulders an additional 5 percentage points of the total cost of a flagship education. The beneficiary of a flagship degree will still pay under 40% of the total cost, while taxpayers will still pay over 60%. We believe this remains an appropriate balance.

Revenues and Investments from Differential Pricing

Differential pricing would generate about $4M in FY16 and $8M in FY17. Differential pricing in FY18 and thereafter would generate about $16M/year, assuming current enrollment levels.

	Juniors and	Revenue		
Major	Seniors	$700 in FY16	$1,400 in FY17	$2,800/yr. FY18+
Business	2,100	$1,470,000	$2,940,000	$5,880,000
Engineering	2,600	$1,820,000	$3,640,000	$7,280,000
Computer Science	1,000	$700,000	$1,400,000	$2,800,000
Total	5,700	$3,990,000	$7,980,000	$15,960,000

This revenue would be invested in three areas that directly benefit students in these majors:

1. Enriched academic experience: 65% of the revenue

Most of the pricing differential will be invested to enhance the academic quality and competitiveness of these three programs vis-à-vis their counterparts at other flagships with which we compete for students, faculty, and research dollars. To improve the educational experience, it is essential to hire more faculty members in order to reduce the undergraduate student/faculty ratio (SFR), reduce class sizes, and strengthen research and innovation.

For comparison, the overall UMCP SFR is 18:1. Full differential pricing by FY19 will result in the hiring of about 23 new full-time faculty members and the ensuing improvements in SFR:

- Business: 5 new professors; new SFR = 27:1, current SFR = 29:1.
- Engineering: 12 new professors; new SFR = 20:1; current SFR = 21:1 (but is as high as 31:1 in some departments).
- Computer Science: 6 new professors; new SFR = 74:1; current SFR = 93:1. *(Footnote 4, page 6.)*

Differential pricing will also be invested in order to:

- Hire more academic advisors, teaching lab technicians, and career services/placement personnel.
- Increase student opportunities for supervised research and internships.
- Improve instructional infrastructure: upgrade lab instrumentation, computing facilities, and learning technologies; create more incubator spaces for student start-ups.

2. More financial aid: 25% of the revenue

UMCP will reserve one-fourth of the revenue for financial aid: $1M in FY16; $2M in FY17; and $4M in FY18 and beyond. There will be no increase in the net cost of education to (a) Pell grant-eligible low income students; (b) low income students with expected family contribution of under $8,000 per year; and (c) students on full scholarships.

3. Enrollment growth: 10% of the revenue

As indicated previously (p. 3), since 2008 the number of majors in Engineering has soared 45% (increase of 1,200 to 4,000) and in Computer Science 140% (increase of 1,300 to 2,200). In FY13, the State provided enhancement funding for 400 new STEM majors, at $18,000 per major. We have already exceeded this goal due to intense student demand.

With full differential pricing by FY19, there will be modest enrollment expansion. At $18,000 per major, Engineering will add about 40 more majors (to 4,040) and Computer Science will add about 20 more (to 2,220). The demand by highly qualified students is greater than this modest increase. However, our greater need is to enhance the educational experience of current students, given the large enrollment increases in recent years without corresponding enrollment funding.

To accommodate this enrollment growth, both disciplines have new, large, and state-of-the-art instructional and research buildings in the construction pipeline. They are made possible by significant private gifts that were leveraged for state capital funding: the A. James Clark Bioengineering Building and the Brendan Iribe Center for Computer Science and Innovation.

Business will maintain its limited enrollment policy to preserve its quality and because of building space constraints. However, it will use the differential to create a new, two-year minor in "General Business" and a second new minor in "Innovation and Entrepreneurship."

These minors are expected to serve over 700 students from across the campus. Many UMCP students will then have access to courses that they want but currently cannot have, unless they are enrolled in the Smith School of Business. Many of the new courses will also be available to Business majors.

The Flagship Context of Differential Pricing

Academic and demographic profile of UMCP students

Relevant to the consideration of differential pricing is the academic, demographic, and economic profile of students in the State's flagship university. It is a distinctive profile that supports a reasonable differential to underwrite educational enhancements that would not otherwise be feasible absent increased state funding.

Academic profile: Today, the freshman GPA average is 4.1; SAT midpoint is 1315; 6-year graduation rate is 85%. This student profile places UMCP among the top 10 public research universities. (For students in these three majors, the scores are even higher.) UMCP leads the state in granting STEM degrees, about 2,300/year.

Demographic profile: Today, minority students comprise 42% of the freshman class.

Household income: The median household income in the State of Maryland is $72,000, the highest in the nation. In the U.S., including in the Big Ten states, the corresponding figure is $52,000. The

median household income of in-state UMCP freshmen is $120,000; of non-resident freshmen, $140,000; and of in-state transfer residents, $70,000.

Student debt: About 55% of UMCP undergraduates earn their degrees debt free. The remainder graduate with debt averaging $25,000, with a 2% default rate. These figures are lower than national figures: 35% graduate without debt; average debt is $30,000; default rate is 14%. They are also lower than our State's averages.

Low income students: Pell grant-eligible students comprise 19% of UMCP undergraduates, which is lower than at Big Ten peers. Under the current low tuition/low aid model, UMCP has fewer resources for grants—whether for Pell-eligible students or for merit award—than peer institutions with a relatively higher tuition/higher aid model. (*Footnote 5, page 10*.)

Efficiency in UMCP degree production

Appendix B (page 12) shows that UMCP's total degree production rose 39% from FY02 to FY14. It also shows that UMCP's costs per degree—tuition and fees plus state appropriations—declined 21% in the same period, adjusted for inflation.

This demonstrates that *UMCP is producing more output at a lower cost per unit—the economic definition of efficiency*.

Appendix B also shows that, during the FY02 to FY14 period, net tuition and fees per degree rose an inflation-adjusted 7%, but state funding per degree plummeted an inflation-adjusted 40%.

Appendix C (page 13) shows that in-state tuition and fees in real terms (adjusted for inflation) from FY02 to FY14 increased only 1%, whereas out-of-state tuition and fees in the same period soared 24%.

Given this overall trend of declining state support, it is all the more remarkable that UMCP was able to lower the cost of production per degree by 21%. UMCP has over-achieved in degree production, though not without potential risk to academic quality, which differential pricing would help remedy.

From the foregoing three graphs, one can draw the following policy implications:

First, *there is a market basis for a reasonable pricing differential* for selected high cost, high demand programs. Reasonableness is defined as the median of Big Ten peers.

Second, given the trend of relatively large decreases in state funding per degree, and the relatively modest increases in in-state tuition and fees per degree, *there is the risk that academic programs—especially the high cost, signature programs—will start slipping in value, quality, and national reputation*, if there are not additional resources to off-set the declining state funding. (*Footnote 6, page 10*.)

Conclusion: Affordable Flagship Excellence and Access in Today's "New Normal"

UMCP serves Marylanders and the State by being affordable and academically front-rank—a flagship that is "equal to the best" in the nation, as our State mandate reads. We interpret "equal to the best" to mean among the top 10 flagships. This is a goal that we believe we can attain, and that we are resolved to attain, within the next five to ten years.

Some of our premier programs are at risk of falling behind those at peer flagships because the resources required for flagship excellence have not been equal to the demand. When a top-15 program such as Computer Science—critical to innovation, cyber-defense, and state economic vitality—reaches a faculty/student ratio that is five times greater than the rest of the University, it is a call to action.

When high-achieving students cannot enroll in Engineering or Business because these programs lack the resources to accommodate them, and when their parents tell us that they are willing to pay extra at UMCP rather than pay higher non-resident tuition at flagships in VA, NC, PA, MI, OH, NY and elsewhere, we need to think more creatively about our one-tuition-fits-all model.

Today, UMCP attracts about 27% of the very best high school graduates in the state. This percentage should and can rise higher. Differential pricing complements state funding to enable UMCP to preserve and enhance its excellence and thereby attract and enroll more of these talented Marylanders. If we can meet the demand for an education "equal to the best," more of these top students will come to UMCP, and they will more likely live and work in Maryland after graduation.

In today's "new normal" of constrained state funding, we propose that the beneficiaries of a flagship-quality education make an increased investment in the value of their degree in fields that are high cost, high demand, and highly compensated. It will be fully phased-in in the fourth year, starting in FY16 at a 2% differential and topping off in FY19 at a 15% differential. In return, this increased investment will enhance the quality of their education and the market value of their degree. Over time, it will also bolster the State flagship's national standing and the economic vitality of Maryland.

Footnotes

Fn. 1, from page 3
"2014 PayScale College ROI Report" (www.payscale.com) estimates that the average UMCP graduate with a baccalaureate degree has an 8.5% annualized net return on investment over a 30-year career, and a 9.9% annualized net ROI if the graduate received the institution's average financial aid package. The net ROI for graduates in Business, Engineering, and Computer Science is higher than for graduates in other fields.

Fn. 2, from page 4
UMCP's in-state tuition and fees of $9,500/year is about $2,300 below the median of Big Ten flagships. It is also about $3,800 below the median of the 16 AAU public institutions in competitor states. (They include, for example, several Big Ten schools and UNC, UCLA, Berkeley). In both benchmarks, UMCP is near the bottom of its peers in resident tuition and fees. For competitive excellence, the Bohanan Commission recommended that it be set at the median of the 16 public peers.

Fn. 3, from page 4
Economist Thorstein Veblen in 1899 noted an exception to the law of demand—that demand moves conversely to price. He observed that with "high status" goods, such as a degree from a highly regarded school, an increase in price does not decrease demand; instead, it makes the good appear more valuable and preferable. It thereby increases demand. This is the basis for the popular impression that "price is quality."

Fn. 4, from page 6
These student/faculty ratios are the number of unduplicated majors divided by the number of full-time

equivalent (FTE) tenured and tenure-track faculty in that college or department. Must Business and Engineering faculty have full-time appointments in their college, so the number of FTE is roughly equal to the faculty head-count. Most Computer Science faculty members have joint appointments with the University of Maryland Institute for Advanced Computer Studies. Hence, the 64 tenured or tenure-track professors in Computer Science contribute only 23.4 FTE. The addition of 6 FTE faculty members to Computer Science would require hiring about 12 faculty members.

Fn. 5, from page 8
UMCP's institutional aid per student averages only about $1,800. Because of our low tuition/low aid model, *we have nearly the lowest per student financial support among Big Ten flagships*. For example, the average aid at Michigan is over $5,000; Iowa, $2,750; Ohio State, $2,500.

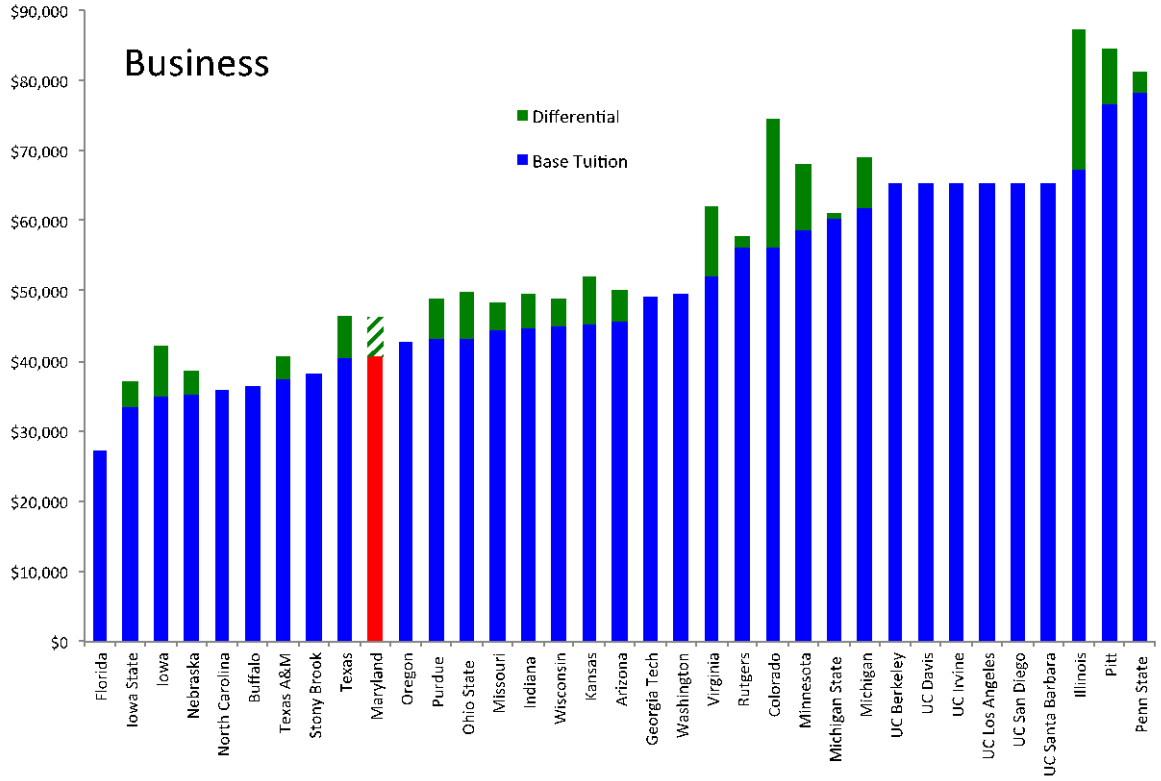
Fn. 6, from page 8
In FY02, UMCP's expenditures per student (tuition & fees + state appropriations) were $2,500 below that the average of our traditional aspirational peers (e.g., Michigan, Illinois, UNC, Berkeley, UCLA). By FY12, this gap had grown to $4,000. (Source: IPEDS Enrollment and Finance surveys.) *This growing gap in per capita funding puts at risks the institution's academic excellence and national reputation.*

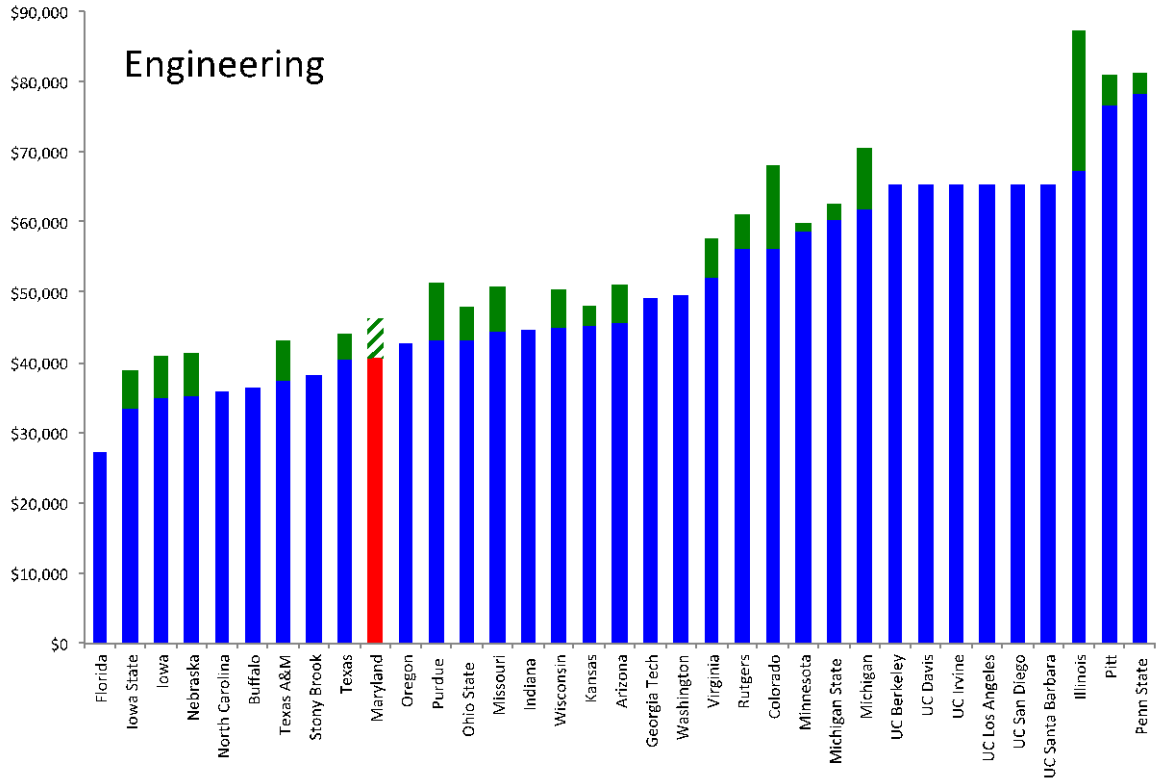
We have done statistical analyses that show—unsurprisingly—a direct correlation between expenditures per student (a marker of academic quality) and the academic standing of the institution. As these expenditures decline, the academic standing subsequently falls; conversely, when these expenditures increase, the academic standing subsequently rises.

Our analyses also show that while UMCP is under-resourced, to date we have still over-performed. On resource measures (e.g., expenditures per student, student-faculty ratio, class size, faculty compensation, etc.), we are ranked between 41st and 98th in the country among public institutions. On academic performance measures (e.g., quality of our student body; retention rates; graduation rates; etc.), we are ranked 15th to 20th—higher on these measures, in fact, than some peer flagships that spend more per student. However, these peers have higher overall standing because resources matter.

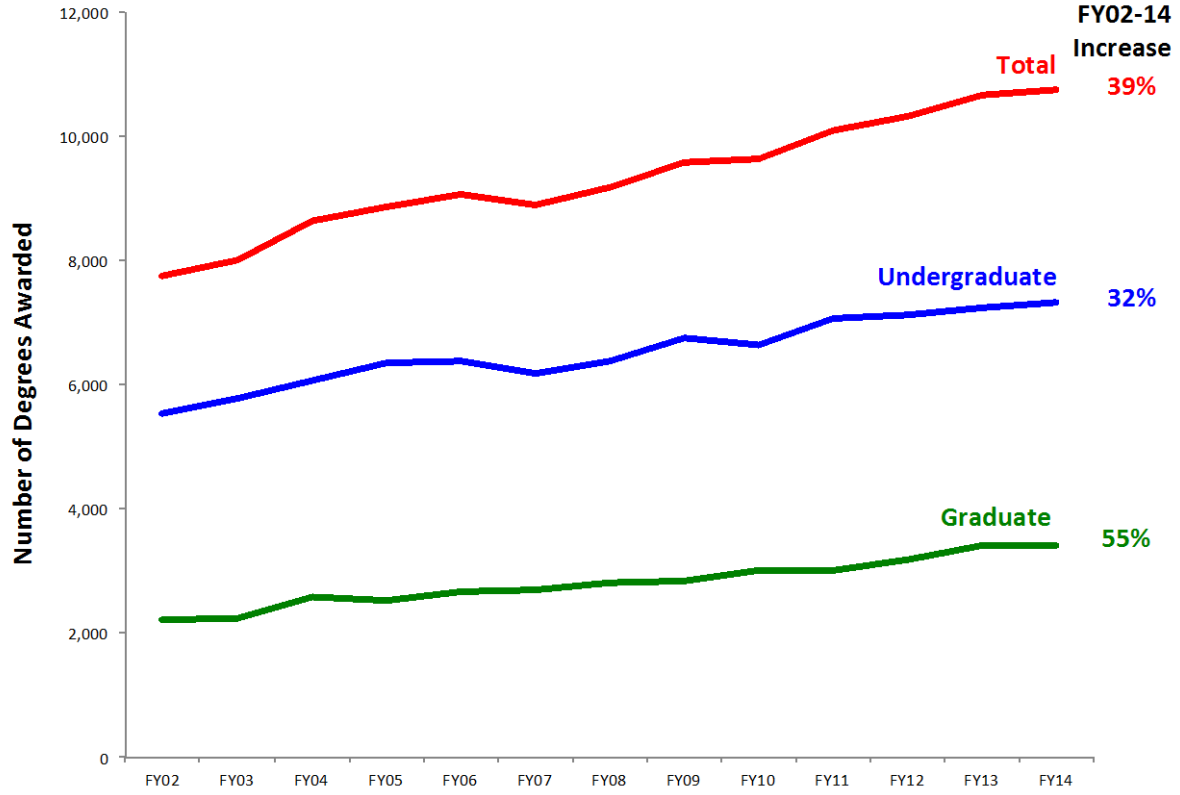
Differential pricing will help ameliorate the under-resourcing and lift the University's overall academic profile. Because it is applied to only 20% of the undergraduates, the impact will likely be modest. Nonetheless, the implementation of differential pricing will be an important step in UMCP's ascent to be "equal to the best" flagships in the nation.

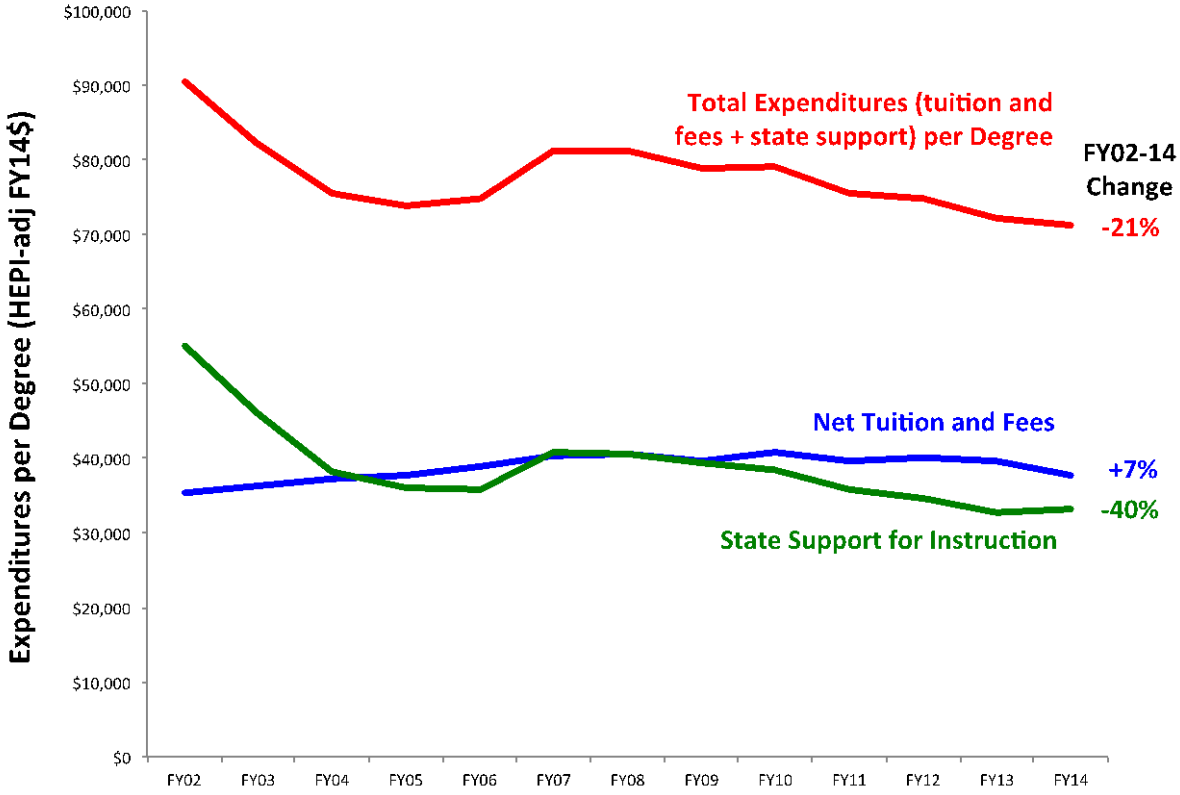
Appendix A. The cost of a bachelor's degree in business and in engineering (base + pricing differential) over 4 years at all AAU public universities. (UMCP is the red bar.)





Appendix B. Top graph: UMCP's increased degree production, FY02 – FY14.
Bottom graph: UMCP's decreased cost per degree produced, FY02 – FY14;
also, UMCP's tuition/fees and state appropriations per degree, FY02 – FY14.





Appendix C. UMCP's resident and non-resident tuition and fees adjusted for inflation, FY02-14.