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The Problems of Enrollment-Retention-Graduation Rates in Higher Education in the United States

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Abstract

Purpose: This study highlights the problems of low enrollment-retention-graduation rates (ERGR) in colleges and universities in the United States. Low ERGR poses significant challenges, thus many public colleges and universities face potential closure and/or merger; therefore, they need strategic improvements in order to maintain their academic viability.

Materials and Methods: This study addresses two critical factors that can explain why public colleges and universities not Ivy Leagues, Public Ivies, and highly selective elite colleges and universities are struggling with ERGR. We use hedonic price and revealed preference theories to highlight the hedonic university education mindset (HUEM) of high school students in the United States. Using the hedonic price theory, we constructed the HUEM curve of high school students to reveal their preferences of colleges and universities. Given the declining population growth rate, we measured the fertility rate gap (FRG) to provide the statistical analyses to show the impact on low ERGR in higher education. Notably, HUEM and FRG are two critical factors used to provide a comparative analysis of the national trends in ERGR over the 1980-2024 period. In addition, we highlight the trends in ERGR and FRG by using the difference-in-means technique to test the average difference over the 1980-1999 and 2000-2024 periods. Finally, we estimated a parsimonious regression to show the impact of FRG on ERGR.

Findings: The estimated regression results showed that FRG has statistically significant negative effect on ERGR. Interpretatively, a negative FRG will result in fewer students in elementary, middle, and high schools, thus leading to lower ERGR in public colleges and universities.

Unique Contributions to Theory, Practice and Policy: It is recommended that enrollment officers need to let high school students know that their colleges and universities provide high quality education similar to the Ivy League, Public Ivies, and other highly selective elite academic institutions.

Keywords: *Enrollment, Retention, Graduation Rates, Tuition Costs, Fertility Rate Gap*

JEL Classification: *C12, E24, E31, M31, M37*

INTRODUCTION

Studies have pointed out that university education in the United States is in deep trouble despite its leadership role in creating one of the great systems of university education in the world during the 20th century and now (World University Rankings 2025: results announced). The American system of university education has generated tremendous scientific discoveries, which continue to fuel and drive the economy, solve pressing social problems, and ensure the cultural vitality of diverse communities countrywide. The system has educated millions of students who are highly trainable, adaptable, and productive, as manifested by the creative ideas and innovations that have improved the quality and longevity of life in the United States. More importantly, the world has also gained from the United States' system of education because of its openness to international students from all countries worldwide. Having open access to higher education has provided tremendous opportunities for economic and social mobility, which has enabled all kinds of people to realize their hopes and dreams, thus enabling society to benefit from the creative energies of all people from different countries and racial backgrounds. Simply put, a well-educated citizenry is crucial to the United States' vitality because its trainability, adaptability, and productivity continue to fuel sustainable economic growth and development. They engage in productive work that leads to breakthroughs in science and industry through the creation of new knowledge, new products, new enterprises, and modern technologies that have changed the entire world. In addition, highly educated citizens are more likely to have stable jobs and remain in the labor force because they have the skills needed to compete in this era of digital information technology, which is growth-enhancing. They are better able to manage internal and external shocks and complexities, and they are adept at acquiring new skills, new knowledge, and manage the flow of current information, thus driving new inventions and innovations.

Statement of the Problem

The National Center for Education Statistics [NCES (2024)] reported that the national undergraduate enrollment peaked in 2010 at 18,082,427 students in the United States and thereafter declined to 15,397,482 students in 2022 a decline of 15 percent [Welding (2025)]. Simply put, many public colleges and universities in the United States will continue to face the endless challenges of enrollment-retention-graduation rates (ERGR) due to a host of factors. Given the importance of public higher education, the ongoing decline in ERGR, and the future implications for the United States' economy, it is vital to address the problems of ERGR, which is a composite variable that combines the enrollment rate that measures the number of students registered in their first year at colleges or universities while the retention rate measures the percentage of first year undergraduate students who returned to the same school after the first year and the graduation rate is the percentage of students who completed their degree at the same college or university within four or six years.

This paper contributes to the current debate about the challenges of ERGR facing public colleges and universities by seeking to address some key research questions: Why are public colleges and universities not Ivy Leagues, Public Ivies, and highly selective elite colleges and universities struggling with low ERGR in the 21st century? What are the primary determinants or causal factors of ERGR in higher education? What alternative strategies can these academic institutions employ to achieve the necessary ERGR for sustainability? In answering these research questions, we utilize both qualitative and quantitative analyses by focusing on the main challenges of ERGR in higher education. Specifically, we provide a statistical analysis of national ERGR trends over the 1980-2024 period. To best of our knowledge, studies have not provided the statistical validation of the impact of the declining population growth rate. First,

we use the hedonic price and revealed preference theories to construct the hedonic university education mindset (HUEM) curve of high school students in the United States. The HUEM curve explains the preferences of high school students for Ivy League, Public Ivies, and highly selective and/or expensive colleges and universities over the low tuition costs of public colleges and universities in the United States. Second, we show that the declining population growth rate measured by fertility rate gap (FRG) has statistically significant negative effect on ERGR, that is, if fewer students attend elementary, middle, and high schools, this will lead to lower ERGR in public colleges and universities.

LITERATURE REVIEW

The access to higher education in the United States has provided tremendous opportunities for social and economic mobility for all kinds of people, including the new generations of immigrants, to realize their hopes and dreams while enabling society to benefit from the creative energies of all its people. The system of higher education in the United States has generated tremendous scientific discoveries, which have enabled the economy to solve pressing socio-economic problems and ensured the cultural vitality of communities across the country. Millions of students are educated; thus they are highly trainable, adaptable, and productive in the creation of a well-trained workforce and spawning creative ideas and innovations that have improved the quality and longevity of life in the United States.

Theoretical Review

The issue of low enrollment-retention is not a new phenomenon. According to Marguerite(1996), the issue of enrollment-retention can be resolved if colleges and universities can integrate the activities of the offices of enrollment management, retention management, admission, financial aid, registration, research, and public relations, including publications and advertising. In other words, collaboration by various institutional offices along with faculty members is essential in achieving the needed enrollment-retention necessary for sustainability. Talbert (2007) pointed out that students' retention in postsecondary institutions has become a vexing problem as graduation rates continued to decline in two– and four-year degree programs in higher education in the state of Minnesota over the last two decades. This called for the academic leaders to get involved in strategic planning and the development of programs that would increase enrollment, retention, and graduation rates; and that special attention should be devoted to reaching out to the minority population, first-generation students, and new attendees in the state.

Many studies have pointed out that higher education in the United States is in deep trouble, despite being one of the world's genuinely great systems of higher education during the 20th century and now. According to Cabeliza (2021), colleges and universities around the world now compete for students, financial resources, and quality teachers; and this competition has compelled some colleges and universities to adopt corporate strategies [Hasse and Krucken (2013), Pucciarelli and Kaplan (2016), and Musselin (2016)]. These studies consider students as customers because they are the main stakeholders in education. Economic theory suggests that the main objective of corporations is profit-maximization, and now, some colleges and universities are forced to adopt the profit-maximizing template by developing their own school brand as an educational strategy intended to differentiate them from other schools with respect to the name of the school, the status of the degrees offered to provide their students with better employment opportunities, and pave the path to graduate schools [Lamboy (2011), Priporas and Kamenidou (2010), Bangari and Chaubey (2017), and Eldegwy, *et. al* (2018)]. Some private and public colleges/universities have adopted corporate strategies intended to ensure

student enrollment and retention rates necessary to achieve their sustainability as academic institutions.

Hunter and Wilson (2019) used Tennessee Community Colleges to highlight the practical implications of dual enrollment and retention. Dual enrollment, also known as concurrent enrollment, allows students to be enrolled in high school while at the same time taking college or university courses. Their study found a major disparity in retention between students with dual enrollment experience and those without, thus suggesting the need to consider institutional approaches that can encourage dual enrollment programs to ensure improvement in institutional retention rates. Adeoye, et al. (2022) listed seven factors that influence the students' choice of private universities in Nigeria by undergraduate students. These factors include affordability, available programs, reputation or academic quality, flexibility of schedule, firsthand learning/real-world experience in the curriculum, location or security, and availability of facilities/resources. These factors that affect enrollment-retention are not only limited to undergraduate students in Nigeria. These factors affect students' enrollment-retention and graduation rates worldwide.

Recent studies have addressed how the looming "enrollment cliff" poses a serious threat to colleges and universities in the United States. Drozdowski (2022) highlighted factors: the COVID-19 pandemic, enrollment declines, administrative bloats, tuition hikes and student debt, industry disruptors and alternative to college, and the perceived value of a college degree that have accelerated the crisis in higher education in the United States. Among these contributing factors, one cannot underestimate the consequences of tuition rates rising at an average of 8% per year, which is twice as fast as the general inflation rate; thus tuition rates double every nine years. In addition, the perceived value of a college degree matters for the enrollment-retention-graduation rates. According to Brenan (2023), Americans from different demographic groups show declining confidence in higher education, with significant gaps among political, educational, gender, and age subgroups. Americans' confidence in higher education has declined to 36%, which was 57% in 2015 and 48% in 2018, and the decline in confidence in higher education or value of a college degree is more pronounced among Republicans.

According to Drozdowski (2023), the "enrollment cliff" poses a Darwinian threat to higher education in which only the wealthiest and market-savviest can survive in the United States. In other words, the "enrollment cliff" would have varying effects on colleges and universities across different regions of the country. Drozdwoski argued that elite private colleges and well-funded public universities will continue to offer a wide range of majors, even unpopular ones, which most would not be able to do.

In a follow-up study, Drozkowski (2024) pointed out that higher education is heading for a bumpy ride between 2025 and 2041 because of the decline in the population of high school graduates due to the projected demographic declines, which would lead to 13% fewer high school graduates in 2041 in comparison to 2025 [Bauman (2024), Marcus (2025)]. According to Drozkowski (2024), the demographic declines are worse than projected. For example, the projected percentage change in high school graduates between 2023 and 2041 showed that only 12 states (Alabama, Delaware, Florida, Idaho, Montana, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, and Texas) and the District of Columbia would actually experience an increase in the number of high school graduates while the other 38 states are projected to experience a decline over the 2023-2041 period. The projected declines are worse for states such as California (-29%), Hawaii (-33%), Illinois (-32%), Michigan (-20%), New Mexico (-21%), New York (-27%), and West Virginia (-26%).

Regionwide, the number of high school students will decrease by 20% in states in the West, while the Northeast and Midwest will experience 17% and 16% declines, respectively. Only states in the South will experience a growth rate of 3% in high school students during the projected period. According to Drozkowski (2023), many colleges and universities in these 38 states face the threat of merger or closure.

Bauman (2024) pointed out that the less selective colleges/universities and those with financial problems are likely to feel the negative effects of enrollment or demographic cliff more acutely than the highly selective elite institutions with huge endowments and cash reserves. According to Marcus (2025), the looming "demographic cliff," projected to arrive in the Fall of 2025, "has been predicted ever since Americans started having fewer babies at the advent of the Great Recession around the end of 2007." More importantly, Marcus (2025) highlighted the big implications for the economy of the United States. In other words, fewer students will translate into fewer colleges and universities, and the absence of skilled labor, which the economy depends on. Studies by Welding (2025) as well as Castillo and Welding (2025) pointed out that since the COVID-19 pandemic, data showed that at least 76 public or nonprofit colleges and universities have closed, merged, or announced closures, and that the Federal Reserve Bank of Philadelphia has identified more closures ahead in the event of a drastic enrollment cliff between now and 2030. These studies also validated what the NCES pointed out that the 2020 COVID-19 pandemic further accelerated the decline in college enrollment of undergraduates, but not graduate students; and that the enrollment will continue to decline in 2025 and into the near future due to a shrinking college-age population.

More importantly, Notermans (2024) listed seven factors (low enrollment numbers in conjunction with "stopped out" students, difficulty in reaching the right audience, lack of comprehension and accurate enrollment data, inefficient digital presence, poor engagement with prospective students and their parents, ineffective branding and differentiation, and slow or inefficient response time) that have contributed to declining enrollment and recommended different pathways that colleges/universities can take to solve the enrollment problems in 2025. Notermans (2024) recommended steps that colleges and universities need to take to solve the problem of the "enrollment cliff." For example, the problem of low enrollment numbers and dropped out students can be solved through the utilization of expert marketing strategies that would enhance personalization; offering scholarships, financial aids, flexible payment plans; expansion into hybrid and online learning options in order to reach out to different groups of students; and highlighting the career outcomes to highlight the value of education. The difficulty in reaching the right/target audience can be resolved by using the pay-per-click (PPC) search engine targeted advertising, targeting international students with focused campaigns, focusing on diversity, equity, and inclusion (DEI) because the current generation is well receptive of DEI.

With respect to the issue of inefficient digital presence, colleges and universities can solve the problem by adopting a multi-channel approach through the utilization of multiple social media platforms needed to outreach to students; improve the organic search rankings with the search engine optimization (SEO) for education in order to appear higher in search results when students look for degree programs or colleges and universities online; and the creation of a user-friendly website with clear and easy navigation, fast loading speeds, and mobile compatibility. In conclusion, Notermans noted that for colleges and universities to address the enrollment challenges, they need to be more proactive and innovative by embracing solutions like personalized marketing, strong digital presence, and consistent branding required to stand out as strong academic institutions.

Conceptual Framework

It is obvious from the plethora of studies that there are many factors causing low ERGR in the United States. The conceptual framework guiding this study is deeply rooted in the hedonic price and revealed preference theories to provide a complete understanding of the students' selections of colleges and universities that offer high quality university education (HQUE) at varying tuition costs (TCs). In other words, a student's utility function[1] reflects HQUE and TCs that colleges and universities provide at varying TCs. The conceptual framework is designed to highlight three groups of students making selections from three categories of colleges and universities thus linked to the variations in ERGR at different TCs. The utility functions for the three groups of students show their preferences with respect to HQUE and TCs while the utility functions for the three categories of colleges and universities reflect their brandings of HQUE and TCs. Notably, HQUE and TCs are linked to ERGR at varying degrees in academic institutions, hence the variations. With ERGR as the variable of concern for higher education, the literature shows the issues of low ERGR from different perspectives. Recently, many studies agreed that the "demographic cliff" poses a big challenge for the "enrollment cliff" in higher education without statistical validation.

Research Gaps Problems

As a contribution to the literature, we fill the gaps from two dimensions. First, we provide the theoretical framework to highlight the choices or preferences of three separate groups of students with respect to three categories of colleges and universities they choose to attend. Using the hedonic price and revealed preference theories, we derive the *hedonic university education mindset* (HUEM) curve to show that the Ivy League, Public Ivies, and the highly selective colleges and universities may not suffer from the challenges of the declining "demographic cliff" and "enrollment cliff" even though they offer HQUE at extremely high TCs. This study asserts that the HUEM, which is generational and global, is a key factor in explaining low ERGR in public higher education relative to the other categories of academic institutions. Second, we provide the statistical validation of the effect of "demographic cliff," measured as the fertility rate gap (FRG) on "enrollment cliff" – low ERGR.

Theoretical Framework

In this section, we concur with Bauman' s (2024) argument that colleges/universities would not equally bear the burden of fewer 18-year-olds and that the elite private colleges and well-funded public universities will continue to offer a wide range of majors, even the unpopular ones, which most other colleges and universities would not be able to offer. In other words, no matter how painful a U-shaped enrollment decline might be in the 21st century, some colleges and universities would be able to weather the "enrollment cliff" through some combination of spending cuts and investment in students' retention until the birth rates rebounded in the United States. Simply put, the highly selective elite institutions stand a better chance of surviving the current and/or future "enrollment and/or demographic cliff" because the university education mindset (UEM) of students is generational.

To highlight the hedonic[2] university education mindset of high school students in the United States, we use microeconomic theory of revealed preference to explain the behavior of students (and their parents) in their choices of which colleges and universities to attend, and the

[1] In microeconomics, a utility function is used to measure the satisfaction or happiness that people get from consuming a combination of goods and/or services. The assumption is that college students consume HQUE and TC.

[2] For detail discussions on hedonic prices, see Rosen (1974); and for revealed preference, see Samuelson (1948).

providers of higher education in public colleges and universities and/or private elite institutions. We strongly believe that students are driven by the high quality of university education (HQUE) provided across the country at different tuition costs (TCs) in these academic institutions when they apply for admissions; therefore, we express the utility functions of students as:

$$U_{Si} = f\,(HQUE_i,\ TC_{si}) \quad \text{.....(1)}$$

where U_{Si} is the utility function for three different preference groups of students (i = 1, 2, and 3) in the choices made based on their university education mindset. We consider those students who prefer state-funded colleges and universities as Group 1, those who prefer state flagship institutions (dubbed Public Ivies[3]) as Group 2, and those who prefer the Ivy League and highly selective elite colleges and universities as Group 3. In other words, U_{S1}, U_{S2}, and U_{S3} reflect the university education mindset curves ($UEMC_1$, $UEMC_2$, and $UEMC_3$) of students from different family income levels, which could be lower-income, middle-income, and upper-income.

Worldwide, it is well known that colleges and universities provide HQUE at different TCs, and this is synonymous with a monopolistic competitive market structure where products are slightly differentiated and sold at different prices. Simply put, students acquire (purchase) HQUE at different TCs. We express the utility functions of these colleges and universities as

$$U_{CUj} = f\,(HQUE_j,\ TCs_j) \quad \text{.....(2)}$$

where U_{CUj} is the utility for three distinct categories of colleges and universities (j = 1, 2, and 3) in their provisions of *HQUE* at different *TCs*. We consider state-funded public colleges and universities as Category 1, flagship state colleges and universities (Public Ivies) as Category 2, and the Ivy League and highly selective elite institutions as Category 3. Intuitively, we consider U_{CU1}, U_{CU2}, and U_{CU3} as the university education branding curves (*UEBC*1, *UEBC2*, and UEBC3), which vary across colleges and universities in the United States.

Figure 1 provides the three indifference curves to show the preferences of the three groups of students. In Panel A, U_{s1} represents the indifference of students from lower-income families where their objective is to acquire HQUE at the lowest possible tuition costs these are students that can be considered as tuition costs risk-averse, U_{s2} reflects students from the middle-income families that can afford to acquire HQUE at slightly higher tuition costs these are students that can be considered as tuition costs risk-neutral, and U_{s3} captures the preferences of students from the upper income families that can afford to pay the highest tuition costs needed to acquire HQUE– these are students that can be considered as tuition costs risk-prefer. Panel B shows the tuition cost preferences of three categories of colleges and universities. While U_{CU1} reflects the preferences of those state-funded public colleges and universities that are not well-branded thus they are suffering from ineffective branding and differentiation, U_{CU2} shows the preferences of flagship universities, from different states across the country, whose brand names are tied to their annual sports activities; and U_{CU3} are the highly selective elite colleges and universities with huge cash reserves [Bauman (2024)], thus their ability to mitigate students' dropouts.

[3] For the list of the colleges and universities dubbed as Public Ivies, see https://en.wikipedia.org/wiki/Public_Ivy.

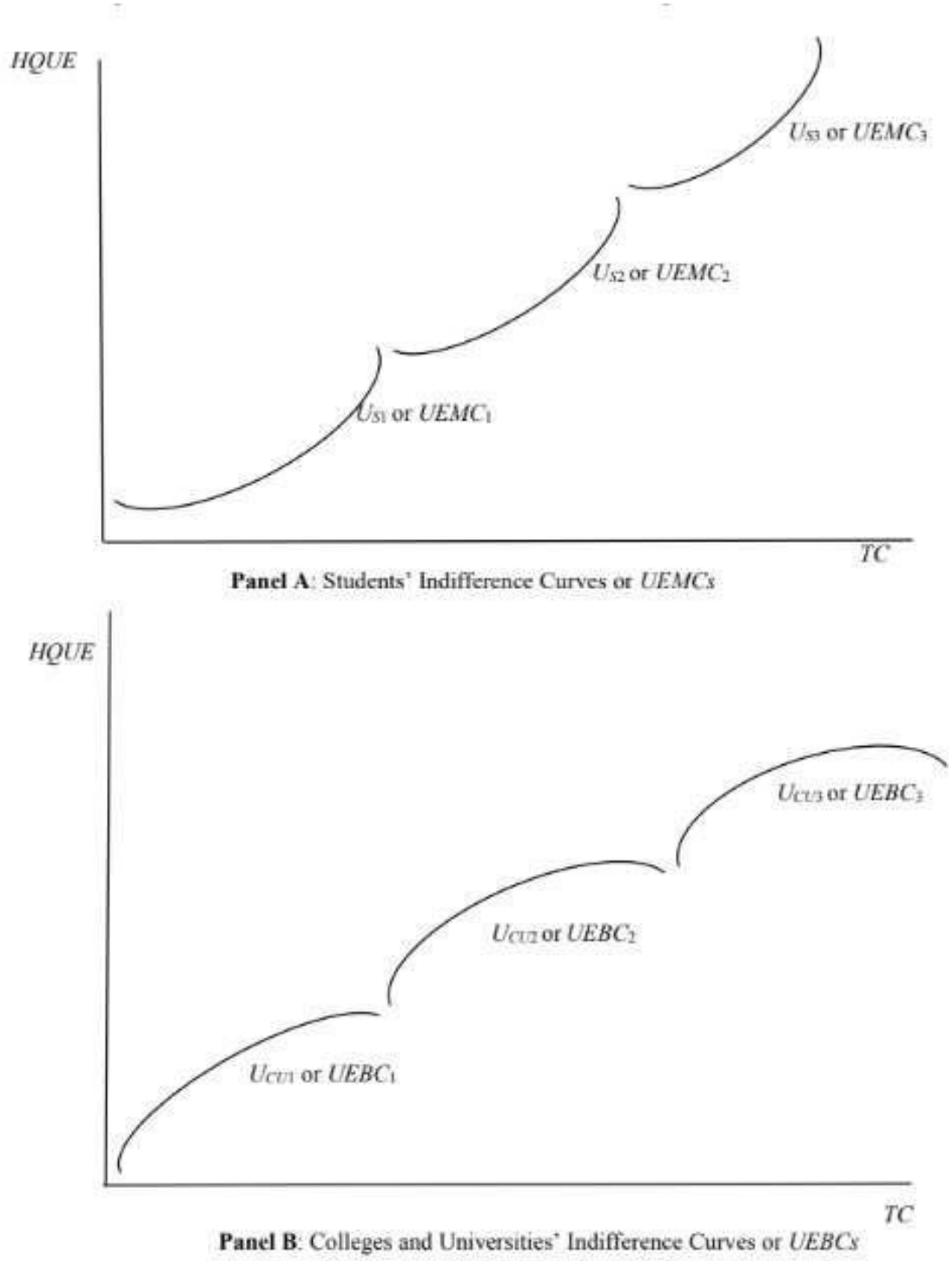

Figure 1: The Indifference Curves of Students and Colleges or Universities

It is important to point out that some students in Group 1 seek admission into colleges and universities in Category 1 and later transfer to those academic institutions in Categories 2 and/or 3. Similarly, students in Groups 2 and 3 can also transfer among the three categories of colleges and universities. Simply put, some students use the colleges and universities in Category 1 as the port of entry needed for their takeoffs to Public Ivies, the Ivy League and highly selective elite colleges and universities. This means a student with U_{S1} can transition

into U_{S2} or U_{S3} before graduation. The transfers also explain why some colleges and universities in Category 1 continue to suffer from low retention and graduation rates along with the declining enrollment rates.

Using the concept of assortative matching, we expect students in the U_{S1} group to match with U_{CU1} category, those students in the U_{S2} group to match with U_{CU2} category, and those students in the U_{S3} group to match with U_{CU3} category hence the points of tangencies of the indifference curves at points *A*, *B*, and *C* in Figure 2. Point *A* shows the associated $HQUE_1$, TC_1, and $ERGR_1$ for students from lower-income families who can only afford colleges and/or universities' tuition costs through student debt, thus they prefer to choose and attend less selective institutions. Point *B* shows the combination of $HQUE_2$, TC_2, and $ERGR_2$ for students from middle-income class families that tend to prefer state flagship colleges and universities whose popularities are well branded or known through their annual sports activities. Point C shows the combination of $HQUE_3$, TC_3, and $ERGR_3$ for students from upper-income families who can afford to attend highly selective elite colleges and universities at an extremely high tuition cost.[4] Joining these points of tangencies at A, B, and C, we have the hedonic university education mindset (HUEM) curve.

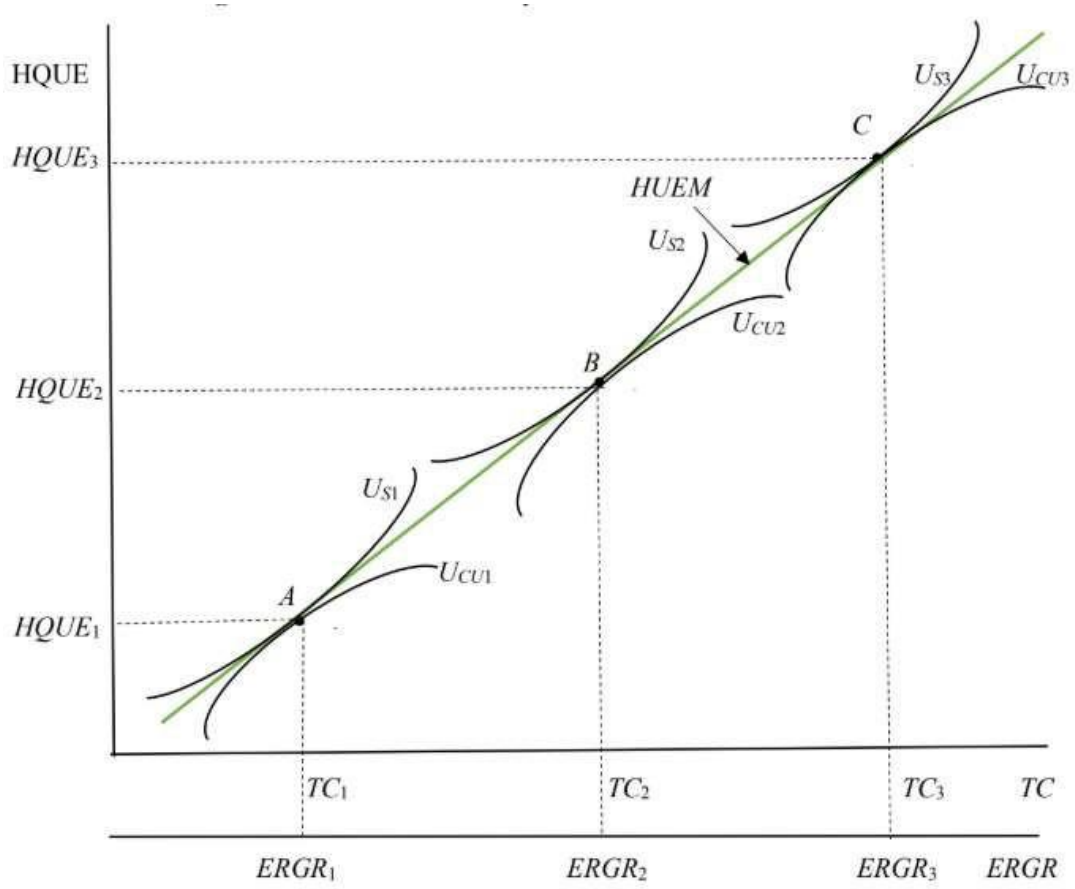

Figure 2: Hedonic University Education Mindset of Students

From the *HUEM* curve in Figure 2, one can easily surmise that those students and their parents have the hedonic university education mindset that $HQUE_3 > HQUE_2 > HQUE_1$, thus, their

[4] Data evidence on applications and acceptance rates provided in Table 1 supports Bauman's (2024) argument that highly selective colleges/universities with huge cash reserves may not suffer as much as the less selective institutions.

willingness or preference for paying high tuition costs: $TC_3 > TC_2 > TC_1$ and $ERGR_3 > ERGR_2 > ERGR_1$. In other words, one could infer that students and their parents tend to link high quality university education to high tuition costs, which they are willing to pay by mortgaging their homes and/or selling other valuable assets. Based on Borjas' (2024, pp. 235-237) argument that highly selective elite colleges and universities "provide no value added" because of the equal returns[5] to human capital in the labor market, one can conjecture that $HQUE_3 = HQUE_2 = HQUE_1$; therefore, we reconstruct the green *HUEM* curve as the blue *HUEM** curve in Figure 3 as a horizontal line.

If the *HQUE* acquired from the three categories of colleges and universities remains the same as depicted in Figure 3, one can deduce that those public colleges and universities in Category 1 should have a "comparative tuition costs advantage;" therefore, they should be able to outcompete those elite colleges and universities in Categories 2 and 3 with respect to ERGR. In other words, colleges and universities in Category 1 should be the least impacted by the "enrollment cliffs," which will prevail over the next three or four decades. However, studies show that the less selective institutions and those facing enormous financial challenges are likely to suffer more acutely from the "enrollment cliff" than the highly selective elite academic institutions that are fully endowed with huge cash reserves and goodwill over the past three or more centuries.

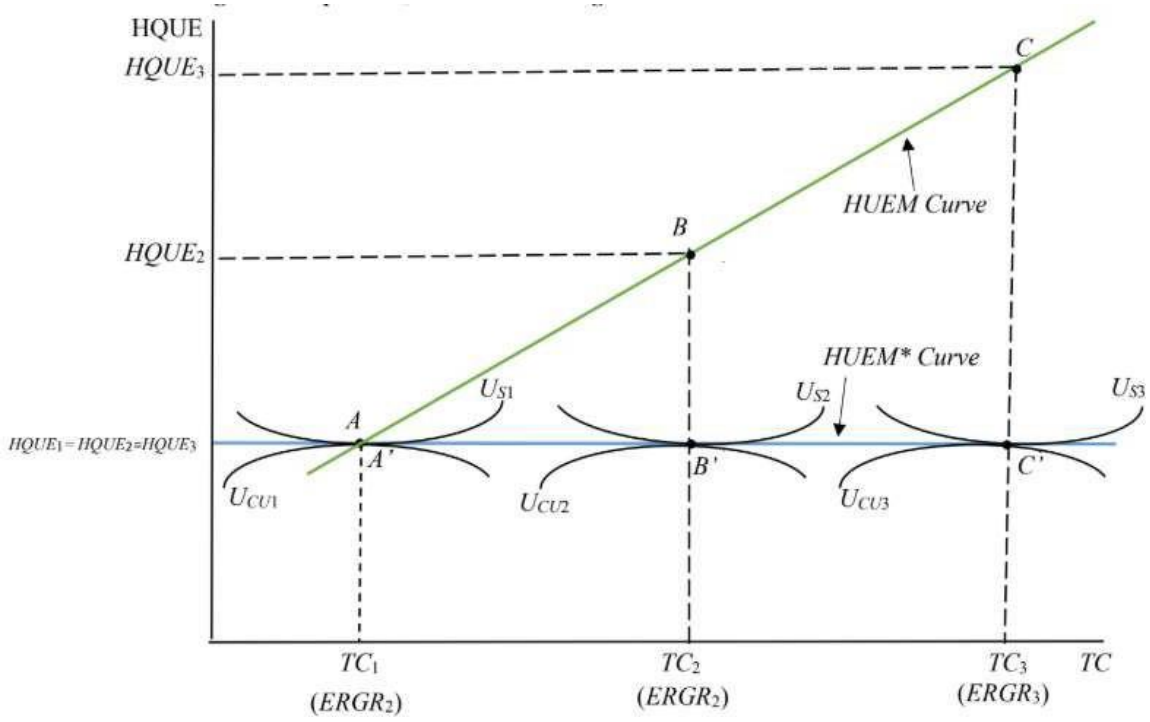

Figure 3: Equal HQUE across Colleges and Universities

The hedonic university education mindset shown by the green *HUEM* curve in Figures 2 and 3 highlights the college and university choice process engrained generationally and globally because of the solid name branding of those highly selective elite colleges and universities in the United States and around the world. Table 1 shows the volume of applications and the low acceptance rates at the Ivy League and other highly selective elite colleges and universities. In addition, Figure 4 also shows the "comparative tuition costs advantage" that colleges and universities in Category 1 have over those in Categories 2 and 3. Even though the lifetime

[5] See Figure 4 for the graphical illustration of lifetime earnings of college graduates from CU_1, CU_2, and CU_3.

earnings curve for graduates from CU_1, CU_2, and CU_3 shows the same trajectory, it is obvious that students, with the support of their parents, will continue to apply for admissions to the Ivy League and highly selective elite institutions more than the less known public colleges and universities because students and their parents still consider $HQUE_2$ and $HQUE_3$ provided by CU_2 (Public Ivies) and CU_3, respectively, to remain higher than the $HQUE_1$ provided by CU_1. In other words, students' preference for the Ivy Leagues, Public Ivies, and those highly selective elite institutions will prevail no matter the change in the academic landscape. The last column of Table 1 shows the percentage of students who would seek admission elsewhere but would still remain overly optimistic to attend these highly selective elite colleges and universities. Simply put, many of these overly optimistic students will find a way to transfer in their sophomore or junior years to fulfill their educational aspirations. In other words, some of these students will use colleges and universities in Category 1 as their alternative port of entry needed to enhance their transfers, thus these colleges and universities in Category 1 will continue to encounter low retention rates.

Table 1: Applications and Admission Rates at Highly Selective Colleges and Universities

Colleges and Universities	Applications	Admission Rates	Not Admitted
1. Amherst College	15,818	7.0%	**93%**
2. Boston College	39,687	12.6%	**87.4%**
3. Brown University†	42,765	5.65%	**94.35%**
4. Columbia University†	59,616	4.29%	**95.71%**
5. Cornell University†	51,328	10.3%	**89.7%**
6. Dartmouth College†	28,230	6.0%	**94.0%**
7. Harvard University†	61,221	3.4%	**96.6%**
8. Massachusetts Institute of Technology	29,282	4.52%	**95.48%**
9. Princeton University†	38,019	4.0%	**96.0%**
10. Tufts University	33,400	10.5%	**89.5%**
11. University of Virginia	64,464	23.0%	**77.0%**
12. University of Pennsylvania†	72,000	5.9%	**94.1%**
13. University of Notre Dame	35,401	9.0%	**91%**
14. Williams College	14,261	8.5%	**91.5%**
15. Yale University†	50,227	4.55%	**95.45%**

Source: Compiled by the authors from: https://en.uhomes.com/blog/colleges-with-lowest-acceptance-rates#why-are-the-acceptance-rates-so-low

Note: † = 8 Ivy League colleges and universities that existed before the United States gained independence. Cornell University, which was founded in 1865, is the only exception.

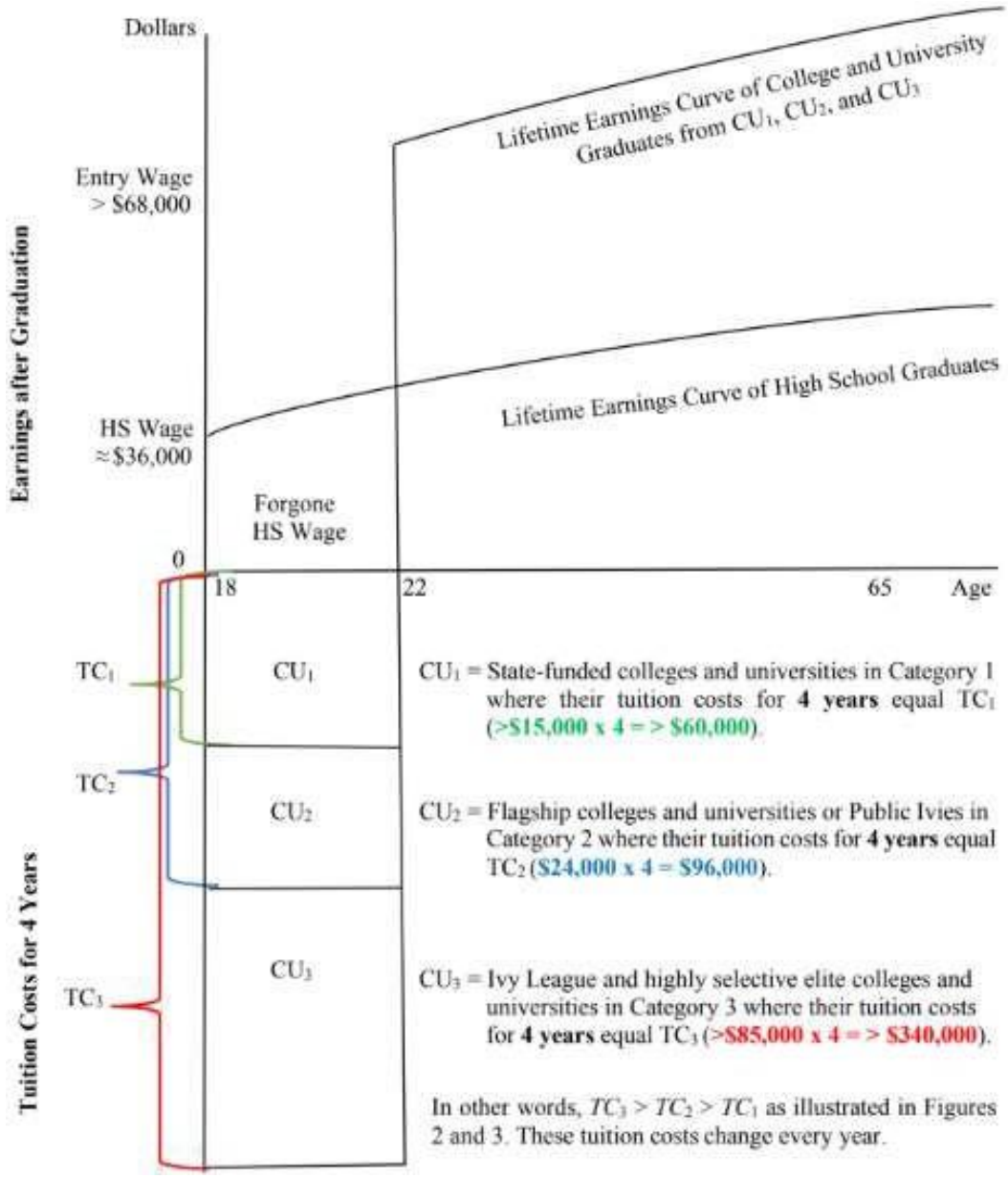

Figure 4: Tuition Costs and Lifetime Earnings after Acquiring HQUE from Colleges and Universities in the United States

Source: Constructed by the authors based on 2024 data.

MATERIALS AND METHODS

To comprehend the trends of the "demographic cliff" measured by the fertility rate (FR) gap and the ongoing "enrollment cliff" measured by ERGR, we provide a comparative analysis of the national trends in ERGR and FR over the 1980-2024 period. For FR and ERGR, we compare the 2000-2024 period to the 1980-1999 period by proposing two sets of null and alternative hypotheses. The null hypotheses (H_0) for FR and ERGR state that there are no significant differences in the means of FR and ERGR between 1980-1999 and 2000-2024 periods versus the alternative hypotheses (H_A) that there are significant differences in both means covering the two periods. That is:

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(a) $H_0: \overline{FR}_{2000-2024} = \overline{FR}_{1980-1999}$ versus $H_A: \overline{FR}_{2000-2024} \neq \overline{FR}_{1980-1999}$

(b) $H_0: \overline{ERGR}_{2000-2024} = \overline{ERGR}_{1980-1999}$ versus $H_A: \overline{ERGR}_{2024} \neq \overline{ERGR}_{1980-1999}$.

Based on the estimated *t*-values for both FR and ERGR reported in Table 2, we reject the null hypotheses of no significant differences between the 1980-1999 and 2000-2024 periods in favor of the alternative hypotheses. Both results provide the statistical confirmation of the "demographic cliff" and "enrollment cliff" issues that many research scholars have raised over the past decade.

Table 2: Trends in FR and ERGR in the United States, 1980-2024

	Variables	$\overline{FR}_{2000-2024}$	$s^2_{2000-2024}$	$\overline{FR}_{1980-1999}$	$s^2_{1980-1999}$	$\Delta\overline{FR}$	*t*-value
a.	$FR_{1980-2024}$	1.85	0.03	1.95	0.01	-0.10	-2.44*
		$\overline{ERGR}_{2000-2024}$	$s^2_{2000-2024}$	$\overline{ERGR}_{1980-1999}$	$s^2_{1980-1999}$	$\Delta\overline{ERGR}$	
b.	$ERGR_{1980-2024}$	0.74	0.00	0.78	0.00	-0.04	-12.32*

Note: * = statistical significance at the 5% level.

Given the statistical validation of the declining FR and ERGR over the 1980-2024 period, it is important to provide additional statistical evidence on how the fertility rate gap (FRG) affects ERGR. The FRG is measured as the difference between the annual FR in the United States and the world annual average fertility rates (WAFR), that is, FRG = FR– WAFR. In other words, the fertility rate gap and the declining fertility rate are two key factors that can explain the declining demographic cliff, thus the enrollment cliff. We express ERGR in a simple algebraic form as:

$$ERGR_t = f(FRG_t, FR_t, Z) \quad \text{.....(3)}$$

where *t* is the sample period covering 1980-2024 period and Z is a vector of other explanatory variables, such as rising tuition costs; Scholastic Aptitude Test (SAT) and American College Testing (ACT) scores; access to financial aids and scholarships, availability of learning centers and/or resources, the diversity of students' population, the number of foreign students; which used to flood the colleges and universities in the 1960s, 1970s, and early 1980s because their countries did not have enough colleges and universities to enroll them; and exchange rate of dollar to foreign currencies (measured by the U.S. Dollar Index - the value of the United States dollar relative to a basket of major foreign currencies (euro, Japanese yen, British pound, Canadian dollar, Swedish krona, and Swiss franc). Given the appreciation of the dollar and the rising tuition costs, many foreign students[6] can no longer afford to apply for admissions to

[6] Over the past three or four decades, many countries have experienced remarkable improvements in the number of colleges and universities available in their countries due to economic growth and development nourished by international trade and global digital information technologies, thus foreign students no longer see the need to apply for admissions to colleges and universities in the United States. For example, during the 1948-1990 period when there were only nine colleges and universities in Nigeria, many students came from Nigeria to the United States to acquire the cherished university education. According to Statista (2025), there are 274 universities, and given the rapid devaluations of the Nigerian currency and rising tuition costs in the United States, many students from Nigeria can no longer afford to come to the United States to acquire a university education. From this illustrative example of foreign students from Nigeria, one can therefore deduce that the decline in the number of foreign students coming to the United States will continue to have negative impact on enrollment.

colleges and universities in the United States. These are factors that can also explain the declining enrollment in the United States.

Bauman (2024) pointed out that "the high school graduating class of 2045 has yet to be born," and according to Drozdowski (2024), 38 states would experience a decline in the number of high school graduates over the 2023-2041 period. This would lead to massive closures and mergers of many state-funded colleges and universities across the United States; therefore, we focus exclusively on FRGt and FRt. We strongly believe that if tuition costs double twice between 2025 and 2045 across all colleges and universities in the United States and there are not enough high school graduates in 2045, the Ivy League and highly selective elite colleges and universities would utilize their big endowments and huge cash reserves to outcompete the state-funded public colleges and universities because of the hedonic university education mindset of students across the country.

Importantly, the Public Ivies, the Ivy League, and highly selective elite colleges and universities are appropriately name branded, which resonates more among students, no matter the severity of the demographic and enrollment cliffs. To show the effects of these two variables that are fundamental to explaining the looming demographic and enrollment cliffs, we express equation (3) in a parsimonious linear form as:

$$ERGR_t = \beta_0 + \beta_1 FRG_t + \beta_2 FR_t + \varepsilon_t \quad (4).$$

Given the ongoing debate among research scholars about the effect declining fertility rate on enrollment, we expect the β_1 coefficient to have a negative effect on $ERGR_t$ if the United States' fertility rate is below the world fertility rate or vice-versa with positive effect, and the β_2 coefficient to have a positive effect on $ERGR_t$. Interpretatively, a negative FRG_t implies there will be fewer children or students at the elementary, middle, and high school levels, and this will continue to lead to lower $ERGR_t$ in public colleges and universities in the United States.

The estimated results reported in Table 3 show three distinct results. The fertility rate gap has a statistically significant negative effect on $ERGR_t$ in the United States, with $R^2 = 0.45$ showing the degree of determination. This is a statistical confirmation of the concerns raised by different studies over the past five years about the declining fertility rate in the United States and around the world. As expected, the fertility rate has a statistically significant positive effect on $ERGR_t$ with $R^2 = 0.22$, showing the degree of determination. Putting both FRG_t and FR_t in the same regression with $R^2 = 0.69$ for both, one can see no difference in their estimated coefficients and their statistical significance. However, since $R^2 = 0.45$ is greater than $R^2 = 0.22$, one can easily surmise that FRG_t poses a bigger challenge for $ERGR_t$ now and in the near future.

Table 3: The Effects of *FRG* and *FR* on *ERGR* in the United States, 1980-2024

	Constant	FRG_t	FR_t	R^2
$ERGR_t$	0.7205	-0.0369		
	(0.0065)	(0.0062)		0.45
	111.29*	-5.90*		
$ERGR_t$	0.6113		0.0759	
	(0.0417)		(0.0219)	0.22
	14.65*		3.47*	
$ERGR_t$	0.5674	-0.0379	0.0801	
	(0.0271)	(0.0047)	(0.0139)	0.69
	20.97*	-8.03*	5.75*	

Note: Standard errors in parentheses and * = the *t*-statistics at the marginal significance level of 1%.

CONCLUSION AND RECOMMENDATIONS

This paper uses the theories of revealed preference and hedonic prices (tuition costs) to highlight the hedonic university education mindset of three groups of students in their choices in a monopolistic competitive education market classified into three categories of colleges and universities. The consensus among research scholars over the past two decades is that enrollment peaked in 2010, and since then, public colleges and universities – not the Ivy Leagues, Public Ivies, and highly selective elite institutions – face demographic and enrollment cliffs.

Conclusion

Based on our graphical illustrations and data evidence presented in Table 1, we strongly believe that the Ivy League and highly selective elite colleges and universities along with Public Ivies will continue to attract and enroll more students between now and the near future because of their endowments, huge cash reserves, especially their effective name branding that nourishes loyalty from the target market of high school students, thus the hedonic university education mindset of students and their parents. Simply put, human behavior is guided by the hedonic principle with respect to their choices of activities with the aim of maximizing positive outcomes or minimizing negative outcomes.

Given the projection that 38 states would experience a decline in the number of high school graduates over the 2023-2041 period due to the demographic cliff, that is, declining fertility rate in the United States, we use the annual data on fertility rate gaps and fertility rates to examine their effects on enrollment-retention-graduation rates over the 1980-2024 period. We found the coefficient of the fertility rate gaps to be negative, with a statistically significant negative impact in explaining the enrollment cliff over the past 45 years in the United States. In other words, our study provided the statistical/econometric evidence as to why at least 76 public or nonprofit colleges and universities have closed, merged, or announced closures and why the Federal Reserve Bank of Philadelphia has identified more closures ahead in the event of a drastic enrollment cliff between now and 2030. The declining fertility rate poses a major challenge to public colleges and universities in the United States because when we experience the shortage of students at the elementary, middle, and high schools due to the demographic cliff, the enrollment cliff will magnify over the next four or more decades.

Recommendations

Given the expectations that the demographic and enrollment cliffs will continue to decline over the 2025-2045 period, we should expect more closures and mergers of colleges and universities in the next two decades and beyond; therefore, the prudent solution is to implement policies that will enhance the positive fertility rate. Simply put, this issue of enrollment cliff due to the ongoing decline in fertility rate must be addressed by policymakers at the local, state, and national levels because of the negative impact on the economy of the United States. It is also important for administrators in public colleges and universities to engage in active collaboration and coordination with all the high schools surrounding them to engage in strategic reorientation of students about university education. More importantly, enrollment officers need to let high school students know that their colleges and universities provide high quality university education similar to the Ivy League, Public Ivies, and highly selective elite colleges and universities.

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