

ACQUIRING HUMAN CAPITAL: ANALYSIS OF DATA OF 139 HIGHER EDUCATION INSTITUTIONS IN THE US FROM 2012 TO 2022

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Abstract

Some private institutions of higher learning in the US have come under severe financial distress and succumbed to extinction after the COVID epidemic (2019-2020). Using data on 139 institutions of higher education in the US, macroeconomic data from 2012 to 2022, classifications of the institutions into three categories—public undergraduate, non-parochial undergraduate, and parochial Christian undergraduate—, eleven (shock) variables or indicators, and factor analysis, this paper finds that private undergraduate institutions, including Christian colleges, are failing at a faster rate relative to their counterparts. Ironically, the internal rate of return (IRR) to investment in parochial colleges is higher than the negative IRR that correlates with their non-parochial counterpart.

The paper finds that the stability of public academic institutions is strongly associated with revenues from in- and out-of-state tuition, which could be attenuated by the diminutive effects of inflation. Public sector education is more stable because of in- and out-of state tuition—coinciding with relatively robust rates of enrollment—though the general rate of enrollment in the US is negatively correlated with the stability of education in the private sector. The paper concludes that despite the critical role of human capital for economic growth and development, and the ability of the parochial institutions to promise higher rates of return to investment in human capital, financially weaker institutions have become critically endangered after the COVID epidemic.

JEL: I121, I 122, I123, I124, I125, I126, I128

Key Words: Development, Human capital, Internal rate of return, Investment, Factor Analysis

1. Introduction

The concept of human capital has a very broad dimension. It is often *used to describe the accumulated set of human knowledge, technology, culture, and ideas created and carried forward by earlier generations of humans that individuals have been able to internalize in order to enhance their ability to function within their economic, social, and natural environments. Like all capital, the term human capital implies that this resource is created by humans.... Also like physical capital, the term implies that this accumulated internalized set of knowledge and know-how is subject to depreciation and obsolescence* (Van den Berg, 2017, pp. 437-38). Extensively, human capital consists of thinking about and making sense of past interactions with the natural and social environments of humans and mentally storing information to make intelligent decisions. The process of accumulating knowledge is usually referred to as the learning process.

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In a structured manner, this paper focuses narrowly on the process of acquiring undergraduate education (human capital) in three categories—public undergraduate, non-parochial undergraduate, and parochial Christian undergraduate—of the institutions of higher learning in the US. *Public colleges and universities typically operate under the supervision of state governments and are funded, in part, by tax dollars and subsidies from the state. As a result, these universities often offer discounted tuition to residents of their states. Public schools run the gamut from small liberal arts colleges to large research institutions* (US News). Data on 139 institutions of higher education in the US and macroeconomic data from 2012 to 2022 are utilized for an empirical evaluation of the stability of the educational institutions. The primary sources of information have been US news, the Federal Reserve Bank of St. Louis (FRED), the National Student Loan Data System, Higher Education, and the National Center for Education Statistics.

The next section provides an overview of the relevant literature that highlights the importance of human capital for economic growth and development. It puts into perspective the potential social effects of the dissipation of the private sources of human capital. The cost-benefit calculus of students and their parents is presented in Section 3. I find that the calculus has prima facie evidence of investor misperception. The section is extensively followed by an examination of a variety of supply-side shocks, including foreign savings, inequities in the financial infrastructure, unemployment and inflation, high school graduation rates, and some subsequent institutional failures. Empirical models and findings about the failures of the educational superstructure are presented at the end of the paper.

2. Literature review: Theoretical foundations for acquiring human capital

The literature on human capital and economic development has a long history. The earliest formal use of the term “human capital” in economics was probably made by Irving Fisher in 1897 (Goldin, 2014). Over the years, the concept has gained currency and made it into multiple models of economic growth and development. A very good chronicle of the contemporary empirical landscape can be found in the work of Guisan and Niera (2006). They analyze the main positive effects of human capital on economic development by taking into account the direct and indirect relationships between the educational level of the population and real GDP per inhabitant and present a list of significant international studies that were published between 1967 and 2006. The relationship between education and development in America, Europe, Eurasia, Africa, and Asia-Pacific was fruitfully explored to establish the added value of education to human development. Importantly, by utilizing international econometric models, they underscore a need for technological transfer or capital mobility to enhance human capital in poorer countries.

Invariably, for econometric reasons, the quantification of human capital has not been entirely straightforward but economists have traditionally used available data on the cost of education (spending), the percentage of children attending school, or the average years of schooling as proxies (stand-ins) for the total stock of human capital (Van den Berg, 2017, p443). In the 1990s, some economists started to prominently endogenize human capital in economic growth models.

Mankiw et al. (1992) discovered that the fit of the exogenous Solow model could be improved by including human capital:

$$Y = K^{\alpha} (AH)^{1-\alpha}; \quad (1)$$

where Y is for national output, K is for physical capital, and H is for skilled labor that is augmented by technology that grows exogenously at the rate of g . individuals in the human capital-oriented economy accumulate human capital by spending time learning new skills instead of working (Jones, 2002, p.55, see also Gylfason, p.101 and Figure 1).

The importance of education is occasionally manifested in the willingness of social planners to allocate a reasonable portion of the national budget to the funding of education.

This paper cannot singularly do justice to the wealth of information on human capital. There is a very rich collection of information on the enhancing effects of education. However, there seems to be a universal consensus that human capital has attractive externalities for economic growth and development. At least, the literature underscores the salience of two practical and significant events that capture the relationship between human capital and economic growth: (i) The East Asian Miracle, and (ii) The Millennium Development Goals (MDGs).

The importance of human capital to economic growth and development was significantly highlighted in the 1990s when eight high-performing East Asian economies (HPAEs)—Japan, Hong Kong, the Republic of Korea, Singapore, Taiwan, Indonesia, Malaysia, and Thailand—registered higher and sustained economic growth from 1965 to 1990 (The World Bank (WB), 1993, p.1).

The East Asian miracle brought education to the forefront of the literature on economic growth and development. Hong Kong, Korea, Singapore, and Taiwan invested heavily in education to increase human capital (WB, 1993, p.43, see also Van den Berg, 2017, p. 438). A very good extension of the analysis and the basis of its occurrence can be found in the work of Page (1994). Importantly, the significance of the relationship between the equitable distribution of national income, investment in human capital, and economic growth and development cannot be overstated.

In September 2000, 189 countries adopted millennium development goals. The second goal was to achieve universal primary education. Before the 2000 declaration, education (human capital) had featured prominently in the human development index (HDI) developed by the United Nations Development Program (UNDP) in 1990. After its debut in 1990, the HDI remained an imperfect but useful algorithm to measure the socioeconomic development of humans and nations. However, in 2010, a newer version of the HDI (NHDI) was introduced as a geometric measurement of human socioeconomic progress (Equation 2):

$$NHDI = \sqrt[3]{H * E * I}; \quad (2)$$

where H is for the health index, E is for the education index, and I is for the income index.¹ To the extent that the indicators have causal and reverse-causal relationships, their multi-collinear relationships should also be noteworthy.

In Warburton (2019), the outcomes of inequities are evaluated in the context of national development. *The paper concludes that lack of opportunities has counterproductive economic consequences for nations that want to improve the well-being of their citizens and allocate human capital in such a way that good human capital is not liquidated to increase the supply of relatively worthless human capital.* Shortly after the declaration of the development goals, various studies were developed to evaluate the prospects and achievements of the declaration. The literature is characteristically extensive, with a focus on specific aspects of the goals.

The influential study of Baldacci et al. (2004) is a rather instructive component of the human capital dimension. Using panel data from 1975 to 2000, their paper explores the direct and indirect channels linking social spending, human capital, and growth in a system of equations for 120 developing countries. They discovered that both education and health spending have a positive and directly significant impact on the accumulation of capital (education and health), which could lead to higher economic growth. The paper also finds that other policy interventions that target the quality of governance, the reduction of excessive budget deficits, and price stability, could also help in moving countries toward the Millennium Development Goals (MDGs). Notably, mere spending—without good governance—is an insufficient indicator of progress toward development. This paper focuses on the processes of acquiring undergraduate education (human capital) in the US and the exposures to supply-side shocks that threaten the institutional stability of some of the sources of human capital. The next section deals with the opportunity costs and investor misperceptions in the process of acquiring human capital.

3. Opportunity costs and investor misperceptions

The rational choice theory of investment in education is identical to decisions to invest in financial instruments. Student investors make intertemporal decisions that do not necessarily internalize the social benefits of their investments. They presume that the second-period discounted earning will comparatively surpass the combination of noninvestment wages (w_1 and w_2) if they decide to work, in contradistinction to investments in education. Consider Goldin's representation of the intertemporal choices (Equation 3):

$$\frac{(E_2 / W_2) - 1}{1 + r} > \frac{C + W_1}{W_2}; \quad (3)$$

¹ The dimension value of education is estimated as a ratio of the disparity between actual and minimum values to maximum and minimum values. The education component is inclusive of adult literacy—with a weight of 0.67—and gross enrollment (with a weight of 0.33). The health (life expectancy) index is a ratio of the difference between life expectancy and 25 years to that of subsequent generations (anticipated expectancy less 25 years); see Todaro and Smith (2015, pp. 52 and 113). Economists use the natural log with base e to accommodate continuous compounding and track variables that grow over time.

where E_2 is the second-period wage that is associated with an investment in education, W_1 and W_2 are for non-investment wages when students prefer to work, C is the cost of education, including the opportunity cost of not consuming the money that is invested in the first period, and r is the rate of repayment (a discount rate when returns are discounted for cost-benefit analysis) (see Goldin, p. 11). Students conclude that the discounted second-period (private) return is greater than the returns of the two periods without the investment (loans). These considerations generally reflect great expectations. Tables 1(a) and (b) report the net present value (NPV) of investment in undergraduate education, descriptive statistics, and enrollment for 36 institutions in 3 categories: (i) the public sector, (ii) the non-parochial private sector, and (iii) the Christian private sector (see the Appendix to this paper for the classifications and data).

The NPV is a pretty compact way to determine the viability of investments; that is, to determine whether investments are worthwhile or rewarding, given some regularity conditions or counterfactuals. Equation 4 provides a less than an infinite representation of the NPV:

$$0 = NPV = \sum_{n=1}^4 \frac{CF_n}{(1+r)^n}; \quad (4)$$

where CF is for projected cash flows that coincide with the 4 years of regular undergraduate education (proxied by the average return after an undergraduate education), and r is for the discount rate—the equivalent of a cost of capital—proxied by the risk-free rate of 4.5% or the borrowing rate of 6% without significantly distinctive outcomes (but for the non-parochial private institutions, which is discounted at 6% for positive returns).

This paper presumes that the NPV is sensitive to some reasonable counterfactuals. It is presumed that: (i) students complete their education in 4 years with some amount of regularity, (ii) the duration of earnings or employment is uninterrupted in the first 4 years of post-graduate education, (iii) there is no alternative form of investment for the acquisition of this form of human capital, (iv) there is no negative cash flow that is associated with this category of investment, (v) the internal rate of return (IRR) is time-sensitive, and (vi) that the returns from post-graduate earnings are not reinvested during the four-year period when students are expected to repay their loans.²

In the public sector, the internal rate of return (IRR), which is merely pecuniary in this case, is about 38% when this type of investment in human capital is contemporaneously worth approximately \$113,994. By paying approximately \$105,000, the student investor would receive an internal rate of return (IRR) of 38%. Therefore, a

² For the sake of simplicity and consistency, the prospects of reinvesting variable flows at indeterminate rates have not been considered for the four-year time horizon. Therefore, the modified internal rate of return (MIRR) has not been granted consideration:

$$MIRR = \sqrt[n]{\frac{FVCF}{PVCF}} - 1; \text{ where } n \text{ is for the relevant time horizon, FVCF is for the future value of}$$

cash flows at reinvestment rates (cost of debt), and PVCF is for the present value of negative cash flows (the outflows) that are discounted at the financing rate.

rational student investor would be willing to pay up to \$104,994 to receive about \$55,260 every year for 4 years after graduation. By paying anything less than \$113,994, the student would earn an internal rate of return that’s greater than 38%. A positive rate of return could also be expected for investment in hybrid Christian and secular education but not for educational investment in overvalued non-parochial private institutions (see Table 1(a)).

Notwithstanding, the finance of undergraduate education is rather nebulous and bewildering (on many fronts). Funds (financial capital) are not readily available for poorer students and some students see no value in investing financial capital in human capital without the certainty of immediate employment. Some students presume that by investing in risky financial assets they could earn greater returns on their investment. Yet returns on investment in financial markets could hardly exceed the luxurious rates of 38% (or even 21%) in 4 years. The NPV of about \$113K easily accommodates a range of returns from the risk-free rate of about 4.5% to the market rate of about 6% for student loans; this flexibility of returns could not be replicated for the costs of human capital in non-parochial private institutions.

Table 1(a): Estimated four-year return on investment in undergraduate human capital

	Public	Private (Non-parochial)	Private (Christian)
Average cost	(\$104,994.11)	(\$240,887.68)	(\$141,652.10)
Net present value	\$113,994.04	\$11,476.45	\$83,216.51
Internal rate of return	38%	(3%)	21%

Table 1(b): Cost of undergraduate education and variations (Fall 2021) (Standard deviation in parenthesis)*

	Public		Private (Non Parochial)	Private (Christian)
Out of state mean (standard deviation)	\$38,560.03 (\$7,535.07)	Tuition & Fees	\$60,221.92 (\$2,776.83)	\$35,413.03 (\$9,345.92)
Instate mean (standard deviation)	\$13,937.03 (\$3941.79)		N/A	N/A
Enrollment (standard deviation)	29,716 (10,020)		7,105 (5,545)	2,945 (2,655)

* Costs do not include books and exogenous academic resources. Data source: US News

The negative IRR, which is only associated with non-parochial private institutions is rather puzzling. The enigma suggests that the cost of education—highly skewed by the most attractive institutions—in the non-parochial private sector is substantially overvalued when the average expected cash flows from the investment in

undergraduate education, \$55, 260, is granted widespread recognition in the US.³ Rational student investors, without any indication of misperception, will be loathed to make such an investment decision but for the conviction that the return from investment in education at the high-cost institutions will be far greater than the projected average (estimated) income.

Naturally, while the parochial colleges provide hybrid education—a mixture of Christian and secular education (probably with some positive externalities or favorable ethical benefits to society)—, some students who prefer Ivy *Leagues* and other brand-name schools to public and parochial colleges (for prestige or institutional differentiations) are usually optimistic outliers. The realism of post-graduate earnings could be misperceived. Implicitly, the cost of tertiary education in some of these institutions is driven by the demand for name recognition, prestige, and the prospects of gainful employment that come with status recognition rather than crystallization. However, the convergence of ambitions and expectations is usually contingent or illusory. Accordingly, some students—who are unsuccessful outliers—inadvertently become saddled with predatory debts (student loans) when they unknowingly opt for negative rates of return on their investment.

Students who seek undergraduate education in public institutions beyond their borders of residence (geographic delineation) face variations in tuition and fees of about \$8K (public institutions); \$2K, in the case of non-parochial private; and \$9K, in the case of parochial/Christian private institutions. The variability of in-state tuition and fees for undergraduate education in the US is much smaller (about \$4K).

In 2021, the large public institutions enrolled about 30 thousand students on average, resulting in a variation of about 10 thousand students (public institutions), six thousand students (non-parochial private), and three thousand students (private Christian). The average cost of out-of-state and in-state tuition and fees was about \$26,248.53. Variability in enrollment imprecisely coincides with variability in tuition and fees, with the least variability in Christian institutions coinciding with the most variability in tuition and fees.

Over time, the returns are expected to incrementally increase before the post-graduate workers decide to retire. Consider Figure 1, where A and E are acquired opportunity costs. An individual who starts to work at age 16 without human capital or acquired skills could earn $B + C$ (lifetime earnings before retirement, with an opportunity cost of A). A college graduate loses income (B) and costs (E) to derive lifetime earnings of $C + D$ before retirement. A discounted value of area D must be preferentially attractive to the student investor when it is greater than the discounted value of areas B and E ; suggesting that the return on education between ages 16 and 18 is positive. The larger the area D relative to areas B and E , the higher the rate of return (Van den Berg, p.452). Both college enrollments and returns to investment in education are susceptible to supply-side shocks.

³ The average estimate for 2022 has been provided by NCES; see “Annual earnings by educational attainment,” May 2022. This estimate is a high-end estimate that departs from lower estimates that could considerably reduce the internal rate of return (IRR).

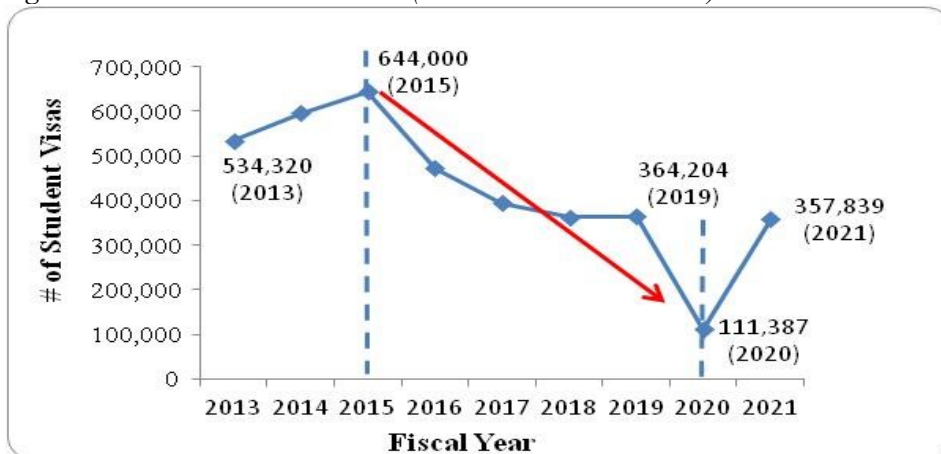
4. The latent supply-side shocks

4.1 Foreign savings

Ironically, over the years, policymakers have inadvertently or pointedly exacerbated the doleful financial situation of some academic institutions that face enrollment shocks by failing to realize that foreign savings could augment the paucity of domestic savings; especially when internal public financial support of academic institutions is anemic. Of course, the US can substantially mitigate the dwindling inflow of foreign savings by providing compensatory public policies for pecuniary shortfalls. In remarkable and confounding ways, indiscriminate assistance can be provided to public and non-public institutions during a period of national disaster like the Covid epidemic but not during difficult periods of policy shocks. The social function of human capital confers indiscriminate national and international benefits.

Figure 2 shows a downward trend of foreign savings from 2015 to 2020. Of course, it is worth noting that the downward trend coincided with the Covid pandemic; hence, a phase of financial difficulty for academic institutions.

*Figure 2: F-1 Student visas issued (Fiscal Years 2013–2021)**



* The fiscal year runs Oct-Sep. Data source: US Department of State.

4.2 The inequities of the financial infrastructure

Not every student can afford a college education. Invariably, the cynical assertion that college is not for everyone could easily validate the financial incapacity of some needy students and their parents. Of course, while the statement seems to be an inconvenient truism, it is a woeful umbrella expression that discounts the willingness of some to acquire human capital and make meaningful contributions to the economic development of their societies.

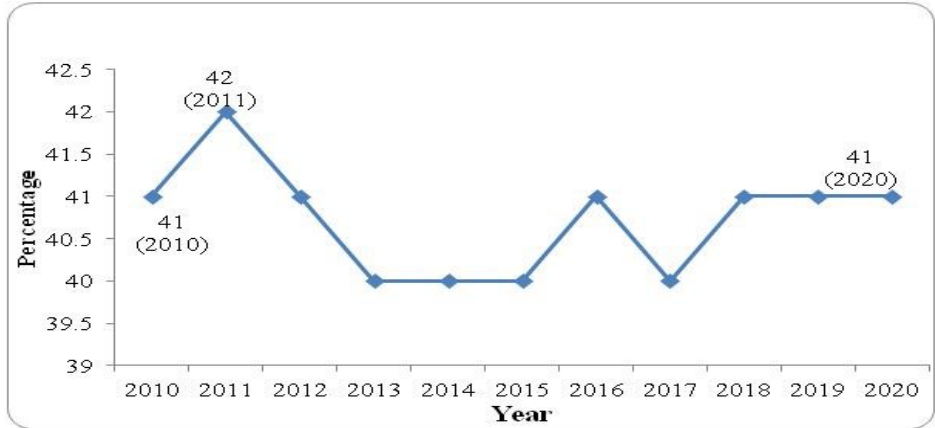
There are various ways of acquiring human capital; but why should the desirous be deprived of the opportunity to be educated and productive citizens? Higher educational costs portend a higher probability of dwindling enrollments and the devaluation of latent capital. Motivated and desirous students must find access to diverse financial resources, including exorbitant packages. Though federal assistance is easy to track because of transparency and available data, resources from private financial institutions are hardly readily available, suggesting that student indebtedness may well have deeper connotations.

The office of Federal Student Aid is responsible for directly managing or overseeing an outstanding federal student loan portfolio, comprising billions of dollars in Title IV loans. Millions of students seek financial help to acquire human capital with positive externalities that are beneficial to the US and the global community.

The federal student loan portfolio typically includes Direct Loans, Federal Family Education Loans (FFEL), and Perkins Loans.⁴ The current sources of finance (liquidity) for education are not as robust as they were in bygone years. The diminishing propensity to get finance for education cannot be realistically decoupled from defaults and challenging job opportunities after graduation. Though the cost of education is prohibitively high in some institutions, enrollment rates—with some amount of stability and volatility between 2010 and 2020—have hovered around 40 % (see Figure 3). Some salient subterranean issues are less evident. Figure 3 does not reflect demographic and racial inequities that complicate the acquisition of human capital;⁵ for example, *the college enrollment rate in 2020 was higher for 18- to 24-year-olds who were Asian (64 percent) than for those who were White (41 percent), Hispanic (36 percent), Black (36 percent), of Two or more races (34 percent), Pacific Islander (34 percent), and American Indian/Alaska Native (22 percent) (NCES, 2022).*

Racial discrimination concerns the unequal treatment of races, whereas racial inequality concerns unequal outcomes (in income, education, health, etc.). While racism is often implicated in processes, contemporary racial inequalities and forms of discrimination are not always the immediate results of contemporary racism (Pager and Shepherd in Clair and Dennis, p.857).

Figure 3: College enrollment rates of 18- to 24-year-olds, by level of institution: 2010 through 2020



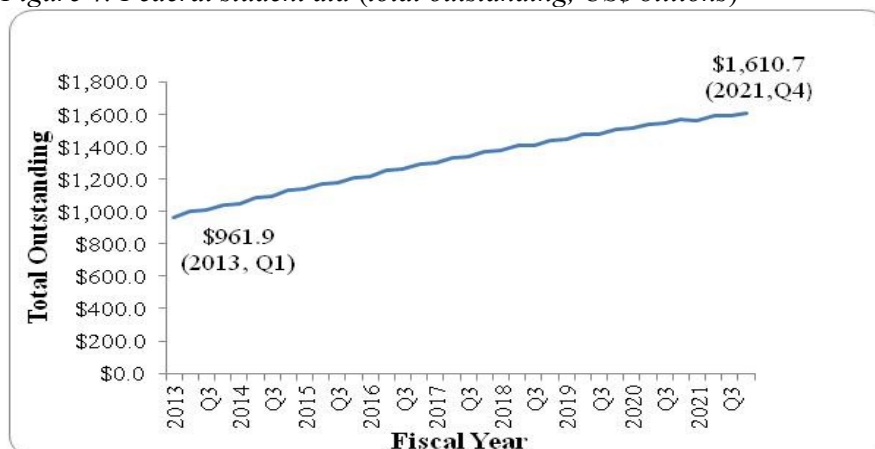
Data source: National Center for Education Statistics

⁴ Though FFEL is listed as part of total outstanding liabilities, it has been discontinued. Lenders of this category of loans made their financial resources available to needy students to enable students or their parents to finance the costs of education at eligible institutions. Similarly, the Perkins loans were discontinued after September 30, 2017. Loans made through the Federal Perkins Loan Program (Perkins Loans), were low-interest federal student loans for undergraduate and graduate students with exceptional financial needs. Final disbursements were permitted through June 30, 2018.

⁵ US courts continue to decide the merits of equitable racial treatment, including preferences or admissions into academic institutions of higher learning.

The general enrollment band (40-42% rate of admission) is not entirely cryptic. Some creditors indulge needy parents and students—who are not necessarily profligate—to fall into a debt trap without the prospect of bankruptcy proceedings. Bankruptcy has never been a laudable financial resolution of impassable debt contracts but it provides relief to debtors who fall under exceptional circumstances when the preconditions for contractual obligations change in fundamental ways.⁶ The contemporary legal theory of bankruptcy in the US is that anyone (excluding students and their obliged parents) who is obligated to a debtor can declare bankruptcy, albeit not frivolously. Figure 4 shows, in the absence of financial relief, the explosion of student debt from billions to trillions in about a decade plus 2 years. The discriminatory precondition for declaring bankruptcy could hardly mitigate the prospects of predatory lending, albeit without guarantees of adequate liquidity for human capital when bankruptcy is accommodated. This conundrum inveighs against the propensity to outsource the cost of education to individuals who aspire to provide human capital that generates positive externalities.

Figure 4: Federal student aid (total outstanding, US\$ billions)*



Data source: National Student Loan Data System (NSLDS). *Notes:

Totals may not equal the sum of Direct Loans, FFEL, and Perkins Loans due to rounding and the timing of the data runs. Data is run at the end of the corresponding federal fiscal year or at the end of each quarter listed by federal fiscal year. Each federal fiscal year begins October 1 and ends September 30. Q1 ends 12/31, Q2 ends 3/31, Q3 ends 6/30, and Q4 ends 9/30. Recipient is the student that benefits from the federal student loan. In most cases, the recipient is the borrower, but in parent PLUS loans, the parent is the borrower and their child is the recipient.

⁶ The legal expression, *rebus sic stantibus*, defines changes in fundamental ways. US bankruptcy laws provide redeeming conditions for debtors who need a fresh start—without harassing creditor claims—and ensure the equitable treatment of creditors who compete for the residual assets of debtors. Bankruptcy proceedings are typically held in US federal courts. Chapter 7 provides for the liquidation of unsalvageable businesses; Chapter 12, for the indebtedness of family farmers and family fishermen; and Chapter 13 for the adjustments of debts by individuals with regular income; see Clarkson and Miller (pp. 577-598) for a comprehensive discussion of US bankruptcy laws.

Could equitable opportunities and distribution of income help to boost enrollment and salvage the misfortunes of some moribund institutions? Pointedly, adverse policy shocks could only expedite the failures of moribund academic institutions and foreclose the prospects of acquiring human capital and capital accumulation. When people are unemployed and underemployed adequate national income and savings cannot be generated to foster national investment and economic growth. These realities also necessitate the implementation of informed public policies that are sensitive to income inequities.

4.3 The socioeconomic consequences of income inequities

Income inequity is directly related to the public policy shock that has insidiously progressed since the 1970s. Income inequality is an indicator of how material resources are distributed in a nation. Notably, people will hardly think about education (human capital) when they have insufficient financial resources to subsist. Sommeiller et al. (2016) found that income inequality had risen in every US state since the 1970s. In 24 states, the top 1 percent captured at least half of all income growth between 2009 and 2013, and in 15 of those states, the top 1 percent captured all income growth. In another 10 states, the top 1 percent's incomes grew in the double digits, while the bottom 99 percent's incomes fell. Overall, the top 1 percent captured 85.1 percent of total income growth between 2009 and 2013. In 2013, the top 1 percent of families nationally made 25.3 times as much as the bottom 99 percent in the US. Figure 5 shows that the Gini coefficient jumped by 10 points from 1960 to 2020.⁷ Significantly, income inequality has progressively increased even in recessionary periods.

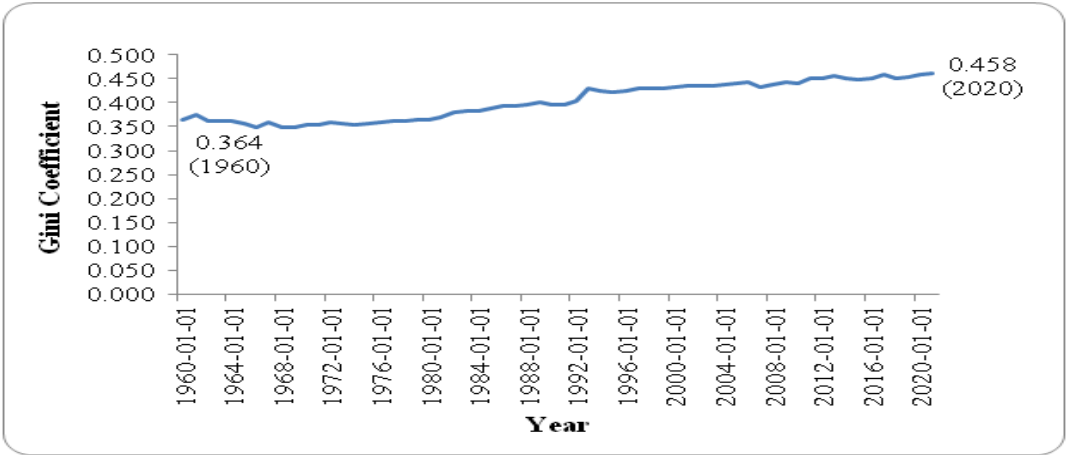
A logical outgrowth of income inequality is poverty and inadequate saving. Saving is functionally related to positive investment and intertemporal consumption (consumption before and after retirement); see Figure 1. Yet 4 out of 10 Americans are unable to come up with \$400 to deal with unforeseen contingencies. Though this paper is centered on students, a substantial amount of parents also play a critical decision in the selection of affordable colleges for their children. The majority of parents received additional income in 2021 through the monthly child tax credit (CTC), but while most higher-income parents primarily saved the inflow most lower-income parents primarily spent the money on housing, items for their children, or food (Federal Reserve Board (FRB), 2022, p.2).

Three in 10 CTC recipients with income less than \$50,000 used the largest portion of their credit on housing expenses, just over 2 in 10 spent the largest portion on their child, and 15 percent spent the largest portion on food. Fifteen percent of adults with income less than \$50,000 struggled to pay their bills because of varying monthly income. This

⁷ The Gini coefficient is an aggregate measure of income inequality ranging from 0 to 1. Higher values are positively correlated to higher manifestations of maldistribution of income. The coefficient is estimated graphically by dividing the area between the line of perfect equality and a Lorenz Curve by the area to the right of the equality line. The US does not have the most egregious distribution of material resources but it could certainly do better—to whom much is given, much will be required (Luke 12:48).

challenge was even more acute among people who were parents in this income range, of whom 27 percent struggled to pay their bills because of income variability (FRB, 2022, p.2).

Figure 5: The Gini Coefficient of income distribution (US, 1960-2021)



Data source: US Census Bureau and FRED

Six percent of adults did not have a bank account. Thirteen percent of Blacks and eleven percent of Hispanics were more likely to be estranged from depository institutions than their adult cohorts. Eleven percent of adults with a bank account ended up paying overdraft fees in the previous 12 months, with higher shares of low-income adults paying such fees (FRB, 2022, p.4). Inauspicious conditions prevent those without the wherewithal from accessing financial markets and funding the acquisition of human capital. Blacks and Hispanics tend to figure prominently in categories of inadequate family income (see Table 2).

Table 2: Family income (by race/ethnicity among all adults)

Race/ethnicity	Less than \$25,000	\$25,000- \$49,999	\$50,000- \$99,999	\$100,000 or more
White	20	16	27	37
Black	43	18	22	17
Hispanic	40	18	22	20
Asian	17	10	23	51
Overall	26	16	25	32

Source: FRB (2022, p.17)

Should the indigent be excluded from the educational landscape to ensure the sustainability of the educational infrastructure? If not, what are the economic prospects for the vitality of academic institutions and the prosperity of the nation? The prototypical mission of Christian institutions was to narrow the gap while also providing religious instruction. Today, the secular component of enrollment and instruction is traditionally lost when public policies are implemented.

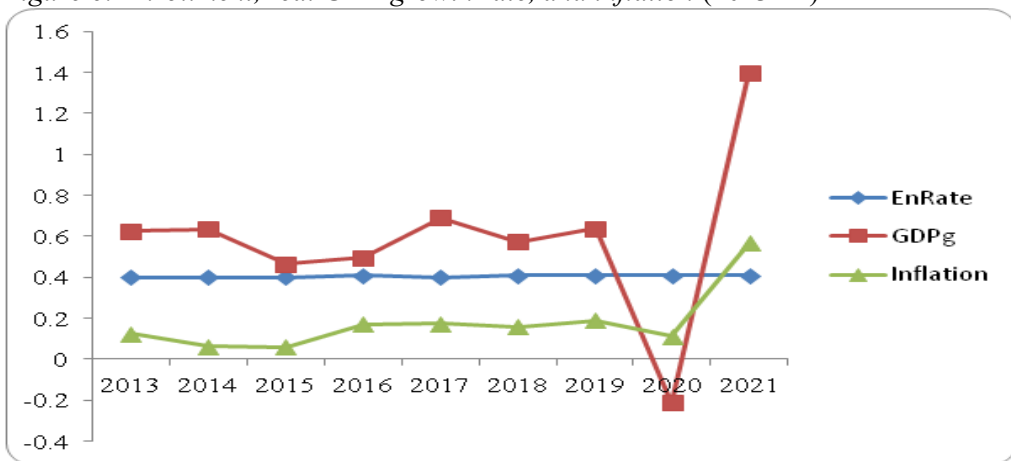
4.4 The general level of unemployment/GDP and inflation

Recessions and full employment are the double-edged swords of macroeconomics. Full employment puts upward pressures on prices (inflation) and prolonged recessions generate the specter of deflation. Central banks are heavily preoccupied with price stability, which is just one of multiple concerns (objectives). Yet employment opportunities are good for post-graduate students to be employed. Employment reduces the prospects for unforgiving defaults on contractual loans.

The share of student loan borrowers who were behind on their payments in the fall of 2021 declined relative to before the pandemic. These borrowers also saw increases in their financial well-being compared with prior years. Twelve percent of borrowers were behind on their payments in 2021, a significant decline from the 17 percent who were behind in the fall of 2019. Seventy-three percent of those who went to college and have student loans for their own education were doing at least okay financially in 2021, up from 65 percent before the pandemic (FRB, 2022, p.5).

Contrary to the rule of thumb (conventional wisdom), the interaction of macroeconomic variables can be very unpredictable, and the uncertainty of interaction poses forecasting challenges. The college enrollment rate for 18-to-24 year-olds does not reflect a tidy relationship to real GDP growth despite the greatest intuitions (see Figure 6) of our human minds. Perhaps, the incongruity could be best explained by the adverse distribution of national income (a distribution anomaly), suggesting that high tides may not necessarily lift all boats when the boats are unmoored from the pathways of the tides.

Figure 6: Enrollment, real GDP growth rate, and inflation (2013-21)*



* EnRate= enrollment rate and GDPg= real GDP growth rate. Data sources: FRED (consumer price index (CPI)/inflation, and real GDP growth rate, computation of real GDP growth by author) and National Center for Education Statistics (enrollment rate, 2021 projection by author).

Though real GDP growth has been comparatively volatile (see Figure 6), the precipitous drop from 2019 to 2020 and robust recovery from 2020 to 2021 have not significantly affected the rate of enrollment (at least in the market period). The data

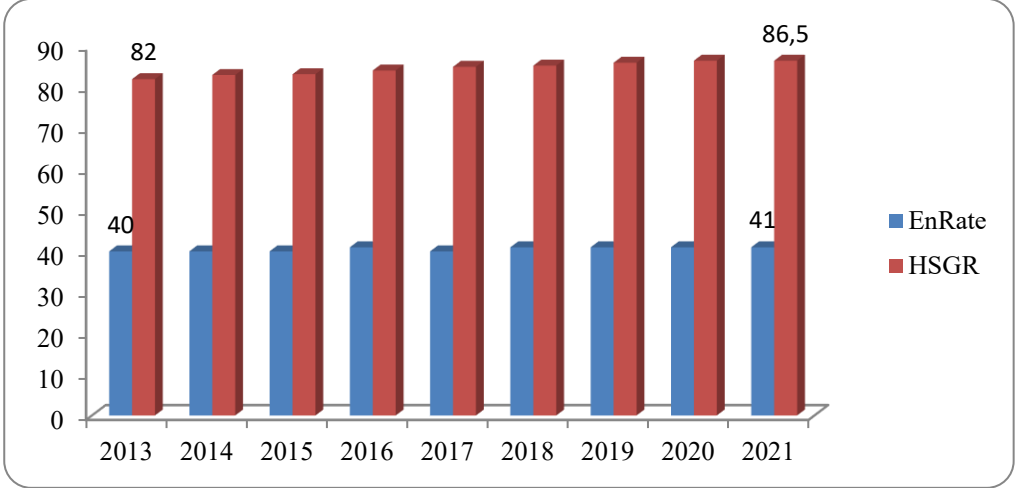
espouse no transmission mechanism. Analogously, national income growth and price volatility portray no noticeable shift in enrollment from 2013 to 2020, suggesting that distributive issues, poor savings, and elusive exogenous variables may hold the key to better explanations of the relatively stagnant but uneven distribution of enrollment rates in the US institutions of higher learning; of course, lagging effects, if any, are contemporaneously indeterminate.

4.5 High school graduation rates

In the school year 2018–19, the national adjusted cohort graduation rate (ACGR) for public high school students was 86 percent, the highest it has been since the rate was first measured in 2010–11. Asian/Pacific Islander students had the highest ACGR (93 percent), followed by White (89 percent), Hispanic (82 percent), Black (80 percent), and American Indian/Alaska Native (74 percent) students (NCES, 2022).

Colleges have been unable to maximize the intake of high school graduates, which does not include the graduates of private sector schools (see Figure 7). The US colleges admit less than half of high school graduates, suggesting, inter alia, that the cost of a college education might just be too prohibitive for the paucity of domestic savings and inadequate income of households as a result of the very bad income distribution. These deficiencies are less than propitious for the sustainability of institutions of higher learning without very robust financial resources. Therefore, colleges face the daunting challenges of reformulating the cost-benefit calculus of student investors, retailing their unique attributes to guarantee positive IRRs, and providing financial support for incoming students without adequate savings and reservations about gainful post-graduate employment.

Figure 7: High school graduation rates and college enrolment rates



Data source; National Center for Education Statistics. HSGR= public high school graduation rates (author’s estimate for 2020 and 2021); EnRate= enrollment rate (author’s estimate for 2021)

4.6 A scandalous wave of mergers and failures (closings)

The COVID-19 (epidemic shock) has irreparably affected some academic institutions—ironically, some institutions that generate positive returns for investors. A substantial amount of the colleges are in the private sector, including the ones that provide hybrid education (see Appendix D). Some of the institutions were buoyed by the nonrecurring federal Coronavirus financial aid, which was prematurely projected to have a sustainable financial effect. The disruption of the epidemic was just too overpowering for institutions without robust endowment and financial standing.

Some of the institutions are not financially competitive even with the best of intentions. They have relatively very low enrollments, higher liabilities, and poorer endowments. Unlike their very wealthy private counterparts with robust endowments but probabilities of negative IRR, they could not survive the Corona epidemic, volatile financial markets, and the impromptu transitional costs that necessitated the migration from the synchronous to the asynchronous method of teaching and learning (the formerly impromptu method of delivering education).

The Corona shock—which coincided with the paucity of national savings—, very high- income inequality, higher levels of unemployment, factor immobility, and loss of actual and potential human capital (inordinate loss of human lives), left some of the financially frail institutions with one of three options: (i) mergers, (ii) acquisitions, and (iii) outright closures; where closures are the hallmarks of insolvency rather than illiquidity. Frailty may well be the result of circumstantial changes. Yet a substantial amount of younger adults may no longer be interested in religious prescriptions. Unfortunately, some older American Christian adults have done all that they could to set instantly objectionable examples.

The net effect is that awkward and unacceptable religious gaffe, which is also associated with the ungodly attributes of xenophobia, bigotry, and intolerance, insidiously derogates Christian values and fail to win secular support or appreciation of Christian values. It is difficult to imagine how spiritual deficit could not portend a very low appreciation of Christian teachings or the Christian way of life.

In addition to exogenous financial shocks, there is no reason to believe that the hurtful Christian discourtesies of bigotry, intemperance and hostilities could not generate localized disaffections. Why is it that some people are so attracted to secular institutions even when they offer negative IRR? Reactions to untoward behaviors are reminders that humans cannot continuously paper over the cracks of objectionable misbehaviors and expect to win favors and financial rewards. Mergers may barely help to staunch the bleeding if Christians in America do not go back to the basics. Of course, the horses might have deserted the barn.

The words, “mergers” and “acquisitions,” are often used interchangeably without precise technical and legal connotations. In reality, they have nuanced distinctions that are more often than not casually overlooked. Mergers are legal combinations of two or more entities in such a way that one—the surviving entity—becomes financially robust by net asset acquisitions. In an acquisition, two or more entities combine to create a new creature or entity.

Technically, combinations could not be characterized as acquisitions when the acquiring institutions retain their original (juridical) identities. One would have to closely sieve through the combinations of the academic institutions to concisely characterize their new arrangements when they are not extinct. I give these terminologies some amount of consideration in Appendix D. However, without splitting hairs, the evidence of institutional failures should suffice for this paper to refocus our attention on the greater problem.

5. Empirical methodology: How do the supply shocks aggregate under latent factors?

Though the performance of the macroeconomic variables provides a cogent explanation for the performance of enrolment in colleges because of their degrees of interaction and correlation, the effects of the interaction of the macroeconomic variables are not always precise for conclusive inferences. There seem to be some latent factors that could otherwise provide insight into the psychology of student enrollment in colleges.

College administrators often make projections about enrollment in the sensible tradition of planning, but forecasts are mere projections that are susceptible to distortions by shocks. Willing and unwilling students are not even certain about the prospects of enrollment for undergraduate education. How do we rank the determinative or indicator variables under the elusive latent factors?

Figures 6 and 7 show that a lot of analytical gymnastics are desirable for objective projections of enrollment and financial stability of academic institutions. This paper analyzes the correlations between a combination of variables and latent factors that are imprecisely quantifiable. Therefore, the desired methodology is factor analysis.

Frost (2022) succinctly captures the intention of factor analysis, which is to use the correlation among observed variables to model a small number of unobserved latent variables known as factors. In effect, the most significant indicator variables could be extracted and classified as virtual variables (factors) that are refractory to measure. Two approaches are generally preferred—an exploratory approach, which does not impose analytical constraints, and a confirmatory approach which imposes analytical constraints.

The exploratory approach assumes that the indicator variables are correlated—typically the case with macroeconomic variables—with no restraining hypothesis. It avoids the predetermination of testable assertions about highly interactive information in the macroeconomic dataset. However, the researcher has to determine the number of factors to be extracted.

This paper prefers the exploratory approach for the theoretical and econometric reasons already outlined. There are multiple ways to engage in the data reduction procedure. High-frequency extraction procedures consider maximum likelihood (ML), principal

axis factoring (PAF), and principal components analysis (PCA).⁸ Highly correlated indicators will share a lot of variances. A useful shrinkage technique, the minimum average partial (MAP), was proposed by Velicer (1976).⁹

The default PCA is considered to be a data reduction technique rather than a factor extraction technique (Frost, 2022). This paper uses the default technique and a scree plot (see Figure 8) to determine the number of factors to be extracted. The scree plot shows the eigenvalues (amount of variation that could be explained by the factors or components—a relationship between variance explained and the number of components).

The model takes a basic generic specification:

$$X = \mu + Lf + \varepsilon \quad (5)$$

where X is for a vector of p observable traits, μ is for the population mean vector of the p observable traits, f is for a vector of m common factors, and ε is for a vector of specific factors. In visual form, the model replicates multivariate regression models but for the fact that the observable variables, X_p , are predicted by unobserved common factors, f_m (traditionally considered to be explanatory variables). Equation 6 provides a more elaborate representation of the abbreviated Equation 5:

$$\begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_p \end{bmatrix} = \begin{bmatrix} \mu_1 + l_{11}f_1 + l_{12}f_2 + \dots l_{1m}f_m \\ \mu_2 + l_{21}f_1 + l_{22}f_2 + \dots l_{2m}f_m \\ \vdots \\ \mu_p + l_{p1}f_1 + l_{p2}f_2 + \dots l_{pm}f_m \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_p \end{bmatrix}$$

(6)

The regression coefficients (l s) are the factor loadings that are reported in Table 3 of this paper. The loadings define the correlative relationships between the virtual factors and their indicators. The matrix of factor loadings (Equation 7) is presented as a continuation of Equation 6:

⁸ The method of extraction is based on assumptions about the data of interest. ML is conventionally preferred when the data is considered to be normally distributed. The PAF is utilized to deal with data that violate the principle of multivariate normality; hence, the consideration of amorphous normal and irregular distributions.

⁹ Velicher's MAP: $r_{ij,y} = \frac{r_{ij} - r_{iy}r_{jy}}{\sqrt{(1-r_{iy}^2)(1-r_{jy}^2)}}$; where the numerator depicts the partial

covariance between a pair of variables, i and j . The numerator is normalized by a pair of correlation expressions, where y provides undesirable information. The Value of MAP increases as the noise components are removed.

$$L = \begin{pmatrix} l_{11} & l_{12} & \cdots & l_{1m} \\ l_{21} & l_{22} & \cdots & l_{2m} \\ \vdots & \vdots & & \vdots \\ l_{p1} & l_{p2} & \cdots & l_{pm} \end{pmatrix} \quad (7)$$

Based on theoretical persuasions, the loadings can be rotated to derive the maximum impact of loadings with a minimum amount of factors (usually not more than 3). Oblique rotations, which liberally allow rotations, accommodate correlation among factors. Orthogonal (45°) rotations assume that the relationships among factors are uncorrelated. Subcategories of those rotations can be found in the factor analysis literature. A subcategory of the oblique rotation is the oblimin rotation, which seeks to minimize the correlations of loadings across factors. The oblique rotation is pertinent to this paper since the factors may be somewhat correlated. Rotations are intended to enhance the interpretability of the factor solution by reaching a simple structure.¹⁰

Modeling academic enrollment and the financial stability of academic institutions is arguably a challenging proposition. Apart from the puzzling correlations of indicator variables, sampling adequacy raises empirical controversies. An influential measure of sampling adequacy (MSA), is known as the Kaiser-Meyer-Olkin (KMO) test, which was introduced and reintroduced in 1970 and 1974 to determine the sampling adequacy of variables (x_j) (Kaiser, 1970, and Kaiser and Rice, 1974). Equation 8 provides the KMO measure for sample adequacy;

$$KMO_j = \frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 + \sum_{i \neq j} u_{ij}^2} \quad (8)$$

where the correlation matrix is $R = [r_{ij}]$ and the partial covariance matrix is $U = [u_{ij}]$. The overall KMO measure of sample adequacy takes all $i \neq j$ combinations into consideration. The KMO test, which is an index, takes variable values between 0 and 1; where very low values problematically suggest that the sum of correlations is very small relative to the sum of partial correlations.

The KMO diagnosis for sample adequacy has controversially evolved over the years. However, using Monte Carlo simulations, Bubb and Brown (2007) found that the requirement of the absolute minimum of observations may be misguided when model construct errors are disregarded; meaning that model construct errors have the greatest effect on coefficients of congruence to maintain factor pattern stability. Therefore, data with few errors (noise) can obtain satisfactory results even with a few numbers of observations (Preacher and MacCallum, 2002). This paper utilizes a KMO test score of

¹⁰ The simple structure maintains, *inter alia*, that: (i) at least each row of loadings should contain at least one zero, and that for every pair of factors (columns), (ii) there should be several items for which entries approach zero in one column but large loadings in another, and (iii) a large proportion of items should have entries approaching zero. The simple structure seeks to achieve a factor solution in which each factor is well defined by a subset of indicators, in which each indicator has an exclusive affiliation with a factor.

0.6, which is consistent with a significant Bartlett probability test score (0.00) of sphericity¹¹ (Ko et al., 2020), an alternative criterion of model adequacy. Unlike the first two models with lower MSA scores that were deemed to be inadequate, the third model is considered to be adequate (see Table 3). The next section reports the empirical findings.

6. Empirical findings

Using the R programming language, 13 variables with both positive and negative effects on enrollment and the financial stability of colleges were initially considered: (i) the growth of national income (gross domestic product in real terms), (ii) the general price level (inflation), (iii) the national enrollment rate, (iv) outstanding student loans, (v) the weights of enrollment in public institutions, (vi) the weights of out-of-state spending in public institutions, (vii) the weights of out of instate spending in public institutions, (viii) the weights of tuition cost in Christian institutions, (ix) the weights of enrollment in Christian institutions, (x) the weights of enrollment in non-parochial private colleges, (xi) the weights of tuition cost in non-parochial colleges, (xii) high school graduation rates, and (xiii) the Gini Coefficient.¹²

The results suggest that two factors could not explain the stabilities of undergraduate education in the public and private sectors of the US. Unsurprisingly, the eigenvalues of two of the variables—high school graduation rates and the Gini coefficient—failed to provide robust information about their empirical usefulness, and were subsequently removed from the final analysis. Notably, Figures 6 and 7 are disconcerting; they show that high school graduation rates have very little relationship to college enrollment, even though some forecasters might want to use graduation rates as a significant yardstick of measurement for college enrollment.

Based on the loadings that are derived from the scree plot of Figure 8, I characterize the factors (components) and preconditions for instructional stability in the public (Factor1/MR1) and private (Factor 2/MR2) sectors of undergraduate education. Public stability explains a lot of the variations in in- and out-of-state tuition as well as enrollment, with out of state tuition showing a very strong correlation (0.90). Inflation is negatively correlated with the stability of undergraduate education in the public sector, albeit with a relatively low factor loading.

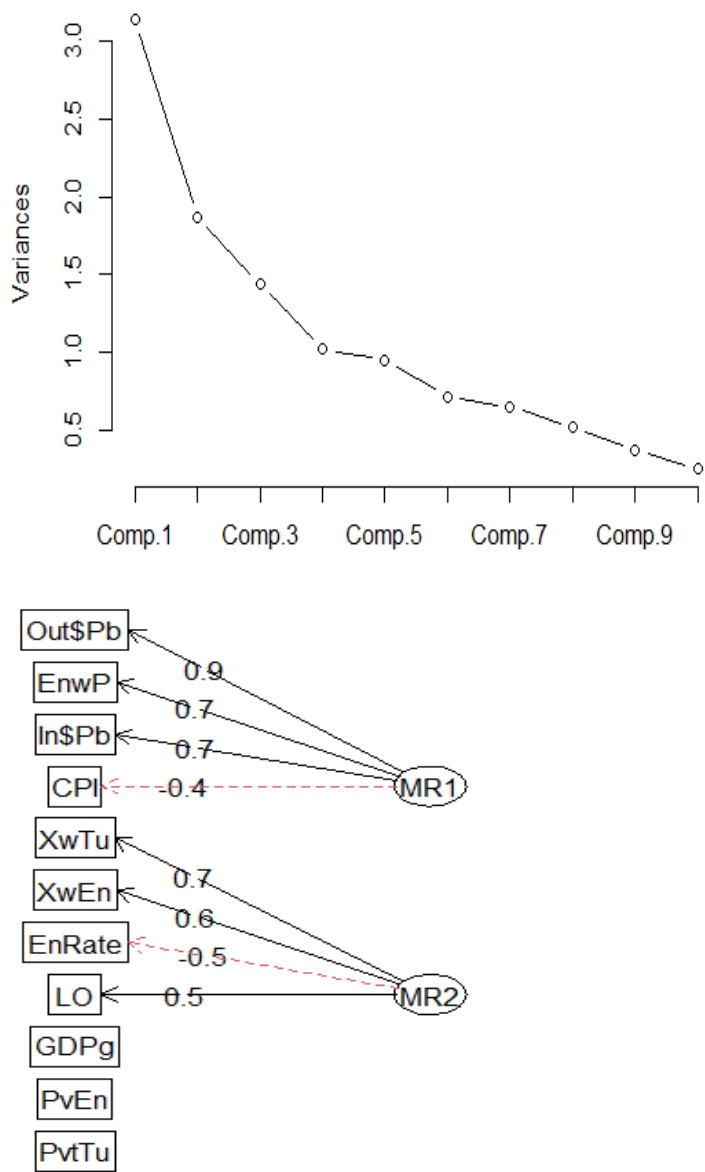
Tuition and enrollment substantially correlate with Factor 2, the stability of undergraduate education in the private sector. The transmission mechanism of outstanding student loans is not entirely evident, but student loans are critical for the

¹¹ Bartlett's test of Sphericity tests the null hypothesis that the correlation matrix is an identity matrix. An identity correlation matrix suggests that the variables are unrelated and unsatisfactory for factor analysis. A significant statistical test (usually less than 0.05) indicates that the correlation matrix is not an identity matrix (rejection of the null hypothesis) and therefore suitable for factor analysis.

¹² The Gini Coefficient and high school graduation rates do not show much variation. For econometric reasons and consistency of dimensionality, without loss of generality, 0.1 is added to the weights for tuition and enrollment in Christian colleges, and private tuition and enrollment.

stability of undergraduate education in the private sector (in reality, both sectors). The general enrollment rate is negatively correlated to Component 2; suggesting that there might be a distribution problem with undergraduate enrollment between the private and public sectors. This finding complements the asymmetric problem depicted in Figure 7.

Figure 8: The screeplot and factor loadings*



The general findings are also affirmed by the biplot (Appendix E). Vectors with closer distances show strong correlations to the respective factors; for example, tuition and enrollment in Christian colleges are strongly correlated and, as a policy measure,

administrators of such institutions must continue to address such a correlation; actually, a truism. Outstanding student loans are negatively correlated with the general enrollment rate; suggesting a liquidity problem for the stability of undergraduate education in general; that is, as outstanding student loans increase, the enrollment rate falls across the board, and vice-versa.

*Table 3: Model selection and measurement of sampling adequacy (MSA) (2012-2021)**

	Model 1	Model 2	Model 3	Public Stability (Factor 1)	Private Stability (Factor 2)
GDP growth	0.63	0.50	0.63	..	
Inflation (CPI)	0.46	0.54	0.62	(0.4)	
Enrollment rate (general)	0.45	0.51	0.62	..	(0.5)
High school graduation rate	0.34	..	..	..	..
Gini coefficient	0.42	0.49	..	..	..
Outstanding student loans	..	0.53	0.52	..	0.5
Public sector enrollment	..	..	0.65	0.7	..
Out-of-state cost (public sector)	..	..	0.58	0.90	..
In-state cost (public sector)	..	..	0.6	0.7	..
Tuition (Christian colleges)	..	..	0.64	..	0.7
Enrollment (Christian colleges)	..	..	0.66	..	0.6
Tuition (non-parochial colleges)	..	..	0.60	..	..
Enrollment (non- parochial colleges)	..	..	0.58	..	..
High school graduation rate	..	..	..	..	..
MSA	0.44	0.52	0.60	N/A	N/A

* Forty observations for quarterly and adjusted weighted data

7. Concluding remarks and discussion

Human capital has historically proved to be indispensable to economic growth and development. Accordingly, the preconditions for the dissemination of human capital must be proactively recognized as a very important foundation for human progress. A skewed competitive landscape, which is also decomposed into multiple categories, may not necessarily provide the best mechanism for delivering critical human capital that is socially beneficial.

The evidence suggests that frail financial institutions are highly susceptible to failure when they are confronted with overpowering supply-side shocks. The shocks may

come in various forms that are both controllable and uncontrollable; for example, while policy shocks are usually controllable, exogenous shocks in the form of foreign savings, epidemics, investor misperception, and idiosyncratic decisions are uncontrollable.

The empirical evidence suggests that outstanding student loans, enrollment rates, inflation, and the cost of human capital have more explanatory sway over the stability of the institutions that provide human capital. Though it is enticing to intuitively think about GDP growth rate and high school graduation, these variables are confounding because of the distributive effects that are associated with them.

Interestingly, though the parochial institutions promise higher rates of return to investment in human capital relative to their non-parochial counterparts, the institutions seem to be struggling. This reality may well be the result of cultural shifts or preferences, and investor perceptions of the providers of human capital. Invariably, the importance of human capital necessitates holistic social plans to staunch the bleeding of vanishing academic institutions.

References

- Baldacci, E., Clements, B., Gupta, S., and Cui, Q. (2004). Social Spending, Human Capital, and Growth in Developing Countries: Implications for Achieving the MDGs. IMF Working Paper, WP/04/217.
<https://www.researchgate.net/publication/5124458>
- Bubb, R. and Brown, B.L. (2007). Determining a minimum number of observations in factor analytic studies: model construct error effects in obtaining factor loading stability and maintaining structural integrity.
<https://www.researchgate.net/publication/319142772>
- Clarkson, K.W. and Miller, R.L. (2021). *Business Law: Texts and Cases* (15th ed.). Cengage Learning.
- Federal Reserve Board (2022, May 23). Economic well-being of US households in 2021. Board of Governors of the Federal Reserve System.
<https://www.federalreserve.gov>
- Frost, J. (2022). Factor analysis guide with an example.
<https://statisticsbyjim.com/basics/factor-analysis>
- Goldin, C. (2014). Human Capital. In *Handbook of Cliometrics*. C. Diebolt and M. Hauptert, (Eds.) (pp.55-86). Berlin: Springer-Verlag.
<https://dash.harvard.edu/bitstream/handle/1/34309590>
- Guisan, M.C. and Neira, I. (2008). Direct and Indirect Effects of Human Capital on World Development, 1960-2004. *Applied Econometrics and International Development*, 6(1), 17-34.
- Gylfason, T. (1999). *Principles of Economic Growth*. Oxford University Press.
- Jones, C.I. (2002). *Introduction to economic growth* (2nd ed.). Norton
- Kaiser, H. F. (1970). A second generation little jiffy. *Psychometrika*, 35(4), 401-415.
- Kaiser, H. F., and Rice, J. (1974). Little jiffy, mark IV. *Educational and psychological measurement*, 34(1), 111-117.

- Ko, M., Kim C., Lee, S. and Cho, Y. (2020). An Assessment of Smart Factories in Korea: An exploratory empirical investigation. *Applied Sciences*, 10(7486), 1-15.
- National Center for Education Statistics. (2022, May). Annual Earnings by Educational Attainment. *Condition of Education*. U.S. Department of Education, Institute of Education Sciences. <https://nces.ed.gov/programs/coe/indicator/cba>
- National Center for Education Statistics. (2022, May). College Enrollment Rates. *Condition of Education*. U.S. Department of Education, Institute of Education Sciences. <https://nces.ed.gov/programs/coe/indicator/cpb>.
- National Center for Education Statistics. (2021, May). Public High School Graduation Rates. *Condition of Education*. U.S. Department of Education, Institute of Education Sciences. <https://nces.ed.gov/programs/coe/indicator/coi>
- Page, J. (1994). The East Asian Miracle: Four lessons for development policy in Fischer, S. and Rotemberg, J.(eds.). *NBER Macroeconomics Annual 1994*, 9(219-282). MIT Press.
- Pager, D., and Shepherd, H. (2008). The sociology of discrimination: racial discrimination in employment, housing, credit, and consumer markets. *Annual Review of Sociology*, 34, 181–209.
- Preacher, K.J. and MacCallum, R.C. (2002). Exploratory factor analysis in behavior genetics research; Factor recovery with small sample sizes. *Behavior Genetics*, 33(2), 153-161.
- Sommeiller, E.Price, M. and Wazeter, E. (2016, June 16). Income inequality in the US by state, metropolitan area, and county. Economic Policy Institute. <https://wid.world/wp-content/uploads/2017/10>
- Spicer, J. (2005). *Making sense of multivariate data analysis*. Sage.
- The World Bank (1993). *The East Asian Miracle: Economic growth and public policy*. Oxford University Press.
- Todaro, M.P. and Smith, C.S. (2015). *Economic Development* (12th ed.). Pearson.
- U.S. Census Bureau (2022, December 12). Income Gini Ratio of Families by Race of Householder, All Races [GINIALLR]. Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/GINIALLR>
- US News (2022). National Liberal Arts Colleges Rankings. US News. <https://www.usnews.com/best-colleges/rankings/national-liberal-arts-colleges>
- Van den erg, H. (2017). *Economic growth and development* (3rd ed.). World Scientific.
- Velicer, W.F. (1976). Determining the number of components from the matrix of partial correlations. *Psychometrika*, 41(3), 321-327.
- Warburton, C.E.S. (2019). Human capital, divergent opportunities, and development in the US. *Regional and Sectoral Economic Studies*, 19(1), 5-33.
- Warburton, C.E.S. (2020). Pedagogical ethics and economic growth in the United States. *Regional and Sectoral Economic Studies*, 20(2), 19-34.

Appendix A: Public institutions tuition and enrollment (Fall 2021, thousands of dollars)*

Institution (Public)	Out of State	Instate	Undergrad enrollment
1. University of California (Berkeley) CA	\$43,980	\$14,226	32,143
2. University of California (Los Angeles	\$44,830	\$13,804	32,119
3. University of Michigan (Ann Arbor)	\$57,273	\$17,786	32,282
4. University of Virginia (Charlottesville)	\$56,837	\$21,381	17,299
5. University of Florida (Gainesville)	\$28,658	\$6,380	34,881
6. University of North Carolina (Chapel Hill)	\$37,558	\$8,998	19,897
7. University of California (Santa Barbara)	\$44,204	\$14,450	23,091
8. University of California (Irvine)	\$43,739	\$13,985	29,449
9. University of California (San Diego)	\$46,374	\$15,348	33,343
10. University of California (Davis)	\$44,494	\$14,740	31,657
11. University of Texas (Austin)	\$40,996	\$11,752	40,916
12. University of Wisconsin (Madison)	\$39,427	\$10,796	35,474
13. University of Illinois (Urbana Champaign)	\$35,110	\$17,138	34,779
14. William and Mary (Williamsburg, VA)	\$46,625	\$23,970	6,543
15. Georgia Institute of Technology (Atlanta, GA)	\$32,876	\$11,764	17,447
16. The Ohio State University (Columbus, OH)	\$35,019	\$11,936	47,106
17. University of Georgia (Athens, GA)	\$30,220	\$11,180	30,166
18. Purdue University (West Lafayette, IN)	\$28,794	\$9,992	37,101
19. Florida State University (Tallahassee, FL)	\$21,683	\$6,517	33,593
20. Rutgers University--New Brunswick (Piscataway, NJ)	\$33,963	\$16,263	36,152
21. University of Maryland, College Park (College Park, MD)	\$39,469	\$11,233	30,922
22. University of Washington (Seattle, WA)	\$40,740	\$12,242	36,206
23. University of Minnesota, Twin Cities (Minneapolis, MN)	\$35,099	\$15,859	36,209
24. University of Pittsburgh (Pittsburgh, PA)	\$36,000	\$19,760	19,980
25. Virginia Tech (Blacksburg, VA)	\$34,838	\$15,208	29,760
26. Texas A&M University (College Station, TX)	\$40,087	\$13,178	56,723
27. University of Connecticut (Storrs, CT)	\$42,102	\$19,434	18,567
28. University of Massachusetts (Amherst, MA)	\$38,171	\$16,952	24,231
29. Indiana University-Bloomington (Bloomington, IN)	\$39,120	\$11,447	34,253
30. North Carolina State University (Raleigh, NC)	\$30,869	\$9,128	26,505
31. Clemson University (Clemson, SC)	\$39,502	\$15,558	21,653
32. Michigan State University (East Lansing, MI)	\$40,662	\$14,850	38,574
33. The Pennsylvania State University (University Park, PA)	\$36,476	\$18,898	40,600
34. Stony Brook University-SUNY (Stony Brook, NY)	\$28,476	\$10,556	17,999
35. Binghamton University—SUNY (Binghamton, NY)	\$28,230	\$10,390	14,307
36. University of California, Santa Cruz (Santa Cruz, CA)	\$45,660	\$14,634	17,864

* This paper does not maintain or endorse the ranking of institutions. Source: US News

Appendix B: Private non-Parochial tuition and enrollment (Fall 2021, thousands of dollars)

Institution (Private, non-parochial)	Tuition & Fees (2021-22)	Enrollment
1.MIT	\$55,878	4,361
2..Princeton	\$57,410	5,321
3. Harvard	\$57,261	7,153
4.. Yale	\$62,250	6,536
5.. Stanford University (CA)	\$60,963	6,989
6. University of Pennsylvania (Philadelphia, PA)	\$63,452	9,962
7. University of Chicago	\$58,680	901
8. California Institute of Technology	\$60,489	6,717
9. Duke University (NC)	\$58,720	6,331
10.Johns Hopkins University (MD)	\$60,984	8,194
11. Northwestern University (IL)	\$56,966	7,057
12. Vanderbilt University (TN)	\$58,866	7,653
13. Washington University in St. Louis	\$52,895	4,076
14. Rice University (TX)	\$58,843	8,874
15. University of Notre Dame (IN)	\$55,468	7,010
16. Emory University (GA)	\$59,957	7,357
17. Georgetown University (DC)	\$58,924	7,073
18. Carnegie Mellon University (PA)	\$60,275	19,606
19. University of Southern California	\$56,500	27,444
20. New York University	\$63,000	6,114
21. Tufts University (MA)	\$59,770	5,441
22. Wake Forest University (NC)	\$59,344	6,521
23. University of Rochester (NY)	\$61,706	9,445
24.Boston University 9Boston. MA)	\$62,360	18,229
25. Pomona College	\$59,238	1,764
26. Williams College (Williamson, MA)	\$61,770	2,166
27.Dartmouth College(Hanover, NH)	\$62,430	4,556
28. Brown University (Providence, RI)	\$65,146	7,349
39. University of Notre Dame	\$60,301	8,973
30. Swarthmore College (Swarthmore, PA)	\$59,328	1,651
31.Cornell university (Ithaca, NY)	\$63,200	15,503
32.Amherst College (Amherst, MA)	\$64,100	1,971
33 Washington and Lee (Lexington, VA)	\$61,750	1,857
34.Harvey Mudd College (Claremont, CA)	\$62,817	905
35. Wellesley College (Wellesley, MA)	\$61,920	2,461
36. Colorado College(Colorado Springs, CO)	\$65,028	2,241

Data source: US News

Appendix C: Christian Institutions tuition and enrollment (Fall 2021, thousands of dollars)

Institution (Private, Christian/ parochial)	Tuition & Fees (2021-22)	Enrollment
1.Harding University (Searcy, AR)	\$23,148	3,687
2. Luther College (Decorah, IA)	\$48,160	1,744
3. Wheaton College (Wheaton, IL)	\$42,240	2,322
4. Baylor University (Waco, TX)	\$51,738	15,191
5.Point Loma Nazarene University (San Diego, CA)	\$41,100	3,174
6. Bethel University (MN) (St. Paul, MN)	\$41,270	2,587
7. Taylor University	\$37,476	1,939
8. Calvin University	\$38,620	3,068
9. Messiah University (Mechanicsburg, PA)	\$39,490	2,495
10. College of the Ozarks (Point Lookout, MO)	\$20,290	1,468
11.Indiana Wesleyan University (Marion, IN)	\$29,684	2,463
12.Azusa Pacific University (Azusa, CA)	\$41,510	3,940
13. George Fox University (Newberg, OR)	\$39,540	2,564
14. Pepperdine University (Malibu, CA)	\$63,142	3,708
15Northwest Nazarene University (Nampa, ID)	\$36,298	1,326
16. Simpson University (Redding, CA)	\$37,480	659
17. Biola University (La Mirada, CA)	\$44,382	3,596
18.Northwest University (Kirkland, WA)	\$35,000	778
19.Franciscan University of Steubenville (OH)	\$31,080	2,610
20.Houghton University (Houghton, NY)	\$16,464	871
21.Seattle Pacific University (Seattle, WA)	\$37,158	2,640
22.California Baptist University (Riverside, CA)	\$38,368	8,252
23.Mount Vernon Nazarene University (OH)	\$34,168	1,699
24.Columbia International University (Columbia, SC)	\$26,740	905
25. Samford University (Birmingham, AL)	\$36,725	3,607
26. Mississippi College (Clinton, MS)	\$21,098	2,523
27. Anderson University (Anderson SC)	\$31,720	3,157
28. LeTourneau University (Longview, TX)	\$34,470	2,992
29. Central College (Pella, IA)	\$19,800	1,139
30. Judson University (Elgin, IL)	\$30,910	934
31. Evangel University (Springfield, MO)	\$26,400	1,352
32. Covenant College (Lookout Mountain, GA)	\$38,860	872
33. Oral Roberts University (Tulsa, OK)	\$32,640	4,136
34. Belmont University (Nashville, TN)	\$39,850	7,069
35. Tennessee Wesleyan University (Athens, TN)	\$27,350	988
36. Abilene Christian University (Abilene, TX)	\$40,500	3,560

Data source: US News

Appendix D: College mergers, acquisitions, and closings

Institution	Status	Shock*	Enroll ment	Students
1. Cazenovia College (NY)	Closure (Spring 2023)	COVID-19 (financial)	(40%)	General
2. Bloomfield College (NJ)	Acquisition (June, 2023)	COVID-19 (financial)	N/A	Minorities (≈80%)
3. Chatfield College (OH)	Closures (January 2023)	COVID-19 (financial)	N/A	General
4. St. John's University Staten Island campus	Closure (Spring 2024)	COVID-19 (financial)	(≈60%) (author)	General
5. Indiana University- Purdue University Indianapolis	Restructuring (July, 2024)	Talent (human capital)		General
6. San Francisco Art Institute	Restructuring (July, 2022)		Decline	General
7. Wave Leadership College (VA)	Closure (June, 2022)	COVID-19 (financial)	Decline	General
8. Marymount California University	Closure (August ,2022)	COVID-19 (financial)	N/A	General
9. Lincoln College (IL)	Closure (May, 2022)	COVID-19 (financial)	Decline	Minorities (substantial)
10. Ohio Valley University (VA)	Closure (December, 21)	N/A	N/A	General
11. Mills College (CA)	Closure (July, 2022)	N/A	N/A	Females
12. St. Louis Christian College (MO)	Merger (May 2022)		Decline	General
13. Sierra Nevada University (NV)	Merger	N/A	N/A	General
14. University of the Sciences (PA)	Merger (June, 2022)	N/A	N/A	General
15. Judson College (AL)	Closure (July, 2021)	COVID-19 (financial)	Decline	Females
16. Becker College (MA)	Closure (August, 2021)	Financial	N/A	General
17. Concordia College	Merger (August, 2021)	COVID-19 (financial)	N/A	General

New York (NY)				
18. Pacific Northwest College of Art (OR)	Merger (July, 2021)	N/A	N/A	General
19. Martin Methodist College (TN)	Restructuring (July, 2021)	N/A	N/A	General
20. Ancilla College (IN)	Merger (July, 2021)	N/A	N/A	General
21. Marlboro College (VT)	Merger (Fall, 2020)	N/A	N/A	General
22. Wesley College (DE)	Merger (July, 2021)	N/A	N/A	General
23. Pine Manor College (MA)	Merger (July, 2021)	N/A	N/A	General
24. Holy Family College (WN)	Closure (Summer,2020)	COVID-19 (financial)	N/A	General
25. Urbana University (OH)	Merger (Spring,2020)	COVID-19 (financial)	N/A	General
26. Nebraska Christian College (NE)	Merger (Spring, 2020)	N/A	N/A	General
27. MacMurray College (IL)	Closure (Spring, 2020)	COVID-19 (financial)	N/A	General
28. Robert Morris University (IL)	Merger (Spring, 2020)	N/A	N/A	General
29. Concordia University – Portland (OR)	Closure (Spring, 2020)	N/A	N/A	General
30. Watkins College of Art (TN)	Merger (Spring, 2020)	N/A	N/A	General
31. Claremont School of Theology (CA)	Merger	N/A	N/A	General

* The shock is intimately related to dwindling enrollment and inadequate financial resources to finance operations. Restructuring is used here to denote operational reorganization for viability within the framework of current needs.

Data source: Higher Ed Dive. <https://www.highereddive.com/>

Appendix E: A biplot of variable correlations

