

ERASMUS UNIVERSITY ROTTERDAM
Erasmus School of Economics

Master Thesis Financial Economics

The link between Institutional Characteristics and Endowment growth of US universities

Student Name: Rajendra Saini

Student ID Number: 446689rs

Abstract:

The main idea of this research focuses on analyzing certain institutional characteristics and determining whether similarities among large endowments provide a plausible explanation for endowment growth. Three institutional characteristics that are found to be statistically significant in explaining the endowment growth include student to faculty ratio, student enrolment and SAT score. SAT score is often associated with institution's selectivity and prestige, it is shown to have a positive impact on the endowment growth. Total enrolment also has a positive impact on the endowment growth as large institutions tend to attract large number of students. It is plausible to assume that these institutions also have variety of faculties, which attracts different types of donors. Lower student to faculty ratio leads to a higher positive endowment growth, hence its negatively correlated with the endowment growth.

Keywords: endowment, institutional factors, philanthropy

Supervisor: Onno Steenbeek

Second assessor: Jan Lemmen

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Chapter 1: Introduction

1.1 Thesis Background

An endowment is a combination of assets invested by a college or university to support its educational mission in perpetuity. An institution's endowment is in fact a combination of hundreds or thousands of individual endowments. It comprises of funds donated by alumni, general public, wealthy donors with a promise that the funds will be used for specific purpose. Endowment funds provide stability (source of income through a constant pay out) to institutions as the revenues generated by them can fluctuate over time. Evidence points towards the fact that institutions with larger endowment funds attract high quality researchers (e.g. Harvard, Yale).

Erasmus University has recently launched a new endowment fund with the goal to raise 100 million euros capital by the end of 2025 and achieve a 10% annual return by 'investing sharply'. The problem, as correctly identified in the Volkskrant article, is that 'funds per student' are falling at Erasmus University and this newly launched fund will allow extra allowance for projects undertaken by students, researchers and the general Erasmus Community. Establishment of this fund is a way for Erasmus University to stay competitive on a world level, as the proportionate increase in the amount of public aid have not been enough to keep up with the increase in the number of students. As seen in other parts of the world, especially in US, endowment funds have become a matter of pride and prestige for universities. Universities with large endowment funds are able to attract talented researchers and top students giving them a competitive edge. As with any other endowment fund, the objectives of Erasmus Endowment fund are grow in size, invest responsibly, achieve a higher rate of return, have a constant pay-out policy and be able to fund projects that are deemed valuable.

Top endowment funds (including Harvard, Yale) have been able to grow exponentially over the past few decades by attracting large sums of donations and achieving consistent higher returns. Hence, it makes for an interesting topic to review and perhaps there are some insights exclusive to US Endowment funds which can be implemented to Erasmus University fund or other industries. The scope of this study is limited to US endowment funds only, primarily the analysis is based on the data collected by NACUBO, IPEDS, WebCASPAR, VSE.

This paper will focus on how some of the potential institutional factors (as identified in the previous literature) could influence and are related to the success of endowment funds. Success in the context of this thesis means the growth of a fund in terms of asset under management. The analysis is limited to funds with market value larger than one billion dollars based on the fiscal year ending June 20, 2017. Hence, it relates to the size of the fund, which also means that the analysis is restricted to large funds. The reasoning behind choosing size as the success factor is that over time, these institutions have been able to grow exponentially, and it makes for an interesting topic to see if there are common institutional factors linked to these endowments and how recognizing these factors can help other institutions in achieving the same success.

The rest of this paper is as follows, chapter 2 provides an overview of endowment history in US, their development overtime and the role they play in universities along with facts about them. Chapter 3 provides an extensive overview of previous literature on this topic, which is categorized into papers by organization of endowments, spending rules and investment strategies. Chapter 4 gives a descriptive summary of the dataset, chapter 5 presents methodology used in this paper and possible limitations. Chapter 6 looks at the results drawn from the data, chapter 7 presents a case study analysis of one of the funds used in this study - Harvard University endowment and finally the conclusion, summary and policy recommendations are described in chapter 8.

Chapter 2 Institutional background of University Endowments

2.1 History

As per the article 'Influences of Endowments & Foundations in the Investment Philosophy', the history of university endowments started even before the independence. In 1638, John Harvard donated his entire library and half of his estate to Harvard college. In 1715, Elihu Yale gave a large sum of money to Collegiate School of Connecticut and the name was later changed to Yale in his honor. Currently, Harvard and Yale university have the largest university endowments in the world. Conferring to the same article, Andrew Carnegie, considered to be one of the richest American of all time, has been an influential character behind the philanthropist culture in the US. He was a firm believer that the ultra-rich should spread their wealth around the country through philanthropy. Carnegie donated

his wealth to many institutions including Carnegie Libraries, Carnegie Corporation of New York, Carnegie Endowment for International Peace, Carnegie Hero Fund, Carnegie Mellon University, and Carnegie Museums of Pittsburgh. He reportedly gave away almost all his wealth and created a philanthropist culture in the US which was followed by Rockefeller, Ford and later by Gates. According to the National Centre for Charitable Statistics (NCCS), there are about 1.5 million nonprofit organizations registered in the US. Hence, there has been a long tradition of philanthropist giving in the US which has led to development of large endowments and foundations overtime.

“A man who dies rich, dies disgraced” – Andrew Carnegie

2.2 Role in universities

Endowment funds are an important source of income providing support for teaching, research, infrastructure and other operating expenses. Endowment income is spent on a variety of different purposes. Focus is on reducing the cost of education, so that students are not burdened with the true cost of education. Endowments are legally bound to spend the donor money in a specified way. Governing bodies and board of directors ensure that money is spent the way it should be.

There are variety of different purposes including student aids for which the endowment income is used by universities and colleges. Because of these student aids, the actual cost of tuition is reduced, which essentially reduces the amount of loan debt carried by students. Similar to student grant aid, specific individual funds within an endowment are allocated towards funding costs related to teaching e.g. professors, scholars, operating expenses related to research purposes. Federal funding for different research programs has been declining over time, hence an endowment is also set up with a purpose of funding related to scientific and scholarly research. Donations in the medical research fields such as cancer, HIV, diabetes and other fields such as physics, engineering, chemistry and so on are common. Large universities often play an influential role in the location or the city where they are situated by providing stable employment over time. Some of the endowments are set up to fund public service activities such as matching talent, recruitment activities, helping students with challenges faced by them, and public services activities. Lastly, some endowment funds are dedicated to fund sporting activities by funding facilities, equipment's, salaries of athletes and so on.

2.3 Functioning and objectives of an Endowment

Most institutions spend about 4.5% of their fund value in funding operations and capital related expenses while the rest of the amount stays invested. Further analysis of the how endowments spend their money is described in the later part of this paper. This partly explains why they have been able to grow significantly over time. Majority of the endowments try to smoothen their spending policy over time while also keeping an eye on intergenerational equity. Goal is to ensure that spending rates are not based on investment returns, in other words, a decline in the market value should not lead to a decline in spending rate and that future generations are not being made worse-off at the expense of higher spending in the current period. Robust real growth in investment returns along with a steady payout policy ensures strong growth in the endowment value over time.

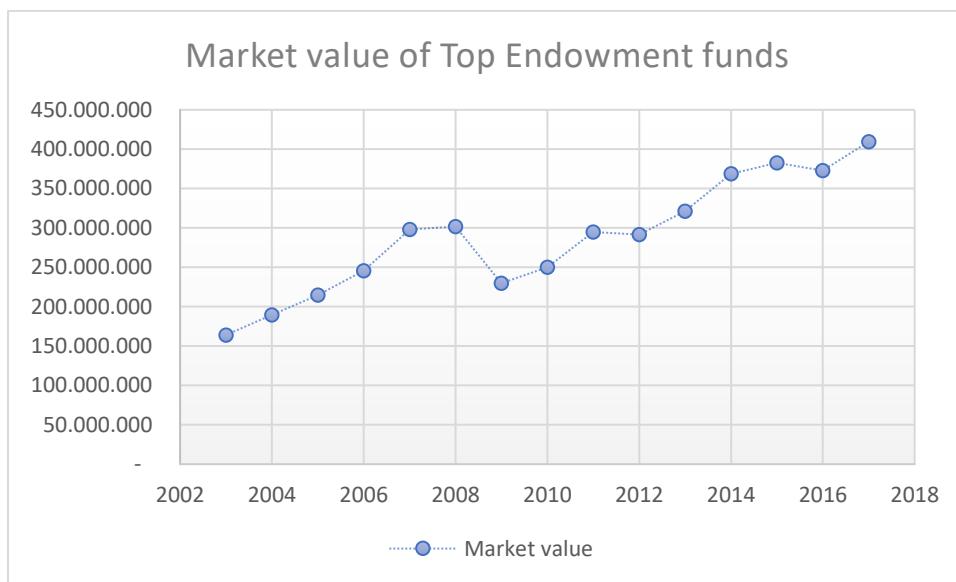
An endowments primary source of income is through charitable donations, it grows over time because of these donations along with investment returns. Some donations are made with a specific purpose (e.g. scholarships or construction of a new library) while others impose no restrictions on endowment funds and can be used for any purpose and invested in a way that is deemed appropriate by the management. Goal of an endowment fund is to maintain a balance between the current spending requirements versus preserving the purchasing power of the fund and making sure that the fund last until perpetuity.

Given the fact that endowments are established with a notion that they will last until perpetuity, they have a more long-term vision in terms of return objectives implying that they have options to invest in broad range of investment vehicles and asset classes without having to worry about short-term fluctuations in the market. Some of the characteristics that are exclusive to endowment funds are unlimited time horizon, modest spending needs, and flexibility in terms of setting policies.

2.4 Current landscape and Growth overtime

In 2003, 46 US institutions had an endowment value of more than a billion dollar, which increased to 100 institutions in 2017, more than doubling in number. Data from Harvard and Yale annual reports show that their funds have been able to grow from approx. \$10 billion euros in 1996 to \$34 billion euros in 2016 (Harvard) and approx. \$2.5 billion euros in 1990 to \$25 billion in 2016 (Yale). There is about 450 billion dollars in the university endowments in the US (while 660 billion dollars in foundations).

According to College Board 'Trends in Student Aid 2017' report, colleges and universities increased their institutional grant aid (non-governmental) by 32% from \$44.4 billion in 2011-12 to \$58.7 billion in 2016-17. Over the same time period, government (federal) aid declined by 15% while aid from employers and other private sources rose less than 10%. Total grant aid in 2016-17 was \$125.4 billion, out of which \$58.7 billion is through universities and colleges, and this makes up about 47% of the total grant. Hence, a significant amount of grant aid money is financed through endowments, which quantifies the importance of these endowment funds on a systematic level. The graph below provides an overview of the change in aggregate value of funds (100 largest funds in total) which were valued over billion dollars for FY 2017. The aggregate value increased from \$162 billion in 2003 to 2016 in \$405 billion more than doubling in amount.



Source: NACUBO-Commonfund Study of Endowments (2003-2017)

Given how crucial endowments are and the rapid growth in endowment values has generated interest among academic researchers. Hence, next chapter focuses on the previous literature on this topic.

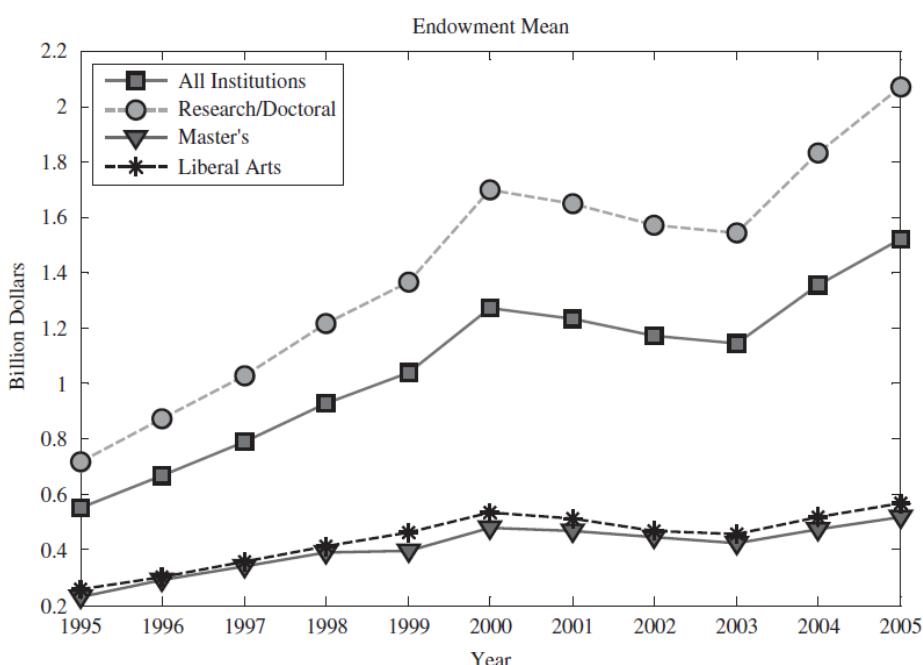
Chapter 3 Literature Review

A university endowment fund is a unitized investment fund established by the university for specific need or to carry out university's operating process. Harvard endowment fund, for example, is made up of 13,000 individual funds (as a single entity).

The existing knowledge or beliefs on performance of US endowment funds is that top funds have been able to consistently perform well over the past decades because of access to better alternative asset class and managers. This stems from the fact that top funds are usually also the larger funds, and they have more funds to invest, making it easier for them to invest in alternatives which otherwise would not be possible. This chapter provides an overview of previous literature done on US university endowment funds in regard to their performance (whether they earn an alpha or not), secret drivers of their success, competition among themselves, changes in asset allocation over time and how it affects their performance and is classified into the following three sections.

3.1 Organization of Endowments

Lee (2009) identifies relationship between institutional characteristics and endowment growth. These institutional factors are further discussed later, this research paper replicates the same study done by Lee, however it looks at more recent time period (2009-2016). When comparing among different types of institution (research/doctoral, master's and liberal arts), research universities have the largest endowments in terms of value. Moreover, they also grow at a faster rate compared to other institution types. The graph below provides an overview of changes in endowment value across different institution types.



Source: The data are from *Voluntary Support of Education 1995 to 2005*, by Council for Aid to Education, 1996 to 2006, New York, NY: Author.

Geiger (1985) examined the logic behind American higher education and documents that the rapid growth of voluntary support to university endowments transformed the wealthy institutions. The question 'why universities have endowments?' has been answered comprehensively in research paper by Hansmann (1990). According to the paper, the argument that endowments serve as a means to intergenerational equity is not compelling and that the main reason why university endowment exist is to provide a financial buffer in the times of difficulty and that it helps ensure the long-run survival of institution's reputational capital, while also protecting its intellectual freedom. Interesting to note that since the paper was written, the reliance on endowments has changed dramatically. It is fair to argue that university's reliance on endowments is more than just a financial buffer. In fact, income from endowment make up large percentage of operating revenue for lot of institutions.

Leslie and Ramey (1998) document that size of an institution is an important factor for a donor, along with the public profile of the university. They also point that business organizations have greater opportunities for association with institutions who are located in areas of economic growth. Hence, they would much rather be a donor in a region where there have lot of business activities going on.

Cunningham and Cochi-Ficano (2002) presents a compelling evidence that source of financial support for universities is sensitive to a variety of unique features of that university. They point out features such as university's academic reputation, aptitude of the student population, the faculty student ratio, the vocational choice of its graduates affects the flow of charitable giving from the donors.

Oster (2003) examined the effect of university endowment growth on donor behavior. This study tested past endowment returns and various other institutional factors that could affect the source of giving donations by alumni and non-alumni. The final conclusion states that traditional donors reduce their donations to the institution based on the perception of the university's wealth.

Binfare, Brown, Harris, Lundblad (2018) show that the financial knowledge of the endowment's governing body is positively correlated with the allocation towards alternative asset class and higher total returns. They document the implication of having knowledgeable board members which provides access to and recommendation of high-performing funds. The implication is that endowments would benefit from having experts in

alternative investments who serve on the board. Table below provides a summary statistic of the NCSE from 2004 to 2015.

	N	Mean	SD	P25	Median	P75	Mean (\$W)
Panel A: Investment Committee (IC) Characteristics (number of members)							
Size - Total Members	7264	8.14	3.39	6.00	8.00	10.00	9.58
Non-Trustees	6105	1.37	2.33	0.00	0.00	2.00	2.73
Investment Professionals	7255	3.92	3.06	2.00	3.00	6.00	6.45
Alternative Specialists	5969	2.40	2.47	1.00	2.00	3.00	4.48
Alumni	4899	4.26	3.52	1.00	4.00	6.00	6.22
Panel B: Presence of Investment Committee Expertise and CIO)							
Experience in Investments	6780	0.51	0.29	0.29	0.50	0.75	0.70
Experience in Alternatives	5502	0.32	0.27	0.13	0.29	0.50	0.49
Endowment CIO	7960	0.24	0.43	0.00	0.00	0.00	0.74

Source: *Binfare, Brown, Harris and Lundblad (2018)*

3.2 Spending Rules

Massy (1990) points out that endowment income provides independence from economic and political forces to the university and its value is not limited to monetary support. There has been lot of criticism that despite the large endowments, the tuition has been rising for students and that billions of dollars should be used to make tuition free. However, Morrell (2000) argues that to be able to maintain the top spot in terms of quality of education, both high tuition fees and large endowments are necessary.

Brown, Dimmock, Kang and Weisbenner (2014) document that endowments actively reduce their payout amount following a negative shock, but not positive shock. This asymmetric behavior is consistent with 'endowment hoarding' meaning that endowments are more interested in hoarding large sum of funds into the endowment fund. Income from endowments make up large portion of the university income, hence these negative shocks also impact university operations such as personnel cuts.

3.3 Investment Strategies and Performance

Lerner, Schoar and Wang (2008) document that majority of the growth in endowment size of the top endowment funds have been driven by their investment performance. Further, they identify size of the endowment, quality of student body, and the use of alternative investments as the key drivers behind high returns of the top endowment funds.

Brown, Garlappi and Tiu (2010) conclude that active endowments significantly outperform passive ones, although university endowments, as a group, do not produce significant risk-adjusted returns. Moreover, over the past few decades, there has been a large heterogeneity in terms of asset allocation among endowment funds, which potentially represent an attempt by endowment fund managers to select exposure to the asset class in which they are more familiar with and have higher selection abilities.

McElhaney (2010) presents that endowment management is mainly about institutions deciding on the endowment's asset allocation across different asset classes. Further concluding that institutions should select least number of specialized managers who are best suited in a particular asset class based on the strategic asset allocation without relying too much on the past performance. Hence, the overall theme of the paper is that universities should focus on management best practices for enhancing the performance of the endowment.

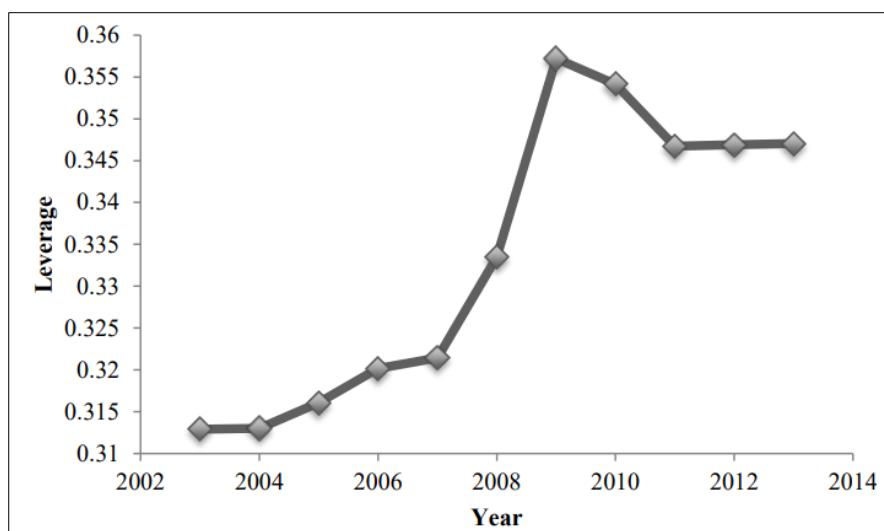
Goetzmann and Oster (2012) reports that asset allocation decisions of endowment is closely associated with the asset allocation policies of their near competitors and single closest competitor. They also document a trend-chasing behavior where endowments with recent positive experience towards an asset class tend to increase exposure to them.

Consistent with the views above, Barber and Wang (2013) finds an intriguing evidence of performance persistence among the Elite institutions and top performing endowments who earn positive alphas relative to public stock and bond benchmarks. Majority of superior performance is explained by their increased exposure towards alternative investments.

Rosen and Sappington (2016) examines whether university endowment managers make decisions only in terms of the assets they manage or also consider the background income of the university i.e. income through other sources. They test whether level and variability of university's background income affect its allocation towards alternative assets such as hedge funds, private equity and venture capital and conclude that the probability of investing in alternative assets and the proportions of these assets increase with the level of background income and decrease with its variability. Hence, manager decisions in regard to investments in alternative assets changes based on the level and variability of the university through other source of income i.e. if the other sources of income are scarce for university, managers are less keen on making illiquid investments.

Chen (2016) studies inequality among universities in terms of capital return. Everything else the same, biggest endowment has a capital return 8 percent higher than the smallest endowment. However, after adjusting for risk and comparing Sharpe ratios the positive correlation between fund size and capital return almost becomes negligible. In essence, the higher capital return of the large endowments is due to the higher risk premium rather than information premium.

Rosen and Sappington (2016) investigate the decision of universities to issue debt. They test whether the expected value and uncertainty of the university's non-financial income (income that is not derived from endowment) affect the leverage of the endowment (value of the liabilities divided by its assets). They find that leverage is negatively associated with the expected value and the uncertainty of the nonfinancial income. To be more specific, (on average) increasing the expected value of nonfinancial income by one standard deviation decreases university's debt by \$5.1 million while increasing the uncertainty of nonfinancial income by one standard deviation decreases debt by \$2.7 million. According to the paper, this behavior is consistent with the pecking order theory which states that manager resort to external source of finance as the last option and prefer to use internal cash first. Further leverage decisions of universities have become less sensitive to expected nonfinancial income but more sensitive to its uncertainty since the recession. The graph below provides an overview of the trend in average leverage based on the data collected by IPEDS. Leverage is defined as the ratio of liabilities to assets. Interesting to note that the average leverage has decreased since the recession among US university endowments.



Source: 'To borrow or not to borrow' Rosen and Sappington (2016)

Dimmock, Wang and Yang (2018) Provides a model which can be used as a guideline for institutional investors when it comes to spending asset allocation decisions. They justify allocations to alternative assets, if these assets can generate expected 2-3 percent excess return. They also document that investors with limited access to sufficiently high alphas should hold conventional portfolios based on the Modern Portfolio Theory framework.

Chapter 4 Descriptive Statistics

This chapter provides an overview of the relevant data on university endowment returns overtime, across different sizes and compares it to the benchmark. Also provides insights into the different sources through which university endowments receive their funding, invest their capital across different asset classes, payout policy and investment strategy. This information is relevant as it relates to main research question 'growth of university endowment'.

4.1 Returns over time

Table 1 provides an overview of the US university endowments, affiliated foundations and benchmark returns (1991-2011). The number of institutions surveyed by NACUBO has increased over time reaching 792 in 2011, and 808 in 2017 (while it was only 346 in 1991). Mean return over this time period has been 8.8 percent, returns of Ivy League (11.9 percent) and Top SAT (10.7 percent) universities have been above the average. It is interesting to note that Ivy League and Top SAT universities have been consistently performing above the average on a yearly basis. Moreover, their returns have been higher than benchmark U.S. stocks (S&P 500), non-U.S. stocks and U.S. bonds (Barclays U.S. Aggregate Bond). This is consistent with the findings from Barber and Wang (2013) that top performing elite institutions tend to perform continuously better, while the bottom quartile funds tend to underperform repeatedly. Ivy league endowment funds perform better on a risk adjusted basis compared to Top SAT institutions.

Over the time period from 1991-2011, only hedge funds and private equity have had higher returns than Ivy leagues. In essence, this table gives an indication how the top performing large elite funds have been able to grow so rapidly over time, which is a result of stellar investment returns and generous donations being poured into these endowments. 'Others' category includes smaller funds which tend to be invested heavily in traditional assets.

Given the fact that US equities, bonds and Non-US equities benchmarks have lagged the alternative asset class benchmark, it explains the underperformance of other category funds over this time period.

Table 1: Endowment and Benchmark Percentage Returns, 1991-2011

Year	All Endowments						Elite vs. Others			Benchmarks				
	N	Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Ivy League	Top SAT	Others	U.S. Stocks	Non-U.S. Stocks	U.S. Bonds	Private Equity	Hedge Funds
1991	346	7.4	3.5	5.6	7.5	9.2	3.6	7.7	7.4	7.4	-9.8	10.7	4.3	14.0
1992	365	13.3	3.2	11.6	13.2	15.0	5	14.9	13.1	13.4	0.7	14.1	9.1	23.4
1993	384	13.5	4.4	11.0	13.7	16.0	16.5	14.0	13.4	13.6	20.0	11.8	21.8	27.5
1994	397	3.0	3.0	1.0	2.9	4.6	7.2	4.3	2.8	1.4	17.5	-1.3	18.3	15.5
1995	415	15.4	4.1	13.2	15.4	17.3	15.5	16.8	15.3	26.1	2.2	12.6	17.6	13.0
1996	425	16.9	4.2	15.0	16.8	18.9	21.2	19.9	16.6	26.0	13.2	5.0	30.6	26.0
1997	435	20.4	4.7	17.9	20.3	22.7	21.0	21.0	20.3	34.7	14.1	8.2	26.1	17.2
1998	445	17.8	4.4	15.3	18.0	20.2	17.7	19.1	17.8	30.2	1.4	10.5	35.8	10.9
1999	577	10.8	4.7	8.2	10.7	13.3	12.2	12.6	10.7	22.8	9.5	3.1	15.9	11.7
2000	600	12.0	10.0	6.2	10.0	15.5	26.7	24.6	11.1	7.2	18.1	4.6	34.5	23.2
2001	564	-3.5	6.3	-7.2	-3.7	0.1	1.5	-5.8	-3.5	-14.8	-23.8	11.2	-11.4	1.5
2002	601	-6.2	4.5	-8.7	-6.3	-3.8	-1.5	-6.3	-6.3	-18.0	-8.2	8.6	-11.7	1.6
2003	643	3.2	3.1	1.6	3.0	4.6	6.2	2.8	3.1	0.3	-4.2	10.4	1.9	7.0
2004	665	15.3	4.1	13.5	15.9	17.7	17.7	17.3	15.2	19.1	32.5	0.3	23.3	13.0
2005	683	9.3	3.3	7.5	9.0	10.9	15.8	13.6	9.0	6.3	16.9	6.8	30.1	8.2
2006	707	10.8	3.5	8.5	10.9	13.0	16.9	15.1	10.5	8.6	28.4	-0.8	25.6	13.8
2007	723	17.2	3.8	15.5	17.5	19.1	23.8	21.9	17.0	20.6	30.1	6.1	34.4	14.4
2008	728	-3.0	4.0	-5.8	-3.3	-0.7	3.3	0.5	-3.2	-13.1	-6.2	7.1	4.5	0.9
2009	793	-18.7	5.3	-21.7	-19.1	-16.4	-22.0	-21.2	-18.6	-26.2	-30.5	6.0	-20.6	-10.1
2010	817	11.9	3.3	10.2	12.1	13.7	12.2	12.2	11.9	14.4	10.9	9.5	18.3	9.1
2011	792	19.2	4.3	17.8	19.8	21.8	20.5	19.9	19.2	30.7	30.3	3.9	24.7	11.5
Mean		8.8	4.4	6.5	8.8	11.1	11.9	10.7	8.7	10.0	7.8	7.1	15.9	12.1
Std dev		9.9					10.9	11.4	9.8	17.0	17.4	4.4	16.2	9.0

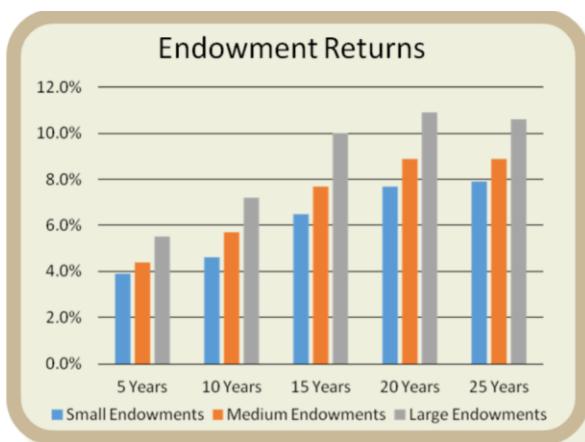
Note: Returns are net of fees. Left block represents data returns of all endowment funds. The middle block represents Ivy League returns, Top SAT school returns (outside of Ivy League) and others. Right block represents benchmark return data (US Stocks = S&P 500, Non-US Stocks = MSCI-exUS, Bond=Barclays Aggregate US Bond, Private Equity = Cambridge PE Index, Hedge Fund = HFR Aggregate Index). Source: Do (Some) University Endowments Earn Alpha? (Barber and Wang, 2013)

Table 2: Endowment and Benchmark Percentage Returns, 2012-2017

Year	All Endowments					Benchmarks		
	N	Mean	25th Percentile	Median	75th Percentile	U.S. Stocks	Non-U.S. Stocks	U.S. Bonds
2012	809	-0.3	-1.9	-0.5	1.0	5.5	-14.1	7.5
2013	813	11.7	10.4	11.7	13.0	20.6	17.1	-0.7
2014	828	15.5	14.4	15.8	17.2	24.6	23.8	4.4
2015	804	2.4	0.7	2.2	3.7	7.4	-5.3	1.9
2016	792	-1.9	-3.3	-2.1	-0.7	4.0	-9.8	6.0
2017	808	12.2	11.1	12.5	13.7	17.9	19.5	6.0
Mean		6.6	5.2	6.6	8.0	13.3	5.2	4.2
Std dev		7.4				8.8	16.7	3.1

Note: Left block represents returns of all endowment funds, while right block compares them to the benchmark US, Non-US stocks and US bonds. (Source: 2017 NACUBO-Commonfund Study of Endowments)

Table 2 provides an overview of 2012-2017 returns. Interestingly, average returns in the recent times have declined. Overall, institutions have lagged US stocks benchmark. The data for 1991-2011 (table 1) provided information about Ivy League and Top SAT schools separately as it was extracted from a research paper, however, table 2 data is downloaded from NACUBO public database. And the analysis is restricted to an overview of all the endowment funds due of lack of data availability. The graph below which is derived from the article “Influences of Endowments & Foundations in the Investment Philosophy”. Comparing returns across different time frame, large endowments have been consistently outperforming the small and medium endowments. Hence, this provides a motivation for focusing on the growth of larger funds and test whether certain institutional factors explain the growth in market value over time for these large funds.



Source: Freddie Mac

Source: “What the Big Names are Doing: Influences of Endowments & Foundations in the Investment Philosophy” By Kevin Chambers

Table 3: Endowment Percentage Returns (across different sizes and institutions)

Size of Endowment	1-year N=808	3-year N=756	5-year N=736	10-year N=630
Over \$1 Billion	12.9	5.0	8.6	5.0
\$501 Million to \$1 Billion	12.7	4.2	8.1	4.6
\$101 Million to \$500 Million	12.5	4.1	7.8	4.4
\$51 Million to \$100 Million	11.9	3.9	7.7	4.4
\$25 Million to \$50 Million	11.7	4.0	7.7	4.5
Under \$25 Million	11.6	4.7	8.1	5.0
Type of Institution				
All Public Institutions	12.2	4.3	8.0	4.5
Public College, University, or System	12.2	4.6	8.1	4.6
Institution-Related Foundation	12.2	4.2	8.0	4.5
Combined Endowment/Foundation	12.1	4.0	7.7	4.3
All Private Colleges and Universities	12.3	4.2	7.9	4.6
Average (All Institutions)	12.2	4.2	7.9	4.6
Median (All Institutions)	12.5	4.1	7.9	4.4

Table 3: Average Annual One-, Three-, Five-, and Ten-Year (%) Returns for U.S. Higher Education Endowments and Affiliated Foundations for Periods Ending June 30, 2017 (Source: 2017 NACUBO-Commonfund Study of Endowments)

Table 3 offers a comparison of endowment returns across different sizes. There is a positive correlation between size and the returns for a one-year data. Comparing 10-year long-term returns, they are identical for funds with assets over billion dollar and funds with assets under 25 million, however the middle cohorts have lagged 10-year returns. Long term returns among public vs private institutions are almost similar consistent across different time horizon. Notice that number of institutions reported declines as the return time period increases (e.g. 808 institutions reported 1-year return while only 630 institutions reported 10-year return) potentially because some of the institutions have not existed for 10 years.

4.2 The way US endowment funds receive their funding

Making donations have been long perceived as one of the core American values. The notion of charity is embedded into the American culture, numbers tend to support this argument. Based on a report from Giving USA foundation, charitable donations accounted for about \$390.05 billion in 2016, making it the most sophisticated market in the world. Moreover, since the early 1900s the US federal government has set up income tax deductions for charitable donations encouraging tax payers make more donations towards the public welfare. This tax deduction was later broadened to corporations as well. This

entire culture of 'giving back to the society' and the financial tax incentives makes it easier for US universities and colleges to raise money through fundraising events.

Charitable donations are the primary source of funds for an endowment fund, and spending these funds are restricted based on donor's wish. As per a survey conducted by Council Aid to Education, US Colleges and Universities raised \$43.60 billion in 2017, an increase of 6.3 percent compared to previous year. This is the highest level of funds raised since the start of the survey in 1957. Donors are drawn to donating their money to institutions who are good custodian of the assets. Hence, the recent trend has been that endowments who are better at managing their funds have seen a large inflow of funds. In US, the top 20 fundraising institutions which account for less than 1% of the Nation's Colleges raised 28.1 percent of all the total gifts received. Interesting to note that the below mentioned Top 20 institutions grew at 10.5% almost double the pace compared to all the US Universities and Colleges. This has led to criticism of wealth donors who donate large amount of funds to endowments who are already super rich. The fact that these large institutions has variety of different faculties (arts, aerospace, economics, engineering and so on), it appeals to a broad range of donors making it easier for them to raise funds. As per Ann E. Kaplan, survey director for CAE, donors are attracted to donating their stocks to university whose endowment is performing better. Moreover, donors with arts collections would rather donate their paintings to a university which has a well-known art gallery, hence making it easier for people to see these artifacts.

Having a sound governing board overviewing the endowment performance, payout policies ensures that the endowment fund is investing and distributing funds the way it's supposed to, instilling more confidence into donor. Hence, having proper framework and guidelines could boast the potential gifts.

Providing financial incentives through means to tax deductions can have a significant impact on the overall giving in an economy, which would also boast the donations received by universities and colleges.

Table: 4 Top 20 US Fundraising Institutions, 2017

	Amount
1. Harvard University	\$1.28 billion
2. Stanford University	\$1.13 billion
3. Cornell University	\$743.50 million
4. Massachusetts Institute of Technology	\$672.94 million
5. University of Southern California	\$668.33 million
6. Johns Hopkins University	\$636.91 million
7. University of Pennsylvania	\$626.49 million
8. Columbia University	\$603.08 million
9. Yale University	\$595.89 million
10. Duke University	\$581.05 million
11. New York University	\$567.12 million
12. University of Washington	\$553.89 million
13. University of California-Los Angeles	\$550.93 million
14. University of Chicago	\$483.47 million
15. University of Michigan	\$456.13 million
16. University of Notre Dame	\$451.43 million
17. University of California-San Francisco	\$422.17 million
18. University of California-Berkeley	\$404.59 million
19. Ohio State University	\$401.85 million
20. Indiana University	\$398.26 million

Source: Council for Aid to Education, 2018

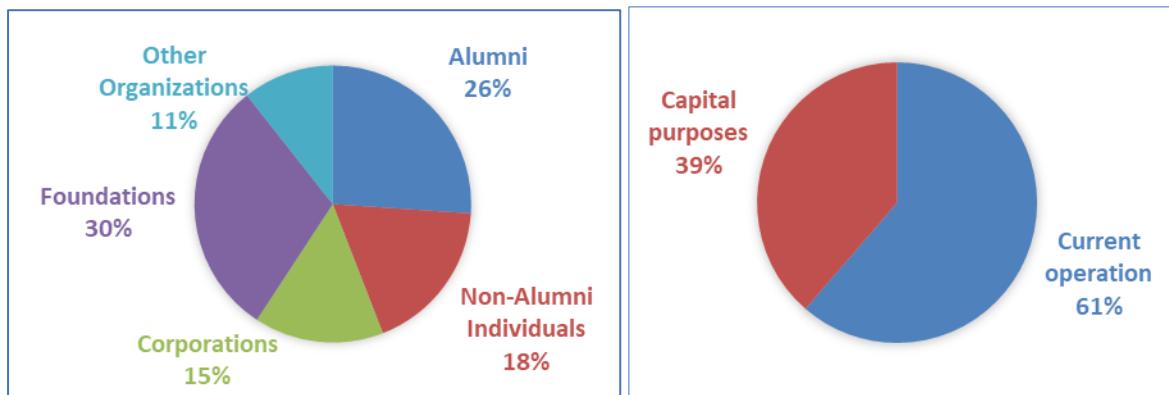
The highlighted institutions in blue also show up in the list of institutions with largest endowments in terms of market value and institutions with highest SAT averages.

Institutions derive their funding from different types of donors including alumni, non-alumni individuals, corporations, foundations, and other organizations. Out of the total support of \$43.60 billion in 2017, foundations account for about 30% of the estimated voluntary support of university endowments (13.13 billion). Second most important source for endowment funding is through alumni of the universities. In 2017, they donated an estimated 11.37 billion making up 26% of the total donations. While the remainder of the donations come from corporations, non-alumni and other organizations. This gives a newly started fund, such as Erasmus Trust Fund, an insight into the most important source of funding that they should target for raising funds. Donations by organizations (such as foundations, corporations and other organizations) are based on prior year commitments which are influenced by the financial markets. Hence, the increase in the donations by organization is partly based on how stock market performed in the prior year.

61 percent of the donation is made with a purpose of funding current operations, while the rest goes towards capital spending. Usually, capital expenditures occur once in a while (in

the sense that the expenses are not recurring) compared to operational expenses, hence it makes sense why the support for operations is higher (which would include funds received for scientific research etc.). For raising funds related to capital expenditures, universities can use funds from the existing revenue (which may not be feasible for a large project), charitable donations by giving an incentive to the donor that the new building will be named after them, special grant from government, issuing bonds or tax-exempt taxable.

Estimated Donation by Source & Purpose, 2017



Source: Council for Aid to Education, 2018

4.3 Invest their capital (across different asset classes)

Table 5 : Asset allocation (%) U.S. College and University Endowments and Affiliated Foundations FY 2017

Total Endowment Size	Domestic Equities	Fixed Income	Non-U.S. Equities	Alternative Strategies (total)	Short-term Securities/Cash/Other
Over \$1 Billion	13	7	19	57	4
\$501 Million to \$1 Billion	20	9	22	42	7
\$101 Million to \$500 Million	27	13	22	32	6
\$51 Million to \$100 Million	33	17	22	22	6
\$25 Million to \$50 Million	37	20	19	17	7
Under \$25 Million	42	24	16	11	7
Type of Institutions					
All Public Institutions	19	10	21	46	4
Public Colleges, Universities, & Systems	15	8	21	51	5
Institution-Related Foundations	24	12	21	38	5
Combined Endowment/Foundation	23	12	20	42	3
All Private Colleges and Universities	15	7	20	54	4
Dollar-weighted Average (All Institutions)	16	8	20	52	4
Equal-weighted Average (All Institutions)	30	15	21	28	6

(Source:2017 NACUBO-Commonfund Study of Endowments)

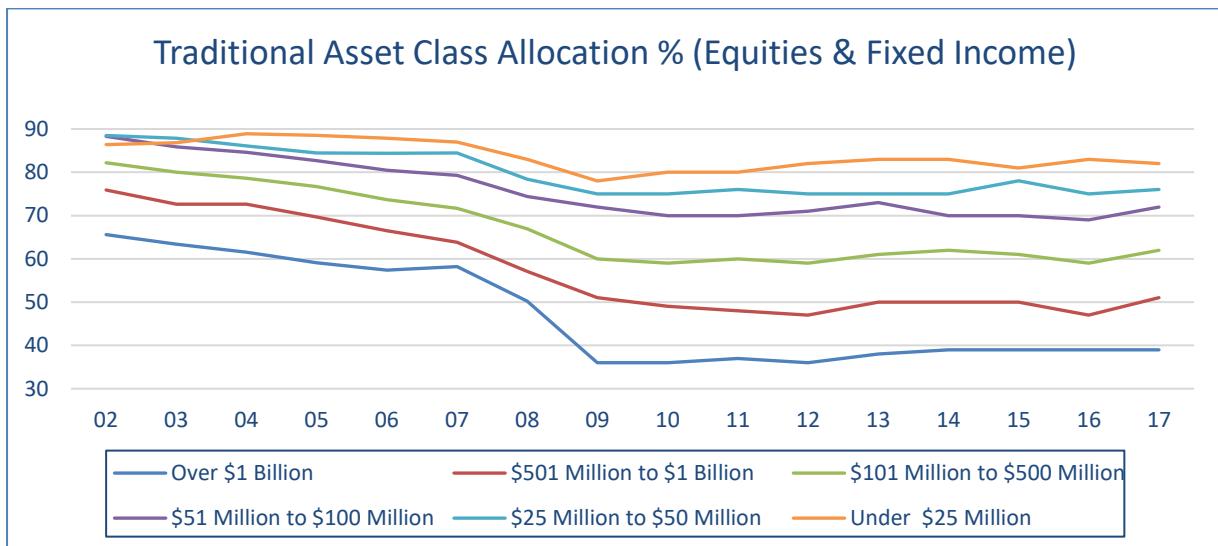
Table 5 provides an overview of the asset allocation for fiscal year 2017, a clear pattern emerges out of the table mentioned above. Endowments with fund size over \$1 billion asset under management, on average, invest heavily in alternative asset classes,

while the opposite holds for smaller sized funds. Given the large size, they have access to larger pool of resources to invest in alternatives and they can afford to invest large part of their assets into illiquid asset classes (and expect a higher return). Historically, the payout rates of these bigger funds have been around 5% (which can potentially change based on the market situation), hence, this limited annual liability allows them to lock in a large portion of their assets into alternative investments. (E.g.- Yale University)

Comparing the asset allocation between different types of institutions, they tend to follow the similar strategy. Both public and private institutions invest large portion of their assets towards alternatives (46 and 54 percent respectively). Traditional asset allocation (equities and bonds) is more or less the same between public and private institutions. Overall comparison of all the institution, the difference between dollar-weighted average versus equal-weighted average is big (specially for US equities and alternatives strategies). This is because there is a vast difference between the asset allocation policies of large funds versus smaller funds, hence, when calculating allocation on an equal weighted basis, smaller funds are represented equally overestimating the equity allocation and underestimating the alternatives. Dollar-weighted average provides a more accurate picture but larger funds like Harvard, Yale etc. have a higher impact on the overall allocation of the study, tilting the alternatives allocation higher.

Table 6: Traditional Asset Class Allocation % (Equities & Fixed Income)

Size of Endowment	Fiscal Year															
	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Over \$1 Billion	66	63	62	59	57	58	50	36	36	37	36	38	39	39	39	39
\$501 Million to \$1 Billion	76	73	73	70	67	64	57	51	49	48	47	50	50	50	47	51
\$101 Million to \$500 Million	82	80	79	77	74	72	67	60	59	60	59	61	62	61	59	62
\$51 Million to \$100 Million	88	86	85	83	81	79	74	72	70	70	71	73	70	70	69	72
\$25 Million to \$50 Million	89	88	86	85	84	85	78	75	75	76	75	75	75	78	75	76
Under \$25 Million	86	87	89	89	88	87	83	78	80	80	82	83	83	81	83	82



(Source: 2017 NACUBO-Commonfund Study of Endowments)

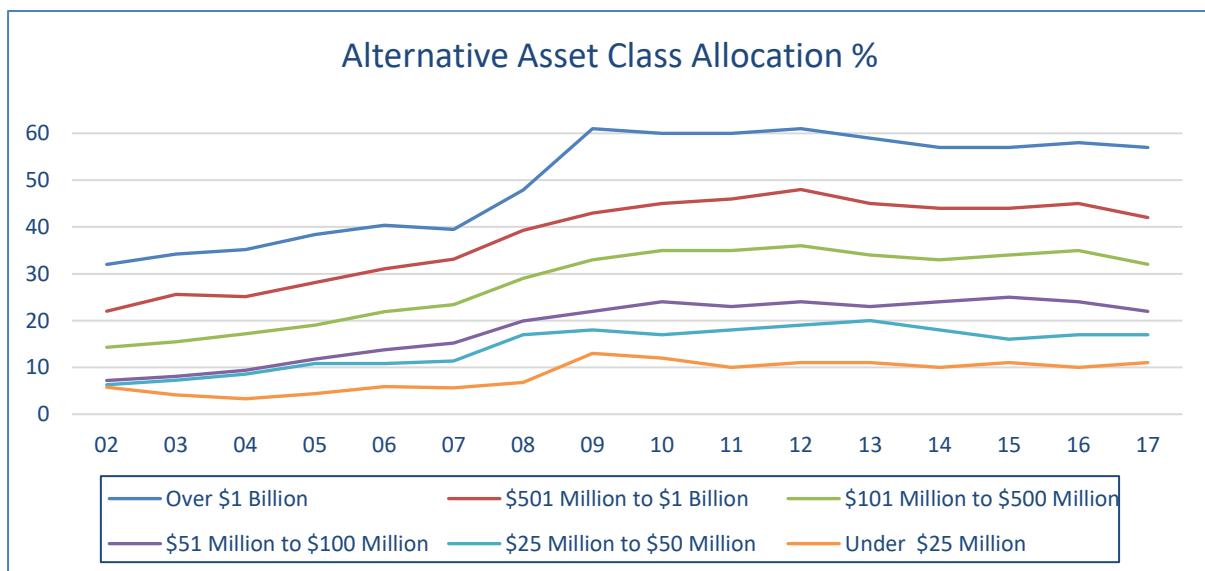
Table 6 is a panel data analysis of traditional asset allocation over time across endowment funds with different sizes. Traditional asset allocation in this instance is a combination of US equities, International (Non-US) equities and US bonds. From the graph above, allocation towards traditional assets has declined since 2002. Although in the recent few years, it's been steady. Sharp decline can be observed during the recessionary period, when investors realized the importance of diversification hence started investing in alternatives even more so. The decline is the sharpest for funds with over a billion dollar under asset management, while it is relatively smaller for funds under \$25 million.

There is vast difference in terms of strategic asset allocation when comparing funds with different sizes. Smaller funds tend to be invested heavily in traditional assets, accounting for almost 85 percent of their investment, while this for larger funds its between 40 to 50 percent. The annual performance of a fund is partly based on how the asset class, in which

its over weighed, has performed. So, it could be that smaller funds perform better based on the fact that equities had a good run in the past year while alternatives lagged behind.

Table 7: Alternative Asset Class allocation %

Size of Endowment	Fiscal Year															
	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Over \$1 Billion	32	34	35	38	40	40	48	61	60	60	61	59	57	57	58	57
\$501 Million to \$1 Billion	22	26	25	28	31	33	39	43	45	46	48	45	44	44	45	42
\$101 Million to \$500 Million	14	16	17	19	22	23	29	33	35	35	36	34	33	34	35	32
\$51 Million to \$100 Million	7	8	9	12	14	15	20	22	24	23	24	23	24	25	24	22
\$25 Million to \$50 Million	6	7	9	11	11	11	17	18	17	18	19	20	18	16	17	17
Under \$25 Million	6	4	3	4	6	6	7	13	12	10	11	11	10	11	10	11



(Source:2017 NACUBO-Commonfund Study of Endowments)

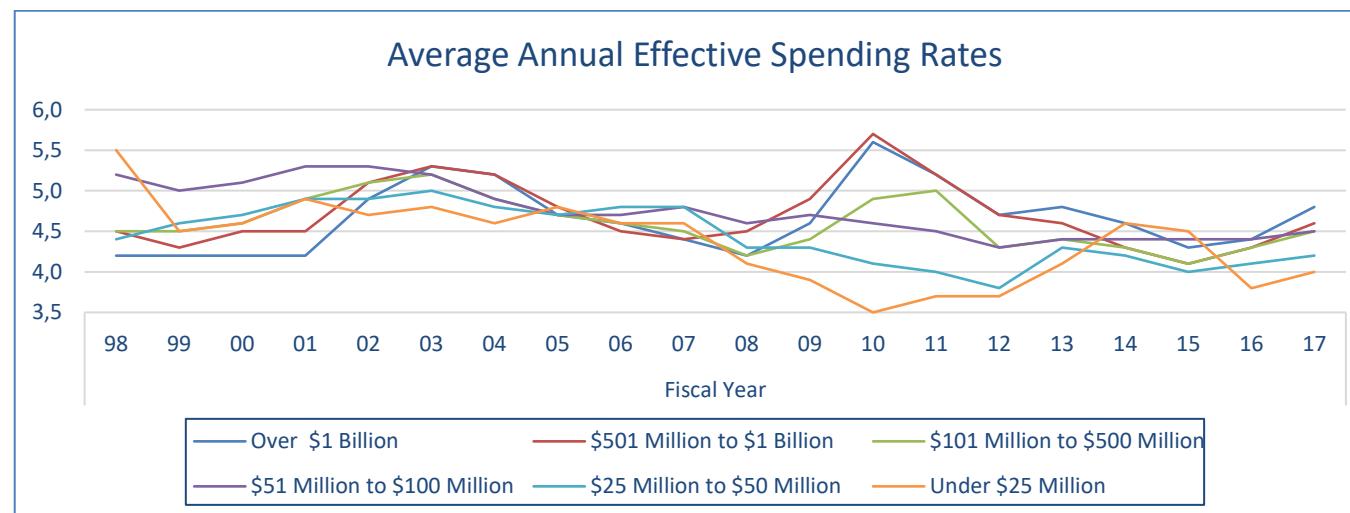
Table 7 provides similar overview, but for alternative asset class which is a total of private equity including leveraged buyouts (LBOs), mezzanine funds, merger and acquisition (M&A) funds, and international private equity and marketable alternatives which include hedge funds, absolute return, market neutral, long/short, 130/30, event-driven, and derivatives. Consistent with the findings from previous table, investments in alternatives spiked during the recessionary period, especially for larger funds. The difference between varies dramatically across different fund sizes. Funds larger than billion dollars under management on average invest about 57 percent of their assets into alternatives while it accounts for only 11 percent for funds under \$25 million. Investment into alternatives is usually illiquid and require a large chunk of money to be locked in for a certain time period. Usually smaller

funds don't have the ability to lock in large chunks of cash restricting their exposure towards alternatives.

4.4 Provide a source of income to the university

Table 8: Average Annual Effective Spending Rates* for U.S. College and University Endowments and Affiliated Foundations, FY 2017-1998

Size of Endowment	Fiscal Year																			
	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Over \$1 Billion	4.2	4.2	4.2	4.2	4.9	5.3	5.2	4.7	4.6	4.4	4.2	4.6	5.6	5.2	4.7	4.8	4.6	4.3	4.4	4.8
\$501 Million to \$1 Billion	4.5	4.3	4.5	4.5	5.1	5.3	5.2	4.8	4.5	4.4	4.5	4.9	5.7	5.2	4.7	4.6	4.3	4.1	4.3	4.6
\$101 Million to \$500 Million	4.5	4.5	4.6	4.9	5.1	5.2	4.9	4.7	4.6	4.5	4.2	4.4	4.9	5.0	4.3	4.4	4.3	4.1	4.3	4.5
\$51 Million to \$100 Million	5.2	5.0	5.1	5.3	5.3	5.2	4.9	4.7	4.7	4.8	4.6	4.7	4.6	4.5	4.3	4.4	4.4	4.4	4.4	4.5
\$25 Million to \$50 Million	4.4	4.6	4.7	4.9	4.9	5.0	4.8	4.7	4.8	4.8	4.3	4.3	4.1	4.0	3.8	4.3	4.2	4.0	4.1	4.2
Under \$25 Million	5.5	4.5	4.6	4.9	4.7	4.8	4.6	4.8	4.6	4.6	4.1	3.9	3.5	3.7	3.7	4.1	4.6	4.5	3.8	4.0



*The effective spending rate represents the distribution for spending divided by the beginning market value (endowment value on or around the beginning of the fiscal year). The distribution for spending is the dollar amount withdrawn from the endowments to support expenditures on student financial aid, faculty research, maintenance of facilities, and other campus operations, as determined and defined by each institution. The rate is calculated net of investment fees and expenses for managing the endowment (Source:2017 NACUBO-Commonfund Study of Endowments)

Table 8 offers an overview of the payout rates for a time period 1998-2017. Historically, payout rates have been around 4 to 5.5 percent and changes in payout rates have been partly determined by the market performance. Payout rates are higher following a recession to compensate for the lower market values, lower following a period of boom. Spending by the larger endowment funds has increased from 4.2 percent in 1998 to 4.8 percent in 2017 (note that the size of the funds has almost doubled during this time period), while smaller funds have reduced their spending rates from 5.5 to 4.0 percent.

Typically, investment total returns are divided between the spending amount and the residue which is to be retained by the endowment fund. University endowments cease to exist forever, hence, the goal is to strike a balance between current spending requirements and the continuity of the fund. The notion of inter-generation equity is important when defining a payout policy, which means that the monetary support provided to the future generation should be equally important compared to the support provided to the present generation adjusting for inflation.

Interestingly, majority of the US colleges don't have endowment funds. While the elite institutions make up large portion of the total endowment assets. The way endowments spend money is primarily determined by the donor. There are restrictions in terms of how the funds can be used. Since endowments comprises of thousands of individual funds, colleges argue that they cannot use the funds like a bank account. Moreover, a large portion of the funds are tied towards alternative asset classes (including private equity, hedge fund, real estate). Hence, in essence, the amount of available cash that can be spent on projects is different than the market value of the fund.

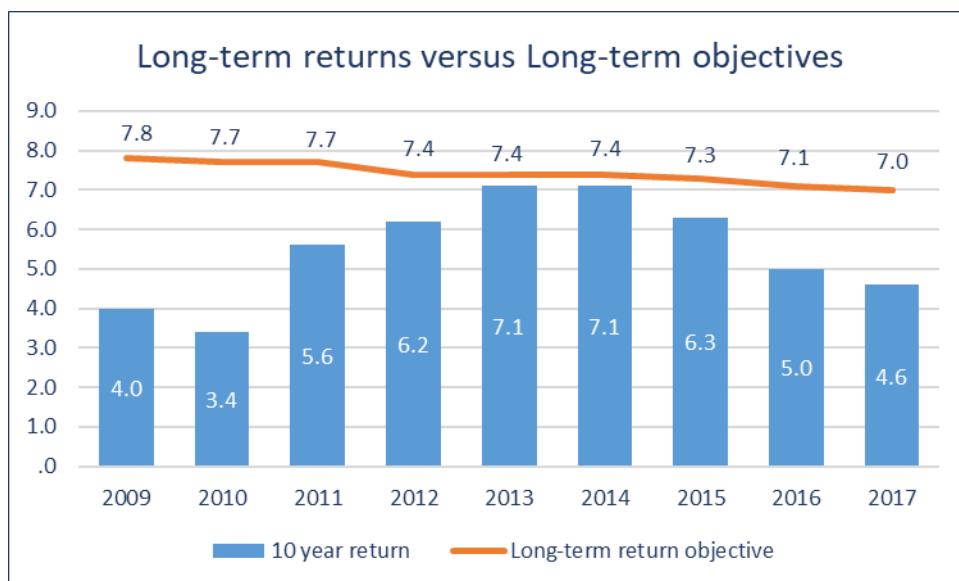
Some of the big endowment funds including Princeton derive almost half of their operating budgets from endowment income. However, there has been rising criticism that larger endowments don't spend enough money or that they could do more. Yale paid out \$480 million in investment management fees while spending only \$170 million of its \$24 billion fund in assisting students with scholarships and other assistance.

4.5 Investment beliefs and strategies

David Swensen, the chief architect behind Yale's success, described that the long-term time horizon of the endowments allows them to exploit illiquid, less efficient markets.

According to the NCSE 2017 report, 96% of the study respondents of US endowment funds reported to have a conflict of interest policy in place. This policy relates to taking measures so that executives managing the fund don't exploit their professional capacity for their own benefit at the expense of the university or the stakeholders. It has been documented that this number is relatively stable over time (and above 95%). Hence, in principle, almost all the Endowment funds adopt policies in place, however, it cannot be concluded whether it's been implemented effectively. Continuing with the results from the survey, 91% of the respondents reported to have a consistent spending policy while the remainder reported to decide on the appropriate spending rate on a yearly basis.

Consistent with the results from the asset allocation, 86% of the respondents go beyond the traditional asset class and strategic allocation to construct their portfolios. Endowments use various strategies relating to risk reduction, inflation protection and other liquidity measures among others. One of the striking results found during the NCSE study was that only 69% of the respondents reported to have long-term investment objectives. This number is even lower (58%) for institutions above with assets over \$1 billion and institutions with assets under \$25 million. If we compare the analysis on the institution type level, public institutions are more likely to have a set return objective compared to private schools. Moreover, they also have higher return objectives (7.1% compared to 6.9% for private).

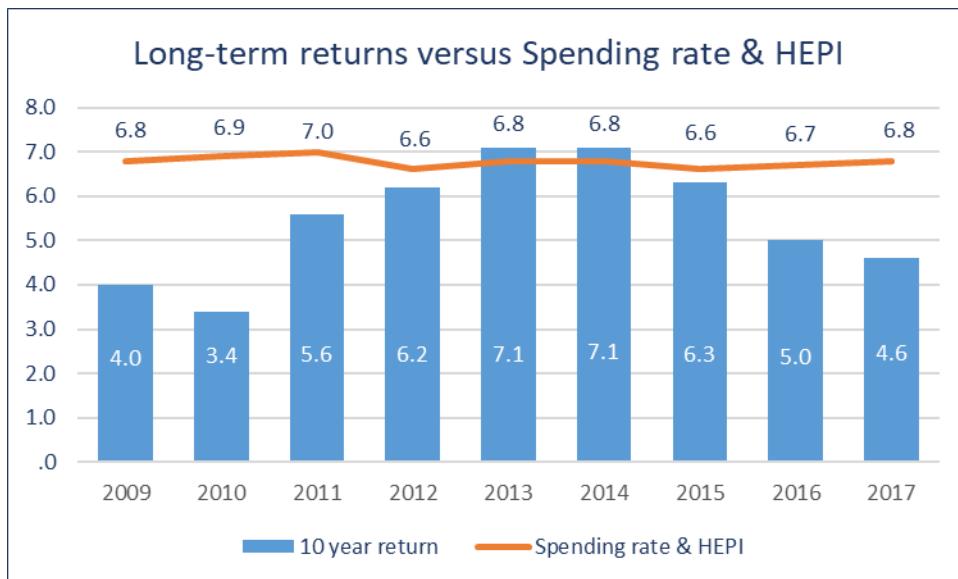


Source: 2017 NACUBO-Commonfund Study of Endowments

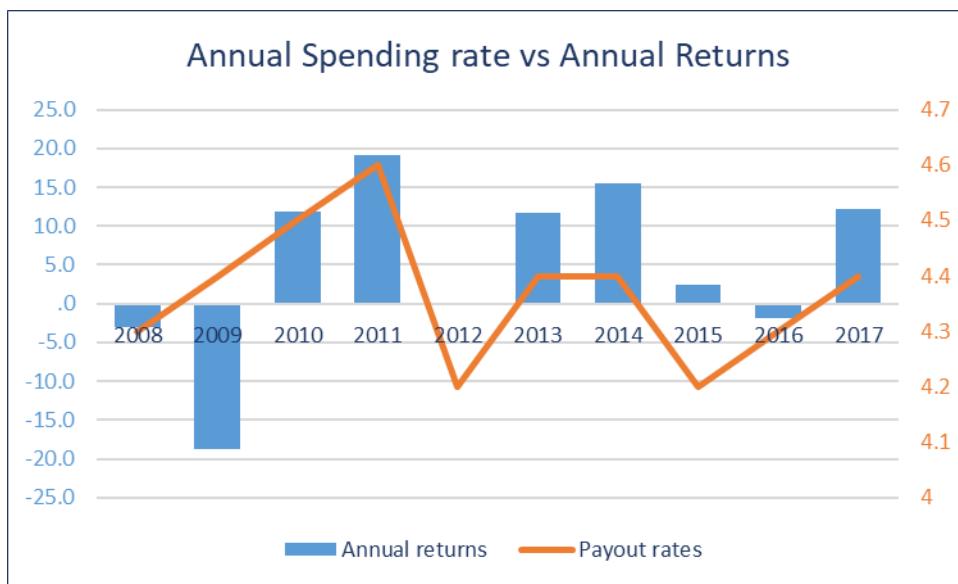
Comparing the long-term trend of (10 year) returns versus long-term objectives, institutions have never been able to perform meet their objectives. That explains the why the optimism as far the average long-term return objectives are concerned has been consistently lowered over the past decade. In principle, the return objectives should be enough to cover the spending rate and the inflation over time. Objectives are based on both these parameters, looking at the result from the past decade – average spending rate has been 4.4% while the increase in cost during the same time period 2.4% (as per report from HEPI The Higher Education Price Index). This sums up to 6.8% which closely aligns with the average return objective of 7.0%. Hence, this provides an indication that return objectives are based on the average spending rates and the increase in costs over time.

As mentioned above, the percentage of universities adopting the long-term objective is relatively low. However, almost all the institutions have a written investment policy statement (IPS) in place. Perhaps, this stem from the regulatory requirements around having an IPS in place. A comprehensive IPS defines clearly stated objectives of the endowment including the return objectives. Typically, objectives of an endowment would include providing a steady flow of income to the university, keeping up with the increase in spending and inflation over time and maximizing risk-adjusted returns. As per survey from NACUBO, almost all the institutions have an IPS in place, however, only 68% have a long-term return objective. This raises question whether IPS developed is comprehensive and effective enough.

Comparison of the long-term return versus the spending rates over time also provides an interesting picture. Barring 2013 and 2014, US endowment's average long-term returns have never been enough to keep up with the sum of average spending rates and increase in cost of education (HEPI, the average increase over the past 10 years has been 2.4%).



(Source: 2017 NACUBO-Commonfund Study of Endowments)



(Source: 2017 NACUBO-Commonfund Study of Endowments)

The above chart compares annual spending rates with annual returns for a time period from 2008 to 2017. Following the years of negative returns, institutions tend to increase their spending rates and spending payout rate after years of positive returns. Analyzing the payout rate of 2017, it increased to 4.4 percent, compared to 4.3 percent in FY 2016 and 4.2 percent in FY2015. This could potentially be attributed to the lower returns in the FY2015 and FY2016. Similar patterns emerge in the beginning of the chart, negative returns in FY2008 and FY2009 is followed by a sharp spike in FY2010 and FY2011 payout rates. Furthermore, institutions with assets over \$1 billion also have the highest spending rates and it decreases with size.

As per survey from NACUBO, 73 percent of the respondent in FY2017 reported to have used the moving average of endowment value in order to calculate their spending/payout rate.

Table 9: U.S. Institutions Change in Endowment Market Value from FY2001 to FY2017

Rank	Institution Name	FY2017 (in \$,000s)	FY2001 (in \$,000s)	Change in Mkt Value (%)
1	Harvard University	36,021,516	17,950,843	100.7
2	Yale University	27,176,100	10,725,100	153.4
3	The University of Texas System	26,535,095	9,363,588	183.4
4	Stanford University	24,784,943	8,249,551	200.4
5	Princeton University	23,812,241	8,359,000	184.9
6	Massachusetts Institute of Technology	14,967,983	6,134,712	144.0
7	University of Pennsylvania	12,213,202	3,381,848	261.1
8	The Texas A&M University System	11,556,260	4,030,881	186.7
9	University of Michigan	10,936,014	3,614,100	202.6
10	North western University	10,436,692	3,256,282	220.5
11	Columbia University	9,996,596	4,292,793	132.9
12	The University of California	9,787,627	4,702,729	108.1
13	University of Notre Dame	9,352,376	2,829,914	230.5
14	Duke University	7,911,175	3,131,375	152.6
15	Washington University in St. Louis	7,860,774	3,951,509	98.9
16	The University of Chicago	7,523,720	3,516,238	114.0
17	Emory University	6,905,465	4,315,872	60.0
18	Cornell University	6,757,750	3,151,384	114.4
19	University of Virginia	6,393,561	1,708,199	274.3
20	Rice University	5,814,444	3,243,033	79.3
21	University of Southern California	5,128,459	2,086,245	145.8
22	Dartmouth College	4,956,494	2,414,231	105.3
23	The Ohio State University	4,253,459	N/A	
24	Vanderbilt University	4,136,465	2,159,614	91.5
25	New York University	3,991,638	1,118,300	256.9
26	The Pennsylvania State University	3,990,781	3,381,848	18.0
27	University of Pittsburgh	3,945,687	1,103,082	257.7
28	Johns Hopkins University	3,844,918	1,822,713	110.9
29	University of Minnesota & Foundation	3,493,641	1,431,942	144.0
30	Brown University	3,245,531	1,434,212	126.3

(Source:2017 NACUBO-Commonfund Study of Endowments)

Table 9 provides a list of top 30 largest endowments in terms of market value at the end of FY 2017, along with their values in 2001 and the growth percentage then. The universities highlighted with blue field (20 out of 30) are also on the list of average SAT Scores of the Top 30 U.S. Universities (based on 2017 National University Rankings of U.S. News and World Report). This suggest a strong correlation between the size of the endowment fund and the average SAT score.

Chapter 5 Data and Methodology

5.1 Data

Data used during this study is derived from a variety of different sources. The largest and the most comprehensive data set on US endowment funds is collected by NACUBO-Commonfund Study of Endowment. Data related to funding received by US endowments is derived from Council for Aid to Education (CAE). In regard to the Harvard endowment case study, the data is collected from the Harvard Annual reports 2016 and 2017 edition. For the regression analysis that follows later, information relating to independent variables are collected from National Center for Education Statistics (IPEDS data) and NCSES surveys (WebCASPAR). The following list of variables are used for the purpose of this study.

Summary of explanatory variables

Variable	Value Label	Source of Data
Governance	PrivateDummy Public (reference)	NACUBO
Institution type	MastersDummy BachelorsDummy Doctoral/Research (reference)	NACUBO
Region	NortheastDummy WestDummy MidwestDummy South (reference)	IPEDS
Research activities	Total R&D expenditure	WebCASPAR
Teaching facilities	Student to Faculty ratio	IPEDS
Enrolment	Total entering students at the undergraduate level, fall	IPEDS
Grant	Annual State Appropriation	IPEDS
Student selectivity	SAT	IPEDS

5.2 Methodology

The research question is whether the above-mentioned institutional factors explain the fund growth of US endowments over time (2009-2016) for 71 largest university endowments in the US. To be more specific, fund growth refers to aggregate change in market value. Hence, this does not just capture the investment rate of return but also reflects the net impact of

1. Withdrawals from fund for operations and capital expenses
2. The payment for management and investment fees of the endowment
3. Additions from donor gifts and other contributions
4. Investment gains or losses

This is a replication of previous study done on this topic in the research paper 'The growth and stratification of college endowments in the United States' (Lee, 2009) which identifies the potential predictors of endowment growth as governance, institution type, enrolment, geographical location, region, research activities, state funding, tuition revenue, alumni giving rate (AGR) and student selectivity. AGR and tuition revenue variables are not incorporated into this thesis because of lack of data availability.

The regression model for the above-mentioned research question is as follows:

Endowment performance = $a + b_0 \text{ Gov} + b_1 \text{ Type} + b_2 \text{ Region} + b_3 \ln(\text{R&D}) + b_4 \ln(\text{student-faculty}) + b_5 \ln(\text{enroll}) + b_6 \ln(\text{Appr}) + b_7 \ln(\text{SAT}) + \text{error term}$

Where:

- Gov – this dummy variable refers to whether the type of institution is public, or a private university/college.
- Type – refers to colleges and universities by their highest degree awarded (bachelors, masters and doctoral/research)
- Region – looks at the region in which the institution is situated in the United States whether that has any impact on the endowment value. It includes Northeast, West, Midwest, and South.
- Ln(R&D) – continuous variable which refers to the log of total R&D expenditure per university/college
- Ln(Student-Faculty) – provides information on the ratio of student per faculty
- Ln(Appr) – total state grant aid provided to the university/college
- Ln(SAT) – provides information on the SAT score required to be accepted at a particular university/college

Potential limitations of this methodology are that a fund may have a policy where it would distribute all of its funds to the institution once it reaches a certain amount. Hence, it may not reach its potential value despite having favorable characteristics. Moreover, the study is limited to a time period from 2009-2016 and large funds only. Which could mean that there's a potential upward bias however, most of the results are more in line with the findings from previous literature. Furthermore, this study is limited to the institutional characteristics discussed in the previous literature, it could be that there are other institutional characteristics which might also be important to endowment growth.

Chapter 6 Empirical results

In this chapter, results related to the regression test are discussed and compared with the findings from previous literature. Summary output table provides an overview of several factors used to explain variation in endowment value out of which student to faculty ratio, enrollment (total students enrolling in fall every year) and SAT score that are statistically significant in explaining the variation of endowments. The regression analysis in this study used eight years of change in endowment value as the dependent variable. Below table provides a comparison between the lee (2009) model and the model used in this paper. The differences between the two papers are highlighted with bold fonts.

Comparison of statistical significance of variables used to explain the variation in endowment value of large US endowment funds (5% level)

Variables	This paper	Lee (2009)
Enrolment	Significant and positive beta	Significant and positive beta
Appropriation	Insignificant and negative beta	Insignificant and negative beta
R&D	Insignificant and positive beta	Significant and positive beta
SAT	Significant and positive beta	Significant and positive beta
Governance	Insignificant and negative beta	Significant and negative beta
Type	Insignificant and positive beta	Significant and positive beta
Region	None of the regions are significant	None of the regions are significant
Tuition revenue	Data not available	Significant and negative beta
Annual giving rate	Data not available	Significant and positive beta

Source: "The growth and stratification of college endowments in the United States by" Hsiu-Ling Lee (2009)

Student selectivity - SAT scores appear to be significant factor in this model. One possible explanation of this could be that it is correlated with the institutions prestige. The best endowed institutions are highly esteemed or highly selective such as Harvard, Yale or Stanford. Higher SAT scores are usually associated with student selectivity of the institution which raises its prestige. These findings are consistent with the previous studies. Barber and Wang (2013) document performance persistence among the elite institutions.

Research activities - In this model, surprisingly, R&D expenditure is not significant in explaining the variation. This could potentially be attributed to the time period being chosen. However, previous studies (Geiger, 1985 and Lee, 2009) have documented that R&D factor is significant as institutions with more research activities also create the need to

establish more fund-raising campaigns. Another potential reason is that research universities attract more and wide variety of different types of donors (think of cancer research foundation or space exploration research), hence leading to larger endowment value overtime.

Region – University's region has no impact on the variation in endowment value (Similar to previous literature findings).

Teaching facilities - This factor relates to the student-faculty ratio i.e. the number of students per faculty. Lower ratio leads to a higher positive endowment growth; hence it is negatively correlated with the endowment growth. Highly esteemed institutions usually have better facilities and more funds that can be used to hire more faculty and hence there are more faculties available per students.

Governance - Governance relates to whether the institution is public or private. Findings from the model suggest that private institutions are statistically insignificant in explaining the variation in endowment growth.

Enrollment - This factor is about the number of students enrolled in the institution during fall (which is the start of an academic year). It is statistically significant and positively correlated with endowment growth. Possible explanation for this result is because these institutions are large, they are more popular among students for application. And this popularity makes it easier for them to raise money from donors leading to higher endowment value.

Institution type - Dummies including masters and bachelor's degree are not significant in explaining the variation in fund growth. However, previous research (Lee, 2009) presents that doctoral universities have been able to grow at a much faster rate compared to its counterparts.

Grant - Annual state appropriation is the annual grant provided to the university by the state. It is not statistically significant, however its negatively correlated. It means that the lowered amount of grant aid has forced the universities to look for other sources of income including focus on endowment growth. Findings from Lee (2009) suggest that annual state appropriation is a statistically significant factor.

Overall, the model explains about 63% variation in endowment value during the time period chosen. Two other factors that are not part of the model due to lack of data availability but have been used in the previous literature are annual giving rate and tuition revenue.

Possible explanation for positive relationship between tuition revenue and endowment growth is that due to increased tuition fees and budgets constraints from federal governments, it has forced these institutions to look for alternative source of income. Hence, there has been more focus on growth of these endowments, which can be used as a source of income to fund operational activities.

Another important institutional factor is AGR (alumni giving rate), prior research on this topic indicate that AGR is based on the alumni satisfaction. Alumni support is an important source of funding for university, hence having a strong relationship with alma mater can benefit the university in the long-run. Overall, institutional factors such as R&D expenditures, SAT scores, student enrollment, research institutions are closely associated with the institution quality which contributes towards endowment growth.

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0,793
R Square	0,629
Adjusted R Square	0,621
Standard Error	0,253
Observations	511

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	11	54,147	4,922	76,829	0,000
Residual	499	31,971	0,064		
Total	510	86,118			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-19,591	2,377	-8,243	0,000	-24,261	-14,922
PrivateDummy	-0,010	0,051	-0,198	0,843	-0,110	0,090
MastersDummy	0,134	0,109	1,232	0,219	-0,080	0,348
BachelorsDummy	-0,052	0,073	-0,717	0,474	-0,196	0,091
NortheastDummy	-0,052	0,032	-1,620	0,106	-0,115	0,011
WestDummy	-0,087	0,049	-1,797	0,073	-0,183	0,008
MidwestDummy	0,010	0,035	0,287	0,774	-0,059	0,079
Total R&D expenditure	0,012	0,038	0,329	0,743	-0,062	0,086
Student to Faculty ratio	-1,078	0,142	-7,583	0,000	-1,357	-0,799
Total entering students at the undergraduate level, fall	0,671	0,080	8,362	0,000	0,514	0,829
Annual State Appropriation	-0,019	0,025	-0,753	0,452	-0,068	0,030
SAT	8,811	0,769	11,463	0,000	7,300	10,321

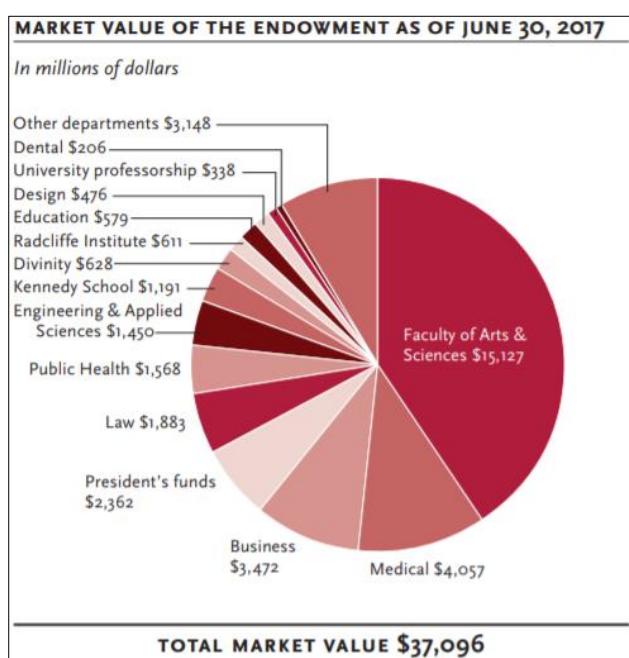
Chapter 7 The Harvard Endowment – a case study

7.1 Introduction

Having looked at the overall endowment trends and potential institutional factors that affect and are correlated with large endowment's growth, it is interesting to look at a particular fund like Harvard in detail to deep dive into the functioning of the endowment, payout policy, investment strategy and asset mix. Harvard is the largest university endowment in the world and in the recent times, there has been a lot of changes made within the organization and management of institution. All these topics are discussed below in this chapter.

7.2 Harvard Endowment

Harvard Endowment fund managed by Harvard Management Company is the largest financial asset of the university used as a source of income to fund faculty and student. Drew Faust, 28th president of the Harvard University, said in a speech that 'It is not a 31 billion-dollar chequing account' and that 'it's a is a critical strategic asset for university'. Harvard University's endowment is the largest academic endowment fund in the world, it was valued at 37.1 billion dollars as of June 2017. In chart below provides an overview of the split per division within the university.

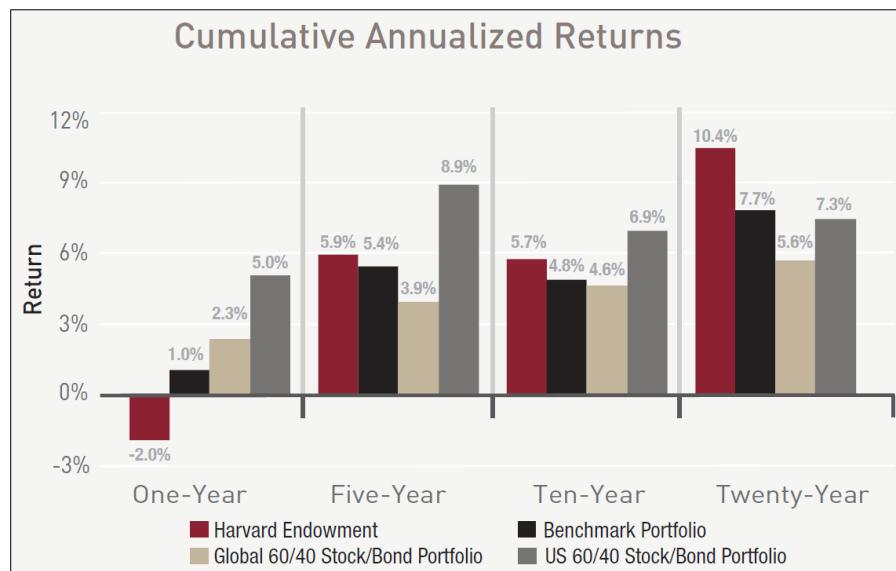


Source: Harvard University. *Financial report, fiscal year 2017*

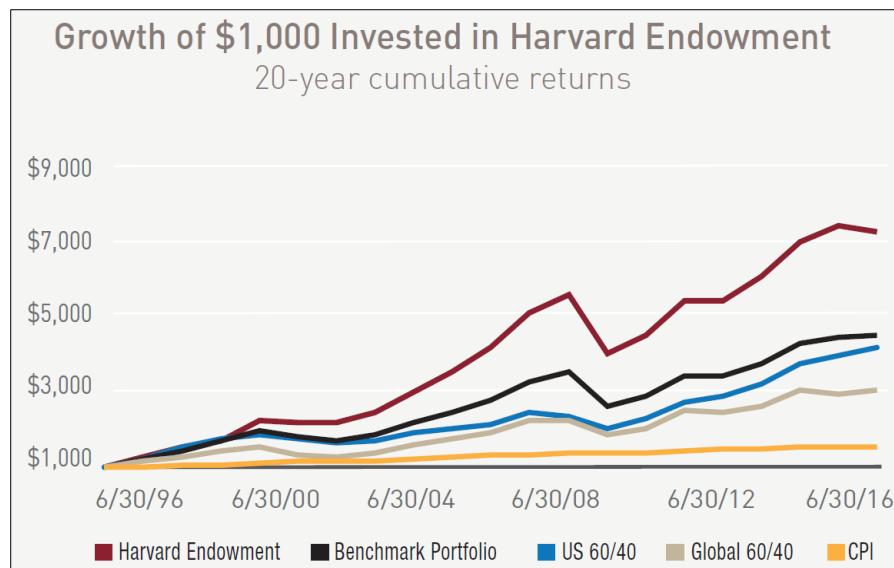
Two things important to know about the Harvard Endowment, as per Drew Faust speech,

1. It is restricted
2. It is forever

They follow the notion of 'vigorous immortality', vigorous meaning that the endowment focuses on having a current impact based on the spending they make as the donors and the general public who support these funds want to see immediate results, while also keeping in mind the immortality aspect i.e. ensuring that they continue to grow forever. Looking at the performance of the fund, the past one-year and five-year return has been lagging behind the benchmark portfolio. Although, the twenty-year return has been way above all the different benchmark at 10.4 percent (in FY 2017, it earned 8 percent return). This makes the case of Harvard an interesting one, there has been lot of changes in the leadership in recent years and hence lot of changes in investment strategy. As per the president's newsletter "...we now face challenges to our continued success".



Source: Harvard University. *Financial report, fiscal year 2017*



Source: *Harvard Management Company, Annual Endowment Report, September 2016*

How it works: Harvard fund consists of 13000 funds in total (although funds are invested as a single entity), out of which 30% of it is unrestricted which is used for the purposes of salary & wages, space & occupancy, financial aid, supplies & equipment. However, larger portion of the fund is restricted (70%) for specific purposes including professorships, financial aid, maintenance, libraries and museums.

Unrestricted (30%)	Restricted (70%)
Salary & wages	Professorships
Space & company	Financial aid
Financial aid	Maintenance
Supplies & equipment	Libraries and museums

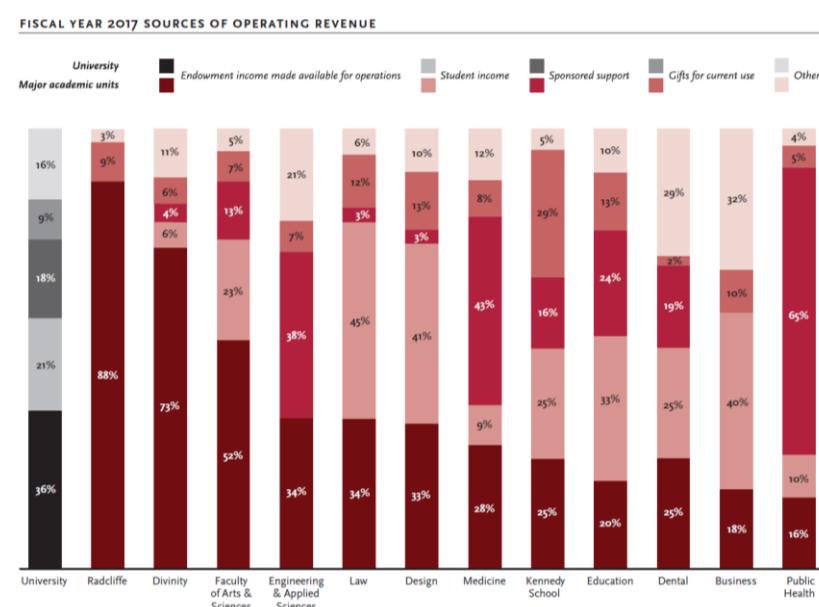
Source: *Harvard at a Glance, <https://www.harvard.edu/about-harvard/harvard-glance>*

Each division within university owns a portion of the endowment, much like an individual investor holding shares in a mutual funds, and these division receive their share of distributions based on the number of units owned. Furthermore, the reliance on endowment income across different faculties within Harvard University varies. For example, due to the Harvard Business Review publishing and the executive education division, the Harvard Business School gets additional revenue other than just the income from tuition, hence they are less reliant on endowment as a source of income. While the Faculty of Arts and Sciences does not have these additional sources of income making them more dependent on endowment fund for income. In this situation, the percentage of fund allocation between restricted and non-restricted use becomes even more important as they

would like to have more of the funds to be allocated towards non-restricted fund (more flexibility).

The below table provides an overview of source of operating revenue for different academic units of the university. Radcliffe Institute for Advanced Study is most reliant as it gets 88% of its income from the endowment fund. While on the other side, endowment income makes up only 18% and 16% for the business school and public health division respectively. Overall, the university derives about 36% of its operation revenues from endowment funds.

Endowment income, that is made available for operations is by far the largest contributor to its operating revenue.



Source: Harvard University. Financial report, fiscal year 2017

Since the 1980s, the importance of endowment at Harvard has increased over time. In 1983, the endowment contributed about 19% of the total operating revenue, which increased to 36% in 2017. Hence, the rise of the endowment fund is making Harvard university 'endowment dependent'. This makes the university more exposed and vulnerable to the volatility in the endowment (caused by volatile financial markets).

Payout Policy: HMC determines the spending policy of the endowment based on the financial situation of the university along with the collective needs of the individual schools. Usually the spending target rate would be between 3 to 6 percent, as it can be seen from the historical rate over time, however the actual spending as a percent of the total budget

has increased over time. The quote below from university's most recent annual report summarizes the Harvard's payout policy:

"The University's endowment distribution policies are designed to preserve the value of the endowment in real terms (after inflation) and generate a predictable stream of available income. Each fall, the Corporation approves the endowment distribution for the following fiscal year. The endowment distribution is based on presumptive guidance from a formula that is intended to provide budgetary stability by smoothing the impact of annual investment gains and losses. The formula's inputs reflect expectations about long-term returns and inflation rates."

Source: *Harvard Management Company, Annual Endowment Report, September 2017*

Harvard allocates 70 percent weightage on prior fiscal year spending and 30 percent weighting to the current or projected market value of the endowment. This formula is subject to change depending on the fluctuations in market value of the endowment due to extreme returns. Harvard magazine's article 'How the Endowment Distribution is set' provides a simplified example as to how Harvard's payout (liability) is calculated. Assuming that the endowment value is 100 dollars, a payout of 5 percent (5 dollars) and an investment return of 10 percent, this would result in a market value of 104.5 dollars (\$100 minus \$5 spending equals \$95; 10 percent investment return results in a value of 104.5 dollars).

- Step 1: current distribution of \$5, after adjusting for inflation (usually HEPI) of 3 percent leads to a payout of \$5.15 for the next year which is then assigned a weight of 70 percent to come up with \$3.61
- Step 2: next step is to assume a rate of return (for example 8 percent) and the starting value of \$104.5 minus \$5 payout equals \$99.5. This amount is multiplied with 1.08 yielding a projected value of \$107.46. This value is used to calculate the targeted 5 percent payout – which equals \$5.37 and this sum is weighted at 30 percent leading to a sum of \$1.61
- Step 3: both these weighted sums are added together to come up with a distribution amount (\$3.61 plus \$1.61) of \$5.22

- Step 4: dividing the \$5.22 by the initial payout of \$5 yields a growth rate of 4 percent in spending amount in the next fiscal year.

Harvard University's Historical Endowment Spending

Year	Revenue from Endowment	% of Total operating revenue
1983	\$105M	19%
1993	\$260M	20%
2003	\$851M	33%
2013	\$1.5B	36%
2017	\$1.8B	36%

Harvard University's Historical Endowment Spending

Fiscal Year	Endowment Value (\$millions)	Endowment Spending (\$millions)	Annual % Increase in Spending	Endowment Spending as a % of Endowment	Endowment Spending as a % of Total Harvard Budget
1982	1.617	82	7	5,1	14
1983	2.307	95	15	5,8	14
1984	2.188	105	11	4,6	15
1985	2.695	111	6	5,1	14
1986	3.435	118	6	4,4	13
1987	4.018	125	6	3,6	13
1988	4.156	135	7	3,3	13
1989	4.479	149	11	3,6	13
1990	4.651	180	21	4,0	15
1991	4.646	193	7	4,2	17
1992	5.087	207	7	4,5	17
1993	5.733	225	9	4,4	17
1994	6.151	260	16	4,5	19
1995	7.002	283	9	4,6	19
1996	8.606	307	8	4,4	20
1997	10.688	332	8	3,9	21
1998	12.741	394	19	3,7	24
1999	13.882	430	9	3,4	24
2000	18.233	556	29	4,0	28
2001	17.594	615	11	3,3	28
2002	16.900	749	22	4,8	32
2003	18.589	771	3	5,1	31
2004	21.849	808	5	4,9	31
2005	25.193	855	6	4,5	31
2006	28.590	933	9	4,3	31
2007	34.252	1.044	12	4,3	33
2008	36.194	1.201	15	4,1	35
2009	25.369	1.443	20	4,1	38

Source: Harvard Management Company (2010)

Case study

Asset mix: Below table provides an overview of the asset mix across different asset class over time of Harvard Endowment fund. Consistent with the pattern mentioned before (for all other endowments), Harvard has also reduced its allocation towards traditional assets. In 1992, domestic equities made up 40 percent of its entire portfolio which made up about 10 percent in 2016. Allocation towards private equities and emerging markets has increased over time as it has been the case in general that managers tend to look for opportunities abroad due to competitive markets, high pressure of delivering alpha. Although, it has been made easier due to globalization, better liquidity, transparent markets.

Harvard University's Historical Asset Mix							
	1992	1996	2000	2004	2008	2010	2016
Domestic equities	40	36	22	15	12	11	10
Foreign equities	18	15	15	10	12	11	7
Emerging markets	-	9	9	5	10	11	11
Private equities	12	15	15	13	11	13	20
Total	70	75	61	43	45	46	48
Absolute return	-	-	5	12	18	16	14
High-yield	2	2	3	5	1	2	1
Commodities	6	3	6	13	17	14	10
Real estate	7	7	7	10	9	9	14
Total	15	12	21	40	45	41	39
Domestic bonds	15	13	10	11	5	4	9
Foreign bonds	5	5	4	5	3	2	1
Inflation-indexed bonds	-	-	7	6	7	5	2
Cash	-5	-5	-3	-5	-5	2	1
Total	15	13	18	17	10	13	13

Source: *Harvard Management Company (2010) Case study*

However, investments in these asset classes are less liquid, hence during times of financial crisis, it can lead to losses and have an effect on the spending amount that's been provided to the university. Large majority of the assets are tied to long term illiquid assets i.e. it would take more than five years for the endowment to liquidate majority (44) of its assets, while about 22 of its assets can be liquidated within 5 days. For the rest of the assets, the number varies between a few days to a max of less than 5 years.

In terms of exposure towards countries, HMC invested 50 percent of its endowment assets in USA in 2010. Hence large portion of its investments are being allocated in domestic market itself, which is obvious given how big the US capital market is. The table on the right provides an overview of the HMC's investment exposure in top 10 countries. Eurozone accounts for about 7 percent of the investments by HMC, while Brazil makes up 5 percent and the rest is split between other countries. Overall, HMC's investments are highly concentrated in US market.

Exposure	%
USA	50
Eurozone	7
Brazil	5
Japan	3
India	3
UK	3
New Zealand	3
China	2
Sweden	1
Canada	1

Investment strategy: Historically, Harvard has been following 'The Hybrid Model' in which it would manage money both in combination with internal and external managers. The mandate for both types of manager was to beat the market and generate alpha. This approach was bit different than majority of the university endowments who would outsource 95-100 percent of their assets to external managers. As it can be seen in the below table that the percentage of assets managed by the external managers has increased over time and the reason behind this (as identified in the HMC case) was manager spinouts. Internal managers left HMC to form their own companies and almost in all cases continued to manage Harvard's funds due to favorable fee arrangements.

HMC, Percentage of Assets Invested with Internal and External Managers												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Internal	69	61	62	74	62	62	55	49	43	38	34	33
External	26	33	36	32	46	43	43	52	61	68	73	64
Cash	5	6	2	-6	-8	-4	2	-1	-4	-5	-7	3

HMC, Number of External Investments in Managers Trading Public Assets												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	6	8	10	11	15	14	18	23	35	62	86	62

Source: *Harvard Management Company (2010) Case study*

In general, internal portfolio managers would be assigned with responsibilities of coming up with their own ideas, structuring a portfolio and managing their mandate (e.g. international equities) based on "Silo" approach (it is an approach where investment professionals focus their work within specific asset class). The hybrid model was cost effective as it would cost about 1-2 percent in management fees from external managers, while it costs a quarter of that to have it managed by the internal managers. From a cost perspective, it would make sense to have all the funds managed inhouse. However, it's not realistic given that HMC

would miss out on outside talent and potential higher return. Outsourcing funds to outside managers potentially result in lack of transparency, liquidity risks and lack of control in terms of what investments are being made in detail. Hence, it could potentially lead to reputational risks affecting the flow of donations that's being made to the university.

HMC has been consistently lagging in terms of performance in the last few years. As per the newsletter from the newly hired President of HMC, N.P. Narveker "Endowment's returns are a symptom of deep structural problems at HMC for years and these matters have challenged HMC for years". Based on their new strategy, they have been moving away from Silo approach towards a more Generalist model. Under Silo, managers conducted research and analysis within their own asset class sometimes leaving gaps in the overall portfolio and redundant duplication. While under the generalist investment model, the investment team takes ownership of the entire portfolio and not just the asset class assigned to them. The primary emphasis is on the performance of the entire portfolio, this is made possible by sharing ideas and having discussions across different teams who work in conjunction to identify investment opportunities not just in a particular asset class, but also across all of the investment universe.

The new investment strategy identified is a five-year process, which will transform the organization's structure and portfolio. Harvard will move a substantial portion of its investments to outside managers, about half of the investment staff at HMC is laid off in the past year outsourcing investments to be managed by external managers. Thus, the strategy going forward is to have the investments managed by external managers. The reasoning behind these changes is increased competition by external managers making it difficult to attract and retain top investment talent and keeping up to date with exploiting rapidly changing investment opportunities. They will close all of its internally managed hedge funds by the end of the fiscal year. Given that it will take a while before all the illiquid investments mature and the new strategy is fully implemented, the ultimate effects of these new changes will not be completely reflected in the short-term. For a large endowment such as Harvard, making changes within portfolio in terms of investment strategy is not easy undertaking. It's a result of few years of underperformance, and issues within the organization.

This new strategy raises questions such as:

- What is the optimal split between internal versus external managers?

Clearly, based on these new strategies, Harvard endowment is leaning more towards outsourcing most of its investments to external managers. For a university endowment to have inhouse investment management, the size of the fund matters. Due to economies of scale, it makes sense for larger funds to have inhouse investments however, for smaller funds it may not be feasible given the capital flow competition in the current markets and the ability to attract talented managers. Hence, for smaller funds, the key is to setup excellent practices in terms of being able to identify top quality external managers and that the investment philosophy of these external managers is closely aligned with that of the endowment. In essence, there is no optimal split that would fit for all the endowments, instead its different for every endowment.

- Whether there should be a liquidity benchmark to compare to

Large endowments took almost a decade to arise at the same level they were before the 2008 recession. Given the fact that a large proportion of the fund is restricted for specific purpose and invested in illiquid assets, it is important for endowments to carefully evaluate their liquidity positions (including conducting stress test, scenario analysis) specially if the reliance on income from the endowment is higher.

- Income from endowment accounts for one-third of Harvard's revenue. Should the risk appetite of the endowment change to reflect 'endowment dependency'?

The asset allocation decisions should be in line with the objectives of the 'client' i.e. the university. Large proportion of assets are invested in alternatives, but going forward, given the increasing importance of these endowments, it maybe that institutions may not be able to afford taking on more risk by investing in risky assets.

Overall, binding this section back to the research question (factors influencing the variance in endowment growth), an endowment such as Harvard has benefited from its reputation (related to SAT score) over time and has been able to raise large sum of money helping its endowment value grow. Hence, it is consistent with the statistical analysis done previously

about SAT score and its relationship with endowment growth. Moreover, given its large size it has been able to invest in alternative assets which otherwise would be difficult to replicate.

Chapter 8 Summary and conclusions

The main idea of this research focuses on analyzing certain institutional characteristics and determining whether similarities among large endowments provide a plausible explanation for endowment growth. Three institutional characteristics that are found to be statistically significant in explaining the endowment growth include student to faculty ratio, student enrolment and SAT score. These findings are consistent with previous study Lee (2009).

SAT score is often associated with institutions selectivity and prestige, it is shown to have a positive impact on the endowment growth. Total enrolment also has a positive impact on the endowment growth as large institutions tend to attract large number of students. Hence, they are able to generate larger tuition revenue. Lower student to faculty ratio leads to a higher positive endowment growth; hence it is negatively correlated with the endowment growth. Highly esteemed institutions usually have better facilities and more funds that can be used to hire more faculty and hence there are more faculties available per students.

Other than the main research question, this study also looked at the history of endowments in US, the role they play in universities and how important they have become for university operations that endowment income makes up large part of university revenue. Further analysis about the payout policies of university endowment has been done. Historically, the payout range has been between 4 to 5.5 percent. In terms of asset mix, the trend has been that allocation towards alternatives investments have been increasing specially for large funds. Furthermore, a case study on Harvard endowment fund has been performed which provides insights into a particular fund.

The factors that are significant in explaining the endowment growth relates to the prestige, size and quality of the institution. It could be that because of this prestige, they receive large sum of donations. Larger endowment funds have variety of different faculties which attracts generous donations from different types of donors. Moreover, they also have the ability to invest a large portion of their assets into alternatives asset classes which has helped them

achieve superior returns, although it could be a disadvantage to lock up a large portion of their cash into illiquid assets as seen in the recession of 2008.

Policy recommendations:

In conclusion, for a newly started endowment fund such as Erasmus fund, focus should be on maintaining prestige, integrity when it comes to functioning of the fund. Having a sound governing board overviewing the endowment performance and payout policy ensures that the endowment fund is investing and distributing funds the way it's supposed to, instilling more confidence in donors. Hence, having proper framework and guidelines could boast potential gifts. Financial knowledge of endowments governing body is positively associated with the higher total return (Binfare, Brown, Harris, Lundblad, 2018). Hence, selection of qualified board members can have positive influence on the fund. Another characteristic is the amount of research activities performed at the university. Higher spend on research attracts different types of donors. Furthermore, Donors are drawn to donating their money to institutions who are good custodian of the assets. Having a close relationship with alma mater have been found influential in endowment growth as alumni has been an important source of raising money. From an investment prospective, suggestion is to outsource funds to be managed by external managers. The key point to keep in mind with regards to the effective use of endowment as a strategic asset is to closely align the operating needs of the university with the capital structure of the endowment (just like any other company). Hence, decisions regarding the investment strategies should be based on what is the university trying to do and what are the current financial challenges faced by the university.

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