

## The impact of inflation on endowment assets

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### ABSTRACT

Maintaining spending power in real terms (current) while preserving an endowment's value in real terms (future) is the crux of intergenerational equity. Tobin's (1974) model provides the conceptual basis on which simulations were developed to study the impact of various inflation (0%, TIPS, CPI, HECA, and HEPI) and new giving scenarios (\$0, \$4 million and \$8 million) on the value of the USD Foundation endowment as well as the value of the future payouts from the endowment. All inflation scenarios except 0% inflation require new gifts to the endowment to maintain or grow the inflation-adjusted value of the endowment with a 6.85% nominal return, 4.80% payout and 2% administrative fee. With \$8,000,000 in annual new gifts to the endowment, the inflation-adjusted value of the endowment grows in all five inflation scenarios. With \$4,000,000 in annual new gifts to the endowment, the inflation-adjusted value of the endowment grows over time in the 0%, TIPS, and CPI inflation scenarios but declines in the higher inflation scenarios (HECA and HEPI). The level of new gifts required to provide for intergenerational equity was also determined; new giving increases the size of the payout on a dollar-for-dollar basis. Holding the sustainable payout rate constant at 4.80% and using HECA as the inflation assumption shows that the "break-even" calculation is \$4,946,170 in new gifts per-year. Finally, the sustainable payout rate under the assumption of zero new gifts was determined. As expected, the sustainable payout decreases with higher inflation and is lower than the current payout rate.

Keywords: endowment value, inflation, intergenerational equity, sustainable payout rate, real value

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## INTRODUCTION

Balancing the present with the future is the crux of intergenerational equity. It is difficult to balance maintaining spending power in real terms (current) with preserving an endowment's value in real terms (future). Tobin's (1974) model provides the conceptual basis for understanding the sustainability issues surrounding the University of South Dakota (USD) Foundation and was used to develop simulations to study the impact of various inflation (based on different methods for measuring the inflation rate) and new giving scenarios (\$0, \$4 million and \$8 million) on the value of the endowment as well as the value of the future payout from the endowment.

### Review of the Literature

The following sentences taken from *the Hammond Associates Research Note* entitled "Inflation and the Implications for Endowment Investments" explain the importance of inflation. "Liabilities, and the ease by which they are met, are largely affected by future price levels. Inflation is a significant risk for endowments because costs will increase, requiring ever larger distributions from the endowment to keep services the same." This statement lays the groundwork for the difficult decision that endowment trustees face. Nobel laureate James Tobin expressed the position of the trustees as follows: "The trustees of an endowed institution are the guardians of the future against the claims of the present. Their task is to preserve equity among generations" (Tobin, 1974).

### Measuring Return and Inflation

The nominal return on an investment is the rate at which the dollar value of the investment grows. In contrast, the real return, also known as the inflation-adjusted return, is the rate at which the purchasing power of the dollars will grow. Stated in another way, higher inflation rates lead to larger differences between nominal and real returns. The Fisher equation describes the relationship between the nominal and real return as follows:

$$(1 + \text{Nominal Rate}) = (1 + \text{Real Rate})(1 + \text{Inflation})$$

There are, of course, different ways that inflation might be estimated. For example, the traditional measure of inflation as reported by the news media is the percentage change in the Consumer Price Index (CPI). There is also the Higher Education Price Index (HEPI) as well as the Higher Education Cost Adjustment (HECA).

Each of these price indices can be used to adjust nominal prices over time. The CPI is an economy-wide price index using a basket of consumer goods. Since higher education institutions are not usually buying a basket of consumer goods, an industry specific index may be more appropriate in some cases. "One such legitimate application is budget planning because administrators tasked with estimating future budget requirements will find an industry specific price index more useful than a broad-based index such as the CPI in assessing likely future costs. This is because the industry specific index is a closer match to actual spending patterns of the institutions. If the rate of change in prices between the things colleges buy and all the other items in the economy is different, then the industry specific price index will give a more accurate picture of budgetary requirements" (Gillian and Robe, 2011).

The CPI is maintained and published by the Bureau of Labor Statistics on a monthly

basis. It has a variety of measures including CPI-U for urban consumers, measures for regions of the country, measures for rural communities, and measures excluding energy and housing costs. The CPI is an index of over 80,000 items in a market basket of goods purchased by consumers. It is widely acknowledged that the CPI has statistical bias related to substitution and quality adjustments (see Advisory Commission (1996) and Johnson, et al (2006)).

There are currently two price indices for measuring costs specific to higher education. The Higher Education Price Index (HEPI) was originally published in 1961 and maintained by Research Associates of Washington, D.C. In 2005, Commonfund Institute assumed management of HEPI. The index is calculated by collecting data for categories of goods that colleges buy. The categories are based on price data for 45 budget components that all schools can report, organized in eight component sub-indexes: faculty salaries; administrative salaries; clerical salaries; service employee salaries; fringe benefits; miscellaneous services; supplies and materials; and utilities. HEPI has a self-referential problem in that the salaries reported to construct the index are often themselves indexed to HEPI. Also, there is no adjustment for changes in quality. Both of these biases may cause the HEPI to overstate the cost increases in higher education. According to the Commonfund (January 2005), the HEPI-CPI correlation was 0.92 from 1994 to 2004. The HEPI average is usually 1-2% higher than the CPI.

The Higher Education Cost Adjustment (HECA), like the HEPI, measures the cost of items that universities usually buy. The methodology of HECA is not as in-depth as HEPI but also does not have the self-referential problem of the HEPI. The State Higher Education Executives Officers construct the HECA index by gathering data on salaries of workers in closely related fields instead of surveying universities. Specifically, HECA is constructed from two federally developed and maintained price indices—the Employment Cost Index (ECI) and the Gross Domestic Product Implicit Price Deflator (GDP IPD). Based on historical data, the HECA appears to grow faster than the CPI but not as fast as the HEPI.

Given current monetary policy in the United States as well as the global financial and fiscal situation, it does not appear that inflation will increase in the immediate future. The yield on 10 year Treasury bonds was 1.40% in July 2012, and the rate on newly auctioned 10 year Treasury Inflation Protected Securities (TIPS) was -0.637%. TIPS provide a real return since they are inflation protected. Therefore, 10 year TIPS were pricing in a negative real return in July 2012. Putting the 10 year T-Bond information, which represents the return on nominal debt, together with the TIPS return, which is a real return, allows us to impute an implied inflation expectation of 2.05% using the Fisher equation.

### **The Real Return on the Endowment**

While the University of South Dakota (USD) enjoys support from the state of South Dakota as a public institution, only about one-third of the University's budget currently comes from the state. State support of public institutions has been shrinking in recent decades, which places more pressure on University endowment funds to provide additional support. The current payout rate for the USD Foundation is 4.8% of the value of the endowment based on a three year rolling average. In addition, there is a 2% administrative fee which goes to the Foundation. Therefore, the "true" payout each year is 6.80% of the three year rolling average value of the endowment. USD Foundation staff estimated a future nominal return on the portfolio of 6.85% per year by averaging long-term asset class return forecasts provided by Jeffrey Slocum & Associates, Inc. who obtained the projections from five major money managers including GMO, Goldman Sachs, Morgan Stanley, UBS, and JP Morgan. If the USD Foundation portfolio of

assets is expected to earn 6.85% nominal, and the payout plus the administrative fee equals 6.8% (nominal), then the real value of the endowment will decline in every year in which inflation exceeds 0.05%.

The four rates of future inflation explained previously along with the June 20, 2012 portfolio value for the USD Foundation portfolio (\$161,622,634) can be used to project the real value of the Foundation portfolio going forward.

	Inflation	Real Return (assuming 6.85% nominal)
HEPI	3.47%	3.27%
HECA	2.95%	3.79%
CPI	2.39%	4.36%
TIPS Implied Inflation	2.05%	4.70%

## METHOD

### A Model for USD Foundation Intergenerational Equity

At the Eighty-Sixth meeting of the American Economic Association in January 1974, a session was held on the subject of Endowment Income. In that session, Nobel Laureate James Tobin presented a paper entitled “What is Permanent Endowment Income?” Tobin stated:

“The trustees of an endowed institution are the guardians of the future against the claims of the present. . . [t]hey want to know, therefore, the rate of consumption from the endowment which can be sustained indefinitely. Sustainable consumption is their conception of permanent endowment income. Consuming endowment income so defined means in principle that the existing endowment can continue to support the same set of activities that it is now supporting.”

While endowment income is only a part of the University’s total spendable income, the trustees of the University might have good reasons to stabilize endowment income only. First, the major sources of non-endowment university income are endogenous. For example, student fees net of financial aid are determined by discretionary policies. Gifts and grants for current use are another source, but are highly uncertain and variable (Tobin, 1974).

Tobin’s model provides the conceptual basis for understanding the sustainability issues surrounding the USD Foundation. However, the model presented in 1974 by Tobin cannot be used directly, as it assumed a fixed endowment from which only dividend earnings could be used for payouts – principle is never touched in Tobin’s model. The model presented here is inspired by Tobin’s approach but developed for the specific case of the USD Foundation.

The following variables are defined:

ENDVAL<sub>t</sub> = The end of year value of the endowment in year t – fees and payouts for year t+1 are calculated from this value.

BEGVAL<sub>t+1</sub> = The beginning of year value of the endowment in year t+1 - equal to ENDVAL<sub>t</sub> from the previous year plus the real growth of the endowment (Eq 1 BELOW).

NOM = The forecasted nominal growth rate for the endowment. The USD Foundation is using the nominal return projection of 6.85%.

INF = The assumed rate of inflation for goods and services the endowment earnings will purchase. The example presented here uses the rate from HECA which is 2.95%.

REAL = The real rate of return, calculated from the Fisher Equation; for this example, REAL equals 3.79%.

$$REAL = \frac{1+NOM}{1+INF} - 1$$

ADFEE = The administrative fee (rate) for the USD Foundation which is currently 2.0% of the previous year's ENDVAL.

USDPAYOUT = The annual payout (rate) to USD from the USD Foundation which is currently 4.80% of the previous year's ENDVAL.

NEWGIFT<sub>t+1</sub> = New annual giving to the USD Foundation in year t+1.

The relationship between the key variables is the following:

Eq 1.  $BEGVAL_{t+1} = ENDVAL_t(1+REAL)$

Eq. 2.  $ENDVAL_{t+1} = BEGVAL_{t+1} - (ADFEE_{t+1} * ENDVAL_t) - (USDPAYOUT_{t+1} * ENDVAL_t) + NEWGIFT_{t+1}$

Eq. 3  $ENDVAL_{t+1} = ENDVAL_t(1+REAL) - (ADFEE_{t+1} * ENDVAL_t) - (USDPAYOUT_{t+1} * ENDVAL_t) + NEWGIFT_{t+1}$

Eq 3 results from substituting Eq 1 into Eq 2. Having accounted for the inflation in the cost of goods and services purchased by the endowment earnings, intergenerational equity implies that  $ENDVAL_{t+1} = ENDVAL_t$ . Realizing this, Eq 3 can be reduced in to the following form:

Eq. 4  $ADFEE + USDPAYOUT - REAL = \frac{NEWGIFT}{ENDVAL}$

Eq 4 provides the conceptual basis for understanding the sustainability issues around the USD Foundation earnings and payout. All conclusions below assume that growth and inflation assumptions are appropriate. For Eq 4, the following outcomes are possible

- A. If  $(ADFEE + USDPAYOUT - REAL) < 0$ , the USD Foundation would not be using all of the REAL growth for fees and payouts therefore the endowment would grow in real terms over time. Currently, using HECA,  $(ADFEE + USDPAYOUT - REAL) = +3.01\%$ .
- B. If  $(ADFEE + USDPAYOUT - REAL) = 0$ , the USD Foundation would have intergenerational equity with no need for new giving by donors.
- C. If  $(ADFEE + USDPAYOUT - REAL) > 0$ , the USD Foundation would need new gifts to keep the value of the endowment from falling in REAL terms over time. This is currently the case for the USD Foundation.  $\frac{NEWGIFT}{ENDVAL}$  is the percentage of endowment value required as NEWGIFTS annually to maintain the value of the endowment. NEWGIFTS arriving at this rate will then provide intergenerational equity.

## RESULTS

The model described in the previous section was used to study the impact of no inflation as well as the four inflation rates discussed previously on the real value of the endowment assets, the real value of the payout to USD, and the real value of administrative fee. The higher the inflation rate, the lower the real return and the lower the real value of the endowment as well as future payouts and administrative fees. The first simulation does not include increases in the value of the endowment that may come from future gifts. Indeed, one strategy may be to “cover” the inflation “gap” with future gifts in order to maintain the real value of the principal of the endowment while maintaining a 4.80% payout and 2% administrative fee given a nominal return expectation of 6.85%. For the purposes of this analysis, the 2% administrative fee is fixed because the USD Foundation is embarking on a new campaign for the next seven years. It should be noted, however, that the 2% administrative fee is an “all in fee” as the USD Foundation receives no outside supplements and is completely funded by this fee. While the 6.85% return expectation will not represent the actual return, it is a reasonable estimate for the

analysis. The charts that are included in the appendix illustrate the results of the simulations that were conducted.

The 6.85% nominal return expectation for the portfolio uses a 4.1% annual nominal return for TIPS and a 4.7% annual nominal return on the Barclay's Aggregate Index over the long-term (ten year) horizon. While these expectations for fixed income are certainly reasonable based on long-term averages, short term returns may be very different from long-term averages based on the current market environment where 10-year TIPS are yielding a real return of -0.637%, and the real return expectations for 10 and 20 year Treasury bonds are negative. Therefore, it is a realistic possibility that a 6.85% nominal return will be difficult to achieve on an average basis over the next ten years. If that is the case, the graphs in the appendix actually overestimate the future real value of the endowment and the payouts.

### **Simulation One: No New Annual Giving**

Simulation One assumes  $NOM = 6.85\%$ ,  $ADFEE = 2.00\%$ , and  $USDPAYOUT = 4.80\%$ , and the results are reported in Table 1 and Figure 1 in the Appendix. For the 0% inflation scenario, outcome A (above) applies, as the payouts from the endowment (6.80%) are less than the real return (6.85%). With no inflation, the inflation-adjusted value of the endowment would grow by 0.05% per year. All other inflation scenarios (TIPS, CPI, HECA, and HEPI) would require new gifts to the endowment to either maintain or grow the inflation-adjusted value of the endowment with a 6.85% nominal return, 4.8% payout and 2% administrative fee. Therefore, the graphs of the first simulation (Figure 1) show that declines in the real value of the USDF endowment will occur if a 4.8% payout and 2% administrative fee are maintained in an environment where the endowment is expected to return 6.85% in nominal terms and inflation is higher than 0.05%. These results are consistent with those presented by the Commonfund (January 2005) and Hammond Associates which show that a 70/30 equity/fixed income portfolio that follows a 5% distribution would have declined in value in many relatively long time periods during the 20<sup>th</sup> century (1931-41, 1967-99, 1964-2004).

### **Simulation Two: \$8 million in new annual giving**

Simulation Two differs from simulation one in assuming \$8,000,000 in annual new gifts to the endowment. The results of the second simulation are shown in Table 2 and Figure 2 in the Appendix. For all five inflation scenarios, when  $NEWGIFT = \$8,000,000$ ,  $\frac{NEWGIFT}{ENDVAL} > (ADFEE + USDPAYOUT - REAL)$ , and the inflation-adjusted value of the endowment grows. The second simulation provides an example of how the real value of the endowment would evolve with new gifts of \$8 million per year. The amount of \$8 million in new gifts is used only for example purposes.

### **Simulation Three: \$4 million in new annual giving**

Simulation Three assumes \$4,000,000 in annual new gifts to the endowment. The results of the third simulation are shown in Table 3 and Figure 3 in the Appendix. When  $NEWGIFT = \$4,000,000$ ,  $\frac{NEWGIFT}{ENDVAL} > (ADFEE + USDPAYOUT - REAL)$ , and the inflation-adjusted value of the endowment grows over time in the 0%, TIPS, and CPI inflation scenarios. However, with

NEWGIFT = \$4,000,000, the HECA and HEPI inflation scenarios yield  $\frac{NEWGIFT}{ENDVAL} < (ADFEE + USDPAAYOUT - REAL)$ , and, therefore, the inflation-adjusted value of the endowment would be falling over time in the higher inflation scenarios (HECA and HEPI).

As mentioned above, one strategy for maintaining the real value of the endowment could be to seek new gifts to the USD Foundation. While new gifts may camouflage the inflation problem, new gifts are not a solution and are also not assured in the future. With new giving, the nominal value of the endowment grows each year. If the new giving is larger in nominal terms than the payout amount, at least for the first few years, the real value of the endowment will grow under the inflation scenarios presented. For example, if the new annual gifts are expected to be only \$4 million instead of \$8 million, the third simulation shows that the nominal value of the endowment will increase, but the effect on the real value depends on the inflation rate. At the highest inflation rate (HECA), the real value will fall if new annual giving is \$4 million. Therefore, annual giving goals would need to be indexed to inflation in order to maintain the real value of the endowment. The next section presents a more in-depth discussion of how much giving would be needed to maintain the real value of the endowment. Specifically, the next section provides a model that can be used to determine the exact amount of new gifts that would be needed to support the real value of the endowment under different nominal returns and inflation rates.

### Simulation Four: An Alternative Approach Using the Same Model

On June 30, 2012, the USD Foundation endowment had a reported value of \$161,622,634. The breakeven value of new giving can be calculated for each of the inflation scenarios where:

	$\frac{NEWGIFT}{ENDVAL} = (ADFEE + USDPAAYOUT - REAL)$
0% scenario:	no new giving needed
TIPS scenario:	\$3,388,294.59 required annually
CPI scenario	\$3,950,228.28 required annually
HECA scenario	\$4,867,674.98 required annually
HEPI scenario	\$5,710,697.64 required annually

The three prior simulations assume that the administrative fee (ADFEE), payout (USDPAAYOUT), and level of new gifts (NEWGIFT) are constant and illustrate the impact of various inflation scenarios on the inflation-adjusted value of the endowment. As part of each simulation, the level of new gifts (NEWGIFT) that would provide for intergenerational equity is determined. Another approach that provides intergenerational equity is to assume a fixed level for NEWGIFT and solve for the level of USDPAAYOUT that would be sustainable (i.e. keep the value of the endowment the same over time). The relationship can be found by rearranging the terms in equation 4.

$$\text{Eq. 5 } USDPAAYOUT = REAL - ADFEE + \frac{NEWGIFT}{ENDVAL}$$

The results of the fourth simulation reported in Table 4 in the Appendix assume  $ENDVAL = \$161,622,634$  (the value of the USD Endowment on 6/30/2012),  $ADFEE = 2.00\%$ , and  $REAL = 3.79\%$ . The value of REAL corresponds to the real rate of return using the inflation estimate from HECA. Two facts are immediately clear: first, as shown in the third column of Table 4, new giving increases the size of USDPAAYOUT (\$) on a dollar-for-dollar basis; second, the break-even calculation in the first model is confirmed here. When NEWGIFT is assumed to

be \$4,946,170 per-year (see highlighted row in Table 4), the sustainable USDPAYOUT rate is calculated as exactly 4.80% (for the HECA inflation assumption).

### **Simulation Five: Sustainable Payout with Zero New Gifts**

Simulations one through four assume that the administrative fee (ADFEE), payout (USDPAYOUT), and level of new gifts (NEWGIFT) are constant and illustrate the impact of various inflation scenarios on the inflation-adjusted value of the endowment. Another way to preserve intergenerational equity is to solve for the payout rate (USDPAYOUT) that will maintain the value of the endowment over time without new gifts (NEWGIFT=0) assuming that the administrative fee (ADFEE) and nominal return remain constant. The relationship can be found by setting NEWGIFT = 0 in equation 5.

$$\text{Eq. 6 } USDPAYOUT = REAL - ADFEE$$

The results, assuming ENDVAL = \$161,622,634 (the value of the USD Endowment on 6/30/2012), are presented in Table 5 in the Appendix. The value of REAL corresponds to the real rate of return using each inflation rate assumption. Note that using the HECA inflation assumption of 2.95%, the sustainable payout rate for the endowment with no new gifts is 1.79%, as also reported in Table 4.

The payout rates in Table 5 will maintain the value of the endowment at the current real value. These payout rates can also be applied to all new gifts to maintain the intergenerational equity of the new gifts. In this way, the new givers are protected against inflation to the same extent as those previously contributed to the current endowment.

### **CONCLUSION**

The simulations highlight several things. First, without new giving, the USD Foundation will struggle to maintain both the payout rate and intergenerational equity in the face of inflation. Indeed, declines in the real value of the USDF endowment will occur if a 4.80% payout and 2% administrative fee are maintained in an environment where the endowment is expected to return 6.85% in nominal terms. Second, when discussing intergenerational equity, the focus is on maintaining the total value of the endowment. New giving can help to maintain the total endowment value, but each individual endowment is still decreasing in real terms as the result of inflation. In that way, new gifts disguise some of the decrease in the real value caused by inflation. Satisfying intergenerational equity for each individual endowment is a valid concern, and the intergenerational equity constraint can be satisfied by solving for the payout rate that will maintain the value of the endowment without new gifts assuming that the administrative fee and nominal return remain constant. This payout rate can also be applied to all new gifts to maintain the intergenerational equity of the new gifts. Finally, the forecast of the nominal rate of return affects these results as well. Maintaining intergenerational equity when nominal returns are less than 6.85% will require even more new giving or a larger decrease in the payout amount.



**APPENDIX**

**Simulation One: No New Annual Giving**

The first simulation forecasts the real value of the endowment, payout, and administrative fee using each of the inflation rates discussed earlier including 0% inflation to show the nominal value. The payout and administrative fees are calculated as 4.80% and 2.0% of the previous year’s endowment value, respectively. The beginning of year endowment value includes the real return based on the previous end of year balance. The value of the USD Endowment on 6/30/2012 = \$161,622,634.

Table 1. Simulation One: No new annual giving

	Date	2015	2020	2025
Assume 0% inflation, Real Growth Rate = 6.85%	Beg. of Year Value of Endowment	\$ 172,866,521	\$ 173,299,120	\$ 173,732,801
	USD Payout (4.80%)	\$ 7,765,646	\$ 7,785,080	\$ 7,804,562
	Admin Fee (2.00%)	\$ 3,235,686	\$ 3,243,783	\$ 3,251,901
Assume 2.05% Inflation per TIPS Average, Real Growth Rate = 4.70%	Beg. of Year Value of Endowment	\$ 162,203,721	\$ 145,899,433	\$ 131,234,008
	USD Payout (4.80%)	\$ 7,436,020	\$ 6,688,571	\$ 6,016,253
	Admin Fee (2.00%)	\$ 3,098,342	\$ 2,786,904	\$ 2,506,772
Assume 2.39% Inflation per CPI Average, Real Growth Rate = 4.36%	Beg. of Year Value of Endowment	\$ 160,518,906	\$ 141,838,379	\$ 125,331,815
	USD Payout (4.80%)	\$ 7,383,299	\$ 6,524,061	\$ 5,764,818
	Admin Fee (2.00%)	\$ 3,076,375	\$ 2,718,359	\$ 2,402,007
Assume 2.95% Inflation per HECA Average, Real Growth Rate = 3.79%	Beg. of Year Value of Endowment	\$ 157,793,305	\$ 135,420,407	\$ 116,219,676
	USD Payout (4.80%)	\$ 7,297,627	\$ 6,262,925	\$ 5,374,929
	Admin Fee (2.00%)	\$ 3,040,678	\$ 2,609,552	\$ 2,239,554
Assume 3.47% Inflation per HEPI Average, Real Growth Rate = 3.27%	Beg. of Year Value of Endowment	\$ 155,316,154	\$ 129,748,562	\$ 108,389,816
	USD Payout (4.80%)	\$ 7,219,345	\$ 6,030,922	\$ 5,038,133
	Admin Fee (2.00%)	\$ 3,008,060	\$ 2,512,884	\$ 2,099,222

**Simulation Two: \$8 million in new annual giving**

The second simulation forecasts the real value of the endowment, payout, and administrative fee using each of the inflation rates discussed earlier including 0% inflation to show the nominal value. The payout and administrative fees are calculated as 4.80% and 2.00% of the previous year’s endowment value, respectively. The nominal value of the annual giving stays constant at \$8 million. The beginning of year endowment value includes the real return based on the previous end of year balance. The value of the USD Endowment on 6/30/2012 = \$161,622,634.

Table 2. Simulation Two: \$8 million in new annual giving

	Date	2015	2020	2025
Assume 0% inflation, Real Growth Rate = 6.85%	Beg.of Year Value of Endowment	\$ 189,966,795	\$ 233,224,949	\$ 276,591,356
	USD Payout (4.80%)	\$ 8,533,838	\$ 10,477,115	\$ 12,425,255
	Admin Fee (2.00%)	\$ 3,555,766	\$ 4,365,465	\$ 5,177,190
Assume 2.05% Inflation per TIPS Average, Real Growth Rate = 4.70%	Beg.of Year Value of Endowment	\$ 178,780,691	\$ 200,971,966	\$ 220,932,632
	USD Payout (4.80%)	\$ 8,195,969	\$ 9,213,300	\$ 10,128,371
	Admin Fee (2.00%)	\$ 3,414,987	\$ 3,838,875	\$ 4,220,154
Assume 2.39% Inflation per CPI Average, Real Growth Rate = 4.36%	Beg.of Year Value of Endowment	\$ 177,011,804	\$ 196,163,069	\$ 213,085,589
	USD Payout (4.80%)	\$ 8,141,913	\$ 9,022,804	\$ 9,801,179
	Admin Fee (2.00%)	\$ 3,392,464	\$ 3,759,501	\$ 4,083,825
Assume 2.95% Inflation per HECA Average, Real Growth Rate = 3.79%	Beg.of Year Value of Endowment	\$ 174,149,357	\$ 188,546,207	\$ 200,901,784
	USD Payout (4.80%)	\$ 8,054,061	\$ 8,719,887	\$ 9,291,308
	Admin Fee (2.00%)	\$ 3,355,859	\$ 3,633,286	\$ 3,871,378
Assume 3.47% Inflation per HEPI Average, Real Growth Rate = 3.27%	Beg.of Year Value of Endowment	\$ 171,546,916	\$ 181,796,442	\$ 190,358,729
	USD Payout (4.80%)	\$ 7,973,777	\$ 8,450,191	\$ 8,848,180
	Admin Fee (2.00%)	\$ 3,322,407	\$ 3,520,913	\$ 3,686,742

**Simulation Three: \$4 million in new annual giving**

The third simulation forecasts the real value of the endowment, payout, and administrative fee using each of the inflation rates discussed earlier including 0% inflation to

show the nominal value. The payout and administrative fees are calculated as 4.80% and 2.0% of the previous year’s endowment value, respectively. The nominal value of the annual giving stays constant at \$4 million. The beginning of year endowment value includes the real return based on the previous end of year balance. The value of the USD Endowment on 6/30/2012 = \$161,622,634.

Table 3. Simulation Three: \$4 million in new annual giving

	Date	2015	2020	2025
Assume 0% inflation, Real Growth Rate = 6.85%	Beg.of Year Value of Endowment	\$ 181,416,658	\$ 203,262,034	\$ 225,162,079
	USD Payout (4.80%)	\$ 8,149,742	\$ 9,131,097	\$ 10,114,909
	Admin Fee (2.00%)	\$ 3,395,726	\$ 3,804,624	\$ 4,214,545
Assume 2.05% Inflation per TIPS Average, Real Growth Rate = 4.70%	Beg.of Year Value of Endowment	\$ 170,492,206	\$ 173,435,699	\$ 176,083,320
	USD Payout (4.80%)	\$ 7,815,995	\$ 7,950,935	\$ 8,072,312
	Admin Fee (2.00%)	\$ 3,256,664	\$ 3,312,890	\$ 3,363,463
Assume 2.39% Inflation per CPI Average, Real Growth Rate = 4.36%	Beg.of Year Value of Endowment	\$ 168,765,355	\$ 169,000,724	\$ 169,208,702
	USD Payout (4.80%)	\$ 7,762,606	\$ 7,773,432	\$ 7,782,999
	Admin Fee (2.00%)	\$ 3,234,419	\$ 3,238,930	\$ 3,242,916
Assume 2.95% Inflation per HECA Average, Real Growth Rate = 3.79%	Beg.of Year Value of Endowment	\$ 165,971,331	\$ 161,983,307	\$ 158,560,730
	USD Payout (4.80%)	\$ 7,675,844	\$ 7,491,406	\$ 7,333,118
	Admin Fee (2.00%)	\$ 3,198,268	\$ 3,121,419	\$ 3,055,466
Assume 3.47% Inflation per HEPI Average, Real Growth Rate = 3.27%	Beg.of Year Value of Endowment	\$ 163,431,535	\$ 155,772,502	\$ 149,374,272
	USD Payout (4.80%)	\$ 7,596,561	\$ 7,240,557	\$ 6,943,157
	Admin Fee (2.00%)	\$ 3,165,234	\$ 3,016,899	\$ 2,892,982

**Simulation Four: Sustainable Payout with a Fixed Level of New Gifts**

Simulation Four presents a model that can be used to determine the exact amount of new gifts that would be needed to support the real value of the endowment under a given nominal return and different inflation rates. The data presented here use a nominal rate of 6.85% and the expected inflation rate calculate using HECA (2.95%).

Table 4. Simulation Four: Sustainable Payout with a Fixed Level of New Giving

<b>NEWGIFT</b>	<b>USDPAYOUT %</b>	<b>USDPAYOUT \$</b>
\$0	1.79%	\$2,890,211
\$2 million	3.03%	\$4,890,211
\$4 million	4.26%	\$6,890,211
\$4.946 million	4.85%	\$7,836,382
\$6 million	5.50%	\$8,890,211
\$8 million	6.74%	\$10,890,211

**Simulation Five: Sustainable Payout with Zero New Gifts**

Simulation Five presents a model that can be used to determine the sustainable payout rate, assuming a fixed administrative fee and investment return and zero new gifts, that would be needed to support the real value of the endowment under different and inflation rates.

Table 5. Simulation Five: Sustainable Payout with Zero New Giving

<b>INFLATION ASSUMPTION</b>	<b>USDPAYOUT %</b>	<b>USDPAYOUT \$</b>
0%	4.85%	\$7,838,698
TIPS Implied Inflation	2.70%	\$4,369,592
CPI	2.36%	\$3,807,658
HECA	1.79%	\$2,890,211
HEPI	1.27%	\$2,047,189

Figure 1. Simulation One: Inflation-Adjusted Value of the USD Foundation Endowment with no annual gifts

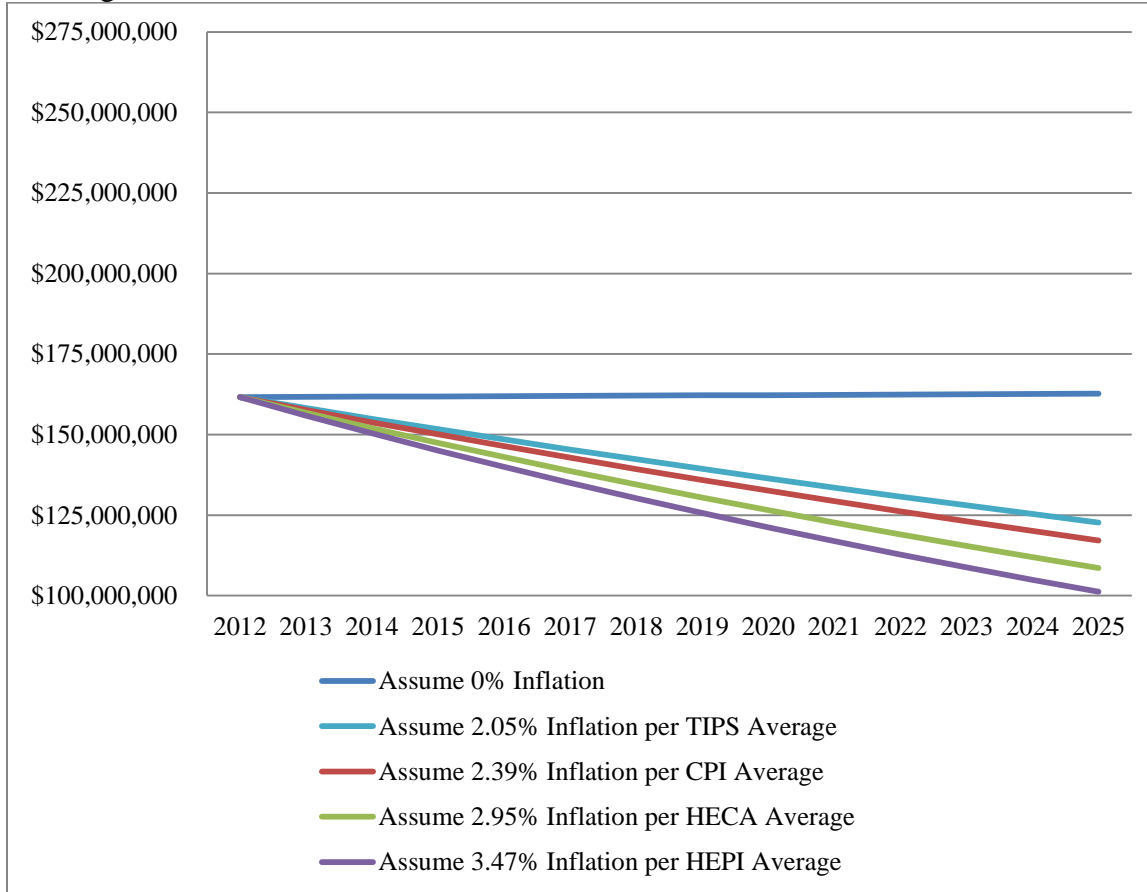


Figure 2. Simulation Two: Inflation-Adjusted Value of the USD Foundation Endowment with \$8 million in annual gifts

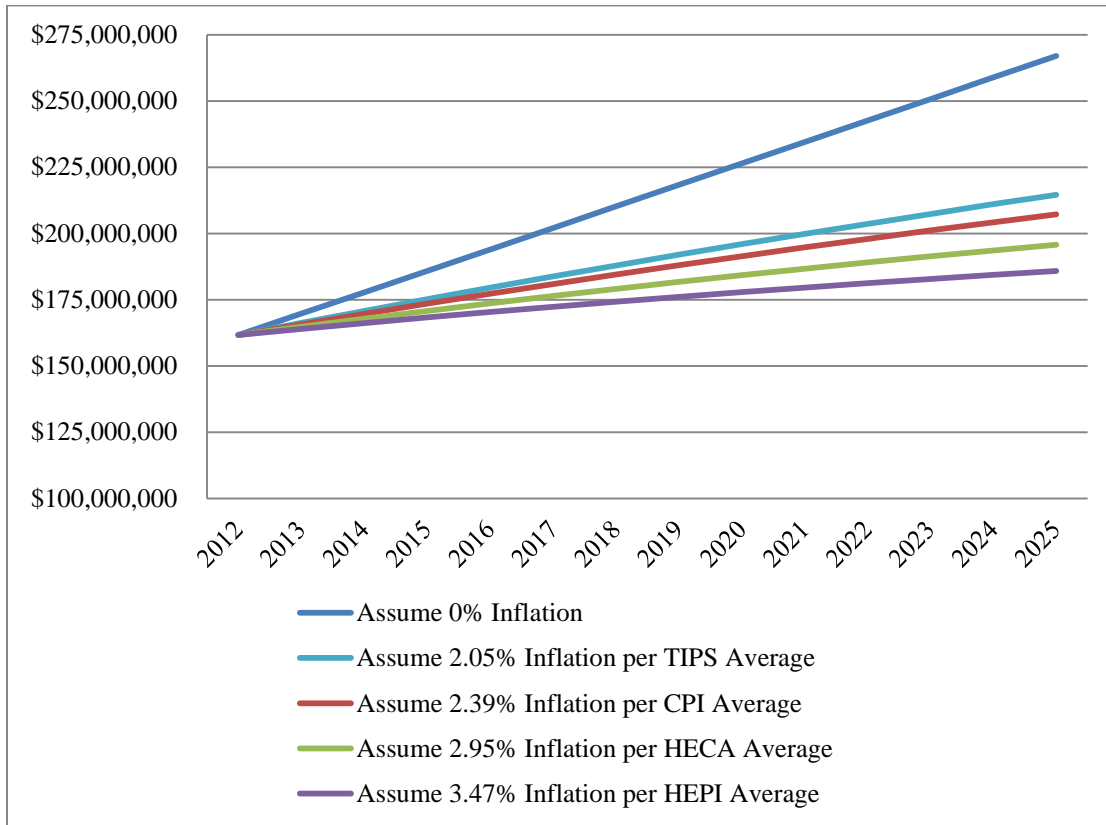
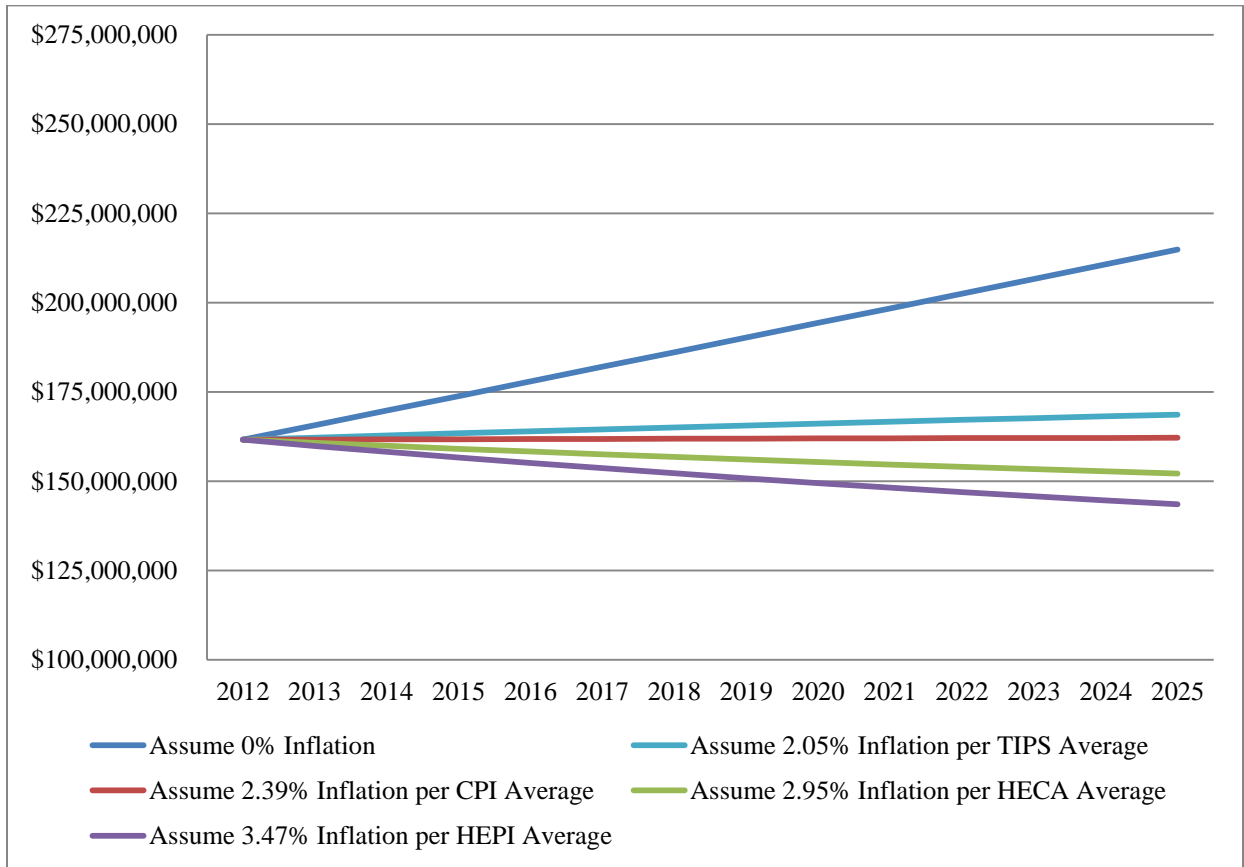


Figure 3. Simulation Three: Inflation-Adjusted Value of the USD Foundation Endowment with \$4 million in annual gifts



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