Thirty-Two Cents on the Dollar:
An Econometric Case Study of a Large Tuition Increase

by

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ABSTRACT

Prior to the 2002-03 academic year, Baylor University's posted tuition rates were considerably lower than those of many comparably ranked private universities. In that year, as part of a major strategic plan known as "Baylor 2012", the tuition rate for new students was increased by nearly 40%. This paper reports the results of a counterfactual study based on a simultaneous equation econometric model of Baylor finances. The major finding of the paper is that by 2011, total net tuition revenue had risen by about 32% percent of the amount that might have been expected from a naïve forecast made in 2002. The main factor eroding revenue growth was a significant rise in unfunded scholarships (price discounts). Lower enrollment than would have otherwise been the case was also a factor, but of lesser importance than the increased price discounting.

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1 Introduction

Beginning in the fall semester of 2002, Baylor University in Waco, TX implemented an ambitious new strategic plan known as "Baylor 2012." A major goal of the plan was to move Baylor from its then-current *US News and World Report* ranking of #82 into the "top tier" of American universities – meaning the top 50 in the *US News* rankings – while "reaffirming and deepening its distinctive Christian mission."[1]

University leaders know that achievement of this ambitious goal would cost a considerable amount of money. While a longer-term element of the strategic plan assumed a significantly larger University endowment, in the early years increases in spending were to be funded by borrowing (Baylor at that time had virtually no long-term debt) and by higher tuition rates. It did appear that the market would bear a substantial price increase. In the 2001-02 academic year, the posted tuition rate for 30 semester hours at Baylor University was $11,370, which was about 62% of the $18,450 rate charged by Southern Methodist University – a comparably (but slightly higher) ranked private university also located in Texas.[2] Baylor implemented a significant tuition increase beginning with new students entering in the 2002-03 academic year.

[1] http://www.baylor.edu/about/vision/index.php?id=62631. Baylor is ranked #75 in the 2012 US News Rankings, tied with six other universities. (*US News & World Report, 2011, p. 118*).

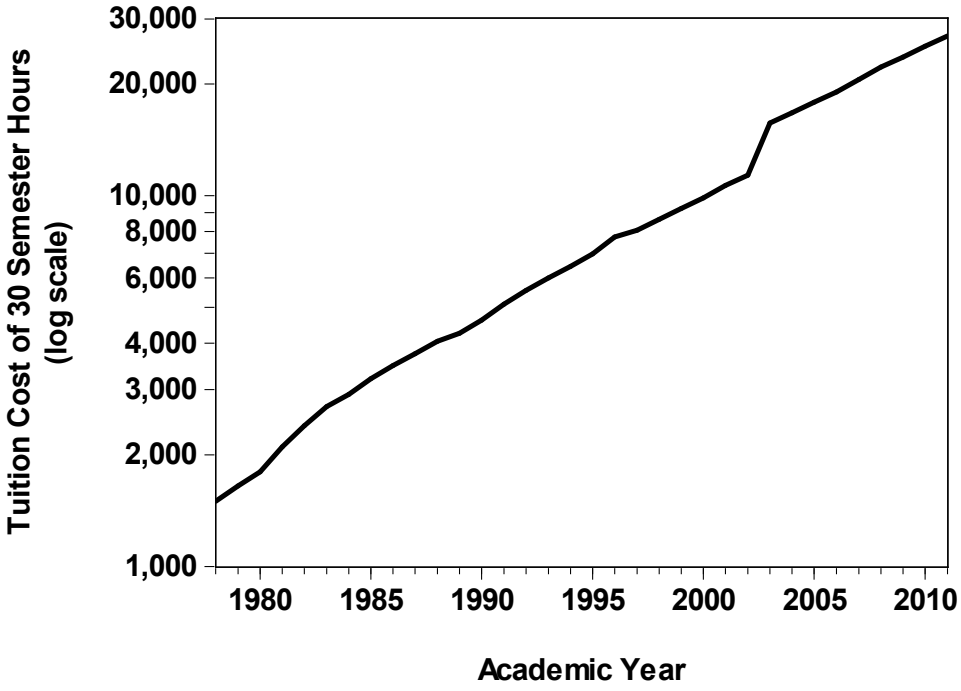
[2] Baylor tuition obtained from the 2001-02 *Baylor University Catalog*. SMU tuition obtained from http://smu.edu/ir/CDS/Archive/cds2000.pdf, page 13.

Prior to 2002-03, Baylor charged tuition by the semester hour. The rate that year was $379. This implied a total tuition bill of $11,370 for 30 credit hours. Beginning in 2002-03, Baylor began to charge a flat tuition rate for any course load between 12 and 18 semester hours (inclusive). The flat rate for that year was $15,700, which was about 81% of the $19,466 charged by SMU in that year.[3] Thus the price for taking 30 semester hours rose by 38%.[4] Students who attended Baylor in 2001-02 were "grandfathered" – that is, allowed to pay a rate in subsequent years reflecting more normal rates of increase. A student who was a freshman in 2001-02, for example, could pay the grandfathered rate for the subsequent four years, a sophomore could pay the lower rate for three more years, etc. Figure 1 shows the academic year tuition paid by a new Baylor student over the period 1978-2010.

[3] http://smu.edu/ir/CDS/Archive/cds2001.pdf.

[4] The rate of tuition increase was 73% for a student taking 12 hours per semester and 15% for a student taking 18 hours per semester.

FIGURE 1
Baylor Tuition, 1978-2011



Because universities offer price discounts through scholarships and financial aid, a given percentage increase in the posted tuition rate does not necessarily imply an identical percentage increase in the average net price paid by students. Financial aid awards may increase with tuition. In addition, with a downward sloping demand curve, a higher net price will reduce enrollment to some extent. Thus total tuition revenue net of scholarships and financial aid probably will not rise as much in percentage terms as the gross tuition rate and could conceivably even decrease.

This paper considers the net revenue and expenditure effects of the large tuition increase implemented by Baylor University in the 2002-03 academic year. Section 2 considers a naïve (and naively optimistic) approach to forecasting revenues from a tuition increase. In contrast to a

naïve approach, a more realistic analysis requires a simultaneous equation econometric model of Baylor finances, which is described in Section 3. Section 4 looks in more detail at elements of the econometric model that are most relevant for this paper. Section 5 outlines the counterfactual exercise simulating the time paths of revenue and expenditure variables that would have occurred in the absence of the "Baylor 2012" strategic plan and its associated tuition increase. The simulation implies that the strategic plan had a much smaller long term effect on net revenues than the effect implied by the naïve forecast in Section 2, primarily because of a significant rise in unfunded scholarships, substantially lower enrollment, and slower growth in other revenue categories. In particular, tuition revenue net of price discounts rose by about 32% of the amount that would have been predicted by a naïve forecast. Section 6 concludes.

2 A Naïve Forecast of Revenue Increases

When considering the impact of a tuition rate increase on tuition revenues, a "best case" scenario would be one in which tuition revenue rises by the same percentage increase as the tuition rate. Define "Net Tuition Revenue" as tuition revenue minus unfunded price discounts. Baylor's net tuition revenue in the 2001-02 fiscal year was $129.0 million. Using the econometric model described below, in the absence of the Baylor 2012 strategic plan those revenues would have been projected to rise to $233.6 million by 2010-11. This forecast was based on a 6.5% increase in the tuition rate per year, a 1% increase in enrollment, and normal increases in the unfunded discount rate.

As was noted above, the Baylor 2012 strategic plan involved a 38% tuition increase in 2002-03. If we assume that otherwise the increase would have been 6.5%, and that tuition would have continued to rise at 6.5% in the years thereafter even with the strategic plan (in fact, they

rose at a higher rate – near 7%), that would mean that the tuition rate would be 33.5% higher in each subsequent year with the strategic plan than without. Naively applying this percentage increase to the original projection of $233.6 million for 2010-11, we obtain a predicted value of $307.2 Million. That is, by 2010-11, the strategic plan would yield $73.6 million (= 307.2 – 233.6) more in net tuition revenue than would have otherwise been the case.

Total net revenues, including revenues from all non-tuition sources (fees, dormitory charges, athletic gate receipts, etc.) would have been predicted to rise to $390.6 million in 2010-11 in the absence of the strategic plan. Adding the $73.6 million in additional tuition revenue to this figure and assuming no change in any other revenue source yields a naïve prediction of $464.2 million in net total revenue with the strategic plan.

The reason these forecasts are "naïve" is because it does not take into account the fact that enrollment is likely to be lower with the higher tuition rate. They also do not consider the possibility that the unfunded discount rate might increase with the higher tuition. Finally, there is also the possibility that if tuition increases more rapidly, there may be an offsetting decrease in revenue growth from other sources such as fees, dormitory charges, etc. To estimate the size of these effects requires a formal analysis based on an econometric model. The econometric model designed to address these issues is discussed in the following section.

3 Econometric Model of Baylor University Finances

The Econometric Model of Baylor University Finances (henceforth denoted ***EMBUF***) has 43 endogenous variables and 27 exogenous variables. The endogenous variables are determined by 24 structural equations and 19 identities. The model is built in the spirit of the macroeconometric model of the US economy maintained by many years by Professor Ray Fair

of Yale University – see Fair (1984) and Fair (1994).[5] In particular, structural equations in the EMBUF take the same form as in the Fair Model: dependent variables are usually but not always in log levels, usually but not always in real terms, and often in per capita (which in the EMBUF is per student) terms as well.

Baylor financial variables are measured by the Baylor fiscal year. Fiscal year ***t*** runs from June 1 of year ***t-1*** to May 31 of year ***t***. Thus, for example, data on the year 2003 in the model reflect activity at Baylor in the summer term of calendar year 2002, the fall term of calendar year 2002, and the spring term of calendar year 2003. (Baylor operates on a semester system rather than a quarter system.) Enrollment variables apply to the fall semester of the fiscal year in question.

Most equations in the model are estimated from data over the period 1978-2011. The exceptions typically begin the sample a year or two later due to data limitations or because of data outliers in the early years. Most data on Baylor variables were provided either by the Baylor Treasurer's office or the Baylor Institutional Research office. Data on exogenous variables were obtained from various sources as described in Appendix A. All equations were estimated and the model was solved using the econometric software package E-Views.[6]

As in any econometric model, variables in the EMBUF are either exogenous or endogenous. Exogenous variables are assigned a number with the prefix EXOG. Endogenous variables are determined either by a structural equation or an identity. Structural equations are assigned a number with the prefix EQ, while identities have a number with the prefix ID. The

[5] See also http://fairmodel.econ.yale.edu/ .

[6] www.eviews.com

endogenous variables in the EMBUF that are explained by structural equations are listed in Table 1. Exogenous variables are shown in Table 2, and the endogenous variables defined by identities are shown in Table 3. The exact structural equations and identities making up the model are shown in Appendix A. Details about the regressions determining each structural equation are provided in Appendix B.

Total operating revenues (REVTOT, which is determined by identity ID13) were $559 million in 2010-11. The main categories of REVTOT are gross tuition (REVTUITGROSS – 69.5% of REVTOT, explained in structural equation EQ19), fees (REVFEES – 8.1%, EQ17), endowment allocation (REVEND – 4.6%, EQ16), and – reflecting Baylor's ties to Baptist Churches in Texas -- the allocation from the Baptist General Convention of Texas (REVBGCT2 – 0.5%, exogenous variable EXOG24). The remaining revenues, including those from residence halls and sporting events, are included in a catch-all "other" category (REVOTHER – 17.6% of REVTOT, EQ18).

Total operating expenditures (EXPTOT, determined by identity ID07) in 2009-10 were $544.8 million. Categories of total spending include spending on instruction (EXPINST, structural equation EQ05), which made up 30.6% of the total. Expenditure on physical plant and maintenance (EXPPLANT, EQ07) made up 7.9% of the total, while scholarships (EXPSCHOL, ID06) made up 25.6%.[7] The remaining 35.9% of total expenditures are captured in EXPOTHER (EQ06), which includes residence halls, dining halls, academic support staff, and institutional support such as the library and information technology services.

[7] Until recent years Baylor accounts have booked tuition as gross revenue and treated scholarships as an expense. More recently, scholarships have been treated as a negative revenue item – essentially a price discount. Either approach leads to the same bottom line, of course. I have chosen to treat scholarships as an expense because that is how it was done in most of the years of my data set.

Most of the remaining structural equations explain variables that determine the various components of REVTOT and EXPTOT. These include the number of new freshmen (NFRNEW, EQ13), the number of other – i.e., other than new freshmen – students (NOTHER, EQ14). An identity sums these two variables to obtain total enrollment (NTOT, ID10). The model has structural equations explaining the tuition cost of 30 semester hours per academic year – 15 hours per semester -- (TURATEFLAT, EQ24) and the average number of credit hours taken by students (LOAD, EQ12).

Endowment revenue in the operating budget (REVEND, EQ16) depends primarily on the size of the distribution of funds from the endowment (ENDDIST), which is explained in its own structural equation (EQ02). The endowment distribution depends on the size of the endowment, and the model has equations to explain the rate of return on the endowment (ENDRETURN, EQ03) and the level of gifts to the endowment (GIFTENDOW, EQ10), and transfers from the operating budget to the endowment (ENDTRAN, EQ04).

On the expenditure side, the primary component of expenditure on instruction (EXPINST) is the total faculty salary bill. Relevant variables in this context are the total number of full-time-equivalent faculty (FTEFAC, EQ09) and the average salaries paid to full professors (SALFULL, EQ22), associate professors (SALASSOC, EQ20), and assistant professors (SALASST, EQ21). Scholarship expenditures (EXPSCHOL, ID06) are derived from a structural equation explaining the unfunded discount rate (DRU, EQ01). "Unfunded" refers to the fact that these scholarships are paid directly from the operating bottom line and are therefore essentially price discounts. Another kind of scholarship is paid from restricted funds – either gifts or endowment income. The total amount spend on restricted scholarships (RESTSCHOL)

is explain in EQ15. Finally, as something of a nonfinancial afterthought, EQ23 explains the average SAT score of incoming freshmen (SATFRNEW).

Identities in the model explain expenditure on scholarships (EXPSCHOL, ID06), the funded discount rate (DRF, ID02), the total discount rate – funded plus unfunded (ID01), the end of year endowment balance (ENDEOY, ID05), the tuition rate per semester hour (TURATEHR, ID17), total tuition and fees paid by students per academic year (TUITFEES, ID16), total credit hours taken by students (HTOT, ID09), and endowment earnings (END_EARNINGS, ID04). The margin of total revenues over total expenses is the operating SURPLUS (ID14), which is expressed as a percentage of total operating revenue in SURPLUSPCT (ID15).

Key exogenous variables in the model are entered as growth rates from the previous year. This is to facilitate counterfactual exercises (not reported in this paper) involving the effects on Baylor finances of alternative time paths of exogenous variables. For example, to examine the effects of the 2008-09 recession on Baylor, it is easier to enter an alternative time path for the growth rate of real per capita Texas personal income than the level.

Among these exogenous growth rates, GRRTXPIPC (EXOG20) is the growth rate of real Texas personal income per capita. GRTXPOP (EXOG21) is the growth rate of the Texas population. GRP (EXOG18) is the growth rate of the US personal consumption expenditures chain-type price index. GRPUBUNIVTF (EXOG19) is the growth rate of average nominal tuition and fees at public universities in Texas. Finally, GRHEPI (EXOG17) is the growth rate of the nominal Higher Education Price Index, an index "…designed specifically to track the main cost drivers in higher education."[8] These exogenous growth rates are converted into levels in various identities: GRRTXPIPC into nominal Texas Personal Income (TXPI) in ID18,

[8] http://www.commonfund.org/CommonfundInstitute/HEPI/Pages/default.aspx

GRTXPOP into Texas population (TXPOP) in ID19, GRP into the price level (P) in ID11, GRPUBUNIVTF into the level of tuition and fees at Texas public universities (PUBUNIVTF) in ID12, and GRHEPI into the Higher Education Price Index (HEPI) in ID08.[9]

Other macroeconomic exogenous variables include the average U.S. income tax rate (TAXRATE, EXOG26), the rate of return on large stocks (LGSTK, EXOG22), the rate of return on small stocks (SMALLSTK, EXOG25), the interest rate on 10-year Treasury Bonds (TBOND10YR, EXOG27), and the nominal price of West Texas Intermediate Crude Oil (OILPRICE, EXOG23). To capture various one-time effects that are otherwise difficult to explain, the model employs dummy variables indicating the specific years of 1981, 1983, 1984, 1985, 1989, 2003, 2004, 2005, and 2010. For example, the dummy variable D1981 (EXOG05) has a value of 1 in 1981 and 0 in all other years. Other dummy variables denote years in which large gifts were received for endowment (BIGGIFTS, EXOG03), a change in endowment management policy (ENDPOLICY, EXOG14), and a large increase in the scope of mandatory fees (FEEDUMMY, EXOG15).

Two exogenous variables in the model relate directly to the "Baylor 2012" strategic plan and the associated tuition increase. BU2012 (EXOG04) is a dummy variable equal to 0 in years (prior to 2003) before the plan was implemented and equal to 1 in years (2003 and later) after its implementation. This variable will pay a key role in the counterfactual exercise. As noted above, the large tuition increase involved a change from an hourly rate to a flat rate, and it applied only to new students. Returning students were charged a lower "grandfathered" rate for

[9] Exogenous variables are measured as closely as possible in fiscal year terms. If raw data are available monthly, the fiscal year definition (June 1 of year t-1 to May 31 of year t for fiscal year t) is followed exactly. For data available quarterly, the fiscal year t value is based on the 3rd and 4th quarter values from year t-1 and the first and second quarter values from year t.

a period of time. The variable FLAT_FRACTION (EXOG16) captures my estimated fraction of students paying the higher flat rate, as opposed to the lower hourly rate, during the transition years 2003-2006.[10] In the years 2007 and beyond, all students were subject to the higher rates associated with the strategic plan, so FLAT_FRACTION = 1 for those years.

4 KEY ELEMENTS OF THE MODEL FOR THE COUNTERFACTUAL SIMULATION

A complete discussion of the entire EMBUF is beyond the scope of this paper. Instead, in this section I will focus on the elements of the model that drive the results of the counterfactual simulation described below in Section 4. Details of the econometric model are provided in the two Appendices to this paper. Appendix A provides information on data sources and shows all of structural equations and identities of the model. Appendix B shows each estimated structural equation in detail.

Recall that the binary variable BU2012 is used to indicate the years during which the "Baylor 2012" strategic plan has been in operation: BU2012 = 1 for years 2003 and beyond, and BU2012 = 0 otherwise. The counterfactual simulation exercise outlined below in Section 4 involves (i) computing a baseline forecast for all endogenous variables of the model, (ii) computing an alternative forecast (the "counterfactual") based on the assumption that BU2012 = 0 in all periods.

[10] The fraction was estimated as the fraction needed to make a weighted average of (grandfathered hourly rate*total credit hours) plus (higher flat rate*total enrollment) sum to gross tuition revenue. This approach is only an approximation, because it ignores the effects of variations in spring and summer enrollment relative to fall enrollment and unpaid tuition balances.

In the development of the model, the variable BU2012 was included as a possible explanatory variable (either directly as a right-hand-side variable or interacted with another variable as appropriate) in all structural equations for which it seemed plausible to so do. If the estimated coefficient was significant at the 5% or 1% level, the variable was retained in the equation. All the differences between the values of endogenous variables in the baseline and counterfactual scenarios are ultimately due to the presence of the BU2012 indicator variable in several structural equations of the model. In addition, the various linkages across equations create effects on endogenous variables for which BU2012 is not significant in the associated structural equation. For example BU2012 is significant in the tuition equation (TURATEFLAT, EQ24) but not in the enrollment equation for new freshmen (NFRNEW, EQ13). Because the tuition variable is a statistically significant determinant of enrollment, however, BU2012 impacts enrollment indirectly through its effect on tuition.

Thus the key task for the purpose at hand is to describe the role of the BU2012 variable in the various structural equations of the model. It turns out that the BU2012 variable is statistically significant in 12 of the model's 24 structural equations. The fact that there are statistically significant effects in exactly half of the structural equations of the model is indicative of the ambition and scope of the Baylor 2012 strategic plan. I proceed now to describe these effects. Regression output for each structural equation of the model is shown in Appendix B, with Table B1 showing output for equation EQ01, Table B2 for equation EQ02, etc.

The primary effect of interest is the tuition increase, which is discussed above in Section 1. Structural equation EQ24 (shown in Table B24 in Appendix B) models the determination of the posted tuition rate. Prior to the implementation of the Baylor 2012 strategic plan in 2003,

tuition increases were driven by two factors. First, faster growth in costs (as measured by the Higher Education Price Index) resulted in higher rates of tuition increase. Second, a higher operating surplus (as a percent of total revenue) in any given fiscal year resulted in a lower rate of tuition increase two years later. (Tuition rates at Baylor are typically set by the governing board a bit more than a year in advance.) The BU2012 variable has two impacts on tuition. Prior to 2003, tuition rates were determined by costs (as measured by HEPI, the Higher Education Price Index) and by the University's financial needs (a higher recent operating surplus meant a lower rate of tuition increase.) In 2003 there was a one-time increase of 36.5%, after which tuition rose at 7% per year regardless of HEPI or the university's operating surplus.[11]

Equally important is the effect of the Baylor 2012 strategic plan on the unfunded discount rate (DRU), which is the dependent variable in structural equation EQ01 (shown in Table B01 in Appendix B). The unfunded discount rate is the fraction of gross tuition and fee revenue that is awarded in financial aid and which is funded from operating revenues rather than through restricted revenues from gifts or endowment. The dependent variable in this equation is LOG(DRU), and the key right-hand-side variable is the real tuition and fee rate.[12] A lagged dependent variable in the equation indicates gradual adjustment of the discount rate to tuition and fee changes. The estimated coefficient on the BU2012 variable in this equation is 0.177, which means that BU2012 was associated with an 19.4% increase in the discount rate

[11] The dependent variable in regression EQ24 is the percentage growth rate of tuition. The estimated coefficient on the first difference of BU2012 is 0.311, with a t-statistic of 18.83. The initial effect of BU2012 on tuition is therefore exp(0.311)-1 = 0.365, or 36.5%.

[12] Use of the logistic transformation the dependent variable of EQ22 – that is, log[DRU/(1-DRU)] had no effect on the results. The Jarque Bera statistic testing the normality of residuals in EQ22 has a p-value of 0.421, so the null of normality cannot be rejected even at the 10% significance level.

[exp(0.177)=1.194]. It is important to remember that this is a percent increase and not a percentage point increase. In 2002, for example, the unfunded discount rate was 0.153, and a 19.4% increase would raise that value to 0.153*(1.194) = 0.183.

The model identifies several effects of BU2012 related to Baylor's endowment. Most significant is a permanent 52% increase in the level of gifts to the endowment (GIFTENDOW) as indicated by structural equation EQ10. In 2002 gifts to endowment were $9.8 million, so a 52% increase translates into an extra $5.1 million in that year -- an amount that grows over time due to the log structure of the equation. This may reflect the "buzz" created by the strategic plan among some important elements of the Baylor constituency. Equation EQ02 (ENDDIST) indicates that, controlling for the size of the endowment, BU2012 was associated with an extra distribution from the endowment of about $10 million per year. Structural equation EQ03 (ENDRETURN) shows that the advent of BU2012 led to the return on endowment being driven by the return on small stocks (which was not the case prior to 2003) as well as the return on large stocks. This reflects the fact that a more aggressive endowment management philosophy was adopted around the same time as the implementation of the strategic plan. Finally, structural equation EQ04 (ENDTRAN) shows that smaller fractions of operating surpluses were transferred to endowment during the BU2012 era than before. This may reflect less of a need to build endowment through transfers because of the significantly higher rate of endowment giving as indicated in EQ10 (GIFTENDOW).

As is noted above, the large tuition increase in 2003 was accompanied by a change in the method of charging tuition from an hourly rate to a flat rate. The flat rate applies to any load between 12 and 18 semester hours (inclusive). Thus under the flat rate system, a student taking

less than 18 hours faces a lower marginal cost of taking an additional hour than a student under the hourly rate system. Structural equation EQ12 (LOAD) explains the average hourly course load taken by Baylor students. The equation shows that higher net tuition and fee rates are associated with lower course loads, but that this effect became slightly smaller with the advent of the strategic plan. This factor is important to take into account in the counterfactual simulation, because the simulation assumes that in the absence of the strategic plan the University would have continued to price tuition with the hourly rate rather than the flat rate.

Equation EQ19 explains the determination of gross tuition revenue (REVTUITGROSS). The Baylor 2012 strategic plan meant that gross tuition revenue was driven primarily by student head count rather than by total semester hours taken.

Four structural equations in the model relate to the size and compensation of faculty. A major aspect of the strategic plan was to increase faculty size and quality. The higher faculty size would allow for a reduction of teaching loads, and these lower loads and higher salaries would allow the University to hire more capable faculty. Both lower teaching loads and higher quality faculty would lead to higher research output, a result that was believed to be crucial to a rise in the rankings. Structural equation EQ09 (FTEFAC) shows that BU2012 was associated with a permanent 3.6% rise in the number of full-time equivalent faculty. Equation EQ21 (SALASST) shows that real average assistant professor salary rose by 6.5% as a result of the strategic plan. The BU2012 variable was not statistically significant in the structural equations for real average salaries of either full professors (SALFALL, EQ22) or associate professors (SALASSOC, EQ20).

Structural equation EQ07 (EXPPLANT) shows a 21.9% initial increase in real spending on physical plant and maintenance per student as a result of Baylor 2012. This reflects the major construction program associated with the strategic plan.[13] This program included new dormitories, new athletic facilities, new parking garages, and a new sciences building that alone cost more than $100 million. Nearly all of this new construction was funded by debt. Prior to the Baylor 2012 strategic plan, the Baylor governing board had a policy of not breaking ground on a new building until the money was in hand to pay for the construction. As a result, in 2001 Baylor had essentially no long-term debt and was therefore able to borrow heavily at favorable rates to finance the building boom.

Structural equation EQ06 (EXPOTHER) explains expenditure other than instruction, scholarships, and physical plant/maintenance. The equation shows that real spending per student in this category is historically strongly correlated with real total operating revenue per student. It is also influenced by the University's financial position (as measured by SURPLUSPCT). The BU2012 dummy in EQ06 shows that the strategic plan resulted in lower real "other" spending per student. This tightening of "other" spending was the likely outcome of the need to finance higher plant and maintenance spending when higher net tuition revenue did not increase nearly as much as was envisioned when the plan was adopted.

In summary, the Baylor 2012 strategic plan was associated with significant increases in the tuition rate, the unfunded discount rate, spending on physical plant and maintenance, and gifts to endowment. It had a large negative effect on expenditures in the "other" category (that

[13] Construction costs are in the capital budget and not the operating budget, so they do not show up in the EMBUF. Higher operating costs reflect interest payments on debt to fund the construction and maintenance costs once new buildings come online.

is, other than spending on instruction, scholarships, or physical plant and maintenance). The plan also caused moderate increases in the number of faculty employed by Baylor, the salaries paid to assistant professors, and the average SAT score of new freshmen.

5 COUNTERFACTUAL SIMULATION

This section reports the results of a counterfactual exercise simulation with the EMBUF in which, in effect, the model "re-runs history" to determine what would have happened to Baylor finances had the Baylor 2012 strategic plan not been implemented.

To accomplish this task, first the model is solved dynamically over the period 2003-2011, the latter being the latest year for which all data are available. A dynamic solution is one in which "only values of the endogenous variables from before the solution sample are used when forming the forecast." (Quantitative Micro Software, p. 441). For example, the tuition rate figures prominently on the right-hand-side of several structural equations and identities. The dynamic solution over the period 2003-2011 therefore uses the tuition rate predicted by the model for the years 2003-2011 on the right-hand-side of all equations. This dynamic solution associated with the true value of BU2012 (equal to zero before 2003 and equal to 1 in years 2003-2010) is denoted the **baseline** or "with BU2012" scenario.

The model is then solved again dynamically over the same period under the assumption that the dummy variable BU2012 has a value of zero in all periods. This is a way of assuming that the strategic plan never happened and things proceeded in the same manner (that is, in accord with the same structural econometric relationships) after 2003 as before. This is denoted the **counterfactual** or "without BU2012" scenario. The difference between the baseline and

counterfactual scenarios gives the effects of the strategic plan – that is, the difference between what did happen because of the plan and what might have happened had the plan not been adopted.

It is important to use the predicted values from the model rather than the actual values of the variables as the baseline scenario. If one uses the actual values as the baseline, then one would in effect be attributing to the strategic plan all the realized values of all of the regression error terms over the years 2003-2011.

As was noted above, students enrolled at Baylor prior to 2002-03 were "grandfathered" – that is, allowed to pay a lower tuition rate than new students. This significantly complicates the relationship between enrollment and gross tuition revenue over the period 2003-2005 (with some small effect in 2006 that is not quantitatively significant). To estimate that relationship accurately would require hard data not only on the fraction of students charged the hourly rate vis-à-vis the flat rate, but also the average hourly course load of students taking the hourly rate. Those data are not available, and attempts to estimate reasonable approximations were unsuccessful. As a result, in the gross tuition revenue equation (REVTUITGROSS, EQ19), I in effect removed the transition years by adding dummy variables for years 2003, 2004, and 2005 to the right-hand-side. This drives the realized error terms in EQ19 for those years to zero, which in turn implies that the difference between the baseline scenario and the counterfactual scenario embodies all of the "true" realized value of the error term (that is, the value that would be observed with accurate data) for those years. [14]

[14] Because the R^2 of EQ01 is so high (0.999936), it might be possible to argue that including the error term as part of the overall effect would likely not cause big problems.

For this reason, and due to space constraints, I choose not to focus on the transition years in my analysis. From 2006 and beyond, virtually all undergraduate students (who make up the vast majority of the student population) have paid the flat rate. My focus in this section will be on the difference between the baseline and counterfactual scenarios in 2011. That is, nine years after the Baylor 2012 strategic plan was implemented, how did Baylor differ from what might have been had the plan not been implemented?

Figure 2 shows the tuition rate charged for 30 semester hours. The baseline dynamic forecast tracks the actual rate closely. In 2011 (that is, the 2010-11 academic year), actual tuition was $26,966 while the baseline value predicted by the model was $26,969. In contrast, the tuition rate in the counterfactual scenario is $20,094 – some 33% below the value in the baseline scenario. Posted tuition rates were much higher in 2011 as a result of the strategic plan than they would have been otherwise.

Figure 2
Baylor Tuition, 2002-2011
Actual, Baseline, and Counterfactual

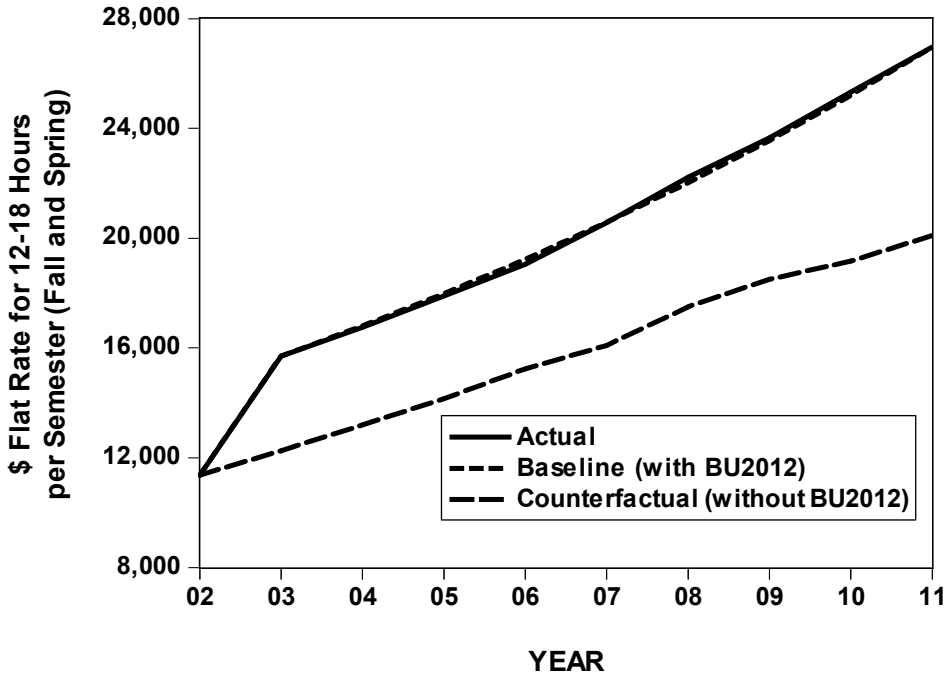


Figure 3 shows the unfunded discount rate, which reflects the size of financial aid awards that are not funded by endowment earnings or gifts. Again, the baseline value tracks the actual value closely, but the counterfactual value is much lower. The strategic plan was associated with a significantly higher unfunded discount rate than would have otherwise been the case. In 2011, the actual rate was 32.3%, while the baseline predicted value was 30.3%. In the counterfactual scenario, the rate rose to only 19.9%.

Figure 3
Unfunded Discount Rate

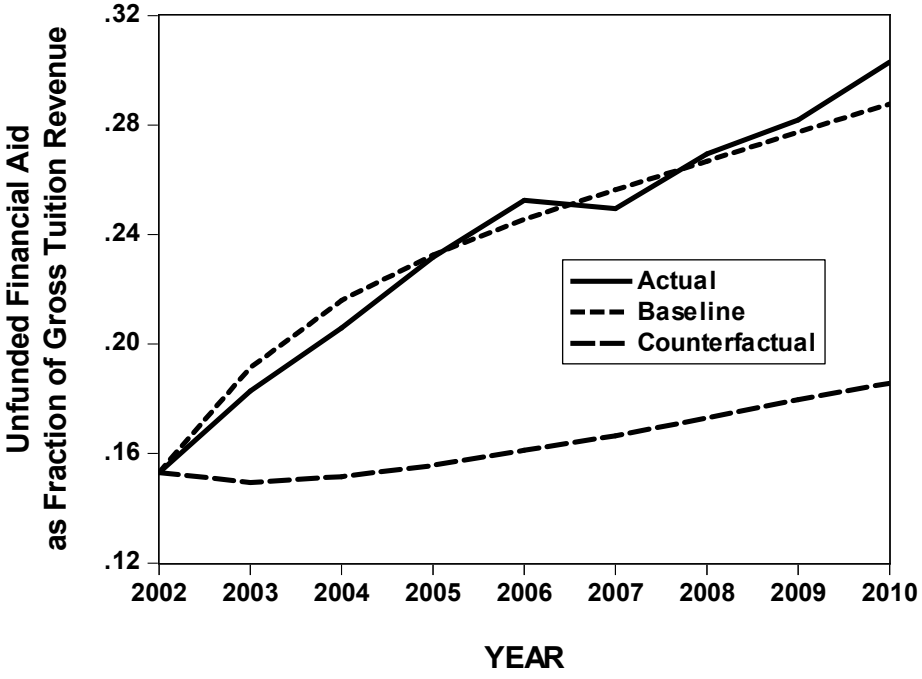


Table 4 provides the 2011 actual values of several key variables in the model, along with the baseline and counterfactual scenario values. The difference between the baseline and counterfactual values may be interpreted as the effect of the Baylor 2012 strategic plan.

Gross tuition revenue is 27.9% higher than it would have been without the plan. (All percentages are expressed as a percentage of the counterfactual.) This is lower than the initial 38% rise in the posted tuition rate for at least two reasons. First, tuition would have risen by six or seven percent in 2003 in any case. Second, enrollment is 6.7% lower in the baseline scenario, so fewer students paid the higher posted price in 2003 and beyond. Interestingly, in the years after the large increase in 2003, tuition rates in the baseline scenario grew at a slightly faster average rate (7.0% per year) than in the counterfactual scenario (6.5%).

Remarkably, unfunded scholarships are 88.4% higher ($134.0 million versus $69.2 million) in the counterfactual scenario than in the baseline. As a result, net tuition revenue (that is gross tuition less unfunded scholarships) is higher by 10.0%. Thus the higher gross tuition was therefore used primarily to provide additional unfunded scholarships. Gross tuition revenue is $84.5 million higher in the counterfactual than in the baseline, while unfunded scholarships are $61.2 million higher.

Recall the naïve forecast in Section 2 above, which implied that net tuition revenue would be $73.6 million higher in 2010-11 with the strategic plan than without. In fact, net tuition revenue was only $23.3 million higher – 31.6 percent of the naïve forecast. Thus the tuition rate increase yielded about 32 cents on the dollar relative to the effects of the naïve forecast. This is the main conclusion of the paper.

The rise in the unfunded discount rate may be one reason for the observed rise in the average SAT score from 1176 in 2002 to 1218 in 2011. Structural equation EQ23 shows that the average SAT score of new freshmen depends positively on the unfunded discount rate (which rose because of BU2012) and negatively on the size of the freshman class (which fell because of BU2012). The higher discount rate may also be a factor in the rise of Baylor's minority student enrollment percentage from 21.7% in 2002 to 32.0% in 2011.[15] A higher discount rate made it possible for Baylor to offer substantial scholarships to these groups of students, though I have no specific information that this course of action has in fact been taken.

[15] http://www.baylor.edu/content/services/document.php/126875.pdf for 2011 value (Fall 2010.). http://www.baylor.edu/content/services/document.php/20668.pdf for 2002 value (Fall 2001). In both cases, % minority is calculated as 100*(1-%white-%not specified)/total enrollment.

Gross total revenue was 17.6% higher in the counterfactual case, driven by the 27.9% rise in gross tuition revenue and a 39.2% increase in revenue from endowment – reflecting higher endowment returns, more gifts to endowment, and a slightly higher spending rate from endowment. These additional endowment revenues were partially offset, however, by a 9.6% decrease in "other" revenues. This result is driven by the presence of the tuition and fee variable in structural equation EQ18 (REVOTHER). The coefficient on that variable implies that a 10% increase in the real net tuition and fee rate will reduce other real revenue per student by about 2.3% in the short-run and by about 4.5% in the long run. It would appear that when Baylor charges students higher tuition, it is more difficult to get money from them in other ways.

Net total revenue – that is, gross total revenue less unfunded scholarships – is 5.1% higher in the baseline scenario than in the counterfactual scenario. This implies that taking all factors into consideration, Baylor did in fact have more operating revenue at its disposal in 2011 because the Baylor 2012 strategic plan was adopted. Because enrollment was lower, total net revenue per student was 12.5% higher in the baseline than in the counterfactual. Baylor achieved higher operating resources per student by combining higher total net revenue with lower enrollment.

On the expense side, gross expenditure (including spending on unfunded scholarships) was 16.7% higher in the baseline than in the counterfactual. Netting out scholarship spending, however, means total net spending 3.8% higher in the baseline. Due to lower enrollment, net expenditure per student is 11.2% higher in the baseline than in the counterfactual. As in the revenue case, however, the similarity in total expenditure is accompanied by significant offsetting difference in subcategories. Spending on physical plant and maintenance is $18.0

million higher in the baseline (reflecting a significant increase in the costs of additional debt issued to fund a number of major construction projects), but this is offset to a considerable extent by $11.1 million less in "other" spending. "Other" expenditure per student was essentially the same (1.2% higher) as a result of the strategic plan. Thus essentially all of the additional revenues per student were spent on instruction and physical plant.

Finally, the last line of Table 4 shows that Baylor 2012 is responsible for a significant decrease in the student/faculty ratio (13.9 in the baseline compared to 15.5 in the counterfactual). This was accomplished with a slightly larger number of full-time equivalent faculty (40) in the baseline case relative to the counterfactual case, accompanied by a significant decrease in total enrollment.

6 CONCLUSION

This paper has described the results of a counterfactual simulation exercise that was undertaken to determine the net revenue and expenditure effects of a large tuition increase enacted by Baylor University in the 2002-03 academic year. This tuition increase took place in the context of a major strategic plan known as "Baylor 2012". The counterfactual simulation estimates what might have happened if the entire strategic plan had not been implemented and Baylor continued to operate in according with historical patterns.

The results of the simulation are as follows: The additional net revenue implied by the higher tuition rate was offset to a large extent by lower enrollment and higher unfunded scholarship expenditures. By the 2010-2011 academic year, total revenue and expenditures (net

of unfunded scholarships) were about five percent higher than the levels that would have been obtained had the strategic plan not been implemented. The net tuition revenue increase was about thirty two percent of what might have been predicted by a naïve forecast in which enrollment and unfunded scholarships were unaffected by the strategic plan. The large increase in scholarship spending may be one reason for observed increases in SAT scores and minority student enrollment.

Because the strategic plan raised revenue and curtailed enrollment growth, total revenue and expenditure per student were about 12% higher (about $3,000 per student) in 2010-2011 with the strategic plan than would have otherwise been the case. On the revenue side, net tuition revenue was 10.0% higher, and higher endowment revenue (spending from endowment) of $7.1 million was more than offset by lower other revenue ($8.8 million decrease) and lower fee revenue ($1.7 million decrease). On the expenditure side, instructional expenditures were $7.9 million higher in the counterfactual, and a $18.0 million increase in spending on physical plant and maintenance was offset to some extent by $11.1 million in lower expenditures in the "other" category (that is, other than instruction, scholarships, or physical plant and maintenance).

The Baylor 2012 strategic plan was implemented in the 2002-03 academic year. The rise in resources from higher tuition that might have been envisioned in a naïve forecast did not materialize because of increased scholarship spending and lower enrollment. The plan was for higher spending on physical plant and maintenance resulting from the building boom, and a large expansion of faculty quantity and quality, to be funded by higher net tuition revenues. Net tuition revenue has not increased as much as may have been envisioned, so the number of and salaries paid to faculty are actually a bit lower in the baseline (with the strategic plan) than in the

counterfactual (without the strategic plan). Physical plant expenditures have risen, and it appears that those extra expenses have to some extent been paid for by cuts in the "other" category of spending – although those cuts in total "other" spending do not translate into cuts in spending per student because of lower enrollment.

This entire exercise assumes that it would have been possible for Baylor to continue operating "as it always had". In fact, that might not have been possible because of the changing landscape of higher education. It is not likely that the administrators who devised the strategic plan foresaw such a large rise in the discount rate, but that turned out to be necessary to moderate the negative effect of the higher posted tuition rate on enrollment.

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Table 1
Econometric Model of Baylor University Finances (EMBUF)
Structural Equations

Equation Number	Dependent Variable (unit of measurement)	Variable Name
EQ01	Discount Rate Unfunded by Endowment (%/100)	DRU
EQ02	Distribution from Endowment ($1000)	ENDDIST
EQ03	Investment Return on Endowment (%/100)	ENDRETURN
EQ04	Transfers from Operations to Endowment ($1000)	ENDTRAN
EQ05	Expenditure on Instruction ($)	EXPINST
EQ06	Other Expenditure ($)	EXPOTHER
EQ07	Expenditure on Physical Plant ($)	EXPPLANT
EQ08	Mandatory Fee Rate ($ per semester)	FEES
EQ09	Full-Time-Equivalent Faculty (#)	FTEFAC
EQ10	Gifts to Endowment ($1000)	GIFTENDOW
EQ11	Gifts for Operations ($)	GIFTOPER
EQ12	Average Course Load (Semester Hours)	LOAD
EQ13	Enrollment of New Freshmen (#)	NFRNEW
EQ14	Enrollment of Students other than New Freshmen (#)	NOTHER
EQ15	Funded (Restricted) Scholarships ($)	RESTSCHOL
EQ16	Revenue from Endowment ($)	REVEND
EQ17	Total Fee Revenue ($)	REVFEES
EQ18	Other Revenue ($)	REVOTHER
EQ19	Gross Tuition Revenue ($)	REVTUITGROSS
EQ20	Average Salary: Associate Professors ($)	SALASSOC
EQ21	Average Salary: Assistant Professors ($)	SALASST
EQ22	Average Salary: Full Professors ($)	SALFULL
EQ23	Average SAT Score of New Freshmen (Verbal+Quant)	SATFRNEW
EQ24	Posted Tuition Rate ($ per 30 semester hours)	TURATEFLAT

NOTE: All variables in the model are defined for the fiscal year, which at Baylor runs from June 1 to May 31. The 2005 fiscal year, for example, runs from June 1, 2004 to May 31, 2005.

Table 2
Econometric Model of Baylor University Finances (EMBUF)
Exogenous Variables

Variable #	Variable (units of measurement)	VARIABLE NAME
EXOG01	Average Associate Professor Salary, AAUP Survey, All Universities	AAUP1_ALL_ASSOC
EXOG02	Average Full Professor Salary, AAUP Survey, All Universities	AAUP1_ALL_FULL
EXOG03	Dummy Variable =1 for years (1984, 1997, 2000) in which large gifts for endowment were received (=0 otherwise)	BIGGIFTS
EXOG04	Dummy variable for "Baylor 2012" strategic plan (=0 through FY2002 and =1 thereafter)	BU2012
EXOG05	Dummy Variable =1 for FY1981 and =0 otherwise	D1981
EXOG06	Dummy Variable =1 for FY1983 and =0 otherwise	D1983
EXOG07	Dummy Variable =1 for FY1984 and =0 otherwise	D1984
EXOG08	Dummy Variable =1 for FY1985 and =0 otherwise	D1985
EXOG09	Dummy Variable =1 for FY1989 and =0 otherwise	D1999
EXOG10	Dummy Variable =1 for FY2003 and =0 otherwise	D2003
EXOG11	Dummy Variable =1 for FY2004 and =0 otherwise	D2004
EXOG12	Dummy Variable =1 for FY2005 and =0 otherwise	D2005
EXOG13	Dummy variable =1 for FY2010 and =0 otherwise	D2010
EXOG14	Dummy Variable indicating years in which policy was to spend endowment earnings, subject to cap and floor (=1 through 1995 and =0 after)	ENDPOLICY
EXOG15	Dummy variable to capture large rise in fee assessments (=0 before 1999 and =1 thereafter)	FEE_DUMMY
EXOG16	(Estimated) Fraction of students paying flat rate tuition rather than hourly rate (%/100)	FLAT_FRACTION
EXOG17	Growth Rate of Higher Education Price Index (%)	GRHEPI
EXOG18	Growth Rate of Personal Consumption Expenditures Chain-Type Price Index (%)	GRP
EXOG19	Growth Rate of Average Tuition and Fees Charged by Texas Public Universities (%)	GRPUBUNIVTF
EXOG20	Growth Rate of Real Texas Personal Income per capita (%)	GRRTXPIPC
EXOG21	Growth Rate of Texas Population (%)	GRTXPOP
EXOG22	Return on Large Stocks (%)	LGSTK
EXOG23	Price of West Texas Intermediate Crude Oil ($/bbl)	OILPRICE
EXOG24	Revenue Allocated to Baylor by the Baptist General Convention of Texas, adjusted ($)	REVBGCT2
EXOG25	Return on Small Stocks (%)	SMALLSTK
EXOG26	Average Income Tax Rate (%/100)	TAXRATE
EXOG27	Interest Rate on 10-year Treasury Bonds (%)	TBOND10YR

Table 3
Econometric Model of Baylor University Finances (EMBUF)
Variables Determined by Identity

Identity Number	Variable (Units of Measurement)	VARIABLE NAME
ID01	Average Discount Rate applied to tuition and fee charges (%/100)	DR
ID02	Funded (by endowment and gifts) discount rate (%/100)	DRF
ID03	Four year moving average of end-of-year endowment balance ($)	END4YR
ID04	Earnings on Endowment	ENDEARNINGS
ID05	Endowment Balance, end of fiscal year ($1000)	ENDEOY
ID06	Expenditure on Scholarships not funded by endowment and gifts ($)	EXPSCHOL
ID07	Total Operating Expenses ($)	EXPTOT
ID08	Higher Education Price Index (FY1983 = 100)	HEPI
ID09	Total Semester Hours Taken (# hours)	HTOT
ID10	Total Student Enrollment (# students)	NTOT
ID11	Personal Consumption Expenditures Chain-Type Price Index (2005 = 1.0)	P
ID12	Average Tuition and Fees Charged by Public Universities in Texas ($ per academic year)	PUBUNIVTF
ID13	Total Operating Revenue ($)	REVTOT
ID14	Surplus of Total Operating Revenue over Total Operating Expenditures ($)	SURPLUS
ID15	Operating Surplus as a percentage of Total Operating Revenue (%/100)	SURPLUSPCT
ID16	Gross Tuition and Fee Rate charged to students ($ per semester)	TUITFEES
ID17	Baylor Hourly Tuition Rate ($ per semester hour)	TURATEHR
ID18	Nominal Texas Personal Income (million $)	TXPI
ID19	Texas Population (1000 persons)	TXPOP

Table 4
Results of Counterfactual Simulation
2011 Fiscal Year Values
(All figures are in Millions of $ unless otherwise indicated; Figures in Parentheses are $ per student)

	Actual	Baseline (predicted with BU2012)	Counter-Factual (predicted without BU2012)	Difference (Effect of BU2012)	Difference as % of Counterfactual
Posted Tuition Rate per Academic Year ($ for 15 hours per semester)	26,966	26,969	20,094	6,875	34.2%
Total Enrollment (# of students)	14,699	14,648	15,692	-1,044	-6.7%
Gross Total Revenue	559.1 (38,037)	540.9 (36,927)	459.8 (29,299)	81.1 (7,627)	17.6% (26.0%)
Unfunded Scholarships	139.6 (9,495)	130.4 (8,904)	69.2 (4,408)	61.2 (4,495)	88.4% (102.2%)
Net Total Revenue	419.5 (28,542)	410.5 (28,023)	390.6 (24,981)	19.9 (3,132)	5.1% (12.5%)
Gross Tuition Revenue	386.6 (26,304)	387.3 (26.439)	302.7 (19,292)	84.5 (7,147)	27.9% (37.0%)
Net Tuition Revenue	247.1 (16.809)	256.9 (17,536)	233.6 (14,884)	23.3 (2,652)	10.0% (17.8%)
Fee Revenue	45.4 (3,091)	43.4 (2,962)	45.1 (2.871)	-1.7 (90)	-3.8% (3.1%)
Other Revenue	98.6 (6,707)	82.3 (5,621)	91.2 (5.809)	-8.8 (-188)	-9.6% (-3.2%)
Endowment Revenue	25.7 (1,746)	25.1 (1,716)	18.1 (1,151)	7.1 (565)	39.2% (49.1%)
Gross Total Expenditure	544.8 (37,067)	530.0 (36,180)	454.0 (28,933)	76.0 (7,247)	16.7% (25.0%)
Net Total Expenditure	405.3 (27,572)	399.5 (27,277)	384.8 (24,525)	14.7 (2,752)	3.8% (11.2%)
Expenditure on Instruction	166.7 (11,344)	162.4 (11,085)	154.5 (9,847)	7.9 (1.238)	5.1% (12.6%)
Expenditure on Physical Plant	42.9 (2,916)	49.1 (3,352)	31.2 (1,985)	18.0 (1,367)	57.7% (68.9%)
Other Expenditure	195.7 (13,312)	188.1 (12,839)	199.2 (12,692)	-11.1 (147)	-5.6% (1.2%)
Faculty Size (# of FTE Faculty)	1,082	1,054	1,013	40	3.9%
Implied Student/Faculty Ratio	13.6	13.9	15.5	-1.6	-10.3%

APPENDIX A

Data Sources

&

Structural Equations and Identities
of the Econometric Model of Baylor University Finances

Table A1
Data Sources
Econometric Model of Baylor University Finances

Variable(s)	Data Source
REVTUITGROSS, RESTSCHOL, REVFEES, REVOTHER, REVEND, GIFTENDOW, ENDDIST, ENDRETURN, ENDTRAN, EXPINST, GIFTOPER, BIGGIFTS, END_DUMMY, END_POLICY, FEE_DUMMY, CONTRAS, REVBGCT2, REVTOT, EXPTOT, SURPLUS, SURPLUSPCT, ENDEOY, END4YR, DRF, EXPSCHOL, END_EARNINGS, EXPPLANT, DRU,EXPOTHER, DR	Baylor University Office of Financial Services and Treasurer
NFRNEW, NOTHER, LOAD, FTEFAC, SALFULL, SALASSOC, SALASST, SATFRNEW, NTOT, HTOT	Baylor University Office of Institutional Research and Testing
TURATEFLAT, FEES, TURATEHR, TUITFEES	*Baylor University Undergraduate Catalog*, various issues
GRRTXPIPC, GRP, TXPI, P	Bureau of Economic Analysis (www.bea.gov)
LGSTK, SMALLSTK, TBOND10YR	Ibbotson Associates (2011)
GRTXPOP, TXPOP	US Census Bureau (www.census.gov)
GRPUBUNIVTF, PUBUNIVTF	Texas Higher Education Coordinating Board (http://www.txhighereddata.org/)
GRHEPI, HEPI	Common Fund (http://www.commfund.org)
OILPRICE, TAXRATE[16], TBOND10YR	Federal Reserve Bank of St. Louis (http://research.stlouisfed.org/fred2)
BU2012, FLAT_FRACTION, D2003, D2004, D2005, D2010	Constructed by the Author

[16] TAXRATE was constructed as the average tax rate implied by aggregate data on Personal Income (PI) and Disposable Personal Income (DPI): TAXRATE = 1–(DPI/PI).

Table A2

Structural Equations

Econometric Model of Baylor University Finances (EMBUF)

EQ01	LOG(DRU) = -6.63970334008 + 0.59160710951*LOG(TUITFEES/P) + 0.176881897331*BU2012(-1) + 1.43711485887*SURPLUSPCT(-2) + 0.303704439851*LOG(DRU(-1))
EQ02	ENDDIST = 6359.33327785 + 0.301898990945*ENDPOLICY*END_EARNINGS + 0.032520377124*(1-ENDPOLICY)*END4YR + 10643.7662057*BU2012
EQ03	ENDRETURN = 0.0702157975712 + 0.265415409649*LGSTK/100 - 0.217181156797*D2010 + 0.309581284859*(SMALLSTK/100)*BU2012
EQ04	ENDTRAN*1000 = 2122306.74552 + 0.463517777274*SURPLUS - 0.198981111372*BU2012*SURPLUS + 5031011.27459*D1983
EQ05	LOG(EXPINST) = 11.2078175697 + 0.798894867587*LOG(FTEFAC*(SALFULL+SALASSOC+SALASST)/3) + 0.443109417529*LOG(TXPI/TXPOP)
EQ06	LOG((EXPOTHER/P)/NTOT) = -0.689436665447 + 0.768248942969*LOG(((REVTOT-EXPSCHOL)/P)/NTOT) + 0.131909043683*D1985 + 0.647786536036*SURPLUSPCT(-2) + 0.247542665322*LOG((EXPOTHER(-1)/P(-1))/NTOT(-1)) - 0.0629495559894*BU2012
EQ07	LOG((EXPPLANT/P)/NTOT) = 6.07661474971 + 0.102758952301*LOG(OILPRICE/P) + 0.450240983509*LOG((EXPPLANT(-1)/P(-1))/NTOT(-1)) + 0.288215543225*BU2012 + 0.714033663033*LOG((TXPI/P)/TXPOP)
EQ08	D(LOG(FEES/P)) = 0.0613851258246 + 0.757890235441*D1981
EQ09	LOG(FTEFAC) = -1.63697025681 + 0.354724002897*LOG(NTOT(-2)) + 0.741164981887*LOG(FTEFAC(-1)) + 0.0353992860568*BU2012 + 0.69120802212*SURPLUSPCT(-2)
EQ10	LOG(GIFTENDOW/P) = 15.0607328194 + 1.23004466492*BIGGIFTS + 0.418792352091*BU2012 + 0.141392360322*TBOND10YR + 1.84712811253*LOG(((TXPI/P)/TXPOP)*(1-TAXRATE)) - 0.776943696057*D1983
EQ11	LOG(GIFTOPER) = 8.82034573739 + 0.677301314254*LOG(TXPI/TXPOP) + 0.572517120169*LOG(GIFTOPER(-1)) + 0.00901808167814*LGSTK(-1)
EQ12	LOG(LOAD) = 1.67709729601 - 0.0246743524713*LOG((TUITFEES/P)*(1-DR)) + 0.0028063600706*BU2012*FLAT_FRACTION*LOG((TUITFEES/P)*(1-DR)) + 0.559925370259*LOG(LOAD(-1)) - 0.0314326056732*D1984
EQ13	LOG(NFRNEW) = 10.9324888401 + 0.444619686228*LOG((TXPI(-1)*(1-TAXRATE(-1))/P(-1))/TXPOP(-1)) - 0.572047838833*LOG((TUITFEES/P)*(1-DR)) + 0.427693312801*LOG(PUBUNIVTF/P)
EQ14	LOG(NOTHER) = -0.478085408824 + 0.866415684381*LOG(NOTHER(-1)) + 0.249463805265*LOG(NFRNEW(-1)) - 0.027726588*LOG(TUITFEES(-1)/P(-1))
EQ15	LOG(RESTSCHOL/NTOT) = 5.90586251531 + 0.161696216239*LOG(GIFTOPER/NTOT) + 0.975121474673*LOG(ENDDIST/NTOT)
EQ16	D(LOG(REVEND))-D(LOG(ENDDIST)) = 0.373104975657*D1999
EQ17	LOG(REVFEES) = 3.4377882142 + 0.313742818596*LOG(FEES*NTOT) + 0.47665647027*FEEDUMMY + 0.476881314725*LOG(REVFEES(-1))
EQ18	LOG((REVOTHER/P)/NTOT) = 9.71298980355 + 1.05250038658*LOG((TXPI/P)/TXPOP) - 0.232888088619*LOG((TUITFEES/P)*(1-DR)) + 0.520689229408*LOG((REVOTHER(-1)/P(-1))/NTOT(-1))
EQ19	LOG(REVTUITGROSS) = -0.35186798707 + 1.02043843954*LOG(TURATEHR*HTOT)*(1-BU2012) + 1.01677312556*LOG(TURATEFLAT*NTOT)*BU2012(-3) + 19.3665226266*D2003*BU2012 + 19.4776843423*D2004*BU2012(-1) + 19.5816216368*D2005*BU2012(-2) + 0.0351185598989*D1984
EQ20	LOG(SALASSOC) = -2.15057756922 + 0.33670043633*LOG(AAUP1_ALL_ASSOC) + 0.460101866629*SURPLUSPCT(-2) + 0.621258181421*LOG(SALASSOC(-1))
EQ21	LOG(SALASST) = -1.19532731926 + 0.121636506803*LOG(REVTOT(-2)-EXPSCHOL(-2)) + 0.717468669958*LOG(SALASST(-1)) + 0.0354703887434*BU2012
EQ22	LOG(SALFULL) = -2.08174201884 + 0.339882528895*LOG(AAUP1_ALL_FULL) + 0.466215532976*SURPLUSPCT(-2) + 0.591097304308*LOG(SALFULL(-1))
EQ23	LOG(SATFRNEW) = 7.94144268118 + 0.106833753308*LOG((TXPI/P)/TXPOP) - 0.0533223236351*LOG(NFRNEW) + 0.0666595691018*LOG(DR)
EQ24	@PCHY(TURATEFLAT) = 0.0398627795703 - 0.417183253102*SURPLUSPCT(-2)*(1-BU2012) + 1.16788281566*D(LOG(HEPI))*(1-BU2012) + 0.31085679836*D(BU2012) + 0.0301071590968*BU2012

Table A3

Identities

Econometric Model of Baylor University Finances

ID01	DR = DRU + DRF
ID02	DRF = RESTSCHOL / (REVTUITGROSS + REVFEES)
ID03	END4YR = 0.25 * (ENDEOY + ENDEOY(-1) + ENDEOY(-2) + ENDEOY(-3))
ID04	END_EARNINGS = ENDRETURN * ENDEOY(-1)
ID05	ENDEOY = ENDEOY(-1) * (1 + ENDRETURN) + GIFTENDOW + ENDTRAN - ENDDIST
ID06	EXPSCHOL = DRU * (REVTUITGROSS + REVFEES)
ID07	EXPTOT = EXPINST + EXPPLANT + EXPSCHOL + EXPOTHER
ID08	HEPI = HEPI(-1) * (1 + GRHEPI)
ID09	HTOT = LOAD * NTOT
ID10	NTOT = NFRNEW + NOTHER
ID11	P = P(-1) * (1 + GRP)
ID12	PUBUNIVTF = PUBUNIVTF(-1) * (1 + GRPUBUNIVTF)
ID13	REVTOT = REVTUITGROSS + REVFEES + REVBGCT2 + REVEND + REVOTHER
ID14	SURPLUS = REVTOT - EXPTOT
ID15	SURPLUSPCT = SURPLUS / (REVTOT - EXPSCHOL)
ID16	TUITFEES = (TURATEHR * 15) + FEES
ID17	TURATEHR = TURATEFLAT / 30
ID18	TXPI = P * TXPOP * ((TXPI(-1) / P(-1)) / TXPOP(-1)) * (1 + GRRTXPIPC)
ID19	TXPOP = TXPOP(-1) * (1 + GRTXPOP)

APPENDIX B

Detailed Information on Structural Equation Regressions
Econometric Model of Baylor University Finances

TABLE B1

Equation EQ01

Dependent Variable:

Log of Unfunded Discount Rate -- LOG(DRU)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(TUITFEES/P)	Log Real Tuition and Fees
LOG(DRU(-1))	Dependent Variable Lagged One Period
BU2012	Dummy Variable Capturing the Effects of the "Baylor 2012" Strategic Plan

Dependent Variable: LOG(DRU)
Method: Least Squares
Date: 08/03/12 Time: 15:16
Sample (adjusted): 1981 2011
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.639703	1.322047	-5.022291	0.0000
LOG(TUITFEES/P)	0.591607	0.119243	4.961341	0.0000
BU2012(-1)	0.176882	0.053008	3.336867	0.0026
SURPLUSPCT(-2)	1.437115	0.579584	2.479562	0.0200
LOG(DRU(-1))	0.303704	0.134032	2.265908	0.0320

R-squared	0.991632	Mean dependent var	-2.171227
Adjusted R-squared	0.990345	S.D. dependent var	0.578335
S.E. of regression	0.056829	Akaike info criterion	-2.750866
Sum squared resid	0.083967	Schwarz criterion	-2.519577
Log likelihood	47.63842	Hannan-Quinn criter.	-2.675471
F-statistic	770.2597	Durbin-Watson stat	1.752834
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.632
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.500
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.547
Jarque-Bera Normality Test	0.770
White Heteroscedasticity Test	0.663

TABLE B2

Equation EQ02

Dependent Variable:

Real Earnings Distributed from Endowment -- ENDDIST

Independent Variables:

Right-Hand-Side Variable	Description
END_DUMMY*END_EARNINGS	Variable capturing the policy of spending endowment earnings subject to a cap and floor prior to policy change in 1995
END_POLICY*(1-END_DUMMY)*END4YR	Variable capturing the policy after 1995 of spending a fraction of the 4-year moving average of the endowment balance
BU2012	Dummy Variable capturing the effects of the "Baylor 2012" Strategic Plan

Dependent Variable: ENDDIST
Method: Least Squares
Date: 08/03/12 Time: 15:16
Sample (adjusted): 1980 2011
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6359.333	1312.817	4.844037	0.0000
ENDPOLICY*END_EARNINGS	0.301899	0.061489	4.909805	0.0000
(1-ENDPOLICY)*END4YR	0.032520	0.002939	11.06432	0.0000
BU2012	10643.77	1750.464	6.080542	0.0000

R-squared	0.970474	Mean dependent var	23145.06
Adjusted R-squared	0.967311	S.D. dependent var	13864.15
S.E. of regression	2506.653	Akaike info criterion	18.60775
Sum squared resid	1.76E+08	Schwarz criterion	18.79097
Log likelihood	-293.7241	Hannan-Quinn criter.	18.66848
F-statistic	306.7766	Durbin-Watson stat	1.409980
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.150
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.262
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.218
Jarque-Bera Normality Test	0.197
White Heteroscedasticity Test	0.164

TABLE B3

Equation EQ03

Dependent Variable:

Return on Endowment -- ENDRETURN

Independent Variables:

Right-Hand-Side Variable	Description
LGSTK/100	Return on Large Stocks (in %)
D2010	Dummy Variable capturing the effect of major administrative changes in 2010
(SMALLSTK/100)*BU2012	Return on Small Stocks (in %), applied only to years of the "Baylor 2012" Strategic Plan

Dependent Variable: ENDRETURN
Method: Least Squares
Date: 08/03/12 Time: 15:15
Sample (adjusted): 1971 2011
Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.070216	0.008430	8.328927	0.0000
LGSTK/100	0.265415	0.044021	6.029305	0.0000
D2010	-0.217181	0.049852	-4.356510	0.0001
(SMALLSTK/100)*BU2012	0.309581	0.069662	4.444052	0.0001

R-squared	0.709904	Mean dependent var	0.104186
Adjusted R-squared	0.686383	S.D. dependent var	0.077678
S.E. of regression	0.043501	Akaike info criterion	-3.339616
Sum squared resid	0.070015	Schwarz criterion	-3.172438
Log likelihood	72.46213	Hannan-Quinn criter.	-3.278739
F-statistic	30.18136	Durbin-Watson stat	1.607295
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.286
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.570
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.770
Jarque-Bera Normality Test	0.598
White Heteroscedasticity Test	0.149

TABLE B4

Equation EQ04

Dependent Variable:

Transfers from Operating Budget to Endowment (in $) -- ENDTRAN*1000

Independent Variables:

Right-Hand-Side Variable	Description
SURPLUS	Operating Surplus
BU2012*SURPLUS	Interaction Variable allowing the effect of Operating Surplus to differ in the years of the "Baylor 2012" Strategic Plan
D1983	Dummy variable capturing exceptional transfer in 1983

Dependent Variable: ENDTRAN*1000
Method: Least Squares
Date: 08/03/12 Time: 15:19
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2122307.	353186.8	6.009020	0.0000
SURPLUS	0.463518	0.104262	4.445714	0.0001
BU2012*SURPLUS	-0.198981	0.102879	-1.934122	0.0629
D1983	5031011.	1567458.	3.209662	0.0032

R-squared	0.617859	Mean dependent var	3654970.
Adjusted R-squared	0.578327	S.D. dependent var	2361273.
S.E. of regression	1533324.	Akaike info criterion	31.43699
Sum squared resid	6.82E+13	Schwarz criterion	31.61838
Log likelihood	-514.7103	Hannan-Quinn criter.	31.49802
F-statistic	15.62940	Durbin-Watson stat	1.707377
Prob(F-statistic)	0.000003		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.448
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.753
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.725
Jarque-Bera Normality Test	0.159
White Heteroscedasticity Test	0.945

TABLE B5

Equation EQ05

Dependent Variable:

Log of Expenditure on Instruction -- LOG(EXPINST)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(FTEFAC*(SALFULL+SALASSOC+SALASST)/3)	Log of estimated total salary bill (number of FTE faculty times average faculty salary across ranks)
LOG((TXPI)/TXPOP)	Log of Texas Nominal personal income per capita

Dependent Variable: LOG(EXPINST)
Method: Least Squares
Date: 08/03/12 Time: 15:15
Sample (adjusted): 1985 2011
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.20782	0.653868	17.14079	0.0000
LOG(FTEFAC*(SALFULL+SALASSOC+SALASST)/3)	0.798895	0.041469	19.26504	0.0000
LOG(TXPI/TXPOP)	0.443109	0.057688	7.681072	0.0000

R-squared	0.998626	Mean dependent var	18.06024
Adjusted R-squared	0.998512	S.D. dependent var	0.535058
S.E. of regression	0.020643	Akaike info criterion	-4.818488
Sum squared resid	0.010227	Schwarz criterion	-4.674506
Log likelihood	68.04959	Hannan-Quinn criter.	-4.775675
F-statistic	8722.120	Durbin-Watson stat	1.793574
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.743
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.730
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.805
Jarque-Bera Normality Test	0.731
White Heteroscedasticity Test	0.497

TABLE B6

Equation EQ06

Dependent Variable:

Log of Real Other Expenditure per Student -- LOG((EXPOTHER/P)/NTOT)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(((REVTOT-EXPSCHOL)/P)/NTOT)	Log of Real Total Net Revenue per Student
D1985	Dummy Variable Capturing Exceptional Event in 1985
SURPLUSPCT(-2)	University Operating Surplus as fraction of Total Net Revenue, lagged 2 periods
LOG((EXPOTHER(-1)/P(-1))/NTOT(-1))	Dependent Variable Lagged One Period
BU2012	Dummy Variable capturing the effects of the "Baylor 2012" Strategic Plan

Dependent Variable: LOG((EXPOTHER/P)/NTOT)
Method: Least Squares
Date: 08/03/12 Time: 15:15
Sample (adjusted): 1981 2011
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.689437	0.318211	-2.166601	0.0400
LOG(((REVTOT-EXPSCHOL)/P)/NTOT)	0.768249	0.093029	8.258122	0.0000
D1985	0.131909	0.028753	4.587670	0.0001
SURPLUSPCT(-2)	0.647787	0.280842	2.306589	0.0296
LOG((EXPOTHER(-1)/P(-1))/NTOT(-1))	0.247543	0.096792	2.557464	0.0170
BU2012	-0.062950	0.021081	-2.986044	0.0062

R-squared	0.992024	Mean dependent var	8.893652
Adjusted R-squared	0.990429	S.D. dependent var	0.278956
S.E. of regression	0.027290	Akaike info criterion	-4.192596
Sum squared resid	0.018619	Schwarz criterion	-3.915050
Log likelihood	70.98524	Hannan-Quinn criter.	-4.102123
F-statistic	621.9193	Durbin-Watson stat	1.858894
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.706
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.356
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.544
Jarque-Bera Normality Test	0.722
White Heteroscedasticity Test	0.374

TABLE B7

Equation EQ07

Dependent Variable:

Log Real Plant and Maintenance Expenditure per Student - LOG((EXPPLANT/P)/NTOT)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(OILPRICE/P)	Log Real Crude Oil Price
LOG((EXPPLANT(-1)/P(-1))/NTOT(-1))	Dependent Variable Lagged One Period
BU2012	Dummy Variable Capturing the Effect of the "Baylor 2012" Strategic Plan
LOG((TXPI/P)/TXPOP)	Log Real Texas Personal Income per capita

Dependent Variable: LOG((EXPPLANT/P)/NTOT)
Method: Least Squares
Date: 08/03/12 Time: 16:07
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.076615	1.527277	3.978724	0.0004
LOG(OILPRICE/P)	0.102759	0.057867	1.775764	0.0866
LOG((EXPPLANT(-1)/P(-1))/NTOT(-1))	0.450241	0.142418	3.161398	0.0038
BU2012	0.288216	0.088826	3.244710	0.0030
LOG((TXPI/P)/TXPOP)	0.714034	0.218327	3.270481	0.0028

R-squared	0.974118	Mean dependent var	7.161400
Adjusted R-squared	0.970420	S.D. dependent var	0.471869
S.E. of regression	0.081156	Akaike info criterion	-2.046169
Sum squared resid	0.184415	Schwarz criterion	-1.819425
Log likelihood	38.76178	Hannan-Quinn criter.	-1.969876
F-statistic	263.4554	Durbin-Watson stat	2.016171
Prob(F-statistic)	0.000000		

NOTE: Discuss EQ07_WLS

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.790
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.604
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.066
Jarque-Bera Normality Test	0.157
White Heteroscedasticity Test	0.011

TABLE B8

Equation EQ08

Dependent Variable:

First Difference of Log Real Mandatory Fee Rate Charged to Students -- D[LOG(FEES/P)]

Independent Variables:

Right-Hand-Side Variable	Description
D1981	Dummy Variable for Exceptional Event in 1981

Dependent Variable: D(LOG(FEES/P))
Method: Least Squares
Date: 08/08/12 Time: 09:27
Sample (adjusted): 1978 2011
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.061385	0.017076	3.594903	0.0011
D1981	0.757890	0.099567	7.611861	0.0000

R-squared	0.644209	Mean dependent var	0.083676
Adjusted R-squared	0.633090	S.D. dependent var	0.161940
S.E. of regression	0.098092	Akaike info criterion	-1.748802
Sum squared resid	0.307904	Schwarz criterion	-1.659016
Log likelihood	31.72964	Hannan-Quinn criter.	-1.718183
F-statistic	57.94042	Durbin-Watson stat	1.554077
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.267
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.373
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.303
Jarque-Bera Normality Test	0.122
White Heteroscedasticity Test	0.596

TABLE B09

Equation EQ09

Dependent Variable:

Log Number of Full-Time-Equivalent Faculty: LOG(FTEFAC)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(NTOT(-2))	Log of Total Student Enrollment lagged two periods
LOG(FTEFAC(-1))	Dependent Variable Lagged One Period
BU2012	Dummy Variable capturing the effect of the "Baylor 2012" Strategic Plan
SURPLUSPCT(-2)	Operating Surplus as a Fraction of Total Operating Revenue, lagged two periods

Dependent Variable: LOG(FTEFAC)
Method: Least Squares
Date: 08/03/12 Time: 15:12
Sample (adjusted): 1981 2011
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.636970	0.678430	-2.412881	0.0232
LOG(NTOT(-2))	0.354724	0.119212	2.975568	0.0062
LOG(FTEFAC(-1))	0.741165	0.074091	10.00351	0.0000
BU2012	0.035399	0.012223	2.896142	0.0076
SURPLUSPCT(-2)	0.691208	0.155024	4.458707	0.0001

R-squared	0.995822	Mean dependent var	6.564613
Adjusted R-squared	0.995179	S.D. dependent var	0.228572
S.E. of regression	0.015870	Akaike info criterion	-5.302084
Sum squared resid	0.006548	Schwarz criterion	-5.070796
Log likelihood	87.18231	Hannan-Quinn criter.	-5.226690
F-statistic	1549.298	Durbin-Watson stat	2.251660
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.471
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.327
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.166
Jarque-Bera Normality Test	0.633
White Heteroscedasticity Test	0.464

TABLE B10

Equation EQ10

Dependent Variable:

Log of Real Gifts to Endowment LOG(GIFTENDOW/P)

Independent Variables:

Right-Hand-Side Variable	Description
BIGGIFTS	Dummy Variable capturing large gifts to endowment in 1984, 1997, and 2000
BU2012	Dummy variable capturing effects of the "Baylor 2012" Strategic Plan
TBOND10YR	Yield on 10-year Treasury Bonds
LOG(((TXPI/P)/TXPOP)*(1-TAXRATE))	Log of Real After-Tax Texas Personal Income per capita
D1983	Dummy Variable for Exceptional Event in 1983

Dependent Variable: LOG(GIFTENDOW/P)
Method: Least Squares
Date: 08/03/12 Time: 15:11
Sample (adjusted): 1978 2011
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.06073	1.695057	8.885090	0.0000
BIGGIFTS	1.230045	0.140040	8.783526	0.0000
BU2012	0.418792	0.141573	2.958146	0.0062
TBOND10YR	0.141392	0.025545	5.535027	0.0000
LOG(((TXPI/P)/TXPOP)*(1-TAXRATE))	1.847128	0.477823	3.865718	0.0006
D1983	-0.776944	0.229145	-3.390623	0.0021

R-squared	0.853320	Mean dependent var	9.345852
Adjusted R-squared	0.827127	S.D. dependent var	0.519034
S.E. of regression	0.215804	Akaike info criterion	-0.070110
Sum squared resid	1.303994	Schwarz criterion	0.199247
Log likelihood	7.191876	Hannan-Quinn criter.	0.021748
F-statistic	32.57838	Durbin-Watson stat	2.276987
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.358
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.573
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.323
Jarque-Bera Normality Test	0.421
White Heteroscedasticity Test	0.704

TABLE B11

Equation EQ11

Dependent Variable:

Log of Gifts for Operating Expenses -- LOG(GIFTOPER)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(TXPI/TXPOP)	Log of Nominal Texas Personal Income per capita
LOG(GIFTOPER(-1))	Dependent Variable Lagged One Period
LGSTK(-1)	Rate of Return on Large Stocks lagged one period

Dependent Variable: LOG(GIFTOPER)
Method: Least Squares
Date: 08/03/12 Time: 15:11
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.820346	3.374422	2.613884	0.0140
LOG(TXPI/TXPOP)	0.677301	0.284623	2.379640	0.0241
LOG(GIFTOPER(-1))	0.572517	0.165492	3.459488	0.0017
LGSTK(-1)	0.009018	0.004853	1.858127	0.0733

R-squared	0.742677	Mean dependent var	14.65064
Adjusted R-squared	0.716057	S.D. dependent var	0.804204
S.E. of regression	0.428531	Akaike info criterion	1.256303
Sum squared resid	5.325514	Schwarz criterion	1.437698
Log likelihood	-16.72900	Hannan-Quinn criter.	1.317337
F-statistic	27.89957	Durbin-Watson stat	1.929945
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.747
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.116
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.203
Jarque-Bera Normality Test	0.606
White Heteroscedasticity Test	0.742

TABLE B12

Equation EQ12

Dependent Variable:

Log of Average Semester Hour Course Load Taken by Students -- LOG(LOAD)

Independent Variables:

Right-Hand-Side Variable	Description
LOG((TUITFEES/P)*(1-DR))	Log Real Baylor Tuition and Fees, net of funded and unfunded discounts
BU2012*FLAT_FRACTION*LOG((TUITFEES/P)*(1-DR))	Interaction of log real net tuition and fees with the estimated fraction of students paying the flat rate
LOG(LOAD(-1))	Dependent Variable lagged one period
D1984	Dummy variable for exceptional event in 1984

Dependent Variable: LOG(LOAD)
Method: Least Squares
Date: 08/03/12 Time: 15:11
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.677097	0.429236	3.907166	0.0005
LOG((TUITFEES/P)*(1-DR))	-0.024674	0.006181	-3.991647	0.0004
BU2012*FLAT_FRACTION*LOG((TUITFEES/P)*(1-DR))	0.002806	0.000746	3.763905	0.0008
LOG(LOAD(-1))	0.559925	0.116246	4.816739	0.0000
D1984	-0.031433	0.008500	-3.698084	0.0009

R-squared	0.847757	Mean dependent var	3.364574
Adjusted R-squared	0.826008	S.D. dependent var	0.019261
S.E. of regression	0.008034	Akaike info criterion	-6.671507
Sum squared resid	0.001807	Schwarz criterion	-6.444763
Log likelihood	115.0799	Hannan-Quinn criter.	-6.595215
F-statistic	38.97908	Durbin-Watson stat	1.919973
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.847
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.241
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.391
Jarque-Bera Normality Test	0.902
White Heteroscedasticity Test	0.792

TABLE B13

Equation EQ13

Dependent Variable:

Log of New Freshmen Enrollment -- LOG(NFRNEW)

Independent Variables:

Right-Hand-Side Variable	Description
LOG((TXPI(-1)*(1-TAXRATE(-1))/P(-1))/TXPOP(-1))	Log Real Texas Personal Income per capita (lagged one period)
LOG((TUITFEES/P)*(1-DR))	Log Real Baylor Tuition and Fees, net of funded and unfunded discounts
LOG(PUBUNIVTF/P)	Log Real Average Tuition and Fees at Texas Public Universities

*NOTE: The discount rate DRU is treated as endogenous, with DR lagged one period as the instrument. (An OLS regression yields very similar results.)

Dependent Variable: LOG(NFRNEW)
Method: Two-Stage Least Squares
Date: 08/03/12 Time: 15:11
Sample (adjusted): 1983 2011
Included observations: 29 after adjustments
Instrument list: C LOG((TXPI(-1)*(1-TAXRATE(-1))/P(-1))/TXPOP(-1))
LOG((TUITFEES(-0)/P(-0))*(1-DR(-1))) LOG(PUBUNIVTF/P)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.93249	1.290856	8.469178	0.0000
LOG((TXPI(-1)*(1-TAXRATE(-1))/P(-1))/TXPOP(-1))	0.444620	0.219453	2.026038	0.0536
LOG((TUITFEES/P)*(1-DR))	-0.572048	0.160624	-3.561400	0.0015
LOG(PUBUNIVTF/P)	0.427693	0.124390	3.438323	0.0021

R-squared	0.885616	Mean dependent var	7.856388
Adjusted R-squared	0.871890	S.D. dependent var	0.114263
S.E. of regression	0.040897	Sum squared resid	0.041815
F-statistic	62.95895	Durbin-Watson stat	2.043043
Prob(F-statistic)	0.000000	Second-Stage SSR	0.049652

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.627
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.442
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.290
Jarque-Bera Normality Test	0.905
White Heteroscedasticity Test	0.158

TABLE B14

Equation EQ14

Dependent Variable:

Log of Enrollment of Students Other than New Freshmen-- LOG(NOTHER)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(NOTHER(-1))	Dependent Variable lagged one period
LOG(NFRNEW(-1))	Log of New Freshmen Enrollment in Previous Year
LOG(TUITFEEES(-1)/P(-1))	Log of Real Tuition and Fees, not adjusted for discounts, lagged one period

Dependent Variable: LOG(NOTHER)
Method: Least Squares
Date: 08/03/12 Time: 15:10
Sample (adjusted): 1976 2012
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.478085	0.362931	-1.317291	0.1968
LOG(NOTHER(-1))	0.866416	0.041394	20.93106	0.0000
LOG(NFRNEW(-1))	0.249464	0.044973	5.546985	0.0000
LOG(TUITFEES(-1)/P(-1))	-0.027727	0.013158	-2.107197	0.0428

R-squared	0.992693	Mean dependent var	9.153829
Adjusted R-squared	0.992028	S.D. dependent var	0.160885
S.E. of regression	0.014365	Akaike info criterion	-5.546302
Sum squared resid	0.006809	Schwarz criterion	-5.372148
Log likelihood	106.6066	Hannan-Quinn criter.	-5.484904
F-statistic	1494.327	Durbin-Watson stat	2.403647
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.231
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.443
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.302
Jarque-Bera Normality Test	0.550
White Heteroscedasticity Test	0.500

TABLE B15

Equation EQ15

Dependent Variable:

Log of Restricted Fund Scholarships per Student -- LOG(RESTSCHOL/NTOT)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(GIFTOPER/NTOT)	Log of Gifts for Operating Expenses per Student
LOG(ENDDIST/NTOT)	Log of Endowment Funds Distributed per Student

Dependent Variable: LOG(RESTSCHOL/NTOT)
Method: Least Squares
Date: 08/03/12 Time: 15:17
Sample: 1981 2011
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.905863	0.162905	36.25348	0.0000
LOG(GIFTOPER/NTOT)	0.161696	0.033498	4.827033	0.0000
LOG(ENDDIST/NTOT)	0.975121	0.050467	19.32204	0.0000

R-squared	0.969955	Mean dependent var	7.240235
Adjusted R-squared	0.967809	S.D. dependent var	0.542297
S.E. of regression	0.097299	Akaike info criterion	-1.730293
Sum squared resid	0.265078	Schwarz criterion	-1.591520
Log likelihood	29.81954	Hannan-Quinn criter.	-1.685056
F-statistic	451.9621	Durbin-Watson stat	1.266020
Prob(F-statistic)	0.000000		

NOTE: Coefficients are still significant even with AR(1) correction – See EQ15B. Also works with Newey-West Std. Errors.

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.080
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.197
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.272
Jarque-Bera Normality Test	0.590
White Heteroscedasticity Test	0.806

TABLE B16

Equation EQ16

Dependent Variable:

First Difference of Log of Operating Revenue from Endowment less First Difference of Log Endowment Distribution -- D(LOG(REVEND))-D(LOG(ENDDIST))

Independent Variables:

Right-Hand-Side Variable	Description
D1999	Dummy Variable for Exceptional Event in 1999

Dependent Variable: D(LOG(REVEND))-D(LOG(ENDDIST))
Method: Least Squares
Date: 08/03/12 Time: 15:09
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D1999	0.373105	0.049241	7.577105	0.0000

R-squared	0.639117	Mean dependent var	-0.007380
Adjusted R-squared	0.639117	S.D. dependent var	0.081968
S.E. of regression	0.049241	Akaike info criterion	-3.154342
Sum squared resid	0.077590	Schwarz criterion	-3.108993
Log likelihood	53.04664	Hannan-Quinn criter.	-3.139083
Durbin-Watson stat	1.948570		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.990
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.289
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.486
Jarque-Bera Normality Test	0.917
White Heteroscedasticity Test	0.444

TABLE B17

Equation EQ17

Dependent Variable:

Log of Total Fee Revenue per Student -- LOG(REVFEES/NTOT)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(FEES*NTOT)	Log of Fees per Student times Total Enrollment
FEE_DUMMY	Dummy Variable capturing a large increase in fees in 1999
LOG(REVFEES(-1))	Dependent Variable Lagged One Period

Dependent Variable: LOG(REVFEES)
Method: Least Squares
Date: 08/03/12 Time: 16:18
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.437788	0.421495	8.156178	0.0000
LOG(FEES*NTOT)	0.313743	0.047029	6.671212	0.0000
FEEDUMMY	0.476656	0.061301	7.775684	0.0000
LOG(REVFEES(-1))	0.476881	0.065676	7.261121	0.0000

R-squared	0.996879	Mean dependent var	15.89523
Adjusted R-squared	0.996556	S.D. dependent var	1.141425
S.E. of regression	0.066986	Akaike info criterion	-2.455466
Sum squared resid	0.130125	Schwarz criterion	-2.274071
Log likelihood	44.51518	Hannan-Quinn criter.	-2.394432
F-statistic	3087.469	Durbin-Watson stat	1.567274
Prob(F-statistic)	0.000000		

NOTE: Newey-West Std Errors show all estimated slope coefficients are significant at 1% or lower. All are also significant at 5% with Wooldridge WLS procedure.

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.279
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.530
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.394
Jarque-Bera Normality Test	0.600
White Heteroscedasticity Test	0.063

TABLE B18

Equation EQ18

Dependent Variable:

Log of Real Other Revenue per Student -- LOG((REVOTHER/P)/NTOT)

Independent Variables:

Right-Hand-Side Variable	Description
LOG((TXPI/P)/TXPOP)	Log of Real Texas Personal Income per Capita
LOG(TUITFEES*(1-DR)/P)	Log of Real Baylor Tuition and Fees Net of Scholarships
LOG((REVOTHER(-1)/P(-1))/NTOT(-1))	Dependent Variable Lagged One Period

Dependent Variable: LOG((REVOTHER/P)/NTOT)
Method: Least Squares
Date: 08/03/12 Time: 15:09
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.712990	2.734411	3.552133	0.0013
LOG((TXPI/P)/TXPOP)	1.052500	0.317339	3.316643	0.0025
LOG((TUITFEES/P)*(1-DR))	-0.232888	0.088526	-2.630719	0.0135
LOG((REVOTHER(-1)/P(-1))/NTOT(-1))	0.520689	0.138792	3.751592	0.0008

R-squared	0.870555	Mean dependent var	8.357773
Adjusted R-squared	0.857164	S.D. dependent var	0.156294
S.E. of regression	0.059069	Akaike info criterion	-2.707003
Sum squared resid	0.101186	Schwarz criterion	-2.525608
Log likelihood	48.66555	Hannan-Quinn criter.	-2.645969
F-statistic	65.01094	Durbin-Watson stat	1.844743
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.807
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.152
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.108
Jarque-Bera Normality Test	0.496
White Heteroscedasticity Test	0.189

TABLE B19

Equation EQ19

Dependent Variable: Log of Gross Tuition Revenue – LOG(REVTUITGROSS)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(TURATEHR*HTOT)*(1-BU2012)	Log of tuition per hour times total hours, for years prior to the Baylor 2012 Strategic Plan (i.e., prior to FY 2003)
LOG(TURATEFLAT*NTOT)*BU2012(-3)	Log of flat rate tuition times enrollment, for years after the tuition increase was fully implemented (FY 2006 and beyond)
D2003*BU2012	Dummy variable for FY 2003, the first transition year
D2004*BU2012(-1)	Dummy variable for FY2004, the second transition year
D2005*BU2012(-2)	Dummy variable for FY2005, the third transition year
D1984	Dummy variable for Exceptional Event in 1984

Dependent Variable: LOG(REVTUITGROSS)
Method: Least Squares
Date: 08/03/12 Time: 15:09
Sample (adjusted): 1979 2011
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.351868	0.025502	-13.79763	0.0000
LOG(TURATEHR*HTOT)*(1-BU2012)	1.020438	0.001431	713.2065	0.0000
LOG(TURATEFLAT*NTOT)*BU2012(-3)	1.016773	0.001305	779.3313	0.0000
D2003*BU2012	19.36652	0.025895	747.8885	0.0000
D2004*BU2012(-1)	19.47768	0.025895	752.1813	0.0000
D2005*BU2012(-2)	19.58162	0.025895	756.1951	0.0000
D1984	0.035119	0.004670	7.519399	0.0000

R-squared	0.999981	Mean dependent var	18.24281
Adjusted R-squared	0.999977	S.D. dependent var	0.940122
S.E. of regression	0.004494	Akaike info criterion	-7.786502
Sum squared resid	0.000525	Schwarz criterion	-7.469061
Log likelihood	135.4773	Hannan-Quinn criter.	-7.679693
F-statistic	233439.0	Durbin-Watson stat	2.266874
Prob(F-statistic)	0.000000		

Regression Residual Test	
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.311
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.534
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.161
Jarque-Bera Normality Test	0.911
White Heteroscedasticity Test	0.772

TABLE B20

Equation EQ20

Dependent Variable:

Log Number of Real Average Associate Professor Salary -- LOG(SALASSOC/P)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(AAUP1_ALL_ASSOC)	Log of Average Associate Professor Salary at Research Universities, AAUP Survey
SURPLUSPCT(-2)	Baylor Operating Surplus as Fraction of Total Net Revenue, Lagged Two Periods
LOG(SALASSOC(-1)/P(-1))	Dependent Variable Lagged One Period

Dependent Variable: LOG(SALASSOC)
Method: Least Squares
Date: 08/03/12 Time: 15:08
Sample (adjusted): 1981 2012
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.150578	0.806549	-2.666394	0.0126
LOG(AAUP1_ALL_ASSOC)	0.336700	0.113170	2.975175	0.0060
SURPLUSPCT(-2)	0.460102	0.184036	2.500059	0.0185
LOG(SALASSOC(-1))	0.621258	0.109059	5.696513	0.0000

R-squared	0.997842	Mean dependent var	3.913425
Adjusted R-squared	0.997611	S.D. dependent var	0.362236
S.E. of regression	0.017706	Akaike info criterion	-5.113370
Sum squared resid	0.008778	Schwarz criterion	-4.930153
Log likelihood	85.81392	Hannan-Quinn criter.	-5.052639
F-statistic	4315.691	Durbin-Watson stat	2.097998
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.279
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.299
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.064
Jarque-Bera Normality Test	0.251
White Heteroscedasticity Test	0.969

NOTES: Newey-West is OK. SURPLUSPCT(-2) becomes insignificant if MA(3) term is included. OK with AR(3). Not clear why there should be a correlation at lag 3. Since p > .05, I use OLS. Serial Correlation not present if SURPLUSPCT(-2) is excluded. I know first hand that salary pools are influenced by available resources, so I keep it in.

TABLE B21

Equation EQ21

Dependent Variable:

Log Number of Real Average Assistant Professor Salary -- LOG(SALASST/P)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(REVTOT(-2)-EXPSCHOL(-2))	Log of Total Net Revenue, lagged 2 periods
LOG(SALASSOC(-1)/P(-1))	Dependent Variable Lagged One Period
BU2012	Dummy Variable capturing the effects of the "Baylor 2012" Strategic Plan

Dependent Variable: LOG(SALASST)
Method: Least Squares
Date: 08/03/12 Time: 15:08
Sample (adjusted): 1980 2012
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.195327	0.519845	-2.299391	0.0289
LOG(REVTOT(-2)-EXPSCHOL(-2))	0.121637	0.040506	3.002889	0.0055
LOG(SALASST(-1))	0.717469	0.065370	10.97558	0.0000
BU2012	0.035470	0.012239	2.898102	0.0071

R-squared	0.998033	Mean dependent var	3.718456
Adjusted R-squared	0.997829	S.D. dependent var	0.402432
S.E. of regression	0.018750	Akaike info criterion	-5.001983
Sum squared resid	0.010196	Schwarz criterion	-4.820588
Log likelihood	86.53272	Hannan-Quinn criter.	-4.940949
F-statistic	4903.819	Durbin-Watson stat	1.771919
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.630
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.815
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.579
Jarque-Bera Normality Test	0.358
White Heteroscedasticity Test	0.745

TABLE B22

Equation EQ22

Dependent Variable:

Log Number of Real Average Full Professor Salary: LOG(SALFULL/P)

Independent Variables:

Right-Hand-Side Variable	Description
LOG(AAUP1_ALL_FULL)	Log of Average Full Professor Salary at Research Universities, AAUP Survey
SURPLUSPCT(-2)	Baylor Operating Surplus as Fraction of Total Net Revenue, Lagged Two Periods
LOG(SALFULL(-1)/P(-1))	Dependent Variable Lagged One Period

Dependent Variable: LOG(SALFULL)
Method: Least Squares
Date: 08/03/12 Time: 15:08
Sample (adjusted): 1981 2012
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.081742	0.631094	-3.298622	0.0026
LOG(AAUP1_ALL_FULL)	0.339883	0.091872	3.699523	0.0009
SURPLUSPCT(-2)	0.466216	0.158218	2.946665	0.0064
LOG(SALFULL(-1))	0.591097	0.096661	6.115179	0.0000

R-squared	0.998310	Mean dependent var	4.178633
Adjusted R-squared	0.998129	S.D. dependent var	0.360220
S.E. of regression	0.015582	Akaike info criterion	-5.368989
Sum squared resid	0.006798	Schwarz criterion	-5.185772
Log likelihood	89.90382	Hannan-Quinn criter.	-5.308257
F-statistic	5513.411	Durbin-Watson stat	1.890057
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.892
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.786
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.495
Jarque-Bera Normality Test	0.204
White Heteroscedasticity Test	0.886

TABLE B23

Equation EQ23

Dependent Variable:

Log SAT Score (Verbal + Quantitative) of New Freshmen: LOG(SATFRNEW)

Independent Variables:

Right-Hand-Side Variable	Description
LOG((TXPI/P)/TXPOP)	Log of Real Texas Personal Income per Capita
LOG(NFRNEW)	Log of New Freshmen Enrollment
LOG(DR)	Log of Total Discount Rate (reflecting both funded and unfunded scholarships)

Dependent Variable: LOG(SATFRNEW)
Method: Least Squares
Date: 08/03/12 Time: 15:08
Sample (adjusted): 1989 2011
Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.941443	0.272994	29.09021	0.0000
LOG((TXPI/P)/TXPOP)	0.106834	0.021900	4.878349	0.0001
LOG(NFRNEW)	-0.053322	0.028542	-1.868201	0.0772
LOG(DR)	0.066660	0.015305	4.355333	0.0003

R-squared	0.933927	Mean dependent var	7.064809
Adjusted R-squared	0.923494	S.D. dependent var	0.024349
S.E. of regression	0.006735	Akaike info criterion	-7.006263
Sum squared resid	0.000862	Schwarz criterion	-6.808786
Log likelihood	84.57202	Hannan-Quinn criter.	-6.956598
F-statistic	89.51956	Durbin-Watson stat	1.950205
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.727
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.829
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.738
Jarque-Bera Normality Test	0.632
White Heteroscedasticity Test	0.424

TABLE B24

Equation EQ24

Dependent Variable: Percentage Change in Tuition Rate -- @PCHY(TURATEFLAT)

Independent Variables:

Right-Hand-Side Variable	Description
SURPLUSPCT(-2)*(1-BU2012)	Operating Surplus (as fraction of total operating revenue) lagged two periods, restricted to years before the "Baylor 2012" Strategic Plan
D(LOG(HEPI))*(1-BU2012)	Growth Rate of the Higher Education Price Index, restricted to years before "Baylor 2012"
D(BU2012)	First Difference Dummy Variable for "Baylor 2012" Strategic Plan (=1 for 2003 and =0 otherwise)
BU2012*D(LOG(HEPI))	Growth Rate of the Higher Education Price Index, restricted to years after "Baylor 2012"

Dependent Variable: @PCHY(TURATEFLAT)
Method: Least Squares
Date: 08/03/12 Time: 15:08
Sample (adjusted): 1981 2011
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.039863	0.008413	4.738203	0.0001
SURPLUSPCT(-2)*(1-BU2012)	-0.417183	0.212580	-1.962478	0.0605
D(LOG(HEPI))*(1-BU2012)	1.167883	0.172502	6.770253	0.0000
D(BU2012)	0.310857	0.016507	18.83209	0.0000
BU2012	0.030107	0.010053	2.994969	0.0060

R-squared	0.940091	Mean dependent var	0.092610
Adjusted R-squared	0.930874	S.D. dependent var	0.059192
S.E. of regression	0.015563	Akaike info criterion	-5.341187
Sum squared resid	0.006297	Schwarz criterion	-5.109898
Log likelihood	87.78839	Hannan-Quinn criter.	-5.265793
F-statistic	101.9972	Durbin-Watson stat	2.187288
Prob(F-statistic)	0.000000		

Regression Residual Test	p-value
Breusch-Godfrey Serial Correlation LM Test (Lags = 1)	0.578
Breusch-Godfrey Serial Correlation LM Test (Lags = 2)	0.598
Breusch-Godfrey Serial Correlation LM Test (Lags = 3)	0.791
Jarque-Bera Normality Test	0.355
White Heteroscedasticity Test	0.279