A FORECAST OF TENNESSEE EDUCATION LOTTERY SCHOLARSHIP EXPENDITURES

A JOINT PROJECT OF THE UNIVERSITY OF TENNESSEE CENTER FOR BUSINESS AND ECONOMIC RESEARCH, THE TENNESSEE HIGHER EDUCATION COMMISSION AND THE TENNESSEE STUDENT ASSISTANCE CORPORATION

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Introduction

This report provides estimates of expected annual expenditures under the Tennessee Education Lottery Scholarship programs for academic years 2010-2011 through 2013-2014. As the TELS programs continue to grow, it becomes imperative to accurately track expected expenditures relative to corresponding revenue streams in an effort to ensure the fiscal sustainability of the programs. Lottery expenditures grew very rapidly during the early years of the program, raising fears that the financing could be unsustainable without policy changes. We carefully evaluate the drivers behind growth in the lottery programs and determine that lottery expenditures should continue to rise during the next two academic years before stabilizing at just below $310 million annually for the next several years. Scholarship expenditures should only grow in subsequent years with the number of high school students, improvements in the quality of education that cause more students to be eligible and retain scholarships, and policy changes. The remainder of this report provides a summary of how these findings were reached.

Total annual TELS expenditures have grown rapidly since the scholarship programs were started in 2004 for two main reasons. First and most importantly, cohorts of students were added to the TELS programs on a gradual basis. Only Freshmen and Sophomores were included in the 2004-2005 academic year, with a new class of Freshmen joining these initial recipients in subsequent years. The 2007-2008 academic year was the first in which recipients spanned the four traditional years of a college education (Freshman, Sophomore, Junior, and Senior). That said, it is reasonable to expect that the 2008-2009 academic year was truly the first full-cohort year for TELS since many recipients use the scholarships for five years.

A second reason for the recent growth in expenditures is a series of structural changes in the scholarship programs, including increases in the dollar amounts of TELS scholarships. As the most prominent example, the initial full-year HOPE scholarship amount of $3,000 has been increased over time to the current value of $4,000. New programs have also been added, including a dual-enrollment program for high-school students, a HOPE scholarship for foster children, and several others.

Given that the TELS system is now at full capacity in terms of having a full set of student cohorts, future expenditure growth will be driven primarily by fluctuations in the size of the annual high school graduating class and further structural changes to the scholarship programs (e.g., changes in scholarship amounts, eligibility criteria, and the like, or the addition of further new programs). Absent these kinds of policy-driven program changes or strong growth in the number graduating seniors, one would not expect future TELS expenditures to continue to grow as significantly as in past years, unless student behavior changed (either for policy or cultural reasons) in such a way as to cause a shift in the propensity to accept or retain TELS scholarships.

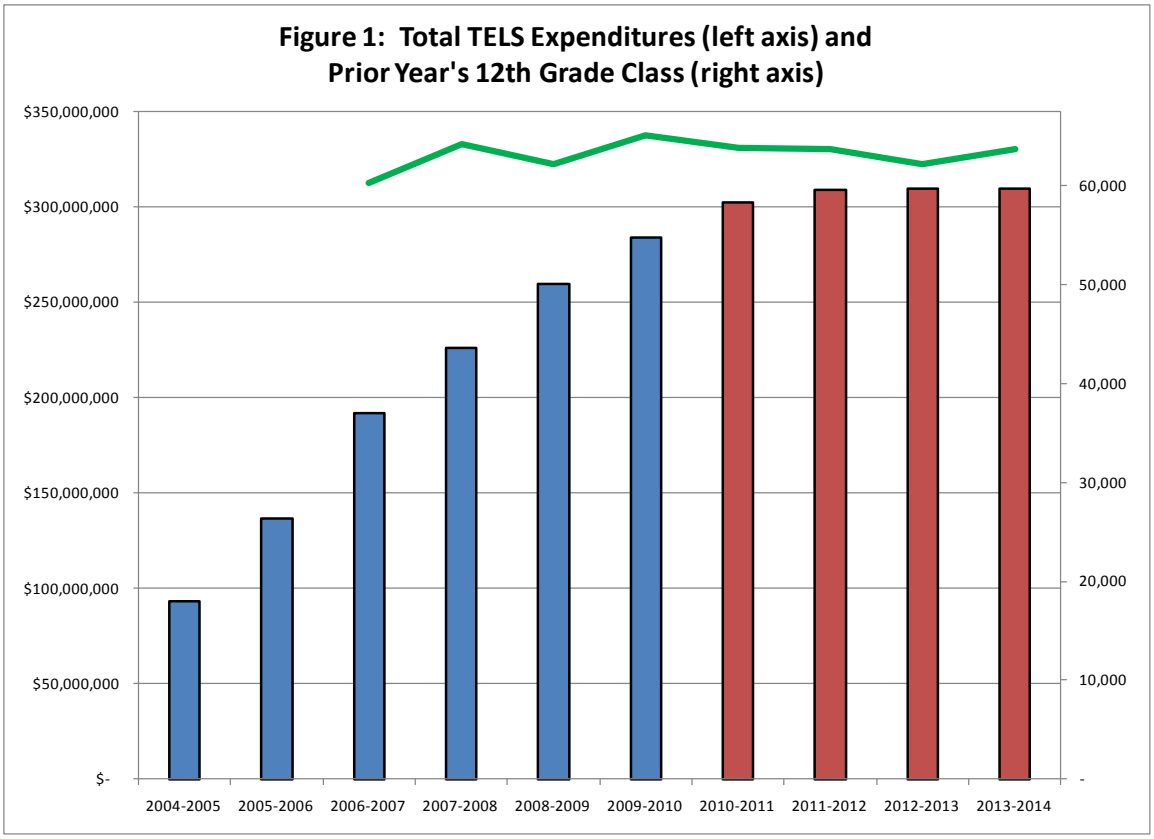
Our forecasting approach is based on estimates of TELS scholarship eligibility among new cohorts of students, take-up among eligibles, and retention among recipients. When possible, we make use of detailed historical data provided by the Tennessee Higher Education Commission and the Tennessee Student Assistance Corporation. Following an overview of our forecast estimates, we describe our methodology in greater detail. Our report concludes with a discussion of various policy, demographic, and economic changes that could impact our estimates of TELS expenditures.

Forecast Overview

Table 1 below provides actual total annual TELS expenditures for academic years between 2004-2005 and 2009-2010, as well as our forecast for academic years 2010-2011 through 2013-2014. Expenditures are expected to continue to rise slightly in the first two forecast years (2010-2011 and 2011-2012) but will then level off and fluctuate relative to the prior year's 12th grade high school class. Figure 1 provides a visual representation of the annual expenditures and also includes a line graph of the prior year's 12th grade class.

Table 1: Total Annual TELS Expenditures

YEAR	TOTAL EXPENDITURES
2004-2005	$ 93,402,500
2005-2006	$ 136,836,500
2006-2007	$ 191,674,600
2007-2008	$ 225,748,285
2008-2009	$ 259,852,858
2009-2010	$ 283,951,400
2010-2011	$ 301,991,109
2011-2012	$ 309,155,554
2012-2013	$ 309,363,086
2013-2014	$ 309,770,821



Forecast Methodology

Our forecasting model is essentially a forecast of student enrollments by TELS scholarship type. Counts of students in each program (by academic semester) are multiplied by average (or weighted average) scholarship amounts to arrive at semester-by-semester expenditure estimates, which are then aggregated to annual amounts. Our starting point is a forecast of the annual number of 12th graders that was produced for our analysis of teacher supply and demand in Tennessee. We then predict annual eligibility for the various TELS programs, take-up of those programs among those who are eligible, and finally retention of scholarships on a semester-by-semester basis. Each of these major steps is discussed in greater detail below.

We should point out that changes in enrollment and expenditures within the latest years of available data prompted us to make adjustments to the eligibility, take-up, and retention rates generated by historical data and econometric models. Specifically, we increased our initial estimates of eligibility, take-up, and retention by sufficient amounts to generate predicted expenditures in the first forecast year that more closely align with the most recent available data on actual expenditures. As an example, our sense is that the recent economic situation has contributed to higher rates of eligibility and retention for the Aspire program than had occurred in the historical

data. Accordingly, our upward adjustments to these parameters have the effect of increasing our estimates of total expenditures.

Eligibility for TELS Scholarships: The primary data source for determining eligibility is a set of ongoing records from the Free Application for Federal Student Aid (FAFSA), by which official eligibility is determined by TELS. Eligibility criteria differ by TELS program, with the HOPE scholarship generally requiring a high school GPA of at least 3.0 or an ACT score of at least 21. For the purposes of our forecast, annual eligibility counts for the HOPE Scholarship and the HOPE Access Grant program are set as the same percentage of the prior year's 12^{th} grade class as in the Fall 2009 data (the last time period for which official eligibility data are available at the student level). Aside from statutory changes in eligibility requirements, eligibility percentages have been quite stable in the historical data.

We should note that our forecast of HOPE scholarship recipients in each term includes those receiving Non-Traditional HOPE Scholarships and HOPE Foster Child Tuition Grants. It also includes those receiving General Assembly Merit Scholarships (GAMS) and Aspire Awards, both of which are supplements to the HOPE Scholarship. Counts of those eligible for GAMS and Aspire are set as fixed percentages of the pool of HOPE-eligible students (33 and 10 percent, respectively, in keeping with historical data while also reflecting the most recent trends and economic conditions) in each term.

Take-Up of TELS Scholarships: We match FAFSA records to TELS enrollment data by term in order to determine initial take-up among the pool of eligible students. Using a variety of information from the FAFSA data, we estimate multivariate econometric models of take-up for HOPE, GAMS, Aspire, and Access. Specifically, take-up is modeled as a function of the student's gender, race (by broad category), adjusted gross income (AGI), parents' AGI, an indicator for whether the student is a dependent on their parents' tax return, indicators for whether the student's mother or father went to college, and indicators for the academic year of the observation (to account for any underlying trends in take-up over time). We then use the econometric estimates to make calculations of predicted take-up rates by program.

Our econometric analyses yield expected take-up rates of 88 percent for HOPE and Aspire and 82 percent for GAMS and Access among those who qualify academically and are also deemed eligible by TELS within the FAFSA records. We should note that there may be additional students who could qualify for a scholarship but, for various reasons, choose not to pursue it by taking the ACT or completing the FAFSA. A number of factors are found to be important in the take-up models. Specifically, we find that white males are more likely than females or those of other races to take up a HOPE scholarship for which they are eligible. Students whose own AGI is either low (between $0 and $10,000) or high (above $50,000) are more likely than those with AGI between $10,000 and $25,000 to take up a HOPE scholarship. Increases in parental AGI tend to lead to increases in take-up rates up until the highest parental AGI category (above

$100,000). Students who are dependents on their parents' tax returns are more likely to take up a HOPE scholarship. Interestingly, students whose parents went to college are less likely to take up a HOPE scholarship, perhaps because they have more out-of-state options for higher education.

Perhaps due to relatively small sample sizes, take-up of Access Grants does not appear to be strongly related to these factors. Take-up of Aspire Awards follows a similar pattern as that for HOPE Scholarships, with two exceptions (both of which are unsurprising given that Aspire Awards are limited to students from lower-income families). First, the student's own AGI does not seem to affect take-up. Second, students with lower parental AGI (at or below $50,000) are more likely to take up an Aspire Award than those with higher parental AGI. Finally, take-up of GAMS is very similar to that for HOPE, except that neither the student's own AGI nor the parental AGI seem to have strong impacts on take-up.

Given these findings, we are not comfortable making further adjustments to the baseline take-up rates outlined above for the forecast period (i.e., we accept the take-up rates generated by the econometric analyses) because we do not believe that there will be major changes in any of these observable factors. We return to this issue below in our discussion of other factors that could impact eligibility, take-up, and retention going forward.

Take-up for other TELS scholarships (for which specific eligibility cannot be determined in the FAFSA data) is handled separately from the above procedures. First, we estimate annual recipients of Dual-Enrollment Grants as increasing percentages of each year's 12th grade class. Given the recent trends in this percentage, however, we allow the percentage to grow at a decreasing rate. Second, we estimate annual recipients of Wilder-Naifeh Technical Skills Grants by considering the possible linkage between historical participation in this program to historical data on the change in total non-agricultural jobs in Tennessee. These trends have tended to move in opposite directions since the Wilder-Naifeh program began. That said, while some improvement in the jobs numbers is anticipated during our forecast period, we are not confident that it would quickly translate into significantly lower Wilder-Naifeh enrollments and have thus held enrollment constant at 14,000 per year. Finally, we rely on recent trends in expenditures and statutory limits on the amount that can be spent on the Helping Heroes Grants and the Tennessee Math and Science Teacher and Rural Health Loan Forgiveness Programs to make an adjustment to total expenditures to account for these programs.

Retention of TELS Scholarships: The final step in our forecast of TELS recipients involves a semester-by-semester accounting of scholarship retention using TELS enrollment data by semester. Specifically, for those who have a particular scholarship each term, we estimate models of the probability of retaining that scholarship into the next term. Retention is estimated as a function of own and parental AGI, indicators for

the student's class in college, age, indicators for dependent status and whether the student's mother or father went to college, the unemployment rate in the student's home county, and a set of indicators for the term of the observation. Results from these models are then used to predict average retention rates by term for each scholarship type.

Predicted retention rates are on the order of 60 to 91 percent between the first and second terms of a student's receipt of the scholarship, with higher retention predicted for HOPE and GAMS and lower retention for Aspire and Access. Conditional retention rates (i.e., the probability of keeping a scholarship into the next term conditional on having kept it up to a particular point in time) do not necessarily fall over time, as those who retain a scholarship at least once are likely to continue to retain it going forward.

A number of factors appear to affect HOPE Scholarship retention. Specifically, we find that sophomores and juniors are more likely to retain than freshmen. This is not surprising given that sophomores and juniors with HOPE Scholarships have already retained them through their freshmen year. Retention tends to rise with parental AGI, at least through the student's first few terms, while patterns relative to a student's own AGI are mixed. Interestingly, higher unemployment in the student's home county is generally associated with lower retention probabilities during a student's first few terms. Students who are dependents on their parents' tax return or whose parents went to college are generally more likely to retain a HOPE Scholarship. Finally, retention tends to fall with the age of the student. These patterns are also observed (with some exceptions) for the retention of Aspire, Access, and GAMS scholarships.

As with our analysis of take-up rates, we do not build in any underlying increase or decrease in retention rates on the basis of these findings from our econometric models. Trends in any of the factors that influence retention will obviously have an impact on overall expenditures, but we do not anticipate significant trends in them during our forecast period. We return to this point below.

Expected TELS Enrollments and Expenditures by Program

The above forecast procedure yields estimated annual enrollments as shown in Figure 2 below. HOPE Scholarship enrollments (including those with Aspire and GAMS supplements and those receiving Non-Traditional or Foster Child Grants) are shown at the top line using the right axis, while other enrollments use the left axis. Semester-by-semester data are provided in Appendix Table 1 at the end of this report.

These enrollment figures are multiplied by average grant amounts to generate the annual total expenditure forecasts by program that are shown in Table 2 below. For the purposes of our forecast, we add up total HOPE Scholarships inclusive of those who also receive supplementary grants (Aspire and GAMS), and then add up the Aspire and

GAMS supplement amounts separately. For example, we anticipate that $22,816,757 will be spent on Aspire supplements in the 2010-2011 academic year, recognizing that every Aspire recipient will also receive a HOPE Scholarship. Their HOPE Scholarship amounts (before the supplements) are included in the $247,595,191 in total HOPE Scholarships in that same year.

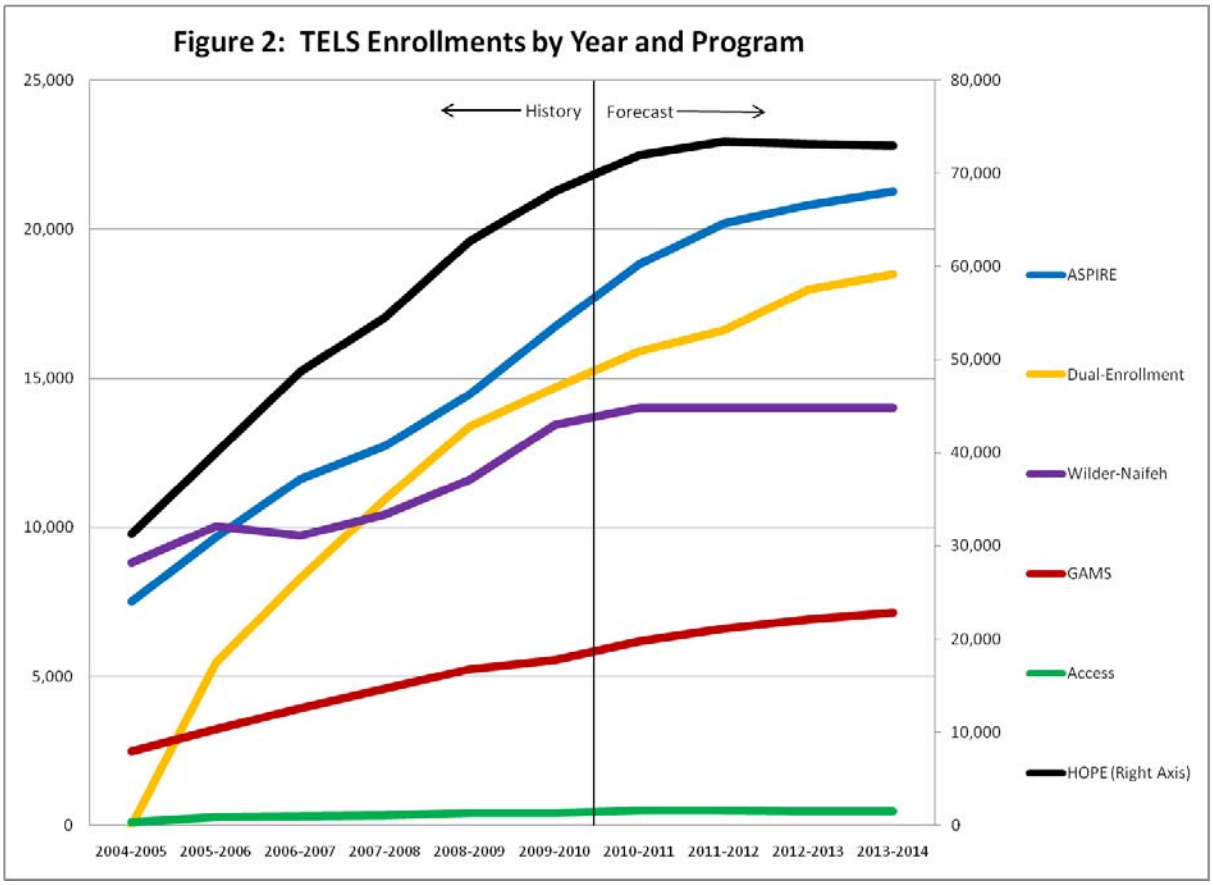


Table 2: Total Annual TELS Expenditures by Program and Academic Year

	2010-2011	2011-2012	2012-2013	2013-2014
HOPE Scholarships	247,595,191	252,444,101	251,367,569	251,101,240
Aspire Supplements	22,816,757	24,453,633	25,187,309	25,726,386
GAMS Supplements	5,496,809	5,877,424	6,154,673	6,355,787
Access Grants	906,399	897,071	879,195	887,836
Wilder-Naifeh	16,800,000	16,800,000	16,800,000	16,800,000
Dual-Enrollment	6,925,954	7,233,324	7,824,340	8,049,573
Other Programs*	1,450,000	1,450,000	1,150,000	850,000
TOTAL	$301,991,109	$309,155,554	$309,363,086	$309,770,821

*Math/Science Teacher and Rural Health Loan Forgiveness Programs and Helping Heroes Grants.

Additional Factors Affecting TELS Expenditures

Our forecast of total annual TELS expenditures relies on the complete history of enrollment in the various scholarship programs. While we are only able to include factors in our take-up and retention models which are available in the data sources provided by THEC and TSAC, those data sources are extremely rich and allow us to consider a wide variety of potential determinants. We find that gender, age, and race all impact take-up and retention, but we do not anticipate any trend changes in the distributions of these characteristics in the Tennessee student-age population during our forecast period. Absent any changes in TELS program structure or policies, then, our sense is that fluctuations in the 12th grade class size will be the most important determinants of future expenditure growth now that we have achieved a full-cohort enrollment level.

Based on our empirical results, a number of things could happen that could increase total TELS expenditures. First, economic fluctuations could have important impacts on TELS expenditures. Specifically, an increase in income inequality that is reflected in a greater share of households in higher AGI categories could lead to greater take-up and retention. We must point out that trend growth in AGI is not expected to significantly impact take-up or retention unless the underlying AGI distribution is altered as described above. While we are not able to control for local unemployment rates in our take-up models (due to the lack of geographic identifiers in the FAFSA records), we do find that students from counties with higher unemployment rates are less likely to retain their scholarships. This finding is interesting and worthy of additional analysis, but it suggests that an expected improvement in labor markets in the next few years could lead to greater retention of TELS scholarships.

The area of TELS expenditures that appears to be most directly related to overall economic activity is the Wilder-Naifeh Technical Skills Grant program, where enrollment moves inversely with non-agricultural job growth. An expected improvement in the jobs forecast is expected to reduce Wilder-Naifeh enrollment as reflected above. Obviously, deterioration in the jobs picture would place upward pressure on TELS expenditures as more individuals choose to pursue Wilder-Naifeh Grants.

In terms of policy, several things could lead to greater TELS expenditures going forward. First, any relaxation of eligibility criteria or increase in scholarship amounts could lead to greater enrollments and expenditures through greater eligibility, take-up, and retention. Further efforts to promote the Dual-Enrollment Grants within the K-12 education system will result in higher-than-expected increases in the number of students pursuing those benefits. Expansion of the Dual-Enrollment program could also have an enduring effect on TELS expenditures if participants are more likely to pursue a full HOPE Scholarship upon high school graduation. In a longer-term view, a general increase in parental education (i.e., a higher percentage of mothers and fathers with

college education or beyond) would also increase retention and, as a result, total TELS expenditures.

Finally, while we are unable to account for it in our model, an improvement in educational quality that increases the likelihood of taking or retaining a scholarship could also increase expenditures. The most likely examples are seen in Tennessee's Race to the Top initiatives. Specifically, the state has expressed the desire to increase high school graduation rates and the share of recent high school graduates who enroll in higher education and complete at least one year of higher education. Success in these areas will add students to the possible pool of TELS recipients, and thus place upward pressure on total TELS expenditures going forward.

Appendix Table 1: Enrollment by Program and Semester

Semester	HOPE	ASPIRE	GAMS	Access	Wilder-Naifeh	Dual-Enrollment	TOTAL
Fall 2004	29,320	7,663	1,971	110	8,815	-	38,245
Spring	25,787	4,181	1,474	35			34,637
Fall 2005	36,380	8,672	2,829	269	10,023	5,465	52,137
Spring	28,601	6,949	2,013	241			44,330
Fall 2006	46,395	11,304	3,737	364	9,725	8,306	64,790
Spring	36,750	8,650	2,516	319			55,100
Fall 2007	51,802	12,088	4,363	384	10,429	10,931	73,546
Spring	37,847	7,794	2,890	217			59,424
Fall 2008	57,846	12,901	5,115	512	11,604	13,384	83,346
Spring	50,841	10,545	4,453	342			76,172
Fall 2009	64,011	14,763	5,381	511	13,438	14,697	92,656
Spring	55,780	12,026	4,604	336			84,252
Fall 2010	66,260	16,779	5,933	496	14,000	15,922	96,678
Spring	57,537	13,643	5,060	328			87,787
Fall 2011	67,560	17,998	6,325	491	14,000	16,628	98,679
Spring	58,663	14,606	5,430	324			89,615
Fall 2012	67,366	18,559	6,634	481	14,000	17,987	99,834
Spring	58,318	15,024	5,675	318			90,623
Fall 2013	67,179	18,977	6,863	486	14,000	18,505	100,169
Spring	58,372	15,325	5,848	322			91,198

Note: HOPE enrollments include those receiving ASPIRE or GAMS supplements, Non-Traditional HOPE, and Foster Child Grants in addition to those receiving HOPE only. Only annual data are available for the Wilder-Naifeh and Dual-Enrollment programs. The TOTAL column is the sum of HOPE, Access, Wilder-Naifeh, and Dual-Enrollment, as ASPIRE and GAMS recipients are counted in the HOPE column. Wilder-Naifeh and Dual-Enrollment recipients are annual counts that are set to be equal in fall and spring semesters.