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## Oklahoma Policy Institute

STATE REVENUE FORECASTING PROJECT  
2010 TECHNICAL MEMORANDUM  
December 2, 2010  
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### Introduction

This memorandum provides technical details and historical background for Oklahoma Policy Institute's revenue forecasts for the state General Revenue Fund (GRF) for the state fiscal years 2010-11 (FY '11) through 2013-14 (FY '14). This is the second year of OK Policy's revenue forecasting project, which seeks to help state leaders and agencies better understand both the short- and longer-range revenue and budget outlook and to encourage the state to improve its own capacity for long-term forecasting and fiscal management. Before reading this memorandum, readers are encouraged to read our issue brief, which summarizes the forecast results in the context of the state's recent economic history and revenue performance and recommends improvements in forecasting and other aspects of state fiscal management and planning. The brief is available on our website at: [//okpolicy.org/new-fiscal-reality](http://okpolicy.org/new-fiscal-reality)

This memorandum summarizes recent GRF history and factors that have affected revenue change. It then describes each of seven revenue forecasts, including assumptions, data used, and projected revenues. It then describes the impacts of tax cuts and revenue apportionment changes already in law, which will affect future state revenue under any forecasting assumptions. It then compares results of the various forecasts for the current and three ensuing fiscal years. It also describes data and assumptions used in estimating the state's total budget for the forecast period.

### Recent Revenue Performance

Forecasting uses data from the past to predict what will happen in the future. All of the forecasts discussed below thus rely on historical quarterly revenue performance. Each of the forecasts estimates GRF revenue for each calendar quarter from the first quarter of FY '11 (July through September 2010) through the fourth quarter of FY '14 (April through June, 2014)<sup>1</sup>. Forecasts are based on quarterly revenues because monthly revenue is subject to extreme fluctuations that make it more difficult to see underlying patterns and annual revenue does not provide sufficient data for analysis. In some cases historical revenue as far back as FY '01 is used to make the forecasts. In other cases, only a few quarters' data is used for forecasting.

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<sup>1</sup> While actual revenue for the first quarter of FY '11 is available as this is written, only Model 3 incorporates that information.

Recent quarterly change data are shown in the Table 1 below. Each quarter includes the actual revenue and the percentage change from the same quarter of the previous fiscal year. OK Policy's forecasts emphasize change from the previous year because revenue varies greatly depending on the time of year. The table shows how quickly GRF revenue turned from healthy growth early in FY '09 to five straight quarters of dramatic revenue declines through most of FY '10. Modest growth has returned in the two most recent quarters. The \$1,105.80 million in revenue for the most recent quarter, the first quarter of FY '11, was 6.8 percent higher than the revenue one year earlier, in the first quarter of FY '10 but 24.7 percent below the same quarter in FY '09.

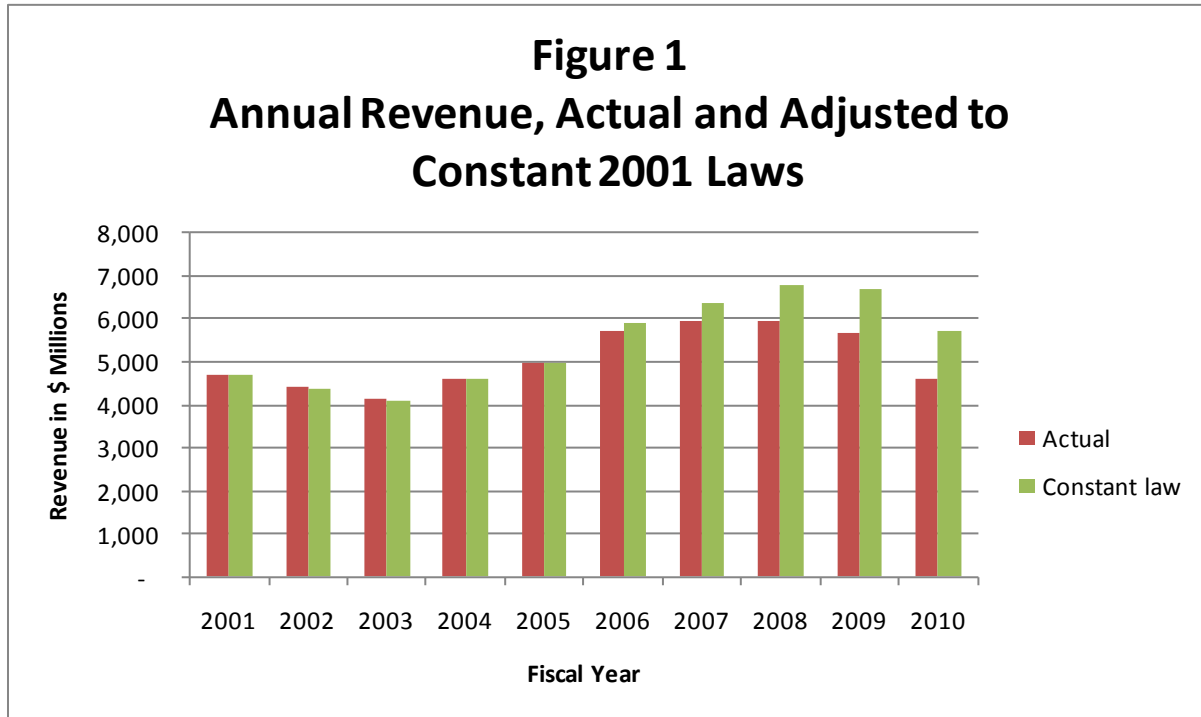
Year	Quarter	Revenue (\$ millions)	Change from Same Quarter Previous Year
2007	1	1,439	8.9%
2007	2	1,397	4.5%
2007	3	1,402	4.8%
2007	4	1,701	-0.4%
2008	1	1,466	2.1%
2008	2	1,378	-1.4%
2008	3	1,329	-5.2%
2008	4	1,780	4.7%
2009	1	1,568	6.9%
2009	2	1,513	9.9%
2009	3	1,298	-15.3%
2009	4	1,312	-26.3%
2010	1	1,106	-29.5%
2010	2	1,093	-27.8%
2010	3	1,032	-20.5%
2010	4	1,369	4.3%
2011	1	1,181	6.8%

Revenue changes in the past have resulted both from economic changes and changes in laws that raise and distribute revenues. In order to isolate economic changes and forecast future revenues, it is important to understand the impact of law changes. Over the last decade, GRF revenue has been affected by cuts in income taxes and by diverting revenue to specific programs and funding needs. Since FY '00 the cumulative loss to the GRF from policy changes has been over \$3.5 billion, of which 69 percent has been from income tax cuts. Large sums have also been diverted to the ROADS highway fund, Teachers' Retirement System, and Oklahoma's Promise scholarship program. Figure 1 shows how these law changes have reduced GRF revenue over this period. By FY '10, revenue would have been \$1.1 billion higher had taxes not been cut and revenue diverted. As described in detail below, many of the forecasts use constant law revenue as their historical basis rather than actual revenue.

#### The Revenue Forecasts

This memorandum reports on the results of seven revenue forecasts. Each estimates revenue for the General Revenue Fund only. The GRF comprises 69 percent of state appropriations (including federal stimulus, or American Recovery and Reinvestment Act funding) for FY '11. FY '11 appropriations also

come from other state funds, such as the House Bill 1017 Education Reform Revolving Fund, Transportation Fund, and Constitutional Reserve (Rainy Day) Fund; as well as federal American Recovery and Reinvestment Act (stimulus) funds. Since these sources may respond differently to economic changes, OK Policy’s forecasts for GRF may not accurately reflect the total appropriations available to the state in FY ’11 and beyond.



Each forecast thus predicts four quarterly revenue amounts for each fiscal year. Our forecasting brief emphasizes annual revenue forecasts compiled from the quarterly forecasts described in this memorandum. Such annual totals are likely to be more accurate than quarterly forecasts and of more use for fiscal planning. This memorandum reports both quarterly forecasts and the resulting annual totals.

The reader may benefit from a brief discussion of the four methods used in the seven forecast models before reviewing each forecast in detail. Models 1 and 2 are based on *expert judgment and trend analysis*. Essentially, these study the recent trends in annual percentage revenue change as shown in Table 1, and then apply assumptions about the duration, length, and shape of the revenue pattern for future quarters. Models 3 and 4 are *historically-based forecasts* that use data about previous Oklahoma revenue cycles and collections to predict future ones. Models 5 and 6 use *multiple regression* to identify relationships between economic indicators and state revenue, then use predictions about future economic data to calculate future revenue. Model 7 also employs regression analysis, but only to identify historical trends in revenue and apply information on these trends to estimate future revenue.

This is the second year of OK Policy’s forecasting project. Models 1-6 were created for the initial forecasts for FY’ 10-13. This year’s version of those models have been updated and adjusted to reflect

additional data accumulated in the last year. Model 7 is a new model. The design, assumptions, and data for each of the forecasts are described below. The strengths and weaknesses of each are briefly described as well. The forecasts for last year's version of models 1-6 are also compared to FY '10 actual revenue to help the reader evaluate the prior accuracy of these models. In doing so, one should consider the purpose of the models is to forecasts several years' revenues; accuracy in one year might or might not be followed by accuracy in longer time periods.

None of the forecasts are perfect and it will not be known for several years if any individual forecast is accurate. Forecasts require application of judgment and different analysts apply judgment differently to the same data. OK Policy's forecasting project attempts to compensate for these and other human problems inherent in forecasting by emphasizing the range of forecasting results that use a number of different methods instead of relying on just one method and one forecast. Actual quarterly and annual projections of all forecasts are compared in greater detail after all forecasts are described.

### Model 1, Quick Recovery

Model 1 is created from a study of revenue changes during the downturn that began in the third quarter of FY '09. The forecasts works from evaluating the trend in the change in revenue from the same quarter of the previous year, adjusted for the effects of any law changes. By this measure, the deepest point of the downturn came in the first quarter of FY '10, when revenue was 23.5 percent less than a year previous (adjusted for changes in laws). Model 1 simply assumes that the recovery will mirror the downturn, so that the percentage revenue change in the first quarter after the trough will be the same as the first quarter before the trough, and so forth. The first quarter of FY '11 is the fourth quarter since revenue growth reached its trough. Model 1 assumes that its percentage revenue change from a year previous will be the same as the change in the fourth quarter before the trough, or 8.67 percent. The following quarter's revenue is forecast to grow at the same rate as five quarters before the trough (10.25 percent) and so on.

While the results from the first three quarters of recovery did not perfectly mirror those from the last three quarters of the downturn, as this model assumes, they were not so different as to indicate the model will not work over the life of the recovery. Figure 2, which follows the discussion of Model 2, shows how revenue change during recovery and downturn have compared so far and how revenue change is projected to change under these two models.

It is not logical to assume that revenue growth from the lowest point will mirror revenue history indefinitely. For this reason, Model 1 assumes this symmetry of revenue decline and growth only through FY '11. After that the forecast switches to an assumption of relatively rapid growth that has typified prior Oklahoma revenue recoveries. It assumes annual revenue growth of 7.5 percent in FY '12, 14.8 percent in FY '13, and 4.15 percent in FY '14. These are the average rates of growth Oklahoma has experienced in years 3-5 of three previous revenue downturns.

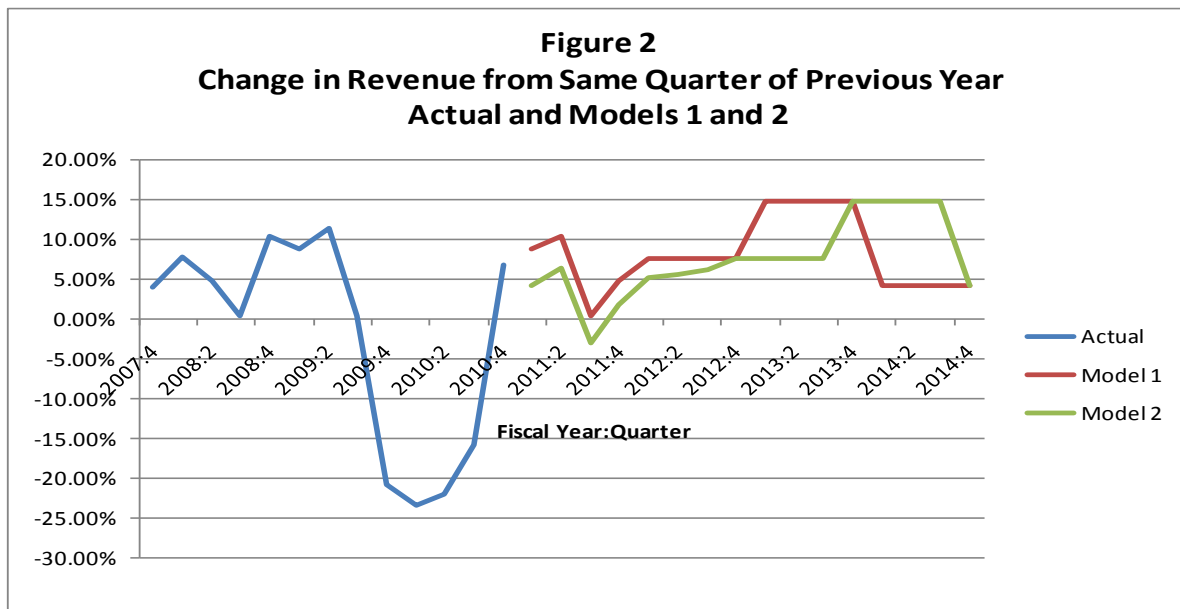
*Strengths* of this method are that it is simple and that the recovery so far suggests it is plausible. *Weaknesses* are that it relies entirely on assumption rather than fact, that it ignores economic projections, and that it has only prior recovery data on which to base the forecasts after the first year. In FY '10, however, this model was reasonably accurate. The revenue forecast of \$4.761 billion was \$161 million, or 3.5 percent, over actual revenue.

Model 2, Delayed Recovery

This forecast assumes a slower recovery in which the upturn in revenue will be more gradual than the downturn that preceded it. While Model 1 assumes a recovery that is symmetrical to the downturn, Model 2 assumes it will take several quarters for revenue growth to return to pre-downturn levels. In the first quarter of FY '11, which is the fourth quarter of the recovery, revenue growth is assumed to be five percent less than the revenue growth four quarters before the trough of the downturn. Once revenue growth reaches pre-downturn levels, it is assumed to grow 7.6 percent and 14.8 percent in FY '13 and FY '14, respectively. These rates represent average revenue growth in prior recoveries. Model 2 assumes the same out-year rate of revenue growth as Model 1 but assumes we take longer to reach this point of "normal" revenue growth.

In the FY '10 forecast, Model 2 was somewhat simpler; it just assumed recovery would be one quarter delayed beyond Model 1. Last year's Model 2 forecast was 9.5 percent below the actual revenue. *Strengths* of this forecast are that it is conservative and leaves open room for the very real possibility that this downturn will be more prolonged than all others in recent history. *Weaknesses* are that it requires an unsupported assumption about how slow the recovery will be and that the first three quarters of recovery suggest the recovery might be faster than the downturn. The forecast is worth considering, however, since there are recent signs that the national economic recovery has slowed and natural gas prices – a key element in Oklahoma's economy – have not yet begun to rise.

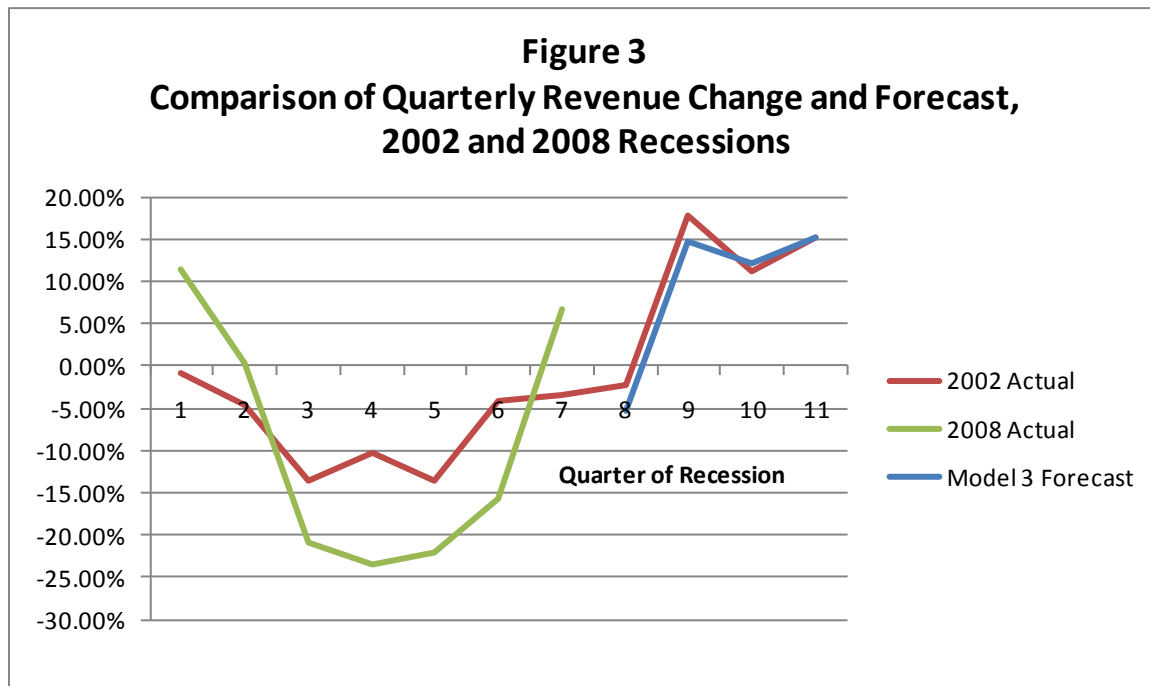
Figure 2 shows actual quarterly changes in the last three years and compares the forecast changes under models 1 and 2.



Model 3, Repeat 2002

Model 3 looks to earlier Oklahoma revenue experience to forecast future revenue. It assumes that this downturn will be proportional to the FY '02 revenue downturn. Revenue results are clearly worse in this recession, so this forecast uses the FY '02 experience not for the depth of the revenue drop, but for the path of the revenue fall and rise. Figure 3 shows it is possible to draw a rough parallel between the downturns. In both cases the steepest revenue decline came in the second quarter of the downturn and in both cases there were three straight quarters of significant declines followed by another quarter of lesser revenue decline. There are notable differences as well, however. The current revenue downturn is much steeper than its predecessor and, in the early stages of recovery; revenue growth is higher in the current situation.

While this data could support any number of assumptions about how the two recoveries will compare, this model treats the dramatic increase in the fourth quarter of FY '10 as an unsustainable path for the current recovery. Looking at the entire course of both downturns, revenue declines in the 2008 recession have been much greater – up to 17 percentage points – than those of the 2002 downturn. Model 3 assumes that the current downturn will continue to be worse for the first two quarters of FY '11. After that, revenue growth is expected to be the same as the parallel quarter of the 2002 recovery, until mid-FY '12, when revenue is expected to grow at the same rates used in Models 1 and 2.



The FY '10 version of this model was constructed in the same way as the current model, but with considerably less data than we now have for the current downturn. That model was the closest to predicting the actual FY'10 revenue, with the forecast 2.6 percent below actual. In addition to this record of accuracy, *strengths* of this scenario are that it uses all available information from our last significant recession and that the data do show some parallels. Further, the FY '02 experience reminds us that recovery can be uneven and there may be dips in the recovery for several more quarters. *Weaknesses* of this scenario are that it requires us to make judgments to fit quarters of this recession

to quarters of the previous recession, that no two recessions are identical, and that this recession seems less likely to lead to as strong a rebound as the FY '02 experience.

#### Model 4—Straight-line

Revenue collections for the first quarter of FY '11 can be combined with the historical revenue pattern to develop a straight-line forecast by extrapolating to the remaining three quarters of the fiscal year. From FY '01 through FY '10 the first quarter contributed an average of 24.7 percent of the revenue for the full year. Dividing the FY '11 first quarter revenue by 24.7 percent results in a revenue forecast of \$4.788 billion. This forecasting method does not, however, provide a basis on which to forecast future year revenues.

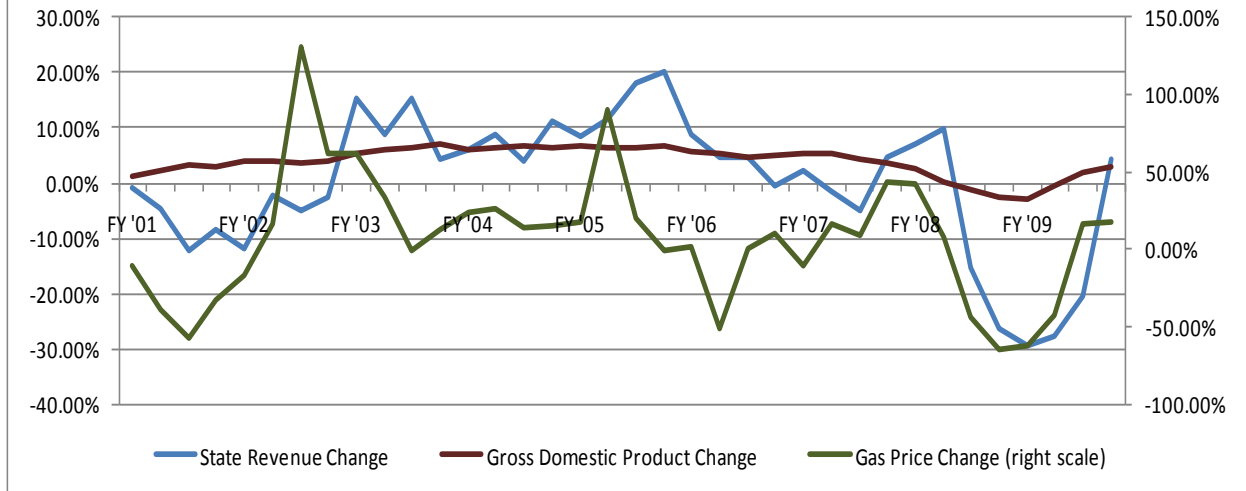
*Strengths* of this method are that it is simple and historically grounded. *Weaknesses* are that it assumes this year will be like all other years and it effectively assumes there will be no change in revenue performance for the entire fiscal year. The latter assumption is not supported by Oklahoma's revenue history. In FY' 10, however, this model was quite accurate, resulting in a forecast that was 2.8 percent below actual revenue.

#### Model 5—Regression on GDP and Gas Prices

Revenue watchers agree that the national economy and natural gas prices both have a significant effect on Oklahoma revenues. Indeed, these are blamed almost universally for our current downturn. Statistics bear out this interpretation. From FY '02 to FY '09, the correlation between quarterly state revenue and U.S. gross domestic product was 0.77 and the correlation between state revenue and wellhead gas prices was 0.69; both suggest a very close relationship.

Figure 4 shows the quarterly changes in state revenue, gross domestic product (GDP) and natural gas prices at the wellhead. The figure suggests a reasonably close relationship among these three variables, though gas prices fluctuate much more severely than the other variables.

**Figure 4**  
**Revenue, Gross Domestic Product, and Gas Prices**  
**% Change from Same Quarter Previous Year**  
**FY '02 - FY '10**



Models 5 and 6 are regression models, which forecast future revenues from forecasts of future GDP and gas prices, based on what we know about the past relationship between revenue, GDP, and gas prices. In order to forecast revenues, we need expert forecasts of GDP and gas prices. GDP forecasts are available from a number of sources. Models 5 and 6 use the median (middle) values of forecasts from the Office of Management and Budget, Congressional Budget Office, Federal Open Market Committee, National Association of Realtors, and the Blue Chip forecast. Natural gas prices are forecast by OK Policy from short term forecasts by the U.S. Energy Information Administration (EIA) and several industry periodicals and longer term forecasts of the Energy Information Administration. The median forecast for nominal (not adjusted for inflation) growth GDP growth are 4.3 percent for calendar year 2010 and between 5.1 and 5.3 percent for 2011-14. By comparison, GDP growth exceeded 6.0 percent from FY '04 through FY '06. Energy prices are more difficult to forecast and forecasts vary widely. In considering both EIA and industry analyst forecasts, we have assumed the wellhead price of gas will rise 10 percent in FY '11, 21 percent in FY '12, 13 percent in FY '13, and 1 percent in FY '14. The price at the end of the forecast period, \$ 6.33 per million cubic feet, would be well above the current level of \$4.22 but still well under the peak of \$10.33. In short, Models 5 and 6 assume a return to healthy economic growth, but not to the level experienced in the mid-2000s.

OK Policy's regression models create formulas linking revenue with economic variables so as to minimize the difference between predicted and actual results. Model 5 is a regression model in which quarterly state revenue is the dependent variable (or the effect in a cause and effect relationship) and the independent variables (the causes) are quarterly nominal gross domestic product (GDP) in billions of dollars, as reported by the Bureau of Economic Analysis, and the wellhead natural gas price reported for the middle month of each quarter by the EIA, as well as a dummy variable for the fourth quarter of the fiscal year, which is typically the highest revenue quarter of the year. This was the best fit of several different models using various combinations of these variables, some of which lag the independent variables.

The resulting regression model is:

$$\text{Revenue} = 280.1 + 0.06 \times \text{GDP} + 32.31 \times \text{gas price} + 216.03 \times \text{fourth quarter}.^2$$

This regression model explains 75 percent of the variation in quarterly state revenues, indicating a very close relationship. There may, however, be some flaws in the modeling, since GDP and gas prices are highly correlated and each quarter's predicted value appears to be closely related to the previous quarter's prediction. While both of these weaknesses appear relatively minor, they could mean that this model does not offer the best prediction that is possible from regression analysis.

*Strengths* of this approach are that it is based on accepted economic relationships, helps us understand what to expect from revenue based on economic indicators, and uses a model that would have accurately predicted quarterly revenues in most previous quarters. One *weakness* is that the model would have predicted higher than actual revenue for most of FY '10, so it may not be up to the task of this deep a downturn. Another weakness is that it depends on outside forecasts of economic activity and gas prices. Even the experts cannot guarantee the right result. Model 5 was slightly different in the FY '10 forecasting project because it did not incorporate the results of the last year. In FY '10 Model 5 was too optimistic, estimating revenue 15 percent over the actual revenue.

#### Model 6 —Regression on Change in Past GDP and Gas Prices

Another regression approach is to use the *change in revenue* as the dependent variable or effect and change in GDP and gas prices as the independent variables or causes. Model 6 is the best of several models with this approach. It *lags* the independent variables, suggesting that Oklahoma revenue change depends on economic and gas price conditions for an earlier period. Figure 4 suggests that is an appropriate model, as revenue frequently seems to have changed later than GDP and gas prices. The resulting model is:

$$\% \text{ change in revenue over same quarter last year} = -.12 + 2.75 \times \text{annual \% change in GDP one quarter earlier} + 0.13 \times \text{annual \% change in gas prices two quarters earlier} .$$

All variables are percentage change from the same quarter of the previous year. <sup>3</sup>This model explains 68 percent of the variation in quarterly revenue changes.

*Strengths* of this model are that it allows for a time delay from economic change to revenue change and that it fits revenue changes of the last decade reasonably well. *Weaknesses* are that it relies on outside forecasts and that it assumes the time delay will be constant into the future. Further, an earlier version of this model was the least accurate in FY '10, under-forecasting revenue by 16.6 percent.

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<sup>2</sup> This model uses generalized least squares (GLS), which provides more accurate estimates than the better-known ordinary least squares (OLS) regression in analyzing series over time.

<sup>3</sup> Like Model 5, this is a generalized least squares model.

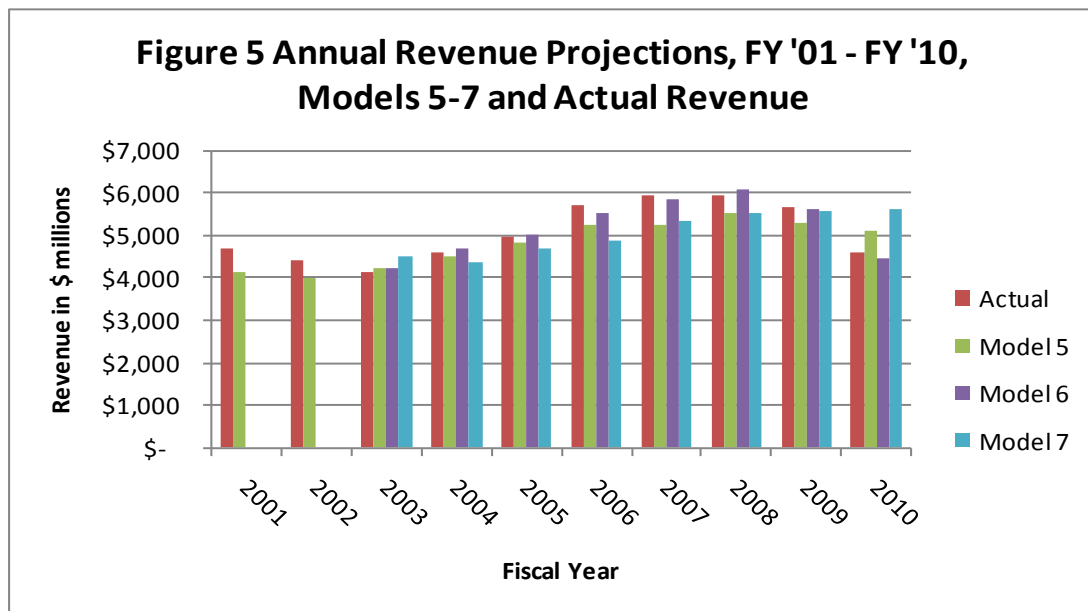
Model 7, Autoregressive Forecast

Like Models 5 and 6, Model 7 is a regression model. Unlike those models, it does not seek a relationship between revenue and economic variables, but seeks to predict changes in future revenue from the changes in prior revenues. In other words, it assumes revenue changes follow a pattern and we do not need to forecast the economy to forecast revenues. Model 7 also forecasts a different and simpler variable, which is the simple dollar change in revenue from one quarter to the next. Then it regresses that dollar difference on the same variable from earlier quarters to find a formula that describes a repeating pattern in revenue changes. Model 7 is the best such *auto*-regressive model of several that were examined. It finds that revenue changes can be predicted from the revenue changes three and four quarters earlier. The formula for Model 7 is:

$$\text{Dollar change in revenue from previous quarter} = \$3.45 - 0.2 \times \text{dollar change in revenue three quarters previous} + 0.71 \times \text{dollar change in revenue four quarters previous}.$$

*Strengths* of this model are that it captures the cyclical nature of economic and revenue change and it does not rely on outside forecasts of economic conditions and gas prices. The principal *weakness* is that it lacks any theoretical underpinnings. It assumes the economic outlook is irrelevant to the revenue outlook, which seems illogical. A supporter of autoregressive models might counter-argue that past revenue performance incorporates economic performance, so that the model incorporates economic forecasts without making them explicit.

Figure 5 shows how models 5-7 would have forecast revenues since FY '01 and compares these forecasts to the actual revenue results. All three models show good fits through most of the historical revenue period. Models 5 and 7 would have seriously over-forecast revenue in FY '10, while model 6 would have been well under actual revenue. This is not surprising, given how seriously FY '10 departed from previous revenue patterns. To the extent that the recovery differs from previous patterns, these models will continue to yield questionable results.



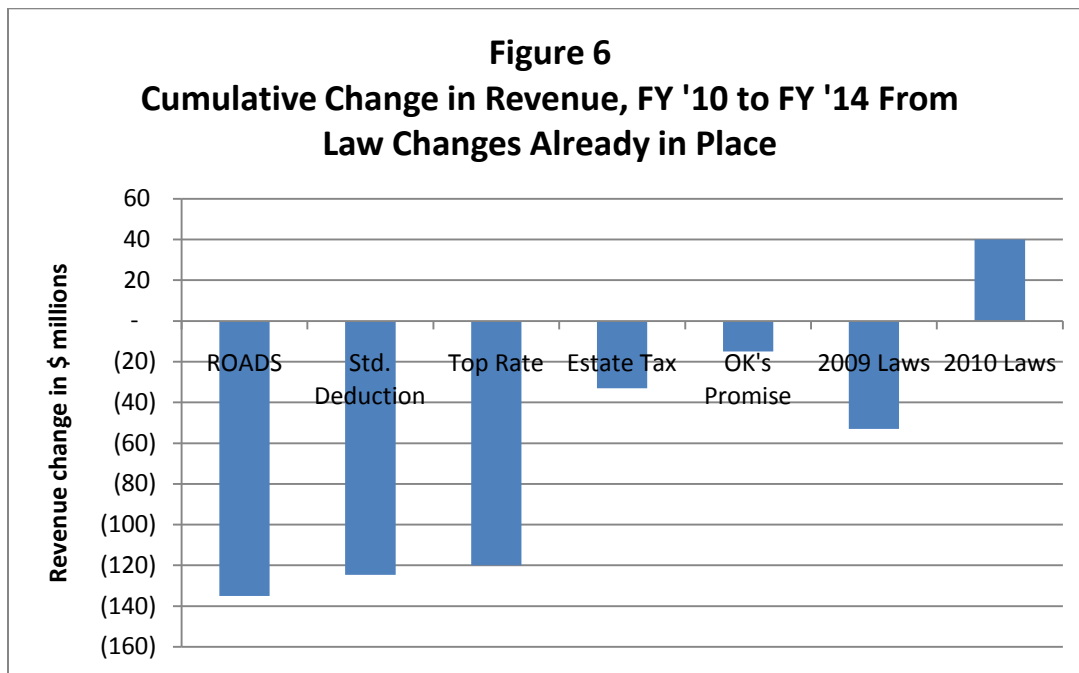
## Adjusting Revenues for Policy Changes

Forecasts must be adjusted for future revenue changes that have already been incorporated into law. All forecasts except Model 3 thus make the adjustments described below.

- In 2006 the Legislature adopted a measure to significantly increase (from \$3,000 to \$11,200 for a married couple filing jointly) the standard deduction from the state personal income tax over four years. The last and largest of the phased increases takes effect in tax year 2010 and will affect income tax revenue in FY '10 and '11. Oklahoma Policy Institute projects that this will reduce revenue by \$53 million in FY '11 under all of the forecasts. In future years, revenue will be reduced by approximately \$25 million more each year because the standard deduction is now tied to the federal deduction, which increases each year since it is indexed to inflation.
- The same 2006 tax cut law also phased in reductions in the top income tax rate. The rate has fallen from 6.75 percent to 5.50 percent. It is scheduled to be reduced to 5.25 percent in the first year in which revenues are forecast to increase by four percent in addition to the cost of the increasing standard deduction. This will take place in FY '12 under every forecast except Model 6. The revenue impact of this reduction is forecast at \$50 million in the first fiscal year of the cut and \$70 million more in the second year.
- In 2006, the Legislature also voted to phase out the estate tax. The tax ends for deaths after December 31, 2009. Because estate taxes may be paid for some time after the death, the revenue loss will be felt through FY '11 and FY '12, for a total reduction of \$33 million from FY '10 revenue levels.
- Also in FY '06, the Legislature created the Rebuilding Oklahoma Access and Driver Safety (ROADS) program. It was funded by reapportioning a growing amount of tax revenue from the General Revenue Fund to the ROADS fund. This will reduce GRF revenues by an additional \$35 million each year from FY '12 through FY '14 and in later years.
- The Legislature created a permanent commitment to the Oklahoma's Promise scholarship program in the 2007 session. Each year the Regents for Higher Education are required to estimate the cost of this program and the Board of Equalization is required to set aside funding before any other state function is funded. Each dollar of increased scholarship cost thus reduces GRF revenue. To date, there has been no need to increase the annual apportionment to this fund. The Regents have requested an additional \$6 million for FY '12. The forecasts assume cost increases of \$3 million per year in FY '13 and FY '14.
- Expected revenue shortfalls in FY '10 prompted the 2009 legislature to adopt many one-time changes in revenues including speeding revenue collections. Since most of these actions only affected collections in one year, OK Policy assumes that FY '11 revenue will be \$53 million lower than it would have been had the FY '10 changes been permanent.
- The 2010 legislature similarly adopted both one-time and ongoing revenue changes to increase revenue for the FY '11 budget. The largest included deferring payment of gross production tax

rebates, one-time transfers to the GRF from other sources, and efforts to improve tax collection. OK Policy projects that these actions will increase revenue in FY '11 by \$292 million; the estimate is based on amounts certified by the Board of Equalization but excludes actions the state will be unable to implement, principally enforcing automobile insurance requirements electronically. OK Policy estimates that the revenue from these actions will fall \$158 million from FY '11 to FY '12 and an additional \$94 million from FY '12 to FY '13 as one-time measures expire and as deferred rebates must be paid.

Cumulatively, these changes are estimated to increase revenue by \$125 million in FY '11 but then reduce it by \$277 million in FY '12, \$226 million in FY '13, and \$63 million in FY '14. These costs will reduce the speed at which revenues recover as the economy turns back up. FY '14 revenue will be \$441 million lower than if 2009 laws and revenue apportionments were held constant. Figure 6 shows the cumulative effect of each law change over the forecast period.



FY '11 Revenue Forecasts

Figure 6 shows the expected quarterly revenue changes for FY '11 under the seven forecasts. It also shows the actual revenue for the recently completed first quarter<sup>4</sup>. The models vary greatly in their quarterly forecasts and in their relationship to the other forecasts. Model 5, the simple regression on current GDP and gas prices, consistently provides higher forecasts. Model 7, the autoregressive regression, and Model 4, based on historical quarterly revenue flows, both suggest stronger revenues

<sup>4</sup> Except Model 4, all quarterly forecasts originally assume FY '10 laws. In order to adjust to FY '11 laws, each quarterly forecast is increased by 3.08 percent, which is the proportion law changes discussed above contributes to the Board of Equalization estimated revenue.

in the first three quarters than in the last quarter. Model 3, based on a repeat of the 2002 recovery suggests the opposite, a slow start with a very strong fourth quarter.

Comparing the seven forecasts to actual revenue for the first quarter of FY '11 suggests that, while individual forecasts vary, the forecasts as a group are on target for the year so far. The median forecast (three other forecasts are below and three above this one), Model 2, is just \$1 million above the actual revenue for the quarter. Model 3, the repeat 2002 scenario, is just \$10 million below the actual. Two other forecasts, models 1 and 6, were within five percent of actual revenue, while models 5 and 7 were much too high.<sup>5</sup>

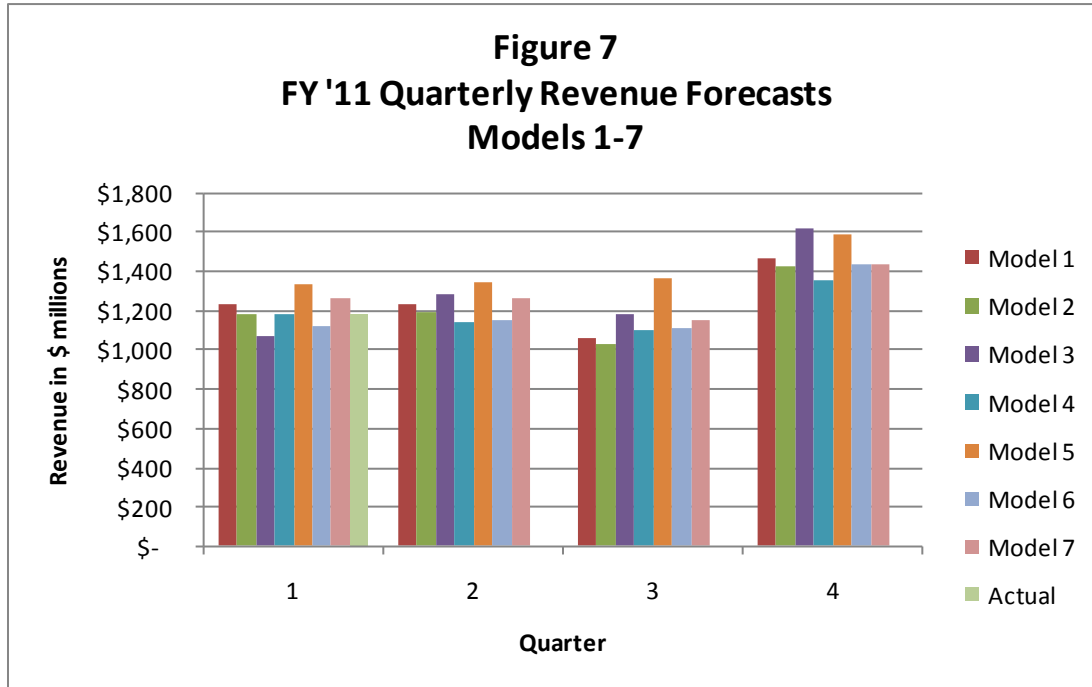
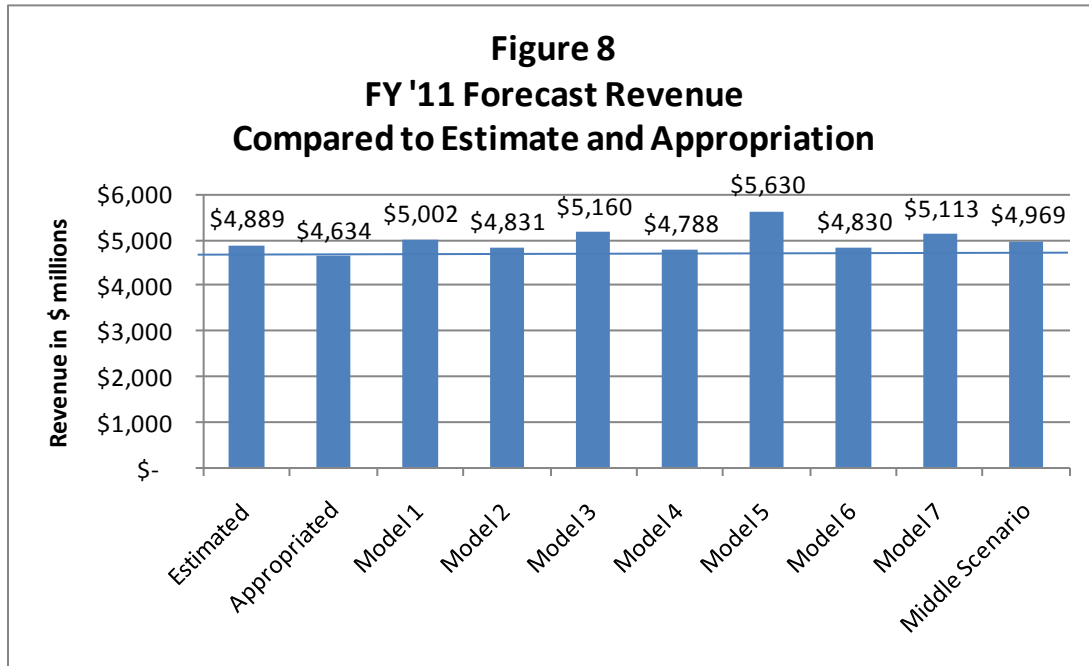


Figure 8 compares the forecasts for FY '11 as a whole to the amount certified by the Board of Equalization and the amount appropriated by the Legislature. The blue line shows the appropriation figure. Revenue must equal or exceed that amount - \$4.634 billion - if the state is to meet its budget obligations for the year. These obligations, formally appropriations, are limited by the Constitution to no more than 95 percent of the official revenue estimate. The forecasts suggest the state will do so, as all seven models forecast revenue in excess of the appropriated amount. The lowest forecast - Model 4 - is that revenue will be \$154 million, or 3.1 percent, over appropriations. The highest forecast - Model 6 - indicates revenue will be \$996 million over appropriations. The final bar on the graph is the "middle scenario," which is created by adding the median forecast from each quarter to establish the best annual forecast." The middle scenario suggests total revenue for the year of \$4.97billion, which is 335million (7.2 percent) higher than appropriations. This middle scenario and Models 1, 3, 5, and 7 all

<sup>5</sup> Model 4 uses actual revenue for the first quarter to forecast the other three quarters, so it is by necessity a perfect prediction of the actual.

show revenue exceeding the original estimate, which would result in a deposit to the Rainy Day Fund as year's end. In all, then, the forecasts suggest few immediate budget worries.



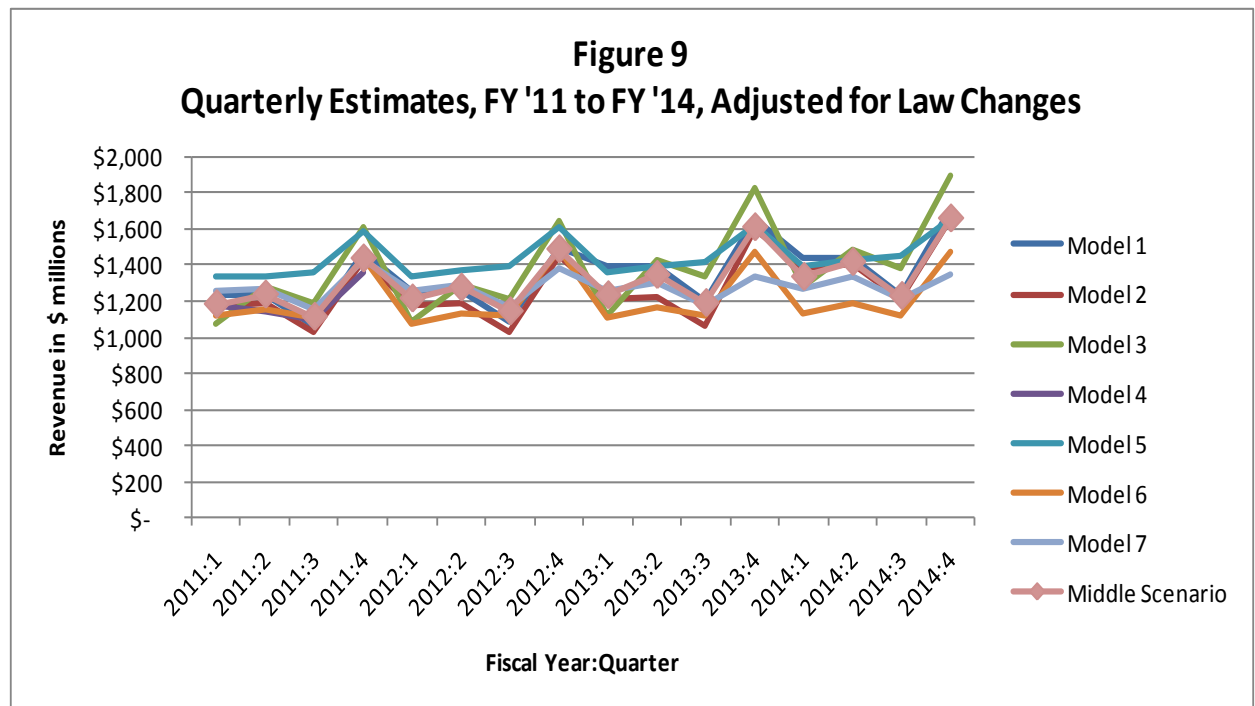
#### Comparing Long-term Forecast Results

Comparing the estimates of the six forecasts from now through FY '14 can give a picture of the likely shape of the recovery. Table 2 and Figure 9 summarize the quarterly revenue projection from the forecasts and the middle scenario, which is the median value of the seven forecasts for each quarter.<sup>6</sup> Table 3 and Figure 10 give the same information on an annual basis. These illustrations indicate significant variation among the forecasts, with a range of \$842 million in FY '11 and \$1.13 billion by FY '14. Model 5 a regression model based on current (forecast) values of GDP and gas prices, estimates revenues the highest until FY '14. Model 6, a regression model based on earlier changes in the same two variables, forecasts lowest. Model 3, based on recovery from the 2002 revenue downturn, starts out among the lowest forecasts but is the highest by FY '14. Model 7, the autoregressive model based on prior shifts in revenue patterns, shows virtually no change in revenue through FY '14, with any economic changes cancelled by revenue loss from law changes. The other models, using trend analysis or other historical approaches, forecast more moderate values. The middle scenario, shown with large

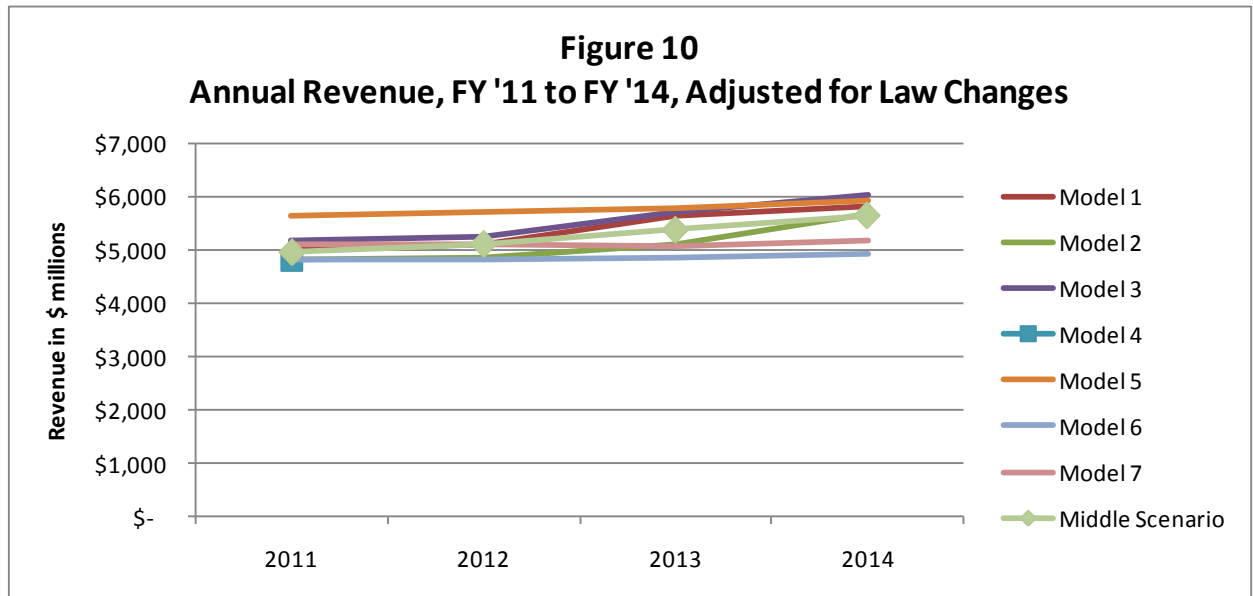
<sup>6</sup> Model 4 estimates revenue only for FY '10, so there are five forecasts and the middle scenario for FY '11 – FY '13.

diamond-shaped markers, represents the best information from all of the forecasts and is used by OK Policy as the basis for its forecasting analysis and recommendations.

Fiscal Year:Quarter	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Middle Scenario
2011:1	\$ 1,232	\$ 1,182	\$ 1,072	\$ 1,181	\$ 1,337	\$ 1,125	\$ 1,258	\$ 1,182
2011:2	\$ 1,236	\$ 1,193	\$ 1,286	\$ 1,145	\$ 1,342	\$ 1,155	\$ 1,265	\$ 1,236
2011:3	\$ 1,063	\$ 1,027	\$ 1,186	\$ 1,103	\$ 1,361	\$ 1,112	\$ 1,155	\$ 1,112
2011:4	\$ 1,470	\$ 1,429	\$ 1,617	\$ 1,359	\$ 1,590	\$ 1,438	\$ 1,434	\$ 1,438
2012:1	\$ 1,255	\$ 1,173	\$ 1,083		\$ 1,342	\$ 1,078	\$ 1,262	\$ 1,214
2012:2	\$ 1,259	\$ 1,189	\$ 1,293		\$ 1,372	\$ 1,133	\$ 1,291	\$ 1,275
2012:3	\$ 1,083	\$ 1,029	\$ 1,210		\$ 1,393	\$ 1,118	\$ 1,168	\$ 1,143
2012:4	\$ 1,497	\$ 1,452	\$ 1,649		\$ 1,612	\$ 1,481	\$ 1,378	\$ 1,489
2013:1	\$ 1,391	\$ 1,212	\$ 1,125		\$ 1,359	\$ 1,106	\$ 1,253	\$ 1,233
2013:2	\$ 1,395	\$ 1,228	\$ 1,433		\$ 1,392	\$ 1,166	\$ 1,300	\$ 1,346
2013:3	\$ 1,200	\$ 1,063	\$ 1,340		\$ 1,413	\$ 1,116	\$ 1,178	\$ 1,189
2013:4	\$ 1,659	\$ 1,601	\$ 1,827		\$ 1,624	\$ 1,477	\$ 1,339	\$ 1,612
2014:1	\$ 1,437	\$ 1,387	\$ 1,283		\$ 1,398	\$ 1,127	\$ 1,271	\$ 1,335
2014:2	\$ 1,442	\$ 1,405	\$ 1,482		\$ 1,430	\$ 1,187	\$ 1,332	\$ 1,418
2014:3	\$ 1,240	\$ 1,216	\$ 1,387		\$ 1,452	\$ 1,118	\$ 1,217	\$ 1,228
2014:4	\$ 1,714	\$ 1,661	\$ 1,891		\$ 1,662	\$ 1,479	\$ 1,344	\$ 1,662



Fiscal Year	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Middle Scenario
2011	\$ 5,002	\$ 4,831	\$ 5,160	\$ 4,788	\$ 5,630	\$ 4,830	\$ 5,113	\$ 4,969
2012	\$ 5,094	\$ 4,843	\$ 5,234		\$ 5,720	\$ 4,810	\$ 5,099	\$ 5,121
2013	\$ 5,644	\$ 5,104	\$ 5,725		\$ 5,788	\$ 4,866	\$ 5,069	\$ 5,380
2014	\$ 5,832	\$ 5,670	\$ 6,044		\$ 5,942	\$ 4,912	\$ 5,165	\$ 5,643



The graphs show the high degree of uncertainty that will face those who estimate revenues in each of the coming years. It also suggests the wide variation in possible impacts of the continuing economic downturn on state spending and public services. While the forecasts agree that revenues will begin climbing again in FY '11, they also agree that recovery will be slow and will take until FY '12 or longer. The variation and the likely slow recovery are important considerations in Oklahoma Policy Institute's recommendations to improve state fiscal forecasting, planning, and communication efforts in the very near future.

#### Forecasts of the Overall State Budget

The GRF only provides part of the picture of the whole state budget. Several other factors have an effect on total appropriations, including other state funds such as the HB 1017 Education Reform and Transportation funds, cash carried over from prior years, appropriations from the Rainy Day Fund, and federal assistance from the American Recovery and Reinvestment Act (ARRA, or the stimulus).

OK Policy's issue brief *A New Fiscal Reality for Oklahoma: The State Budget Outlook 2011-14* expands on the revenue forecasts to estimate the total budget and compare it to prior budget levels. Readers are encouraged to review that brief to better understand the gravity of the budget situation facing

state government over the next three years. This section provides detail on data and assumptions made to estimate each component of the total state budget for FY '12 through FY '14.

- *General Revenue Fund* is estimated at 95 percent (as limited by the Constitution) of the middle scenario revenue forecasts described above.
- *Cash* depends on whether previous years' revenue exceeded estimates, whether state agencies spent less than budgeted, and whether the Legislature transfers cash from other state funds. For FY '12, the budget forecast assumes the state will be able to access \$120 million from the cash flow reserve fund and \$50 million in additional carryover. For FY '13 and '14 the budget forecasts assume that the state will collect 100 percent of estimated revenue in FY '11 and FY '12; this so-called "five percent money" is available for budgeting one full fiscal year later.
- *Other state funds* are assumed to grow 3 percent per year. Many of these funds rely on low-growth revenue sources such as the lottery and tobacco tax, so their growth will generally be lower than that of the GRF.
- The *Rainy Day Fund* has been depleted, but the FY '12 budget estimate includes \$100 million from the RDF that the Legislature set aside for use in that year. For FY '13 and '14 no RDF money is assumed since the Fund will be quite small and since revenue shortfalls that would trigger most uses of the fund are not expected.
- *ARRA* funds will be depleted by the end of FY '11 *except* for money carried over in the Oklahoma Health Care Authority from an extension of the higher ARRA Medicaid match. The \$108 million included in the FY '12 budget forecast is based on the Authority's estimate of the funds from that extension that will not be spent by the end of FY '11.

For the Issue Brief: "A New Fiscal Reality for Oklahoma: The State Budget Outlook, 2011-2014", go to [okpolicy.org](http://okpolicy.org)

If you have questions about this memorandum or wish to discuss it, please contact us at: [info@okpolicy.org](mailto:info@okpolicy.org) or (918) 794-3944