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LOWER TAXES AND ECONOMIC GROWTH: RESPONSE TO A FLAWED ANALYSIS

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When the Speaker and other leaders of Florida's House of Representatives released their plan to roll back property taxes and place a tight growth limit on state and local revenues, they included a report in their release by the firm of Arduin, Laffer & Moore that claims lower taxes will lead to higher economic growth. This report takes an extremely limited and simplistic view of what makes a state grow and the incomes of its residents increase.[2] It looks only at taxes, and ignores all other factors. Yet businesses well understand that the other side of the equation — the public K-12 and higher education programs that provide an educated and productive workforce; roads and infrastructure; health care and environmental preservation and protection; public safety; and the quality of life that taxes buy — are equally important in determining the growth of a state and the decisions business leaders make on where to locate, grow and expand their businesses.

Even on the issue of taxes, there are many problems with this report and its use of data.

- The authors committed an elementary statistical mistake; they constructed an equation that used personal income on both sides in a way that guaranteed a negative relationship between taxes and income — not because of any real world relationship but because of how they constructed their measure of tax burden.

- The authors used the equation to imply causation, even though there is no way to determine the direction of causation in the type of statistical analysis they conducted; tax levels could be a result of economic growth rather than economic growth being a function of tax levels.

- The report ignored the relationship of public services and economic growth, even though mainstream economic literature finds that state expenditures on education, infrastructure, highways, and other services arguably matter as much or more than taxes in determining economic growth rates.

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[2] "An Analysis of the Proposed Property Tax Cut in Florida," Arduin, Laffer & Moore Econometrics, undated.

- The report used a comparison of the highest and lowest tax states to bolster their claims of the affect of taxes on economic growth, but such comparisons are fraught with pitfalls and easily manipulated. This critique shows that similar data could be used to reach very different conclusions.

Because of these and other flaws in their analysis, the report fails to prove that lower property taxes — or lower taxes generally — would improve Florida's economy.

A Flawed Methodology

The report claims that Florida's economy would grow if the property tax were rolled back and partially replaced with a state sales tax increase. The basis for the claim is an equation that is only partially described in the report. It is described as determining the effect across states of the change in the tax burden — measured by the change in taxes per $1,000 of personal income — on real per capita personal income. It appears that the equation took into account only one other factor, which was national economic growth. The report did not specify what years were used in this equation, or what measures of taxes were being considered. Nor did it provide the specifications that would allow another researcher to determine its validity. We have examined and attempted to replicate the results using data from 1980-2000 and 1990-2000.

We find that the authors used a flawed equation in arriving at their results. Both their independent variable and their dependent variable — that is, both sides of their equation — used a measure of personal income. This muddies any relationship found between state and local revenues and personal income growth, and calls the results into question. The authors examined a relationship and constructed an equation that would almost always come out as negative — not because of any real world relationship but because of statistical error. (This is why: In examining the relationship between personal income and taxes as a percent of personal income – a negative relationship will be expected to occur. For example, suppose the absolute level of taxes does not change. If personal income goes up then taxes as a percent of personal income would go down. Similarly, in years when income falls, the taxes as a percent of personal income would go up. When you then look at the relationship statistically between personal income growth and this measure of tax burden, it will appear to be negative.)

We looked at several alternative equations that do not suffer from this flaw. When we examine changes in both personal income and taxes on a per capita basis, the relationship becomes positive and stays statistically significant. That is, the results show that a higher tax burden is related to more — not less — per capita income growth. This is the opposite of the result claimed in the report. As discussed below, this does not necessarily mean that higher taxes *cause* higher income growth, but only that there is a statistical relationship that is contrary to the statistical relationship posited in the report. We looked at this relationship for all 50 states, excluding Alaska and Wyoming and for state and local taxes and total state and local general revenues for both 1980-2000 and 1990-2000. We also included changes in national economic activity.[3]

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[3] For more information about what we examined see Appendix 1.

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There is still another flaw in the equation the report relied on to make its claim of lower taxes leading to higher economic growth. The authors seem to relate current growth in personal income with current taxes received. Yet taxes are a function of personal income and it is likely that changes in tax revenues can be caused by changes in personal income growth. We instead examine the relationship of income growth to changes in the prior years' taxes and again we find a positive relationship between growth in taxes as a percent of personal income and personal income growth (and also a positive relationship if both variables are on a per capita basis). Indeed if we examine the change in each state's total tax burden per $1,000 of the *prior* year's income – we again find a positive relationship between growth in personal income and taxes.

Thus, most or all of the claimed relationship between government revenues and income growth seems to be coming from *how* the authors have specified their equation. Arduin, Laffer, and Moore have committed basic errors in examining this issue, invalidating their conclusions.

Limits of This Type of Analysis

Even if equations such as these find a relationship between higher or lower taxes and income growth, it is difficult to interpret the meaning of such a relationship. A correlation found in this type of equation does not imply causation, nor does it imply the direction of the relationship. For example, if economic growth in a state is strong, revenues may be growing and it becomes possible for the state to provide a tax cut without reducing public services. Similarly, if there is a localized economic problem (that is not captured in the national economic trends, which is the only factor the equation in the report holds constant) such as the Michigan auto industry, the state may have to raise taxes to maintain education and other services. In both of these cases, the economic performance was the cause of the tax change; the tax change was not the cause of the economic performance. Indeed, given our estimates when we explicitly examined the affect of prior taxes on personal income growth and the effect of prior year income growth on taxes, there appears to be a positive relationship between the two factors. Moreover, to do a thorough job of exploring this topic, it would be important to control for more factors in trying to examine the relationship between taxes and growth, most notably controlling for more characteristics of the states examined, including information on their population and the level of services received.

Researchers Find Expenditures Matter as Well as Taxes

The report results are at odds with the mainstream of economic research on the relationship of taxes and economic growth. Most researchers find that reduced taxes can modestly spur economic growth. But the effect is quite small, and depends on holding expenditures on public services constant— which rarely is possible in the real world. And researchers also find that state expenditures on education, infrastructure, highways, and public health matter as much or more than taxes in determining economic growth rates. Reduced taxes that are accompanied by reductions in spending on services that benefit the economy and businesses can have a negative effect on economic growth.[4]

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[4] A recent interpretive survey of the literature by Northwestern University Economist Therese McGuire finds that the results of research on interregional differences in taxes is mixed; depending on the decade studied and the measures used, one can find significant effects of taxes on economic growth or not. Timothy Bartik, Senior Economist at the

Comparison of Five Highest-Tax and Lowest-Tax States				
State	State and Local Tax Burden (2004)	Personal Income Per Capita Growth (1995-2005)	Non-Farm Payroll Employment Growth (1995-2005)	Unemployment Rate, December 2006 (Seasonally adjusted)
Alabama	8.30%	52.4%	7.7%	3.6%
South Dakota	8.35%	67.4%	13.5%	3.2%
Tennessee	8.55%	46.2%	9.8%	4.7%
New Hampshire	8.57%	52.9%	17.6%	3.5%
Colorado	8.86%	54.6%	21.3%	4.0%
Average Low Tax Burden	**8.53%**	**54.7%**	**14.0%**	**3.8%**
Vermont	11.69%	55.8%	13.0%	3.8%
Hawaii	11.69%	37.8%	13.0%	2.0%
Maine	12.67%	53.0%	13.7%	4.7%
Wyoming	12.67%	77.1%	20.0%	3.0%
New York	13.68%	48.0%	8.1%	4.0%
Average High Tax Burden	**12.48%**	**54.4%**	**13.5%**	**3.5%**
Median all states	**10.19%**	**50.8%**	**13.3%**	**4.3%**

A Misleading Use of Averages

Table 3 in the Arduin, Laffer, and Moore report displays the ten highest-tax and the ten lowest-tax states along with a number of economic variables over the 1995-2005 period. This table, which is used to support a claim that lower taxes lead to higher growth, masks a great deal of information. Such presentations, with rankings and averages, are often misleading. The results often depend on the years used, the number of states put in the different categories, and whether one looks at averages or medians. In this case, a small modification in presentation could reach the opposite conclusion on some of the measures.

For example, the five states with the highest tax burden (state and local taxes as a percent of personal income) according to the data from the U.S. Census Bureau and the Bureau of Economic

W.E. Upjohn Institute for Employment Research, finds that "Equally competent research projects may get widely divergent estimates of the economic development effects of fiscal variable." Literature that shows expenditures matter include a well-regarded early study by Jay Helms, and a later review by Ronald Fisher. Economist Robert Lynch reviews the literature and finds that increases in taxes, when used to expand the quantity and quality of public services, may promote economic development and economic growth. Therese J. McGuire, "Do Taxes Matter? Yes, no, maybe so*," State Tax Notes.* Vol. 28 No. 10, June 9, 2003; Timothy Bartik, *New England Economic Review*, March/April 1997; Jay L. Helms, "The Effect of State and Local Taxes on Economic Growth: A Time Series-Cross Section Approach, *The Review of Economics and Statistics*, Vol. 67, No. 4, November 1985; Ronald C. Fisher, "The Effects of State and Local Public Services on Economic Development, *New England Economic Review*, March/April 1997; Robert Lynch, Rethinking Growth Strategies: *How State and Local Taxes and Services Affect Economic Development*, Economic Policy Institute, 2004.

Analysis are New York, Wyoming, Maine, Hawaii, and Vermont. These states have an average tax burden of 12.5 percent and an average per capita income growth of 54.4 percent. (The growth period is the same as was considered in the original report, 1995-2005.)   The five states with the lowest tax burden — Alabama, South Dakota, Tennessee, New Hampshire, and Colorado—have an average tax burden of 8.5 percent and an average per capita income growth of 54.7 percent. While there was a full four percentage point difference in the average tax burden between the five highest and five lowest states, *their per capita income growth was essentially identical.*

Moreover, the per capita income growth experienced by *both* the lowest and the highest tax states was substantially above the median per capita income growth for all states, which was 50.8 percent. (See table below. Note that we were not able to exactly replicate the data in the report, which lacks footnotes to explain the origins of the data. A full table of all the states and measures used in the original report with the correct data and data sources is provided in Appendix 2.)

Other measures show similar disparities. The average unemployment rate was lower among the five highest tax states than in the five lowest tax states. In both cases, it was lower than the median state. The non-farm employment growth for both the low and high tax states was also above the median state.

There was more population growth in the five low-tax states and this growth was reflected in the migration numbers and affected the measures of total personal income and total growth in Gross State Product.   But the economic performance numbers that did not depend on population growth — per capita personal income, employment growth, and unemployment rate were equally favorable among the five high tax states as in the low tax states.

One gets such mixed results — and such different results from using a different number of states — because the determinants of economic growth are far more complicated than just tax levels, and many variables have to be considered if one wants to account for economic growth.   At a minimum, tables such as Table 3 do not "prove" that tax levels in the absence of all other considerations affect economic growth.

Yet another point concerns the time frames used in the table. As noted above, correlation does not prove causation, and there always is an issue of which direction the causation, if any, flows. In the case of Table 3, the tax levels were for 2004. Yet the economic variables were measured from 1995 to 2005. It makes no sense to suggest that 2004 tax levels had an impact on economic growth in 1996 or 2000. If one thinks such a comparison such as the one in Table 3 is valuable, one would have to look at tax levels in some period before the period of the economic performance that is being considered.

In response to the Arduin, Laffer and Moore (ALM) report, we tried to reproduce their results to examine what factors might be driving the reported correlation between tax burdens and real personal income growth. Below is a set of explicit definitions of the variables and specifications we examined. Note in **all** cases the **only** results that were negative at a statistically significant level involved regressing personal income growth on taxes normalized by personal income. As explained in the body of this report, using personal income to explain personal income is not appropriate economic practice and will give anomalous results. We have included a sample set of results examining the relationship between percentage change in personal income and percentage changes in state and local taxes and gross domestic product (GDP) for 1990-2000 – more specifications are available from the authors upon request.

For all of our variables we examined both the relationship between percentage changes in real per capita personal income to both percentage changes in our various measures of tax burden and gross domestic product and changes in tax burden and GDP.

Testing the ALM Model

As far as we could tell, the ALM model used one of the two equations below (or some combination of percentage changes and differences):

We will define:

Y= Real Per Capita Personal Income = (Personal Income/Population)/Consumer Price Index

X= State and Local Tax Burden Per \$1,000 Personal Income = State and Local Taxes/(Personal Income/\$1,000)

Z=Real GDP=GDP/Consumer Price Index

The relationship between growth rates (or the percentage change in variables):

% change in real per capita personal income = α + β (% change in tax burden per \$1,000 personal income) + χ(% change GDP) + ε

or

$(Y_t - Y_{t-1})/Y_{t-1} = \alpha + \beta(X_t - X_{t-1})/X_{t-1} + \chi(Z_t - Z_{t-1})/Z_{t-1} + \varepsilon$

The alternative specification that may have been used was the relationship between differences in variables.

Regression Results of Correlation of Income Growth and Tax Burden (Percent Changes in State and Local Taxes) 1990-2000 Results Excluding AK and WY				
% Change State and Local Taxes/Personal Income	-0.211 (0.021)			
% Change Real Per Capita State and Local Taxes		0.081 (0.025)		
Lagged % Change State and Local Taxes/Personal Income			0.076 (0.023)	
%Change (State and Local Taxes/Lagged Personal Income)				0.077 (0.022)
% Change In GDP	1.099 (0.091)	1.138 (0.099)	1.208 (0.097)	1.186 (0.097)
Constant	-0.045 (0.005)	-0.049 (0.005)	-0.051 (0.005)	-0.050 0.005
State Fixed Effects	no	no	no	no
Adjusted R-Squared	0.3401	0.2336	0.2340	0.2354

Change in real per capita personal income = $\alpha + \beta$ (change in tax burden per \$1,000 personal income) + χ(change GDP) + ε

or

$(Y_t - Y_{t-1}) = \alpha + \beta(X_t - X_{t-1}) + \chi(Z_t - Z_{t-1}) + \varepsilon$

Avoiding the ALM pitfall

To avoid the problem of having the same personal income variable on both sides of the equation we varied the specifications by replacing the authors' tax burden variable with:

Real per capita state and local taxes = (State and Local Taxes/Population)/Consumer Price Index,

Lagged state and local tax burden per \$1,000 personal income –this examined the relationship between income growth in year t on tax changes in year t-1 (normalized by personal income

$((Y_t - Y_{t-1})/Y_{t-1} = \alpha + \beta(X_{t-1} - X_{t-2})/X_{t-2} + \chi(Z_t - Z_{t-1})/Z_{t-1} + \varepsilon$

Current year state and local tax burden per $1,000 of the prior years personal income.

X_t= State and Local Taxes$_t$/(Personal Income$_{t-1}$/$1,000)

and

$$(Y_t - Y_{t-1})/Y_{t-1} = \alpha + \beta(X_t - X_{t-1})/X_{t-1} + \chi(Z_t - Z_{t-1})/Z_{t-1} + \varepsilon$$

We performed standard statistical analysis for 1980-2000 and 1990-2000. We also replaced our tax burden variable with a broader measure of state and local activity by including state and local general revenues instead of state and local taxes. We examined the relationship including and excluding indicator variables for each state. We also tried replacing national gross domestic product measures with year indicator variables to control for specific effects in each year.

In all cases we only found a negative and statistically significant result for the ALM specification while all of our other specifications that corrected for the simultaneity of including personal income on both sides of the equation were statistically significant and positive.

Appendix 2: State and Local Tax Burden vs. 10-Year Economic Performance

| | State & Local Tax Burden (2004)* | Growth Between 1995- 2005 | | | | | Net Domestic In-Migration as a % of Population (2005-2006) | Unemployment Rate, December 2006 (Seasonally adjusted) |
		Gross Domestic Product Growth**	Personal Income Growth	Personal Income Per Capita Growth	Population Growth	Non-Farm Payroll Employment Growth		
Alabama	8.30%	61.25%	61.6%	52.4%	5.85%	7.74%	6.9%	3.6
South Dakota	8.35%	73.63%	76.0%	67.4%	5.01%	13.48%	2.5%	3.2
Tennessee	8.55%	68.97%	63.6%	46.2%	11.80%	9.80%	8.4%	4.7
New Hampshire	8.57%	71.27%	73.0%	52.9%	12.89%	17.64%	1.7%	3.5
Colorado	8.86%	100.42%	88.5%	54.6%	21.86%	21.32%	6.3%	4
Texas	9.37%	94.99%	87.2%	55.2%	20.94%	21.34%	9.4%	4.5
Missouri	9.37%	57.11%	56.6%	45.2%	7.80%	8.22%	2.3%	4.9
Virginia	9.36%	89.72%	77.1%	56.1%	13.40%	19.50%	0.6%	2.9
Oregon	9.46%	80.12%	65.0%	44.3%	14.27%	16.93%	9.4%	5.4
Montana	9.47%	71.82%	68.2%	57.5%	6.64%	19.96%	7.0%	2.9
Oklahoma	9.44%	74.60%	70.1%	58.6%	7.11%	14.86%	3.5%	3.8
Georgia	9.67%	82.71%	78.1%	43.9%	24.62%	17.57%	13.1%	4.6
Florida	9.50%	97.73%	83.9%	50.3%	22.22%	30.26%	9.2%	3.3
South Carolina	9.83%	62.71%	67.5%	47.5%	13.29%	13.02%	11.2%	6.6
Arkansas	9.83%	62.75%	61.6%	47.4%	9.48%	10.20%	7.0%	5.1
Indiana	9.95%	61.21%	56.0%	45.5%	7.08%	6.08%	0.8%	4.8
North Carolina	9.90%	80.94%	72.3%	45.7%	18.08%	13.09%	11.9%	4.9
Iowa	9.86%	57.92%	57.2%	51.9%	3.42%	9.06%	0.0%	3.5
Massachusetts	10.09%	66.90%	65.8%	59.2%	4.75%	7.35%	-7.7%	5.3
North Dakota	10.29%	68.08%	62.7%	65.5%	-2.04%	14.35%	-3.3%	3.2
Illinois	10.21%	55.68%	53.4%	44.3%	6.30%	4.86%	-5.4%	4.1
Washington	9.95%	76.63%	70.6%	48.7%	14.79%	18.42%	6.8%	5.0
Maryland	10.09%	79.22%	75.8%	59.1%	10.25%	17.05%	-4.6%	3.9
Mississippi	10.21%	51.05%	58.4%	47.6%	6.83%	5.15%	-5.1%	7.5
Arizona	10.02%	108.13%	102.8%	51.3%	34.30%	39.64%	21.5%	4.1
Michigan	10.45%	49.89%	45.7%	39.3%	4.39%	2.58%	-6.4%	7.1
Idaho	9.99%	74.14%	77.4%	46.2%	21.41%	28.35%	15.5%	3.2
Kentucky	10.23%	55.32%	61.0%	50.0%	7.34%	11.12%	2.3%	5.2
Delaware	10.17%	105.34%	75.6%	51.9%	15.35%	17.50%	6.4%	3.4
Pennsylvania	10.33%	55.49%	52.6%	49.8%	1.70%	8.58%	0.0%	4.6
Nevada	10.03%	127.35%	120.1%	44.2%	52.52%	55.75%	21.6%	4.4
Utah	10.44%	96.05%	82.5%	48.8%	23.64%	26.67%	5.9%	2.6
Minnesota	10.52%	78.56%	70.7%	55.0%	10.01%	13.89%	-0.9%	4.2
California	10.59%	78.46%	74.1%	52.7%	14.06%	19.02%	-7.9%	4.8
Alaska	10.70%	58.49%	52.6%	38.9%	9.74%	18.37%	-2.6%	6.7
Louisiana	10.70%	54.10%	33.1%	28.9%	2.94%	5.52%	-54.8%	4.3
Kansas	10.80%	65.74%	61.3%	52.8%	5.66%	11.41%	-2.7%	4.5
New Mexico	10.72%	66.12%	69.8%	51.5%	11.95%	18.58%	4.5%	3.8
New Jersey	10.87%	61.62%	63.3%	51.4%	7.67%	12.30%	-8.3%	4.2
Connecticut	10.84%	60.38%	61.6%	53.1%	5.31%	6.49%	-4.8%	4.2
West Virginia	10.98%	45.89%	46.3%	46.8%	-0.53%	8.55%	2.2%	5.1
Ohio	11.11%	50.35%	45.0%	41.7%	2.39%	3.98%	-4.2%	5.6
Nebraska	11.29%	58.80%	61.1%	51.8%	6.11%	14.64%	-3.2%	3.1
Rhode Island	11.47%	70.60%	60.5%	51.6%	5.56%	11.70%	-11.7%	5.2
Wisconsin	11.57%	61.32%	59.8%	49.7%	6.61%	10.98%	-0.6%	4.9
Vermont	11.69%	66.03%	64.9%	55.8%	5.67%	13.03%	-1.1%	3.8
Hawaii	11.69%	47.71%	46.9%	37.8%	6.39%	13.01%	-2.5%	2.0
Maine	12.67%	62.66%	62.6%	53.0%	6.01%	13.68%	0.7%	4.7
Wyoming	12.67%	87.20%	86.0%	77.1%	4.87%	19.93%	5.8%	3.0
New York	13.68%	61.14%	53.8%	48.0%	4.27%	8.06%	-11.7%	4.0
Median	**10.19%**	**66.5%**	**64.2%**	**50.8%**	**7.2%**	**13.3%**	**1.9%**	**4.3**

*State & local tax burden is state and local taxes divided by personal income.
**Gross Domestic Product uses SIC classification for 1995 and NAICS for 1996-2005.

Sources: State & local tax burden: US Census Bureau and Bureau of Economic Analysis (BEA), Gross Domestic Product: BEA, Personal Income Growth: BEA, Personal Income Per Capita Growth: BEA, Population Growth: US Census, Non-Farm Payroll, Employment Growth: Bureau of Labor Statistics (BLS), Net Domestic In-Migration as a % of Population: US Census, Unemployment Rate: BLS