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*American Enterprise Institute for Public Policy Research*

# Revenue-Maximizing Corporate Income Taxes: The Laffer Curve in OECD Countries

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**Revenue-Maximizing Corporate Income Taxes:  
The Laffer Curve in OECD Countries**

By

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Preliminary draft: July 2007

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**Abstract:**

Corporate tax rates among industrialized nations have been declining steadily since the mid 1980s. Theories of globalization, capital mobility and tax competition have been proposed to explain these changes. Less attention has been paid to the changes in corporate tax receipts during this period and their relationship to tax rates. This note explores these changes and finds, similar to Clausing (2007), strong statistical evidence of a Laffer curve in the international corporate tax data. This conclusion remains even when significant potential outlier countries, such as Ireland, Switzerland and Norway, are excluded from the sample. We extend her work by exploring the time variation in the revenue maximizing corporate income tax rate from 1980 to 2005. We find robust evidence that a Laffer curve has existed in the corporate tax sphere throughout most of our sample period. It is not merely a recent phenomenon. We also find that the revenue maximizing corporate tax rate was about 34 percent in the late 1980s, and that this rate has declined steadily to about 26 percent for the most recent period. In addition, we confirm our finding when using combined central and sub-central (i.e. federal plus average state) tax rates.

## I. Introduction

Corporate tax rates have been in decline for over two decades. This is true globally, although cuts have been more significant among developed nations where initial rates tended to be higher. Significant increases in trade, foreign direct investment and globalization have occurred over the same period, and increased capital mobility may have led to increased rewards from tax competition. In addition, clever tax managers may be able to use direct investment and transfer pricing to locate profits in low tax countries with increasing competence. If so, the benefits of being a low tax country, and costs of being a high tax country, might be significantly higher today than they were in the early 1980s.

A consequence of increased capital mobility may be declining corporate revenues resulting from high tax rates. Multinational firms could, in theory, move activities so elastically between localities that revenues decline if rates are high relative to one's neighbors. In a world without such mobility, countries may even be able to hold capital "captive" and reap healthy revenues with high rates. The question is ultimately empirical.

This note explores a data set of corporate tax rates and collections for OECD countries (1980-2005) to identify the empirical relationship between corporate tax revenues and rates. We use nonlinear regression techniques in order to model this relationship in Laffer curve form. We explore the existence of a revenue maximizing rate and estimate its trend over time.

While discussions of the Laffer curve date well before Arthur Laffer himself,<sup>1</sup> empirical evidence has been scant. Some previous discussions include the principle of the Laffer curve concept applied to tariffs (Caves and Jones, 1973), and to empirical work on U.S. taxes on labor income (Fullerton, 1982). However, while Hines (2005) and others have explored causes of the

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<sup>1</sup> For example, Adam Smith wrote in *The Wealth Nations* (1776), "High taxes, sometimes by diminishing the consumption of the taxed commodities, and sometimes by encouraging smuggling, frequently afford a smaller revenue to government than what might be drawn from more moderate taxes." Book V, Chapter II.

decline in corporate tax rates, the only recent work we are aware of that explores the specific issue of corporate income tax and the Laffer curve is Clausing (2007).

Clausing (2007) finds a parabolic relationship between tax rates and tax revenue among OECD nations, consistent with the Laffer curve interpretation. We begin this work by replicating Clausing's results with slightly different data. After replication, we extend her work in two ways. First, we employ a modestly more current database (1980-2005) and explore how the Laffer curve has changed over time. We also test the Laffer curves with central and sub-central combined corporate tax rates for the period 1981-2002.

## **II. Related Literature**

### *Tax competition and corporate tax rates*

Theories of tax competition, predicated generally on capital mobility and fixed labor markets, suggest that tax rates on capital should be declining and that more open and integrated economies should have lower capital (corporate) taxes. Hansson and Olofsdotter (2005) examine the empirical literature and conclude, "The results of previous studies seem inconsistent, and provide only weak empirical support for the predictions of the tax competition theory." Slemrod (2004) notes, "there is no consensus in the political science literature that openness, liberalization, or globalization has led to reduced taxation of capital income, including use of the corporate income tax, although lower corporate taxes were sometimes pursued as a policy package with financial liberalization." Rodrik (1997) explores the relationship between integration and corporate tax rates. Grubert (2001) measures trends in the effective tax rate on U.S. foreign direct investment. Results from both suggest that tax competition is leading to

reduced corporate tax rates. However, Swank (1998) finds corporate income tax rates positively correlated with capital mobility in OECD countries.

Slemrod (2004) goes on to observe that in certain specifications of his model, a greater degree of openness predicts lower tax rates in certain years. Some evidence of a Laffer effect, although not explicitly acknowledged by Slemrod, is apparent as he writes, “While a policy of openness may contribute to driving down the rate of taxation per unit of investment, bigger, more globalized economies attract a higher base for corporate taxation, and, therefore, can collect more revenue from taxing corporate income.”

#### *Foreign direct investment and host country corporate tax rates*

A number of articles have estimated the responsiveness of foreign direct investment (FDI) to host country tax rates and have found elasticities significantly larger than 1. In recent work, Altshuler, Grubert and Newlon (2001) find FDI increasingly responsive to tax rates as the elasticity of foreign capital with respect to after-tax rates of return rose from 1.5 in 1984 to 3 in 1992. A meta-analysis by De Mooij and Ederveen (2003) finds a median tax rate elasticity of foreign capital of -3.3 and a trend to increased responsiveness over time. These high elasticities are consistent with the view that reductions in corporate rates could lure a significant enough amount of economic activity to a locality to create a Laffer curve in the corporate tax space.

### **III. Trends in Corporate Taxation: Rates and Collections**

A number of studies have shown evidence of a decline in central government corporate tax rates globally. Hansson and Olofsdotter (2004) note that average statutory corporate tax rates in the OECD have declined from 45 percent in the early 1970s to below 35 percent thirty years

later. Hines (2005) observes that a GDP-weighted average statutory tax rate of 68 countries fell from 45.9% in 1982 to 32.9% in 1999. Clausing (2007) confirms this trend and tax surveys conducted by the accounting firm KPMG provide details. For example, the average corporate tax rate among those countries surveyed annually has declined from 33.2 percent in 1997 to 26.9 percent in 2007. Among OECD countries, the central government rate has declined from 36.0 to 27.8 during this period (KPMG 2007). In addition, sub-central government (i.e. state level) rates have also declined, according to our data collected from PriceWaterhouseCoopers.<sup>2</sup>

While corporate tax rates have fallen, revenue data for OECD countries indicate that corporate tax revenues have been increasing since the early 1990s.

#### **IV. Empirical Framework**

We will model corporate tax collections as a function of the statutory tax rate and the square of the rate. Following Clausing (2007) our initial regression framework is:

$$\text{Corporate Tax Revenue/GDP}_{it} = \alpha + \beta_1 * (\text{Tax Rate}_{it}) + \beta_2 * (\text{Tax Rate}_{it}^2) + e_{it} \quad (1)$$

Where  $i$  is the country and  $t$  is the year. However, as we expect that revenues may react with a lag, we will also explore

$$\text{Corporate Tax Revenue/GDP}_{it} = \alpha + \beta_1 * (\text{Tax Rate}_{it-j}) + \beta_2 * (\text{Tax Rate}_{it-j}^2) + e_{it} \quad (2)$$

where  $j$  is the lag and  $e_{it}$  is an error term. As revenues may respond with some delay to changes in rates, we will present results for  $j=1$  and  $5$ .

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<sup>2</sup> More info on this data source is provided below.



Clausing (2007) also explores a model which accounts for corporate profitability and the relative size of the corporate sector. Specifically:

$$\begin{aligned} \text{Corporate Tax Revenue/GDP}_{it} = & \alpha + \beta_1 * (\text{Tax Rate}_{it}) + \beta_2 * (\text{Tax Rate}_{it}^2) \\ & + \beta_3 * (\text{Corporate Profitability})_{it} + \beta_4 * (\text{Corporate Share})_{it} + e_{it} \end{aligned} \quad (3)$$

Results for the coefficients reported by Clausing for (3) are not materially different than for (1) except that additional explanatory variables improve the fit and the revenue maximizing tax rate is a bit higher. As our purpose is to use numerous sample splits to explore the robustness of the results, and their variation over time, we will focus on her most parsimonious specification. In addition to the noted variables, all runs will include year fixed effects to control for the possibility that time trends in corporate profitability drive the results.

Finally, since our revenue data is for all levels of government and tax rates is for central government, we also employ a model that combines central and sub-central government corporate income tax rates and assume that sub-central taxes are deductible at the central level (as is the case in the United States). For simplification we have assumed for all countries that local taxes are deductible from federal. Hence, we derive local and federal combined tax rates as  $\tau_C = \tau_L + \tau_F(1 - \tau_L)$ , where  $\tau_C$ ,  $\tau_L$  and  $\tau_F$  are combined, local, and federal (or central government) tax rates respectively.<sup>3</sup>

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<sup>3</sup> Because both central and sub-central government tax rates were declining rather consistently during the period (see Figure 1) while total corporate tax revenues were flat and then rising, one would expect our central-government tax rate regressions to underestimate the Laffer curve effects. Because the net decline in rates is greater than the decline measured by the central government tax rate alone, the elasticity of tax revenue with respect to tax rate would be greater than that estimated. In addition, we expect that the revenue maximizing combined tax rate to be higher than the revenue maximizing central government tax rate. We first employ regressions using federal tax rates, for comparability to Clausing, and then provide estimates using the combined rates.

## V. Data

Data on central government statutory (flat or top marginal) corporate income tax rates, exclusive of surtax, for the period 1980-2003 is from University of Michigan's World Tax Database.<sup>4</sup> For the years 2004-2005, corporate tax rates are from 2006 OECD Tax Database, Table II.1. Switzerland's 1999-2000 tax rate is entered as 0.32 in University of Michigan's database. We believe this is an error because of a discrepancy with *PriceWaterHouseCoopers' Corporate Taxes: Worldwide Summaries*, which reports a flat rate of 8.5% for the federal corporate income tax rate. We have corrected this in our data. Data on local level government (flat or top marginal) corporate income tax rates for the period 1981-2002 are from *PriceWaterHouseCoopers' Corporate Taxes: Worldwide Summaries* various year publications.

Data on corporate income tax revenue collected by all levels of government are from the OECD revenue database. Mexico did not report revenue for any year; hence our full sample consists of 29 OECD countries. GDP data is from the IMF World Economic Outlook Database. Table 1 provides descriptive summary statistics for our corporate tax rates, corporate tax revenue, revenue as a share of GDP, and GDP. Figure 1 illustrates the trend in average government tax receipts from corporate income taxes and average corporate tax rates.

## VI. Results

Table 2 reports the results of our attempts to replicate Clausing's basic Laffer curve result. The first column reports her key coefficient estimates. The second column provides estimates we obtain when we attempt to replicate her results by limiting our sample to 1980-2002. This sample is different from hers in that it excludes 1979, for which we do not have data.

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<sup>4</sup> We use the Michigan data rather than our own AEI tax database to make replication easier. The Michigan data are available online at (<http://www.bus.umich.edu/otpr/otpr/introduction.htm>).

Her corporate income tax revenue data is for central government whereas we employ revenue data for all levels of government. As can be seen in the table, however, the estimates are virtually identical, with a positive and significant coefficient on the tax rate, and a negative and significant coefficient on the tax rate squared, a pattern consistent with the Laffer curve shape. Next, we provide results for our entire sample and again results are similar. In the remainder of the table, we report results for different subsamples to explore the robustness of these results. In the fourth column, Ireland (a noted tax haven), Norway (a country with unusual oil revenues), and Switzerland (a country with significant internal variation in taxation) are removed from the sample. Removing these three countries does not change the basic conclusion although the revenue maximizing rate is slightly higher. In the final column we report results when restricting the dataset only to 20 countries for which we have observations for all years, 1980-2005. In effect, this excludes the lesser developed, newer members of the OECD that could potentially be affecting results if they grow quickly upon joining the OECD, i.e., if other non-tax factors related to ascension into the OECD contribute to revenue growth.<sup>5</sup> These results are very similar to our full sample results.

The last row of Table 2 reports the estimate of the inflection point on the Laffer curve consistent with the coefficients on the tax rate and the tax rate squared. These range from a low of about 30 percent for the 20 country sample, to a high of 37 percent for the sample without Ireland, Norway and Switzerland.

Since corporate tax rate changes can happen mid-year, and may affect revenues with a lag, Table 3 reports the same sets of specifications but with one year lag for the corporate tax rate. Table 4 reports similar results when the tax rate is lagged 5 periods. Generally speaking

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<sup>5</sup> This excludes Portugal, Czech Republic, Mexico, Hungary, Turkey, Slovak Republic, Poland, Iceland, Australia, and Greece. Australia and Greece were dropped because we do not have revenue data for them for 2005.

the results are similar, with statistically significant coefficients that match the pattern first found by Clausing. There is some evidence, however, that the lag relationship is somewhat stronger, as evidenced by higher quality of the fit. Accordingly, for the subsequent runs, we focus on the lagged specifications.

Table 5 reports runs for different subsamples. We break the data up into four 5-year periods (1980-1984; 1985-1989; 1990-1994; 1995-1999) and one six year period (2000-2005). We find that the Laffer curve fits the data with statistically significant coefficients in each subperiod.<sup>6</sup> Our estimates for the revenue maximizing point are roughly similar, ranging from 30 to about 34 percent, for the early years. For the most recent period of the sample, the revenue maximizing rate drops sharply to about 26 percent. A Chow test reveals that this point is statistically different from the earlier years: 1985-1989 and 1990-1994.

Table 6 reports the same set of runs, but for the tax rate that is lagged 5 periods, except that the 5-period lagged runs were, of course, not possible for the first 5-year period in the sample. These runs are statistically significant in each subperiod and the results indicate a smoothly declining peak of the Laffer curve. A Chow test indicates that the revenue maximizing tax rate in the most recent period (2000-2005) are statistically different from 1985-1989 and 1990-1994, but not from 1995-1999.

To explore the trend in the Laffer curve in more detail, we estimated the Laffer curve specification for rolling 5-year subsamples of the 5-period lag specification, and then, for the purposes of exposition, identified the Laffer curve peak from that estimate as the estimate for the mid-point year in the sample. This allowed us to calculate the peak of the Laffer curve for each

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<sup>6</sup> For the periods 1980-1984 and 1995-1999 coefficients were significant at a 95 percent confidence interval and coefficients in all other periods were significant at a 99 percent confidence interval.

year from 1987 to 2003. The results are plotted in Figure 2.<sup>7</sup> We find that the peak has declined steadily from 1987 to 2003, beginning the period close to 34 percent, and ending the period near 26 percent. For reference, we also report the average tax rate for OECD countries over the same period for both central and combined corporate income tax rate. The average rate has remained above the Laffer curve peak throughout the period, but the gap between the average rate and the peak of the curve has diminished significantly over time.

Figure 3, plots the Laffer curves implied by our estimates for the first and last subsample, 1985-1989 and 2000-2005. The peak of the curve has moved to the left over time, but the shape of the curve has changed as well. The curve in the earlier period is noticeably flatter than the peak in the most recent period, suggesting that the revenue penalty from having rates above the peak has increased sharply. This is consistent with the view that capital has become progressively more mobile.

Tables 7, 8 and 9 present a comparison of regression results between the central and combined tax rates for the period 1981-2002. Table 7 reports the contemporaneous results. Table 8 those with a one-year lag between the tax rate and the revenue collected and Table 9 reports results for a 5 year lag. Two aspects of the results are noteworthy. First, the revenue maximizing rates are higher, as expected, but by an amount larger than the average sub-central rate. Second, the decline in the revenue maximizing rate is larger for the combined tax rate.

## **VII. Conclusion**

We replicate and extend the results of Clausing (2007). We find robust statistical evidence of a corporate tax Laffer curve. We find that the revenue maximizing point has dropped over time, and is about 26 percent by the end of our sample. In addition, the shape of

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<sup>7</sup> The results of the individual estimates are available upon request.

the curve has changed over time, becoming steeper. This suggests that the penalty for being above the peak of the Laffer curve has increased, an observation consistent with increased capital mobility. We also find that the gap between the peak of the Laffer curve and the average tax rate among OECD countries has narrowed. Furthermore, the inclusion of sub-central corporate income tax rates does not alter the results except that the revenue maximizing combined rate is higher and the decline in the revenue maximizing rate has been greater.

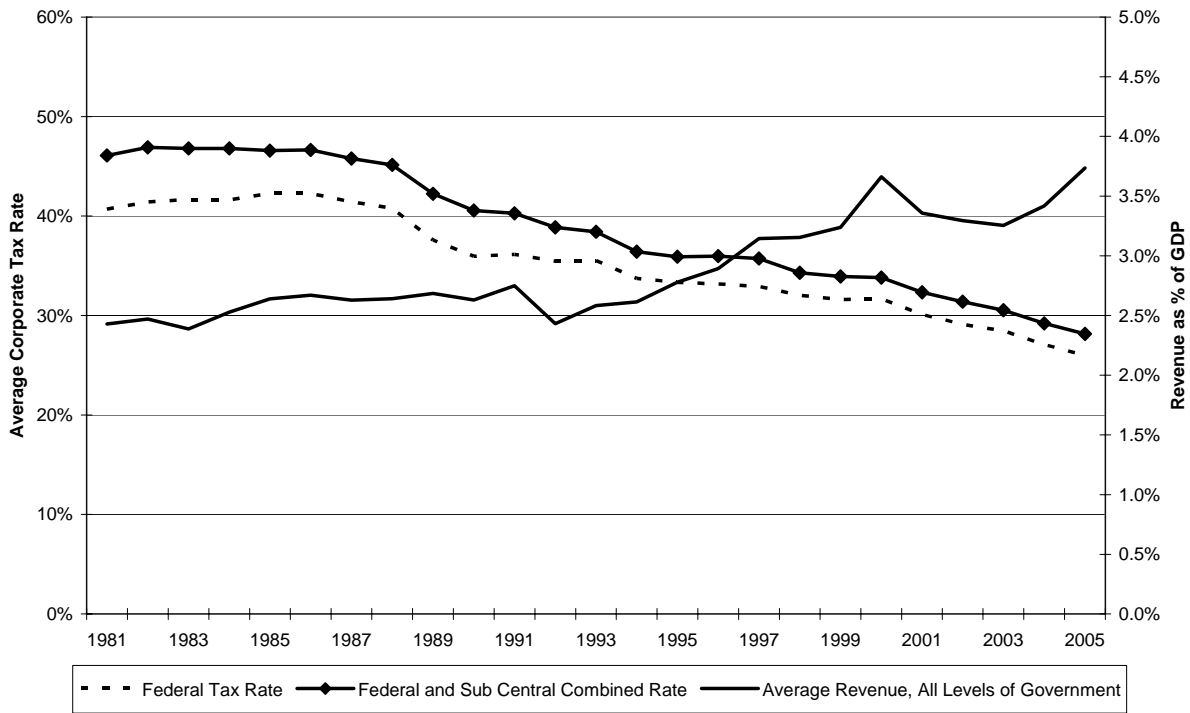
Additional research is necessary to explore the robustness of this evidence to a larger dataset including non-OECD countries and to explore the interplay between corporate income taxes and changes in revenues and tax policies among other common revenue sources.

**Table 1: Descriptive Statistics For Full Sample: 1980-2005, 29 Countries**

Variable	Obs	Mean	Std. Dev.	Min	Max
Corporate Federal Income Tax Rate	668	0.351	0.096	0.085	0.560
Corporate Federal and Local Combined Income Tax Rate, 1981-2002	564	0.396	0.092	0.160	0.647
Corporate Tax Revenue (as % of GDP)	668	2.94%	1.50%	0.27%	12.50%
Corporate Tax Revenue (\$, millions)	668	21,598	45,552	55	363,850
GDP (\$, billions)	668	739.5	1,568.1	4.4	12,455.8

Above summary statistics is limited to observations where both rate and revenue data are nonmissing.

**Figure 1: Corporate Income Tax Revenue From All Levels of Government, Average Corporate Income Tax Rate (Federal and Total Combined) in OECD countries**



**Table 2:**

Dependent Variable: Corporate Income Tax Revenue/GDP						
	Clausing result from her paper	Our replication of Clausing results: 1980-2002	All Years (1980-2005): Different Country Combination			
			All countries	No Ireland, Norway, & Switzerland	20 countries with data for all years <sup>1</sup>	
Tax rate	0.147 [0.022]**	0.141 [0.027]**	0.141 [0.025]**	0.297 [0.034]**	0.125 [0.021]**	
Tax rate <sup>2</sup>	-0.221 [0.039]**	-0.23 [0.042]**	-0.227 [0.039]**	-0.4 [0.046]**	-0.212 [0.035]**	
Constant	0.002 [0.003]	0.01 [0.004]*	0.01 [0.004]**	-0.024 [0.006]**	0.015 [0.003]**	
# of obs.	587	576	668	590	520	
R-squared	0.13	0.12	0.11	0.12	0.13	
Revenue Maximizing Rate	<b>0.333</b>	<b>0.307</b>	<b>0.311</b>	<b>0.371</b>	<b>0.295</b>	

**Table 3: Tax Rate - 1 Year Lagged, All Years (1980-2005); Different Country Combination**

Dependent Variable: Corporate Income Tax Revenue/GDP				
		All countries	No Ireland, Norway, & Switzerland	20 countries with data for all years <sup>1</sup>
Tax rate_(t-1) <sup>2</sup>		-0.296 [0.033]**	-0.423 [0.063]**	-0.279 [0.032]**
Constant		0.004 [0.002]	-0.026 [0.009]**	0.008 [0.002]**
# of obs.		643	568	500
R-squared		0.13	0.13	0.15
Revenue Maximizing Rate		<b>0.314</b>	<b>0.369</b>	<b>0.306</b>

**Table 4: Tax Rate - 5 Year Lagged, All Years (1980-2005); Different Country Combinations**

Dependent Variable: Corporate Income Tax Revenue/GDP				
		All countries	No Ireland, Norway, & Switzerland	20 countries with data for all years <sup>1</sup>
Tax rate_(t-5) <sup>2</sup>		-0.286 [0.030]**	-0.35 [0.051]**	-0.277 [0.030]**
Constant		0.007 [0.002]**	-0.008 [0.007]	0.009 [0.002]**
# of obs.		535	472	420
R-squared		0.15	0.13	0.15
Revenue Maximizing Rate		<b>0.306</b>	<b>0.341</b>	<b>0.307</b>

Robust standard errors in brackets

\* significant at 5%; \*\* significant at 1%

<sup>1</sup>: excludes: Portugal, Czech Republic, Mexico, Hungary, Turkey, Slovak Republic, Poland, Iceland, Australia, & Greece



**Table 5: Tax Rate - 1 year lagged**

Dependent Variable: Corporate Income Tax Revenue/GDP						
	1980_1984	1985_1989	1990_1994	1995_1999	2000_2005	1980_2005
Tax rate_(t-1)	0.132	0.228	0.219	0.196	0.272	0.186
	[0.056]*	[0.039]**	[0.038]**	[0.063]**	[0.073]**	[0.019]**
Tax rate_(t-1) <sup>2</sup>	-0.218	-0.344	-0.347	-0.291	-0.515	-0.296
	[0.087]*	[0.061]**	[0.058]**	[0.122]*	[0.151]**	[0.033]**
Constant	0.011	-0.005	-0.006	-0.001	0.002	0.004
	[0.008]	[0.005]	[0.006]	[0.007]	[0.007]	[0.002]
# of obs.	89	116	131	138	169	643
R-squared	0.07	0.13	0.12	0.09	0.06	0.13
Revenue Maximizing Rate	<b>0.303</b>	<b>0.331</b>	<b>0.316</b>	<b>0.337</b>	<b>0.264</b>	<b>0.314</b>

**Table 6: Tax Rate - 5 year lagged**

Dependent Variable: Corporate Income Tax Revenue/GDP						
	1985_1989	1990_1994	1995_1999	2000_2005	1980_2005	
Tax rate_(t-5)	0.163	0.184	0.269	0.314	0.175	
	[0.046]**	[0.028]**	[0.030]**	[0.072]**	[0.018]**	
Tax rate_(t-5) <sup>2</sup>	-0.243	-0.283	-0.473	-0.587	-0.286	
	[0.070]**	[0.043]**	[0.054]**	[0.146]**	[0.030]**	
Constant	0.004	0	-0.003	-0.003	0.007	
	[0.006]	[0.004]	[0.003]	[0.007]	[0.002]**	
# of obs.	113	120	136	166	535	
R-squared	0.06	0.16	0.23	0.08	0.15	
Revenue Maximizing Rate	<b>0.335</b>	<b>0.325</b>	<b>0.284</b>	<b>0.267</b>	<b>0.306</b>	

Robust standard errors in brackets

\* significant at 5%; \*\* significant at 1%

<sup>1</sup>: excludes: Portugal, Czech Republic, Mexico, Hungary, Turkey, Slovak Republic, Poland, Iceland, Australia, & Greece

**Comparison Between Combined Total (Federal and Local) Tax Rate and Federal Tax rate  
Regression Results**

**Table 7:**

Dependent Variable: Corporate Income Tax Revenue/GDP

	Using Combined Tax Rate					Using Federal Tax Rate				
	1981_1986	1987_1992	1993_1997	1998_2002	1981_2002	1981_1986	1987_1992	1993_1997	1998_2002	1981_2002
Tax rate	0.488	0.181	0.291	0.235	0.193	0.172	0.215	0.141	0.065	0.142
	[0.087]**	[0.077]*	[0.090]**	[0.088]**	[0.032]**	[0.041]**	[0.036]**	[0.070]*	[0.023]**	[0.028]**
Tax rate <sup>2</sup>	-0.507	-0.199	-0.33	-0.333	-0.213	-0.28	-0.337	-0.174	-0.097	-0.228
	[0.094]**	[0.084]*	[0.125]**	[0.130]*	[0.039]**	[0.065]**	[0.055]**	[0.139]	[0.058]	[0.044]**
Constant	-0.088	-0.013	-0.031	-0.006	-0.012	0.006	-0.004	0.002	0.023	0.009
	[0.019]**	[0.017]	[0.016]*	[0.014]	[0.007]	[0.006]	[0.005]	[0.008]	[0.003]**	[0.004]**
Observations	136	148	135	145	564	136	148	135	145	564
R-squared	0.09	0.02	0.13	0.04	0.09	0.1	0.13	0.09	0.03	0.11
Revenue Maximizing Rate	<b>0.481</b>	<b>0.455</b>	<b>0.441</b>	<b>0.353</b>	<b>0.453</b>	<b>0.31</b>	<b>0.32</b>	<b>0.41</b>	<b>0.34</b>	<b>0.31</b>

**Table 8: Tax Rate - 1 Year Lagged**

Dependent Variable: Corporate Income Tax Revenue/GDP

	Using Combined Tax Rate					Using Federal Tax Rate				
	1981_1986	1987_1992	1993_1997	1998_2002	1981_2002	1981_1986	1987_1992	1993_1997	1998_2002	1981_2002
Tax rate_(t-1)	0.498	0.217	0.309	0.256	0.186	0.155	0.221	0.214	0.213	0.189
	[0.100]**	[0.070]**	[0.085]**	[0.093]**	[0.033]**	[0.043]**	[0.037]**	[0.053]**	[0.073]**	[0.020]**
Tax rate_(t-1) <sup>2</sup>	-0.519	-0.236	-0.366	-0.367	-0.21	-0.254	-0.34	-0.319	-0.379	-0.299
	[0.108]**	[0.075]**	[0.113]**	[0.139]**	[0.039]**	[0.067]**	[0.054]**	[0.099]**	[0.147]*	[0.034]**
Constant	-0.09	-0.021	-0.034	-0.009	-0.01	0.008	-0.005	-0.006	0.006	0.002
	[0.022]**	[0.016]	[0.015]*	[0.015]	[0.007]	[0.006]	[0.006]	[0.007]	[0.007]	[0.003]
Observations	113	146	136	144	539	135	146	136	144	561
R-squared	0.09	0.03	0.11	0.04	0.08	0.08	0.15	0.11	0.05	0.13
Revenue Maximizing Rate	<b>0.480</b>	<b>0.460</b>	<b>0.422</b>	<b>0.349</b>	<b>0.443</b>	<b>0.31</b>	<b>0.33</b>	<b>0.34</b>	<b>0.28</b>	<b>0.32</b>

**Table 9: Tax Rate - 5 Year Lagged**

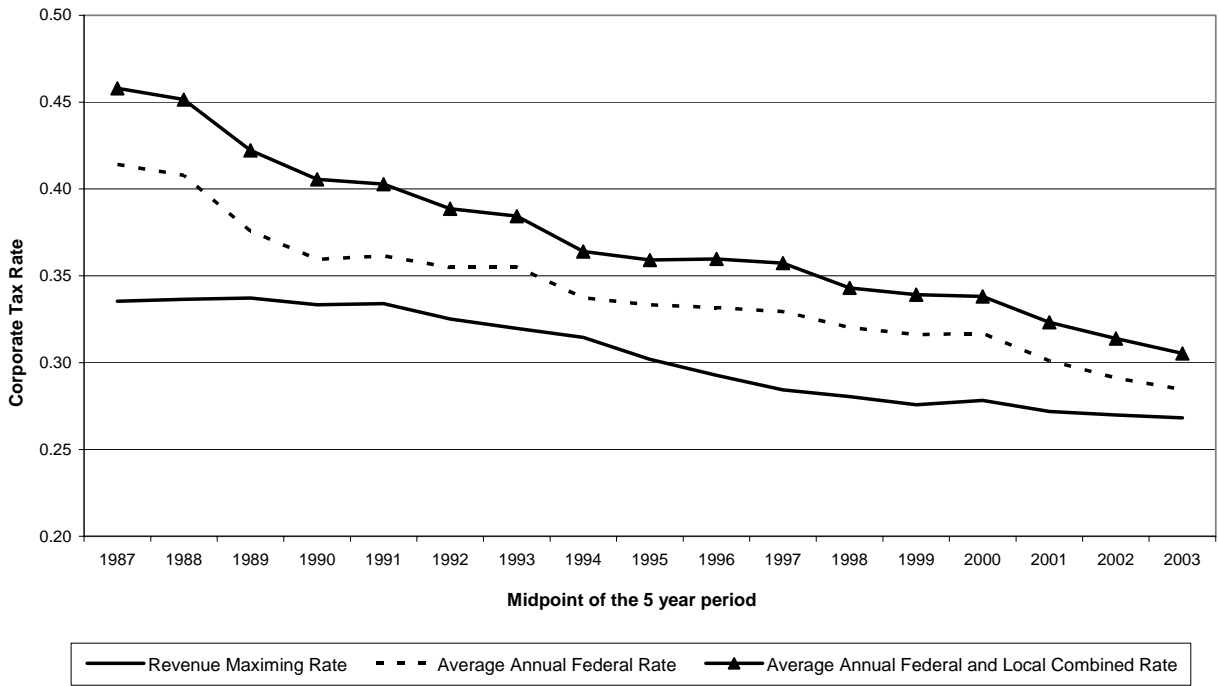
Dependent Variable: Corporate Income Tax Revenue/GDP

	Using Combined Tax Rate					Using Federal Tax Rate				
	1981_1986	1987_1992	1993_1997	1998_2002	1981_2002	1981_1986	1987_1992	1993_1997	1998_2002	1981_2002
Tax rate_(t-5)	0.474	0.314	0.192	0.183	0.113	0.142	0.195	0.195	0.256	0.177
	[0.231]	[0.067]**	[0.102]	[0.090]*	[0.047]*	[0.086]	[0.034]**	[0.029]**	[0.053]**	[0.019]**
Tax rate_(t-5) <sup>2</sup>	-0.491	-0.33	-0.24	-0.275	-0.141	-0.231	-0.29	-0.323	-0.46	-0.285
	[0.246]	[0.070]**	[0.110]*	[0.112]*	[0.052]**	[0.132]	[0.050]**	[0.051]**	[0.103]**	[0.031]**
Constant	-0.083	-0.046	-0.009	0.006	0.008	0.011	-0.001	0.002	0.003	0.006
	[0.051]	[0.015]**	[0.023]	[0.018]	[0.010]	[0.012]	[0.005]	[0.003]	[0.006]	[0.003]*
Observations	22	141	129	139	431	44	141	129	139	453
R-squared	0.09	0.06	0.08	0.05	0.09	0.06	0.12	0.18	0.1	0.15
Revenue Maximizing Rate	<b>0.483</b>	<b>0.476</b>	<b>0.400</b>	<b>0.333</b>	<b>0.401</b>	<b>0.307</b>	<b>0.336</b>	<b>0.302</b>	<b>0.278</b>	<b>0.311</b>

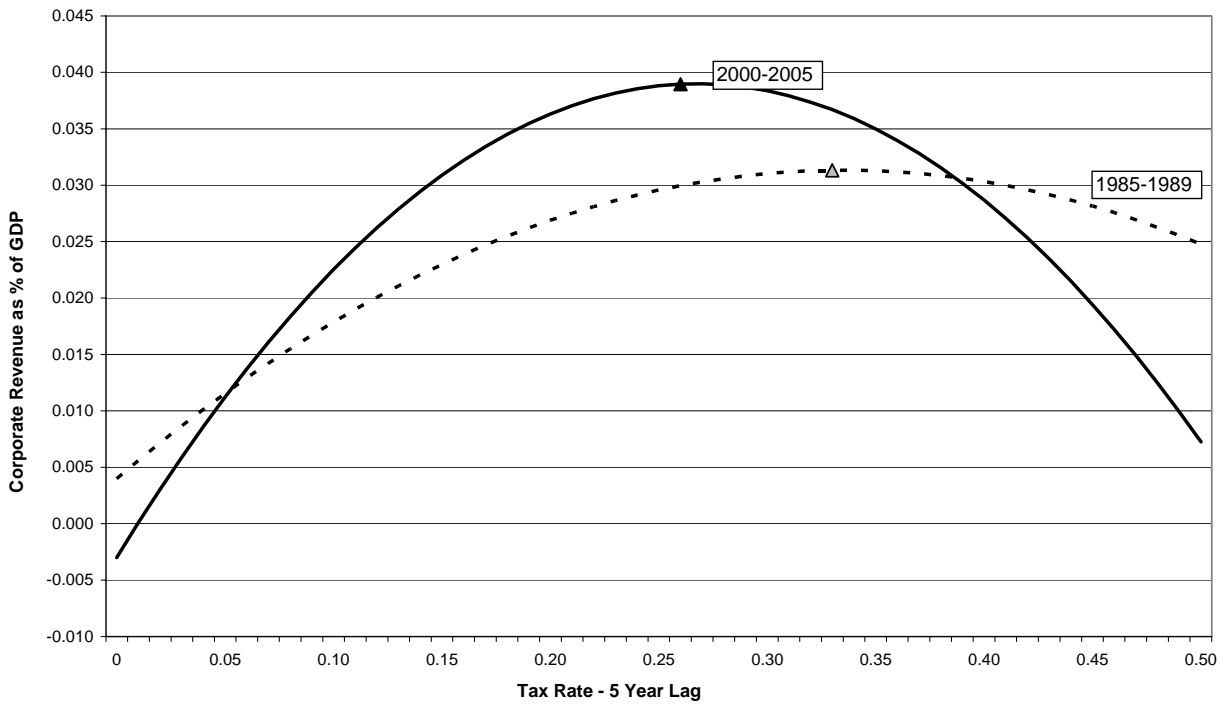
Robust standard errors in brackets

\* significant at 5%; \*\* significant at 1%

**Figure 2: Revenue Maximizing Tax Rate for 5 Year Period Samples (using 5 year lag tax rate) and Annual Average Tax Rate**



**Figure 3: Corporate Tax Revenue and Tax Rate (5 Year Lagged) (Laffer Curve)**



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