FROM TAX CARTEL TO TAX REFORM:

CORPORATE TAX REFORM IN THE ERA OF GLOBALIZATION

by

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ABSTRACT

The effects of corporate taxation are a strongly contested issue amongst economists, politicians, and the international community. Countries within the Organization for Economic Cooperation and Development have gradually decreased corporate tax rates post World War II to compete for foreign direct investment. Collecting sufficient tax revenue, while creating a competitive environment for business are valence issues that every country faces. The World Economic Forum published the Global Competitiveness Index in 2016, assessing the social and political factors that comprise a country's global competitiveness score. This paper uses the Global Competitiveness Index to assess empirically the economic factors that lead to an overall increase or decrease in the global competitiveness for an individual country. The empirical evidence discussed concludes that the statutory tax rate and tax code complexity are the most relevant economic factors in assessing a countries global competitiveness. The theoretical evidence further demonstrates that a territorial tax system is more likely to increase global competitiveness over a worldwide corporate tax structure.

Keywords: corporate taxation, effective corporate tax, tax competition

JEL Classification: D01, D21, D90, F60, F65, G41

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I. Introduction

The corporate tax reform debate in the United States between lawmakers, corporations, and the public has reached a fever pitch. From the working-class Americans who feel they are losing ground in the 21st century, to the corporate executives who lobby Congress for a tax code that ensures fair competition in the international economy, U.S. lawmakers face no easy solution to reforming one of the world's most complex tax codes. When the New York Times revealed in 2012 that Apple Inc., the world's largest taxpayer and tech giant utilizes complex tax strategies that minimize its tax liability to the U.S. and governments around the world, regulators and lawmakers spiraled into a frenzy.[1] European Union regulators demanded Apple retroactively pay billions of dollars of taxes. U.S. lawmakers were quick to assert that the untaxed revenue should to be repatriated back to the U.S. because of laws in the U.S. tax code. Amongst this debate is Apple, who acknowledges that the question is not how much taxes are owed, but to where Apple owes taxes under the current tax structure. In its November newsroom statement Apple outlined its vision for tax reform to avoid similar problems in the future.

Statement by Apple: November 6th, 2017

> "Apple believes comprehensive international tax reform is essential, and for many years has been advocating for simplification of the tax code. Reform that allows a free flow of capital will accelerate economic growth and support job creation. A coordinated legislative effort internationally will remove the current tug of war between countries over tax payments and ensure certainty of law for taxpayers."[2]

[1] Charles Duhigg, *How Apple Sidesteps Billions in Taxes*. (The New York Times, 2012)
[2] *Apple Statement*, 6 November 2017

The debate that lawmakers and regulators are not engaging in today, is what tax policies encourage multinational corporations (MNCs) to pursue complex tax strategies, and what policy deviation, if any, should be pursued to alter these incentives.

An open empirical question to this debate is if corporate tax reform is to occur, what factors will lead to an increase in the economic competitiveness of the United States, while still maintaining the political objectives of the government? The United States is considered one of the most competitive economies in the world, yet it has maintained a corporate tax structure that has changed little in the post war era, with a top statutory tax rate of 39.1%.[3] The top marginal statutory corporate tax rate has decreased post World War II; however, it remains amongst the world's highest tax rates as the average global corporate tax rate has decreased over time.

Politicians are quick to point out that the actual tax rate corporations pay, or the effective tax rate is much lower than the statutory rate. Corporations, especially MNCs like Apple, utilize deductions and credits to reduce their taxable income, and ultimately their tax liability. The complexity in the U.S. tax code has resulted in an effective average tax rate that is more in line with the global average statutory tax rate. Those in favor of the current system argue that the deductions and in the U.S. tax code or 'loopholes' put U.S. corporations on an equal playing field with other low tax countries; however, they ignore the inefficiencies and perverse incentives that this tax structure encourages. Obscure tax strategies that U.S. multinationals follow are primarily within in the law but are likely not what lawmakers intended when expanding the complexity of the tax code. These incentives add a dimension of complexity that create new challenges in simplifying the tax code.

[3] Congressional Budget Office

One solution many U.S. based firms employ to avoid the high statutory tax rate is to reincorporate in a foreign country, or undergo a corporate inversion. Such territories that offer more favorable tax treatment such as a lower corporate tax rate have been characterized as "tax havens" for diverting tax revenue from high tax countries. The term tax haven is not used in the same context amongst politicians, economists, and the private sector, and often generates controversy between various actors. The Organization for Economic Cooperation and Development (OECD) defines a tax haven as a country which imposes a low or no tax, and is used by corporations to avoid tax which otherwise would be payable in a high-tax country.[4] The OECD and other international organizations argue that low tax jurisdictions are a threat to international security by allowing a means for financing terrorist activity, organized crime, and other corrupt practices. While some jurisdictions with low taxes may invite secrecy, corruption, and crime; this is a matter of political governance and should not be confused with tax competition in the global economy. Countries that are members of the OECD have strong political and legal institutions and utilize the corporate tax rate amongst other factors as a means for attracting Foreign Direct Investment (FDI), which leads to a country's economy to become increasingly competitive.

In today's globalized economy in which capital and labor are highly mobile, we would expect MNCs to incorporate and invest capital in jurisdictions that allow them to maximize their after-tax rate of return.[5] The microeconomic behavior of firms in the context of a global economy gives insight into determining the factors the government should consider in creating

[4] *Towards Global Tax Co-Operation*, (The Organization for Economic Cooperation and Development, 1998)

[5] See "What Drives Corporate Inversions" by Burcin Col, Rose Liao, and Stefan Zeume in literature review. This study found that found that a 1% lower tax rate in host country results in .6% drop in effective tax rate and .4% increase in firm value.

the most competitive tax policy. Advocating for a tax policy that does not consider the behavior of firms leads to a different set of incentives for firms, and ultimately a less efficient outcome.[6] The OECD offers a different approach in its report *Towards Global Tax Co-operation,* in which it argues that the presence of low tax countries or tax havens threatens the ability of states to finance public services by diverting tax revenue. The OECD advocates for a tax cartel which would harmonize corporate tax rates amongst OECD countries and effectively end tax competition between modern developed economies.[7] This paper diverges from the OECD's assumptions and looks at the macroeconomic and microeconomic indicators that lead to an overall increase in economic competitiveness. In analyzing from a microeconomic perspective, this paper builds a framework for tax policy recommendations based on the theoretical and empirical evidence presented.

Whether it be competition between countries, firms, or individuals; competition gives rise to new ideas and innovation through exchange. The idea of competition, through the exchange of individuals, firms, and state actors is the cornerstone of economic thought. It is what Adam Smith meant in his book *The Wealth of Nations* when he says "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages" (Smith, Book 1 Ch. 2).[8] Just as firms

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[6] A similar application of this theoretical explanation was introduced by Art Laffer in his widely used "Laffer Curve" which suggests there is an optimum rate of taxation that maximizes government revenue. A tax rate above this rate discourages production and decreases revenue. In this application, the reduction in corporate tax revenue is due to MNCs shifting productive assets to low tax jurisdictions.

[7] *Towards Global Tax Co-Operation*, (The Organization for Economic Cooperation and Development, 1998)

[8] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, (London: W. Strahan and T. Cadell, 1776), Book 1 Ch.2

compete in the market for business, so do countries compete for investment by those firms. This paper challenges the assumptions of the OECD empirically and theoretically to advocate for tax policy that increases competition.

Theoretical Framework

While the field of behavioral economics suggests otherwise, this paper makes the theoretical assumption that the rational decision of firms is to make investment decisions that maximize after tax profits. On the microeconomic level, this behavioral assumption indicates that if firms face higher taxation in their country of origin, all else equal, they will reincorporate in a low tax jurisdiction.

On a macroeconomic level, the tax policy of each country should be designed to minimize the deadweight loss[9] to the economy, while raising sufficient tax revenue to finance the social, political, and economic objectives of the country. Similarly, the tax policy should remain neutral, meaning that the presence of a tax should not distort the incentives firms face in deciding how to allocate physical and financial capital.

The underlining framework for the predictions made in the data section below follow the notion that as world markets have liberalized and become more competitive in the post-World War II era, so has the tax policy of individual countries. In the post war era, the U.S. maintained some of the highest corporate tax rates in the world, with top statutory rates exceeding 50% until 1970.[10] In the post war era with Europe and the Asia Pacific in ruins, the U.S. dominated the

[9] Deadweight loss in economics refers to the net social loss to society that is created because of a tax, subsidy, or price control on a sector of the economy. Because all taxes distort incentives to an extent, most economists advocate for tax policy that minimizes the net social loss to society.
[10] Internal Revenue Service; https://www.irs.gov/pub/irs-soi/02corate.pdf

international economy accounting for about 40% of the worlds output.[11] In this hegemonic economic structure, U.S. corporations were left with U.S. markets to sell goods and services, until the economies of Europe and the Pacific could rebuild to purchase U.S. exports. This hegemonic structure allowed the U.S. to impose high corporate tax rates until other markets strengthened and began to lower tax rates to compete for U.S. FDI.

The restructuring of the international economy in the later 20th century created a new role for tax competition and an increasing number of OECD countries realize that expanding the tax base by lowering statutory rates is an effective means to increase the productive capacity of their respective economies.

II. Literature Review

Understanding the factors that promote FDI, limit the number of corporate inversions, and promote a competitive economy is the interest of lawmakers when considering corporate tax reform. Given the importance and great complexity to this topic, it is important to understand how firms make this decision on a microeconomic level. The literature outlined below captures the decision-making process of firms in response to a change in the corporate tax rate.

James R. Hines Jr. and Eric M. Rice published "Fiscal Paradise: Foreign Tax Havens and American Business" in the Quarterly Journal of Economics in 1994. Hines and Rice found that a one percentage point higher tax rate reduces reported profits by three percent. Because of this effect, it appears that multinational corporations report higher profits in low-tax jurisdictions that would normally be associated with their use of productive assets. This behavior enhances the tax collections of low-tax jurisdictions by triggering tax liability and encouraging MNCs to locate

[11] *Bank Secrecy, Tax Havens and International Tax Competition*, (Tax Foundation, 2009), p.3-5

physical operations in tax havens. In 1994, Hines and Rice suggested that the sustainability of a high tax structure may be threatened by the presence of low tax jurisdictions. Their analysis of firms is useful in assessing how the statutory tax rate affects tax collection and revenue but it does not address the difference between a territorial tax system or a worldwide tax system.

Anna Grumpert, James R. Hines Jr., and Monika Schintzer in their article *Multinational Firms and Tax Havens* sampled German MNCs from 2002-2008 and found that 20.4% have tax haven affiliates. Grumpert, Hines, and Schintzer's study suggests that firm-specific marginal costs of income relocation are the driving factor in a firm's decision to invert. Because these costs are greater for small firms, large MNCs are most likely to have foreign tax affiliates as the costs are greater for small firms. This study leads to a greater understanding of how the tax code affects small firms compared to large corporations.

In their article "What Drives Corporate Inversions", Burcin Col, Rose Liao, and Stefan Zeume found that the stability of public institutions was more significant in understanding a firm's decision to invert. This study compares 11 home countries with over 45 host destinations between 1996-2013 and found that a 1% lower tax rate in host country results in .6% drop in effective tax rate and .4% increase in firm value. This study lays the microeconomic framework for understanding the behavior of firms in the presence of a high tax country.

The literature preceding this paper heavily focuses on enhancing the tax collection of high tax jurisdictions and on the decisions of firms when in the presence of a high corporate tax rate. The literature neglects to analyze how complexity of the tax code may lead MNCs to invert and decrease a country's economic competitiveness. Another lapse in the literature is failing to

consider the effect of a worldwide tax system versus a territorial tax system.[12] This paper heavily considers these factors in assessing a country's overall competitiveness. These factors should be considered given the complexity of U.S. tax code and the ability of MNCs to move capital in a globalized international economy.

III. Methodological Approach

In this section, we lay out the empirical framework used to assess a country's overall global competitiveness. To best determine the factors that lead to an increase in global competitiveness, this study estimates a linear equation based off the Classical Linear Regression Model. The model as shown in Eq. (1) below is linear in its parameters, and contains more observations than the number of parameters. This equation to be estimated does not violate the assumptions of homoscedasticity, no multicollinearity, and no autocorrelation.[13]

Eq. (1)

$$y = \widehat{\beta_0} + \widehat{\beta_1} * x_1 + \widehat{\beta_2} * x_2 + \hat{e}$$

To determine which factors lead to an overall increase in global competitiveness, we use global competitiveness as the dependent variable with the following independent variables: corporate tax rate (ctr), combined corporate tax rate (cctr), effective average corporate tax rate (eatr),

[12] A worldwide tax system taxes the domestic and foreign income of businesses with the domestic countries headquarters. A territorial tax system taxes businesses on only income earned within a country's borders. It applies to all businesses that operate within a country's boundaries, whether that business is headquartered in that country or another.

[13] The classical linear regression model makes the assumptions that the error term has a mean of zero, a constant conditional variance (homoskedastic), is normally distributed, and is not correlated with the x variables (endogenity). It also assumes that the independent variables x are not perfectly linearly correlated (no multicollinearity) and that the error terms are not serially correlated (no autocorrelation).

effective marginal corporate tax rate (emtr), hours to comply with corporate taxes (htc), and a dummy variable for whether the jurisdiction utilizes a territorial or worldwide tax system (Dterr). Each variable and their relevance as well as respective sources is explored in further detail in the data section below. Eq. (2) below outlines the equation to be estimated.

Eq. (2)

$$\text{gcomp} = \widehat{\beta_0} + \widehat{\beta_1} * ctr + \widehat{\beta_2} * cctr + \widehat{\beta_3} * eatr + \widehat{\beta_4} * emtr + \widehat{\beta_5} * htc + \widehat{\beta_6} * D^{terr} + \hat{e}$$

The classical linear regression model is best suited for this study because this study is focused on the factors that increase or decrease the competitiveness of an economy as measured by the Global Competitiveness Index. The variables outlined in the equation to estimate are linear in their parameters. Utilizing a linear regression will best determine whether an increase or decrease in the independent variables will lead to an increase or decrease in global competitiveness. The regression output will determine the strength or magnitude of each independent variable as well as the significance as determined by each variables p value.[14]

The literature preceding this study used different methodology in assessing the microeconomic behavior of firms. Hines and Rice used a logarithmic model having analyzed many nonfinancial variables over three different time periods. This was appropriate given the high variability in data as well as the time periods regressed. Gumpert, Hines, and Schnitzer also used nonlinear regression having divided their sample between large and small firms. Having used many home and host destinations, Col, Liao, and Zeume used a nonlinear model to assess the value added to a firm after a corporate inversion.

[14] This study follows the standard in economic literature and uses a 5% rejection region to test the null hypothesis. A p value less than 0.05 (5%) is a rejection of the null hypothesis and thus we can confirm the variables statistical significance. For a value greater than 0.05 (5%) we reject the null hypothesis and cannot conclude statistical significance for the variable.

The theoretical framework which this study is based on is that MNCs will make investment decisions that minimize taxable income and maximize after tax profits for the firm. To gain the greatest return on an investment, firms will shift productive assets (labor and capital) to low tax jurisdictions that have a lower statutory tax rate. Thus, all else equal, we predict that a lower corporate tax rate (ctr) and combined corporate tax rate (cctr) will increase the competitiveness of a country by attracting more investment from MNCs. Similarly, a less complex tax code requires less time to comply with corporate taxes. Complex tax codes with many deductions and exemptions incentivize firms to maximize profits through utilizing every opportunity to minimize tax liability. The shifts time and financial resources from productive value added activity, to non-productive non-value added activity, and decreases the productive capacity of firms. Thus, we predict that a decrease in the time taken to comply with corporate taxes (htc) will lead to an overall increase in global competitiveness. The data and regression to follow assess the strength and significance of each variable in more detail.

IV. Data

The sample of countries that this study pulls data from 34 of the OECD countries. These countries have all been part of the OECD for more than one year and have strong economic, political, and legal institutions. These countries were selected based on the continuity of their political governance and their shared membership in the OECD. Assessing countries with similar structures of government is important to maximize the effectiveness of the classical linear regression model. Using countries with weak institutions and poor governance would increase the likelihood of a presence in heteroscedasticity, which violates the assumptions of the classical linear regression model.

Data on global competitiveness (gcomp) comes from the *Global Competitiveness Report 2016-2017*, which is published by the World Economic Forum. This index uses 12 Pillars: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, financial market development, technological readiness, labor market efficiency, market size, business sophistication, and innovation. The World Economic Forum uses these indicators to create an index for each country on a scale of one to seven. Global Competitiveness is used as the dependent variable in the linear regression shown in Eq. (1).

The independent variables corporate tax rate (ctr) and combined corporate tax rate (cctr) come directly from OECD published data. The corporate tax rate data measures the top statutory rate that corporations pay directly to the central government. The combined corporate tax rate of the central government and local jurisdictions is the amount paid by corporations. In the case of the United States, this rate is 38.9%, which is the top statutory rate that corporations pay on including federal and state corporate taxes.

The effective average corporate tax rate (eatr) and effective marginal corporate tax rate (emtr) come from the *Oxford University Centre for Business Taxation*. The effective marginal tax rate refers to the tax bracket that firms fall in while the effective average tax rate refers to the average rate that firms are taxed at. Since corporate taxes add an expense to firms in making an investment, the effective marginal tax rate describes the proportionate increase in the cost of capital due to the tax. Since we only expect firms to make investments where the marginal benefit is equal to or greater than the cost of capital, a lower effective marginal tax rate would increase the probability of firms to make an investment decision. Likewise, firms will increase investment in jurisdictions that allow them to retain the greatest share of corporate profits. The

effective average tax rate is the proportion of pre-tax profits that will be taxed and explains the long-term investment decisions for a country.

Data on the hours it takes to comply with corporate taxes (htc) and tax system structure (Dterr) come from the *Paying Taxes 2017 Report* published by the World Bank Group paying taxes team, and the Price Waterhouse Coopers (PWC) paying taxes team. The hours taken to comply with corporate taxes is a good indicator of tax code complexity because it shows how much legal and accounting resources firms expend on average to comply with corporate taxes. The more complex a country's tax code is with exemptions and deductions; the more time and resources corporations will expend to minimize taxable income. The last independent variable, Dterr is a dummy variable for whether the country uses a territorial or worldwide tax system. This is an important variable to consider because a worldwide tax system taxes corporate income earned both domestically and abroad while a territorial system only taxes income earned within a state's borders. This attribute to the tax code incentivizes MNCs to hold financial assets abroad, rather than repatriate profits back to the home country. Based on this behavior of firms, it is expected that territorial tax systems will lead to greater global competitiveness while worldwide tax systems will reduce global competitiveness.

Table 1 below displays the summary statistics for the dependent variable and each independent variable.

Table 1

Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
gcomp	34	5.015882	.4852373	4.02	5.86
ctr	34	22.55838	6.318044	8.5	35
cctr	34	24.45313	6.086533	9	38.90648
eatr	34	.2175992	.0555962	.097179	.348529
emtr	34	.1414726	.0696173	-.076734	.309381
htc	34	46.79412	27.01266	12	122
Dterr	34	.1764706	.38653	0	1

As shown in Table 1, Switzerland has the highest global competitiveness score at 5.86, while Greece has the lowest at 4.02. The index which ranges on a scale of one to seven is not widely distributed with a standard deviation of .485. Conversely, hours to comply (htc) has an extremely large standard deviation of 27.01 with large variation in various OECD country's tax code complexity. Some countries such as Mexico take as much as 122 hours to comply while others such as Ireland, only require 12 hours to comply. The mean cctr is slightly higher than the mean ctr, suggesting that on average most OECD countries have local jurisdictions that impose corporate taxes and increase tax liability for corporations.

The independent variables used in this study are important to consider because they are not factored into the World Economic Forum's measure of global competitiveness. The 12 pillars this index uses are based on social and political factors and do not assess how tax rates and tax structure affect a country's rank in global competitiveness. The preceding literature utilized some of the independent variables used in this study however, the literature above applied this data to

nonlinear models to understand the behavior of firms in the context of corporate taxation. This study uses the most important tax indicators and regresses them on global competitiveness to assess the strength and significance they may or may not have on the dependent variable. The independent variables used assess legal tax burden, effective tax burden, and tax complexity.

V. Empirical Results

The following Stata output below displays the linear regression of Eq. (2).

Linear Regression (1)

```
reg gcomp ctr cctr eatr emtr htc dummy1
```

Source	SS	df	MS		
Model	4.56640314	6	.76106719	Number of obs	= 66
Residual	10.8589917	59	.184050707	F(6, 59)	= 4.14
				Prob > F	= 0.0016
				R-squared	= 0.2960
				Adj R-squared	= 0.2244
Total	15.4253949	65	.237313767	Root MSE	= .42901

gcomp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ctr	-.0366466	.0150913	-2.43	0.018	-.0668443	-.006449
cctr	.0565609	.0226155	2.50	0.015	.0113074	.1018144
eatr	-1.324109	2.273866	-0.58	0.563	-5.874105	3.225887
emtr	2.220603	1.280037	1.73	0.088	-.3407444	4.781951
htc	-.0050576	.0020326	-2.49	0.016	-.0091249	-.0009903
dummy1	.1223384	.1565533	0.78	0.438	-.190924	.4356008
_cons	4.671658	.2451954	19.05	0.000	4.181023	5.162293

Based on the output from the regression above, the estimated equation Eq. (2) is determined by Eq. (3) as follows.

Eq. (3)

$$\widehat{\text{gcomp}} = 4.671658 + -0.366466 * \text{ctr} + .0565609 * \text{cctr} + -1.324109 * \text{eatr} + 2.220603 * \text{emtr} + -.0050576 * \text{htc} + .1223384 * \text{D}^{\text{terr}}$$

The results from the regression and Eq. (3) above show negative coefficients for ctr, eatr, and htc and demonstrate the predicted relationship between the dependent variable global

competitiveness. For the constant $\widehat{\beta_0}$, this model predicts that a country will have a global competitiveness score of 4.671658 on average, if that country has a 0% corporate tax rate, 0% combined corporate tax rate, 0% effective average tax rate, 0% effective marginal tax rate, requires zero hours to comply with taxes, and uses a worldwide tax structure. The coefficient for $\widehat{\beta_1}$ predicts that for every 1%-point increase in the corporate tax rate, global competitiveness will on average decrease by 0.366466 points on the index. The coefficient for $\widehat{\beta_2}$ predicts that for every 1%-point increase in the combined corporate tax rate, global competitiveness will on average increase by 0.0565609 points on the index. The coefficient for $\widehat{\beta_3}$ predicts that for every 1%-point increase in the effective average tax rate, global competitiveness will decrease by 1.324109 points on the index. The coefficient for $\widehat{\beta_4}$ predicts that for every 1%-point increase in the effective marginal tax rate, global competitiveness will increase by 2.220603 points on the index. The coefficient for $\widehat{\beta_5}$ predicts that for every additional hour required for firms to comply with corporate taxes, global competitiveness will decrease by 0.0050576 points on the index. For the coefficient $\widehat{\beta_6}$, the model predicts that if the country utilizes a territorial tax structure, global competitiveness will increase by 0.1223384 points on the global competitiveness index.

The regression found ctr, cctr, and htc to meet the 5% threshold for statistical significance, leading us to reject the null hypothesis and conclude there is a relationship between gcomp and the independent variables. The negative coefficients for ctr and htc confirm the prediction outlined previously that an increase in the ctr and htc will lead to an overall decrease in global competitiveness. The positive coefficient for cctr violates the prediction that an increase in cctr would decrease global competitiveness; however, this variable does not vary significantly from ctr as many smaller countries do not have local jurisdictions that impose taxes on corporations beyond the central government. Another explanation for this relationship is that if

cctr increases, this does not necessarily indicate an increase in ctr as well. If a local jurisdiction imposes a higher corporate tax rate, labor and capital may flow to low tax regions within the country and not cause a decrease in global competitiveness for the country.

Surprisingly, the independent variables eatr, emtr, and dummy1 did not meet the 5% threshold for statistical significance. This indicates that effective tax rates may not be a significant factor in determining global competitiveness. Factors that bring down the effective tax rate include deductions, exemptions, and credits that reduce the tax liability for MNCs. The effective marginal tax rate, which is the cost to the firm of expanding capital due to the tax may not be a driving factor in determining global competitiveness. This is likely because the cost to reincorporate for MNCs is greater than the benefits of tax savings. This result confirms Grumpert, Hines, and Schintzer's argument that firm specific costs of relocation are the driving factor behind a firm's decision to undertake a corporate inversion. Grumpert, Hines, and Schintzer highlighted that these effects were strongest for small firms where these firms did not have the financial capital to undertake a corporate inversion. In this case, a high effective marginal tax rate and a high effective average tax rate will not have a relationship on global competitiveness because the firm's decision to invert or expand FDI abroad is determined by its individual cost of capital.

Additionally, of the sample of 34 OECD countries, only six observations used a worldwide tax system. This resulted in low variability in a sample size of only 34 countries and is one explanation why the dummy variable was not statistically significant. One solution to remedy this problem is to double the observations and include data from the previous year. Linear Regression (2) below shows the coefficients and significance when the sample size is

doubled. Note that eatr and emtr are dropped from the regression due to the lack of statistical significance from Linear Regression (1).

Linear Regression (2)

```
reg gcomp ctr cctr htc dummy1
```

Source	SS	df	MS	Number of obs	=	67
				F(4, 62)	=	5.20
Model	3.89039231	4	.972598077	Prob > F	=	0.0011
Residual	11.5931846	62	.186986848	R-squared	=	0.2513
				Adj R-squared	=	0.2030
Total	15.4835769	66	.23459965	Root MSE	=	.43242

gcomp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ctr	-.0297237	.0143341	-2.07	0.042	-.0583771	-.0010703
cctr	.0499733	.0147226	3.39	0.001	.0205432	.0794033
htc	-.0051993	.0019433	-2.68	0.010	-.0090838	-.0013147
dummy1	.1560781	.1532837	1.02	0.313	-.1503316	.4624878
_cons	4.690186	.2422487	19.36	0.000	4.205938	5.174434

Doubling the sample size of the regression did not bring the dummy variable for the type of tax system to meet the threshold of statistical significance; however, it did bring the p-value closer to zero indicating that an increase in the sample size leads the relationship to increase in significance. Additionally, doubling the observations brought the p-values for cctr and htc closer to zero than Linear Regression (1), strengthening the significance for these variables as well.[15]

[15] An extension of this study would include a larger sample of countries and cover data over time. Using panel data to cover a greater variety of countries and multiple time periods would continue to bring the p-value for dummy1 closer to zero and strengthen the significance.

VI. Tests for Multicollinearity

Variance Inflation Factor

Test for Multicollinearity

```
vif
```

Variable	VIF	1/VIF
eatr	28.59	0.034973
cctr	22.33	0.044773
emtr	4.35	0.229977
ctr	2.95	0.338908
dummy1	1.07	0.937877
Mean VIF	11.86	

Piecewise Correlation Matrix

Test for Multicollinearity

```
pwcorr gcomp ctr cctr eatr emtr htc dummy1
```

	gcomp	ctr	cctr	eatr	emtr	htc	dummy1
gcomp	1.0000						
ctr	0.0046	1.0000					
cctr	0.2657	0.8008	1.0000				
eatr	0.2572	0.7749	0.9329	1.0000			
emtr	0.1803	0.4004	0.3657	0.6255	1.0000		
htc	-0.3514	0.2967	0.2364	0.1431	0.0039	1.0000	
dummy1	0.0072	0.1630	0.1015	0.0746	0.0854	0.5080	1.0000

To ensure that the model is correctly specified, this study tested the data for multicollinearity using the Variance Inflation Factor (VIF) test and piecewise correlation test. The Stata output from the VIF displayed a presence of multicollinearity for eatr and cctr.[16]

[16] According to the assumptions of the Classical Linear Regression Model, a VIF factor greater than 10 indicates that the model is incorrectly specified and that multicollinearity is present.

Additionally, the piecewise correlation matrix above confirms the VIF test with high correlations for eatr and cctr. These results confirm the previous assumption that effective tax rates and statutory tax rates will correlate with each other, especially the combined corporate tax rate which is an extension of the corporate tax rate.

To eliminate multicollinearity in this model, the variables eatr and cctr are dropped to see the impact this would have on the coefficients and significance. Linear Regression (3) below shows the results.

Linear Regression (3)

Dropping cctr and eatr to eliminate multicollinearity[17]

```
reg gcomp ctr emtr htc dummy1
```

Source	SS	df	MS	Number of obs	=	34
				F(4, 29)	=	1.79
Model	1.54074443	4	.385186107	Prob > F	=	0.1572
Residual	6.22927944	29	.214802739	R-squared	=	0.1983
				Adj R-squared	=	0.0877
Total	7.77002387	33	.235455269	Root MSE	=	.46347

gcomp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ctr	.0042115	.0147255	0.29	0.777	-.0259055	.0343286
emtr	.9777649	1.282112	0.76	0.452	-1.644448	3.599978
htc	-.0087458	.0036314	-2.41	0.023	-.0161727	-.0013188
dummy1	.2929829	.2433027	1.20	0.238	-.204627	.7905928
_cons	5.140097	.314243	16.36	0.000	4.497398	5.782797

Dropping cctr and eatr did not have a positive effect on the regression, significantly increasing the p-values for the independent variables and decreasing the magnitude of the coefficients.[18]

Solutions to remedy multicollinearity are to combine terms, drop affected variables, or expand the data set.

[17] Linear Regression (3) follows the original data set. This data is pulled from 34 of the OECD countries.

[18] In this instance, the 'do nothing' approach to remedying multicollinearity is most appropriate.

VII. Robustness Tests

As indicated in the introduction, the selection of 34 OECD countries was chosen to isolate the effect that the independent variables would have on global competitiveness. Expanding the sample size to include emerging economies and least developed countries (LDCs) would introduce social and political factors that would affect the regression. The strength and significance of the independent variables would become less clear for countries that unstable social and political institutions seem to influence investment decisions by MNCs. As such, we did not expect to violate the homoscedastic assumption of the Classical Linear Regression Model.

To confirm this prediction and test for heteroscedasticity, White's test for homoscedasticity was used and the Stata output is as follows:

White's Test for Homoscedasticity

```
. estat imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(26)     =     29.44
         Prob > chi2  =    0.2915

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	29.44	26	0.2915
Skewness	7.25	6	0.2984
Kurtosis	0.45	1	0.5017
Total	37.14	33	0.2840

White's test above confirms our prediction that heteroscedasticity is not present with a p-value for the Chi-squared distribution greater than the 5% threshold. This test indicates that the null hypothesis is failed to be rejected and that the model contains heteroscedasticity.

VIII. Analysis of Results

It is apparent after doubling the sample size that the p-values for the independent variables are closer to zero and to the 5% threshold for statistical significance. This is striking because though the not all the variables match the predictions made previously, doubling the number of observations increases the probability that there is a relationship between the independent and dependent variables.

This observation was especially strong for the variable cctr, which resulted in the variable exceeding the 5% threshold when doubling the sample size. This significant relationship could be understood that as a state, region, or province becomes more globally competitive, the rate at which it can tax and still maintain economic growth increases. For instance, in the U.S., those states which are economically competitive for reasons other than their corporate tax rate, (California, New York, Massachusetts, ect.) maintain highly skilled labor force, strong public education, and diverse economies. These factors amongst other social and political factors may allow states to charge a tax premium to conduct business within these states to access competitive markets that are not present in other states. This notion of a tax premium in competitive markets is not new and dates back to the Post World War II era and the 1960s. Post World War II, corporations paid a high corporate tax rate to gain access to American markets that dominated production and consumption. As Andrew P. Morris and Lotta Moberg illustrate in their article, *Cartelizing Taxes: Understanding the OECD's Campaign against "Harmful Tax Competition*, the technological developments of the 1950s increased international competition

through making cross border transactions more feasible. Additionally, the integration of Europe through the beginning of the European Union, along with the General Agreement on Tariffs and Trade (GATT) further cultivated open markets and competition in the international economy.[19] These factors resulted in a structural change in the economy post WWII that prevented the U.S. from maintaining a high tax structure that was also competitive.

While international competition post World War II is intuitive, competition between individual states in the U.S. is more complicated than this paper predicted. Jim Tankersley and Max Ehrenfreund from the Washington Post cite an instance where an increase in corporate and income taxes in California was followed by 4.1% economic growth, while tax cuts in Kansas were followed by only 0.2% economic growth.[20] The so called "California Effect" has been loosely argued as a rationale for higher taxes, however, it remains strongly contested by economists and political scientists. Data on economic growth trends from the Bureau of Economic Analysis (BEA) suggests that the combined corporate tax rate (cctr) does not follow the same pattern as statutory corporate tax rates and is more complex than the linear regression supposes. Additionally, the low value for adjusted r-squared shown in the regression above (.203) confirms this realization that while some variables demonstrate strong and significant relationships, they only explain 20.3% of the variation in global competitiveness amongst OECD countries.

Another surprising result from the regression output was the lack of significance for whether a territorial or worldwide system increases global competitiveness (dummy1). With U.S.

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[19] Andrew Morris and Lotta Moberg, *Cartelizing Taxes: Understanding the OECD's Campaign against Harmful Tax Competition* (Colombia Journal of Tax Law, 2011) Vol.4 No.1
[20] Jim Tankersley and Max Eherfrund, *The Interesting thing When California Hiked Taxes and Kansas Lowered them*, (The Washington Post, 2016)

corporations holding over $2.6 trillion in unrepatriated corporate profits,[21] it's clear that U.S. corporations respond to a high statutory tax rate by holding profits overseas. This incentive structure results in less mobile financial capital, where firms may reinvest profits overseas when they may have served a more productive use in the U.S.

The independent variable showing the highest statistical significance in the regression was htc, or hours to comply with corporate taxes. In the multiple regressions above, htc exceeded the 5% threshold for significance and showed a magnitude of 0.0050576. While the magnitude of this variable is small, this is due to the nature of the data which large corporations require many hours to comply with taxes and the marginal effect of an increase has a small but meaningful impact on a countries global competitiveness score. For instance, MNCs in Ireland take only 12 hours to comply with taxes (the lowest of OECD countries) while MNCs in Mexico take 122 hours (the highest of OECD countries). Ireland has a gcomp score of 5.18 while Mexico has a score of 4.41, demonstrating that tax code complexity is a strong factor to consider in assessing global competitiveness. Countries such as Mexico in which the corporate tax structure is complex and MNCs take substantial time to comply with the tax code diverts the firm's resources from productive uses to non-value added activities. Firms in Ireland and Mexico both face the same incentives, to maximize after tax profits for shareholders. Given this theoretical framework, it is not surprising that Ireland's less complex tax code has influenced its relatively high ranking amongst OECD countries on the Global Competitiveness index.

[21] In a worldwide tax structure, U.S. based corporations pay taxes on income earned within the borders of the U.S. and on income earned in foreign jurisdictions. Corporations only pay tax on these profits when they are 'repatriated' or diverted back to the U.S. corporate headquarters from the foreign subsidiary.

Discussion

The implications from the data above on future tax policy in the United States are subtle, yet important. Based on the predictions mentioned earlier, a reduction in all tax rates, simplification of the tax code, and a switch to a territorial tax system were all necessary to increase the global competitive standing of the U.S. However, after analyzing the data presented above, not these factors are equally important in this objective. Achieving increased global competitiveness is more nuanced, particularly considering the interdependent forces at play.

For instance, the effective marginal and effective average tax rates were discovered to be of less importance to policy makers, as the results from Linear Regression (1) displays. The size disparity between large MNCs and small businesses is a relevant factor in a firm's strategy to maximize after tax profits and thus, may not affect a firm's decision to invert if the cost to reincorporate in a low tax jurisdiction is greater than the tax savings. This argument was first put forth by Grumpert, Hines, and Schintzer's article, *Multinational Firms and Tax Havens.* While the predications outlined earlier stated otherwise, discovering that these factors (emtr and eatr) are not relevant in discerning global competitiveness implies that policymakers should focus on other variables in tax policy.

Additionally, policymakers should focus their attention to the variable htc, and make efforts to simplify compliance with the tax code. This highly significant variable should indicate to policymakers that efforts to eliminate the exemptions and deductions in the tax code that add complexity is the most significant method to increasing global competitiveness. Additionally, the U.S. statutory corporate tax rate should be lowered to be more in line with the OECD average as the strength and magnitude of the regression showed.

IX. Conclusion

Current Developments

The results of this study have implications for U.S. tax reform, especially considering current developments in tax reform by the U.S. Congress. With Republican electoral victory in 2016, Republican lawmakers now have an opportunity and incentive to pass tax reform that adheres to the party platform of low taxes. The tax reform proposal currently in progress makes some of these tax cuts, while altering the structure of the tax code regarding corporate taxes.

Most notably under this proposal, the statutory corporate tax rate will be lowered from 35% to 20%, slightly lower than the OECD average of 25%. This substantial drop in the corporate tax rate places the statutory rate in line with the majority of OECD countries, and as presented in the data above, will make the U.S. more economically competitive in the international economy. Beyond tax cuts, this proposal aims to strengthen the current worldwide structure of corporate taxation by implementing a one-time tax of 12% on all profits of U.S. foreign subsidiary profits earned abroad, and a 10% tax on all profits earned thereafter.[22] Republican lawmakers goal in this policy is to incentivize MNCs to reinvest the $2.5 trillion in foreign earned profits back to the U.S. Under this policy, MNCs can no longer defer taxation of foreign profits, and for profits repatriated back to the U.S., MNCs must pay the full 20% corporate tax rate. Additionally, many of the exemptions and deductions have been preserved, thereby making the corporate tax structure more complex and not reducing the hours corporations will need to comply with taxes.

[22] Jim Tankersley, Thomas Kaplan, and Alan Rappeport, *Republican Plan Delivers Permanent Corporate Tax Cut* (The New York Times, 2017)

The effects of this policy, should it be enacted are yet to be determined; however, the effort to change corporate incentives through taxation is a deviation from the neutral tax policy outlined in the theoretical framework. In strengthening the status quo worldwide tax system, the U.S. tax code changes the incentives firms face in making investment decisions to capture more tax revenue. MNCs such as Apple Inc., have developed complex schemes to minimize taxation in response to U.S. policy and recent European Union (EU) mandates to retroactively pay taxes on profits earned from the MNCs foreign subsidiary in Ireland. Apple, along with other U.S. multinationals have worked with Appleby, a global network of lawyers helping Apple avoid the $14.5 billion in taxes it was ordered to pay by EU regulators. Appleby has helped Apple set up offshore affiliates in Jersey, a new tax strategy that complies with the complex legal structures of both the U.S. and the EU.[23]

In strengthening the current worldwide tax system, the U.S. may succeed in recapturing some of $2.6 trillion in corporate profits held overseas; however, this does not shift policy to a neutral tax code. A more accurate description would emphasize that it retains a complex structure that MNCs will continue to pursue rent seeking behavior,[24] which diverts resources from productive uses to non-value added purposes. Though Linear Regression (1) did not indicate statistical significance for the dummy variable indicating the presence of a territorial tax structure, this was due to the relatively few countries in the OECD that utilize a worldwide tax

[23] Jessee Drucker and Simon Bowers, *After a Tax Crackdown, Apple found a New Shelter for its Profits* (The New York Times, 2017)

[24] Rent seeking behavior, or utilizing nonproductive activities to maximize after tax profits is encouraged through a complex tax code. This is done through lobbying and other means to encourage politicians to act on the behalf of the firm. The greater deductions, credits, and exemptions available to MNCs; the greater incentive for a firms legal and accounting department to utilize the law to maximize profits.

system. Linear Regression (3) demonstrated that by doubling the sample size, this variable increased in magnitude and significance.

An extension of this study might analyze countries beyond the OECD for a greater period to confirm the theoretical predictions and analysis for the variable Dterr. Additionally, looking beyond OECD countries could give insight into how significant the analyzed variables above in the absence of stable social, political, and economic institutions.

Global competitiveness is a broad index that assesses the relative economic strength and productive capacity of individual countries. In the era of open markets which labor and capital move freely across borders, the U.S. is faced with the choice to compete for FDI through attractive tax rates and a simplified tax code; or strengthen the status quo system and continue losing ground in the international economy. While current reform proposals hit some of these targets, it falls short by other measures and does not implement a neutral tax code that maximizes economic capacity and efficiency.

The political economy of the 1960s is no longer applicable to the tax policy of the 21st century. As the trend of tax competition amongst OECD countries has taken shape in the past few decades, the U.S. has primarily been a bystander and made few changes to compete in the international economy. As the U.S. continues to lose ground with increasing corporations moving capital overseas, the political sentiments of what reforms should be made have reached a tipping point. Politicans must balance the divergent interests between the public, firms, and international institutions in deciding what reforms should be made. Perhaps lawmakers should regard the words of Adam Smith in their decision, that “In general, if any branch of trade, or any

division of labour, be advantageous to the public, the freer and more general the competition, it will always be the more so".[25]

[25] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, (London: W. Strahan and T. Cadell, 1776), Book IV, Chapter II, p. 458, para. 15.

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