

SINK OR SWIM: CURRENT TAX POLICIES AFFECTING THE UNITED STATES'
COMPETITIVENESS ABROAD

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Abstract

This study uses labor productivity in terms of real GDP as a basis for comparing a nation's competitiveness. We evaluate how corporate income tax, dividend tax, and the tax on the highest income bracket affect productivity while controlling for several environmental factors. A set of 24 OECD member nations is observed from 1996-2006. It is found that statutory corporate income tax rates significantly impact labor productivity in terms of real GDP.

Introduction

The global economic environment has drastically changed over the past 50 years. The United States emerged from World War II as an international economic powerhouse. The division of Korea along the 38th parallel has become a real-world experiment of command vs. market economic systems. The collapse of the Soviet Union permitted former Soviet Bloc countries, such as Poland and Hungary, to institute market reforms and remove price controls. China, while remaining governed by the Communist Party, has begun to experiment with market reforms and material incentives. The recent uprisings in Egypt and Tunisia were catalysts for political reform across the Middle East. Only time will tell if democracy will emerge from these political upheavals.

The 2008 global financial crisis devastated many countries and required billions of dollars in financial support to remedy. Countries such as Portugal, Spain, and Greece have come dangerously close to defaulting on debt obligations. The United States is not immune to the financial pressures other countries are experiencing. Legislators in the United States are preparing to once again raise the debt ceiling as public indebtedness continues to climb. In April of 2011, Standard & Poor's reduced the outlook on the United States' AAA credit rating to negative from stable for the first time in S&P's 150 years of existence.

The 2008 recession did demonstrate how interconnected global markets have become. A systemic shock reverberated across the world as credit markets in the United States froze. Subsequently, worldwide credit markets were frozen and the worst economic downturn since the Great Depression had begun. Moving forward, it is imperative to consider a globalized economy. Nations are no longer independent or immune from other countries' economic problems. Globalization has altered the way in which the entire world operates.

A result of globalization is the increased mobility of capital across the world. This mobility has birthed multinational enterprises that are capable of establishing foreign affiliates around the globe regardless of where the parent company resides. To attract global capital flows and taxable profits, countries have looked to the tax code to provide incentives for enterprise investment. This ultimately causes nations to compete against one another.

This study uses labor productivity in terms of real GDP as a basis for comparing a nation's competitiveness. We evaluate how corporate income tax, dividend tax, and the tax on the highest income bracket affect productivity while controlling for several environmental factors. A set of 24 OECD member nations is observed from 1996-2006. It is found that statutory corporate income tax rates significantly impact labor productivity in terms of real GDP.

The rest of this paper is organized as follows. Section I will provide general definitions and section II will briefly detail areas that nations compete in to maximize productivity. Section III provides a review of the literature regarding taxation and the

taxes used in this study. Section IV explains the empirical analysis with supporting literature and section V briefly lists some areas of further improvement.

I. Definitions

It is critical to establish a formal definition of competition within the context of this study. Competition is often perceived as the interaction of multiple parties in a zero-sum game, that is one party's gain comes at the loss of the other. This understanding of competition is instilled within young Americans as they grow and compete against others in various arenas including sports, academics, and the labor market. This study will use a specific definition of global competition. To derive the definition, we first consider the Random House Dictionary and Collins English Dictionary formal definitions of “compete”. The Online Etymology Dictionary is also considered to provide insight to the history of the term.

Random House Dictionary provides the following definition of “compete”, “*to strive to outdo another for acknowledgment, a prize, supremacy, profit, etc.; engage in contest.*” The Collins English Dictionary defines “compete” as, “*to contend (against) for profit, an award, athletic supremacy, etc.; engage in a contest with.*” Both definitions possess qualities of the generally accepted definition of competition, qualities such as struggling with an opponent to achieve an end result. It is also interesting to note that both definitions entertain “profit” as a result of competition. Likewise, both interpretations contain the phrase, “engage in (a) contest”. This idea of competition is shared across many regions of the world.

The origin of “compete” is detailed in the Online Etymology Dictionary. The word is derived from the 17th century Latin word “competer”. The meaning of the Latin

word is, “*to come together, agree, to be qualified*”. The Latin definition was later expanded to include, “*strive together*”. The origin differs from the generally accepted definitions today with regards to the opposition aspect. The Latin origin depicts a sense of togetherness and a motivation towards excellence. The English dictionaries sharply contrast this depiction. For purposes of this study, a definition reflecting more of the Latin origin of the word “compete” is appropriate. We are interested in tax policies that affect the ability of a country to become a leader in the global economy.

Labor productivity in terms of real GDP evaluates how productive each worker is within a nation. The Organization for Economic Cooperation and Development defines productivity measures as ratios of volume measures of output to volume measures of input (Giovannini and Nezu, 2001). In this regard, productivity can be measured differently. Some instances include productivity of capital rather than labor. The OECD lists the productivity of capital and the productivity of labor as two acceptable measurements. The productivity of labor used here is a good indicator of a country’s competitiveness because the measure accounts for economic output relative to the number of workers in the labor force (Handbook, 2009). The labor force includes workers that are both employed and unemployed. The precise definition of the labor force varies across countries. For example, some set different age thresholds for inclusion and exclusion from the labor force. The measurement used here only includes economic activities such as, but not limited to: working full or part-time, establishing a kiosk, and processing goods for sale. Begging, studying, and personal housework are not

considered to be economic activities¹. Increases in output per worker contribute to rising wages, employment, and investment opportunities (Giovannini and Nezu, 2001). For this reason, the dependent variable used to assess competitiveness is,

$$RealGDP/\#ofworkers \quad (1)$$

The ratio is converted into US dollars by multiplying the ratio by the US exchange rate in the observed year.

II. Competitive Realms

It is now necessary to reveal the economic realms in which nations around the world compete. Labor, capital, investment abroad, and production are four factors contributing to a nation's global competitiveness.

a. Labor

A nation's economic prosperity is heavily dependent on the strength of the labor force. Of course the strength of the labor force is determined by numerous factors. For starters, a country's social safety nets and labor relations affect not only the sheer size of the labor force participation rate but also the efficiency. A good example of such relations can be found in the “Dutch unemployment miracle”. For 13 years following 1970, the Netherlands’ unemployment rate increased nine percentage points to 11%. By 2001, the rate was back down to 2%. Many accredit this to the implementation of the Wassenaar Accord (Blanchard and Philippon, 2004). This policy experiment was between Dutch corporations and labor unions and effectively reduced the wages paid in an attempt to widen the corporations’ profit margins. The logic behind the accord rested on the assumption that increased profit margins would create more investment

¹ See The United Nation's 2009 Handbook on Measuring the Economically Active Population and Related Characteristics in Population Censuses for detailed information regarding global census calculations.

opportunities and subsequently more jobs. The agreement was very contentious but contributed to the long-run viability of the Dutch labor market². Other factors such as the level of generosity in unemployment benefits (and the generosity of corporate employment benefits for that matter) affect a nation's labor market. It all boils down to incentives on both the supply and demand side of the labor market.

b. Capital

Simply stated, capital is resources utilized as a means of production. Capital can take on many forms. Other than currency, capital includes: buildings, land, natural resources, equipment, manufacturing tools, patents, and any other inputs that contribute to the production process.

The accumulation of capital is necessary to remain competitive in a globalized economy. The countries that consistently accumulate new capital continue to produce and satisfy domestic and international consumers. A consistent accumulation of capital is imperative because as production cycles continue through time, capital is depleted and must be replenished. It is also important to note that the accumulation of capital is necessary to remain competitive but it is the efficient allocation of capital that determines the productivity of a nation's capital stock level. An abundance of capital can create a moral hazard for a manager that diminishes the marginal productivity of capital. Due to the abundance, managers may use less discretion when allocating the capital.

c. Investment

Countries with extensive foreign investment remain competitive by simply enhancing exposure to other parts of the world. It may be argued that foreign investment

² See Blanchard and Philippon (2004) for more information regarding the Dutch Unemployment Miracle.

is a weak gauge of a nation's overall strength because an increase in foreign investment may be indicative of a weak domestic market. This is not entirely true when comparing two contrasting points of view. On one hand, there is evidence that outbound foreign direct investment (FDI) is a substitute for domestic investment³. That is, multinational corporations will substitute domestic investment with investment abroad. On the other hand, Desai, Foley, and Hines (2005) conduct a similar study on FDI but instead of macro-level data, they studied data at the firm level. Their results showed that at the US multinational level, outward FDI is complimentary to domestic investment. This implies that US multinational firms expand operations domestically as international investment increases.

These results reflect the ability for firms to participate in horizontal and vertical FDI. Horizontal FDI takes place when firms seek to replicate certain operations and business activities in a foreign country to exploit lower transaction costs and favorable business environments. Vertical FDI is achieved by separating the production process into segments that operate most efficiently in various parts of the world. For example, a US manufacturing firm may have a manufacturing warehouse and an assembly plant for the same product in separate countries where labor and transportation costs are more appealing. In the multinational firm setting, expanding the business' international output will increase investment domestically and abroad. The firm may be headquartered in the US but have operations internationally. Both aspects will expand complimentary to one another. This argument rests on the assumption that at least a portion of the profits earned abroad is invested domestically.

³ These studies look at FDI over a span of countries, see Feldstein (1994)

d. Production

Of course, labor, capital, and investment yield nothing without production.

Production is the ability to utilize a given set of inputs for the purpose of generating a finished good or service to earn economic rent. Production output is commonly measured using GDP. GDP is a numeric calculation of the total expenditures of a country in a given period of time. Most sources calculate GDP in the United States as,

$$GDP = C + I + G + (Ex - Im) \quad (2)$$

Where total consumption is denoted, C . Total investment is denoted, I . Government expenditures is denoted, G . $Ex-Im$ refers to net exports and is simply calculated as exports less imports. Real GDP is the aggregate adjusted for inflation.

III. Taxation

The competitive position of a country is largely a function of the tax code. Taxes are often the subject of intense political debates surrounding economic growth. This study focuses on a specific set of taxes: corporate income tax, dividend tax, and the personal income tax on the highest income bracket. *Part a* of this section establishes a brief history of current American tax policy. Then, the natures of foreign tax policies are compared to US policy. *Part b* visits the economic theory surrounding taxation with a numerical example and graphical representation. Finally, *Part c* explores the specific taxes used in this study.

a. A Brief History of American Tax Policy Since 1986

Tax policies in the United States tend to remain active for extended periods of time. In fact, there have been numerous bills that have only slightly altered the tax code

since the Tax Reform Act of 1986 (TRA86). This policy was enacted by the Reagan Administration and is often praised for simplifying the tax code. TRA86 consolidated fifteen income tax brackets down to four. In addition to the consolidation, the corporate income tax was lowered from 46% to 34%. The marginal tax rate for high earners was reduced to 28% from 50% (Feldman and Fichtner, 2001). The act also sought to mitigate the use of tax shelters by limiting the losses investors could claim against income from certain investment vehicles commonly used to exploit the tax code. With time, sophisticated tax planning has reopened loopholes that the legislation attempted to seal. Many exemptions and credits are available to a narrow segment of the economy and favor specific interests. Milton Friedman summed up this point in a 1986 Wall Street Journal article,

“Why is it that hardly a year passes without a new tax bill? The reason is that so long as a tax bill is under consideration, with many billions of dollars at stake, lobbyists are actively pressing for the introduction or retention of special provisions to benefit their clients. And so long as lobbyists are active, thousand-dollar-a-plate dinners and similar devices will tap them for campaign funds...The end result is a tax system so complex that literally no one can master it in full detail.”

- Milton Friedman, July 7th, 1986

Scholes, Wilson, and Wolfson (1992) conducted a study observing different firms' responses to the reduction in the corporate tax rate following implementation of TRA86. The corporate income tax reduction took place gradually over a two-year period. Over that period, the researchers observed the changes in deducted expenses and income deferrals across large corporations. They found the standard tax avoided as a portion of

pre-tax income in response to TRA86 to be 0.23%. This scenario was particularly interesting because tax rates were decreasing for firms supplying to others whose rates remained constant. This presented the opportunity for the supplying firm to defer income until after the tax rates declined. On the other hand, the firms also accelerated tax-deductible expenses while taxes were still high to essentially enlarge the bottom line as the tax rates fell. These practices are commonly referred to as income shifting.

Income shifting is only beneficial if all trade-offs are considered. A firm that legally shifts income to more favorable periods may still be scrutinized and prodded by regulatory agencies. Damage to a firm's reputation aside, the mere administrative costs of dealing with regulatory agencies can diminish gains from income shifting. Income deferrals to future periods reduce the income levels in current periods. Publicly traded firms could suffer from declines in earnings per share as a result of deferring income to future periods (Scholes, *et al.*, 1992).

Since TRA86 was signed, 23 additional tax bills have been enacted in the United States (History, 2003). Most of the bills were drafted in response to dire economic scenarios and most focused on a narrow segment of the economy. Top corporate tax rates were on the rise with the implementation of the Omnibus Budget Reconciliation Act of 1993. This act established top corporate tax rates of 35% and top income tax rates of 39.6%. The Economic Growth and Tax Relief Reconciliation Act was enacted in 2001 on the heels of the 2001 economic downturn. This policy reduced the tax rate for each income bracket by about 1% while also increasing the standard deduction for joint-filers. The Job Growth and Tax Relief Reconciliation Act of 2003 is credited with reducing tax rates on capital gains and dividends. Capital gains and dividend taxes have become the

primary substance of debate regarding tax policy going forward. The most recent legislation regarding taxation in the United States was very contentious given the nature of the political environment in Washington. A Republican controlled House proved pivotal in assuring the extension of the tax cuts set forth in 1993 and 2003. The rates on capital gains and dividend income will remain at a maximum of 15% until 2012.

The wave of globalization engulfing the world has increased the level of competition across all nations. Capital and other resources are highly mobile and flow freely across hundreds of countries. Nations must compete in order to retain a sufficient amount of resources for production. Nations must also compete for taxable profits (Feldstein, 1994). Many aspects that make a country attractive for investment are out of governmental control such as consumer demand and the natural environment. Tax rates are set by legislators and are used to generate revenue. Taxes can also provide incentives and disincentives in a globalized competitive environment. Over the last ten years a steady reduction in corporate tax rates has swept the globe. The United States is not included among the countries displaying such a trend.

Perhaps the most competitive cuts have been made by nations offering extensive social safety nets such as Sweden and Canada. As of 2011, Sweden's effective corporate tax rate rests slightly above 26%. Not only is this rate over 10 percentage points less than the US rate of about 39% but also it has come down from 60% in one decade. Canada has also aggressively slashed corporate tax rates. In 1996, the effective corporate tax rate in Canada was just under 45%. A decade later, the Canadian government has reduced the effective corporate tax rates to around 34%. Moreover, Canada plans on reducing the rate even further to 15% by 2012 (Miller and Kim, 2008). The explicit goal stated by the

Canadian government is to retain the lowest statutory tax rate among G-7 nations. The United States has not reacted as the other OECD member nations have in the wake of the global reduction in tax rates. In fact, the US now possesses the highest corporate tax rate among the OECD nations. Prior to 2010, Japan exhibited the highest rate but recent reforms will bring the effective rate to 35.7%, slightly less than the United States⁴.

The incentive to attract global capital flows has contributed to the broad reduction in capital income tax rates. This phenomenon brought forth the issue of harmful tax competition among many European countries. The theory of harmful tax competition was introduced in 1986. Zodrow and Mieszkowski (1986) explained how the free flow of capital provides the incentive for nations to reduce tax rates in order to maintain an attractive after-tax rate of return for international investors relative to competing nations. Slashing rates to attract capital flows inevitably produces a “race to the bottom” effect in which tax rates may become too low to support public expenditures (Gordon, 1986).

Harmful tax competition has led some nations to consider taxing less mobile factors of production such as labor. Daveri, *et al.* (2000) explored labor taxation in the European Union and discovered that serious negative implications resulted from shifting towards a dependence on labor taxation over capital income taxation. The most serious of these implications is increasing unemployment. The paper details how the labor and capital tax rates move inversely to one another in many European nations. The increasing tax burden on labor could not be completely transferred to workers because of the labor-friendly policies those countries. As a result, labor costs increased throughout Europe. Naturally, increasing labor costs increased the demand for capital and the

⁴ See appendix A-1 for a figure displaying corporate tax rates among the OECD member nations.

marginal productivity of capital diminished. Between 1970 and 1995, the capital to labor ratio in the EU more than doubled. As the marginal productivity of capital diminishes, the overall rate of output slows. This is due to the fact that a given amount of labor is necessary to acquire maximum productivity of capital. Of course, there are many other macroeconomic variables that contribute to high levels of unemployment.

Efforts have been made across Europe to minimize the harmful effects of tax competition. The OECD and G-7 member nations have drafted a series of agreements that concentrate on discouraging activities that promote harmful tax competition. The agreements also impose penalties on transactions with known tax-haven countries that are deemed “uncooperative” in maintaining fair tax practices. The efficacy of such agreements is questionable because they are not legally binding. Moreover, there is not an international policing unit enforcing the agreements. Theoretically, none of the countries will enforce them because the costs of monitoring are high and free-riding countries that did not sink costs into monitoring enjoy the resulting benefits. A country will only monitor as long as the private costs outweigh the private benefits.

b. Economic Theory of Taxation

The global trend in corporate income tax rate reduction is fueled by the simple notion of competition. In a globalized economy, countries not only compete for investment but they compete for taxable profits as well. Lower statutory tax rates relative to competitors attract investment and economic activity, *ceteris paribus*. The economic activity generates taxable profits. Assuming a nation efficiently collects and allocates tax revenue, higher taxable profits should increase public expenditures, wages, domestic and

foreign investment, research and development, and other similar welfare enhancing concepts.

A micro-level example of taxation on the markets for goods and services will provide a better understanding of how taxes affect welfare in a nation. Consider the supply and demand equations for Good A below.

$$Qs_0 = 80 + 60p_0 \quad (3)$$

$$Qd_0 = 144 - 30p_0 \quad (4)$$

Supply and demand equations, such as the ones above, will yield the equilibrium price and quantity of the good when set equal to each other. The equilibrium price and quantity are the levels at which all of the good produced will be consumed for an accepted market price.

The corresponding equilibrium price and quantity for the two equations above is $P_0 = \$0.71$ and $Q_0 = 122.7$. Before a tax is imposed it is necessary to establish whether the consumer or supplier will shoulder most of the tax burden. Price elasticity describes how sensitive a change in the quantity demanded or supplied of a good is to a change in price. The concept of price elasticity stems from the derivation of the supply and demand curves. The highest price a consumer in a given market is willing to pay is the highest and left most value on the demand curve. Starting at this point and moving down the demand curve, the price elasticity moves from perfectly elastic to perfectly inelastic. The lowest and right most value on the demand curve corresponds to the largest quantity demanded at a price of $\$0.00$ ⁵. The price elasticity equations are calculated by multiplying the co-efficient of the price variable by the ratio of the equilibrium price to

⁵ This is known as zero-price quantity, See appendix A-2

equilibrium quantity. To derive price elasticity for the consumer (ϵ) and the supplier (η) the following equations are used,

$$\eta = 60(.71/122.7) = .35 \text{ (inelastic)} \quad (5)$$

$$\epsilon = -30(.71/122.7) = /-.17/ \text{ (inelastic)} \quad (6)$$

Both equations produce inelastic price elasticities because the absolute values are less than one. Simply stated, there is only a slight sensitivity to price fluctuations for both the supply and demand side of Good A. It is not true that the supplier will simply pass the entire tax burden on to the consumer. The party that is less elastic will shoulder the greater tax burden. In this example, the consumer is less elastic. The following equation will determine how much of the tax burden is applicable to the consumer.

$$\eta/\eta-\epsilon = .35/ (.35-(-.17)) = .6731 \text{ or } 67.3\% \quad (7)$$

The consumer will shoulder 67.3% of the tax burden and intuitively the supplier will be responsible for, 1-.6731, or 32.7%.

Now that the tax burdens for Good A are established, consider a tax on the good at \$1.12 per unit sold. This tax will alter the supply equation (3) to reflect the new tax.

$$Q_s = 80 + 60(p-\tau) = 80 + 60p - 60(1.12) = 12.8 + 60p \quad (8)$$

Equations nine and ten represent the after tax levels of supply and demand for Good A. The demand equation (10) remains the same as before (equation 4). To calculate the new equilibrium quantity and price we set the two equations below equal to each other.

$$Q_{s1} = 12.8 + 60p_1 \quad (9)$$

$$Q_{d0} = 144 - 30p_1 \quad (10)$$

The after tax equilibrium price and quantity levels are now $P_1 = \$1.46$ and $Q_1 = 100.2$.

Notice that after the tax is accounted for, the equilibrium price rose and the quantity fell,

recall $P_0 = \$0.71$ and $Q_0 = 122.7$. The new price and quantity reflects what is known as

the tax wedge. The buyer will pay the new equilibrium price of $\$1.46$ but the seller will

only receive $\$0.34$ because of the tax. Below, Figure 1 illustrates the effect of taxes on

Good A. The tax wedge is denoted by the difference between the new and old supply

curves. In this example the tax wedge is $\$1.12$, the seller must pay taxes of $\$1.12$ per unit

to the taxing authority. Since both the consumer and the supplier share the tax burden, the

portion of the tax wedge applicable to each party is simply the burden percentages

(equation 7) multiplied by the tax wedge.

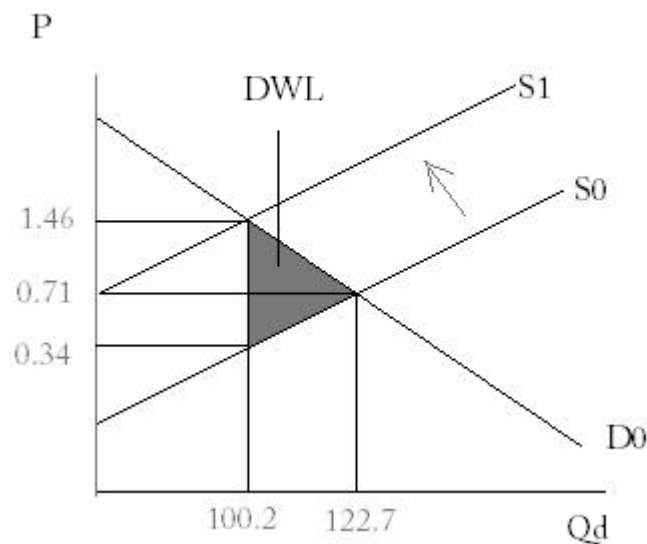


Figure 1: A supply-side tax with dead-weight loss in the market for Good A

The consumer was less elastic and therefore assumes 67.3% of the tax burden.

The portion of the tax wedge paid by the consumer is $\$0.75$. The producer pays $\$0.37$.

The tax revenue generated by the taxing authority can be calculated by simply

multiplying the tax wedge by the quantity produced. In this example, the taxing authority generates \$112.22 in revenue.

Investors constantly seek the highest rate of return given a constant level of risk. The tax wedge directly influences the rate of return on international investments. The tax wedge effectively reduces the after-tax rate of return. This phenomenon motivates investors and entrepreneurs to seek higher pre-tax rates of return on investment. A smaller wedge will increase the return on similar investments across different tax regimes. It is understandable that countries are racing to slash tax rates to attract investment. The country with the smallest tax wedge will attract the most investment, *ceteris paribus*. Low corporate tax rates attract taxable profits that countries compete for in a globalized economy.

Introducing a tax wedge also generates dead-weight loss in a market. A market in equilibrium will match all possible output from sellers with the consumers. When a market is not manipulated the entire equilibrium output in a given market will be consumed at the equilibrium price. Dead-weight loss occurs when an impediment prevents the market from clearing all output at the equilibrium price. Notice the shaded triangle that is formed once the tax is included in the supply equation in Figure 1. The area of this triangle represents the dead-weight loss as a result of the \$1.12 supply-side tax. The dead-weight loss triangle is formed because the seller does not retain the entire amount of the price that the buyer pays. The tax reduces the price that the seller attains equal to the tax wedge. A simple calculation of the area of the triangle reveals dead-weight loss of \$25.20. This value essentially represents how much has been left on the table as a result of the tax disincentive.

When taken in aggregate, dead-weight loss throughout a country reflects serious issues of productivity but simply removing taxes is unreasonable. Taxation is intended to raise revenue for allocation by the government. Tax revenues contribute to public expenditures in education, transportation, and social security. Higher tax revenue also raises the level of well-being. Public employees enjoy rising wages as revenues rise. The increase in public expenditures that results from higher revenues takes place in the private sector, which benefits the entrepreneurs and firm owners. The rising profits provide the ability for the firm to expand and hire more people or increase the wages of the existing employees. High tax revenues are ideal but simply raising taxes does not always achieve this result.

Inflation is another culprit to diminishing after tax rates of return on investment. Often times, investors will hold assets for a period greater than five years. A generally accepted rate of inflation in the United States is 2-4% per year. The average inflation rate in the US over the last decade was 2.47%. Inflation can be understood as a general rise in the overall price level. A common measurement of inflation is the consumer price index (CPI). The CPI is a bundle of commonly purchased goods across the nation. Economists observe the changes in the price level of the goods over time. The goods are periodically changed in order to accurately track what the consumers are purchasing. Dairy products, eggs, and oil are common goods included in the CPI. Inflation is harmful to investors because the price of the asset will rise consistent with inflation. The price may rise but so will the price of everything else. There is no economic profit to be made unless the price of the asset appreciates at a rate greater than that of inflation.

Inflation combined with a large tax wedge greatly reduces after-tax rates of return on investment. A country cannot remain competitive with a large tax wedge bolstered by a large inflation rate. Feldstein (1983) explains how the tax-inflation effect reduces business investment. Businesses may depreciate capital expenses over the duration of the capital's useful life. Inflation distorts the depreciation expense because the general price level is rising. Higher rates of inflation hinder the benefits of depreciating capital. Also, differences between real economic gains and nominal price appreciation discourage investment. A realized gain on an asset will be taxed even if the gain is solely a product of inflation.

Inflation indexing of capital gains is a popular argument for promoting neutral inflation effects. Indexing allows an investor to account for the inflation rate over the period that the asset was held. This creates a neutral inflation effect because tax is subsequently collected from the real gain and not the nominal price appreciation. Hall (1995) discusses how inflation raises the effective tax rate on capital. The taxes paid on simple inflation are included with taxes paid on actual real gains of an asset. This inclusion raises the effective rate that is paid on the actual real gains. In fact, in some instances (most notably 1976) the effective tax rate on capital exceeded 200%⁶. Opponents of inflation indexing believe it will only increase the complexity of the tax code. The trade-off may not be economically attractive if rates are reduced but compliance costs increase.

Tax revenues can be altered by adjusting the rate at which the tax base is taxed or by adjusting the tax base itself. Baldwin and Okubo (2008) and Devereux, *et al.* (2002)

⁶ See Appendix A-3 for a chart of the effective tax rates on capital gains in the United States

observe increasing tax revenues as a result of a base-widening, rate-lowering tax regime. Baldwin and Okubo's results suggest that increased tax revenues will always follow a broadening of the tax base if the rate is left the same for the marginal firm (Baldwin, 2002). This implies a lower rate over a broader base to capture the same revenues that a higher rate over a narrow base would generate. This tax regime was popular during the 1980's in many countries around the world. Canada, France, Germany, and the United States are among a few of the nations that enacted such policies. Ultimately, broadening the tax base and lowering the tax rates spread the taxation burden more evenly across the nation. Widening the tax base can be achieved in a number of different ways. One way is to strive for full employment (Devereux, *et al.*, 2002). Full employment widens the tax base because workers and firms pay labor taxes. As employment levels rise, the number of labor tax payments increase.

Lowering taxes may not always increase a nation's competitiveness. It is possible that raising taxes will increase tax revenue. If allocated efficiently, the increase in tax revenue will increase public expenditures and further stimulate the economy. This concept is best understood by observing the Laffer Curve. This economic concept describes the relationship between tax rates and tax revenues. With tax rates on the x-axis and tax revenues on the y-axis, a downward opening parabola suggests that an optimal level of taxation exists to collect the maximum amount of tax revenues. The theoretical concept of the Laffer Curve is studied in texts dating as far back as the 14th century (Chakraborty, 1997). Figure 2 is an illustration of the Laffer Curve. The illustration depicts a symmetrical curve but a more realistic curve is less predictable and unique to every nation (Chakraborty, 1997). The Laffer Curve is limited because it

focuses solely on the tax rate to explain tax revenue. A change in tax revenue could be a result of a variety of other factors affecting the tax base. Rising income levels in a country could contribute to higher tax revenues.

Chakraborty (1997) observes the time lag of tax rate adjustments on tax revenues. The time lag is another factor that distorts the theoretical Laffer Curve. The tax rates corresponding to specific revenues may not include the time lag and are representative of prior tax rates. These limitations among others limit the effective use of the Laffer Curve.

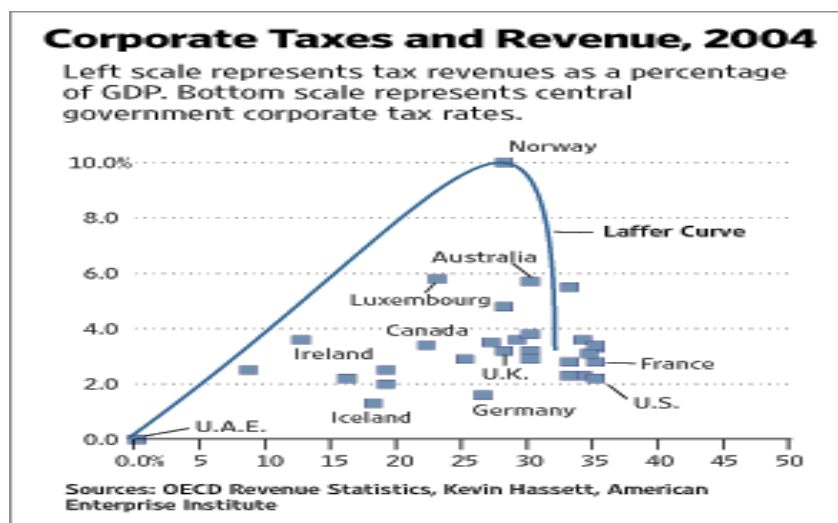


Figure 2: The Laffer Curve⁷

c. Taxes Observed

Corporate Income Tax

Countries impose corporate income taxes to collect tax revenue on the reported earnings of corporations. The United States taxes a firm's earnings based on the firm's organizational structure. Companies may choose to register as a limited liability

⁷
 Illustration courtesy of Kevin Hassett

company (LLC) or type-s corporation to mitigate corporate tax liability. The LLC and type-s structures are popular among private firms because taxation is collected at the personal or entity level. When assessing the implications of corporate income tax on a nation's competitiveness, the amount of tax revenues generated from corporate income tax must be considered. Corporate income taxes are imposed directly on corporate income but the effects of the taxation may actually affect other factors such as a nation's capital stock levels, overall riskiness of business practices, and less mobile factors of production such as labor. Finally, the presence of corporate income tax provides the incentive to actively avoid taxation.

Auerbach (2006) explores how corporate income tax revenues as a percentage of GDP have decreased steadily since 1966. During this time, the ratio of corporate income tax revenues to GDP was about 4.5% and about 20% of total revenues in the United States. By 1983, the ratio declined to 1.33% and roughly 5% of total governmental revenues. Following the 2001 recession, corporate income tax revenue as a percentage of GDP was back up to about 3% and 15% of total revenues. Figure 3 illustrates corporate tax revenues as a percentage of total revenues over the last 60 years in the United States. This pattern does reflect the cyclical nature of business cycles in the US. Corporate tax revenues are expected to decline as the country enters into recession and corporate earnings decrease. This is even observed today as the United States emerges from the 2008 recession. Public corporations are holding record cash levels on balance sheets because of uncertainty and the reluctance to expand. Dollars that are not invested do not produce earnings that can be taxed. Also, corporate tax rates as a percentage of revenues broke the downward trend in the United States after implementation of TRA86.

The current literature strongly supports the argument that increasing capital mobility has contributed to the global reduction in corporate income tax rates. Heinemann, Overesch, Rincke (2010) conducted a study to examine the spatial implications of tax competition. The study focused on European countries that adjust tax rates in response to reductions by neighboring countries. These results indicate that European nations are pressured to reduce corporate income tax rates as a competitive response to reductions in the tax policies of neighboring countries. This study supports the notion of tax competition to capture mobile capital and taxable profits. As capital becomes increasingly mobile, countries (particularly countries with neighbors in close proximity) must set tax rates similar to one another to prevent driving capital towards competing countries.

Factors other than corporate income tax, such as location factors, have proven to impact capital accumulation. Location factors include: hyperinflation, the level of privatization, the level of corruption, the business cycle, and labor costs in a geographic location (Bellak and Leibrecht, 2009). It has become increasingly difficult to assess the impact of location factors and tax-policy on corporate decision-making. For example some studies (Hodge, 2010; Miller and Kim, 2008) focus on the global reduction in corporate income taxes as a competitive disadvantage to the United States, since the US has not participated in such reductions.



Figure 3: Corporate tax revenues as a percentage of total revenues (US)⁸

A reduction in competitiveness solely as a result of tax-policy does not consider the advantages of operating in the United States. For example, the United States' consumer demand alone is a competitive advantage simply due to a higher standard of living and a relatively wealthy middle-class. Also, the United States protects well-defined property rights regarding intellectual property, which encourages research and development. In addition to protecting property rights, the United States also allows virtually unimpeded access to the global marketplace. These factors alone contribute to attracting international capital flows.

Corporate income tax has implications not only on corporate earnings, but on labor and the amount of business risk within a nation as well. Kotlikoff and Miao (2010) studied the impact of corporate income tax on decisions made by individuals characterized as least-skilled entrepreneurs to most-skilled entrepreneurs. Highly skilled entrepreneurs will refuse to go public to avoid corporate income taxation in an attempt to acquire higher after-tax rates of return on investment. Hiring labor is risky because it costs a lot to hire and train employees. Also, employees that reach a desired level of

⁸

Source: Reuters, December 2010 (Office of Management and Budget)

contribution must have incentives to remain on-board such as bonuses and raises. These factors affect the cost structure of the firm and as a result, entrepreneurs consider hiring labor as a risky decision. A highly skilled entrepreneur that chooses not to go public, and therefore avoids corporate income tax, may not hire as many workers in order to remain conservative. The resulting reduction in private sector hiring lowers the wage rate as workers become more willing to settle for lower wages in order to remain employed.

As wages decline, less-skilled entrepreneurs that are working for a “safe wage” may decide to quit the job and start a business. This incentive motivates small business development but increases the level of risk within a country since starting a business is risky. These businesses may not fully develop and be forced to lay off employees and provide lower wages to remain profitable, only feeding the reduction in overall wage rates as a result of corporate income tax avoidance. These results imply that less-skilled workers suffer the most from high corporate tax rates in the form of lower wage rates (Zodrow, 2010).

Tax avoidance is on the forefront of corporate income tax literature. The ability of firms to legally exploit tax-planning schemes hinders the argument that corporate income tax affects capital allocation decisions. It is true the US now has the highest statutory corporate income tax-rate in the world but tax-planning schemes may bring a corporation's effective corporate income tax rate close to 0%. A 2010 Bloomberg article explains how Google is able to lower their effective corporate tax rate to 2.4% while headquartered in the United States with corporate income tax rates of 35% (Drucker, 2010). An emeritus professor at Baruch College, Prof. Abraham Briloff, estimates the

lost revenue as a result of such tax-planning schemes in the US is about \$60 billion in annual revenue.

Tax competition does not necessarily translate into a reduction in corporate income taxes but is also the ability to avoid taxes. Countries may competitively attract global capital flows by ignoring and even promoting tax-planning schemes (Peralta, Wauthy, van Ypersele, 2006; Hong and Smart, 2010). In this instance, a high corporate income tax rate is imposed but domestic firms without international exposure pay a higher effective rate than multinational enterprises. Countries remain competitive by permitting tax avoidance rather than reducing the corporate income tax rate. This allows a country to collect on the high rate but also attract taxable profits from multinational firms with sophisticated tax-planning strategies. This provides support to the argument that a country remains competitive by eliminating, if not subsidizing, the corporate income of multinational enterprises while imposing high tax rates on domestic firms (Zodrow, 2010).

Tax-planning schemes often involve shifting funds between countries with varying tax rates. For example, a corporation operating in a high tax rate country, such as the United States, can establish a financing subsidiary in a low tax country. Under current tax law, the corporation can inject liquidity into the financing arm freely as it is considered an “unincorporated affiliated entity”. These capital injections are not subject to taxation because they are considered inter-company transfers. The financing subsidiary is permitted to “loan” the funds back to the parent company in the high tax rate country. In the United States, the interest payments on these loans can be deducted. In the low rate country, the interest income is taxed at a rate lower than the corporate

income tax rate of the United States. Wash, rinse, repeat and this process effectively reduces the rate that the corporation is subject to on overall earnings (Zodrow, 2010).

Dividends

The tax treatment of dividends also varies across the globe. Countries remain competitive when permitting a larger after-tax return on investment. Dividends enhance welfare in an economy because the shareholders become wealthier as consistently paid dividends become larger. Dividends are not exclusive to the wealthiest investors. Any retirement fund, pension, and middle-class shareholder will receive the common stock dividend. Examining the nature of dividend policies requires assessing the extent that double-taxation increases the effective tax rate on dividends.

Dividends are subject to double taxation, which taxes the same profit at the corporate and shareholder level. As of 2010, Slovak Republic is the only nation that does not tax dividends at the shareholder level (OECD, 2010). First of all, the profit is taxed at the corporate level by corporate income tax and then retained as earnings. Second, the dividend is paid out of retained earnings and taxed by the personal income tax. These two rates combined produce the effective rate at which dividends are taxed. Since 2003, the United States has had a combined rate of almost 50% for high-earners. This rate is higher than the standard OECD nation. The median rate during among the OECD nations is 42.6%.

Full and partial imputations are the most common methods of reducing double taxation among the OECD nations. Full imputation grants a dividend-tax credit to the shareholder for the full amount of the corporation's tax. Mexico, Canada, and Australia enact full imputation policies. Partial imputation grants a dividend-tax credit to the

shareholder for a less than full amount of the corporation's tax. The United Kingdom implements a partial imputation policy (OECD, 2010).

Majority of the OECD nations, including the United States, adhere to the classical system or a modified classical system of dividend taxation. The classical system taxes dividend income at the shareholder level similar to that of other capital income taxes, such as interest income. The modified classical system sets forth preferential rates, compared to other capital income, at which the dividend is taxed at the shareholder level.

Dividend taxation does affect the after tax rate of return on investment but firms will not simply discontinue issuing dividends as a result of the tax rate. Chetty, Rosenberg, and Saez (2005) describe how dividends emit an agency or signaling effect. The signaling effect theory is more widely accepted than the agency effect theory of dividend payments (Chetty, et al., 2005). The signaling effect refers to a healthy firm's ability to “signal” the firm's strength by making regular dividend payments. The market sees firms that consistently raise dividends as being financially strong. The agency effect refers to how managers finance new investments and monitor risk. This theory states that there is less organic capital available to managers when large and consistent dividends are paid out. This eliminates the moral hazard of a firm holding excess earnings and forces managers to exercise caution when designating equity towards new investments (Jensen & Meckling, 1976). Assuming the signal theory holds true, a higher tax rate would reduce the after tax rate of return to shareholders but the number of dividends paid would most likely remain constant.

Due to the effects of harmful corporate tax competition, many members of the European Union have switched to flat rates of dividend taxation on the highest income

brackets. The Czech Republic, Poland, Greece, and Italy are a few of the countries that have implemented such policies. De Kam and Bronchi (1999) claim that while a flat tax rate policy regarding dividends undermined the redistributive effort of the general tax policies, it was in response to increasing tax competition and a desire to broaden the tax base as a result. Countries attempting to seek alternative means of attracting mobile capital instituted the flat-rate policy. The European Union embraced this method of dividend taxation since the reliance on labor taxation could be avoided and the nations could remain competitive by cutting corporate income taxes.

High-Earners

Taxes are imposed for the purpose of generating revenue but many nations around the globe enact redistributive tax policies. These policies are generally progressive and individual income in the highest income brackets are taxed at rates greater than those imposed on lower brackets. The concept is seen as being redistributive since the tax revenues are used for social programs and public expenditures. Much like multinational enterprises, high net worth individuals are capable of sophisticated tax planning and can lower the effective rate actually paid on income. Also, some tax structures tax high earners at a lower tax rate on marginal income than that of middle-income earners. Much of the debate surrounding tax policy in the United States has pertained to the taxation of high-earners.

De Kam and Bronchi (1999) explain how the middle and lower class tax brackets actually pay a higher marginal tax rate than high-earners. This is due to the social security contribution caps many OECD nations impose. Earnings above a certain amount are not subject to social security contributions. This raises the tax on an additional unit of

income for middle and low-income earners relative to high-earners since the former are subject to the implicit taxation of social security contributions. Consider this, social security contributions are mandatory but capped at \$100,000 and the tax is 15%. Also, the middle income tax bracket is 25% and the high-income bracket, from \$100,000 and up, is taxed at 35%. The high-income bracket has a lower marginal tax rate, which is on every additional dollar, because of the social security exclusion. The middle-income bracket actually pays 40% marginal income tax when taking into account the social security contribution whereas the high-earners only pay 35% due to the cap on social security contributions at \$100,000.

Evidence shows that many countries, mostly European, are switching to relying on the taxation of high-earners for tax revenues. Garfunkel (2010) states in a KPMG report that Iceland instituted a progressive system where high-income brackets are taxed greater than the lower brackets following the collapse of the banking sector during the 2008 recession. This policy replaced the flat-tax policy that was in place. The report also suggests that high earners have the ability to migrate to countries with lower statutory tax rates. This argument is not substantiated because tax rates are not the only reason people choose to live where they do. Schooling, families, amenities, geographic location, and the community are all influential in determining where to live. Moreover, high-earners can lower the effective rate paid on income so it seems that migration based on tax rates is doubtful.

Effective tax rates on high-earners in the United States have hovered around 39-42% from 1996-2006 (OECD, 2010). This is not too different than many OECD nations. Denmark imposes among the highest rates that are around 60% for the period 1996-2006.

These rates are difficult to interpret because the actual rate depends on the amount of tax planning the individual undertakes. Nevertheless, high-income statutory rates have been increasing across the globe over the last decade (Garfunkel, 2010).

IV. Empirical Analysis

The objective of the empirical analysis is to determine how sensitive productivity (equation 1) is to changes in the corporate income, dividend, and high-earner tax rates across the OECD members. We use a fixed-effects panel model to assess the effects with the country specific effects fixed. The countries included in the study are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Mexico, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, The United Kingdom, and the United States. The data ranges from 1996-2006 and is all publicly available online. Most of the data was acquired from the OECD Database, 2010. Data on productivity was acquired from Penn World Tables 6.3. The data on the highest income bracket was retrieved from the World Bank Database, 2011. *Part a* will introduce the explanatory variables that were included. The regression output and robustness checks will then be displayed in *Part b*. *Part c* will cover the results and conclusions of the empirical study and provide supporting literature.

a. The Explanatory Variables

Recall that the dependent variable being observed is *realgdp/workers*. To assess the percentage change we apply the logarithmic transformation. *l_realgdp/worker* is the name displayed in the regression output. The same transformation is applied to corporate income tax rate and is denoted, *l_corp*. Dividends and high-earners, denoted as *Dividend* and *High*, are the other two tax variables. The tax rates are all statutory tax rates and

were acquired from the OECD tax statistics database, 2010. Variables are considered statistically significant from the 90-99% levels.

We control for government financial balances, as denoted *FinBal* in the output. Financial balances are measured as the national surplus or deficit as a percentage of nominal GDP (OECD, 2010).

Capital formation is another explanatory variable, denoted *capform* in the regression output. Capital formation is calculated as the percentage change from the prior year. It is the outlays of production less the sales of scrap or similar equipment. The calculation includes private and public industries as well as non-profit industries⁹. It basically measures how much capital has been accumulated from the prior period.

Gross national savings is also controlled for and denoted, *l_GNS*. This variable also received the logarithmic transformation. OECD calculates this variable as gross national savings as a percentage of nominal GDP (OECD, 2010). Gross national savings includes both private and public savings and is calculated by the OECD as total domestic savings less total foreign savings.

Another explanatory variable used is outward foreign direct investment or, *l_fdi*. This variable also received the logarithmic transformation. This variable measures the amount of outflows in millions of US investment dollars for the respective year (OECD, 2010). The OECD defines foreign direct investment as one investing entity having a lasting relationship in a foreign country. The relationship is determined by the level of control management imposes on the foreign entity and the number of capital transactions between the affiliated entities.

⁹ See OECD Outlook 87 for more information regarding the calculation.

The final explanatory variable is the unemployment rate with a logarithmic transformation, l_unemp . This measure is calculated using the number of unemployed as a percentage of the labor force (OECD, 2010).

These variables make up all of the explanatory variables that will be used in the following regressions. The objective is to see which tax rates remain statistically significant as the various regressions are executed. If a tax variable remains significant, it is assumed that it has an impact on productivity.

b. Regression Output and Robustness Checks

The regression output displayed in Figure 4 was produced using the fixed-effects panel model. There were 24 cross-sectional units, representing the countries, stacked over an unequal time-series length of 5-11 years. A White correction was imposed to remedy non-constant error variance and autocorrelation. The output below indicates logged corporate income tax, logged unemployment, and financial balances are statistically significant at the 95% level. Also, capital formation is significant at the 99% level. The variable of interest here, logged corporate income tax, possesses a negative coefficient as expected. This output is interpreted as a 1% increase in the corporate income tax rate results in a 0.17% decrease in productivity. Financial balances appear to share a positive relationship with productivity. This is expected since increases in surpluses yield increases in domestic investment. It is also possible that surpluses are returned to the taxpayer in the form of tax breaks or credits. Tax breaks and credits encourage consumption and savings, which stimulates the economy since individual wealth rises.

Model 1: Fixed-effects, using 209 observations
Included 24 cross-sectional units
Time-series length: minimum 5, maximum 11
Dependent variable: l_RealGDP_worke
Robust (HAC) standard errors

	coefficient	std. error	t-ratio	p-value	
const	12.5598	0.407352	30.83	4.38e-073	***
l_Corp	-0.179662	0.0761097	-2.361	0.0193	**
Dividend	-0.000130514	0.00190840	-0.06839	0.9456	
High	0.0402248	0.179271	0.2244	0.8227	
FinBal	0.0137295	0.00533678	2.573	0.0109	**
capform	-0.00763543	0.00126701	-6.026	9.50e-09	***
l_GNS	0.0744260	0.106265	0.7004	0.4846	
l_fdi	-0.0147016	0.00975587	-1.507	0.1336	
l_unemp	-0.151805	0.0603553	-2.515	0.0128	**
Mean dependent var	11.70755	S.D. dependent var	1.401170		
Sum squared resid	2.267998	S.E. of regression	0.113197		
R-squared	0.994446	Adjusted R-squared	0.993473		

Figure 4: Regression Output

Capital formation is highly significant and retains a negative coefficient. This seems counter-intuitive but one explanation is that an abundance of capital results in the inefficient allocation of resources and actually lowers the productivity of the capital being deployed. Logged unemployment rate is also statistically significant with a negative coefficient. This is expected since rising unemployment has a negative effect on GDP. GDP and the number of workers share a strong positive relationship, shown in Figure 5. See appendix A-4 for a residuals distribution.

The same regression was run again but the countries that did not have complete annual data were removed to ensure robustness of our results. The second regression with the reduced sample is shown in Figure 6. These results confirm our original finding that logged corporate income tax has a statistically significant negative relationship with the dependent variable.

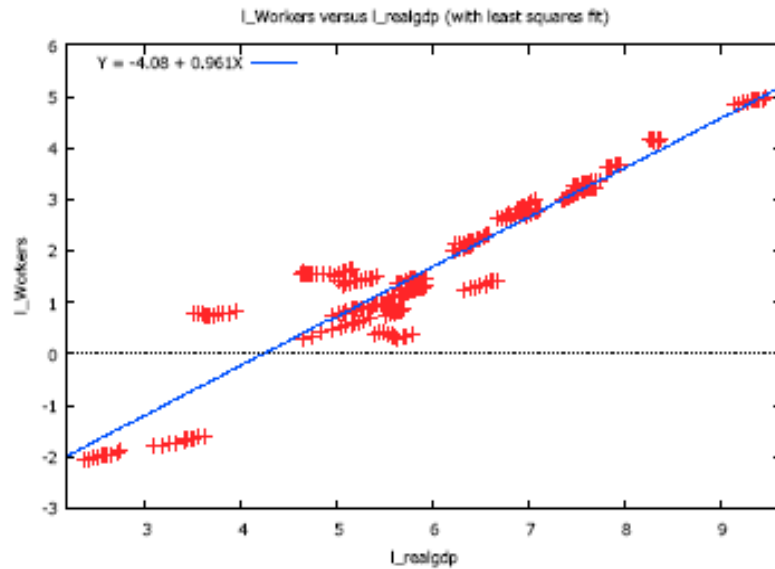


Figure 5: Real GDP to Workers

Here the variable has become significant at the 99% level. The sensitivity of productivity to changes in the corporate income tax appears to have increased with this model. The coefficient is -0.22, which is interpreted as a 1% increase in the corporate tax rate will have a 0.22% decrease in productivity. The original model produced a coefficient of -0.17.

The other variables retain the coefficient signs that were produced in the first regression. The magnitudes of the coefficients also remain comparable to before. Financial balances became significant at the 99% level and logged unemployment dropped to the 90% level of significance. Similar to the original, the White correction for non-constant error variance and autocorrelation were imposed. See appendix A-5 for a residuals distribution.

Model 1: Fixed-effects, using 152 observations
Included 15 cross-sectional units
Time-series length: minimum 6, maximum 11
Dependent variable: l_RealGDP_wor
Robust (HAC) standard errors

	coefficient	std. error	t-ratio	p-value	
const	12.7956	0.511702	25.01	2.62e-051	***
l_corp	-0.223056	0.0682945	-3.266	0.0014	***
Dividend	-0.000229754	0.00281549	-0.08160	0.9351	
High	0.0275500	0.183261	0.1503	0.8807	
FinBal	0.0194394	0.00700694	2.774	0.0064	***
capform	-0.00770595	0.00135907	-5.670	8.92e-08	***
l_fdi	-0.0136018	0.0106632	-1.276	0.2044	
l_GNS	-0.0656516	0.176165	-0.3727	0.7100	
l_unemp	-0.106518	0.0597755	-1.782	0.0771	*
Mean dependent var	11.43673	S.D. dependent var	1.010330		
Sum squared resid	1.756058	S.E. of regression	0.116674		
R-squared	0.988607	Adjusted R-squared	0.986664		

Figure 6: Countries with all data

A third regression was run reducing the sample down to only the countries that imposed a small-business tax rate in addition to a corporate tax rate. The output is displayed in Figure 7. This regression result is particularly interesting because the tax on the highest income bracket becomes significant at the 90% level. The coefficient is negative with a value of -0.483. Most importantly, logged corporate income tax remains significant at the 99% level and the coefficient is hardly adjusted from the second regression.

All of the previously significant variables remain significant in this result with consistent coefficients and magnitudes; financial balances at 95 % while capital formation and logged unemployment are significant at the 99% level. See appendix A-6 for a residuals distribution.

Model 1: Fixed-effects, using 60 observations
Included 6 cross-sectional units
Time-series length: minimum 6, maximum 11
Dependent variable: l_RealGDP_wor
Robust (HAC) standard errors

	coefficient	std. error	t-ratio	p-value	
const	12.1573	0.694735	17.50	5.81e-022	***
l_Corp	-0.215228	0.0689452	-3.122	0.0031	***
Dividend	-0.00662047	0.00427821	-1.547	0.1286	
High	-0.483080	0.268071	-1.802	0.0781	*
FinBal	0.0122797	0.00600820	2.044	0.0467	**
capform	-0.00584932	0.000942136	-6.209	1.41e-07	***
l_GNS	0.180899	0.182132	0.9932	0.3258	
l_unemp	-0.148856	0.0508508	-2.927	0.0053	***
l_fdi	-0.0209712	0.0145697	-1.439	0.1568	
Mean dependent var	10.95432	S.D. dependent var	0.351481		
Sum squared resid	0.426662	S.E. of regression	0.096308		
R-squared	0.941463	Adjusted R-squared	0.924920		

Figure 7: Countries w/ small-business tax

A final check for robustness was executed, this time controlling for time specific effects. This regression produced results that held each year's specific effects fixed with a time dummy. Variables remaining significant are robust to time and country specific effects. Below, Figure 8 displays the regression results with the time dummies. The two variables that remain significant are capital formation and the variable of interest, logged corporate income tax. The coefficient for logged corporate income tax remains negative but the sensitivity of productivity to changes in the corporate income tax rate decreases relative to prior regressions, the coefficient is -0.104. As with the other tests, the White's correction for non-constant error variance and autocorrelation was imposed. See appendix A-7 for a residuals distribution.

Model 2: Fixed-effects, using 209 observations
Included 24 cross-sectional units
Time-series length: minimum 5, maximum 11
Dependent variable: l_RealGDP_worke
Robust (HAC) standard errors

	coefficient	std. error	t-ratio	p-value	
const	12.0354	0.268695	44.79	5.68e-095	***
l_Corp	-0.104008	0.0537446	-1.935	0.0547	*
Dividend	-0.00132799	0.00183048	-0.7255	0.4692	
High	-0.143068	0.173922	-0.8226	0.4119	
FinBal	0.00318879	0.00369822	0.8622	0.3898	
capform	-0.00148954	0.000610284	-2.441	0.0157	**
l_GNS	-0.0164073	0.0499996	-0.3281	0.7432	
l_fdi	-0.00497535	0.00672623	-0.7397	0.4605	
l_unemp	0.0156403	0.0390506	0.4005	0.6893	
dt_2	0.110350	0.0125254	8.810	1.56e-015	***
dt_3	0.159567	0.0178869	8.921	7.91e-016	***
dt_4	0.205663	0.0219494	9.370	4.97e-017	***
dt_5	0.333046	0.0306989	10.85	4.31e-021	***
dt_6	0.381322	0.0301118	12.66	3.42e-026	***
dt_7	0.344875	0.0280355	12.30	3.60e-025	***
dt_8	0.209005	0.0230406	9.071	3.15e-016	***
dt_9	0.146032	0.0257336	5.675	6.01e-08	***
dt_10	0.153547	0.0276305	5.557	1.06e-07	***
dt_11	0.161233	0.0328468	4.909	2.17e-06	***
Mean dependent var	11.70755	S.D. dependent var	1.401170		
Sum squared resid	0.687279	S.E. of regression	0.064152		
R-squared	0.998317	Adjusted R-squared	0.997904		

Figure 8: Time Dummies

c. Results and Conclusions

It is found that increases in the corporate income tax rate have a statistically significant negative impact on productivity. The variable logged corporate income tax rate remained significant in all three robustness checks. Additionally, the coefficients for the variable ranged from -0.2231 to -0.1040 over the regressions. These results are consistent with the literature. Karras and Furceri (2008) conduct a similar study using OECD data but use real GDP per capita instead of real GDP per workers as the response variable. The elasticities found in their study were slightly higher at -1.0 to -0.5. Workers are preferred here to total population because some countries have much larger populations than others and we are concerned with the productivity of the workforce. Arnold, *et al.* (2001) conducted a study among OECD nations but also used GDP per

capita as the dependent variable. The results regarding corporate tax rate elasticities were relatively high at -2.01. Arnold & Schwellnus, 2008, discovered findings that are closely aligned to those presented in this paper. The paper produced coefficients consistent with the ones here ranging from -0.357 to -0.19. Rather than real GDP per worker, Arnold & Schwellnus used total factor productivity as the dependent variable. Hong Ding (2008) conducted a study on OECD nations using a two-stage least squares fixed-effects panel model. The results of that study indicated a tax elasticity of -.09, just slightly lower than the coefficient produced from the model with time dummies in this study. The dependent variable in the Ding study was real GDP to number of hours worked.

One explanation for dividend tax not being statistically significant is the signaling theory discussed earlier in this paper. Firms issue dividends to send a signal of financial strength to the markets. One sign of a financially strong firm is a consistent and rising dividend payment. Even firms that are not performing well only consider cutting the dividend as a last resort. Furthermore, directors and shareholders may force management to return more cash to the owners to reduce the moral hazard of a manager having access to an abundance of equity. These factors contribute to a low level of adjustments in dividend payments.

It is interesting that the tax on high-earners remained insignificant except when only including countries with small-business tax rates. It is estimated that the tax on high-earners remains insignificant because majority of the workers are not considered high earners. The significance found among the small-business tax countries could be a response from large venture capitalists and private equity firms. These two groups are comprised of high net worth individuals and may withdraw small-business financing as

the rate on high-earners increases. Although, these results do not hold up to the tests for robustness, and therefore the results are inconclusive.

There is little empirical research on the response of GDP to changes in dividend taxation and the tax on high-earners. This is an area that should continue to be researched because of the policy implications associated with these taxes. With tax debates often focusing on the redistributive aspects of personal income tax on the highest bracket, more conclusive research would provide a better foundation for understanding the full implications of future policy alterations.

V. Further Improvement

This research can be enhanced in a number of ways. First of all, we conducted the study based on macro-level data. A micro-level analysis could allow researchers to capture tax-planning effects and tax breaks for firms and wealthy individuals. Also, this study did not control for spatial dependence. As noted, many European countries tend to reduce tax rates in response to reductions in a neighboring country's tax rate. The use of a dynamic space-time panel model would enhance these results¹⁰. Including the average effective tax rate (AETR) on investment would increase the precision of our models because the AETR is the effective rate on cross border investment between two countries¹¹. As with any study of this nature, omitted variable bias is an issue. With an entire universe of variables affecting an investment or business decision, it is impossible to account for every factor.

¹⁰ See Debarsy, Ertur, and LeSage (2011)

¹¹ See Hajkova, Nicoletti, Vartia, and Yoo (2006)

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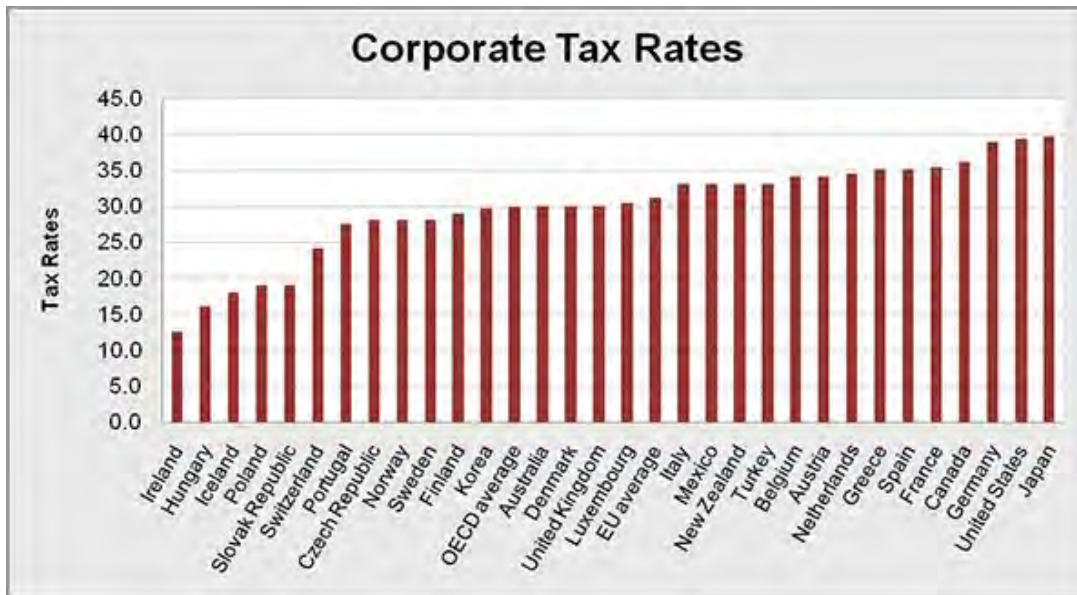
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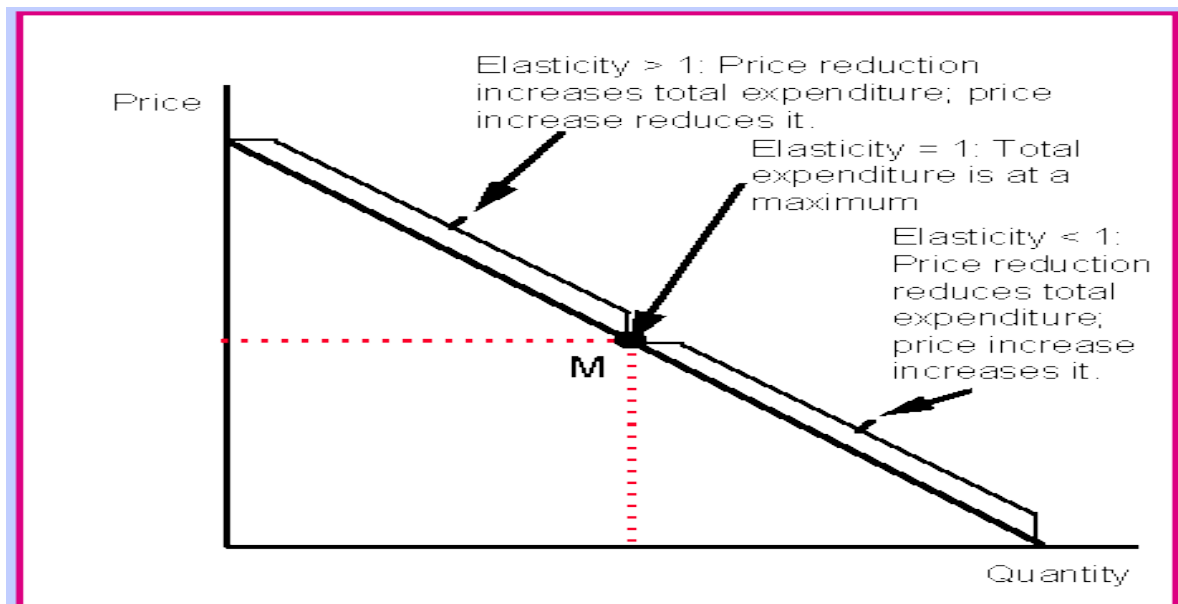
Appendix

A-1



Effective corporate income tax rates among OECD nations. This figure does not include the recent reforms Japan has enacted which set the new rate of 35.7%, which is less than the United States of 39%. Source: (<http://www.marketingspot.com/tag/income-shifting/>)

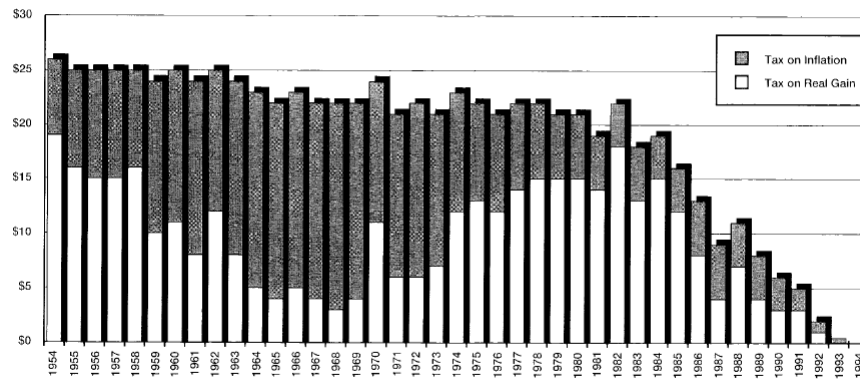
A-2



The Demand Curve. Source: (<http://courses.cit.cornell.edu/econ101-dl>)

A-3

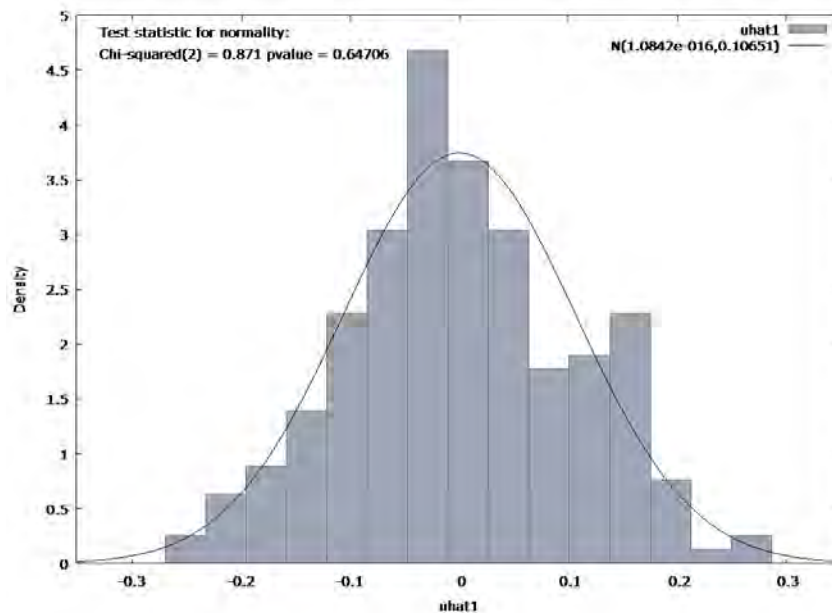
Figure 1
The Tax on Real vs. Inflationary Capital Gains of an Average Stock
(Stock Bought in June of Designated Year and Sold in June of 1994)



Source: Tax Foundation.

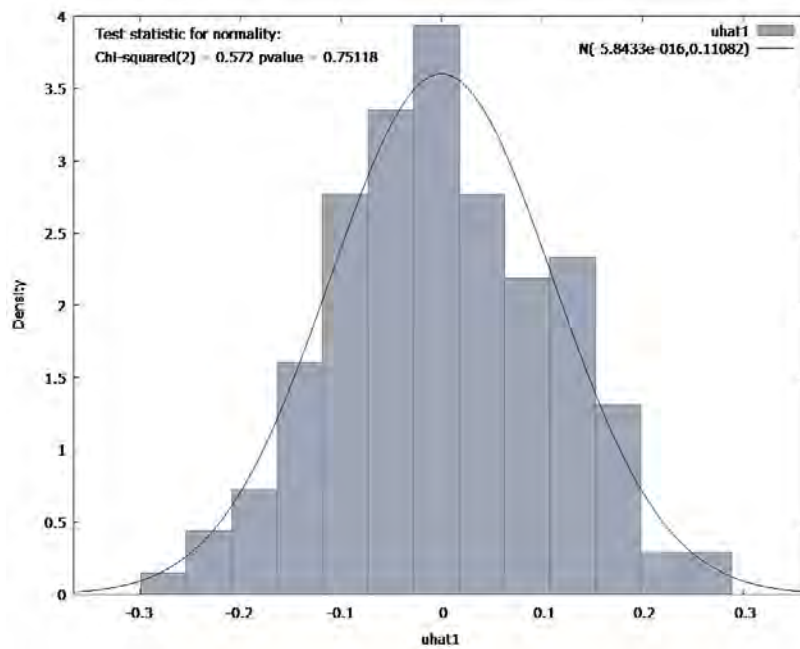
Illustration of the inflation effects on capital gains tax rates.

A-4



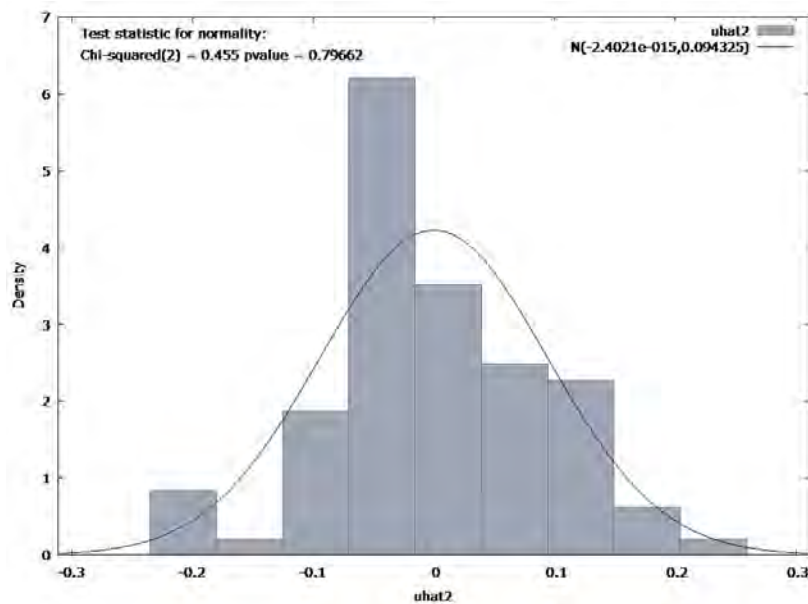
Residuals distribution for the first model.

A-5



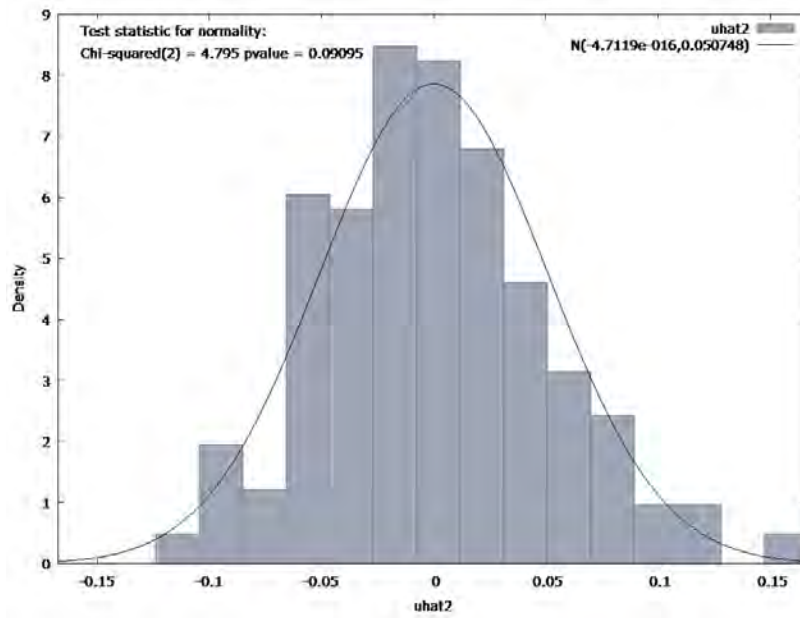
Residuals distribution for the second model containing countries with all data.

A-6



Residuals distribution for the third model containing countries with a small business tax.

A-7



Residuals distribution for the final model with time dummies.