

Lower Taxes for One, More Money for All? Profit
Shifting and its Economic Effects

by

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Abstract

The European Union recently pursued litigation on the multinational enterprise Apple Incorporated, accusing the company of owing the Irish government over \$14.8 billion in back taxes due to tax avoidance deals with the country¹. This case provides a glimpse into the global concern over the use of tax havens. This paper explores the effects of Apple's profit-shifting on the economic surplus of their retail market, estimating the effect of the taxes avoided by the company on the consumer surplus. The results are inconclusive. I find a positive correlation between the amount of tax avoided and consumer surplus for the iPod Nano consumers but a negative correlation for the iPhone consumers. It is difficult to achieve a definitive conclusion because the data has a limited number of observations and the consumer surplus proxy does not account for willingness to pay that might change with the different models of Apple products. Further research should be directed to overcome these limitations.

Introduction

Within the past decade, the MNE Apple Incorporated has been under fire for their alleged tax havens outside of the United States. In recent years, the European Commission ruled that Apple Inc. has made deals with the Irish government to secure a tax rate far lower than not only the American corporate tax rate, but also the official Irish tax rate itself. For comparison, While America has a corporate tax rate of 24.6%, Irish tax rates are about half that amount with 12.5%. Nevertheless, it was argued by the European Commission that between the years of 2003 to 2014, Apple Inc had been paying Irish corporate tax rates as low as .005%. As of mid-December,

¹ forbes.com

it was ruled that Apple Inc. will not be ordered to pay the alleged amount in back taxes. This verdict matters as global loss in revenue due to profit shifting practices such as tax havens has resulted in \$100 billion in lost revenue for the United States government in 2017 alone².

Apple was able to pursue these tax havens with the help of their two subsidiary companies: Apple Operations International (AOI), and Apple Sales International (ASI). AOI is incorporated in Ireland and keeps central management in the US. By doing this, they dodge US tax codes that define a tax residence as where you incorporate, as well as Irish tax codes that define a tax residence as where one holds central management. ASI, alongside enjoying the same benefits of AOI, collects foreign assets through their cost-sharing agreement with their parent company, Apple Inc. For example, since 60% of Apple's total sales are in Eurasia, then ASI must pay 60% of their parent company's research and development (R&D). In return for this cost-sharing agreement, ASI is granted a portion of Apple Incorporated's total income, as well as the economic rights to Apple Inc's intellectual property. However, when looking at the collection of earnings, ASI's collecting a disproportionate amount of earnings, with Apple's Inc's total profit-to-costs ratio being 7:1, while ASI's profit-to-costs ratio is 15:1. Additionally, ASI collects 64% of Apple's total pre-tax earnings despite representing a mere 1% of Apple's total customers and 4% of total employees (Ting, 2014). Due to AOI and ASI enjoying the same tax benefits, those earnings can then go without being properly taxed.

There is the argument that tax havens do not provide a net detriment to the economy at large, as it allows innovators and investors at the head of businesses to freely reallocate their profits

² www.taxfoundation.org

towards their highest valued use in a manner that will leave Apple and its customers better off. There have been notable business owners and investors, such as Elon Musk, who have shown their disdain for heavily taxed regions, as the young businessman has decided in late 2020 to leave his base of operations in California for the state of Texas, as their tax laws are more lenient, cutting state income and/or capital gains taxes for individuals. This leniency is a far cry from California, with its 13.3% income tax on amounts over \$1 million a year, and capital gains tax rates of similar stature³.

Despite differing arguments, there still needs to be a comprehensive method of comparing the net gains of tax avoidance to its net losses. This paper measures how the amount of profits Apple shifted through tax havens may have had a positive or negative effect on the socio-economic conditions of the US through economic surplus. This is done in an attempt to explore the theory that MNE's shifting profits can be good for the economy as a whole as they allow MNE's to have more money at their disposal to improve the conditions of both the company and its consumers.

The paper is structured as follows. First, we explain the distinctions between tax evasion, and the more legitimate act of tax avoidance. Through this, we will explain how profit shifting through pursuing tax havens falls within the realm of tax avoidance. Second, we will explain the factors that lead to the creation and heavy use of tax havens, explored through the viewpoint of both the MNE and the tax haven country. Third, we will explore the potential solutions to the use of tax havens hypothesized in the academic literature, as well as their respective levels of success.

³ www.wsj.com

Next, we explore the debate over whether the Organization for Economic Cooperation and Development (OECD) is an effective and useful asset against the MNE's and their profit shifting. This will be done by exploring the OECD's Anti-Bribery Coalition and its efforts to curb the influence of lobbyists aiming to loosen foreign policy towards more profit shifting. Next, we discuss economic surplus and what it means to a business at large as well as what it means to this paper. Following this, we explain the methodology behind this paper's research, which will analyze the relationship between the amount of taxes avoided by MNE's and the contributions by these MNE's towards the economic surplus of their products.

Literature Review

What Qualifies as "Tax Avoidance"?

It is important to note that the actions of Apple Inc may not be considered as tax evasion-- something more akin to breaking the law--but more so tax avoidance. Deak (2004) provides a clear distinction between the two phenomena. He writes that what is defined as tax evasion encompasses acts such as fraud, false accounting, money laundering, bribery and the like. It is characteristic of small to medium business while MNE's are able to move more freely from one jurisdiction to the next without needing to break the law. Since Apple Inc. is a multinational enterprise, and their acts do not exactly fall within the aforementioned examples or anything of the like, we can conclude that Apple Inc's behavior may not exactly be tax evasion, but may be more akin to tax avoidance.

Factors That Encourage Tax Havens

Information on which countries are culpable for becoming tax havens for US companies such as Apple Inc. is important as well. Jansky (2019) explored this question in his paper which aimed to place his purported \$100 billion bill due to tax havens onto specific industries that hold tax havens. Jansky used industry-level data to find whether there is a strong relationship between the location of MNE's profit and the location of that MNE's economic activities. The paper found that the major tax havens for US-based MNE's include the Netherlands, Luxembourg, and Ireland, all of which are members of the EU at the time of his study. This speaks to the lack of international cooperation when combating tax havens, as many nations would rather compete through corporate tax lowering. Jansky was unable to find detailed data to provide an industry breakdown of costs. This was due to the fact that while the data collected was able to identify the industries of MNE affiliates in tax havens, they could not identify the industries of their respective US parent companies that are ultimately responsible for the bulk of the \$100 billion bill for tax haven use. Nevertheless, this paper is important to consider when determining the main culprits of tax havens with respect to US MNE's.

Nebus (2019) pursued a more theoretical approach to explain what makes a MNE pursue tax havens. This paper takes an institutional logics approach by asking questions such as: when facing the same tax laws in the same country with the same economic considerations, why do some MNE's pursue tax havens and others do not? Secondly, they examine how new reforms affect former givens of their theory for motivating factors towards tax havens. This new theory is then able to create a complementary approach to solve the issue of tax avoidance. This study finds that state tax laws on their own cannot properly combat tax havens because of perpetual friction between sovereignty and harmony of tax laws between various states, as states wish to

maintain control over their individual tax legislation. In addition, outlier states--states with considerably different laws and which refuse to cooperate at all--will continue to operate as tax havens. Additionally, if MNE's are not on board with tax reform, they will simply continue with their tax avoidance practices.

Government Solutions to Tax Havens

Many academics have argued that more lenient tax laws--such as lowering the amount of double taxation--may lead to lower corporate tax havens and expatriations. Rosenzweig (2010) conducted a study exploring the effects of what the paper calls, "capital neutrality," on the appearance of tax havens. Capital neutrality occurs when countries such as the United States enact policies such as decreasing double taxation, thus allowing for easier capital flow from one country to the next, promising higher economic prosperity internationally. These measures have the unintended effect of inviting underdeveloped countries to become tax havens to attract said capital. This is referred to in the paper as the "capital neutrality paradox" (CNP). While this may lead to tax haven countries to be punished, that punishment leads to tax haven countries to be more competitive with tax rates in order to balance-out the negatives of the punishment, referred to in the paper as the "punishment paradox" (PP). This paper then turns to what it believes to be the core issue: Underdeveloped countries becoming tax havens because capital otherwise does not flow regularly into these countries. Thus, the paper proposes that the solution to tax havens is neither lenient tax laws nor the punishment of tax havens, but rather, the investment in alternative measures, indirect fiscal transfers for example, that incentivize capital to flow regularly into underdeveloped countries.

Other studies also suggest that more laws and law enforcement will lead to corporate tax rate competition between nations. Hauck (2019) conducted a study on the effects domestic pressures on MNE's to prevent profit-shifting had on the domestic corporate tax rate as well as the domestic/onshore nation's relationship with offshore tax havens. In exploring domestic pressures, Hauck isolated offshore lobbying by tax haven countries as a countermeasure to onshore pressures against profit-shifting, which then pushes down profit shifting costs, which in turn shifts down onshore tax rates as the onshore country will now have to compete with offshore tax haven rates. Hauck suggests that preventing tax havens is not as simple as increasing domestic pressures, as that only causes an economic ripple effect. This occurs as offshore lobbying works to decrease onshore pressures, bringing onshore MNE's to offshore tax havens, the new tax revenue amassed by offshore havens frees up capital for the offshore haven, allowing tax haven countries to allow for even lower tax rates to better compete with onshore tax rates.

OECD Initiatives Against Tax Havens

This matter has also brought into question the Organization for Economic Co-operation and Development (OECD) and whether this organization has made a significant impact on the struggle against tax havens. Brewster (2014) had assessed the efficacy of the OECD Anti-Bribery Coalition (ABC). This paper explored the member states' efforts to enforce domestic legislation against corporate corruption with the added effect of its MNE's operating abroad. It should be noted that profit shifting and pursuing tax havens is not what the OECD deems corrupt. On its own, profit shifting to tax havens is just another form of tax avoidance, and is acceptable under US law. Corruption in the case of the ABC initiative instead refers to private actors in tax haven nations who bribe members of government in nations such as the US and other OECD nations in the hopes that those government actors pass more legislation that allows

for more profit shifting. This becomes difficult due to the ambiguity of the OECD's Treaty obligations, the ambiguity resulting from a lack of specification on what a state is to use to enforce anti-corruption laws. According to Brewster, in 2013, less than half of Treaty members were able to prosecute a nonstate/private actor for corruption. Due to the ambiguity, it also becomes difficult for states to identify when other states are breaching the treaty agreements.

Years later, Jensen and Malesky (2018) reassessed the effectiveness of the OECD's ABC and found more evidence in support of the OECD's efforts. The ABC was orchestrated to reduce the amount of non-state actors who bribed onshore countries to make their MNE's less restricted to pursue tax havens. The ABC carried this out through peer-review, that is, through Global Performance Assessments (GPA), which generated new public data on the activities of non-state actors, effectively curating a "naming and shaming" strategy. This was implemented in Phase 3 of the ABC in 2010 through forming working groups to perform onsite reviews of signatory participants (non-state actors who signed up for the ABC) and monitoring their implementations. At the onset, it was not clear whether the ABC truly decreased real bribery, as the Coalition's increasing probability of investors being punished may have led to decreased reported bribery but also decreased admittance to bribery. Nevertheless, by conducting a survey that shielded respondents and decreased reporting bias, the paper found that non-state actors that signed for the ABC had reduced their bribery after Phase 3 of the ABC in 2010.

How Tax Haven Countries Benefit from Profit Shifting

Many papers provide critical critiques of profit shifting and tax haven countries, but it is important to highlight the benefits that may arise from MNE's pursuing tax havens. Dyreng, Lindsey, and Thornock (2010) conducted a study on how the US state of Delaware practiced tax

laws that allowed the state to act as a tax haven for out-of-state American businesses. Their paper noted Delaware's being on top of National Geographic's list of most secretive tax havens in the world. Furthermore, their paper used a logistic regression model which proved their prediction that Delaware's tax advantages play a significant role in their high rates of subsidiary incorporations by out-of-state corporations. Their regression thus further supported the idea that the state of Delaware operates as a tax haven. Their paper found that companies incorporating subsidiaries in Delaware save on average 15-24% on their respective state income tax burdens. This is beneficial to Delaware, as in 2007, they generated over \$700 million in revenue from franchise fees and other related expenses. This accounted for 21.6% of Delaware's revenue for that year. Such revenue is beneficial to a state such as Delaware, as it is relatively small, and in 2010 ranked within the bottom ten among states that collect corporate net income tax, collecting only \$142 million⁴.

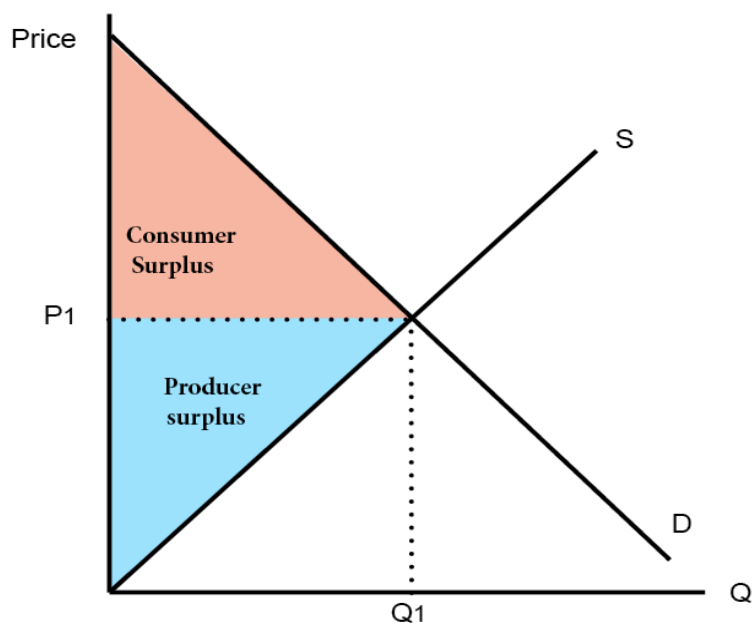
Dyrenge et. al's paper also highlighted the legal benefits US corporations receive by incorporating subsidiaries in Delaware. Delaware established the Delaware Court of Chancery, which specializes in corporate legal disputes. This court is unique to Delaware in that it has its own well-established laws and precedents, functions without a jury, and specializes specifically in corporate law. This particular legal system thus makes business more efficient for US corporations across various states. While this paper focuses more on proving that Delaware is a tax haven, it also brings into consideration the revenue benefits that small states such as Delaware receive by being a tax haven, as well as the benefits to American business from profit shifting to Delaware.

⁴ census.gov

Economic Surplus

Examining economic surplus is important because this paper seeks evidence to support the hypothesis that as Apple's avoided taxes increase, their consumer product prices decrease, and this increase in avoided taxes and decrease in prices both represent the economic surplus for Apple Inc. Economic Surplus is a microeconomic term that refers to the monetary benefit, or surplus, received by both the consumer and the producer during a transfer of goods or services. It represents the sum of the consumer surplus--that is, the difference between the amount the consumer is willing to pay and the amount the consumer actually pays--and the producer surplus--the difference between the cost to produce the product and the price at which the product is sold. Figure 1 provides a sample Demand and Supply graph labeled for the consumer, producer, and economic surpluses.

Figure 1: Demand Curve, Supply Curve, Consumer Surplus, & Producer Surplus

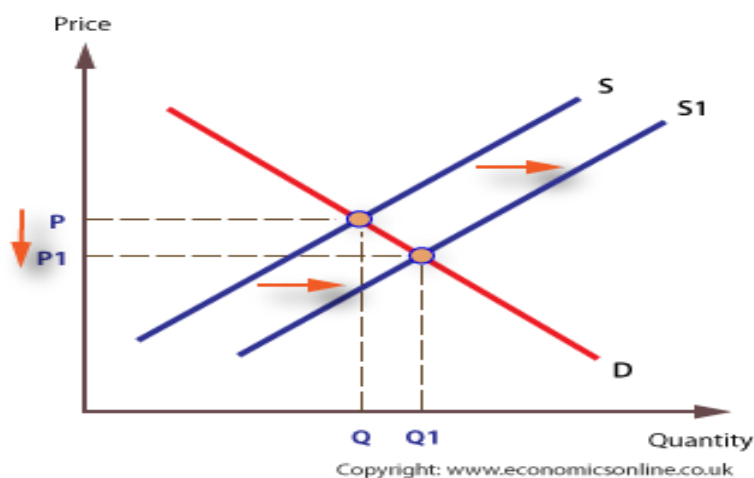


Source: www.economicshelp.org

In the figure above, the x-axis represents the quantity of goods sold, denoted by Q . The y-axis represents the price of goods, denoted by $Price$. The upward-sloping line represents the supply curve, denoted by S . The downward-sloping line represents the demand curve, denoted by D . The equilibrium point, where the quantity supplied and the quantity demanded meet, is denoted by the intersection of the dotted lines $P1$ --equilibrium price--and $Q1$ --equilibrium quantity. This is the point at which a product is sold in the market. The area shaded red is the consumer surplus, that is, the area between the demand curve and the equilibrium price, $P1$. The area shaded blue represents the producer surplus, that is, the area between the equilibrium price and the supply curve.

According to microeconomic theory, the less taxes are levied on a business, the more the supply curve shifts to the right. This movement results in a greater producer surplus, which also creates a larger overall economic surplus. Figure 2 depicts the effect of rightward shift of the supply curve,

Figure 2: Rightward Shift of the Supply Curve



Source: www.economicsonline.uk

with the x-axis denoting quantity of goods sold, the y-axis denoting price of goods, D representing the demand curve, S representing the supply curve, S1 representing the new supply curve, Q representing the equilibrium quantity, P representing equilibrium price, Q1 representing the new equilibrium quantity, and P1 representing the new equilibrium price.

As shown by the graph, a rightward shift of the supply curve reduces a good's market price. As a result of this, there is also an increase in the area between the equilibrium price and the demand curve, as well as an increase in the area between the equilibrium price and the supply curve. This results in both a larger consumer surplus and a larger producer surplus. According to microeconomic theory, as taxes on the costs of a business decreases, the supply curve shifts to the right, allowing for all the benefits. Therefore, as the MNE Apple allows itself more tax avoidance through the tax havens, their cost of production will decrease, creating a rightward shift in their supply curve. This increased surplus would result in a greater economic benefit for both Apple and its customers.

In this study, economic surplus will be found by conducting a year-by-year comparison between the independent variable of taxes dodged by Apple subsidiary ASI, and the dependent variable of the sales price of Apple products between the years 2003 and 2011. If the average cost of Apple products decreases as ASI's profit shifting increases, showing a negative correlation, this will lend support to the theory that a decrease in a manufacturer's taxes does in fact shift the supply curve to the right, both decreasing price and increasing economic surplus. From there, we can

suspect there to be a considerably large economic surplus due to Apple's profit-shifting through tax havens.

Data

This paper analyzes the relationship between the amount of taxes avoided by Apple Incorporated and the prices of their consumer products over a nine-year period in an attempt to track potential changes in economic surplus as a result of Apple Inc's tax avoidance. Data on Apple's avoided taxes is collected from the paper of a 2017 Commission Decision from the European Union (EU), published under the Official Journal of the European Union. This paper summarizes the activities of one of Apple's subsidiary companies, Apple Services International (ASI). Table 1 is taken from the EU document, listing yearly revenue attributed to the subsidiary ASI, as well as ASI's yearly taxes declared in statutory accounts (European Commission, 2017).

Table 1: ASI financial information (in USD million)

<u>Year</u>	<u>ASI turnover</u>	<u>Profit before tax</u>	<u>Of which interest and investment income net of interest charges</u>	<u>Tax declared in statutory accounts</u>
2003	1,682	165	14	2.1
2004	2,223	268	12	2.1
2005	4,068	725	27	3.9
2006	5,626	1,180	54	6.5
2007	6,951	1,844	122	8.9
2008	10,378	3,127	145	14.9
2009	15,404	5,662	92	3.7

2010	28,680	12,140	127	7
2011	47,281	22,134	64	9.9
2012	[63,000 - 63,500]	[35,000 - 35,500]	[300 - 400]	[1 - 10]
2013	[62,500 - 63,000]	[26,500 - 27,000]	[1,000 - 1,500]	[1 - 10]
2014	[67,500 - 68,000]	[24,500 - 25,000]	[900 - 1,000]	[1 - 10]

In order to accurately calculate the amount of taxes avoided by ASI, which will serve as the independent variable, this paper will focus on the time period between 2003 and 2011, years which have uncontested turnover amounts recorded by the EU. This yearly turnover amount will first be multiplied by the corporate tax rate of the United States, 35% (tradingeconomics.com). Next, the resulting difference will have the declared taxes in statutory accounts subtracted from it. The equation is as follows:

$$\text{taxes avoided} = ((\text{turnover in USD} * 0.35) - (\text{tax declared in statutory accounts}))$$

Using the information provided by the European Union, as well as the public record on the United States' corporate tax rates, Table 2 represents the amount of taxes avoided by the Apple Subsidiary ASI between the years 2003 and 2011.

Table 2: Taxes Avoided by ASI, 2003-2011

Year	US Corporate Tax Rate (%)	Taxes Avoided (billion USD)
2003	35	0.587
2004	35	0.776
2005	35	1.420

2006	35	1.963
2007	35	2.424
2008	35	3.617
2009	35	5.388
2010	35	10.031
2011	35	16.538

Aside from the Apple's avoided taxes, other independent variables must be considered for this paper to accurately predict the prices of Apple's consumer products. The US Gross Domestic Product (GDP) is a prime example of such variables, as it serves as a measurement of a country's yearly economic performance. If a nation's GDP is not as impressive as the year prior, one can assume that business in that nation has also performed poorly, thus leading to lower revenue for businesses such as Apple, thus meaning less taxes collected, which could then affect product pricing. Data on the US GDP will be taken from the World Bank, an accredited and trusted international organization tasked with recording data on economic development in countries around the globe. Table 3 represents the US GDP between the years 2003 and 2011 (data.worldbank.org).

Table 3: US Gross Domestic Product, 2003-2011

Year	US GDP (2021 USD) (trillions)
2003	11.458
2004	12.214
2005	13.037

2006	13.815
2007	14.452
2008	14.714
2009	14.449
2010	14.992
2011	15.543

Apple Inc's consumer products are known for their innovative features that appear with each model release. These innovations are likely to affect the release price of Apple's products, as an innovation may in part justify an increase in product pricing. In an attempt to control for this factor as closely as possible, this paper will include the independent variable of yearly average prices of Apple's stock. This paper believes that Apple's stock price correlates with the company's product innovations, as stock price reflects the value of the company as perceived by the market, and the consumer market is likely to invest in a product if that product demonstrates consistent innovations that keep up with or improve upon current technological capabilities.

Table 4 represents the yearly average stock prices of Apple stock, adjusted for stock splits. Data on Apple Inc's stock prices are taken from macrotrends.net, a trusted research platform for long term investors, home to over 100 years of market data and over 50 performance and fundamental criteria.

Table 4: Apple Yearly Average Stock Price, 2003-2011

Year	Yearly Average Apple Stock Price (USD)
2003	0.33

2004	0.63
2005	1.67
2006	2.53
2007	4.58
2008	5.07
2009	5.24
2010	9.28
2011	13.00

Source: www.macrotrends.net

The dependent variable for this study will be the prices of Apple Inc's products between the years of 2003 of 2011. This variable is difficult to measure, as Apple is known for their many products, and not many of those products were released on a yearly basis throughout the years of focus. To remedy this issue, this paper will conduct two regression analyses, between the independent variable of taxes avoided by Apple Inc, and two distinct dependent variables of various Apple products. The first dependent variable to be analyzed will be the price of Apple's iPod Nano between the years of its releases, from 2005 to 2010. This dependent variable was chosen as the iPod Nano saw consistent yearly releases between 2005 and 2010 and will thus be easy to compare with the yearly amount of taxes dodged by Apple, albeit only within a 6-year time span. Additionally, the storage capabilities of each iPod vary throughout the years. To accommodate for this, the study will focus on the cheapest and thus the most accessible model released each year.

Table 5 represents the release date prices of each iPod Nano release from 2005 to 2010, adjusted for inflation using an online inflation rate calculator (usinflationcalculator.com). Table 6 provides summary statistics for the independent variables, taxes avoided by Apple Inc, US GDP, and Apple Inc yearly average stock prices between the years 2005 and 2010, and the dependent variable, the adjusted release prices of the iPod Nano between the years 2005 and 2010.

Table 5: iPod Nano release date prices, 2005-2010

Year	Model	US Release Date Price (2020 USD)
2005	1st Generation, 1GB	198.78
2006	2nd Generation, 2GB	192.57
2007	3rd Generation, 4GB	187.23
2008	4th Generation, 8GB	180.31
2009	5th Generation, 8GB	180.96
2010	6th Generation, 8GB	178.04

Table 6: Variable Summary, Dependent & Independent Variables

Variable	Observations	Mean	Standard Dev.	Minimum	Maximum
Taxes Avoided (Billions)	6	4.140	3.213	1.419	10.031
iPod Nano Release Prices	6	186.32	8.11	178.04	198.78
US GDP (2021 USD)	6	14.243	0.708	13.037	14.992

(trillions)					
Yearly Average Apple Stock Price (USD)	6	4.73	2.66	1.67	9.28

Method

This paper explores the potential relationship between MNE's profit shifting through tax havens and the aggregate well-being of their businesses as well as their consumers. This will be done by running regression analyses on the effect that the amount of profits shifted through tax havens by MNE's has on product prices. This paper hypothesizes a negative correlation between Apple's avoided taxes and release prices of their consumer products. As Apple's avoided taxes increase, Apple's product prices should decrease. However, If this hypothesis is not corroborated by the findings of this paper, it will cast a strong shadow of doubt over the argument that less taxes levied on corporations will create more economic prosperity for society at large.

The release prices of Apple products are collected from Apple's product press releases and are adjusted for inflation in 2020 US dollars. The amount of taxes avoided by Apple is calculated using data on ASI's turnover between the years of 2005 and 2010, collected from a European Union Commission Decision report from 2017. This paper hypothesizes that Apple's product prices decrease as Apple's avoided taxes increase. The equation for this model is as follows:

$$ipodnanoprice = b0 + (b1)*(appleavoidedtaxesbillions) + (b2)*(adjustedgdptrillions) + (b3)*(appleavgstockprice) + e$$

In this regression model, b_0 is the constant, b_1 is the slope coefficient for taxes avoided by Apple, b_2 is the slope coefficient for US GDP, and b_3 is the slope coefficient for Apple's yearly average stock price. Lastly, e is our error term, as our constant and slope alone cannot guarantee an exact estimation on its own.

Results

A regression analysis was conducted to determine the impact of taxes avoided by Apple on the prices of Apple iPod Nano products between the years 2005 and 2010, with a control for yearly US GDP and Apple's yearly average stock price. The regression results are displayed in Table 7.

Table 7: Regression Data, Experiment 1

	Coefficient	t-value
Constant	388.389	6.244**
Apple Yearly Avoided Taxes (billions)	-2.245	-1.353
US Yearly GDP (trillions)	-14.644	-3.016*
Apple Average Yearly Stock Price	3.340	1.155
Adjusted R Squared	0.911*	

Note: *** means significant at 1% level, ** means significant at 5% level, * means significant at 10% level

With an Adjusted R Square of 0.911, our regression model finds that 91% of the change in Apple's yearly iPod Nano release prices can be explained by the amount of taxes avoided by Apple, adjusted yearly US GDP, and yearly average Apple stock price. The resulting equation is as follows:

$$\begin{aligned} ipodnanoprice = 388.39 + (-2.25)*(appleavoidedtaxesbillions) + (-14.64)*(adjustedgdptrillions) \\ + (3.34)*(appleavgstockprice) + e \end{aligned}$$

Where *ipodnanoprice* is the dependent variable iPod Nano adjusted release date prices, 388.39 is the constant, -2.25 is the slope coefficient for Apple's avoided taxes, *appleavoidedtaxesbillions* is the independent variable for Apple's avoided taxes in billions, -14.64 is the slope coefficient for adjusted US GDP, *adjustedgdptrillions* is the independent variable adjusted US GDP in trillions, 3.34 is the slope coefficient for Apple's yearly average stock price, *appleavgstockprice* is the independent variable Apple's yearly average stock price, and *e* is the error term.

Each coefficient represents the relationship between its independent variable and the dependent variable. In particular, iPod Nano prices decrease by \$2.25 for every \$1 billion increase in Apple's avoided taxes, holding all else constant. Additionally, iPod Nano prices decrease by \$14.64 for every \$1 trillion increase in US GDP. Lastly, iPod Nano prices increase by \$3.34 for every \$1 increase in Apple's yearly average stock price. These findings suggest a negative relationship between the amount of taxes dodged by Apple and the prices of Apple's consumer products. However, the coefficient for the independent variable of Apple's avoided taxes is not

statistically significant at the 99%, 95%, or 90% Confidence Level. As a result, this experiment is unable to support this paper's hypothesis that a decrease in Apple Inc's supply-side taxes lowers the equilibrium price of their goods, increasing economic surplus for both Apple and its consumers.

Considering that the iPod Nano is one of several products released by Apple, more data must be collected to truly determine the amount of economic surplus achieved by Apple's profit shifting. To remedy this, a second regression model was conducted between the independent variables, taxes avoided by Apple, yearly US GDP, Apple's yearly average stock price, and the new dependent variable, release date prices of Apple's iPhone products, adjusted for inflation. Table 8 lists the release date prices of iPhones from 2007 to 2011. Once again, only the cheapest and thus most accessible iPhone models will be surveyed. Table 9 represents the US GDP between the years 2007 and 2011⁵. Table 10 provides summary statistics for the independent variables, taxes avoided by Apple Inc between the years 2007 and 2011, yearly US GDP, yearly average Apple stock price, and the dependent variable, adjusted release prices of the iPhone between the years 2007 and 2011.

Table 8: iPhone Release Date Prices, 2007-2011

Year	Model	US Release Date Price (2020 USD)
2007	iPhone, 4GB	\$622.87
2008	iPhone 3G, 8GB	\$720.04
2009	iPhone 3GS, 16GB	\$722.62

⁵ data.worldbank.org

2010	iPhone 4, 16GB	\$710.95
2011	iPhone 4s, 16GB	\$746.73

Table 9: Adjusted US GDP, 2007-2011

Year	US GDP (2021 USD) (trillions)
2007	14.452
2008	14.713
2009	14.449
2010	14.992
2011	15.543

Table 10: Variable Summary, Dependent & Independent Variables

Variable	Observations	Mean	Standard Dev.	Minimum	Maximum
Taxes Avoided (Millions)	5	4.140	0.321	1.420	10.031
iPhone Release Prices	5	704.64	47.590	622.870	746.73
US GDP (2021 USD) (trillions)	5	14.830	0.457	14.449	15.543
Yearly Average Apple Stock Price (USD)	5	7.430	3.638	4.580	13.000

A regression analysis was conducted to determine the impact of taxes avoided by Apple on the prices of Apple iPhone products between the years 2005 and 2010, with a control for yearly US GDP and Apple's yearly average stock price. The regression results are displayed in Table 11.

Table 11: Regression Data, Experiment 2

	Coefficient	t-value
Constant	-2022.587	-0.753
Apple Yearly Avoided Taxes (billions)	45.205	1.604
US Yearly GDP (trillions)	205.112	195.971
Apple Average Yearly Stock Price	-88.523	-1.522
Adjusted R Squared	0.303	

Note: *** means significant at 1% level, ** means significant at 5% level, * means significant at 10% level

With an Adjusted R Square of 0.303, this regression model finds that 30% of the change in Apple's yearly iPod Nano release prices can be explained by the amount of taxes avoided by Apple, adjusted yearly US GDP. The resulting equation is as follows:

$$iphoneprice = (-2022.59) + (45.21)*(appleavoidedtaxesbillions) + (205.11)*(adjustedgdptrillions) + (-88.52)*(appleavgstockprice) + e$$

Where *iphoneprice* is the dependent variable iPhone adjusted release date prices, *-2022.59* is the constant, *45.21* is the slope coefficient for Apple's avoided taxes, *appleavoidedtaxesbillions* is the independent variable for Apple's avoided taxes in billions, *205.11* is the slope coefficient for adjusted US GDP, *adjustedgdptrillions* is the independent variable adjusted US GDP in trillions, *-88.52* is the slope coefficient for Apple's yearly average stock prices, *appleavgstockprice* is the independent variable Apple's yearly average stock price, and *e* is the error term.

In this second model, Apple's avoided taxes and US GDP have opposite impacts on yearly iPhone release prices than that of the first model. iPhone prices increase by \$45.21 for every \$1 billion increase in Apple's avoided taxes. Additionally, iPhone prices increase by \$205.11 for every \$1 trillion dollar increase in US GDP. Lastly, iPhone prices decrease by \$88.52 for every \$1 increase in Apple's yearly average stock price. These findings suggest a positive relationship between the amount of taxes dodged by Apple and the prices of Apple's consumer products. However, the coefficient for the independent variable of Apple's avoided taxes is not statistically significant at the 99%, 95%, or 90% Confidence Level. As a result, this experiment is unable to support this paper's hypothesis that a decrease in Apple Inc's supply-side taxes lowers the equilibrium price of their goods, increasing economic surplus for both Apple and its consumers.

Limitations

This paper aimed to measure whether Apple's profit-shifting results in lower prices for Apple's consumer products. This was done to test the microeconomic theory that a decrease in supply-side taxes shifts the demand curve to the right, resulting in a lower equilibrium price and a greater economic surplus. This study is hindered by the fact that Apple is known for their many products, from phones to mp3 players, to computer hardware. It would be difficult to track each of Apple's major consumer products, as their prices fluctuate from year to year, and many if not all their products were not released on a year-to-year basis between the years of 2003 and 2011. Thus, this study was unable to fully compare Apple's avoided taxes to the average prices of their consumer products from year to year.

When conducting this study, one must also consider other factors that influence price fluctuation of Apple's consumer products. For example, Apple is known for their enterprising, and usually releases new products with new, innovative features. These innovations may be able to account for any particular spikes in product prices over the year. Additionally, it would be difficult for this study to quantify how much innovation can account for price fluctuations. While this paper aimed to remedy this issue by controlling for Apple's stock prices, this proxy variable is far from a perfect method of factoring for product innovation.

This paper investigates whether consumers receive the economic surplus of Apple's tax havens through a lower cost of Apple's consumer products. However, the tax laws that allow MNE's to pursue tax havens may have benefits that are unable to be examined within the scope of this paper. The benefits of Apple's tax havens, for example, may have allowed for the MNE to expand into new markets within other countries. This being said, while Apple's consumer's

products may not have received major price decreases through lower taxes, they would still be made available to more consumers across the world, which would be a benefit to consumers who were once unable to purchase these products due to their city, state, or country of residence. Additionally, Apple's avoiding taxes may allow for higher wages in certain sectors of their industry. These factors, however, are unable to be measured within the scope of this paper.

In order to find further evidence that Apple's tax avoidance leads to greater economic surplus, this paper conducted a second experiment which replaced the dependent variable of iPod Nano prices with the new dependent variable iPhone prices. Nevertheless, within both experiments the independent variable of Apple's avoided taxes lacked statistical significance at the 99%, 95%, or 90% Confidence Level. This can be attributed to the fact that both experiments were conducted with a very small sample size. Because Apple does not release any of their products on both a yearly basis and within an adequately long time span, the independent variable of Apple's avoided taxes cannot be experimented on within a wide-enough range of variables for statistically significant results.

Conclusion

This paper sought to determine whether an increase in Apple's avoided taxes correlated with a decrease in Apple's consumer products. After running a regression model between the independent variable, Apple's avoided taxes, and the dependent variable, iPod Nano prices between the years of 2005 and 2010, a negative correlation was found between the two variables. On its own, this study suggests that a decrease in supply-side taxes shifts Apple's supply curve to the right, both decreasing market prices of their products and increasing economic surplus.

After a second study examining the correlation between the independent variable, Apple's avoided taxes, and the dependent variable, iPhone prices between the years 2007 and 2011, There was a positive correlation between the two variables. On its own, this second study suggests that a decrease in Apple's supply-side taxes did not significantly shift Apple's supply curve to the right, failing to decrease market price and increase economic surplus. The two experiments provided opposing results. However, both experiments saw the coefficient for Apple's avoided taxes failing to reach statistical significance at the 99%, 95%, or 90% Confidence Level. Thus, these findings were unable to prove that Apple's avoided taxes have a significant effect on Apple's product prices, and both experiments are unable to support this paper's hypothesis that a decrease in Apple Inc's supply-side taxes lowers the equilibrium price of their goods, increasing economic surplus for both Apple and its consumers.

Both experiments suffered from a degrees of freedom problem, as Experiment 1 had only 6 observations, Experiment 2 had only 5 observations, and both experiments had only 3 independent variables. This paper's results may nevertheless point to a trend that would have been further supported had more observations been made available to both experiments. More experiments must be conducted on MNE's to explore whether their tax avoidance using tax havens results in lower consumer product prices and greater economic surplus. To remedy the degrees of freedom problem faced by this paper, future experiments must explore MNE's with consumer products that release on a yearly basis and for a far longer time frame than that observed within this paper. More and adequately relevant independent variables must be identified as well.

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