INCOME SHIFTING AMONG OPTION INTENSIVE FIRMS IN THE 1990'S

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One way a multinational corporation can further satisfy its primary objective, which is to maximize shareholder wealth, is to minimize the share of its income that is transferred through taxation to the various sovereign nations within which it does business. The profit maximizing firm attempts to maximize (minimize) taxable income in those jurisdictions where income tax burdens are the least (most) in such a way as to diminish the present value of its global total tax burden.

While the US corporate income tax rate has remained relatively stable over the decades since most US income tax rates were last slashed as part of the Tax Reform Act of 1986, across the rest of the world, non-US corporate income tax rates have continued to fall. Even though the US statutory rate was among the lowest corporate income tax rates of any industrialized nation in 1988, by 2008, due to continuing rate decreases around the globe the US rate had become one of the highest corporate income tax rates amongst the G-8. In April of 2012, the US statutory rate as applied to corporate income became the highest among all the Organization for Cooperation and Economic Development (OECD) countries.

This study will examine the behavior of option intensive corporations during the late 1990's. Coinciding with the longest recorded economic expansion in the history of the United States and coupled with the so-called "internet bubble" during the second half of

the decade, this period of rapid stock price appreciation was also a time when many highly profitable companies faced substantially lower current US tax liabilities due to the large tax deductions resulting from the employee exercise of increasing quantities of non-qualified stock options at substantial gains. Enormous tax losses reported by employee stock option granting firms were sufficient to eliminate not only current US corporate income tax liabilities but also several years of future tax liabilities for some firms. Previous research has documented an increasing proportion of US multinational corporate income recognized in foreign jurisdictions, thereby escaping the relatively high US corporate tax rates until the foreign profits are repatriated back into the US.

Perhaps US corporate income tax rates are so high in comparison to equally suitable substitute foreign locations that many firms have relocated their income producing activities to lower taxed jurisdictions abroad. Or it may be that US multinational firms engage in various cross border income shifting techniques to avoid high US corporate income tax rates and reduce their overall global tax burden. Profitable option intensive firms in the late 1990's faced in effect lower US corporate income tax rates due to their extensive employee stock option deductions and resulting net operating loss carry-forwards. It is possible that these firms had more incentive to recognize income domestically than their non-option intensive corporate peers.

Using a sample of the largest US firms comprising the NASDAQ-100 index on May 31, 2001, this study found evidence of higher US profitability among NASDAQ-100 multinational firms with the largest deductions resulting from the exercise of options by their employees during the 1997 – 2000 fiscal years suggesting that these firms where more likely to recognize or even generate income within US borders when facing

effectively lower US corporate income tax rates. Such an observation has potential public policy implications and contributes to the literature on tax motivated income shifting behavior.

DEDICATION

I dedicate this work to the memory of Dr. James B. “Jim” King, II (1944-2004) dear friend, trusted guide and advocate throughout my academic career. His continuous encouragement even near the very end of his battle for life formed my inspiration to never give up no matter what life handed to me or my family during the PhD program. I will spend my academic career in part hoping to pay off the debt of love and gratitude I owe to him. It is my prayer, Jim that you are pleased with my work and proud of who I’ve become during the process.

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Without the continuous encouragement and support from my family and wife in addition to the guidance I received from my committee members and support I depended on from the School of Accountancy, I would never have completed my dissertation.

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CHAPTER 1

INTRODUCTION

"Why did the corporate chicken cross the border? Because taxes were lower on the other side." -- Actual bad joke once told in my undergraduate tax course.

Traditionally the chief purpose of a corporation is to maximize shareholder wealth subject to ethical constraints. Whatever portion of corporate income is paid to the government in the form of taxes would seem to defeat that wealth maximizing purpose by transmuting corporate wealth into sovereign tax revenues. Can a corporation maximize wealth for its shareholders by minimizing its global tax burden? Perhaps by following that chicken across the national border? C*aeteris paribus* even the most patriotic All-American chicken, would likely find its wealth maximizing purpose best served by crossing the US border into just about any industrialized foreign country around the globe to reduce its tax burden and thereby increase after-tax income. April 1, 2012 was the effective date of a Japanese corporate tax rate reduction, which left the United States at the very top of developed nations in terms of the greatest tax burden levied upon corporate income.[1]

The United States not only failed to participate in the global corporate tax competition but also came in dead last as a result. The global tax race resembled a race to the bottom over the past 30 years as country after country has lowered its

[1] Joseph Mason, "World's Highest Corporate Tax Rate Hurts U.S Economically," *U.S. News & World Report*(2012), http://www.usnews.com/opinion/blogs/economic-intelligence/2012/04/02/worlds-highest-corporate-tax-rate-hurts-us-economically.

corporate tax rate (Whalley, 1990; Klassen, Lang and Wolfson, 1993; Devereux, Lockwood and Redoano, 2008), while the US has left corporate tax rates essentially unchanged since the last corporate income tax rate cut in 1986.[2] Those cuts, part of the Tax Reform Act of 1986 (TRA 1986), reduced the US corporate income tax rate by 50% and made the US corporate income tax rate the lowest rate amongst the industrialized nations. In fact, by the time these corporate income tax rate reductions became fully effective in 1988, the US Corporate income tax rate was 12 percent lower than the average corporate income tax rate for the G-7[3]. In the years since TRA 1986, other developed countries have further reduced their corporate tax rates to levels even lower than those in the US, eliminating the competitive advantage to domestically sourced income.

Tax avoidance within the bounds of law is as ethical as it is universal. A 1934 opinion by Judge Learned Hand contained the following passage, "Anyone may arrange his affairs so that his taxes shall be as low as possible; he is not bound to choose the pattern which best pays the treasury. There is not even a patriotic duty to increase one's taxes. Over and over again the Courts have said there is nothing sinister in so arranging affairs as to keep taxes as low as possible. Everyone does it, rich and poor alike and all do right, for nobody owes any public duty to pay more than the law demands."[4] When it has been cost effective to do so, both corporate and individual taxpayers have simply relocated to avoid high tax rates. In 2007 the state of Maryland

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[2] The only change to the US corporate tax rates since TRA1986 has been a one percentage point *increase* in 1993 (Miller and Kim, 2008).

[3] Liveris, A. N. (2011). Make It In America: The Case for Re-Inventing the Economy. Hoboken, New Jersey, John Wiley & Sons, Inc.

[4] Judge Learned Hand, Gregory v. Helvering 69 F.2d 809, 810 (2d Cir. 1934).

introduced a new millionaire's tax which increased to 6 ½% the marginal income tax rate on annual incomes exceeding $1 million. According to a CNBC article, that tax rate increase resulted in a $1.7 billion reduction in state tax revenues as some of Maryland's most affluent counties experienced population declines.[5] Apparently, at least in part, millionaires left the state for more tax friendly US locales as Maryland experienced a net population decline of 31,000 over the remainder of the decade following this tax increase.[6] In 2011, the State of Illinois enacted a 45% corporate tax rate increase[7] which prompted Indiana and Wisconsin to organize their own independent campaigns intended to persuade businesses to relocate from Illinois to either Indiana or Wisconsin and by doing so avoid higher Illinois state taxes[8]. These campaigns appear to have been effective. By the summer of 2012, at least 17 companies had plans to move out of Illinois into Wisconsin or Indiana according to Wisconsin and Indiana Economic Development Corporations[9]. Clearly some taxpayers will act to reduce their tax burdens as the opportunity arises when perceived benefits outweigh perceived costs.

One notable feature of the United States tax system is its imposition of tax upon the worldwide income of domestic multinational corporations. Under such a global tax system, however, does it make a difference in which nation the income of a US multinational corporation is earned, particularly from the standpoint of its US tax liability? At first glance, this global approach to US taxation might seem to make the

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[5] Robert Frank, "In Maryland, Higher Taxes Chase Out Rich: Study," (2012), http://www.cnbc.com/id/48120446/In_Maryland_Higher_Taxes_Chase_Out_Rich_Study.

[6] ibid.

[7] Douglas Belkin, Lauren Etter, and Ilan Brat, "Illinois Braces for Tax Increases," *Wall Street Journal*, January 13, 2011.

[8] Sean F. Driscoll, "Rockford Falls Prey to Wisconisn Luring from Across the Border," *Rockford Register Star*, June 23, 2012.

[9] Ibid.

whole conversation on cross border income shifting appear moot. This is not the case. The income earned by a foreign subsidiary of a US corporation is not subject to US tax in most cases until repatriated back into the United States.[10] At that point a US corporation which repatriates foreign subsidiary dividend income is liable for the full amount of US income tax due on the repatriated foreign income less a credit for foreign income taxes paid subject to various limits (Abrishami, 2005). Repatriation of foreign sourced income back to the United States is not mandated by law, and some of the foreign sourced income earned by US multinational corporations is apparently never repatriated nor taxed at the difference between the foreign and generally higher US income tax rates (Fritz, Hartzell, Titman and Twite, 2007). Even if additional US corporate income taxes are only deferred for a number of years, from a present value standpoint the value of deferral can represent a substantial reduction in overall tax expense compared to immediate repatriation or merely earning profits within the US (Yang & Jeffers, 2008). When politicians and pundits refer to tax breaks which encourage US corporations to outsource jobs or relocate manufacturing operations overseas, I suspect it is in reality this indefinite US tax deferral on most foreign sourced income earned by domestic multinational corporations to which they refer.

Unlike millionaires emigrating from high tax states or firms relocating across state borders, a US multinational corporation does not necessarily have to close up shop and fire all its employees only to begin anew within the borders of some foreign tax haven to effect an overall minimization of their global corporate tax burden--although this is not entirely unheard of. Companies have a large variety of alternative tools with which to

[10] I.R.C. §862(a)

avoid paying the highest corporate tax rates and lower global tax burdens. Some of these methods simply "shift" taxable corporate income recognized by a US multinational corporation from higher taxed into lower taxed nations. A company may attempt to maximize (minimize) its revenue and/or minimize (maximize) expenses such as cost of goods sold within low (high) tax countries through strategic transfer pricing policies. Many of these tax motivated transfer pricing strategies are considered "abusive" by the United States Treasury. The Internal Revenue Service has considerable statutory latitude to prevent tax evasion under Internal Revenue Code (IRC) § 482 and the corresponding Treasury Regulations which govern transfer pricing between related parties. Nevertheless, the IRS efforts under § 482 are problematic and often ineffective. Although GlaxoSmithKline in 2006 did agree to pay a $3.4 billion IRS settlement over a transfer pricing dispute, the largest corporate tax settlement in US history (Solomon, 2007), it was reported by the IRS that estimated tax revenue losses due to abusive transfer pricing of $11.2 billion occurred between 1996-1998 (IRS, 1999). A subsequent report by the US Treasury just two years later described transfer pricing abuses resulting in estimated lost tax revenue of $53 billion for the year 2001 alone (Milbourne, 2004). Other researchers further conclude that IRS efforts to combat abusive transfer pricing have become largely and increasingly ineffective, perhaps beginning in as early as the 1990's (Sullivan, 2008; Kleinbard, 2011; Grubert, 2012).

US Multinational corporations also manage the relative amounts of revenues and expenses recognized in domestic vs. foreign jurisdictions by tactically manipulating cross border royalty payments to, from and between foreign subsidiaries (Collins and Shackelford, 1998), or via cost sharing agreements between affiliated multinational

members of a controlled group (Kleinbard, 2011) or also by increasing the investment in or utilization of assets in higher taxed countries so as to maximize the tax benefit of depreciation or amortization deductions (Harris, 1993). Additionally, despite interest allocation rules for multinational corporations under US tax law, tax motivated placement of new debt instruments can still locate interest deductions wherever they result in optimal tax benefits for the borrowing corporation (Newberry and Dhaliwal, 2001). This non-exhaustive listing of income shifting devices to avoid taxes is in addition to the in-exhaustible variety of methods in which firms evade taxes through ever plentiful tax shelter arrangements such as foreign LILO's (lease in lease out contracts) and numerous basis shifting transactions to name only two (Young, 2004) out of the many thousands of IRS listed and reportable transactions according to the Government Accountability Office (GAO, 2011). Evermore creative strategies to minimize global taxes proliferate as fast as tax practitioners can dream them up and ostensibly even faster than they can be uncovered by the IRS (Young, 2004).

Does the current US tax system generate and collect revenues efficiently? The efficacy of US tax law, in particular income tax law, may provide a lifetime of research questions to study. What makes a provision of tax law effective? By one definition, a tax law should in fact accomplish its stated objectives, yet achieve them with an acceptable level of undesirable side effects (Feldstein, 1999).

I can no longer remember when I first heard this oft repeated truism, "When the government imposes a tax on something, society gets less of it." For example, if the excise tax on alcohol and cigarettes is viewed as an attempt by government to discourage the use of these two hazardous yet legal consumer products, it could then

be established that these excise taxes contribute to the decline of tobacco and alcohol use within the US over time as the excise tax burden has increased. However, higher cigarette taxes have also resulted in increased smuggling to avoid the tax, according to a June 2012 CNN report[11]. Other undesirable side effects include unacceptably large amounts of excise tax paid by low income smokers whose behavior, according to research, is largely unaffected by increased cigarette taxes and who in New York State spent a crushing average of 23.6% of family income on cigarettes, up from 11.4% over a period of eight years according to a 2012 New York Post article[12].

Despite the fact there are politicians who view income taxes as a method of wealth redistribution between citizens; the primary purpose of an income tax is to generate government revenue. Unlike an excise tax on alcohol or cigarettes, the primary purpose of an income tax is not to discourage income production. Corporations are taxed, but it is not in the public interest to have fewer or uniformly smaller corporations. In addition to generating income tax revenues for the Treasury, profitable corporations employ workers and contribute to economic growth. If a corporate income tax rate is so high as to reduce corporate tax revenues by discouraging corporate investment, suppressing economic growth or distorting economic incentives, or by causing economic deadweight costs or other negative consequences which outweigh the benefit of the tax revenues generated, then that corporate income tax rate is inefficient (Feldstein, 1995). John Maynard Keynes noted this idea of tax efficacy with the eloquent language typical of his day, “Nor should the argument seem strange that

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[11] Harriet A. Washington, "Ethicist: Health Bans and 'Sin Taxes' Can Easily Backfire," (2012), http://www.cnn.com/2012/06/08/health/ethicist-public-health-initiatives/index.html.

[12] Patrick Basham and John Luik, "The Great Cigarette-Tax Lie," *New York Post*, October 8 2012.

taxation may be so high as to defeat its object, and that, given sufficient time to gather the fruits, a reduction of taxation will run a better chance, than an increase, of balancing the budget. For to take the opposite view today is to resemble a manufacturer who, running at a loss, decides to raise his price, and when his declining sales increase the loss, wrapping himself in the rectitude of plain arithmetic, decides that prudence requires him to raise the price still more;—and who, when at last his account is balanced with naught on both sides, is still found righteously declaring that it would have been the act of a gambler to reduce the price when you were already making a loss."[13] As statutory income tax rates increase, the revenues generated by the tax may actually decline, as was a consequence of the Maryland millionaire's tax.

US multinational corporations, subject to the highest tax rates in the developed world domestically seem disposed to reducing their overall global tax burdens by recognizing income in low tax countries whenever these firms are properly positioned so as to make cross border income shifting possible as well as feasible particularly from the cost-benefit standpoint. Is the US statutory tax rate on corporate income too high in comparison to those statutory rates in place throughout the rest of the developed nations, resulting in multinational corporations working to avoid or at least postpone the payment of US taxes by transferring income abroad? Might US multinational corporations respond to lower US corporate tax rates by refraining from shifting income out of the US or even by shifting foreign income to the US? These are merely two forms of the same basic research question this study will investigate.

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13 John Maynard Keynes, "The Means to Prosperity," (London: Macmillan, 1933; reprint, January 14, 2008).

It may be possible to predict the outcome of a statutory reduction in US corporate income tax rates by investigating firms that make extensive use of non-qualified employee stock options (ESO's). These firms often receive large compensation deductions against taxable income when their ESO's are exercised to buy shares below the current market price, which effectively reduces the rate of tax paid on its corporate income. If these option intensive firms are found to recognize a higher proportion of their global income in the US while non-option intensive profitable firms facing the full statutory corporate income tax rate are recognizing an increasingly larger proportion of their income abroad, then it may be possible to draw the conclusion that US corporate tax rates have become so high relative to foreign OECD corporate income tax rates as to impede US corporate tax revenue collection or even reduce domestic economic growth.

This research fits within the stream of cross boarder income shifting literature extending the research stream by examining conditions which might reverse the direction of the river of income presently flowing out and away from the US. By taking a novel approach to modeling hypothetical tax rate reductions using a proxy variable representing reduced rates of statutory corporate income tax, it is my hope for this study to make an incremental yet somewhat unique contribution to the existing literature on tax motivated income shifting and to contribute to the bourgeoning public policy debate over the direction of any future changes to US corporate tax rates.

The remainder of the dissertation is to be organized as follows: Chapter 2 will review relevant literature, develop a research model and present testable hypotheses; Chapter 3 will outline research methodology, define study variables and finally discuss

statistical methods used in hypothesis testing; Chapter 4 will discuss sample selection, data collection and present descriptive sample statistics; Chapter 5 will present the results of data analysis and empirical testing; then lastly, Chapter 6 will contain a discussion of conclusions and implications from this research including areas for future study.

CHAPTER 2

LITERATURE REVIEW AND HYPOTHESES

"Do Taxes Matter? If Not, Why Not? If So, How Much?"[14]

BOOK-TAX INCOME GAP

A simple model of rational economic behavior predicts tax avoidance behavior when the expected benefits of avoidance exceed the expected costs (Book, 2007). There is evidence that corporate tax avoidance was on the rise in the US during the decade of the 1990's (Plesko, 2004; Desai, 2003). The February 2000 Economic Report of the President reported that annual US aggregate corporate income grew 113% between 1990 and 1999, while over the same period US corporate tax receipts increased by only 71%.[15] Over the later part of the decade, 1996-1999 saw pre-tax corporate profits rise over 23% while corporate tax receipts grew much more slowly, increasing only 7.7% (McIntyre and Nguyen, 2000). US corporate tax revenues as a share of gross domestic product (GDP) at 1.9% trailed the 2.8% proportion collected on average by non-US members of the Organization of Economic Cooperation and Development (OECD) (Keightley and Sherlock, 2012). This was despite a US corporate tax rate which was the second highest within the OECD, the weighted average corporate tax rate for non-US OECD countries was more than 7% lower than the US

[14] (Shackelford and Shevlin, 2001; Scholes, Wolfson, Erickson and Maydew, 2005)
[15] Economic Report of the President, Table B-26, page 337.

corporate tax rate of 35% in 2009[16]. Each of these comparative measures suggests mounting deterioration of the US corporate income tax base over the past two decades.

Broadly, three streams of research contribute to an explanation of corporate tax revenues which make up a declining share of a growing base of corporate pre-tax income. Three principal causes for the growing book-tax income difference result from both government studies and peer-reviewed academic research include first, a growing pervasiveness of corporate tax shelters; second, increased income shifting by multinational corporations to reduce taxes and third, the expanding practice of granting non-qualified stock option plans as employee compensation.

TAX SHELTERS

The U.S. Treasury issued a report in 1999 on the growth of corporate tax shelters believed to contribute to the divergence between corporate book and tax income (Treasury, 1999). The 1999 Treasury report is consistent with academic research finding evidence of increasing corporate tax evasion through the use of various reportable transactions to shield corporate income from tax (Mills, Newberry and Tautman, 2002; Desai, 2003; Plesko, 1999). The archival stream of academic research on abusive tax sheltering activity is somewhat thinner than other research streams examining components of the divergence between corporate book income and tax income in part due to the difficulty in obtaining firm level data which often includes IRS tax-return data accessible only under special IRS agreement. In addition, the further difficulty of even conceptualizing corporate tax avoidance makes measurement of its

[16] "The President's Framework for Business Tax Reform," (The White House and Department of the Treasury, 2012).

magnitude imprecise and even subjective (Slemrod, 2004b). Not all corporate tax shelters are explicitly illegal and there exists no way to distinguish with clarity between tax avoidance which is generally legal and tax evasion which is illegal. Any line drawn between the criminal and the aggressive must be drawn through grey area of indeterminate width within which lawyers argue and courts ultimately decide.

As new tax shelters are created and implemented, the IRS works to discover and identify each new abusive tax shelter to become one of the thousands of reportable transactions listed by the IRS as belonging to the type requiring disclosure and subjecting the corporate taxpayer to elevated scrutiny and the likely denial of any tax benefits received. Yet in spite of reduced US corporate tax rates within TRA 1986, tax shelters have grown more attractive to many corporations as the transaction costs associated with tax shelters have declined along with the expected value of possible tax penalties, the risk of facing an IRS audit having fallen precipitously (Treasury, 1999).

At first glance evidence on the growth of corporate tax shelters could lead to the conclusion that corporate tax sheltering activity has been on the increase for many years. The “tax gap” estimate of taxpayer non-compliance, which includes explicitly illegal forms of tax evasion, while increasing in absolute dollars has nevertheless, remained a constant percentage of the estimated total taxes legally due. Estimates of the annual difference between total taxes due under applicable statutes compared to the dollars actually paid increased between 2001 and 2006 according to Treasury estimates from $345 billion to $450 Billion (Slemrod, 2007; Mazur and Plumley, 2007) while the expected percentage of tax compliance had remained statistically unchanged at about 83% in both 2001 and 2006 (Treasury, 1999). In fact, the percentage estimate

of taxpayer compliance has remained relatively stable since 1973 when the tax gap statistics were first published and the proportion of tax compliance also stood at about 83% (Treasury, 1988). As an aside, it is interesting to find that IRS estimates of tax non-compliance specifically exclude the types of illegal activities which comprise a considerable proportion of the US underground economy including for example drug dealing, prostitution, illegal gambling.

INCOME SHIFTING

Other research has addressed cross border income shifting since the US tax rate reductions in TRA 1986. Foreign operations as a proportion of total activity by US multinational firms have increased since the mid 1990's (Grubert, 2012; Sullivan, 2008; Bauman and Schadewald, 2001). Even more striking than increased globalization on the part of US businesses is the even greater proportion of worldwide income that is reported to have been earned outside the US by these companies (Grubert, 2012). The share of worldwide income earned abroad has been growing among US multinational corporations since at least 1996 growing disproportionately larger than related expansion of foreign business activity or increased foreign sales reported by multinational firms since 1996 (Sullivan, 2008). Studies of income shifting using cross sections of aggregate national level data to test for evidence of income shifting by US multinational corporations consistently report evidence of income shifting to reduce global tax burdens. Bureau of Labor Statistics data on cross border trade between 54 countries over the period 1997-1999 was examined to find a statistical relationship between a countries relatively lower tax rate which was associated with less volatility in export transfer prices; export prices which were found to be significantly lower than

similar export price levels between unrelated parties (Clausing, 2003). An analysis of manufacturing industry data for 1979-1997 within 22 OECD countries found significant evidence of cross border income shifting in response to changing national average tax rates. The authors estimated that as much as 65% of the potential increased revenue resulting from a tax increase is subsequently lost due to income shifting (Bartelsman and Beetsma, 2001). Another study of multinational export prices from 2006 using US Customs data taken from documents tracking US export transactions for an eight year period beginning in 1993 found that intrafirm export transfer prices were more than 50% lower on average than similar prices charged by the same firm to unrelated parties (Bernard, Jensen and Schott, 2006) consistent with the results found by Clausing (2003). In addition, Bernard, Jensen and Schott (2006) found a negative relationship between the destination countries income tax rate and the reduction in price levels between related firms. Companies were also found to reduce intrafirm prices in response to increase import tariffs. It is estimated based on this research that transfer price manipulation by US multinational firms in 2004 cost the US Treasury as much as $5.5 billion in corporate income tax revenue (Bernard, Jensen and Schott, 2006). Taken together, these studies of national level data show consistent evidence of international income shifting out of the US through transfer price manipulation to reduce US tax burdens on global income.

The evidence of tax motivated income shifting resulting from the analysis of firm level data provides less consistent evidence of the incidence of income shifting behavior vs. the national level data among US multinational firms but does allow for certain conclusions to be drawn concerning the specific mechanisms employed by multinational

corporations to shift income into lower taxed foreign countries and minimize their US tax liabilities.

Using actual corporate tax return data, it is estimated that in 1988 US manufacturing firms shifted $7.7 in income before taxes to their foreign subsidiaries using a model that assumes equal rates of after-tax return amongst affiliated members of a US consolidated group (Rousslang, 1997). Two research papers in 1993 found evidence of tax induced income shifting in the years immediately following TRA 1986 (Harris, 1993; and Klassen, Lang and Wolfson, 1993). Harris (1993) made comparisons of international firms to purely domestic firms in terms of tax expense and pretax income. Klassen, Lang and Wolfson (1993) examined changes in foreign and domestic income subject to tax to conclude that multinational firms participated in tax motivated income shifting. In the years immediately following the US corporate rate reductions of TRA 1986, as the US was the low tax jurisdiction among developed nations, it is not surprising to find much of the income shifting evidence for the remainder of the decade of the 1980's pointing to US multinational corporations shifting income into the US to take advantage of relatively low corporate income tax rates among developed nations subsequent to TRA 1986. Due in part to a 2 year phase in of the new lower tax rates beginning in 1987 combined with the creation of the Alternative Minimum Tax (AMT) regime within TRA 1986, alternative explanations for the results presented in 1993 by these two post TRA 1986 studies cause their evidence of income shifting to seem inconclusive (Shackelford, 1993). In 1996, however by examining worldwide tax burdens and difference in reported profitability between domestic and foreign corporations more reliable evidence of post TRA 1986 income shifting is found among

firms exhibiting higher volumes of intrafirm cross border transfers in two samples of firm data covering two years each beginning in 1982 and 1988. The author chooses these two periods around but not including the passage and implementation of the tax law changes in TRA 1986 (Jacob, 1996), improving upon the quality of conclusions made about post TRA 1986 income shifting evidence drawn from the earlier inconclusive 1993 research. Taken together, the results of these studies of both national level and firm level data present relatively strong evidence from which to conclude that US multinational firms shift income across national borders motivated by the desire to reduce overall global tax burdens. The remainder of the income shifting literature reviewed herein attempt primarily to descriptively analyze common attributes of income shifting firms while presenting evidence of other income shifting methods in addition to tax motivated transfer price management which may also enable US multinational firms to avoid recognizing income in those nations with relatively high corporate tax burdens.

By replicating the Jacob (1996) study after hand collecting much of the missing information within the sample of firm year observations drawn from Compustat data, researchers were able narrow the prevalence of post TRA 1986 tax motivated income shifting to the top eight sample deciles determined by firm size (Conover and Nicoles, 2000). This firm size effect has been documented in other income shifting research (Rego, 2003; Klassen, Lang and Wolfson, 1993) along with a transactional volume effect (Grubert, 2003; Clausing, 2003; Bartelsman and Beetsma, 2001) which suggest economies of scale which make possible increased tax motivated income shifting.

Other research that examines income shifting using methods other than cross border income shifting has found evidence of income shifting increasing along with

measures of “firm flexibility” according to Harris (1999). So called highly flexible firms must have sufficient expenses such as advertising or interest which can be relocated to alternate tax jurisdictions without prohibitive transaction costs. Research in 2001 found that tax incentives influenced the location of interest deductions as a mechanism of income shifting to lower global tax burdens (Newberry and Dhaliwal, 2001). Evidence has been found pointing to income shifting through the manipulation of interest payments as well as dividend and royalty payments between members of an affiliated group for the use of intangibles (Collins and Shackelford, 1998). In related research involving intangibles, Grubert (2003) found that corporate tax rates at the high and low extremes of the global distribution had a tendency to attract manufacturing firms with large research and development expenditures. His results suggest that either very high or very low tax jurisdictions are attractive to these firms because a large volume of transactions involving research and development allows firms to mitigate high tax rates or increase the benefits of low tax rates through income shifting (Grubert, 2003). Multinational firms with deferred tax assets in the form of net operating losses carry forwards are also demonstrate greater flexibility with a propensity to shift income and recognize within the US a larger share of worldwide earnings (Newberry and Dhaliwal, 2001). Finally, it is possible to recognize more income within a lower taxed country by what is termed “real” income shifting (Clausing, 2009). In this study, Clausing (2009) attempts to separate “financial” income shifting which involves primarily the pricing of certain transactions between affiliated group members from “real” income shifting.

Both tax motivated transfer pricing and tax motivated manipulation of the location of and rents charged for the use of intangible assets or on interest payments on loans

made to affiliate members within a multinational consolidated group are examples of financial income shifting while for this study, so called “real” income shifting involves relocating the actual productive activity of a US multinational corporation to a lower taxed international jurisdiction (Clausing, 2009). To operationalize “real” income shifting, changes in the scale of employment within national borders serves as a proxy for the differences in overall scale of “real” operations within national borders. Since “real” operations are not as flexible in terms of the ease to which they can be relocated with low transactional costs between countries to facilitate cross border income shifting, it is not at all unexpected that measures of “real” income shifting were related far less significantly to cross sectional variances in national tax rates than were measures of “financial” income shifting measures which exhibited a much higher sensitivity to multinational tax rates. The income shifting literature points to the existence of widespread cross border income shifting motivated by opportunities to reap substantial financial benefits which accrue to income recognized outside the US. These benefits have grown larger as function of corporate tax rate differentials between the US and the other OECD nations, tax rates which have incrementally and increasingly diverged over the past two decades. At the same time, a variety of factors have resulted in declining transactional costs and reduced risks of penalties associated with income shifting intended to reduce corporate tax payments. Once again the empirical evidence for income shifting is consistent with a simple model of rational economic behavior on the part of multinational corporations that are wealth maximizing tax minimizers to the degree that opportunities exist to engage in tax motivated income shifting where the expected savings from both a reduction in global tax liability and lower present value

cost of taxes deferred over an essentially unlimited period of time proceeding repatriation back to the US which continue to exceed the expected value of all costs both explicit and implicit attributable to income shifting across national borders.

The tax cost to repatriate foreign income back to the US has steadily increased as foreign corporate income tax rates have declined relative to US rates over the preceding two decades, ignoring any temporary reduction in the cost foreign income repatriation resulting from the limited availability of any tax holidays. Therefore the tax competition which continues to occur between developed countries, coupled with the growing levels of income shifting by US multinational firms seeking to benefit from lower foreign tax rates is the likely cause of evidence that firms to avoid the high tax cost of earnings repatriation by maintaining large overseas accumulations of cash on their corporate balance sheets (Foley, Hartzell, Titman and Twite, 2007). This conclusion is based on their investigation of cash holdings within a sample of nearly 35,000 observations on firms with $100 million in total assets over the years 1982-2004 which limited to US corporations outside of the regulated utilities and financial services industries. The extent of foreign cash holdings representative of US multinational income that has not been repatriated and thus not subject to US tax on worldwide corporate income further contributing to the eroding US corporate tax base and contributing to the evidence supporting a theory that US corporate tax rates are so high in comparison to non-US OECD nations that the corporate income tax at current rates is inefficient both in terms of distorted economic incentives as evidenced by the disproportionately large foreign cash holdings by US multinational firms and in terms of the ability of the US corporate income to generate income evidenced by falling

corporate tax receipts during a period of growth in corporate pretax income at a time the US has among the highest tax rates on corporate income relative to other developed nations.

NON-QUALIFIED STOCK OPTIONS

The final research stream which contributes to the understanding of aggregate growth rates for corporate pre-tax income far in excess of the rate of growth in aggregate corporate taxable income since at least the mid-1990s relates to the tax treatment of nonqualified employee stock options, the use of which began to explode in the mid-90s, concurrent with the beginning of these dramatic increases observed in the gap between corporate book income and reported corporate taxable income. Researching these nonqualified options provided evidence documenting the extent to which many firms have reduced, or even eliminated their entire tax liabilities as a result of deductions relating to the exercise of nonqualified stock options by their corporate employees (Hanlon and Shevlin, 2002; Graham, Lang and Shackelford, 2004). The estimated tax benefit of tax deductions resulting from the recognized gains by employee option holders upon exercise grew over 100% from $27.6 billion to $56.4 billion annually over the years 1998 to 2000 (Sullivan, 2002) representing not only the growth of stock option compensation which saw a rise in the number of employees receiving compensation partially in the form of stock options beginning early in the decade of the 1990's with approximately one million employee stock options recipients while approximately 7-10 million corporate employees were granted these non-qualified options by early in the first decade of the 21st century. These millions of additional employee stock options recipients, by the early 2000's were growing to encompass a

more diverse collection of employees beyond just the members of upper management (Sullivan, 2000). Subsequent research in this area found evidence that the tax benefits of options exercise were of sufficient magnitude to influence the optimal capital structure[17] among firms which exhibited the most extensive use of employee stock options during the latter part of the decade of the 1990's.

[17] The theory of optimal capital structure has a long history beginning with seminal research in 1958 and 1961by Modigliani and Miller. The theory posits the existence of an optimal capital structure which includes debt at levels sufficient to result in equilibrium between the tax benefits of deductible interest payments upon corporate debt and the costs associated with the risks of increased leverage.

CHAPTER 3

MODEL AND HYPOTHESIS DEVELOPMENT

It is likely that companies substitute between debt and other tax shields such as amortization and depreciation or investment tax credits as the firm seeks its optimal capital structure (DeAngelo and Masulis, 1980). Graham, Lang and Schackelford (2004) find evidence that non-qualified stock options do act as a substitute tax shield in place of debt, which may offers an explanation for the perplexing case of very large profitable US firms which contain little or no debt within their capital structures. While there may be substitution between available corporate tax shields for a firm seeking its optimal capital structure according to the current literature, it seems evident that all tax shields are not created equal. As a substitute form of corporate tax shield and at least from the corporate point of view, the favorable tax treatment afforded nonqualified corporate stock options comes as near to statutory perfection as has ever been achieved. In addition to realizing compensation deductions for compensation that was neither paid nor charged against corporate income upon option exercise, the corporation receives in cash the option strike price from the employee upon option exercise.

Other corporate tax shields have a cost to the corporate recipient of the tax benefit, a cost that in absolute terms generally outweighs the tax benefit received[18]. For example, the tax benefit of deductible interest at current US statutory corporate income tax rates results in tax benefits of only $.35 for each $1.00 paid in tax-deductible

[18] This is ignoring explicit or implicit non-tax benefits accruing from the use of tax shields, such as increased return on equity resulting from leverage as a tax shield.

interest. To receive the tax benefits of depreciation or amortization as a tax shield the corporation must to incur the acquisition cost of a depreciable or amortizable asset. Conversely the favorable tax treatment afforded to non-qualified stock options results in a corporate tax deduction upon exercise for compensation at no real cost to the corporate employer. The amount of gain recognized both as income to the exercising employee and compensation expense to the corporation is calculated as the amount by which the market share price exceeds the option strike price at exercise.

Under Accounting Principles Board (APB) Opinion 25 the financial accounting treatment afforded nonqualified stock options granted at or below the money results in no income recognition by the recipient employee and no compensation expense to the option granting corporation. The subsequent exercise of the option results in a credit to additional paid in capital for the current tax benefit realized from deductions from corporate taxable income resulting from stock option exercise. It must be stated that while in theory, each employee stock option exercised is dilutive upon the ownership interests of pre-existing shareholders; as a practical matter, these effects are probably immaterial. The number of additional shares issued in satisfaction of options exercised are very likely insufficient in magnitude to cause a measurable decline in market share price.

While in form employee stock options may be an alternate tax shield substituting for leverage in firms with so little debt on their balance sheets. In substance employee stock options have a rather one sided cost-benefit relationship. Their usage results in the benefit of additional cash along with the potential for corporate tax deductions from option exercise without cost. Therefore I propose that in substance employee stock

options result in reduced tax liabilities indistinguishable from the reduction that would result from a statutory reduction in corporate income tax rates. Let T_r be the reduced tax rate that ignoring the tax benefit of stock options equates tax liability to the statutory corporate tax liability after stock option compensation deduction. Let P_i represent pretax income before option deductions, O_d represent the deduction for stock option compensation, and T_s represent the statutory tax rate on corporate income respectively, then:

$$\text{for } P_i > O_d$$

$$T_r P_i = T_s(P_i - O_d) \qquad \text{(a); and}$$

$$T_r P_i = T_s P_i - T_s O_d \qquad \text{(b); and}$$

$$T_r = T_s(1 - O_d / P_i) \qquad \text{(c)}$$

For every non-zero amount of tax benefit triggered by the recognition of income on the part of employees exercising non-qualified stock options, in amounts insufficient to completely offset all income subject to tax at the statutory corporate rate: there also exists a hypothetically reduced tax rate which would result in an identically reduced corporate tax liability in the absence of any deduction resulting from the exercise of employee stock options.

It might be counter argued that such a reduced tax rate might be computed for any corporate deduction which partially offsets income subject to the statutory corporate income tax rate. However, the case of non-qualified employee stock options is unique in two ways. First, as previously discussed these particular compensation deductions become available to the corporation at no real cost to the corporation. Second, the amount of tax benefit that ultimately results from the exercise of employee options is

exogenous to the corporation. Corporate tax deductions resulting from the exercise of previously granted stock options are triggered by the external actions of current or former corporate employees who are individually attempting to maximize their own personal wealth, rather than by any endogenous corporate desire to maximize shareholder wealth or minimize tax liabilities. Also exogenous is the amount of the resulting deduction for compensation expense that becomes available to the corporation upon the exercise of non-qualified employee stock options. While the strike price is chosen by the options granting corporation endogenously, it is most likely set at the market share price on the grant date. The amount of compensation expense deduction available to the corporation is an exogenous function of the market price per share upon option exercise occurring on a day chosen externally by the option holding employee. While the corporation has control over the terms and timing of its initial grant of stock options to its employees, any potential future reduction in corporate income tax liabilities resulting from an option grant to employees is of uncertain likelihood as well as unknown magnitude. Non-qualified stock options granted to corporate employees under the financial accounting rules that existed before 2004 in their substance result in exogenous tax effects similar to a statutory reduction in corporate rates, more similar than the costly alternative tax shields options resemble in form.

As the result of this substance over form argument, this study will treat stock option deductions occurring within the sample population of corporate firm years as a proxy variable for a hypothetical reduction in the statutory corporate tax rate applicable to corporate taxable income to individual firm year observations as if the applicable statutory rate for each firm year was both stochastic and continuous, in stark contrast to

the actual statutory corporate income tax rate which is constant over the entire sample period.

The general research questions proposed in the introductory chapter can now be viewed in the light of the findings reported within this review of the existing literature above. Those questions were as follows. First, is the US statutory tax rate on corporate income so high compared to statutory rates over the rest of the developed world as to induce multinational corporations to avoid or at least postpone the payment of US taxes by transferring income to relatively low taxed nations? Alternatively, might US multinational corporations respond to lower US corporate tax rates by not income shifting or even by shifting foreign income back into the US?

First, based on the simple model of rational economic behavior which takes into consideration the relationship between expected costs and benefits to predict corporate behavior, I would expect to find evidence suggesting that high corporate tax rates would be associated with a greater degree of tax avoidance through the use of corporate tax shelters. While the literature documented declining expected costs to engage in a tax shelter, the expected benefits of sheltering income from US taxes remain relatively unchanged since the mid 1980's as US taxes are not intrinsically high at current levels. Due to US corporate income tax rates which remain largely unchanged since TRA 1986, the expected benefits of participation in a corporate tax shelter remained unchanged which might provide some explanation for the stability of the approximate 83% expected rate of tax compliance over the past two decades. However, stable tax rates are insufficient to explain the continued 83% estimated compliance rate as this

rate is also relatively unchanged since the first 83% estimate was published in 1973, a time when corporate tax rates were two times the rates passed in 1986.

Income shifting researchers found evidence of income shifting into the US by multinational corporations to take advantage of relatively low US tax rates in the late 1980's as compared with relatively higher tax rates in other developed nations. The literature exploring multinational income shifting presents evidence, however of tax motivated income shifting out of the US over the past two decades subsequent to the 1980's. This research culminates in a study which documents the disproportionate amount of cash accumulations within the foreign subsidiaries of multinational firms due to the high tax costs of repatriation of the increasing share of income shifted and reported as earned in foreign jurisdictions. Looking at national level data for the aggregate of US multinational corporations there seems to be strong evidence consistent with income shifting and for ruling out the alternate suggestion that higher overall levels of profitability are experienced outside of the US. In addition the increasing share of foreign income as a share of global US multinational corporate income was in excess of amounts that might be explained by increased global profitability rather than income shifting into lower taxed jurisdictions abroad. If the relatively high rates of tax on US corporate income drive the recognition of income abroad that follows that the relatively high US corporate rates provide one explanation for US corporate tax system that has become increasingly inefficient in terms of its ability to generate corporate tax revenue even marginally proportionate to the growth of US corporate income. Therefore one might conclude based on current literature that while in an absolute sense, US corporate income tax rates have remained essentially

unchanged over the past 25 years, the efficiency of existing statutory corporate income tax rates has declined based on the reduction of corporate tax revenues collected as a share of a growing base of corporate pretax income, and that this decline in US corporate tax efficiency might be the result of tax rate changes in the rest of the developed world, which have made US rates relatively high in comparison.

This relative rate differential increases the expected benefit of shifting income out of the United States and deferring indefinitely the tax cost of repatriating foreign income. Repatriating foreign profits to the US causes a “second level” of corporate income tax above foreign taxes paid in most cases, in the form of US corporate tax applied to repatriated income at a rate approximately equal to the excess of US income tax rates over foreign rates paid upon the foreign income, foreign rates that are in all likelihood, lower than US rates. Although the two general research questions mirror each other, it is the second question which asks how companies might react if US statutory tax rates on corporate income were lowered in terms of a reversal in the overall direction of income shifting or perhaps decreased incentives to shift income outside the US at all. Both possible scenarios would result in an increased amount of taxable income reported as earned within the US. This discussion of the current literature viewed under the light of the simple model of rational economic behavior leads to the following testable hypotheses:

H1: Firms experiencing greater tax benefits from the exercise of employee stock options, will exhibit greater domestic taxable return on assets and/or sales inconsistent with typical income shifting away from the US and into lower taxed developed countries.

H2: Firms without foreign operations which experience greater tax benefits from the exercise of employee stock options, will exhibit less domestic taxable return on sales and/or assets than their multinational counterpart sample firms which would be consistent with the multinational firms shifting additional foreign income into the US.

CHAPTER 4

METHODOLOGY

It is problematic to make direct observations of income shifting within firm level data (Harris, Morck and Slemrod, 1991). Instead researchers have looked at the likely influence income shifting would have on other easily observable variable thought to be correlated with shifted income so that this alternative correlated variable can serve as a proxy measurement of the unobservable level of shifted income (Gruber and Mutti, 1991; Hines and Rice, 1990). One such model to indirectly measure shifted income begins with a linear function of US tax liability developed within in a study of international income shifting by Harris, Morck and Slemrod (1993) and published as a chapter in a 1993 book entitled "Studies in International Taxation" published by the University of Chicago Press. This linear model of current tax liability is given as follows:

$$T_u = r_U (Y_u - Y_{so} + Y_{si})$$

T_u is the total current US tax liability. r_u is the US statutory rate on corporate income. The expression within the brackets represents current reported taxable income and is the combination of actual current US taxable income (Y_u) less the amount of current taxable income shifted out of the US to lower tax countries (Y_{so}) plus the amount of current taxable income shifted into the US from higher taxed countries (Y_{si}). Only T_u, the total current US tax liability is commonly reported by the majority firms according to Harris, Morck and Slemrod (1999). As the US statutory corporate tax rate is also known, reported taxable income which is the sum of the three unobservable components within the brackets, could be easily calculated. Therefore, only the individual values of these three variable components which together make up reported

taxable income would still remain unknown. Individually, these values for multinational corporations are generally unobservable. Harris, Morck and Slemrod (1999) then note the following, "A firm's U.S. income is likely to be roughly proportional to the size of its U.S. operations. . . We want to explain income shifting, $Y_{si} - Y_{so}$, using total US federal taxes, $T_u = r_U (Y_u – Y_{so} + Y_{si})$. Dividing the latter variable by the size of US operations allows us to interpret variations in the resulting ratio (after controlling for other obvious predictors of US taxable income), as due to income shifting." The researchers then use this model to find evidence of US multinational corporations engaging in tax motivated cross border income shifting to minimize taxes during the mid-1980's.

My dependent variable in this study of income shifting among option intensive firms is adapting directly from the income shifting variable developed by Harris, Morck and Slemrod (1999) and discussed above. Within a more recent sample of firms from the latter half of the 1990's, relatively high US corporate income tax rates on a global basis led to my expectation that US multinational corporations would be more likely to shift taxable income away from the US so that lower (higher) US taxable return on US assets or lower US taxable return to sales would be consistent (inconsistent) with income shifting behavior during a later portion of the 1990's subsequent to aggressive tax competition engaged in by non-US OECD nations which further reduced their corporate tax rates to levels below the US corporate tax rates set by TRA 1986.

My independent variable of interest thought to predict income shifting behavior is a metric representing the extent of available tax benefits resulting from the employee exercise of stock options. It is expected that stock option deductions which serve to proxy for hypothetical statutory corporate income tax rate reductions faced by the

individual firms over each annual set of observations will prove to be a significant predictor of the dependent variable which is a proxy measure of income shifting. Alternative specifications of the option tax benefit variable could have included the amount of reduction in effective tax rates (EFT) due to the option deduction. This method was rejected for this study due to the low number of firms that would remain in the sample with positive effective tax rates subsequent to the adjustment for the tax benefit due to stock option exercise. Desai (2003) reported that firms make use of the entire amount of option deductions even when an NOL is generated in the current year. Therefore the total tax benefit of stock options exercised during an annual period has spillover affects into future periods which could predict the magnitude of firm cross border income shifting activities. While tax benefits of options upon current tax expense are potentially limited by pre-option current tax expense. Marginal tax rates have also been simulated to make predictions about firm behavior, however for a study of income shifting behavior this method is problematic as its prediction sets up a tautology in that the marginal tax rate, the rate of tax upon the next dollar of income earned by a corporation is dependent upon the locations in which it recognizes global income. These are thought to be predicted by the global rates it faces on its next dollar of income which is also a function of the locations it chooses to recognize its global income, and so on. So in light of the findings by (Desia, 2003) the natural log of the tax deduction available from the employee exercise of stock options will retain the maximum number of firm observations and capture all the information contained in the level of stock option deductions both currently and upon future fiscal periods.

Other variables control for non-tax factors which have been shown to affect observed profitability levels in previous income shifting research and contribute to the following panel regression equations to be estimated:

$$USTUSA_{tj} = \acute{\alpha} + LNDCTESO_{tj} + SIZE_{tj} + FGNRATIO_{tj} + SIC_{tj} + YR_{tj} + \acute{\varepsilon}_{tj} \quad (1)$$

$$USTUSS_{tj} = \acute{\alpha} + LNDCTESO_{tj} + SIZE_{tj} + FGNRATIO_{tj} + SIC_{tj} + YR_{tj} + \acute{\varepsilon}_{tj} \quad (2)$$

Where for firm j in year t = [1997 – 2000]:

$USTUSA_{tj}$ = current US tax expense scaled by US long-term assets

$USTUSS_{tj}$ = current US tax expense scaled by non-export US sales

$LNDCTESO_{tj}$ = natural log of the absolute dollars of stock option tax deduction

$SIZE_{tj}$ = the natural log of global assets

$FGNRATIO_{tj}$ = the ratio of foreign to global sales, measuring the extent of foreign operations

SIC_{tj} = a vector of effects coded industry dummy variables taking values 0 or -1

YR_{ij} = a vector of dummy variables indicating fixed effects for 1997, 1998 or 1999

$\acute{\varepsilon}_{tj}$ = residual

A significant positive coefficient for $LNDCTESO_{tj}$, the independent variable believed to proxy for hypothetical statutory tax rate reductions, would indicate reduced income shifting away from the US and the possibility of income shifting back into the US by these firms facing effectively lower tax rates due to their deductions from option exercise in support of H1. Bifurcating the sample into two groups of firms, those with and those without foreign operations and then comparing the results of regression

estimated separately for each group may then give additional information with which to reject or accept H2 which suggests greater increases in US taxable income associated with larger stock option deductions among multinational firms which could shift foreign income back into the US vs. their purely domestic counterparts.

The testing of hypotheses as applied to this cross section of 97 NASDAQ-100; j = 97 firms over a series of 1997-2000; t = 4 annual observations is a matter of discovering the degree to which increases in tax benefits resulting from stock option exercise are associated with increases in taxable return on assets and or taxable return on sales within the US and among US multinational corporations vs. their domestic counterparts. Using a method of panel regression which takes into account the annually repeated observations for each firm within the cross section will be likely to increase the likelihood of finding significant results. Containing only four years of annual data but nearly 25 times as many firms within the cross section, a panel method is more appropriate for this data than a time series analysis as the latter typically relies on larger values of t in terms of repeated measures over time (Gujarati, 1995, pp. 714-718). Since the values observed in the raw data clearly increase over time, a fixed effects model which accommodates differences in the linear intercept term over time is my specific choice in panel method, which is said to give consistent parameter estimates and is generally preferred to a random effects model (Johnston and DiNardo, 1997).

Serial correlation is a frequent occurrence in financial statement data over consecutive reporting periods. Financial statement observations have strong built in relationships to the previous year(s) observation(s) especially when companies experience growth over the sample time period (Gujarati, 1995, pp. 400-403). Although

first estimation of this fixed effects model of panel regression will employ the ordinary least squares (OLS) model with three (t-1) dummy variables to indicate fixed effects for sample firm years (Park, 2009), if Durbin-Watson statistics based on the estimated regression residual values lead to a rejection of the null hypothesis of no first order serial correlation (Johnston and DiNardo, 1997, pp. 179-182), a first order autoregressive (OLS) model will next be estimated in an attempt to reduce the effects of serial correlation. Further tests will determine the extent of additional violations of the OLS assumptions to be addressed.

CHAPTER 5

SAMPLE DESCRIPTION

Sample firms are drawn from corporations which comprise the NASDAQ-100 index of the largest nonfinancial services industry firms trading on the NASDAQ stock exchange. The starting point for sample selection is the list of firms which comprise the NASDAQ-100 index as of May 30, 2001. Compustat defines a fiscal year as having an annual financial statement reporting period ending any time within June 1 of the current year through May 31 of the subsequent year. This means that within Compustat data, fiscal year 2000 is assigned to data taken from financial statements with any year-end date occurring between the period which begins June 1, 2000 and ends May 31, 2001. The firms which comprise the NASDAQ-100 index on May 30, 2001, the end of FY 2000, along with their ticker symbols are listed in Appendix A.

NASDAQ firms are chosen for the research sample due to the magnitude of stock option tax deductions generated by the employee exercise of nonqualified stock options over the last half of the decade of the 1990's which are the annual periods represented within my cross section of firms, 1996-1997. Prior research involving stock option compensation has documented the highest level of stock option intensity within the NASDAQ-100 as compared to other stock indices such as the S&P 100 during this time period (Hanlon and Shelvin, 2002; Graham, Lang and Shackelford, 2004). Graham, Lang and Shackelford (2004) document the degree of stock option intensity found within the NASDAQ-100 index of firms, finding evidence for fiscal year 2000 of reduced marginal tax rates for nearly all NASDAQ-100 firms compared to their findings

of reduced marginal rates occurring for about 25% of S&P 100 firms as the result of stock option exercise.

2-digit SIC industry codes were retrieved for 99 of the 100 index firms for which information was available. NASDAQ-100 companies are distributed among 5 of the 10 defined SIC industry groups and 15 separate industries within these groups as shown in Figure 1. The largest sample concentration of 49 firms is found within just 1 industry group, while 82 of the 99 sample firms make up the total number of firms within the 2 largest industry groups which occur within the sample data.

Table 1

Distribution of Sic Codes Among NASDAQ Firms FY 2000

Manufacturing Industry Group	2-digit SIC CODE	# of Firms
Apparel and Other Textile Products	23	1
Paper and Allied Products	26	1
Chemicals and Allied Products	28	10
Industrial Machinery and Equipment	35	11
Electrical and Electrical Equipment	36	23
Transportation Equipment	37	1
Instruments and Related Products	38	2
Group Total		49
Transportation, Communication and Utilities Group		
Communications	48	11
Retail Trade Group		
General Merchandise Stores	53	1
Furniture, Home Furnishings and Equipment Stores	57	1
Eating and Drinking Places	58	1
Miscellaneous Retail	59	2
Group Total		5
Finance, Insurance and Real Estate		
Depository Institutions	60	1
Service Industries		
Business Services	73	32
Engineering and Management Services	87	1
Group Total		33

Data on stock options exercised for sample firms was hand collected from individual financial statement footnotes within the annual reports submitted to the Security Exchange Commission (SEC) on form 10-K. Previous researchers have made the recommendation that stock option data, in order to achieve an adequate level of accuracy, be hand collected from financial statement footnotes rather than estimated from cash flow statement entries, when investigating tax benefits from stock option exercise (Hanlon and Shevlin, 2002). Compustat data is not adjusted for any reduction in current tax expense nor for reported effective tax rates (Mills, Newberry and Trautman, 2002). Neither are the balance sheet accounts for deferred taxes affected by the current tax benefit resulting from option exercise since this particular book-tax difference is permanent and never reverses. Only infrequently to annual reports contain sufficient information within the statement of cash flows or statement of changes in equity to ascertain the current tax benefit that results from stock option exercise (Hanlon and Shevlin, 2002). Annual reports before 2004 almost universally disclosed the granting and exercise of employee stock options only by footnote disclosure under Statement of Financial Accounting Standards (SFAS) 123 and Accounting Principles Board (ABP) Opinion No. 25 which allowed for the recording of compensation expense equal to the intrinsic value of options granted to employees (Graham, Lang and Shackelford, 2004). Since the typical practice was for the strike price to be set at or below the market price on the date granted, non-qualified options granted under the pre-2004 rules ordinarily had no intrinsic value which resulted in no compensation expense that could be reported on the income statement.

SFAS 131 required financial statement footnote disclosure of segment reporting information beginning in 1997, which for most firms resulted in disclosure of geographic segment data. Data was hand collected from disclosures of sales and long-lived assets attributed to the United States for each firm over the years 1997-2000, one less year than of data than for stock option exercise data however the additional year of stock option sample data from the year 1996 allows for the creation of lagged tax variables related to option exercise. The overwhelming majority of firms categorized as foreign total US export sales including sales attributed to US Foreign Sales Corporations (FSC's). A small number of firm year observations did not categorize as foreign sales their US export sales and comprised less than 5% of firm year observations. These observations were transformed to exclude US export sales from reported US sales to maintain consistency across the entire sample for reported amounts of US Sales.

Remaining data for the sample of NASDAQ-100 firms was collected using Research Insight from Compustat. Missing observations for current tax expense within the data retrieved from the Compustat database was supplemented by hand collection when possible from the tax footnote disclosures within the annual statements. Table 2 contains descriptive statistics for data collected for the cross section of firms within the annual periods 1997-2000. The data takes the form of unbalanced panel data as not every firm was in existence for the entire time series 1997-2000, which combined with scattered missing values, results in 326 firm year observations with complete data on all variables. Jarque-Bera tests of normality result in extremely high test statistics for all raw variables listed resulting in rejection of the null hypotheses of normally distributed

values. Table 3 contains descriptive statistics for the regression variables for equations (1) and (2).

Table 2

Descriptive Statistics on Data Points over Entire Sample

(000,000)'s except for Observations

	ASSETS	GBLNIBT	FSALES	ISOCASH	ISOTAX
Mean	4,351.26	519.67	1,015.28	71.07	369.59
Median	1,435.73	116.41	222.28	20.24	51.47
Maximum	98,903.00	15,141.00	19,814.00	1,888.92	13,925.34
Minimum	19.24	(7,439.80)	-	-	-
Std. Dev.	10,730.97	2,014.78	2,378.87	171.77	1,189.62
Skewness	6.04	4.36	4.30	5.95	7.11
Kurtosis	45.71	27.63	26.15	49.89	66.64
Jarque-Bera	26,763.89	9,274.04	8,283.75	31,791.28	57,751.35
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1,418,511.91	169,412.83	330,980.38	23,168.24	120,486.08
Sum Sq. Dev.	37,424,933,415.83	1,319,281,837.31	1,839,176,986.52	9,588,550.37	459,940,592.84
Observations	326.00	326.00	326.00	326.00	326.00

	SALES	US LTA	US SALES	US TAX
Mean	3,074.37	1,093.98	2,059.09	171.25
Median	867.39	237.20	516.24	26.33
Maximum	39,090.00	29,816.00	32,177.00	4,744.00
Minimum	2.52	2.46	2.52	(161.00)
Std. Dev.	6,282.98	3,145.68	4,357.84	562.29
Skewness	3.43	6.10	3.99	5.42
Kurtosis	15.32	45.76	21.51	34.85
Jarque-Bera	2,700.46	26,859.59	5,517.12	15,381.33
Probability	0.000000	0.000000	0.000000	0.000000
Sum	1,002,243.62	356,638.91	671,263.24	55,826.22
Sum Sq. Dev.	12,829,633,711.81	3,215,964,204.97	6,172,009,337.54	102,754,101.40
Observations	326.00	326.00	326.00	326.00

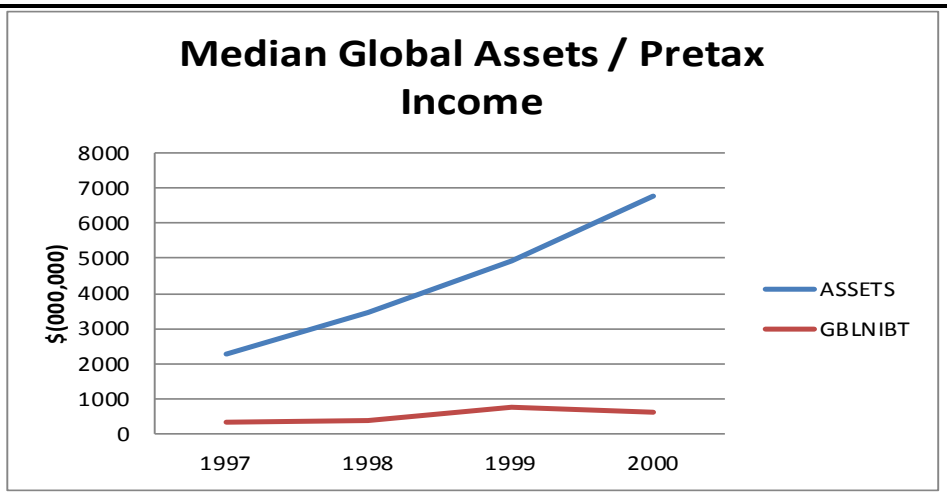
Table 3

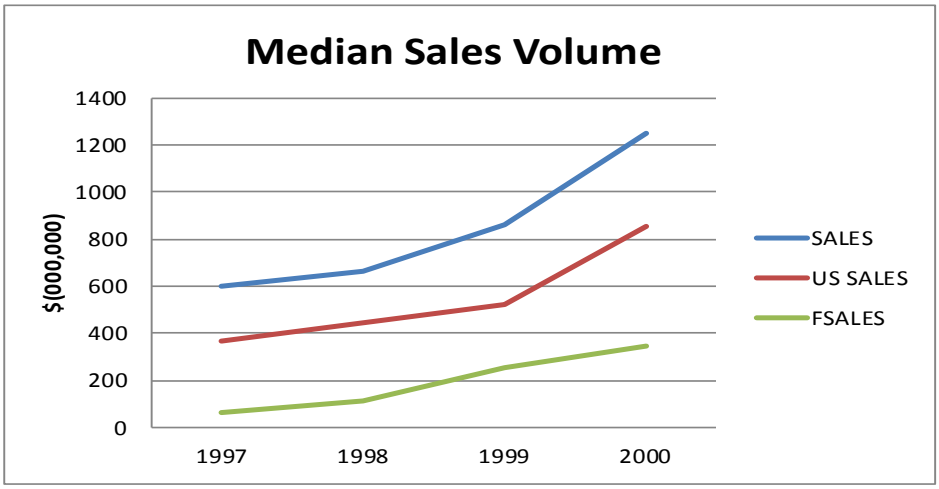
Descriptive Statistics on Regression Variables Equations (1) and (2)

(000,000)'s except for observations

	USTUSLT	USTUSSALE	LNDCTESO	FGNRATIO	SIZE
Mean	0.311001	0.073906	3.934352	0.280378	7.238321
Median	0.077463	0.042763	3.963342	0.275153	7.272120
Maximum	4.123347	0.590904	9.541465	0.894175	11.50189
Minimum	-0.167047	-0.326572	-4.674413	0.000000	2.957095
Std. Dev.	0.545487	0.100902	2.226712	0.218352	1.531769
Skewness	3.090278	1.633767	-0.54437	0.299194	-0.176154
Kurtosis	15.13658	8.013420	4.206421	2.133147	3.494836
Jarque-Bera	2465.549	475.9900	35.10072	14.74714	4.904411
Probability	0.000000	0.000000	0.000000	0.000628	0.086103
Sum	99.20925	23.57592	1255.058	89.44057	2309.024
Sum Sq. Dev.	94.62293	3.237649	1576.723	15.16151	746.1283
Observations	319	319	319	319	319

Well over half of the NASDAQ-100 component firms on May 31, 2000 were added to the index over the course of the periods 1996-2000. As the index is comprised of the 100 largest NASDAQ traded firms in terms of annual market capitalization levels, the fact that 59 firms were recent additions to the index over the previous five years might be indicative of high rates of growth with the firms that make up the research sample. Figure 1 contains graphs depicting annual median levels of asset, sales and pretax income levels which have grown consistently over the period 1997-2000.





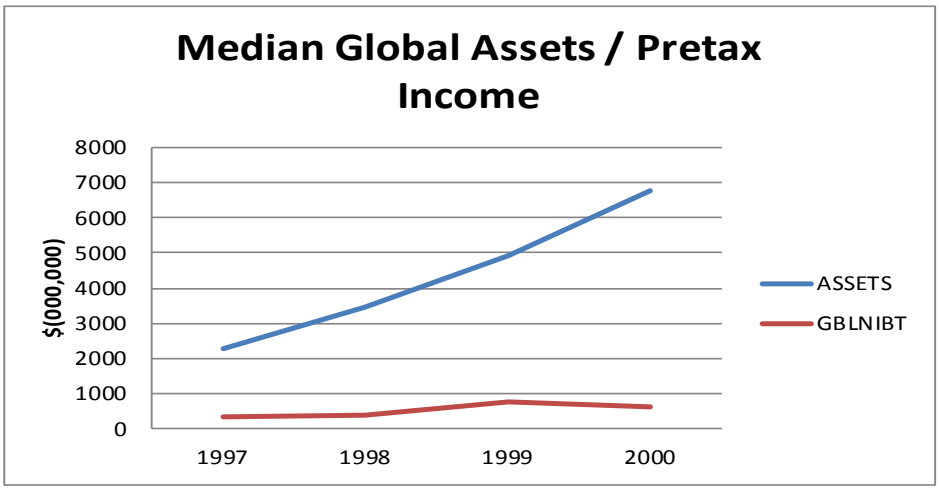


Figure 1. Annual Median Sales, Asset, Pretax Income and Us Tax Levels 1997-2000

The effects of stock options reduced the tax liabilities for most firms within the sample grew in magnitude over the period 1997-2000. Over the entire sample of firm years total tax benefit from stock options was 2.14 times greater than the total US current tax expense reported by all firms. For the 81.5% of firm years with positive current income tax expense, the total tax benefit of stock options was 1.96 times greater than the total US current tax expense reported by this subsample of firms. After taking into account the tax benefit of stock option exercise for each firm year, adjusted current income tax expense is positive for only 177 out of 366 firm year sample observations containing data. Figure 2 depicts the annual growth in these option tax benefits on an annual basis for the fiscal years 1997-2000.

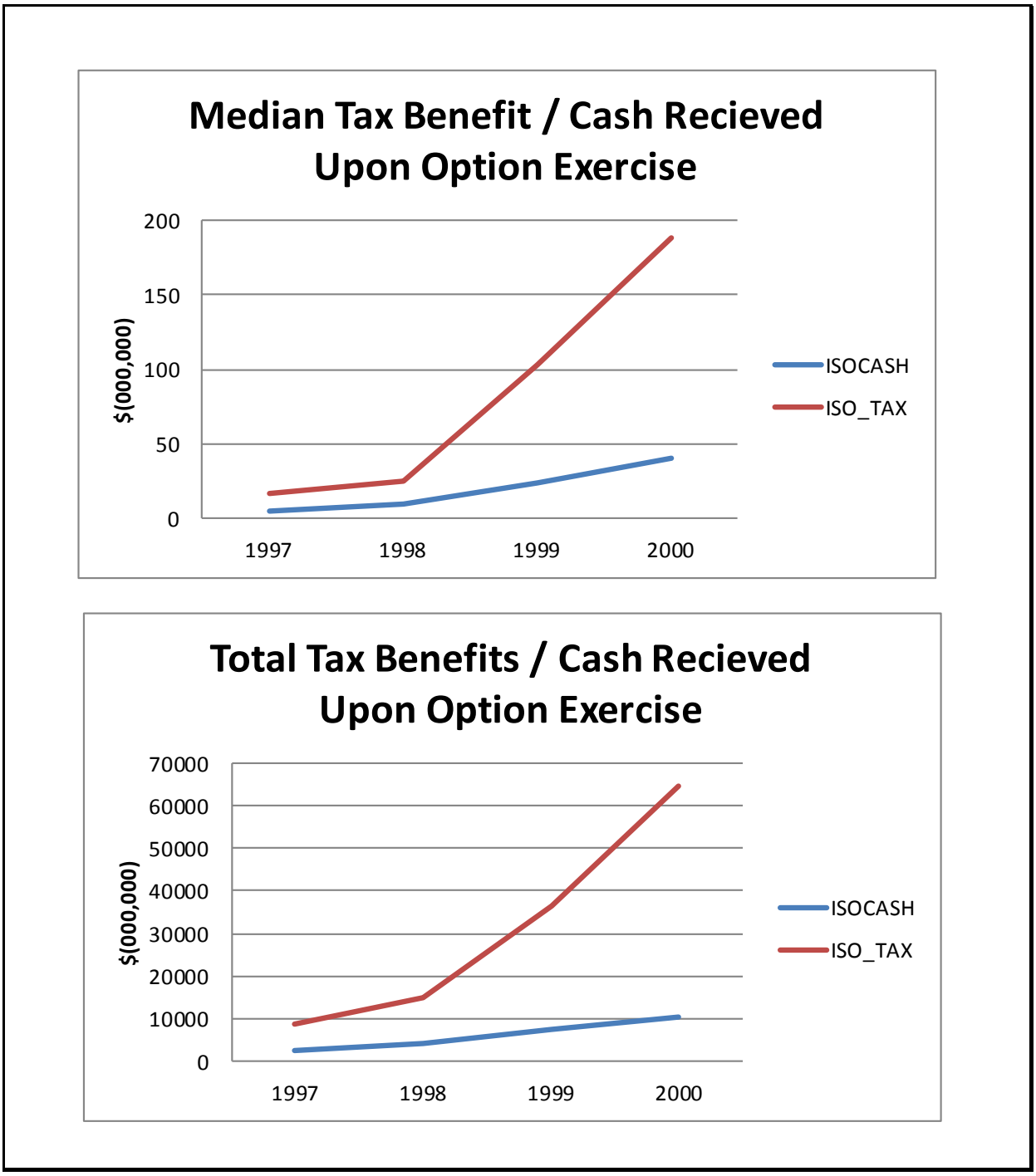


Figure 2. Annual Tax Benefits and Cash Proceeds from Stock Option Exercise 1997-2000

Cash generated by employee stock options within the sample also grew in magnitude over the sample period. Over the entire sample, the cash generated by the strike price received by firms upon the exercise of employee stock options totaled 31% of total net cash flows from financing activities over all annual reports over 385 sample firm year observations containing this data. Annual percentages of cash generated by firms from option exercise represented 34.4%, 26.5%, 29.9% and 33.8% of net cash flows from financing activities for fiscal years 1997, 1998, 1999 and 2000 respectively. At the sample median, annual percentages of cash generated by the cash received by firms upon option exercise represented 19.1%, 36.0%, 26.0% and 54.3% of net cash flows from financing activities for fiscal years 1997, 1998, 1999 and 2000 respectively. Figure 2 also depicts the growth in total cash received annually by sample firms upon the exercise of stock options for fiscal years 1997-2000. Clearly the exercise of non-qualified employee stock options represented growing amounts of tax benefits through compensation deductions as well as a growing source of cash financing between 1997 and 2000 for this sample of firms comprising the NASDAQ-100 index at the close of FY 2000. For as many of 35 firms out of the total sample of 97 firms, cash generated from employee stock option exercise exceeded global net income in at least one fiscal year. For 14 firms, cash generated by employee stock options exceeded global net income in all four sample years. It is easy to draw the conclusion that for many of these firms, stock options functioned not only as a form of tax shield but also as an important source of cash financing.

CHAPTER 6

RESULTS

The fixed effects panel OLS estimates of the two regression equations resulted in the following coefficient estimates with t-Statistics in parentheses:

$$USTUSA_{tj} = \underset{(0.843238)}{0.269280} + \underset{(3.304858)}{0.062839}*LNDCTESO_{tj} + \underset{(1.169638)}{0.032676}*SIZE_{tj} \underset{(-0.976068)}{-0.157536}*FGNRATIO_{tj,}$$

$$sec = 0.494028,\ R^2 = 0.231359;\ Equation\ (1)$$

$$USTUSS_{tj} = \underset{(-0.149294)}{-0.008737} + \underset{(3.896417)}{0.013107}*LNDCTESO_{tj} + \underset{(0.703723)}{0.003506}*SIZE_{tj} + \underset{(3.125932)}{0.091279}FGNRATIO_{tj},$$

$$sec = 0.091227,\ R^2 = 0.263636;\ Equation\ (2)$$

Durbin-Watson statistics of 1.207 for the return on sales equation (2) and 1.217 for the return on asset equation (1) do not rise above 1.5, the approximate critical value at which the null hypothesis of serial correlation among the residuals can be rejected (Johnston and DiNardo, 1997, Appendix D). Breusch-Godfrey serial correlation Lagrange multiplier tests also shows highly significant evidence of serial correlation among the OLS residuals. One undesirable consequence of serial correlation among the OLS residuals is that parameter estimates are no longer minimum variance which results in misleading tests of significance for hypothesis testing (Gujarati, 1995, pp. 409-415). Therefore a method to remedy this serial correlation among sample observations will be attempted. The simplest remedial method for serial correlation is to transform the OLS model into a first-order autoregressive model through the addition of an autoregressive term to both equations (1) and (2).

A first-order autoregressive model takes previous residual values into the estimation of the current model in an attempt to reduce the negative consequences of serial correlation through an iterative process (Maddala, 1992, p. 252). An iterative process is necessary due to the inability to observe the actual preceding residual values. Using the autoregressive model to estimate adjusted equations (1) and (2) reduces the influence of serial correlation and improves the estimation of the regression equation parameters.

The coefficient estimates with t-Statistics in parentheses for the first-order autoregressive models are as follows:

$$\underset{}{USTUSA_{tj}} = \underset{}{0.212234} + \underset{(0.504793)}{0.046068}*LNDCTESO_{tj} + \underset{(2.020227)}{0.057457}*SIZE_{tj} \underset{(1.569782)}{-0.100385}*FGNRATIO_{tj,} \underset{(-0.439172)}{}$$

$$sec = 0.458110,\ R^2 = 0.392532;\ \text{Equation (1)}$$

$$\underset{}{USTUSS_{tj}} = \underset{}{-0.051525} + \underset{(-0.690444)}{0.006645}*LNDCTESO_{tj} + \underset{(1.753097)}{0.01404}*SIZE_{tj} + \underset{(2.250256)}{0.081198}*FGNRATIO_{tj,} \underset{(2.085992)}{}$$

$$sec = 0.091227,\ R^2 = 0.263636;\ \text{Equation (2)}$$

Under the autoregressive models, Durbin-Watson statistics are higher than the approximate 1.5 critical threshold level at 2.0267 for equation (1) and 1.9441 for equation (2) allowing for the rejection of the null hypothesis of serial correlation among the residuals (Johnston and DiNardo, 1997, Appendix D). In the absence of serial correlation, minimum variance parameter estimates allow for more accurate significance testing for the rejection or acceptance of the research hypotheses. However, the parameter estimates achieved through the autoregressive model are initially puzzling. For both equations (1) and (2) the predictor variable of interest, $LNDCTESO_{tj}$ has for both equations a smaller coefficient that has become practically inconsistent for both

estimations. Despite the decline in significance for nearly all independent variables, the addition of the autoregressive terms increased the amount of sample variation explained by the two models as measured by an increased R^2 for the autoregressive model. My first reaction to these results is to suspect another violation of OLS regression assumptions, that of no multicollinearity between the independent variables (Gujarati, 1995, p 319). One indication of multicollinearity in the regression equation is the presence of low t-statistics reported for regression coefficients even while the model has good fit to our data with relatively high R^2. Table 4 presents the coefficients of correlation between the three metric explanatory variables contained in both regression equations.

Table 4

Pairwise Correlations among Sample Predictor Variables

	LNDCTESO	SIZE	FGNRATIO
LNDCTESO	1	0.523797	0.126697
SIZE	0.523797	1	0.106274
FGNRATIO	0.126697	0.106274	1

The highest level of correlation among variable pairs is between the tax predictor variable $LNDCTESO_{tj}$ and the control variable $SIZE_{tj}$. The pairwise correlation between the two is about 0.52, much lower than 0.8 which would suggest high multicollinearity, yet above the minimum value at which multicollinearity is likely to exist (Gujarati, 1995, pp. 335-337). Dropping the control variable $SIZE_{tj}$ from the regression equation could solve a problem with multicollinearity if it exists, but might also result in model misspecification due to an omitted variable. Although dropping the control variable

$SIZE_{tj}$ does in fact result in smaller standard errors and larger t-statistics when this more parsimonious model is estimated for both equations (1) and (2), the elimination the control variable for $SIZE_{tj}$ is not adequately justified given the relatively low pairwise correlation between the independent variables as seen in Table 4, and in light of prior research which has documented a size effect for some studies of income shifting. Therefore eliminating the control variable $SIZE_{tj}$ would likely result in model misspecification absent more evidence to the contrary. Adding to my confidence in this decision not to drop a variable to remedy my possible problem with multicollinearity is a discussion of lagged dependent variables by Achen, (2000). Not all the independent variables in the autoregressive model are reported with high standard errors and insignificant t-Statistic values as might indicate the presence of multicollinearity. In fact, the most significant independent variable in my autoregressive model is the autoregressive term AR(1) , which also has the highest coefficient value among predictor variables. According to Achen, (2000) the addition of an autoregressive leg term to regression model has often resulted in an appearance of dominance within the model by the autoregressive term as it exhibits a relatively high and very significant coefficient value compared to other independent variables contained in the regression model. Such a reduction in both coefficient value and significance upon model variables resulting from the introduction of an autoregressive term is due to the occurrence of a strong trend within one or more explanatory variables (Achen, 2000).

One possible solution to this problem cited by Achen, (2000) is from a 1996 paper which suggests the use of Estimated Generalized Least Squares (EGLS) using panel weights to correct for both heteroskedasticity and serially correlated residuals in

panel data (Beck and Katz, 1996). The results of estimating the regression equations (1) and (2) using the EGLS method are as follows:

$$USTUSA_{tj} = \underset{(0.858100)}{0.325457} + \underset{(2.342668)}{0.041090}*LNDCTESO_{tj} + \underset{(1.027165)}{0.27775}*SIZE_{tj} - \underset{(0.042307)}{0.007588}*FGNRATIO_{tj},$$

$$sec = 1.012382,\ R^2 = 0.144652;\ Equation\ (1)$$

$$USTUSS_{tj} = \underset{(-0.147976)}{-0.010755} + \underset{(2.356550)}{0.007368}*LNDCTESO_{tj} + \underset{(1.040668)}{0.005135}*SIZE_{tj} + \underset{(2.487883)}{0.03459}*FGNRATIO_{tj},$$

$$sec = 0.992332,\ R^2 = 0.149019;\ Equation\ (2)$$

Between the previous estimation of the autoregressive model in this estimation of the EGLS model above, the coefficients on $LNDCTESO_{tj}$ changed very little, decreasing only 0.005 for equation (1) and increasing only 0.001 for equation (2). However, the coefficients on $LNDCTESO_{tj}$ have substantially increased in significance, approaching the .01 level of significance within both equation (1) and equation (2). How then should these results be interpreted?

For both equations (1) and (2) the coefficients on $LNDCTESO_{tj}$ both have a positive sign indicating a direct relationship between the absolute dollar value of stock option deductions available to sample firms, and their levels of taxable return on both long-term domestic assets as well as to domestic sales. The coefficient on $LNDCTESO_{tj}$ for equation (1), which had as its dependent variable the ratio of US taxable income to identifiable long-term US assets, was 0.04. Interpretation of this coefficient is that for every dollar of increased stock option deduction available to the firm, the conditional mean of the dependent variable, the ratio of US taxable return on US long term assets, could be expected to rise on average by 0.04. This coefficient is significant, although not highly so, falling just short of the 0.01 level (p=0.0198). The

coefficient on $LNDCTESO_{tj}$ for equation (2), which had as its dependent variable the ratio of US taxable income to US sales, was 0.007. Interpretation of this coefficient is that for every dollar of increased stock option deduction available to the firm, the dependent variable $USTUSA_{tj}$ a ratio of US taxable return to US sales could be expected to rise on average by 0.007, holding all other variable constant (Maddala, 1992, p. 150). This coefficient is also significant, but not highly significant, falling just short of the 0.01 level (p=0.0190).

There is little doubt that these coefficients are statistically significant in the sense that it can be said with confidence that both coefficients are non-zero. However, is the magnitude of these coefficients large enough to suggest that they are of practical importance such that H1 can be supported? Standardized coefficients for $LNDCTESO_{tj}$ are calculated by multiplying the coefficient by the ratio of its variable standard deviation over the standard deviation of the dependent variable. Standardized coefficients for $LNDCTESO_{tj}$ are 0.22414 for Equation (1) and 0.162598 for Equation (2). Standardized regression coefficients represent the change to the dependent variable measured in standard deviations which would result from a one standard deviation increase to the value of the predictor variable. There is not as much variability within the distribution of the dependent variable $USTUSS_{jt}$ as compared to the dependent variable $USTUSA_{jt}$ as shown in Figure 3. For this reason a one standard deviation change in $LNDCTESO_{tj}$ results in similar amounts of change between the two dependent variables in terms standard deviations of change. The coefficients are much closer than in the unstandardized regression however the two standardized coefficients are not comparable in the same way as two standardized coefficients within the same equation

against the same dependent variable. Nevertheless, they do give a certain amount of comparability in terms of the relative magnitude of influence exerted upon its respective dependent variables in terms of the extent of change across the dependent variable within my sample. On that, basis both $LNDCTESO_{tj}$ coefficients from each equation are of relative importance in explaining the effect a change in stock option tax benefit has on the amount of income a firm recognizes within the US relative to US long term assets or US sales. However, in both equation (1) and equation (2) explain a small portion, only 14.9% and 14.5%% of the variation in their dependent measures respectively.

The next step taken to gather evidence for the testing of hypothesis 2 involved the bifurcating of the entire sample into two groups, one of purely domestic firms and the other group of multinational firms. Additional inference might be drawn about cross border income shifting engaged in by multinational firms by comparing the regression results from that group to a second group of purely domestic firms which have no foreign operations with which to shift into US. Due to the reduced sample size, it was not possible to include all the SIC_{tj} industry variables without creating perfect multicollinearity. The results for equations (1) and (2) estimated upon the multinational sub-sample of 76 firms across 259 firm years are as follows:

$$\underset{\quad(-0.19390)}{USTUSA_{tj} = -0.056233} + \underset{\quad(2.836027)}{0.053914*LNDCTESO_{tj}} + \underset{\quad(0.585462)}{0.018712*SIZE_{tj}} + \underset{\quad(0.310218)}{0.072067*FGNRATIO_{tj,}}$$

$$sec = 1.000609,\ R^2 = 0.068936;\ \text{Equation (1)}$$

$$\underset{\quad(-0.553324)}{USTUSS_{tj} = -0.027519} + \underset{\quad(2.921782)}{0.009735*LNDCTESO_{tj}} + \underset{\quad(0.549317)}{0.003022*SIZE_{tj}} + \underset{\quad(2.331821)}{0.092633*FGNRATIO_{tj},}$$

$$sec = 0.992491,\ R^2 = 0.130861;\ \text{Equation (2)}$$

Equations (1) and (2) estimated upon the purely domestic sub-sample of 24 firms across 60 firm years, excluding several industry variables as in the multinational sample and excluding FGNRATIOtj which is zero for all domestic firms by definition, the results are as follows:

$$USTUSA_{tj} = \underset{(1.117492)}{0.178016} - \underset{(-2.027787)}{0.032199}*LNDCTESO_{tj} + \underset{(3.920905)}{0.074194}*SIZE_{tj},$$

sec = 0.952727, R^2 = 0.643066; Equation (1)

$$USTUSS_{tj} = \underset{(0.683889)}{0.028135} - \underset{(-2.871883)}{0.011671}*LNDCTESO_{tj} + \underset{(2.249052)}{0.011453}*SIZE_{tj}$$

sec = 0.940083, R^2 = 0.342119; Equation (2)

The results of the parameter estimates for these two equations upon the bifurcated sample illustrate substantial differences between these two subsamples one of multinational firms and another consisting of purely domestic firms.

Within the panel of multinational firms, coefficient estimates on the tax variable $LNDCTESO_{tj}$ point to a larger positive effect upon the dependent variable in both equations in comparison to those estimated from the full sample. Even so, for the equation (1) the R^2 coefficient of correlation at 0.07 is indicative of lower explanatory power upon variation within the dependent variable $USTUSA_{tj}$ compared to the whole sample, which may be due in part to the reduction in bifurcated sample size. The overall equation exhibits low statistical significance as the null hypothesis that all the coefficients are not significantly different from zero can be rejected at only a very low level of significance based on the F-statistic calculated for Equation (1) as estimated upon the subsample of multinational firms.

Also for the multinational subset of firms, the combined explanatory power of the predictor variables for equation (2) is very significant for the overall equation. The null hypothesis of all the coefficients being not significantly different from zero is easily rejected at a high level of significance with the F-statistic. The coefficient on $LNDCTESO_{tj}$ is highly significant, along with high significance for the positive coefficient on $FNGRATIO_{tj}$. In fact, the coefficient on $FNGRATIO_{tj}$, the ratio of foreign to global sales for each firm year observation, is positive over the estimated equation (2) for the full sample and both equations (1) and (2) for the multinational samples. This ratio has no meaning for the sample of purely domestic firms. , this variable representing in part the extent of global operations on the part of each multinational firm is consistently positive as well for equation (2), which has as its dependent variable current US taxable income scaled by US sales.

To various degrees, in every estimation of equation (2) increased foreign operations are associated with increased US taxable return on sales. One explanation for this finding might be that along with a greater extent of multinational operations these firms also experience increased opportunities to shift their foreign income back into the United States to take advantage of tax benefits which have become available as the result of the employee exercise of stock options, which effectively lower the tax rates that shifted or repatriated income will face upon its arrival here in the US.

It is much harder to move assets around the world that it is to move income around the world through the various income shifting techniques. The coefficients on $FGNRATIO_{tj}$ estimated on equation (1) against US taxable return on US long term assets are insignificant for both the full sample and the purely multinational subset of

firms. This is inconsistent with growing opportunities for cross border income shifting based on the extent of foreign sales. Alternatively, it may also be a reflection of measurement error in the variable foreign sales as firms designated as foreign sales their US export sales.

Both equations (1) and (2) estimated for the domestic sample of firms, showed substantially higher R^2 values of 0.64 and 0.32 respectively. These are firms that due to their lack of international operations are incapable of engaging in cross-border multinational income shifting through any majority-owned foreign subsidiaries. Increased profitability as measured by current tax expense scaled by either domestic long-term assets or domestic sales seems to be a function of firm size and industry affects among these domestic firms. The high explanatory power of these two equations as compared to those estimated on multinational samples in terms of R^2 suggest that the set of factors which contribute to variation in profitability between multinational firms is larger and perhaps more complex than those needed to explain variations in profitability between purely domestic firms in the US.

CHAPTER 7

CONCLUSIONS AND IMPLICATIONS

It was first hypothesized that firms with the greatest tax benefits from stock options would display the greatest level of domestic current taxable return on domestic assets and/or domestic current taxable return on domestic sales. Current tax expense is reported without any reduction for the tax benefits of stock option exercise, therefore it reflects a measure of profitability for a purely domestic firm as well as a measure of both profitability and current income recognized within the US by multinational corporations. Evidence of a relationship between increasing tax benefits accruing to firms from the employee exercise of stock options, and increased US profitability was very significant from a statistical standpoint. As to explanatory power of stock option tax benefits with respect to cross-border income shifting from the standpoint of practical importance, since the dependent variables were each operationalized as quasi-financial ratios: taxable return on US assets and taxable return on US sales, a slow percentage growth in these ratios of US profitability, particularly if associated with greater tax benefits from stock option deductions, would be meaningful evidence for support of H1. Increasing measures of US taxable return ratios in the presence of increased tax benefits from employee stock options operating to effectively reduce corporate tax rates for these firms provides evidence consistent with either reduced income shifting out of the US and/or the shifting of foreign income into the United States in support of the acceptance of Hypothesis 1.

While the significant positive coefficients on $FGNRATIO_{tj}$ over estimations of equation (2) might suggest that a firm's opportunities to shift income internationally grown as the ratio of foreign sales to global sales increases with expanding foreign operations, an alternative explanation might be that increasing US export sales drive the increase in US tax expense even as these US export sales were classified as foreign sales. If the amount of US export sales classified as foreign sales is sufficiently large, it would certainly bias the results in favor of a finding that income is being shifting into the US due to systemic measurement error within this variable. While the extent of any such bias is unknown, if the results are biased in this fashion then this would call into question any conclusions drawn based on equation (2) where the dependent variable is taxable income as a proportion of US sales which would also show systemic measurement errors due to the classification of US export sales if in fact the problem is widespread among sample firm years.

Therefore, more reliable conclusions about possible income shifting can be drawn from Equation (1) where current tax expense as a ratio of US long term assets was the dependent variable. The reason for this expectation of greater internal validity for parameters estimated for Equation (1) is two-fold. First, any material changes to the amount of a firm's long term US assets, even if in response to changing tax incentives would not generally be instantaneous. Even if US long term asset values fluctuate in response to changing tax incentives, such asset value changes would occur with a considerable response lag time. For this reason, the effect of income shifting into the US upon the dependent variable in Equation (1) would be reflected in the current tax expense numerator while the denominator, comprised of long term US assets, would

remain relatively more stable even in the presence of cross border income shifting by a firm.

Conversely, evidence of income shifting behavior, particularly tax motivated transfer price manipulations by a firm, would be likely to affect both the numerator and denominator of the dependent variable in Equation (2). Income shifting into the United States would inflate the numerator for increased current taxes due on the shifted income, while the denominator would likely also change from an increase to US sales revenue due to tax motivated transfer price manipulation designed to increase US income. At best, $USTUSS_{tj}$ is a noisy proxy variable with which to measure the latency of income shifting. Even if the evidence obtained from Equation (1) is more reliable for drawing inferences about these firms, the results from Equation (2) show a very high level of significance across the full and multinational samples for the coefficients on $LNDCTESO_{tj}$ in further support of H1.

An alternative explanation to Hypothesis 1 for these results could be that multinational firms are just more profitable than their domestic counterparts and it is this fact alone that drives any observed increase in the ratio US current taxes to assets? If multinational firms were merely more profitable, wouldn't the market reward these winning firms with higher and higher stock prices which would as a consequence, increase the amount of compensation deductions resulting from employees exercising their options with larger gains in excess of strike prices? There are two reasons to discount this particular alternative explanation for the findings. First, previous research points to multinational firms increasing global operations and profit margins outside the US without increasing overall global profitability (Grubert, 2012). Second, if the

observed level of US profitability measured by US taxable return on US Long term assets was due only to inherently greater profitability on the part of multinational firms, then the coefficient on $FGNRATIO_{tj}$ should have been positive and significant as multinational operations even if only related to US exports, would have been associated with increased profitability as measured by the dependent $USTUSA_{tj}$. The coefficient on $FGNRATIO_{tj}$ was insignificant upon each estimation of Equation (1) so that greater profitability on the part of multinational firms can be rejected in favor of increased return on long term domestic assets due to income shifting into the US by multinational firms facing tax motivated income shifting incentives. The income shifting incentives for these firms are the opposite of a more typical firm due to the effectively lower rates these option intensive firms face due to the extent of stock options exercised by their employees. Since this behavior is exogenously determined from the standpoint of these firms it is similar in nature to tax rate reductions which would also be exogenously determined by government.

Sufficient evidence exists within this study to reject the null hypothesis of no income shifting and instead to conclude that option intensive firms in the 1990's engaged in cross border income shifting, leading to the acceptance of H1. Hypothesis 2, which was essentially that option intensive multinational firms would show higher US profitability than shown by their option intensive purely domestic counterparts, cannot be supported by the evidence provided by these equations estimated on either the full sample or the bifurcated samples. Evidence of greater profitability on the part of multinational firms compared to their purely domestic counterparts was provided by the estimates of Equation (2) as the coefficient on $FGNRATIO_{tj}$ was both positive and

significant for both the full sample and the multinational sample. However due to the potential measurement errors inherent in $FGNRATIO_{tj}$ due to US export sale classification; I am reluctant to conclude that the evidence provided is sufficient to support H2.

The results of bifurcating the sample into multinational and domestic subsamples generate additional implications for future research. The much larger coefficients of determination resulting from the estimation of the purely domestic sample as compared to either the multinational sample or the full sample causes me to question the nature of the additional complexity within the US profitability of firms with multinational operations. Could the introduction of additional control variables increase the predictive ability of the regression equations and lead to a better understanding of the effects of stock option intensity on cross border income shifting? While the current study included those variables which previous research had documented as important to corporate income shifting behavior, other factors probably contribute to corporate profitability even if they have not been shown to contribute to the understanding of firm income shifting behavior.

Additionally, although I believe that in substance the effect of stock option deductions is essentially equivalent to a reduction in statutory rates individually faced by each firm, the actual form of these stock options remains a tax shield and a deduction against corporate income to the firm. If indeed the stock option tax benefit variable is a good proxy for a hypothetical corporate tax rate deduction on an individual firm basis, its estimation may have included significant noise within that estimation. Regression

equations (1) and (2) in total explain less than 15% of the variation in their respective dependent variables.

If stock option deductions are indeed essentially equivalent to a statutory rate deduction, perhaps they are in the nature of temporary tax rate reductions rather than actual long term permanent rate reductions. The importance of this distinction is with respect to any contribution by this research to the larger question of whether US corporate income taxes are too high relative to our non-US national competitors in the global economy. Beyond the scope of this discussion is the possibility that tax benefits from stock option exercise are in the nature of transitory benefits. Such transitory benefits were initially described by Milton Friedman. According to his permanent income hypothesis, transitory tax benefits would be less likely to change firm behavior (Friedman, 1992).

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APPENDICES

Appendix A

Firms Comprising the NASDAQ 100 Index on May 30, 2001

Apple Inc.	AAPL
Abgenix Inc	ABGX
Adobe Systems Incorporated	ADBE
ADC Telecommunications	ADCT
Adelphia Communications Corporation	ADELQ
Altera Corporation	ALTR
Applied Materials Inc.	AMAT
Applied Micro Circuits Corporation	AMCC
Amgen Inc.	AMGN
Amazon.com Inc.	AMZN
Ariba Inc	ARBA
At Home Corporation	ATHMQ
Atmel Corporation	ATML
Bed Bath & Beyond Inc.	BBBY
BEA Systems Inc.	BEAS
Biogen Inc	BIIB
Biotet Inc.	BMET
Brocade Communications Systems Inc	BRCD
Broadcom Corporation	BRCM
BroadVision Inc	BVSN
Concord EFS	CEFT
Chiron Corporation	CHIR
Check Point Software Technologies Ltd.	CHKP
CIENA Corporation	CIEN
Comcast Corporation - Special Class A	CMCSK
CMGI Inc (MLNK:2008)	CMGI
Comverse Technology Inc	CMVT
CNET Networks	CNET
Conexant Systems Inc (Formerly Rockwell Semiconductor Systems)	CNXT
3Com Corporation	COMS
Costco Wholesale Corporation	COST
Compuware Corporation	CPWR
Cisco Systems Inc.	CSCO
Cintas Corporation	CTAS
Citrix Systems Inc.	CTXS
Dell Inc.	DELL
Dish Network Corporation	DISH
Electronic Arts Inc.	EA
eBay Inc.	EBAY

LM Ericsson Telephone Company	ERICY
Exodus Communications Inc	EXDSQ
Fiserv Inc.	FISV
Flextronics International Ltd.	FLEX
Genzyme	GENZ
Gemstar-TV Guide International Inc	GMSTE
Human Genome Sciences Inc	HGSI
IAC/InterActiveCorp	IACI
IDEC Pharmaceuticals Corporation	IDPH
Immunex Corporation	IMNX
Inktomi Corporation	INKT
Intel Corporation	INTC
Intuit Inc.	INTU
i2 Technologies Inc	ITWO
Sun Microsystems	JAVA
JDS Uniphase Corporation	JDSU
Juniper Networks	JNPR
KLA Tencor Corporation	KLAC
Linear Technology Corporation	LLTC
Level 3 Communications Inc	LVLT
Microchip Technology Incorporated	MCHP
McLeodUSA Inccorporated	MCLD
Medimmune Inc.	MEDI
Mercury Interactive Corporation	MERQE
Metromedia Fiber Network Inc	MFNX
Millennium Pharmaceuticals Inc	MLNM
Molex Inc	MOLX
Microsoft Corporation	MSFT
Maxim Integrated Products Inc	MXIM
Novell Inc	NOVL
NetApp Inc.	NTAP
NVIDA Corporation	NVDA
Novellus Systems Inc	NVLS
Nextel Communications Inc	NXTL
Oracle Corporation	ORCL
Palm Inc	PALM
Paychex Inc.	PAYX
PACCAR Inc.	PCAR
PMC Sierra Inc	PMCS
Parametric Technology Corporation	PMTC
PeopleSoft Inc.	PSFT
QUALCOMM Incorporated	QCOM
QLogic Corp	QLGC

Rational Sortware Corporation	RATL
RF Micro Devices Inc	RFMD
RealNetworks Inc	RNWK
Sanmina-SCI Corp	SANM
Starbucks Corporation	SBUX
Siebel Systems Inc.	SEBL
Staples Inc.	SPLS
PanAmSat Corporation	SPOT
Smurfit-Stone Container Corp	SSCC
Tellabs Inc	TLAB
TMP Worldwide Inc. (Became Monster Worldwide, Inc 2003 MNST)	TMPW
VeriSign Inc.	VRSN
VERITAS Software Corporation	VRTS
Vitesse Semiconductior Corporation	VTSS
WorldCom Inc	WCOEQ
Xilinx Inc.	XLNX
XO Communications Inc	XOXO
Yahoo! Inc.	YHOO

Appendix B

Output from E-Views Statistical Analysis Software Package

OLS Fixed Effects Panel Regression Model Time Series Dummy Variables: Equation (1)

Dependent Variable: USTUSA
Method: Least Squares
Date: 11/15/12 Time: 13:07
Sample: 1 396
Included observations: 319

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.269280	0.319341	0.843238	0.3998
LNDCTESO	0.062839	0.019014	3.304858	0.0011
SIZE	0.032676	0.027937	1.169638	0.2431
FGNRATIO	-0.157539	0.161402	-0.976068	0.3298
SIC23	-0.605765	0.359549	-1.684790	0.0931
SIC26	0.594509	0.364113	1.632759	0.1036
SIC28	0.668122	0.269546	2.478692	0.0137
SIC35	0.283042	0.266944	1.060305	0.2899
SIC36	0.425415	0.263191	1.616374	0.1071
SIC37	0.259435	0.437615	0.592840	0.5537
SIC38	0.244484	0.310998	0.786128	0.4324
SIC48	0.852834	0.266420	3.201082	0.0015
SIC53	0.844425	0.351200	2.404398	0.0168
SIC57	0.317578	0.350331	0.906510	0.3654
SIC58	0.716262	0.350830	2.041621	0.0421
SIC59	0.846324	0.304365	2.780625	0.0058
SIC60	0.202207	0.350279	0.577274	0.5642
SIC73	0.503141	0.258592	1.945698	0.0526
DUM1997	0.149938	0.087934	1.705108	0.0892
DUM1998	0.121157	0.084417	1.435225	0.1523
DUM1999	0.061560	0.078664	0.782572	0.4345

R-squared	0.231359	Mean dependent var	0.311001
Adjusted R-squared	0.179772	S.D. dependent var	0.545487
S.E. of regression	0.494028	Akaike info criterion	1.491116
Sum squared resid	72.73106	Schwarz criterion	1.738981
Log likelihood	-216.8330	Hannan-Quinn criter.	1.590104
F-statistic	4.484863	Durbin-Watson stat	1.217456
Prob(F-statistic)	0.000000		

OLS Fixed Effects Panel Regression Model Time Series Dummy Variables: Equation (2)

Dependent Variable: USTUSS
Method: Least Squares
Date: 11/15/12 Time: 13:11
Sample: 1 396
Included observations: 341

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.008737	0.058523	-0.149294	0.8814
LNDCTESO	0.013107	0.003364	3.896417	0.0001
SIZE	0.003506	0.004982	0.703723	0.4821
FGNRATIO	0.091279	0.029201	3.125932	0.0019
SIC23	-0.006351	0.066320	-0.095758	0.9238
SIC26	0.032101	0.067002	0.479112	0.6322
SIC28	0.022989	0.049172	0.467523	0.6404
SIC35	0.027549	0.049227	0.559629	0.5761
SIC36	-0.012112	0.048504	-0.249700	0.8030
SIC37	0.054330	0.080692	0.673302	0.5012
SIC38	-0.036392	0.057361	-0.634433	0.5263
SIC48	0.081633	0.048799	1.672838	0.0953
SIC53	0.100516	0.064846	1.550064	0.1221
SIC57	0.021134	0.064682	0.326738	0.7441
SIC58	0.049605	0.064766	0.765917	0.4443
SIC59	0.088630	0.056173	1.577785	0.1156
SIC60	-0.017638	0.064673	-0.272730	0.7852
SIC73	0.040450	0.047549	0.850699	0.3956
DUM1997	0.021430	0.015800	1.356360	0.1759
DUM1998	0.011595	0.015089	0.768474	0.4428
DUM1999	0.001997	0.014069	0.141935	0.8872

R-squared	0.263636	Mean dependent var	0.076162
Adjusted R-squared	0.217613	S.D. dependent var	0.103136
S.E. of regression	0.091227	Akaike info criterion	-1.891332
Sum squared resid	2.663140	Schwarz criterion	-1.655351
Log likelihood	343.4722	Hannan-Quinn criter.	-1.797314
F-statistic	5.728380	Durbin-Watson stat	1.207335
Prob(F-statistic)	0.000000		

Results of LM Tests for Serial Correlation OLS Residuals: Equations (1) and (2)

Breusch-Godfrey Serial Correlation Lagrange Multiplier Test
Equation (1) OLS

F-statistic	32.66715	Prob. F(2,296)	0.0000
Obs*R-squared	57.67967	Prob. Chi-Square(2)	0.0000

Breusch-Godfrey Serial Correlation Lagrange Multiplier Test
Equation (2) OLS

F-statistic	30.87061	Prob. F(2,318)	0.0000
Obs*R-squared	55.44237	Prob. Chi-Square(2)	0.0000

First-Order Autoregressive OLS Panel Regression Fixed Effects Model: Equation (1)

Dependent Variable: USTUSA
Method: Least Squares
Date: 11/28/12 Time: 16:04
Sample (adjusted): 2 396
Included observations: 287 after adjustments
Convergence achieved after 14 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDCTESO	0.044230	0.022490	1.966638	0.0503
SIZE	0.068140	0.029786	2.287653	0.0229
FGNRATIO	-0.106405	0.227953	-0.466787	0.6410
SIC23	0.174046	0.423747	0.410731	0.6816
SIC26	0.569249	0.434747	1.309379	0.1915
SIC28	0.592628	0.230844	2.567220	0.0108
SIC35	0.102704	0.246442	0.416746	0.6772
SIC36	0.330098	0.220619	1.496232	0.1358
SIC37	0.771752	0.967002	0.798088	0.4255
SIC38	0.136196	0.324403	0.419837	0.6749
SIC48	0.912789	0.277349	3.291116	0.0011
SIC53	0.854959	0.394780	2.165661	0.0312
SIC57	0.212578	0.378764	0.561241	0.5751
SIC58	0.591383	0.375135	1.576452	0.1161
SIC59	0.895948	0.302662	2.960228	0.0034
SIC60	0.013400	0.393185	0.034080	0.9728
SIC73	0.449362	0.202287	2.221405	0.0272
DUM1997	0.179854	0.079913	2.250629	0.0252
DUM1998	0.137737	0.076046	1.811234	0.0712
DUM1999	0.081592	0.059074	1.381199	0.1684
AR(1)	0.506141	0.054738	9.246691	0.0000

R-squared	0.391947	Mean dependent var	0.325013
Adjusted R-squared	0.346229	S.D. dependent var	0.565780
S.E. of regression	0.457468	Akaike info criterion	1.344135
Sum squared resid	55.66765	Schwarz criterion	1.611902
Log likelihood	-171.8834	Hannan-Quinn criter.	1.451452
Durbin-Watson stat	2.026714		

Inverted AR Roots	.51

First-Order Autoregressive OLS Panel Regression Fixed Effects Model: Equation (2)

Dependent Variable: USTUSS
Method: Least Squares
Date: 11/28/12 Time: 16:01
Sample (adjusted): 2 396
Included observations: 313 after adjustments
Convergence achieved after 10 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDCTESO	0.007006	0.003753	1.866794	0.0629
SIZE	0.011568	0.005121	2.258792	0.0246
FGNRATIO	0.082471	0.038827	2.124062	0.0345
SIC23	0.126269	0.075321	1.676413	0.0947
SIC26	0.095159	0.076521	1.243571	0.2147
SIC28	0.057684	0.039034	1.477779	0.1405
SIC35	0.055648	0.043293	1.285371	0.1997
SIC36	0.023229	0.038650	0.601012	0.5483
SIC37	0.157343	0.165067	0.953205	0.3413
SIC38	0.010400	0.057418	0.181131	0.8564
SIC48	0.153787	0.048176	3.192210	0.0016
SIC53	0.114340	0.070435	1.623353	0.1056
SIC57	0.052756	0.067521	0.781334	0.4352
SIC58	0.082236	0.067104	1.225499	0.2214
SIC59	0.152652	0.054119	2.820689	0.0051
SIC60	-0.009602	0.069589	-0.137982	0.8903
SIC73	0.073924	0.035813	2.064163	0.0399
DUM1997	0.016274	0.013839	1.175980	0.2406
DUM1998	0.004195	0.013365	0.313846	0.7539
DUM1999	0.003470	0.010603	0.327240	0.7437
AR(1)	0.471725	0.053532	8.812039	0.0000

R-squared	0.414795	Mean dependent var	0.077683
Adjusted R-squared	0.374712	S.D. dependent var	0.105821
S.E. of regression	0.083678	Akaike info criterion	-2.058950
Sum squared resid	2.044576	Schwarz criterion	-1.807607
Log likelihood	343.2257	Hannan-Quinn criter.	-1.958507
Durbin-Watson stat	1.944122		

Inverted AR Roots	.47

EGLS Estimation Using Panel Weights: Equation (1)

Dependent Variable: USTUSA
Method: Panel EGLS (Period SUR)
Date: 12/03/12 Time: 12:42
Sample: 1997 2000
Periods included: 4
Cross-sections included: 89
Total panel (unbalanced) observations: 319
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.325457	0.379276	0.858100	0.3915
LNDCTESO	0.041090	0.017540	2.342668	0.0198
SIZE	0.027775	0.027041	1.027165	0.3052
FGNRATIO	-0.007588	0.179349	-0.042307	0.9663
SIC23	-0.718941	0.459801	-1.563594	0.1190
SIC26	0.527535	0.470238	1.121849	0.2628
SIC28	0.583535	0.344390	1.694404	0.0912
SIC35	0.251775	0.341562	0.737130	0.4616
SIC36	0.416460	0.335663	1.240706	0.2157
SIC37	0.326254	0.569594	0.572782	0.5672
SIC38	0.206770	0.398959	0.518274	0.6047
SIC48	0.732187	0.342280	2.139145	0.0332
SIC53	0.754737	0.453622	1.663800	0.0972
SIC57	0.220656	0.452668	0.487456	0.6263
SIC58	0.654551	0.452910	1.445212	0.1494
SIC59	0.718614	0.392336	1.831631	0.0680
SIC60	-0.009366	0.452676	-0.020690	0.9835
SIC73	0.467732	0.331020	1.413000	0.1587
DUM1997	0.104707	0.090856	1.152453	0.2501
DUM1998	0.080445	0.061600	1.305918	0.1926
DUM1999	0.056626	0.043032	1.315921	0.1892

Weighted Statistics

R-squared	0.144652	Mean dependent var	0.444451
Adjusted R-squared	0.087246	S.D. dependent var	1.065026
S.E. of regression	1.012382	Sum squared resid	305.4251
F-statistic	2.519808	Durbin-Watson stat	1.967813
Prob(F-statistic)	0.000434		

Unweighted Statistics

R-squared	0.221161	Mean dependent var	0.311001
Sum squared resid	73.69601	Durbin-Watson stat	0.795042

EGLS Estimation Using Panel Weights: Equation (2)

Dependent Variable: USTUSS
Method: Panel EGLS (Period SUR)
Date: 12/03/12 Time: 12:46
Sample: 1997 2000
Periods included: 4
Cross-sections included: 94
Total panel (unbalanced) observations: 341
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.010755	0.072680	-0.147976	0.8825
LNDCTESO	0.007368	0.003127	2.356550	0.0190
SIZE	0.005135	0.004935	1.040668	0.2988
FGNRATIO	0.083459	0.033546	2.487883	0.0134
SIC23	-0.045651	0.089026	-0.512782	0.6085
SIC26	0.033882	0.090055	0.376236	0.7070
SIC28	0.002743	0.065967	0.041578	0.9669
SIC35	0.009557	0.066038	0.144713	0.8850
SIC36	-0.024371	0.064987	-0.375023	0.7079
SIC37	0.055896	0.108526	0.515045	0.6069
SIC38	-0.057552	0.077200	-0.745489	0.4565
SIC48	0.042629	0.065601	0.649817	0.5163
SIC53	0.078020	0.087915	0.887441	0.3755
SIC57	0.006285	0.087741	0.071637	0.9429
SIC58	0.032394	0.087847	0.368760	0.7126
SIC59	0.062232	0.076069	0.818107	0.4139
SIC60	-0.039534	0.087749	-0.450537	0.6526
SIC73	0.020307	0.063961	0.317486	0.7511
DUM1997	0.011790	0.014476	0.814466	0.4160
DUM1998	0.002087	0.011721	0.178064	0.8588
DUM1999	0.000709	0.010444	0.067848	0.9459

Weighted Statistics

R-squared	0.149019	Mean dependent var	0.575441
Adjusted R-squared	0.095833	S.D. dependent var	1.044148
S.E. of regression	0.992332	Sum squared resid	315.1111
F-statistic	2.801839	Durbin-Watson stat	1.811549
Prob(F-statistic)	0.000080		

Unweighted Statistics

R-squared	0.247697	Mean dependent var	0.076162
Sum squared resid	2.720785	Durbin-Watson stat	0.840365

EGLS Estimation Using Panel Weights: Multinational Sample Equation (1)

Dependent Variable: USTUSA
Method: Panel EGLS (Period SUR)
Date: 12/09/12 Time: 09:09
Sample: 1997 2000 IF FSALES>0
Periods included: 4
Cross-sections included: 76
Total panel (unbalanced) observations: 259
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.056233	0.290009	-0.193900	0.8464
LNDCTESO	0.053914	0.019010	2.836027	0.0049
SIZE	0.018712	0.031961	0.585462	0.5588
FGNRATIO	0.072067	0.232312	0.310218	0.7567
SIC28	0.195245	0.223029	0.875424	0.3822
SIC35	-0.085203	0.177927	-0.478862	0.6325
SIC36	0.067795	0.166062	0.408251	0.6834
SIC48	0.326756	0.220656	1.480843	0.1399
SIC73	0.134535	0.157937	0.851829	0.3951
DUM1997	0.133162	0.109349	1.217765	0.2245
DUM1998	0.110245	0.072244	1.526006	0.1283
DUM1999	0.059904	0.048945	1.223918	0.2221

Weighted Statistics

R-squared	0.068936	Mean dependent var	0.412967
Adjusted R-squared	0.027472	S.D. dependent var	1.020377
S.E. of regression	1.000609	Sum squared resid	247.3007
F-statistic	1.662533	Durbin-Watson stat	1.895068
Prob(F-statistic)	0.082498		

Unweighted Statistics

R-squared	0.117993	Mean dependent var	0.336754
Sum squared resid	77.54782	Durbin-Watson stat	0.723978

EGLS Estimation Using Panel Weights: Domestic Sample Equation (1)

Dependent Variable: USTUSA
Method: Panel EGLS (Period SUR)
Date: 12/09/12 Time: 09:14
Sample: 1997 2000 IF FSALES=0
Periods included: 4
Cross-sections included: 24
Total panel (unbalanced) observations: 60
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.178016	0.159300	1.117492	0.2692
LNDCTESO	-0.032199	0.015879	-2.027787	0.0480
SIZE	0.074194	0.018923	3.920905	0.0003
SIC28	0.474753	0.082786	5.734673	0.0000
SIC35	0.371756	0.115946	3.206296	0.0024
SIC36	0.299352	0.083555	3.582705	0.0008
SIC48	0.607671	0.082349	7.379247	0.0000
SIC73	0.365347	0.071751	5.091897	0.0000
DUM1997	-0.097058	0.079734	-1.217268	0.2293
DUM1998	-0.060475	0.072604	-0.832946	0.4089
DUM1999	-0.018006	0.040733	-0.442044	0.6604

Weighted Statistics

R-squared	0.643066	Mean dependent var	0.909382
Adjusted R-squared	0.570222	S.D. dependent var	1.396966
S.E. of regression	0.952727	Sum squared resid	44.47674
F-statistic	8.828033	Durbin-Watson stat	1.182437
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.549329	Mean dependent var	0.199831
Sum squared resid	2.608336	Durbin-Watson stat	0.736637

EGLS Estimation Using Panel Weights: Multinational Sample Equation (2)

Dependent Variable: USTUSS
Method: Panel EGLS (Period SUR)
Date: 12/09/12 Time: 09:12
Sample: 1997 2000 IF FSALES>0
Periods included: 4
Cross-sections included: 81
Total panel (unbalanced) observations: 280
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.027519	0.049734	-0.553324	0.5805
LNDCTESO	0.009735	0.003332	2.921782	0.0038
SIZE	0.003022	0.005502	0.549317	0.5832
FGNRATIO	0.092633	0.039726	2.331821	0.0205
SIC28	-0.024421	0.035809	-0.681969	0.4958
SIC35	-0.004093	0.031899	-0.128296	0.8980
SIC36	-0.046312	0.028621	-1.618093	0.1068
SIC48	0.026503	0.033695	0.786574	0.4322
SIC73	0.005717	0.027118	0.210823	0.8332
DUM1997	0.013039	0.016485	0.790981	0.4297
DUM1998	0.004531	0.013209	0.343026	0.7318
DUM1999	-0.000954	0.011953	-0.079801	0.9365

Weighted Statistics

R-squared	0.130861	Mean dependent var	0.603176
Adjusted R-squared	0.095187	S.D. dependent var	1.046775
S.E. of regression	0.992491	Sum squared resid	263.9904
F-statistic	3.668274	Durbin-Watson stat	1.768573
Prob(F-statistic)	0.000072		

Unweighted Statistics

R-squared	0.220115	Mean dependent var	0.085091
Sum squared resid	2.565298	Durbin-Watson stat	0.822175

EGLS Estimation Using Panel Weights: Domestic Sample Equation (2)

Dependent Variable: USTUSS
Method: Panel EGLS (Period SUR)
Date: 12/09/12 Time: 09:13
Sample: 1997 2000 IF FSALES=0
Periods included: 4
Cross-sections included: 25
Total panel (unbalanced) observations: 61
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.028135	0.041139	0.683889	0.4972
LNDCTESO	-0.011671	0.004064	-2.871883	0.0060
SIZE	0.011453	0.005092	2.249052	0.0289
SIC28	0.055781	0.019144	2.913727	0.0053
SIC35	0.052983	0.029900	1.772036	0.0825
SIC36	0.005079	0.020970	0.242229	0.8096
SIC48	0.031445	0.019571	1.606732	0.1144
SIC73	0.028882	0.017208	1.678387	0.0995
DUM1997	-0.026150	0.019040	-1.373442	0.1757
DUM1998	-0.015887	0.017043	-0.932188	0.3557
DUM1999	-0.004738	0.009506	-0.498380	0.6204

Weighted Statistics

R-squared	0.342119	Mean dependent var	0.716760
Adjusted R-squared	0.210543	S.D. dependent var	1.057974
S.E. of regression	0.940083	Sum squared resid	44.18778
F-statistic	2.600156	Durbin-Watson stat	1.269861
Prob(F-statistic)	0.012655		

Unweighted Statistics

R-squared	0.196071	Mean dependent var	0.035177
Sum squared resid	0.162789	Durbin-Watson stat	0.933210

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