2013

The Impact of the Security Transaction Taxes on Stock Prices and Stock Liquidity; Evidence from the NYSE

Vedika Agarwal
Claremont McKenna College

CLAREMONT McKENNA COLLEGE

THE IMPACT OF THE SECURITY TRANSACTION TAXES ON STOCK PRICES AND STOCK LIQUIDITY; EVIDENCE FROM THE NYSE

SUBMITTED TO

PROFESSOR ERIC HUGHSON

AND

DEAN GREGORY HESS

BY

VEDIKA AGARWAL

FOR

SENIOR THESIS

SPRING, 2013

APRIL 29th, 2013

Acknowledgements

I would like to take this opportunity to thank everyone who has helped in their own way for this thesis project. I want to start by thanking my family, especially my parents and my grandmother for their exceptional trust and faith in me. Without their hard work I would not be at Claremont McKenna College. I would like to thank my economic professors for their teachings. Without the knowledge they imparted, I would not be able to understand many concepts used in this paper. Finally I would like to thank my reader, Professor Eric Hughson. His guidance, support and encouragement helped me from the start to the finish of this project. He was always more than willing to discuss and answer my questions and queries on the thesis topic. His insights and suggestions go a long way to make this thesis possible.

Abstract

Security Transaction taxes have been in place in many countries for many years now. Yet we do not fully know how these taxes effect prices, volumes, bid-ask spreads and volatility and in turn if they are good for the economy or not. This paper is an attempt to understand how security transaction taxes decrease volume of trading, decrease prices of stocks and increase bid-ask spreads. It analyses the effect the STTs implemented by the state and federal government in New York on June 1st 1905 and December 1st 1914 respectively, had on the stocks of the New York Stock Exchange. These results will help us analyze whether future implementations of STTs will harm or benefit the market.

Table of Contents

I. Introduction

Security Transaction Taxes (STTs) are attracting a lot of interest today. This is because some of the member states of the European Union are implementing STTs in 2014. Moreover the United States of America has also seen many proposals for implementation of STTs. The reason countries in general want to implement STTs, is because it is a good source of revenue. The governments of these countries have a budget deficit from bailing out insolvent financial organizations as a result of the financial crisis of 2007-2009. The government feels that because the financial industry is partly responsible for the crisis, it should pay their dues by bearing the cost of STTs. However, because there is uncertainty about the effects these taxes have on the economy, governments are hesitant in implementing these taxes.

Even though there is a dearth of evidence on the effects of these taxes, there have been some theoretical and empirical studies in this field. Fortunately, historically we have a natural experiment which can help us study the effects of STTs. In 1905 the state of New York implemented a state STT of 2 basis points per 100$ of par value. In 1914 the US government implemented a federal tax of 2 basis points per 100$ of par value. This raised the total STT in New York to 4 basis points per 100$ of par value in 1914. This paper uses this natural financial experiment to analyze the effect of STT on the economy.

This paper looks specifically at the effect the STT imposed on 1st June 1905 and 1st December 1914 in New York City, has on volume, prices and bid- ask spreads. It looks at the monthly change in volume, price, bid-ask spread and bid-ask percent to see the direction these variables change in because of the tax. It also calculates whether these changes are statistically significant.

After analyzing the above observations it was found that price and bid-ask spreads move in the opposite direction as proposed in the hypothesis. The paper hypothesis that volumes and prices should decrease, while bid-ask spreads should increase as a result of STTs. However, analysis of the experiment shows that price tends to increase when it should decrease, while bid-ask spreads tend to decrease when it should increase. Moreover, these changes are not statistically significant. Volume is seen to mostly decrease. This agrees with the proposed hypothesis. There are some statistically significant changes in volume, price and bid-ask spreads that take place months before and after the implementation of the tax. In general there is no specific trend seen after the implementation of the tax, with prices and bid-ask spread being very volatile in the months before and after the tax.

The following section of this paper is section II on the Literature Review. It looks at the background of STTs and recent news about their implementation in the European Union. This section also looks into the history of STTs in United States of America and elaborates some existing theoretical and empirical work on the effects of STTs on the economy. Section III lays down the hypothesis and the reasons for these claims. It then talks about the model used for the experiment. Section IV describes the data and methodology. Section V contains the results while section VI discusses the meaning of these results. Section VII lays down the conclusion.

II. Literature Review

Securities Transaction tax, is a tax imposed on the purchase and sale of securities. This tax could apply to stocks, bonds, derivative instruments, mutual funds, exchange-traded funds (ETFs) and other securities. Sometimes STTs can be specific and apply to transaction involving certain securities like stocks and derivatives but not bonds and mutual funds. Other times STTs can be specific in terms of the type of traders it applies to. It can apply to all traders, or be limited to institutional traders while not including individual traders. This tax has been around for a long time and has been implemented in many countries. Currently at least 29 countries-including Australia, Brazil, China, France, Hong Kong, India, Ireland, Japan, Russia, South Korea, Switzerland, Taiwan and the United Kingdom - have some form of STT.

The most recent news in the field of STTs is about the European Union Financial transaction tax (EU FTT). A proposal by the European commission, will introduce FTT within some EU member states by 2014. This proposal imposes a 0.1% tax on equity and bonds and a 0.01% tax on derivative transactions. It is said that this tax has the capability to raise 57 billion Euros per year. It is implemented to make the financial sector pay for the bailouts it received during the crisis. However, this tax has been very controversial with the proposal failing to get unanimous support for an EU wide implementation of FTTs in October 2012. The European Commission allowed the use of enhanced co-operation[1] to implement tax in those EU member states that wanted to do so. This proposal supported by eleven EU members including France, Germany, Italy, Austria,

[1] A procedure which allows a minimum of nine EU member states to implement advanced integration or cooperation, without involving the other EU members as long as the majority of EU's 27 countries give their permission. This is also used for divorce and patents in EU.

Belgium, Estonia, Greece, Italy, Portugal, Slovakia and Spain was approved by the European Parliament in December 2012 and the Council of the European Union in January 2013 (Economist article- Europe's financial-transaction tax- 23rd February 2013)

People have different opinions about the EU FTT. Banks and businesses in Europe are worried that the FTT will drive share, currency and derivative trading out of Europe. This tax which is implemented by only eleven of the EU member states might have a negative impact on the whole of Europe. To partially mitigate this risk, the EU commission proposes to tax transaction based on issuance and residency. People are also worried that because the tax is not implemented all over Europe it might drive trading to member states outside the eleven EU member states involved. UK already imposes a stamp tax on its traders since 1694 and maybe this FTT will help improve trading in UK. Sweden levied a FTT in the 1980's which led to 60% of its trading volume moving to London. This tax was repealed in 1991. Being a firsthand witness to the movement of stock market trade outside its country, Sweden cautioned against the implementation of the EU FTT. Moreover, it is said that this tax may have a global effect also. Many countries including USA buy and sell stocks and bonds in European markets and engage in business with European banks. Many people think that the best solution to this problem is a global STT. (The Guardian: EU approves financial transaction tax for 11 eurozone countries-22nd January 2013)

STT have been around for a long time. The oldest FTT that is still in existence is the stamp duty put on the London stock exchange in 1694. During 1694, stamp duty was a tax paid on instruments like written documents which were given a physical stamp. During the 18th and 19th century this tax extended to many more items like newspaper,

playing cards, hats etc. The money collected would go to the government directly. In the recent years the number of goods this stamp tax covers has decreased a lot. In 1986 stamp duty reserve tax was imposed on shares and other securities. On 1st December 2003 stamp duty was mostly abolished apart from duty on shares and securities. Stamp duty land tax was introduced on the same day on land transactions

Today, the stamp tax in UK is 50 basis points or 0.5%. This tax has caused trading in UK to move to securities that are not taxed. So while trades in equities have decreased, trading in options and derivatives (that are not taxed) have increased. Rather than trading stocks of firms listed on the London Stock Exchange, investors are trading American Depositary Receipt[2]s (ADRs). Moreover investors are using Contracts for Differences [3](CFDs) to avoid transaction tax (Investment company institute-STT)

United States of America has also implemented STTs in the past. The state of New York imposed a STT in 1905, to help generate money to ease the state deficit. In the next eight decades the tax was revised approximately nine times with prices moving up and down. In 1932 the tax which was initially 2 cents on 100$ par value was doubled (because of the effects of the Great Depression). In March 1933 firms lowered their par value to less than $10 from $100, reducing tax paid by a lot. As a result, in June 1933 the tax was changed to per share rather than per $100 par value. In 1966, John V. Lindsay- the mayor of New York City- raised the tax by 25%. The immediate effect was the NYSE threatening to move across the Hudson River to New Jersey. In the late 1970's the tax started to phase out and was completely phased out in 1981. Till today, the state of New

[2] Securities of non-US companies that are traded on US financial markets
[3] Contract between a buyer and a seller stating, that the seller will pay to the buyer the difference between the current value of the asset and its value at the time of transaction. If this difference is negative the buyer pays the seller

York collects STTs which accounts to billions of dollars but returns it to the traders immediately (New York Times- In Wall St. Tax, a Simple Idea but Unintended Consequences- 26th February 2013).

The introduction of this tax reduced the profits of traders and hence they traded more in an attempt to earn back their lost profits. As a result in the first month under this tax, the turnover rate in the New York Stock Exchange jumped from an already high 191% in 1905 to 244% in 1905 and 240% in 1906. Shares were changing hands once every twenty weeks (Wall Street Journal-Why a Financial-Transaction Tax Could Backfire-13th December 2011)

NYC state tax 1905-1981 [4]						
Date	Year	Tax (dollar/ dollar of par value)				Information
June 1st	1905	$0.02				two cents per $100 of par value on stocks traded, transferred or delivered in NY state
March 1st	1932	$0.04				four cents on $100 par value of stock transferred in NY state on round lots. **Tax doubled, one of the reasons can be the after effects of the great recession (1929-32)**
		P<$5	**$5<P<$10**	**$10<P<$20**	**$20<P**	
June 2nd	1933	$0.030			$0.040	changed to per share basis
July 1st	1945	$0.010	$0.020	$0.030	$0.040	reduced for stock less than $10
July 1st	1966	$0.013	$0.025	$0.038	$0.050	25% increase. NYSE threatened to move outside NY to evade tax.
October 1st	1968	$0.013	$0.025	$0.038	$0.050	An amendment was made which capped the max tax on one trade at $350
August 1st	1975	$0.016	$0.031	$0.047	$0.063	25 % surcharge
August 1st	1978	$0.013	$0.025	$0.038	$0.050	25 % surcharge expires
October 1st	1979	$0.009	$0.002	$0.026	$0.035	after 30% rebate
October 1st	1980	$0.005	$0.010	$0.015	$0.020	after 60% rebate
October 1st	1981	$0.000	$0.000	$0.000	$0.000	after 100% rebate

[4] Taken from: Pomeranets Anna and Daniel Weaver. "Security Transaction Taxes and Market Quality"

After World War I, Civil War and Spanish-American War, the federal government of USA was not in a very good financial condition. To help share the financial burden, the federal government imposed a STT of 2 basis points per 100$ of par value from 1914-1965. It was increased to a range between 4 to 6 basis points from 1932 through 1941. The tax was repealed in 1965. In 1966 the calculated STT was 0.1% on security issuance and 0.04% on transfer.

Currently the Securities and Exchange Commission (SEC) imposes a tax of 0.224 basis points on stock transaction under the "Section 31 fee". The proceeds from this STT are used to fund the agency.

Federal tax 1914-1966[5]

Date	Year	Tax (dollar/ dollar of par value)		Information
		P <$20	P >$20	
December 1st	1914	$0.020		two cents per $100 of par value to help pay for the cost of US involvement in WWI
September	1916	$0.000		tax was repealed
December	1917	$0.020		Reinstated
June 21st	1932	$0.040	$0.050	stocks without par value where taxed on a per share basis
September 20th	1941	$0.050	$0.060	tax increased
January	1966	$0.000	$0.000	after 100% rebate

Except for the presence of the small STT by the SEC, the US government has not implemented STTs for a long time now. However, recently a number of proposals to implement STTs have been proposed in the 112th United States Congress. H.R 3313, H.R 3638, H.R 5727, S.1787 and S. 2252 are proposals that want to impose a three-basis-point fee on non-consumer transactions involving stocks, bonds, futures, options swaps and credit default swaps. H.R. 1125 is another proposal that wants to impose a 1%

[5] Taken from: Pomeranets Anna and Daniel Weaver. "Security Transaction Taxes and Market Quality"

transaction fee on all transactions in the economy not only security transactions. The objective of these proposals is to eliminate national debt and individual income tax.

H.R 3313 is one of the more famous proposals. It was introduced in the House of Representatives by Representative Peter DeFazio and Senator Tom Harkin on November 2nd, 2011. This proposal is called "Wall Street Trading and Speculators Tax Act" and asked for a tax of 3 basis points on the purchase of a security. This is more than 10 times the tax that the SEC charges currently. This tax applies to stocks, notes, bonds, debentures, derivatives-options, futures and swaps. It exempts initial issuance, securities lending and debt with a fixed maturity of 100 days or less. In case of stocks, partnership interests and debt, the base for this tax is the fair market value of these securities. While in the case of derivatives, the base of this tax is the cash flow generated by the contracts. There have been many debates on the effect that this tax will have. Some people believe that this proposal like any other STT would hurt the financial markets. The tax could reduce volume and liquidity resulting in wider bid-ask spreads. This would also increase taxes on middle-class investors, depress the value of the financial asset and increase hedging costs.

This is where the study of the STTs on the NYSE in 1905 and 1914 can be useful. Understanding the effects the 1905 and 1914 STTs had on the NYSE can help forecast the impact the new STT might have on the US financial markets. There are some differences between the proposed DeFazio-Harkin tax and the STTs of 1905 and 1914. The former applies to a wider range of securities while the latter applied only to stock transfers. From 1914 to 1958 the latter tax applied to the par value of the stock while the new STT will apply to the market value of the stock. A stocks par value is usually less

than its market value. It was only in 1959 that the older STTs applied to the stocks market value and became more comparable to the DeFazio/Harkin tax. Transaction costs have decreased a lot since 1965. Hence a STT of this magnitude would have a far greater impact proportionally on investments today than it had in 1914. Moreover, algorithmic trading[6] which is present today was not in existence 1905. Algorithmic traders provide liquidity which could counteract the decreasing effect STTs have on liquidity.

The effect of STTs on the economy is being debated since 1987. This is because we are not sure how these taxes effect price, volume, bid-ask spreads and volatility. While some argue that STT will improve the economy, others are against it, and think it might harm the economy. The following paragraphs state the arguments and conclusions of a few theoretical and empirical papers on the effect of STTs on the economy, particularly its effect on volume, price, bid-ask spread and volatility.

The papers by Stiglitz (1989) and Summers and Summers (1989) consider STTs of a lower rate between 0.5-1% and 0.5% of the value of the transactions respectively. They both agree that this kind of STT can be beneficial to the economy. While both of them say that STTs will discourage speculative trading leading to a reduction in volatility, Stiglitz (1989) also mentions that STTs will not lead to an increase in spreads. Schwert and Seguin (1993) slightly disagree with them and say that while STTs may not affect volatility, they can increase bid-ask spreads. Moreover they say that STTs reduce volume and prices.

The papers by Stiglitz (1989) and Summers and Summers (1989) state that STTs mainly affect those who buy and sell in the same day, or with a few days or weeks. These

[6] When trading orders are entered using an algorithm by electronic platforms. These algorithms are pre-programmed trading instructions and may initiate the order without human interaction.

kinds of transactions are generally carried by noise traders. Because STTs mainly reduce the activity of speculators, price volatility deceases. STTs hardly affect those people who have long term investments. If the proportion of investors that invest in long term assets increase, firms will need to shift their attention from short term to long term investments. This reorientation of managerial focus because of STTs can help the economy. Schwert and Seguin (1993) seem to have a different view on the effect of STTs on volatility. They say that STTs may not necessarily lead to a decrease in volatility. According to Schwert and Seguin (1993), STTs may not reduce price volatility because STT affects all traders equally. Hence it will reduce the activities of price-stabilizing, liquidity providing informed traders as well as the activities of noise traders. It is not very clear whether STT will have a greater effect on price-stabilizing or price de-stabilizing traders. Because of this uncertainty, the upward or downward movement in price volatility is also uncertain.

Stiglitz (1989) says that STTs may not have an effect on bid-ask spreads and hence may not lead to larger spreads. He says that STT may discourage some buyers and sellers from trading. If this effect is symmetric, it will lead to thinner markets. Because in thinner markets, it takes a longer time for a buyer to be matched to a seller, the market maker needs to buy the security and hold it till the seller arrives. The market makers need to be compensated for this function which includes the risk they bear and the capital which is tied up. Hence a STT may increase the spreads. However, Stiglitz points out that for stocks that are widely sold, market makers do not need to step in. Hence STTs may not necessarily lead to larger spreads. Schwert and Seguin (1993) have a different view about the effect of STTs on bid-ask spreads. They say that STTs will increase bid-ask

spreads. They believe that because the different components of the spread are increasing, the spread increases as a whole.

Schwert and Sequin (1993) say that a tax on transaction will reduce prices. STTs increase the total cost of transacting in the secondary market. Because required rates of return are directly proportional to transacting costs, an increase in transacting cost will increase the required rate of return. This would thus reduce the asset price. They also say that more liquid and actively traded security would experience a larger drop in prices.

According to Schwert and Sequin (1993) STTs will lead to a decrease in volume. This is because of three reasons. Firstly, STTs discourage trading. Secondly, this tax would induce distortions. Short term trades need to be rolled over often, which may be costly because of a STT. Hence traders might shift to long term assets. Both buyers and sellers would reorganize the structure and quantities of assets they hold to reduce the payment of taxes. Thirdly, in extreme circumstances the volume could fall to zero, if trading moves to a different country.

According to Stiglitz (1989), STTs promotes economic efficiency. This is done through the exchange and the capital-raising functions. Just as tariffs have a negative effect on the exchange of goods; STTs impede the exchange of assets. However, inefficiency in exchange is not that big. This is because first, the proposed taxes are sufficiently small that the deadweight loss that is generated is negligible. Secondly, it is very difficult to interpret the welfare loss associated with reduced trades based on incorrect expectations. The second way that STTs promote market efficiency is by making it easier for firms to raise money. Because STT reduce volatility, buyers of stocks bear less risk concerning the selling price they will receive. Moreover, reducing volatility

also leads to better allocation of capital for firms. Firms issue more shares when their share value is over-valued. This investment is not socially desirable because of unreasonable expectations. Because STT reduce volatility the prices of stocks will not be over-valued and hence firms will not make undesirable investments. Unlike Summers and Summers (1989) and Stiglitz (1989), Schwert and Seguin say that STT will reduce market efficiency by raising cost of trades that take advantage of asset mispricing. It also leads to an increase in the cost of transacting by directly increasing transaction costs and indirectly increasing bid-ask spreads. This could lead to more asset mispricing.

III. Model

This paper hypothesis that implementation of STTs will decrease volume, decrease price and increase the bid-ask spreads. The following paragraphs give reasons for these claims. The hypothesis relies on the logic that when spreads increase, volume and price decrease. As said in Amihud and Mendelson (1986), the spread between the bid and the ask price is a measure of illiquidity because it is the sum of the buying premium and the selling concession. This spread is negatively related to liquidity. As the spread increases, liquidity characteristics like trading volume, the number of shareholders and the number of market makers trading the stock decrease. Because of this negative relationship it makes sense to say that volume decrease as spreads increase. As spreads increase, price of stocks are said to fall because according to Amihud and Mendelson (1986) there is a positive relation between stock returns and illiquidity. When bid-ask spreads increase, the liquidity decreases (as mentioned in the above paragraph). This reduction in liquidity or increase in illiquidity increases the rate of returns, which reduce the price of the asset. Therefore, if bid-ask spreads increase volume and prices will both decrease

The bid-ask spread can be decomposed into three parts, order processing, inventory risk and information asymmetry. Because the different components of the spread are increasing, the spread increases as a whole (Schwert and Seguin, 1993). The order processing cost/ clearing cost is the fixed cost the market-maker charges for trade execution. As the volume decreases with the implementation of STT, the number of transaction across which the fixed cost could be spread decreases. This leads to an increase in the fixed cost. The inventory risk/ inventory carrying costs are the market

maker's compensation for holding on to risky assets. Equity traders use derivatives to hedge their risky assets. A tax of these securities will increase their cost on hedging. Because the cost for hedging increases, the cost of inventory risk will also increase. The information asymmetry represents the likelihood that a market maker is facing an informed trader who had superior knowledge of the assets fundamental value. If it is believed that STT reduces the activities of noise traders more than it reduces the activity of informed traders, the probability of the market maker facing an informed trader increases. This increases the information asymmetry element of the bid-ask spread. All the elements of the bid-ask spreads increase with the issuance of STTs which leads to an increase in the bid-ask spread.

Other reasons for the increase in bid-ask spread can be attributed to the reduction in the activities of noise traders due to the implementation of STTs. Reduction in the activities of noise traders leads to less market liquidity. Because markets are thinner (less liquid) it is difficult for buyers and seller to get matched quickly and as a result the market maker needs to hold on to the security. The market maker need to be compensated for holding on to the asset because firstly, he is using his capital which he could have invested elsewhere and secondly, holding on to a security is risky. This compensation to market makers increase bid-ask spreads. A similar event is seen in 1914 with the implementation of a federal tax of 2 basis points per 100$ par value. This increased the total tax in New York to 4 basis point per 100$ par value (this is because the state tax of 2 basis points per 100$ par value was already present). This increase in STT, wiped out the profits of floor traders and as a result the number of floor traders dropped from 200 to 50 (Meeker 1922). Floor traders are type of dealers who traded in the stock market for very

small and quick profits. They executed their own trade and hence did not need to pay commission to a broker. The increase in STT reduced the liquidity in the markets because the floor traders decreased significantly. This affected the specialists, who could execute orders either for themselves or act as stock brokers. The specialist who acted as dealers had the opportunity to buy more securities only to sell them at a slightly higher price later. This is very similar to the job of market makers today. These specialists had to take into account the STT and hence sold the securities for a higher price. As a result the bid-ask spread increased.

For this study, I follow the methodology outlined below. I have monthly data on volume, price, bid-ask spread and bid-ask percent for all the stocks in the NYSE for six months before and after the implementation of the 1905 and 1914 taxes. I sort all the stocks by month and then calculate the monthly average and monthly change in volume, price and bid-ask spread. This is done first with all the observations. Then the data set is refined for robustness. The same test is performed with all the data used in the first test but after removing the outliers. The observations which are more than three standard deviations away from the mean are removed to perform this test. Then the test is done with stocks that have been checked for outliers as well as have data for all six months. This removes almost half of the observations, because many stocks had data for only one or two months rather than for all six months. After that, the test was done with stocks that were checked for outliers, had data for six months as well as were present before and after the tax. This led to the removal of more observations. There were many stocks that had data for the six months before the tax but were not present after the tax or vice versa. This is done to prevent stocks that were present for a short period of time but had extreme

values to affect the analysis. It also prevents stocks that were present before the tax but not after the tax from skewing the results. Then I find t-statistics for the above tests to understand which of these changes were significant.

I also calculate how many stocks increased or decreased after the implementation of both the taxes. This was done using data only for one month before and after the tax. These months included May 1905 and June 1905 for the June 1st 1905 tax and July 1914 and January 1915 for the December 1st 1914 tax. The data was cleaned to include only those stocks that were present before and after each tax.

IV. Data

The data set used for the following tables includes monthly data for volume, price, bid-ask spreads and bid-ask spread percentage for all the stocks on the NYSE for a period of six months before and after the implementation of both the taxes. For the period six months before and after the June 1st 1905 tax, I considered the months from December 1904 to May 1905 and the months of June 1905 to November 1905 respectively. For the period six months before and after the December 1st 1914 tax, I considered the months of February 1914 to July 1914 and the months of January 1915 to June 1915 respectively. I do not look at data for the months of August 1914-December 1914 as the NYSE was closed because of the effects of World War I that started on July 31st 1914. The data set does not have volumes for all the stocks and so the analysis for the change in volume due to the tax might be affected. This is alright because even though the effect of STTs on price bid-ask spread and volatility is not known for sure. Most people agree that STTs reduce volume.

The Terminology used in this paper is outlined below. The Price in the data set is the average of the ask closing price and the bid closing price. The Bid-ask spread is the difference between the ask closing price and the bid closing price. The bid-ask spread percentage is the difference in the ask closing price and the bid closing price divided by the price. The volume is the number of shares traded.

The following paragraphs talk about the tests performed to understand the change in volume, price, bid-ask spread and bid-ask percent. For table 1a and 1b, data for six months before and after the tax was used as it is, without deleting any stock. The monthly average and change in volume, price and bid-ask spread was calculated. There are 1502

and 1479 observations for the six month period before and after the 1905 tax respectively. The number of observations in the six months before and after the 1914 tax is 1773 and 1652 respectively. The numbers that are bolded are averages and changes in volume, price and bid-ask spreads for the months after the tax. They have been bolded for the ease of identification.

Table 1a

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1905 tax

	Average Volume	Change in Volume	Average Price	Returns	Average Bid-ask Spread	Change in spread	Average Bid-ask %
1904 December	-	-	$80.90	-	2.87	-	0.0462934
1905 January	6537.55	-	$82.33	1.77%	2.15	-25.24%	0.0336428*
1905 February	9871.88	51.00%	$84.59	2.74%	2.11	-1.86%	0.0308768
1905 March	4946.13*[7]	-49.90%	$86.47	2.23%	2.77	31.58%	0.0355794
1905 April	7559.48	52.84%	$82.59	-4.48%	3.18	14.77%	0.0490914*
1905 May	4302.42	-43.09%	$84.65	2.49%	3.34	5.17%	0.0494432
1905 June	**3515.49**	**-18.29%**	**$83.16**	**-1.76%**	**2.98**	**-10.88%**	**0.0435010**
1905 July	**4482.50**	**27.51%**	**$85.19**	**2.44%**	**3.14**	**5.37%**	**0.0429711**
1905 August	**8984.68***	**100.44%**	**$85.12**	**-0.08%**	**2.62**	**-16.60%**	**0.0398523**
1905 September	**2573.04***	**-71.36%**	**$87.77**	**3.11%**	**2.43**	**-7.29%**	**0.0330730**
1905 October	**6651.30***	**158.50%**	**$86.35**	**-1.61%**	**2.33**	**-4.03%**	**0.0355981**
1905 November	**7414.18**	**11.47%**	**$85.57**	**-0.90%**	**2.40**	**2.88%**	**0.0344068**

[7] The star indicates that the change in the volume/price/bid-ask spread or bid-ask spread percent from the earlier month to this month is significant

Table 1b

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1914 tax							
	Average Volume	Change in Volume	Average Price	Return %	Average Bid-ask Spread	Change in spread	Average Bid-ask %
1914 February	-	-	$73.53	-	3.11	-	0.0639482
1914 March	-	-	$72.46	-1.46%	2.93	-6.04%	0.0595775
1914 April	-	-	$69.85	-3.60%	3.50	19.77%	0.0722078*
1914 May	-	-	$70.98	1.62%	3.33	-5.01%	0.0689481
1914 June	-	-	$72.03	1.48%	3.74	12.48%	0.0720647
1915 July	-	-	$63.29*	-12.13%	4.69	25.31%	0.0966773*
1915 January	**-**	**-**	**$64.39**	1.73%	**2.51***	-46.42%	**0.0739094***
1915 February	**-**	**-**	**$62.17**	-3.45%	**2.97**	18.34%	**0.0865452**
1915 March	**-**	**-**	**$68.34**	9.93%	**2.29**	-23.05%	**0.0563669***
1915 April	**-**	**-**	**$74.80**	9.45%	**2.72**	18.78%	**0.0486937**
1915 May	**-**	**-**	**$70.73**	-5.44%	**3.61***	32.86%	**0.0756710***
1915 June	**-**	**-**	**$71.44**	1.01%	**3.06**	-15.22%	**0.0679748**

Summary Statistics

Summary statistics for data 6 months before 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	783	6753.347	20949.93	5	238600
Price	1502	83.56945	59.6422	0.875	392.25
Bid-ask spread	1502	2.71401	5.154977	0.025	64
Bid-ask spread %	1501	0.040663	0.063654	0.000705	0.470588
Summary statistics for data 6 months after 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	798	5757.001	16359.96	5	182100
Price	1479	85.59051	60.49272	0.8125	475
Bid-ask spread	1479	2.639487	4.566945	0.125	57
Bid-ask spread %	1479	0.038083	0.058814	0.000579	0.433862

Summary statistics for data 6 months before 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	1773	70.65302	52.91788	0.625	490
Bid-ask spread	1773	3.53927	6.97017	0.125	85
Bid-ask spread %	1773	0.071958	0.099332	0.000593	0.5
Summary statistics for data 6 months after 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	1652	69.05782	52.59493	0.2955	423.75
Bid-ask spread	1652	2.885347	5.443673	0.029	80
Bid-ask spread %	1652	0.067996	0.097224	0.000764	0.5

The data set used for this table removes the outliers that were present in the earlier test. The number of observations removed six months before and after the 1905 tax are 24 and 19 respectively. While the number of observations removed before and after the 1914 tax is 22 and 18 respectively. The observations that were significantly three standard deviations away from the mean were considered as outliers.

Table 2a

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1905 tax							
	Average Volume	Change in volume	Average Price	Returns	Average Bid-ask Spread	change in spread	Average Bid-ask %
1904 December	-	-	$78.97	-	2.41	-	0.0438748
1905 January	6537.55	-	$81.27	2.91%	2.15	-10.78%	0.0337668*
1905 February	9928.96	51.88%	$82.10	1.02%	1.85	-14.06%	0.0299884
1905 March	4975.73*	-49.89%	$81.23	-1.06%	1.97	6.62%	0.0321489
1905 April	7656.99	53.89%	$79.94	-1.59%	2.77*	40.45%	0.0468043*
1905 May	4302.42	-43.81%	$81.67	2.17%	2.84	2.53%	0.0468036
1905 June	**3515.49**	**-18.29%**	**$80.70**	**-1.18%**	**2.52**	**-11.21%**	**0.0406641**
1905 July	**4510.80**	**28.31%**	**$81.80**	**1.36%**	**2.35**	**-6.63%**	**0.0374241**
1905 August	**9043.08***	**100.48%**	**$82.90**	**1.35%**	**2.49**	**5.66%**	**0.0376541**
1905 September	**2573.04***	**-71.55%**	**$85.37**	**2.98%**	**2.40**	**-3.27%**	**0.0332355**
1905 October	**6696.35***	**160.25%**	**$83.84**	**-1.80%**	**2.30**	**-4.17%**	**0.0357858**
1905 November	**7461.03**	**11.42%**	**$84.09**	**0.30%**	**2.33**	**1.16%**	**0.0343774**

Table 2b

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1914 tax							
	Average Volume	Change in Volume	Average Price	Returns	Average Bid-ask Spread	Change in spread	Average Bid-ask %
1914 February	-	-	$72.99		2.17	-	0.0434608
1914 March	-	-	$70.49	-3.42%	3.70	70.66%	0.0811919
1914 April	-	-	$72.24	2.48%	3.21	-13.26%	0.0820083
1914 May	-	-	$68.36	-5.37%	3.92	21.96%	0.0723522
1914 June	-	-	$64.31	-5.93%	2.43	-37.94%	0.0613039
1915 July	-	-	$58.26*	-9.41%	2.82*	16.16%	0.0835340*
1915 January	**-**	**-**	**$71.44**	**22.63%**	**1.98***	**-29.88%**	**0.0416314***
1915 February	**-**	**-**	**$71.08**	**-0.51%**	**2.74**	**38.45%**	**0.0597032**
1915 March	**-**	**-**	**$66.91**	**-5.86%**	**2.70***	**-1.33%**	**0.0734681***
1915 April	**-**	**-**	**$76.93***	**14.97%**	**2.97**	**9.79%**	**0.0581507**
1915 May	**-**	**-**	**$60.97**	**-20.75%**	**2.72***	**-8.46%**	**0.0786277***
1915 June	**-**	**-**	**$55.91**	**-8.29%**	**2.02***	**-25.85%**	**0.0816978**

Summary statistics

Summary statistics for data 6 months before 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	778	6786.916	21011.98	5	238600
Price	1478	80.88987	54.80004	0.875	290
Bid-ask spread	1478	2.329993	3.558681	0.025	27
Bid-ask spread %	1478	0.038834	0.059809	0.000705	0.470588
Summary statistics for data 6 months after 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	794	5782.477	16397.19	5	182100
Price	1460	83.10933	54.4026	0.8125	282
Bid-ask spread	1460	2.398152	3.690835	0.125	25
Bid-ask spread %	1460	0.036638	0.055104	0.000579	0.433862

Summary statistics for data 6 months before 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	1751	67.97348	46.14568	0.625	287.5
Bid-ask spread	1751	3.047473	4.315096	0.125	32
Bid-ask spread %	1751	0.070389	0.097443	0.000593	0.5
Summary statistics for data 6 months after 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	1634	66.70862	46.23191	0.2955	242
Bid-ask spread	1634	2.521936	3.551972	0.029	25
Bid-ask spread %	1634	0.066743	0.095804	0.000764	0.5

The data set used for this test is free from outliers and includes only those stocks that have data for all six months before and after the tax. There are many stocks that did not have data for all six months and hence a large number of observations had to be deleted. From the data set used in the previous table, 662 and 704 observations were deleted before and after the 1905 tax. 581 and 806 observations are deleted before and

after the 1914 tax. Almost half the data set is deleted because of stocks had missing information for some months.

Table 3a

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1905 tax

	Average Volume	Change in volume	Average Price	Returns	Average Bid-ask Spread	change in spread	Average Bid-ask %
1904 December	-	-	$79.85	-	2.00	-	0.0345559
1905 January	6237.69	-	$81.18	1.68%	2.15	7.60%	0.0349499
1905 February	6731.92	7.92%	$82.87	2.08%	1.62	-25.02%	0.0266443
1905 March	4295.79	-36.19%	$83.48	0.74%	2.01	24.40%	0.0291666
1905 April	5017.20	16.79%	$80.22	-3.91%	2.20	9.56%	0.0383824
1905 May	3260.15	-35.02%	$79.90	-0.40%	2.72	23.62%	0.0470337
1905 June	**3365.17**	**3.22%**	**$82.79**	**3.62%**	**2.65**	**-2.57%**	**0.0410362**
1905 July	**4836.56**	**43.72%**	**$83.36**	**0.69%**	**2.51**	**-5.34%**	**0.0372834**
1905 August	**8652.46**	**78.90%**	**$85.97**	**3.13%**	**2.66**	**5.87%**	**0.0404236**
1905 September	**2655.25***	**-69.31%**	**$86.83**	**1.01%**	**2.58**	**-3.01%**	**0.0360410**
1905 October	**6154.65***	**131.79%**	**$86.68**	**-0.18%**	**2.38**	**-7.50%**	**0.0353837**
1905 November	**8512.37**	**38.31%**	**$86.82**	**0.16%**	**2.79**	**16.83%**	**0.0382900**

Table 3b

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1914 tax							
	Average Volume	Change in Volume	Average Price	Returns	Average Bid-ask Spread	Change in spread	Average Bid-ask %
1914 February	-	-	$72.58	-	2.00	-	0.0397391
1914 March	-	-	$71.88	-0.97%	2.10	4.71%	0.0418981
1914 April	-	-	$69.53	-3.27%	2.48	18.33%	0.0511039
1914 May	-	-	$71.32	2.57%	2.10	-15.37%	0.0477408
1914 June	-	-	$70.33	-1.38%	2.38	13.09%	0.0483217
1915 July	-	-	$63.47	-9.76%	3.75*	57.65%	0.0808949*
1915 January	**-**	**-**	**$60.80**	**-4.22%**	**1.65***	**-55.91%**	**0.0544427***
1915 February	**-**	**-**	**$60.11**	**-1.13%**	**1.79**	**8.64%**	**0.0630340**
1915 March	**-**	**-**	**$63.05**	**4.89%**	**1.20***	**-33.20%**	**0.0351965***
1915 April	**-**	**-**	**$70.19**	**11.32%**	**1.85***	**54.11%**	**0.0401926**
1915 May	**-**	**-**	**$65.59**	**-6.55%**	**2.25**	**21.91%**	**0.0552950***
1915 June	**-**	**-**	**$66.91**	**2.01%**	**1.76**	**-21.81%**	**0.0455662**

Summary statistics

Summary statistics for data 6 months before 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	413	5225.167	12624.79	5	86000
Price	816	81.25005	52.58022	6.375	248.75
Bid-ask spread	816	2.118045	3.010067	0.125	24
Bid-ask spread %	816	0.035122	0.052789	0.000705	0.470588
Summary statistics for data 6 months after 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	402	5819.724	14924.32	25	123100
Price	756	85.58334	56.85381	7.625	256
Bid-ask spread	756	2.595888	3.857173	0.125	25
Bid-ask spread %	756	0.037983	0.055585	0.000579	0.433862

Summary statistics for data 6 months before 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	1170	69.84519	45.95	0.6875	249.5
Bid-ask spread	1170	2.469658	3.609462	0.125	30
Bid-ask spread %	1170	0.051649	0.073754	0.000593	0.5
Summary statistics for data 6 months after 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	828	64.37262	45.29722	0.3125	238.5
Bid-ask spread	828	1.748412	2.649525	0.125	25
Bid-ask spread %	828	0.049038	0.079917	0.000764	0.5

The data set used for this table is checked for outliers. Moreover, only those stocks that have data for all six months as well as those that are present before and after the tax are taken into consideration. There were many stocks present only before or after the tax and had to be removed. From the data set used in the previous table, 360 and 300 observations were deleted before and after the 1905 tax. 516 and 174 observations are deleted before and after the 1914 tax.

Table 4a

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1905 tax							
	Average Volume	Change in volume	Average Price	Returns	Average Bid-ask Spread	change in spread	Average Bid-ask %
1904 December	-	-	79.85	-	2.00	-	0.0345559
1905 January	6237.69	-	81.18	1.68%	2.15	7.60%	0.0349499
1905 February	6731.92	7.92%	82.87	2.08%	1.62	-25.02%	0.0266443
1905 March	4295.79	-36.19%	83.48	0.74%	2.01	24.40%	0.0291666
1905 April	5017.20	16.79%	80.22	-3.91%	2.20	9.56%	0.0383824
1905 May	3458.54	-31.07%	84.51	5.35%	3.11	41.01%	0.0552795
1905 June	**2485.43**	**-28.14%**	**85.05**	**0.64%**	**2.66**	**-14.35%**	**0.0468204**
1905 July	**4032.28**	**62.24%**	**86.26**	**1.42%**	**2.43**	**-8.60%**	**0.0400240**
1905 August	**8652.46**	**78.90%**	**85.97**	**3.13%**	**2.66**	**5.87%**	**0.0404236**
1905 September	**2655.25**	**-69.31%**	**86.83**	**1.01%**	**2.58**	**-3.01%**	**0.0360410**
1905 October	**6154.65**	**131.79%**	**86.68**	**-0.18%**	**2.38**	**-7.50%**	**0.0353837**
1905 November	**8512.37**	**38.31%**	**86.82**	**0.16%**	**2.79**	**16.83%**	**0.0382900**

Table 4b

Monthly averages and changes in Volume, Price and Bid-ask Spread for all stocks on the NYSE for the 1914 tax							
	Average Volume	Change in Volume	Average Price	Returns	Average Bid-ask Spread	Change in spread	Average Bid-ask %
1914 February	-	-	$64.81	-	1.12	-	0.0289965
1914 March	-	-	$64.73	-0.12%	1.38	22.57%	0.0338316
1914 April	-	-	$62.44	-3.55%	1.53	11.25%	0.0360138
1914 May	-	-	$63.94	2.41%	1.48	-3.52%	0.0406861
1914 June	-	-	$62.97	-1.51%	1.60	8.54%	0.0378764
1915 July	-	-	$55.62	-11.68%	2.38*	48.21%	0.0648861*
1915 January	**-**	**-**	**$60.24**	**8.31%**	**1.54***	**-35.14%**	**0.0523119**
1915 February	**-**	**-**	**$59.46**	**-1.29%**	**1.57**	**1.71%**	**0.0554226***
1915 March	**-**	**-**	**$61.89**	**4.08%**	**1.05***	**-32.77%**	**0.0320926***
1915 April	**-**	**-**	**$68.41**	**10.54%**	**1.57**	**49.29%**	**0.0343515**
1915 May	**-**	**-**	**$63.70**	**-6.89%**	**1.99**	**26.38%**	**0.0503484***
1915 June	**-**	**-**	**$65.01**	**2.06%**	**1.47**	**-25.85%**	**0.0420511**

Summary statistics

Summary statistics for data 6 months before 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	224	5948.518	14927.06	5	86000
Price	456	85.96116	58.47635	6.375	248.75
Bid-ask spread	456	2.344463	3.049527	0.125	24
Bid-ask spread %	456	0.040922	0.061624	0.000705	0.470588
Summary statistics for data 6 months after 1905 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	224	4729.772	13870.11	25	113000
Price	456	86.84641	58.0498	7.625	256
Bid-ask spread	456	2.644901	3.470108	0.125	20.5
Bid-ask spread %	456	0.043938	0.063439	0.000579	0.433862

Summary statistics for data 6 months before 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	654	62.4203	46.36545	1.5625	249.5
Bid-ask spread	654	1.58104	2.420615	0.125	20.5
Bid-ask spread %	654	0.040382	0.062874	0.000593	0.5
Summary statistics for data 6 months after 1914 tax					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	654	63.11829	46.12188	0.3125	238.5
Bid-ask spread	654	1.533219	2.419717	0.125	25
Bid-ask spread %	654	0.04443	0.074273	0.000764	0.5

The data set used for this table includes the observations for one month before and after the 1905 and 1914 tax was used. This includes the months of May 1905 and June 1905 for the 1905 tax and the months of July 1914 and January 1915 for the 1914 tax. Only stocks that are present both before and after the tax were taken into consideration

Table 5a

Number of stocks that increased or decreased in Volume, Price, Bid-ask spread and bid-ask spread percentage after the 1905 tax							
Normal stocks (Total 124)							
	increase	% increase	decrease	% decrease	remained the same	% remained the same	lacking in data
Volume	18	-	33	-	7	-	66
Price	84	67.74%	29	23.39%	11	8.87%	-
Bid-ask spread	47	37.90%	48	38.71%	29	23.39%	-
Bid-ask spread %	50	40.32%	63	50.81%	11	8.87%	-
Preferred stocks (Total 88)							
	Increase	% increase	Decrease	% decrease	Same	% same	lacking in data
Volume	13	-	11		3		61
Price	54	61.36%	26	29.55%	8	9.09%	-
Bid-ask spread	32	36.36%	36	40.91%	20	22.73%	-
Bid-ask spread %	33	37.50%	50	56.82%	5	5.68%	-

Table 5b

Number of stocks that increased or decreased in Volume, Price, Bid-ask spread and bid-ask spread percentage after the 1914 tax							
Normal stocks (Total 126)							
	increase	% increase	decrease	% decrease	remained the same	% remained the same	lacking in data
Volume	-	-	-	-	-	-	-
Price	108	85.71%	16	12.70%	2	1.59%	-
Bid-ask spread	39	30.95%	68	53.97%	19	15.08%	-
Bid-ask spread %	41	32.54%	84	66.67%	1	0.79%	-
Preferred stocks (Total 71)							
	Increase	% increase	Decrease	% decrease	Same	% same	lacking in data
Volume	-	-	-	-	-	-	-
Price	52	73.24%	17	23.94%	2	2.82%	-
Bid-ask spread	15	21.13%	51	71.83%	5	7.04%	-
Bid-ask spread %	17	23.94%	54	76.06%	0	0.00%	-

Summary Statistics

Summary statistics for the month of May 1905					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	115	3414.23	8163.45	15.00	40900
Price	213	81.97	58.80852	0.88	382
Bid-ask spread	213	3.34	5.60387	0.13	40
Bid-ask spread %	213	0.05	0.072206	0.00	0.434783
Summary statistics for the month of June 1905					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	105	3063.62	7472.497	10.00	41500
Price	213	82.98	58.80281	0.88	372.5
Bid-ask spread	213	3.03	5.423346	0.13	40
Bid-ask spread %	213	0.04	0.063672	0.00	0.394366

Summart stats for the month of July 1914					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	268	63.29128	47.61601	0.6875	287.5
Bid-ask spread	268	4.691698	8.153737	0.125	85
Bid-ask spread %	268	0.096677	0.113983	0.002413	0.5
Summart stats for the month of January 1915					
Variable	Obs	Mean	Std. Dev.	Min	Max
Volume	0				
Price	243	64.38861	53.11323	0.2955	418.5
Bid-ask spread	243	2.513597	4.711778	0.029	61
Bid-ask spread %	243	0.073909	0.10466	0.001046	0.5

V. Results

Tables 1-4, calculate the monthly average and change in the volume, price, bid-ask spread and bid-ask percentage. In table 1a there is a drop in volume, price, bid-ask spread and bid-ask percent in the month after the implementation of the 1905 tax. However, none of these changes are statistically significant. In table 1b there is an increase in price and a decrease in bid-ask spread and bid-ask percent in the month after the 1914 tax is implemented. While the increase in price is not statistically significant the decrease in bid-ask spread and bid-ask percent is significant but in the opposite direction. The hypothesis claims that the bid-ask spread should increase, but it is decreasing in this case. The other changes that are statistically significant are months before or after the tax.

In table 2a there is a drop in volume, price, bid-ask spread and bid-ask percent in the month after the implementation of the 1905 tax. These changes are very similar to the changes seen in table 1a and are not statistically significant. In table 2b there is an increase in price and a decrease in bid-ask spread and bid-ask percent in the month after the 1914 tax is implemented. These changes are in the same direction as the change seen in table 1b. However there seems to be a greater increase in the price and a weaker decrease in bid-ask spread and bid-ask percent. While the increase in price is not statistically significant the decrease in bid-ask spread and bid-ask percent is significant but in the opposite direction. The other changes that are statistically significant are months before or after the tax.

In table 3a there is an increase in volume and price and a decrease in bid-ask spread and bid-ask percent in the month after the implementation of the 1905 tax. None of these changes are significant. In table 3b there is a decrease in price, bid-ask spread

and bid-ask percent in the month after the 1914 tax is implemented. While the decrease in price is not statistically significant the decrease in bid-ask spread and bid-ask percent is significant but in the opposite direction. The other changes that are statistically significant are months before or after the tax.

In table 4a there is decrease in volume, bid-ask spread and bid-ask percent while the price increases slightly. None of these changes are significant. In table 4b the price increases while the bid-ask spread and bid-ask percent decreases. The change in the price and bid-ask percent is not significant, but the change in the bid-ask spread is. The other changes that are statistically significant are months before or after the tax.

Section 5 shows the number of stocks that increase or decreased in volume, price, bid-ask spread and bid-ask percent. In table 5a the price for 67.74% of the normal stocks and 61.36% of the preferred stocks increase. The bid-ask spread for 38.71 % of the normal stocks and 40.91% of the preferred stocks decrease. There is not a very large difference in the number of stocks that increase or decrease for the bid-ask spread and bid-ask percent. There are 33 normal stocks that decrease in volume while only 11 preferred stocks. 66 stocks have missing data, so it will not be very helpful to conclude the change in volume looking at this table. In table 5b the price of 85.71% of the normal stocks and 73.34% of the preferred stocks increase. The bid-ask spread for 53.97 % of the normal stocks and 71.8% of the preferred stocks decrease. The bid-ask percent for 66.67% of the normal stocks and 76.06% of the preferred stocks decrease.

VI. Discussion of Results

Most of the above tests lead to a decrease in volume, bid-ask spread and bid-ask percent and an increase in the price after the implementation of the tax. Only the change in the volume moves in the direction claimed by the hypothesis. The price and the bid-ask spread move in the opposite direction from the changes proposed in the hypothesis.

After the implementation of the 1905 the volume mostly decreases (except table 3a, where volume increases slightly). Even though the change in volume moves in the direction proposed in the hypothesis, none of these changes were significant. This can be due to the lack of data on volume for many stocks. The price decreases sometimes (table 1a and 2a) and increases sometimes (table 3a and 4a) after the implementation of the 1905 tax. However, the changes in price are very small and not statistically significant. The bid-ask spread shows a more stable trend and decreases in all tests after the implementation of the 1905 tax. This movement is in the opposite direction of the proposed change in bid-ask spread. None of these changes are significant. The price and bid-ask spread are very volatile and jump up and down even in the months were there was no change in taxes.

After the implementation of the 1914 tax, the bid-ask spread and bid-ask percent decrease (the bid-ask percent is not significant in 4b). This change seems to be significant but in the opposite direction as proposed in the hypothesis. While the hypothesis claims that the price should decrease, the price increases (in most of the tables except table 3b) after the 1914 tax. None of these changes are significant. The data on volume for all the stocks around 1914 and 1915 is missing. So, the analysis in the change in the volume cannot be done. The price and bid-ask spreads are very volatile and jump up and down

even in the months were there was no tax change. The abnormal changes in the price and the bid-ask spread can be attributed to the outbreak of World War I on 28th July 1914, four months before the implementation of the STT on 1st December 1914. World War I also led to the closing down of the NYSE for four months. These events and the months leading up to them were a period of uncertainty. This could be a reason for the high volatility seen in the price and bid-ask spread.

VII. Conclusion

The effect of the tax of 1st December 1914 is not a very good indicator of the effects of STTs in general. This is because WWI and the shutdown of NYSE were major events that also occurred during that period, which could affect the volume, bid-ask spread and price more than the STTs could. The implementation of the STT on June 1st 1905 is a much better date, to study the effects of the STT. However, it is seen that the price and bid-ask spreads move around a lot in the months before and after the1905 tax also. There were many changes in federal and state taxes till 1981, which could be good experiments for studying the effects of STTs further.

The 1905 and 1914 taxes did not show a very stable trend, with the changes in price and bid-ask spread not being big enough to be statistically significant. This may be because the STT was very small. I think a small tax in the range of 0.5%-1% may not affect prices and bid-ask spreads a lot. Hence it would be a good way to create revenue. The tax in 1905 was 2 basis points per 100$ of par value, which comes to be 0.02%. The tax in 1914 was another 2 basis points per 100$ of par value which increased the total tax in New York to 4 basis points per 100$ of par value. This accounts to 0.04% which is still smaller than 1%. Studying STTs which are 1% or greater can give a more definite change in price and bid-ask spreads. These studies could give a better answer to the question, "Do STTs help or harm the economy?"

References

Amihud, Yakov and Haim Mendelson. "Asset Pricing and the Bid-Ask Spread." *Journal of Financial Economics* 17 (1986) 223-249

Economist: Europe's financial-transaction tax Bin it- Plans for a transaction tax ought to be dropped- 23rd February 2013

Investment Company Institute (nation association of US investment companies)

Meeker, James Edward. 1922. The Work of the Stock Exchange. New York: The Ronald Press Company

New York Times: In Wall St. Tax, a Simple Idea but Unintended Consequences-26th February 2013

Pomeranets, Anna and Daniel Weaver. "Security Transaction Taxes and Market Quality" (Working paper)

Schwert, G. William, and Paul J. Sequin. 1993. "Securities Transaction Taxes: An Overview of Costs, Benefits and Unresolved Questions." *Financial Analysts Journal*, 27-35

Stiglitz, Joseph E. 1989. "Using tax policy to curb speculative short-term trading." *Journal of Financial Services Research*, 3:101-115

Summers, Lawrence H. and Victoria P. Summers. 1989. "When Financial markets work too well: a cautious case for a securities transaction tax." *Journal of Financial Service Research*, 3:163-188.

The Guardian: EU approves financial transaction tax for 11 eurozone countries-22nd January 2013

Wall Street Journal-Why a Financial-Transaction Tax Could Backfire- 13th December 2011