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Testing the Tobin Theory

The Effect of Financial Transaction Taxes on European Equities

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Preface and Acknowledgements

With much hard work and dedication I am proud to present my thesis. I hope you will enjoy reading it as much have enjoyed writing it. My thesis instructor is a great tutor who has many good ideas to challenge his students with. It has been an honor to have been able to have worked with him. I would also like to thank my family for their support during this chapter of my life. During the past year that I have been working on my thesis, I have had the privilege of receiving a healthy niece and nephew into the family. I hope that Gabriella and Ra'id will both one day surpass this degree. I also thank my good friend Bruce Tjon Tsoe Jin for the support and critique he has given me. This paper was also written aftermath of the financial crisis. Financial transaction taxes are a means correcting for certain types of behavior that have plagued the financial sector for many decades. With that in mind this paper is also a plea for a more sustainable and responsible financial sector.

ABSTRACT

This paper researches whether the proposed European transaction tax will have a considerable effect on the volatility of European stocks. Therefore a model is constructed to measure the impact of several transaction taxes that have been active between the years 1980 and 2014. The methodology consists of a panel regression and a difference in difference approach. This paper concludes that transaction taxes have a negative effect on the volatility of stocks. This conclusion does coincide the economic theory of the Tobin Tax which indicates that a small tax in financial instruments would decrease the price volatility.

Keywords:

FTT, Tobin Tax, European Commission IP/11/1085, volatility

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Chapter 1 Introduction

Before the financial crisis two important opinions dominated the attitude of economist on the financial markets. The economists were led foremost by the assumptions that the Arrow-Debreu world applied: financial improvements would lead to efficient distribution of risk because the markets become more complete. Secondly, when assets in financial market are traded in a higher frequency and at a larger volume these assets a considered highly tradable. This liquidity would result in a strong tendency to an efficient price formation (Schäfer, Schulmeister, Vella, Masciandaro, Passarelli and Buckley, 2012). Taking these prevailing paradigms into account. The opponents of Financial Transaction Taxes (FTT) require proponents to demonstrate that excessive trading activities are actually the cause of sharp price fluctuations and deviations of market prices from their fundamental values. Proving that excessive trading causes inefficient pricing can be quite challenging. The ‘‘right’’ price is hardly determinable. There is also a lack of evidence on the relationship between trading volume and deviation of prices from their fundamental level (Schulmeister, Schratzenstaller and Picek, 2011).

Is an FTT an unnecessary tax measure? If we look at the ongoing economic meltdown one would think otherwise. Before the recent crisis, the markets were flooded with new products. The crisis brought to light that, instead of making the markets more complete, many of the new products were merely channeled funds that were moved into opaque assets with hard to monitor risk. In 2007 the housing price bubble burst and this erroneous trend became clear. As a result the prices of various other securities changed dramatically.

In light of the recent Financial Crisis, The European Union has opted to reintroduce this tax measure. For the purpose of repaying the damage of the 2008 crisis as well as making markets more prone for future crises (European Commision, 2013).

The European commission argues that the recent financial crisis had a serious impact on public finances. While governments and European citizens at large have borne the costs. There resides a strong consensus within Europe that the financial sector should contribute more fairly given the costs of dealing with the crisis and the current under taxation of the sector.

The first steps of a common system of financial transaction tax was tabled on the 28th of September 2011 and amending Directive 2008/7/EC[1]. The main objectives of this proposal where:

- Harmonizing indirect taxation on financial transactions, to insure proper functioning of financial instruments across the European Union at the same time.
- Appropriate and fair taxation of the financial sector. And ensure a level playing field in respect to other sectors.

[1] COM (2011) 594 final.

- Creating appropriate disincentives for transactions that do not enhance the efficiency of financial markets thereby complementing regulatory measures to avoid future crises.

The discussion surrounding the recent FTT movement has been budgetary, ethical and with limited scientific support. The motives of the proponents are utopian and in hindsight of the recent economic crises. And the opponent believe it to be an unnecessary change in what was supposedly a flawless free market system.

The FTT is a tax concept that was originally created by Tobin (1978). His idea was charging a small amount (≈0.1%) of the transaction to discourage speculators from short-term speculation thus decreasing the overall volatility of stock markets. The initial purpose of the Tobin Tax was to solely reduce volatility by discouraging excessive speculation. This coincides with the third objective[2] that the EC had set the FTT out for. The overall circumstances behind both taxes may differ, but the principle remains the same.

Determining whether the FTT has an effect on volatility is a recurring mystery in finance literature (Comotto 2013, Schäfer, 2012 and PwC, 2013). Further study is necessary on the implementation of this tax measure which is relevant for both society and the economic science. The European FTT might be the future of financial taxation. Regardless of its effectiveness to regulate, it will have a significant impact on European citizens.

This thesis tries to unravel whether past evidence provides a strong indication for the efficiency enhancing properties of an FTT. The research question is therefore:

Did the changes in Financial Transaction Taxes in Europe affected volatility of the stock markets?

Our null hypothesis states that FTT's have no significant effect on volatility. And our alternative hypothesis states that FTT's have a significant effect on volatility. This research question will be answered by a quantitative analysis which will be discussed in chapter 5. This chapter includes a description of the methodology. In chapter 2 the theory of Tobin Tax will be discussed. This section will also include a summary of literature on opponents and proponents of the Tobin Tax. Chapter 3 is dedicated to the European commission's FTT proposal. Chapter 4 is about the countries that have already implemented FTT's but the focus remains on European countries. Chapter 4 will give a brief description of the transaction tax history in Europe. The data that will be used is described and analyzed in chapter 6. In chapter 7 the results of the quantitative research will be discussed and in chapter 8 this thesis will be concluded as further research recommendation will be addressed and the limitations are noted.

[2] European Commission, COM (2013) 71 final page 4

Chapter 2 Theory of the Tobin Tax

A tax on financial transactions has been an ongoing debate for decades. Among the first was Keynes in 1936. He proposed introducing a transaction tax to reduce the short term mentality of the market and improve long term investments (Keynes, 1936). From this first initial theory we will follow the developments on this topic to a more recent stage. In this chapter we will focus on the Tobin tax. In paragraph 2.1 the history and theory behind the Tobin tax will be explained. In paragraph 2.2 we will discuss an important part of the Tobin Tax, namely, volatility. Afterwards we will focus on the discussion between various authors on the Tobin tax in paragraph 2.3.

2.1 History and Theory of the Tobin Tax

The idea of an international currency transaction tax was first formally proposed by Nobel laureate economist James Tobin (1978). His proposal was a small tax – he suggested 1/10 percent- on all foreign exchange dealings. The objective was to reduce disruptive speculation in foreign exchange markets by raising the cost of engaging in such activities.
The Tobin tax was built upon the earlier work by Keynes (1936) in his book, *The General Theory of Employment, Interest, and Money.* In *The General Theory* Keynes proposed the imposition of a small transaction tax on all stocks trades to reduce instability in domestic stock markets. His proposition was motivated by the stock market crash of 1929 which left disastrous consequences for the US economy. Keynes notices that speculating was more prevalent on the New York stock exchange than on the London stock exchange due to the absence of the stamp duty tax at Wall Street.

"It is usually agreed that casinos should, in the public interest, be inaccessible and expensive. And perhaps the same is true of stock exchanges. That the sins of the London Stock Exchange are less than those of Wall Street may be due, not so much to differences in national character, as to the fact that to the average Englishman Throgmorton Street is compared with Wall Street to the average American, inaccessible and very expensive. The jobber's "turn", the high brokerage charges and the heavy transfer tax payable to the exchequer, which attend dealings on the London Stock Exchange, sufficiently diminish the liquidity of the market to rule out a large proportion of the transaction characteristic of Wall Street. The introduction of a substantial Government transfer tax on all transactions might prove the most serviceable reform available, with a view to mitigating the predominance of speculation over enterprise in the United States (Keynes, 1936, P.159-60)."

More recently, following the Financial Crisis of 2008, the idea of a FTT to reduce speculation received support from the European Commission and many other policy makers. To name a few, authors like Dorothea Shäfer, German Institute of Economics Research and Stefan Schulmeister, Austrian Institute of Economic Research have reiterated their support for this tax instrument. Though this does not make the Tobin tax necessarily right, it does dispel the notion that it is an outlandish idea.

While many American economist in the 1970's were kept busy with the dilemma of a fixed or a floating exchange rate for monetary policy, Tobin was more concerned about the mobility of international financial instruments. According to Tobin, sovereign states and governments do not have the capacity to adjust to large scale international trade in foreign currency without losing control over policy instruments like employment, inflation and production. International mobility of financial instruments distort the governments and central bank's fiscal and monetary policies because national interest rates cannot radically differ from each other[3]. Capital mobility results in the speculation of currency. Speculation has a negative effect on the real economy. For example the speculation on exchange rates. Export sectors suffer from this speculation caused by the appreciation of local currency (Eichengreen, Tobin and Wyplosz, 1995). Exchange rate speculation can occur in a floating as in a fixed rate regime. In the floating regime speculation occurs on future prices. In the fixed regime speculation occurs on the depreciation of the currency (Tobin J. , 1993). These problems occur because goods and workers transition at a slower pace across borders than financial instruments as a reaction to exchange rate changes. This mechanism is indifferent to either floating or fixed exchange rate regimes. To solve for this Tobin pleads for a segmentation between countries so governments and central bank can continue their economic policies. The international financial markets are more integrated than other markets[4]. The technological advanced in the financial sector have grown faster than global growth economically, politically and socially. This causes an over-efficient financial sector. To fix this decoupling, the international trade in financial instruments should be slowed down[5]. Tobin proposes a uniform ad-valorem tax on buying financial instruments on the spot market that are listed in foreign currency. Also the import of goods and services that are listed in foreign currency should be taxed. This proposed tax would reduce short term currency transactions. The effect on permanent or long-term transactions would be insignificant. This way profitable projects, arbitrage, and currency speculation would, in the long-term, not be hindered[6]. The proposed tax would be claimed by the government in the residing country of the buyer of the financial instrument. The IMF or World Bank would be the organization that manage the tax proceeds[7]. By the introduction of this tax primarily banks, responsible for global integration of financial markets, and multinationals would

[3] Tobin (1978), p. 153-154.
[4] Tobin (1978), p. 154-155.
[5] Tobin (1996), p. 494.
[6] Tobin (1978), p. 155, 159.
[7] Eichengreen et al. (1995) p. 164-165.

be burdened and the volatility of exchange rates would decrease[8]. If speculators have shorter-term investment horizons than sustainable long-term investors than these speculator will be demotivated from the market by the transaction tax thus will the volatility of the financial market decrease in their absence. With the decrease of these short term currency transactions, national interest rates will once again differ from each other thus making domestic economic policy viable. Eichengreen, Tobin and Wyplosz(1995) also argue that financial instruments which are traded in various currencies and are perfect substitutes to each other, cannot generate different payoffs in domestic currency unless the interest rate difference is eliminated as a result of expected exchange rate movements[9]. Although this is important, Governments and Central banks can't always set exchange rate expectations at the rates they aimed at. By obstructing short term currency transactions some margin will be created between sovereign interest rates[10]. By implementing a financial transaction tax resources that would be foregone by speculation (which is a zero sum game), like knowledge and diligence, can be diverted and taxed to serve international objectives[11]. To make sure the financial transaction tax does not disrupt the trade in commodities, the tax rate is kept small in comparison to transport- and other remaining costs[12].

2.2 Tobin's volatility

An important claim of Tobin Tax proponents is that the Tobin Tax can reduce volatility and excessive speculation[13]. Questioning whether there is excess volatility in foreign exchange markets, and if these markets function properly is a natural starting point for discussion of this claim. The macroeconomic prices between countries is very dependent on the foreign exchange rate. They powerfully influence the relative price at which goods and services differ from one economy to another. One of the main assumptions that exchange rates are expected to be stable is because they are determined by ''economic fundamentals''. Fundamentals like a nation's resource endowment, relative level of productivity and growth rate of that productivity level. These economic fundamentals are considered to be relatively stable and shouldn't change much on a daily, monthly or even yearly basis. With this in mind, exchange rates should be relatively stable (Palley, 2003). Yet empirical data clearly shows that flexible exchange rates have been much more volatile than warranted by macro-fundamentals, a fact that is especially clear in the daily and monthly data (Obstfeld, 1995).

[8] Tobin (1978) p. 158-159.
[9] Eichengreen et al. (1995) p. 164. The point here is that Governments and Central Banks should be able to dictate expected exchange rate movements to cancel out arbitrage opportunities.
[10] Eichengreen et al. (1995) p. 164-165
[11] Tobin (1996) p. 496
[12] Eichengreen et al (1995) p. 165
[13] Stiglitz (1989) & Schäfer et al. (2012)

Apart from the increase in volatility, there has also been an increase in the volume of foreign exchange trading. In 1973, daily trading volume averaged around $15 billion. In 1998 it averaged $1,500 billion. An increase of this magnitude far exceeds which can be explained by inflation and increased international trade. Also, more than 80% of this daily trading is of a short-term nature and being settled within seven days (Felix, 2001).

Statistical analysis reveal a robust positive correlation between volume and volatility. Research on the micro economic structure of foreign exchange markets (Wei and Kim, 1997) shows that the open position of large foreign exchange traders Granger-causes volatility[14], and is unrelated to subsequent appreciation. These positions that were taken by large market traders had an absolute effect on the volatility[15]. Their research shows that these large positions were taken systematically prior to bouts of increased volatility, yet opening of these positions is unrelated to sustained changes in the exchange rate.

Statistical evidence[16] clearly support a market characterized by significant amounts of volatility. These trading patterns and price movements cannot be explained by economic fundamentals. This evidence support Tobin's (1978) theory about volatility[17].

Microeconomic studies based on high frequency data (daily and monthly) support Tobin's idea of volatility but there is also lower frequency macroeconomic evidence supporting his theory. The foreign exchange market has been subject to long swings that result in large departures of the real exchange rate from purchasing power parity the last 25 years, which theory predicts should hold (Rogoff, 1996). According to Palley (2003) economic models are still not able to predict exchange rates empirically. And because the best way to predict an exchange rate over any modest time horizon still remains the random walk. This is a sign of speculative noise trading.

Noticeably, financial markets with a flexible exchange rate system have been hit by a higher frequency of crises. To name a few: France was hit by crises in 1982, Mexico in 1994, East Asia in 1997, Russia in 1998, Argentina and Brazil in 1999 (Palley, 2003) and the Eurozone in 2008. The belief is that all of these crises, were either triggered or exacerbated by financial speculation, and that measures to reduce speculation – such as the Tobin tax- would either have helped avoid the crisis or reduce the extent of resulting damage. Although the original concept of the Tobin tax was designed for currency speculation, the main principle remains the same. It would be impossible to focus only on certain financial instruments and as the EC suggests, the scope of the FTT should be as broad as possible. The Tobin tax is eventually a measure against excessive volatility and speculation.

2.3 Key arguments for and against the Tobin tax

[14] Wei & Kim (1997) p. 7 Granger causality from option positions to volatility.
[15] Wei & Kim (1997) p. 14
[16] Wei & Kim (1997)
[17] *"In the absence of any consensus on fundamentals, the markets are dominated – like those for gold, rare paintings, and – yes, often equities – by traders in the game of guessing what other traders are going to think."*(Tobin, 1978)

Following the stock market crash in the late 1980's, Stiglitz and many other authors saw the FTT as a solution. Stiglitz (1989) proposed a relatively low tax on financial transactions. His main reason for implementing an FTT was that information asymmetries and different groups of traders resulted in Pareto inefficiency. The social gains from getting financial information earlier is lower than the private gains. Innovation on the capital markets can only increase this gap between social and private gains thereby further decreasing the Pareto inefficiency[18]. Market innovations like High Frequency trading have by this intuition decreased social welfare. These innovations would lead to Pareto inefficient equilibria. Stiglitz suggests to discourage such companies from investing in business that does not add to social welfare or harm social welfare. A transaction tax will discourage noise traders[19] from speculating and therefore make way for traders who make more long-term investments. This would improve the efficiency of the financial market.

Just like import taxes, a transaction tax will obstruct the trade of capital thus the efficiency of the market will be lost. This loss is insignificant because it is proposed to be between 0,005% and 0,01%, and the deadweight loss is proportional to the square of the proposed tax rate[20].

Uninformed traders[21], who invest in equity funds, long term traders and informed traders will not be hindered by the transaction tax. Mainly because they do not trade as much or trade more efficiently to achieve high yields. Short term speculators who buy and sell financial instruments within weeks are most discouraged by the transaction tax because their yields will decrease significantly. The speculators do not invest in the market index but do think they can beat the market by willing to take on the extra risk and costs. These speculators are described as irrational noise traders that trade with basic financial knowledge and on anomalies that are not scientifically proven. When long term traders become a larger share of the financial markets, because of the transaction tax, firms will focus more on long-term investors for business. This will encourage more sustainable managerial attitudes. A financial transaction tax will likely cause a decrease in liquidity on the capital markets. This will in effect cause certain traders and financial instruments to cease on the market. Bid-ask spread will widen because the markets would thin out as a portion of the traders will leave. For popular instruments which are traded regularly, this effect will be negligible.

Because of the decrease in liquidity, critics claim that this will increase market volatility. A majority of ''noise traders'' will cease their activities following the introduction of the transaction tax. Arbitrageurs who seek to stabilize the market will also cease trading[22]. The increase in volatility by their absence is negligible as the transaction tax rate is so small that ''arbitrageurs'' will continue trading because their profits will still be higher than their taxes.

[18] Example given in Stiglitz (1989) p. 103
[19] Stiglitz (1989) p. 104-105: 1.1.1 A Taxonomy of Traders.
[20] Stiglitz (1989) p. 104
[21] Stiglitz (1989) p. 104-105: 1.1.1 A Taxonomy of Traders.
[22] Stiglitz (1989) p. 111

Earlier research[23] provides us with evidence that transaction taxes don't increase market volatility and might even decrease it. A reduction of financial market volatility has many advantages. Buyers of financial instruments will bare less systematic risk and will be able to resell their instruments easily. Firms will get the advantage of raising capital more easily. Less market volatility will also contribute to more efficient allocation of capital. For example, it is more attractive to issue shares when stocks are traded above par. In this case companies invest more than is socially optimal because of low capital costs. When the volatility of the market decreases, the chance of overvaluation of shares will also decrease. This will make capital allocation more efficient.

Stiglitz proposed that the transaction tax rate on option and derivatives should be half of that stocks to prevent market distortions. Buying a call option and a put option of the same company and time will lead to the payoff as a stock. Because this portfolio is almost identical, the tax outcome should also be the same.

At the same time, Summer and Summers were also proponents of the Tobin tax. A Tobin tax does not only convert short-term activities for long-term strategy thus decreasing volatility, it also raises a considerable amount of taxes (Summers and Summers, 1989). The introduction of a transaction tax will unlikely cause liquidity problems. Summers and Summers draw this conclusion because similar transaction taxes in Japan, UK and Switzerland have not led to significant liquidity problems in those markets. Summers and Summers also supported a lower transfer tax rate upon debt securities than on shares to equalize the economic effect of both capital markets. The trading frequency of debt is higher and the average period is shorter than that of shares[24], but in recent markets that might not be the case. Summers and Summers were more focused on the US and pleaded that a transaction tax should be raised on American financial instruments traded by at least one American party, irrelevant where the transaction takes place. By using this method of taxation, it will be harder to avoid taxation by trading abroad. Also people without American nationality will be subject to the transaction tax if they trade within the border. In a way the transaction tax will function as an entrance fee to the US financial market. This is an interesting way to tax foreign entrants without having to draw up exceptions in foreign tax policy[25]. The agent, who functions as a broker in the transaction, the stock market or the emitting body are subject to taxation[26].

Spahn (1995) suggested that the original Tobin tax can be improved upon. One of the shortcomings of the original Tobin tax was defining a proper tax base. It is impossible to separate speculative from ''normal'' transactions within the proposed tax base. The only way to tax speculative transactions is by taxing financial transactions al together which effects financial market efficiency. Another

[23] See Schulmeister (2011) for a summary of recent studies on short term price volatility in relation to transactions costs, Table 2: Effects of financial transaction taxes or transaction costs in general on short-term price volatility

[24] Summers and Summers (1989) p. 278

[25] Summers and Summers (1989) p. 281

[26] Summers and Summers (1989) p. 284

shortcoming is that Tobin only wanted to tax transaction on the spot market. Market agents avoid the transaction tax by trading in derivatives. Which means that the transaction tax should cover derivatives to work optimally. Spahn's critique also suggests that close to cash substitutes (short-term market instruments, similar to banker's acceptances and commercial papers) should be subject to the transaction tax[27]. The uniform low tax rate of the Tobin tax is not effective, which wouldn't be enough to scare away speculators. In contrast a uniform high tax rate would cripple the efficiency of financial markets[28].

Table 1 Annualized Foreign Interest Rate Required Under a Tobin Tax to Match a 4 Percent Return in Home Currency(source: Spahn, 1995)

Maturity	**Tax Rate**	
	T = 0.5 percent	T = 1 percent
One day	551.3	4016.7
Three days	90.7	250.9
One week	35.6	77.2
One month	11.0	18.5
Three months	6.6	9.4
One year	5.0	6.1
Five years	4.6	5.3

The table above demonstrates that the Tobin tax discriminates against all foreign assets however long-term capital investment requires only slightly higher rate of return than domestic assets. The discrepancy becomes smaller as the maturity of foreign investments increases. Short-term trading bears high relative costs, and speculative round-trip excursions in other countries are likely to be heavily discouraged by the Tobin tax.[29]

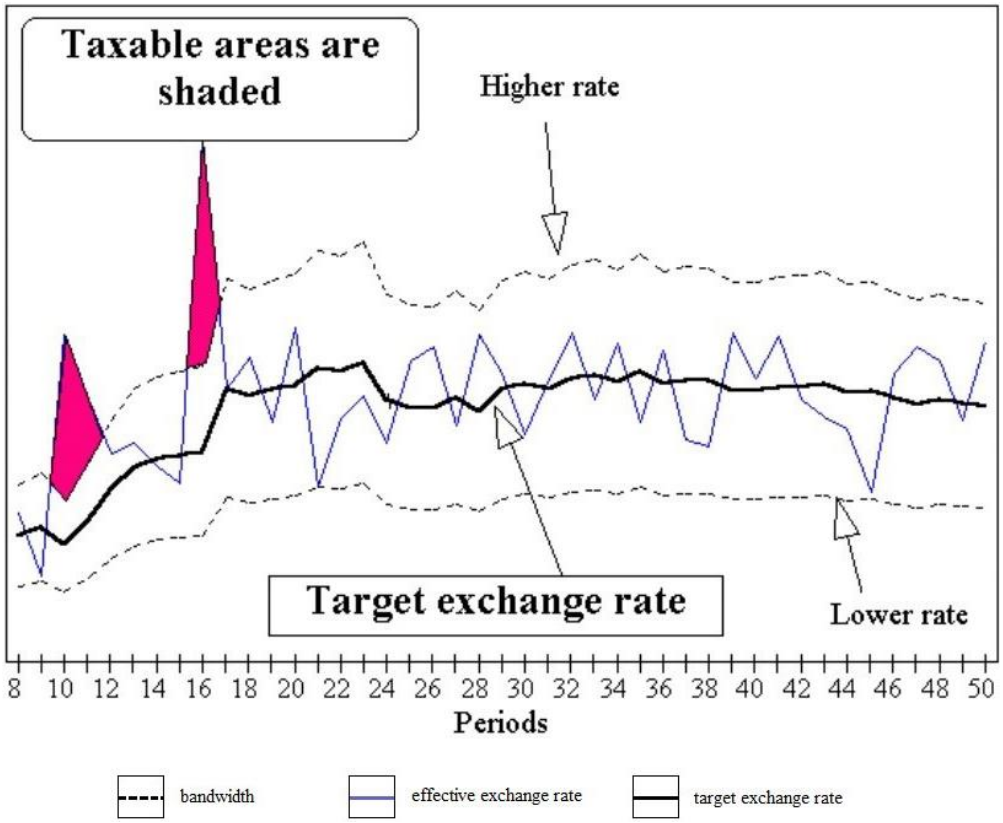
Furthermore, the transaction tax revenue would be so large that no single international organization could bare that amount of responsibility. This risk is better diversified away across different institutions across the world[30]. The Tobin tax would be feasible bearing the administrative requirements[31]. As an alternative to the Tobin tax, Spahn suggests a transaction tax at a low rate and a surcharge to discourage speculation, which is due in periods of exchange rate turbulence. By applying a low transaction tax rate, stable and substantial tax revenues will be generated without harming the liquidity of international financial markets. The surcharge will not be applied in stable periods of foreign exchange markets thus not create revenue in those periods. When a speculative attack occur against a currency, the surcharge will function as a ''circuit breaker'' to discourage speculation. The normal low tax rate, e.g. 0.01% will be charged on currency trading on the spot market. The

[27] Spahn (1995) p. 22
[28] Spahn (1995) p. 25
[29] Spahn (1995) p. 4
[30] Spahn (1995) p. 27
[31] Spahn (1995) p. 30

transaction tax can also be collected on derivatives and should at least be half the tax rate than that of the spot market[32] . The surcharge will be applicable depending on the exchange rate. When the effective exchange rate[33] strays outside a curtain bandwidth, speculators will be assumed to be the cause of it, the surcharge will be charged as the difference between the effective exchange rate and the maximum or minimum allowed effective exchange rate that is surpassed. Spahn suggests to stimulate a target exchange rate according to the historical exchange rate movement[34]. As long as exchange rates fluctuate between the bandwidth, the surcharge will not be executed, this is depicted in figure 1. The colored parts in this figure represent the tax base of the surcharge. Even when non-speculative transactions are traded, their agents will still be subject to the transaction tax. Spahn expects the adjusted Tobin tax to stabilize the monetary system and decrease currency speculation[35]. Spahn also advocates an as global as possible imposition of the transaction tax. Because it is obviously impossible to impose it globally. It should be imposed systematically across country groups without the risk of trade moving to non-FTT zones[36]. The combination of a low transaction tax rate with a high exchange surcharge is an ideal way to discourage speculation and maintain sustainable financial markets.

[32] Spahn (1995) p. 32
[33] The effective exchange rate is defined as the average exchange rate compared to a basket of currencies. Spahn (1995) p. 37
[34] For a complete description of the target exchange rate, please refer to: (Spahn) 1995 p. 49-50
[35] Spahn (1995) p. 35
[36] For example see: Schulmeister (2011), p. 21: Securities transaction tax in Sweden.

Figure 1 Illustration of the Working of the Exchange Surcharge[37]



In recent decades financial markets have grown rapidly to an extent that the market trade 70 times that of the nominal GDP (US and EU) (Schulmeister, Schratzenstaller and Picek, 2011). Buckley (2012) considers that financial institutions, like banks, have '' become the business''. The essential business of banking is intermediating capital to borrowers able to put it to good use. When the business of banking becomes speculating and trading, which viewed across the system is a zero-sum game, we are in a new world which calls for new regulatory responses[38]. Much of this new banking business comes from High Frequency Trading (HFT), where high speed computers are used to exploit price fluctuation. HFT involves the generation of massive numbers of orders for very short periods (often less than a second), many of which are subsequently cancelled to mask the true intent of the trader. About 50-70% of trading is classified as HFT. Financial markets have changed fundamentally but the measures to regulate them have not changed at all[39]. The fast trading increase tend to make stock and commodity prices less accurate. This is because short-term price runs, fuelled by very rapid trading programs, accumulate to long-term trends and distortions in prices. The resulting over-shooting of prices favors speculators over long-term investors and thereby feeds into the ever higher levels of

[37] Spahn, (1995). Chart 1. Illustration of the Working of the Exchange Surcharge. The vertical axis being the exchange rate and the horizontal axis being time.
[38] Shafer et al, (2012) p. 102
[39] Shafer et al, (2012) p. 100

trading which we are seeing[40]. The transaction tax is a good way to divert short-term market speculation with more sustainable long-term investments.

The effectiveness of a FTT relies on two economic assumptions. One of them is that noise trader and some speculators drive up trading volume for short term gain which in turn generates inefficient price movements on financial markets. Fundamental investor suffer addition costs (created by noisy price signals) created by this behavior. It would be more ideal if fundamental investors would control the market because their investment activities are more efficient and would therefore result in less volatile markets. Therefore the imposition of an FTT will raise costs of trading that will drive certain speculator and noise traders off the market and leaving the fundamental investors to control the market. The second assumption is that the role of speculation economically disruptive and destabilizing (Erdogdu and Balseven, 2006)

The Tobin Tax proposal also has its fair share of opponents. Davidson (1998) agrees with Tobin that perfect global capital mobility isn't a good idea for stability. Davidson argues that a Tobin tax is not the solution to hamper capital mobility appropriately[41]. Davidson argues that financial markets do not function efficiently, the given prices on financial markets do not accurately describe the discounted value of net cash flows. The spot market prices of liquid assets can fluctuate at any given moment and the future net cash flows of an asset cannot be calculated with a decent degree of certainty[42]. This is the main reason why speculation continues to exist, and even increases. If financial market were efficient, irrational traders would consistently make losses. This way ''noise traders'' would no longer survive in the Darwinian sense of the system. Or they would survive by adapting appropriately by not consistently making mistakes[43]. A floating exchange rate combined with an inefficient financial market can result in destabilizing speculative attacks when significant changes to the exchange rate are expected[44]. A credible institute that traders can rely on to keep exchange rates more stable, would in that case be more effective that hampering speculation with a Tobin tax. A Tobin tax would harm international trade in goods and services more than the trade in financial instruments. The international trade in goods and services is dependent on financial instruments like forwards and futures contracts to hedge risk. Davidson argues that the international trade in goods, services and arbitrage activities will also be burdened as a result[45] (this effect will be discussed in depth in the following chapter).

It is unlikely that a Tobin tax can stop speculative attacks on currency because the suggested tax rate is too low[46]. Arbitrage activities that stabilize financial markets are more discouraged than speculative activities. The low transaction tax tariff discourages transactions aimed at small fluctuations in the

[40] Shafer et al, (2012) p. 100
[41] Davidson (1998) p. 641
[42] Davidson (1998) p. 647, 653
[43] Davidson (1998) p. 652
[44] Davidson (1998) p. 649
[45] Davidson (1998) p. 650
[46] Davidson (1998) p. 650

expected exchange rate. This is more likely an issue for arbitrageurs than speculators. Davidson supports international supervision and regulation instead of a Tobin tax. One of the main objectives of such an intervention on financial markets is to give countries the possibility to control and manage their international trade in financial instruments in case of a capital flight.

Empirical research adds little to the debate on the relationship between transaction cost and volatility (Stotsky, 1996). This tax increases the transaction costs and the costs of implementation will be high. Stotsky (1996) theoretically argues that a financial transaction cost will decrease the efficiency of the market[47]. Market participants will be discouraged to arrange their preferred portfolio and stabilizing arbitrage will also decrease. A transaction tax will increase the costs of capital and hamper economic growth[48]. Stotsky also criticized Spahn version of the Tobin tax. The variable nature of the surcharge is dependent on the market environment that's causes by periods of lower volatility and higher volatility of prices of financial instruments. This insecurity damages the workings of the financial markets and the bid and ask price spreads will widen. Variable tax rates increase the burden, taking into account the large amount of financial transactions on which they will be applied, on administrative systems and tax authorities. Assuming monetary policy can be adjusted quickly and independently from political interest, fiscal policy is dependent on political interest[49]. Combining these fiscal policy with monetary policy is a fundamental issue in macroeconomics. The effective implementation and sustainability of the adjusted Tobin tax would require perfect cooperation between central banks and sovereigns which in practice does not happen with taxes and exchange rates. It is also questionable that short-term transactions be effectively heavier taxed than long-term transactions. Empirical evidence shows little to no evidence that short-term traders have a negative effect on stability of financial markets (Stotsky, 1996). A financial transaction tax also has negative consequences for banks. Banks use short-term financial instruments to hedge risks in order to lend to businesses and consumers. Spahn argues that a low 'normal' tax rate does not affect financial market efficiency. This is not the case because of the cascade effect that is brought by many market brokers. The transaction tax will cascade between many brokers and will eventually distort their profits significantly[50]. Also the proposed derivative trade tax rate at 50% is not appropriate. Financial product in the derivative market are too complex to apply just a single tax rate. Stotsky suggests that a transaction tax would only be effective if implemented globally. The high mobility of financial transactions makes it easily possible to avoid the tax by trading abroad e. g the Swedish transaction tax in 1980's[51].

Recent decades have introduced funds that can easily flow across frontiers and financial assets that cannot easily be taxed. Tax avoidance is a large problem for implementing transaction taxes

[47] Stotsky (1996) p. 28
[48] Stotsky (1996) p. 28
[49] Stotsky (1996) p. 29
[50] Schafer et al, (2012) p. 80
[51] Stotsky (1996) p. 29

(European Commision, 2013). According to Hanohan and Yoder (2010) if there is an effective crackdown of tax havens it will close various loopholes that allow tax bases to migrate away from high tax jurisdictions. This will make it easier to introduce new or higher taxes without the fear that the tax base will migrate away[52]. Taxes like the European proposal[53] that seem unfeasible can then become potentially viable. In the recent European proposal[54], much emphasis was put on the prevention of future crisis. Hanohan and Yoder (2010) argue that the valuation and rating of structured financial products[55], which caused the last crisis, is not addressed by the introduction of a financial transaction tax. Failures in this structured finance market have little to do with frequent trading, or with complex sequences of transactions such as would be discouraged by a transactions tax[56]. The complexity that causes the problems with collateralized debt obligations (CDO's) was largely a result of the reallocation of contractual claims then the payments themselves. Although considerable amount financial transaction are comprised of derivatives, a FTT would have little impact on how mortgage-backed securities are sold and constructed. The same can be said about credit default swaps (CDS's). The sale of CDS's become popular in the 1990's and a large amount of debt is insured through CDS's. But the CDS premiums entailed only a fraction of their nominal amount. These premiums did not cover the riskier part of the debt. As a result, these contracts transferred risk from parties who wanted to shed it towards parties who were able to absorb it but rather parties[57] who didn't understand it. An FTT would be applied on the CDS premiums paid thus would have no significant effect market behavior[58]. When we look at the recent financial crisis Hanohan and Yoder (2010) argue that the presence of an FTT would have had no significant impact.

The European financial service sector is considered to have a high tax burden. In a recent report by PwC, the financial sector's VAT exemption was examined against the tax burden of the non-financial economy. The VAT exemption means that the financial sector pays irrecoverable VAT[59].

It is estimated to have conferred a potential tax advantage of between €18.1bn and €23.6bn in 2009, it bears a higher than average tax burden which has made it a significant contributor to government revenues (PwC, 2013). Research has suggested that the VAT exemption in fact burdens the European financial service sector with irrecoverable VAT, estimated to be €33bn in 2007 (PwC, 2011) which creates a significant economic distortion (Adam, VAT and Financial Services, 2011). The Tobin Tax also lacks a focus on core sources of financial instability. It does not target key attributes – such as institution size, interconnectedness, and substitutability – that give rise to systematic risk (IMF, 2010).

[52] Hanohan & Yoder (2010), p. 5
[53] COM (2013) 71 final
[54] COM (2013) 71 final
[55] Collateralized debt obligations (CDO) and credit default swaps (CDS).
[56] Hanohan & Yoder (2010), p. 14
[57] For example the failed insurance company: AIG
[58] Hanohan & Yoder (2010), p. 16
[59] VAT which it pays to suppliers and which it cannot offset

In a recent empirical study by Becchetti, Ferrari and Trenta (2013) finds reductions in transaction volume and intraday volatility at the introduction of the French FTT. Their study composed of analyzing the daily trading volumes, intraday volatility, bid-ask spreads and amortized bid ask spreads of 106 French stock with a market capitalization of 1*bn*. Their research also considers a control group of 231 stocks on the Paris stock exchange. Their empirical analysis consisted of three steps. The first step consists of individual tests on stocks for significant changes in daily trading volumes, intraday volatility, bid-ask spreads and amortized bid ask spreads. In respect to daily volume, the amount of traded stocks saw a decrease after the introduction of the FTT. As for the bid ask spreads, the effect on liquidity was reported to be moderate to slightly decreasing as the distance from the FTT implementation increases. When taking a look at intraday volatility, the effect of the FTT becomes stronger as the interval increases around the event date. The two following steps consist of a more aggregate effect of the tax instead of the individual one. The second step consists of a difference in difference tests that examines the changes on treatment and control stocks. The results of the difference in difference indicate a 22% decrease in volume. As for the effect on liquidity, the bid-ask spread remains unchanged as a result of the FTT. The difference in difference results for intraday volatility were clearer, as the 30 and 90 day interval show a decrease of 17 percent and 23 percent in contrast to the control group. The third step consists of econometric panel estimates with various specifications on period and industry. The results of the panel estimates were used to confirm and qualify the previous findings.

Following a FTT rate increase of 3‰ to 5‰ in China, Baltagi, Li and Li (2006) report an increase in volatility. In their study, they analyzed domestically traded ‘’A’’ stocks on two Chinese exchanges. They examined changes is turnover[60], trading volume, market volatility and market efficiency. In order to examine the impact of the FTT increase on trading volume, the trading volume before and after the FTT implementation are taken into account. Several time intervals are used around the event and to validate the results a regression of trading volumes on a constant and a time dummy to indicate a before and after period, is run. The results indicate 25-36% reduction in trading volume as result of the FTT increase. The market volatility change is examined by comparing the variances of the returns before and after the increase of the FTT increase with the use of Levene statistic for variance equality. Evidence indicates that the market volatility increased significantly after the FTT increase. To examine the effect on market efficiency a modified Generalized Autoregressive Conditional Heteroskedasticity(GARCH) is used. The results of the GARCH imply that volatility shocks are assimilated in the stock market at a slower rate after the FTT increase. Which indicates a decrease in efficiency.

However, after the abolishment of the FTT in Japan, Lui (2004) found an increase in volatility. In their study they investigate the effect of equity transaction costs on the efficiency of price discovery on the

[60] The number of shares traded over period as a percentage of the total shares in a portfolio

Tokyo Stock Exchange. The focus of this study was on the impact of the 1989 change in the Japanese FTT with the help of a first-order autocorrelation of returns of stocks traded on the Tokyo Stock Exchange. Daily data was used with a sample period between April 1st, 1987 and March 31st, 1991 with the tax event at April 1st, 1989. As a control group, Japanese stocks that are cross listed as American Depository Receipts are used which are not subjected to the tax. Their results conclude that a reduction in transaction costs improve the price discovery process.

Phylaktis and Aristidou (2007) also examined the effects of FTT's on the mean and volatility of Greek stock market returns by selecting highly traded stocks during bull and bear periods. Bull markets are markets where investors expect the price of securities to rise and keep rising. Bear markets are the opposite of this. They expect FTT's to have a greater impact on volatility in bull periods in comparison to bear periods. To investigate the relationship between FTT and daily stock market returns, GARCH models and Exponential GARCH models are used. The data consisted of daily observations between September 24th 1997 and December 31st 2003 giving a total of 1564 observations. Their first results find no significant effect of the FTT on the daily stock returns. Their second result concludes that the FTT did not have a significant on the volatility of daily stock returns in normal periods. The third conclusion is that the FTT increases volatility during bull periods. Their final conclusion is that highly traded stocks during bull periods are more prone de the volatility decreasing effect of the FTT.

Chapter 3 European Financial Transaction Tax

This chapter provides a discussion of the European Commission's proposal of a unified financial transaction tax. Eleven member states have iterated their enhanced cooperation for common system FTT. In paragraph 3.1 the basics like: scope, taxable subject, exemptions and the tax rate are discussed. In paragraph 3.2 an impact assessment will be outlined of the proposal. In paragraph 3.3 the European Commission's FTT is compared to the Tobin Tax.

3.1 Outline of the European Commission's FTT proposal

In the latest proposal of the financial transaction tax by the European Commission[61], the scope of the tax is as wide as possible. The main reason for this is that financial instruments are often close substitutes for each other. Therefore, the scope covers instruments which are negotiable on the capital market, money-markets instruments (with exception of instruments of payment), units or shares in collective investment undertakings – which include undertakings for collective investment in transferable securities (UCITS) and alternative investment funds (AIF) and derivative contracts. The tax is not limited to trade in the organized markets. Over-the-counter trade is also taxed by the proposal. The tax is also not limited to the transfer of ownership. If a party transfers the obligation and another party assumes the risk implied by the financial instruments it is also considered a taxable event.

Both purchase and sale of financial instruments are taxed at their respective purchase or sales-price unless other considerations are determined[62]. Among these considerations[63]: the transactions of financial instruments between entities within the same concern are also considered a taxable event. Even though it might not be a traditional purchase or sale. Additionally, in order to prevent tax avoidance, each material modification of a taxable financial transaction should be considered a new taxable financial transaction of the same type as the original transaction. It is proposed to add a non-limitative list of what can be considered a material modification[64].

Transactions with the European Bank, the European Financial Stability Facility, the European Stability Mechanism and the European Union are excluded from taxation[65]. According to Directive 2008/7/EC primary market transactions are not subject to the FTT because these transactions are part of the

[61] COM (2013) 71 final p. 8-9
[62] COM (2013) 71 final p. 11
[63] COM (2013) 71 final p. 11: However, to avoid market distortions special rules are necessary where the consideration is lower than the market price or for transactions taking place between entities of a group and which are not covered by the notions of "purchase" and "sale".
[64] COM (2013) 71 final page 8
[65] European Commission, COM (2013) 71 final p. 9

restructuring of firms. This exclusion makes sure that only speculative transactions are subjected to the FTT.

As for the taxable subject, the definition of a financial institution is kept as broad as possible. It essentially covers investment firms, organized markets, credit institutions, insurance and reinsurance undertakings, collective investment undertakings and their managers, pension funds and their managers, holding companies, financial leasing companies, special purpose entities and where possible refers to the definitions provided by the relevant EU legislation adopted for regulatory purposes.

In order for a financial transaction to be taxable in the participating Member State, one of the parties to the transaction needs to be established in the territory of a participating Member State[66]. Taxation will take place in the participating Member State in the territory of which the establishment of a financial institution is located, on condition that this institution is party to the transaction, acting either for its own account or for the account of another person, or is acting in the name of a party to the transaction.

The proposal COM (2013) 71[67] of the European Commission does not include an exact tax rate. Outside literature (Schulmeister et al, 2008, 2011 and Schäfer et al, 2012) suggest a tax rate of 0.1% on financial instruments and 0.01% on derivatives. Member States are allowed to differ from this minimum but are expected to adjust these rates to a sufficiently high level to allow for harmonization.[68]

Although Directive 2008/7/EC has already been set into motion. The European Commission has not pin-pointed it´s exact specifications. Although the two following proposals[69] were thorough. None could nuance its implementation other than keeping the tax base broad, fair and as global as possible[70].

3.2 Impact assessment

The European Commission found that when compared to a baseline scenario of no intervention at EU level and in a single market for financial instruments, that the FTT system would have a positive effect on public finances which would amount to a 0.5% of GDP in additional annual revenue[71].

In contrast to the critique of (Stotsky, 1996), the European Commission expects the FTT to cost very little in administrative costs once the IT systems are up and running. The cost of administrating e.g. the UK Stamp Duty is reported to be about 0.1% of the revenue collected[72]. This compares very favorably with other major taxes, such as VAT or income taxes. The reason for this is that almost all

[66] European Commission, COM (2013) 71 final p. 10
[67] European Commission, COM (2013) 71 final p. 12
[68] European Commission, COM (2013) 71 final p. 11
[69] European Commission, COM(2011) 594 and COM (2013) 71
[70] European Commission, SWD (2013) 29 final p. 4
[71] European Commission, SWD (2013) 28 final p. 16
[72] European Commission, SWD (2013) 28 final p. 47

transactions are carried out electronically; information is collected and processed by clearing houses and regulatory authorities, and must be kept by financial institutions for some years, thus facilitating tax audits and enforcements[73]. The European Commission's FTT is estimated to cost around €50 and 150 million annually if it is implemented centrally[74].

For some sectors, like the energy sector, the investment goods industry or trade intensive sector with significant trade activities outside domestic currency area, hedging price and exchange-rate risks could become (approximately 0.01% of the underlying value) more costly as a consequence of the direct effects of the FTT of 0.01%.

For sectors and companies that finance their investments activities by issuing shares and enterprise bonds, the cost of capital might increase as well due to higher transaction costs on the secondary markets for these securities. The European commission estimates an increase of 7 basis points. The EC's argues that the positive indirect effect from squeezing out ''excessive[75]'' financial intermediation and ''spread internalization[76]'' should offset this direct effect[77].

All financial transactions typical for small and medium-sized enterprises (SMEs) are out of scope of the common system FTT[78]. As a result SMEs will not be affected by the FTT. In cases when a SME intends to hedge itself against certain price, interest rate or currency risks, it will be affected[79].

Some authors outside European Commission argue that a European FTT will even prevent future crises by shifting incentives of market participants from short term to long term goals (Schäfer, et al., 2012). According to a paper of Gray, Griffith-Jones and Sandberg (2012), a European FTT will not adversely hit pension funds and will turn short term speculative into more long-term investments with appropriate risk. High frequency traders will be hit most by the European FTT. This financial literature suggests that the additional objective of the unified FTT is a normative one by suggesting that trade attitude should be regulated by the government. Because financial stability is considered to be a public good[80], as considered by Shafer et al. (2012).

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[73] European Commission, SWD (2013) 28 final, chapter 8.
[74] European Commission, SWD (2013) 28 final p. 47
[75] Pure rent-seeking financial intermediation, excessive risk taking and leveraging and that do not improve the efficiency or stability of financial markets should be discouraged. European Commission, SWD (2013) 28 p.12
[76] Spread internalization: rolling back of business models in financial markets that were mainly aiming at redistributing wealth and rents, even at the price of higher risk exposure, instead of creating wealth and values. European Commission, SWD (2013) 28 final p. 16
[77] European Commission, SWD (2013) 28 final p. 48
[78] This might be a rather strange assumption. But I believe that the European Commission assumes that SME's trade so little shares that these costs would be negligible.
[79] European Commission, SWD (2013) 28 final p. 48
[80] Shäfer (2012) p. 77: '*The financial crisis has also shown that stability in the financial markets is a public good. Banks and other market participants can neither be excluded from using financial stability nor is there rivalry in the consumption of the "good" as long as stability is there. Financial markets driven by self-interested parties tend to overuse financial stability and are unable to provide stability by themselves. Only the state can provide financial stability. Trading can thus be viewed as using the public good "financial market stability". Against this background, the FTT is a mean to prevent over-usage and to contribute to the financing of this public good.'*

3.3 Comparing the FTT to the Tobin Tax

The Tobin Tax and the European FTT can be compared by looking at both their respective objectives, scope and tax rate. The European FTT aims to harmonize the legislation on indirect taxation on financial transaction, ensure that the financial sector contributes to the cost of the recent crisis and create appropriate disincentives for transactions that do not enhance the efficiency of the financial markets and thereby help avoiding future crises (European Commision, 2013). The Tobin Tax was designed to diminish the inefficiency[81] created by noise traders on the foreign exchange markets globally. The tax revenue would benefit the IMF and/or World Bank. This tax would reduce the recurrence of future crises. Supporting the central bank policy was one of Tobin's main concerns, in which case the Tobin Tax would help (Tobin, 1978). Both taxes where proposed in very different times and after different crises[82] taken into account. But both believed that speculators contribute to an inefficient functioning of the financial markets.

The objectives of the Tobin Tax and the European FTT are significantly related but their revenues are distributed differently and on a different scale.

While the European FTT wants to keep its scope as broad as possible, reaching out to almost every available financial instrument. The Tobin Tax was designed for transaction on the foreign exchange markets. Although this is a reasonable difference, both taxes focus on reducing excessive price volatility within their scopes.

When considering a tax rate, both the Tobin Tax and the European FTT use qualitative criteria. The European Commission advises a tax rate of 0.1% on financial instruments and a 0.01% on derivatives. While Tobin advises a tax rate no higher than 1%[83]. In both proposals it is essential to keep the tax sufficiently low.

One of the key similarities between the European FTT and the Tobin Tax is the proposed effect on excessive price volatility. Both taxes intend to reduce this volatility to increase welfare. Both taxes also propose a sufficiently low tax rate. With these essentials in mind, the European FTT can be considered a Tobin Tax.

[81] Inefficiency by speculative attacks, see chapter 2.
[82] Keynes after 1929 stock market crash, Tobin after the Oil crisis in 1973.
[83] Tobin, (1993) p.11

Chapter 4 History and cases of the Tobin tax in Europe

This chapter will be dedicated to understanding the Tobin taxes that have been implemented in the past. The focus of this paper will be on the European Economic Group (EEG). The proposed FTT of the European Commission is intended to be implemented in all the European Union Member states starting with the 11 member states (European Commision, 2013): Belgium, Germany, Estonia, Greece, Spain, France, Italy, Austria, Portugal, Slovenia and Slovakia. In the next chapter an empirical test will be run on past transaction taxes in the EEG. In order to form a panel of FTT's it is necessary that they comply with a proper definition of one. In paragraph 3.1 a definition of a financial transaction tax will be discussed so that it can be applied as a benchmark to the available financial transaction taxes between 1980 and 2014 in the EEG. Paragraph 3.2 will give an outline of financial transaction taxes in the EEG region between 1980 and 2014. Paragraph 3.3 will give an analysis and summary of these transaction taxes as a preparation for empirical testing.

4.1 The definition of a financial transaction tax

As described in chapter 2, Keynes and Tobin were among the first to point out the down side of speculation. Both point out the unsustainable mentality of noise traders. This is theoretically a micro-economic issue where rent seeking agents pursue short-term gains at the expense of society. Essentially a small tax is applied on transactions in order to produce a more sustainable trading attitude. This speculative aspect is not bound by which financial instrument market the transaction tax is applied to. Therefore a transaction tax is applicable to most instances (if not all) where noise traders cause excessive volatility.

Fundamentally, FTT's can be taxed upon an array of financial transactions. There are practically two kinds of FTT's transaction taxes (Van Der Veken, 2014): stamp duties and securities taxes. Stamp duties are levied on certain financial transfers based of the transfer and/or administration of their legal documents. Securities taxes only tax the transfer itself. Stamp duties do not initially direct themselves at the financial transactions but rather at a variety of legal documents as a tax base.

Stamp duties were introduced to tax the registration of legal documents like property rights. Legal ownership could only be transferred if the stamp duty was paid. Now most stamp duties on the registration of documents are abolished but the method of stamp duties on the emission of debt and equity still remain. Transaction taxes don't tax the registration of a legal documents but rather the transaction of the financial instrument. The consequence of this is that stamp taxes can be charged on stock and securities of domestically incorporated entities technically worldwide. On the other hand transfer taxes rely on the particular jurisdiction of the transaction itself. This difference between stamp duty and transfer tax is decisive for the size of the tax base and for possible tax evasion. The difference

between these two taxes is not always as clear, as some of them were not deliberately introduced to tax stocks and bonds but merely grew to become that way (Schulmeister, Schratzenstaller and Picek, 2011). For the purpose of this paper both stamp duty and transfer tax or considered a financial transaction tax. Next to these two taxes there is also a currency transaction tax but such a tax was never implemented.

Table 2 Types of financial transaction taxes[84]

Financial transaction taxes	Taxable object	Advantages and disadvantages	Also referred to as
Stamp duty	Acquiring or transfer of legal ownership of financial instruments	+ Virtually global jurisdiction on domestic entities − Based on the taxing of the registration not the transfer. This gives governments less control over which types of transfers are taxed.	Stamp Tax
Transfer tax	Transfer of property rights of financial instruments within jurisdiction	+ Governments have more control over which transactions are taxed − Transfer taxes can more easily be evaded then capital duties due to the nature of the transfer. And the lack of administrative necessity.	Stock market tax, transaction tax, securities transaction tax

[84] Schulmeister et al. (2011), Van Der Veken (2014).

Due to the availability of stock data, this paper requires FTT's that are taxed on stocks.
Taken the aforementioned into account, a definition of a financial transaction tax is defined as the following:
A financial transaction tax is a tax applied on the transfer (including the transfer of property rights) of financial instruments like: shares, bonds and options. A transfer is considered a sale and/or a purchase of the financial instrument. These transfers take place on recognized marketplace as well as over the counter transactions. The scope of financial instruments must include at least securities like stocks. The financial transaction tax rate is high enough to alter the mentality of noise traders and low enough not to disrupt efficient price formation[85].

4.2 Transaction taxes across Europe

This section summarizes FTT activity in the European Economic group.

4.2.1 Austria

A transfer tax applied was applied to stocks and bonds (Wrobel, 1996). The transfer tax was applied on the exchanges in Austria, or elsewhere if one party is Austrian. The tax was applied on both sales and purchases of the respective instruments. The rate is four basis points for government bonds and 15 basis points for equities[86]. It was possible to avoid this tax by trading abroad. The transfer tax was abolished following a tax reform act in 2000[87].

4.2.2 Belgium

There was a capital duty present in Belgium before 2006 and it was levied at a rate of 0.5%. Next to that, Belgium also introduced a transfer tax in 1927 which was reformed in 1990. Primary market transactions[88] were exempt from the transaction tax as of 2004. Transactions in securities (sales and purchase) like government bonds, corporate bonds and pension funds were taxed at a rate of 0.07% till 2011. Transactions in other financial instruments like warrants and stocks are taxed at a rate of 0.17% with a maximum of €500 (Florence, 2012). All types of financial instruments are in scope, like equity, shares of investment companies, bonds, and some derivatives.

[85] Shafer et al, (2012) p. 2
[86] Pollin, Baker, & Schaberg, (2002) p. 47
[87] Schulmeister, Schratzenstaller, & Picek, (2008) p. 15
[88] Primary market transaction are transaction that occur when companies sell their new stocks and bonds for the first time.

This transaction tax brought a revenue of €134 million in 2010 and €131 million 2011, which is 0.04% of Belgium GDP. In 2013 the tax rates were increased. The tax on government bonds, corporate bonds and pension funds was increases to 0.09% with a maximum of €650. And on the 1st of August transaction tax on stocks and warrants was increased to 0.25% with a maximum of €740. Belgium is, as of 2004, one of the 11 participating countries for the European Commission's FTT[89].

4.2.3 Finland

Finland has a long history of financial transaction taxes. It first began as a stamp-duty on security trading in 1942. Only for a brief period between 1985 and 1992 did the tax change to a 1 % per round-trip[90] (which means a 0.5% levy on every sale or purchase) transaction tax (Westerholm, 2003). This tax was imposed broadly on equities, profit participating loans, bonds, options, debt securities and derivatives. The tax was charged if the transferee and/or transferor is a Finnish resident or a Finnish branch of certain financial institutions. Several exceptions were possible. E.g. no transfer tax is payable if the equities in question are subject to trading on qualifying markets (even if the transfer is carried out as an OTC transaction)[91]. The Finnish transaction tax was abolished on the 1st of May 1992 due to a lack of effectiveness and because of a migration of stock trading from domestic to abroad.

4.2.4 France

France decided to implement an FTT, ahead of the European Commission's proposition, on the 1st of August 2012. The February 2012 proposal consisted of three types of financial transactions[92]:

- The acquisition of shares ('SAT')
- "High frequency trading" ('HFT tax')
- The acquisition of credit default swaps ('CDS tax')

The proposal included the levying a transfer tax on the acquisition of shares. The acquisition of shares would be taxed if the head office of the company is located in France, the company's shares are listed on the regulated stock market and the company has a market capitalization exceeding €1 billion on 1 January 2012. Irrespective of the location of the regulated market on which these companies are listed or in which country the buyer is located the tax is levied. The tax subject is defined as the investment

[89] Florence (2012) p. 11
[90] An asset that goes through a round-trip is bought and sold, which in this case means that the transaction is subjected to the transaction tax twice.
[91] European Commission Brussels, 28.9.2011 SEC(2011) 1102 final Vol. 9
[92] TaxNewsFlash, First legislative proposals for 2012, include tax on financial transactions, increased VAT rate, and enhanced foreign account reporting obligations, February 14, 2012, KPMG

service provider or the broker, which has executed the transaction on its behalf or on behalf of the client, or the securities account holder of the investor when the transaction is not executed by a broker (AFTI, 2012). The transaction tax rate on shares is set at 0.1%. High frequency trading and the acquisition of credit default swaps are not restricted to these criteria[93]. All companies that are operating in France qualify for tax on high frequency trading. For a tax on credit default swaps individuals must be established in France and a company that has to be operating in France. The tax rate for the tax on high frequency trading and on the acquisition of credit default swaps is 0.01%. In contrast to the European Commission's proposal, the French FTT is levied from the buyer and not the seller (Sullivan and Cromwell, 2012).

4.2.5 Italy

In 2013 Italy introduced their FTT with the aim to raise additional funds for the government. The FTT will apply to: transfer of title (including convertible bonds) of (i) shares (ii) securities, and (iii) derivatives. This FTT will also be applied upon HFT. In respect to securities, the FTT will apply to transactions executed from March 1st 2013 at the following rates: 0.2% on securities trades not on regulated markets; and 0.1% on securities trades on regulated markets or on a multilateral trading facility. The trading of derivatives will be taxed starting July 1st 2013 at a fixed scale amount depending on (i) the derivative and (ii) the notional value of the relevant contract[94] (Astolfi and Vittore, 2013).

4.2.6 Ireland

Before the formation of the state in 1937, Ireland introduced a tax on financial transactions[95]. The tax was levied on the transfer of legal ownership of shares in Irish companies and derivative financial instruments that relate to shares in Irish companies. Securities that were issued by the Irish government or by the European Union and their interest are exempt from the tax. The tax is considered a stamp tax and is levied at a rate of 1% (KPMG, 2013).

4.2.7 Germany

The transaction tax law stems back from 1922. This tax was effective on stock transfers and was suspended in September 1944. After being reinstated in 1948, the tax was in effect till January 1st

[93] 1) the head office of the company is located in France. 2) capitalization exceeds €1 billion on 1 January 2012.
[94] Example: a financial instrument of 2.500€ would be levied for 18.50€ (0.0075%). And a financial instrument of 100.000€ would be levied for 3.750€ (0.0375%).
[95] Legislative reference: Sections 2, 88 and 90 and Schedule 1 of the Stamp Duties Consolidation Act 1999.

1991. The tax was levied on bonds, equities and mutual funds[96]. Depending on the instrument type, the tax was levied with a tax rate of 0.1% on bonds and 0.25% on shares and other fixed income securities. Because of the fall of the Berlin wall this tax was abolished in 1991 by virtue of ‘’Finanzmarktförderungsgesetz’’. This was also called the first act to improve market conditions.

4.2.8 Greece

At the end of the 1990’s Greece imposed a financial transaction tax on ATHEX[97] shares. The transaction tax was levied at a rate of 0.3% in 1998[98] and was applicable on the transfer of listed shares that were traded as of 19 February 1998 (i.e. two days after the date that L.2579/1998 was published in the Government Gazette as provided by this law). As of the 8th of October 1999 the transaction tax rate was increased to 0.6%[99] and subsequently reduced to 0.3%[100]on the 1st of January 2001 and then reduced to 0.15%[101] on the 1st of January 2005. Currently the rate is 0.2%[102] for the sale of listed shares performed as of 1 April 2011[103]. This tax is calculated on the value of the shares transferred as it appears on the tag issued by the intermediating brokerage firm. The tax burdens the buyer of the shares, individual or corporate entity, unions or trusts, regardless of their residence, origin or place of residence or domicile and even if they are exempt from the payment of other taxes or duties by virtue of other provisions[104].

4.2.9 Netherlands

The Dutch version of a transfer tax was passed on January 1st 1972 which replaced their stamp duty which was abolished in the same year. The main reason for applying the tax was to generate tax revenue (Van Der Veken, 2014). The transaction tax was levied at a rate of 0.12% on securities[105]. From a tax revenue perspective this transaction tax yielded reasonable results. The revenues were growing from 1983 to 1988. On July the 1st of 1990 the transaction tax was abolished because the tax was the main reason why trading shifted abroad and parliament wanted the trade to shift back to the domestic markets (Paling, 2012).

[96] Artikel 4 des Gesetzes zur Verbesserung der Rahmenbedingungen der Finanzmärkte; BGBl I 1990, 266
[97] Athens Stock Exchange
[98] Article 9 par. 2 of Law 2579/1998
[99] Article 22 of Law 2742/1999
[100] Article 37 par. 5 & 6 of Law 2874/2000
[101] Article 12 of Law 3296/2004
[102] Article 16 par.2 of Law 3943/2011
[103] KPMG Greece e-mail Correspondence, see appendix 1
[104] Law No. 2579/1998, article 9, paragraph 2, as amended by Law No. 3296/2004, article 12 and Law 3943/2011, article 16.
[105] Paling (2012) p. 19

4.2.10 Sweden

The Swedish transfer tax was introduced in 1984 and was abolished in 1991. During its existence, this transfer tax had been changed in scope and size on several occasions. From 1984 to 1989, it was applied primarily to transactions in stocks and stock based derivatives. As of 1989, the FTT also included fixed-income securities – primarily bonds and bills – and the derivatives based on those securities. The Swedish transfer tax was introduced in two waves in the 1980's (Schulmeister et al. 2011). The first wave's main concern was dampening the rapid wage increase in the financial sector. The second wave of the tax was more about curbing speculation which also focused on fixed income securities. In the first wave, which was 1984 to 1986, the tax was 0.5% for both purchase and sale. Because of limited effects the revenues were a disappointment. As a result the rates were doubled in 1986 to 1% for every purchase and sale. This increase had a drastic effect on the market behavior. Swedish brokers began to avoid the tax by moving their activities abroad where the tax would have no jurisdiction. About 60% of the most actively traded Swedish stock classes moved to London. Overall, the 1986 tax-rate-increase did not reduce the total trading volume of Swedish stocks by much, but rather pushed trading from Stockholm to London. As a result, the FTT revenues remained small (Waldenstrom, 2008). In the second wave, which started in 1986 (see above), fixed income instruments and their derivatives were added to the transfer tax. They mainly consisted of government bonds and bills. The fixed-income addition had a very drastic impact on market behavior. In the first week of its introduction the trading of bonds fell by 85% and the trading of futures to almost 98% (Wrobel, 1996). Because of this increase the tax revenues turned out to be scant. The Swedish FTT was phased out because of its bad performance and was eliminated in 1991. It remains a popular example in the FTT discussion and financial literature. According to Schulmeister et al (2011) the tax "failed due to a bad tax design and the resulting migration of trading volume".

4.2.10 Switzerland

Switzerland recently abolished their stamp duty which dates back to 1972[106]. Federal Stamp Duties Act consisted of three parts: issue tax, real estate transfer tax and insurance premiums tax. The issue tax is a stamp duty levied on the issue of Swiss securities like shares and bonds. A taxable person is a company or the person who issues the securities. The tax rate on the issuance shares, bonds and participating rights was 1%. The issue of the bonds are taxed at 0.06% or 0.12% per year to maturity[107]. Certain transactions, especially in the case of reorganizations[108], are exempt from tax.

[106] European Commission Brussels, 28.9.2011 SEC(2011) 1102 final Vol. 9
[107] Credit Suisse: Regulatory update, July 2013 – Financial transaction taxes
[108] Similar to primary market transactions. These transaction are vital to the solvability of companies thus should not be levied by a transaction tax.

The stamp duty is levied on the transfer of certain Swiss securities: mainly shares, similar participating rights in corporate entities, bonds and shares in investment funds, and similar foreign securities[109]. Swiss stock brokers ("Effektenhändler") and ‘’remote members’’ also pay a stamp duty when trading securities. Stock brokers are primarily banks or companies holding taxable securities of which the book value exceeds CHF 10 million. Remote members are foreign members of a Swiss stock exchange in respect of Swiss securities. The rates are 0.15% in respect of Swiss securities and 0.3% in respect of foreign securities. The insurance premium tax is a stamp duty levied on insurance premiums. Insurance companies are subject to the tax. The standard rate is 5% of the premium. The Swiss stamp tax was abolished in March 2012 as the result of the Banking Reform Act (Walder Wyss attorneys at Law, 2011).

4.2.11 Spain

In Spain, article 108 of Law 24/1988 on securities market imposed something very similar to a transfer tax. This transfer tax is only levied when a non-Spanish entity buys real estate capital from a Spanish entity and when that transaction results in a controlling stake in the Spanish entity (more than 50% stake), the buying entity would then have to pay the transfer tax. If the controlling stake of the Spanish entity is acquired via a holding of companies the tax will not be exempt. Once this control has been obtained by the non-Spanish controlling entity, the entity will be taxed for amount around 6% to 7% of the transaction[110] [111]. Because this transfer tax was levied at a too high rate and is aimed at taxing a controlling position of shares, it should not be considered a financial transaction tax because it adheres only to a fraction of trade.

4.2.12 United Kingdom

The United Kingdom has an age old stamp tax which date back to 1694. This tax historically required a physical stamp to be attached to or impressed upon the instrument in question[112]. The modern version of the Stamp Tax no longer requires a physical stamp. The tax is levied on shares of all companies listed on the British stock exchange and is not levied on foreign companies established in the UK (Florence, 2012). The tax is also levied on equity derivatives with loan capital generally being exempt except where it has equity features such as convertible shares[113]. Since the start of the 1980’s the transaction tax rate has changed twice. Transactions before 1984 were taxed at a rate of 2% of the

[109] Swiss Tax law: http://www.admin.ch
[110] ACT 24/1988, OF 28 JULY, ON THE SECURITIES MARKET CONSOLIDATED TEXT, p. 163
[111] Capital duty: The European Commission formally requests Spain to abolish its transfer tax on certain contributions of capital, European Commission - IP/10/83 28/01/2010
[112] HMRC Stamp Tax Manual p. 7
[113] European Commission Brussels, 28.9.2011 SEC(2011) 1102 final Vol. 9 p. 707

sales price of shares after being reduced to 1% on the 13th of March. In the autumn of 1986 the tax rate was reduced to 0.5%[114] with an 'exit rate' of 1.5% in case the share was converted into a financial instrument which was not covered by the Stamp Tax (Bond, Hawkins, Klemm, 2004). The British Stamp Tax collected a total of 10 billion pounds, roughly 0.8% of British GDP (Schulmeister, Schratzenstaller and Picek, 2008).

4.3 Conclusion

This chapter summarizes the FTT's that were, and are, present in the Euro-zone according to the definition of an FTT. After the initial proposal of James Tobin for a transaction tax, sovereigns started implementing FTT's in the 1970's and 1980's. In the early 1990's some of those taxes were abolished (Germany, Netherlands, and Sweden). Most due to a shift to trading abroad, thus bypassing the transaction tax and rendering it ineffective. Starting from 2011 several countries across the EEG started introducing or increasing a FTT. FTT sentiment might be a result of the recent crisis in the financial sector. With exception to Greece, there is clearly a period of inactivity seen from 1992 to 2010. This is illustrated in figure 2.

Figure 2: Financial transaction tax rates on European equity from 1980 to 2014(%)

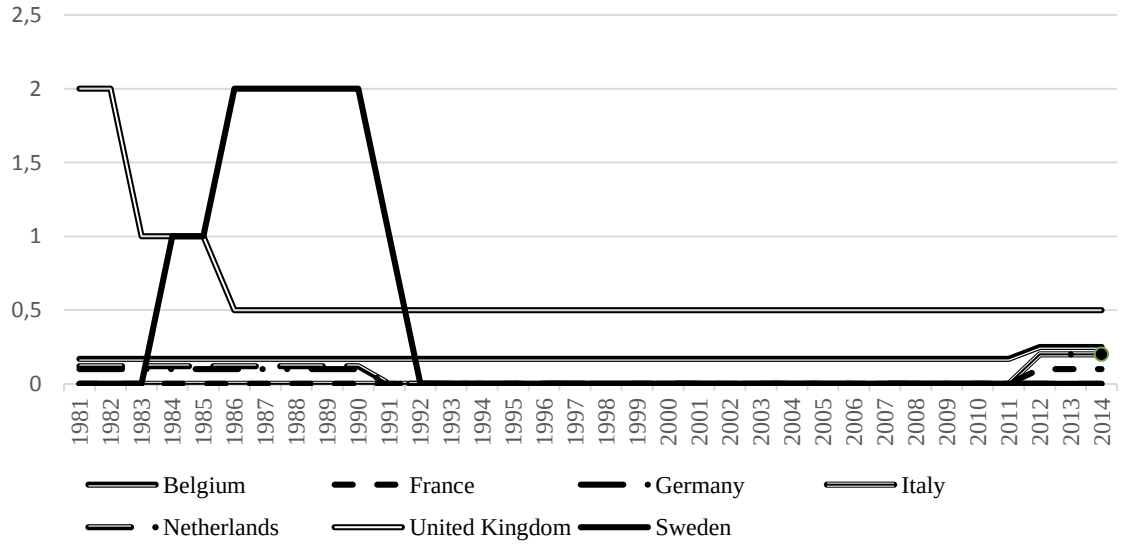


Table 2 summarizes the FTT history of the European transaction tax including their occurrence, how many times(if any) they were changed, whether they are selected for research and how many are available in the dataset. Identifying when and where these FTT's were introduced, abolished and changed; opens up the research question for a statistical analysis.

[114] Bond et al. (2004) p. 11

Table 3 FTT Panel of European Economic Group (EEG)[115]

Country	FTT presence[116]	FTT changes since 1980[117]	Selected for research[118]	# firms[119]
Austria	Yes	• Transfer tax was abolished 2000. Bonds were levied at a rate of 0.04% and stocks were levied at a rate of 0.15%.	No	n/a
Belgium	Yes	• On August 1st 2012 the transfer tax was increased from 0.17% to 0.25%.	Yes	10
Denmark	No	• n/a	No	n/a
France	Yes	• On August 1st 2012 the transfer tax was introduced with a tax rate of 0.1%.	Yes	10
Germany	Yes	• Germany had an capital duty prior to the fall of the Berlin wall. The transaction tax was abolished January 1st 1991 and had a tax rate of 0.1%.	Yes	10
Greece[120]	Yes	• Was introduces 19 February 1998 at a rate of 0.30%. • Was increased to 0.60% on the 8th of October 1999. • Was decreased to 0.30% on the 1st of January 2001. • Was again decreased to 0.15% on the 1st of January 2005. • Was increased to 0.20% on the 1st April 2011.	Yes	8
Ireland	Yes	• Capital duty in force. But no changes were made.	Yes	10
Italy	Yes	• Transfer tax introduced on the 1st of March 2013 with a tax rate of 0.2%.	Yes	10
Luxemburg	No	• n/a	No	n/a
Nederland	Yes	• The transfer tax was abolished on the 1st of July 1990. It had a tax rate of 0.12%.	Yes	10
Portugal	No	• n/a	Yes	2
Spain	Yes	• The transfer tax was abolished in 1988 but is in most traditional cases not considered a transaction tax.	Yes	10
Sweden[121]	Yes	• The transfer tax was introduced on January the 1st 1984 with a tax rate of 0.5%. • It was increased to 1% on July the 1st 1986. • It was gradually abolished in 1990. On the 1st December 1990 this FTT was gone.	Yes	9
United Kingdom	Yes	• The capital duty was reduced from 2% to 1% on the 13th of March 1984. • It was subsequently reduced on the 18th of March 1986 to 0.5%.	Yes	10

Source: KPMG, (2012). Table 3 presents a summary of FTT activity between 1980 and 2014 in the EEG.

[115] KPMG, (2012)
[116] FTT present since 1980
[117] Changes in FTT rate since 1980
[118] Availability of data to select country for study
[119] Number of compatible stocks for the complete panel

Chapter 5 Methodology

This chapter will explain the methodology with which we will answer the research question from chapter 1:

Did the changes in Financial Transaction Taxes in Europe affects volatility of the stock markets?

In order to answer this question a panel regression is chosen with a select group of available stocks dating back to 1980. This chapter will explain the regression model and the data selection. As discussed in previous chapters the European Commission proposal is based on the Tobin tax. Europe has a history of FTT's which has been discussed in Chapter 4. In paragraph 5.1 a first methodology will be explained where I use past stock data to examine the effect of Tobin Taxes on stock market volatility. Paragraph 5.2 will include a second approach that involves a difference in difference model. This methodology is focused on studying the differences of the variables around dates on which FTT is changed. This approach will bypass any distortionary effects that using the entire dataset may have.

5.1 Panel regression method

The research question will be answered with the following regression model:

$$Y_{t,i,j} = \alpha_{t,i,j} + \beta_1 Y_{t-1,i,t} + \beta_2 X1_{t,i,j} + \beta_3 X2_{t,i,j} + \beta_4 X3_{t,j} + D_i + D_j + D_t + \varepsilon_{t,i,j}$$

Definitions:

$Y_{t,i,j}$ = Monthly volatility of the stock in company i in month t. This is either Historical Volatility or High – Low Volatility.

$\alpha_{t,i,j}$ = The constant of the estimation of stock in company i and country j in month t.

$Y_{t,i,j-1}$ = Monthly volatility in country j of the stock in company i on month t-1. This is either Historical Volatility or High – Low Volatility.

$X1_{t,i,j}$ = Volume of stocks traded in country j in company i and on month t.

$X2_{t,i,j}$ = Market Value in country j of company i and on month t.

$X3_{t,j}$ = The FTT rate that country j is subjected to in month t.

D_i = Fixed-effect dummy for companies.

D_j = Fixed-effect dummy for countries.

D_t = Fixed-effect dummy for time periods.

[120] KPMG Greece, email correspondence. See Appendix A.
[121] Walch 2013, Market Operations Analysis, Financial transaction tax: http://www.ecb.europa.eu/paym/groups/pdf/bmcg/130409/item_6.pdf?6bd7d4f7a8cffd84d2849088959d9bc2

$\varepsilon_{t,i,j}$ = Residual of the equation of the stock in country j in company i at time t. We assume that the residuals are independent identically distributed.

Explanation:

β_4 measures the average effect of an FTT on volatility. $X3_{j,t}$ is the FTT rate which indicates the presence and level of the FTT on that specific stock in that particular country. β_4 can be calculated on an entire set at any time between 1980 to 2014. β_4 Is therefore the main focus of the hypothesis as discussed in chapter one:

$$H_0: \beta_4 \; is \; not \; significant$$
$$H_1: \beta_4 \; is \; significant$$

A positive value of β_4 means that the FTT affects the average volatility of stocks positively. A negative value of β_4 means that the FTT decreases the average volatility of stocks. A significant negative value of β_4 would coincide with the theory described in chapter 2 about the Tobin tax. According to the theory financial transaction taxes should lead to a reduction of volatility in financial markets.

Our first dependent variable (Y) is historical monthly volatility (Jones and Seguin, 1997) of the stocks in our dataset and is calculated according to the following formulae:

$$Vol_{i,t} = \sqrt{\frac{\sum_{s=d0}^{d1-d0}(u_{i,s}-\bar{u}i)}{d1-d0-1}},$$

In this formula d0 stands for the first day of the month over which the volatility is calculated, d1 stands for the last day of the month. ū is the average return of the stock over the period that the volatility is calculated. $u_{i,s}$ stands for the log-return between day s and s-1(formula below) for firm i. Daily return indices are used when calculating the historical volatility.

$$u_{i,s} = \ln(\frac{closing\ price\ of\ company\ i\ on\ day\ s}{closing\ price\ of\ company\ i\ on\ day\ s-1})$$

Our second benchmark will be volatility based on daily high and daily low values of stock prices divided by the average closing price of the last 5 business day. This approach is based on that of Westerholm (2003, p. 241) who suggests that this calculation is less prone to fluctuations in trading volume than the standard deviation volatility measure.

$$Vol_{it=}\frac{daliy\ high\ price\ of\ company\ i\ on\ day\ t-daily\ low\ price\ of\ company\ i\ on\ day\ t}{average\ closing\ price\ of\ company\ i\ on\ the\ 5\ preceeding\ businessdays}$$

Unlike the Historical volatility, the High-Low volatility does not use return indices but rather an intraday fluctuation of the price. High-Low volatility accentuates variation in prices more than historical volatility does that out of closing price returns alone. Still having the historical volatility as a benchmark is very useful. Data sources do not allow High-Low volatility data to be available for certain periods and markets, while data for historical volatility is more readily available. This adds necessary dimension to the stock panel.

Market Value of European stocks is an independent control variable in the regression model. According to Jones and Seguin (1997) Market Value is an appropriate proxy for factors that influence the volatility of a stock, like the quality and quantity of stock information, trading volume and bid-ask spreads[122]. By adding Market Value to our independent variables we control for these factors. The market value is a proxy for correcting for firm size. Firms in the panel have different market values that also change through time. As companies grow their market value increases. As their market value increases their equity information becomes more accurate. As their information becomes more accurate their stock volatility will decrease. The daily market value of company i is the daily closing value of each company stocks multiplied by the number of outstanding shares[123].

Volume[124] is also an independent variable in this regression model. Volume can be a sign of liquidity and will be used as a second control proxy in the regression model (Summer and Summer 1989, Stiglitz 1989). Thus volume corrects the model for the tradability of the firm. The traded volume is the amount of shares that are traded in a particular day t of firm i. If a company is illiquid it will be harder to buy and sell their stocks because there are less market participants or the respective market has trading barriers like costs or other factors harming liquidity. If stocks are therefore illiquid their volatility will be higher as a consequence. By adding volume as a proxy, the model corrects for different sector- and market liquidity that may influence its volatility. This paper focusses on the total effect of FTT's on the volatility and not the cleared up effect.

Fixed-effects (FE) and Panel structure: The main advantage of panel data is that the regression model can control for stable characteristics (i.e. characteristics that do not change across time) whether they are measured or not. The regression model is corrected for fixed-effects. In contrast to a random-effects model a fixed-effects model assumes that every panel subject has its own intercept. In a normal OLS model these cross-section and period specific effects would be stowed away in the error-term ($\varepsilon_{t,i,j}$) not improving the explanatory power of the model. By introducing fixed-effects to the model we assume that every European stock has its own fixed effect because inherently, every company differs from one another. The dummy correcting for company fixed-effects is depicted as D_i. FTT's are directly related to a countries fiscal structure, therefore we also want to add a country fixed effect

[122] Jones and Seguin (1997) p. 731
[123] Market value / market capitalization expressed in millions of local currency– datatype (MV).
[124] Volume in expressed in thousands of shares traded

dummy to control for differences between countries. D_t is the dummy variable that corrects the model for fixed-effect through time. If there was a crisis at time t where all stocks were subjected to, the time dummy will correct the constant for those effects in time. The Hausman test is used to indicate the appropriateness of the fixed-effects model[125]. Having the ability to use the fixed-effect model give the opportunity to correct for omitted variables. The panel also includes implicitly a control group, a group of stocks that are not subject to FTT's. When working on a panel of eleven countries, most of the time, only one country undergoes a FTT change followed by another FTT change several months or years later. This renders the remainder of the panel, countries that aren't hit by an FTT change, as a control group each time a FTT change hits the timeline. We also estimate this specification using White period standard errors to allow for general contemporaneous correlation between the firm residuals. As a robustness check, various models will be estimated excluding the first order serial correlation.

5.2 Difference in difference method

In order to further control for omitted variables the methodology includes the use of a difference in difference model as discussed in Cameron and Trivedi (2005). This method is chosen as a way to sum up the effects of various FTT changes in the panel. By using this approach; the panel now bypasses any distortionary effects of the periods between FTT changes (likes crises, wars, trade embargo's, ect.). The modified DID method[126] uses the same data as the model specified above but then taking the difference in two and four period intervals. When focusing on one specific change in the FTT, the DID estimator is given by:

$$\beta_4 = (\mu_{1,1} - \mu_{1,0}) - (\mu_{0,1} - \mu_{0,0})$$

Introducing some notation, $\mu_{i,t}$ stands for the outcome of the variable i at time t. Define i=0 for the control group and i=1 for the treatment group. Define t=0 to be a pre-treatment (treatment in this case being the FTT) period and t=1 to be the post-treatment period (though only the treatment group gets the treatment).

They main concept behind difference in difference is that it simply uses the difference between the treatment and the control group as an estimate of the treatment effect (i.e. it uses the estimate: $\mu_{1,1} - \mu_{1,0}$). This method assumes however that the treatment and control groups have no other differences apart from the treatment, which is a strong assumption in non-experimental data. A weaker assumption

[125] Appendix B1: Hausman test results and description
[126] Cameron and Trivedi, 2005 p. 768

is that any difference in the change in values between treatment and control groups is the result of the treatment effect.

We apply this method by taking differences of all available variables (market value, volume, FTT, historical volatility and high-low volatility). There are two sets of differences calculated by the methodology. The first set uses a two months interval around the FTT change and is the difference of the variable in period 2 with that of period 1. The second set uses a four months interval around the FTT change and is the difference of the variable in period 4 with period 1. Having both a two months and four months interval could include a lagged effect of the FTT in one of the control countries in addition to the effect the difference is supposed to focus on. In order to apply this method the stock panel therefore needs to be cleaned for such lagged effects around all the FTT change dates. Hereby all data is removed from of the panel except one or two periods before and after the FTT changes. In total, the DID method works around 15 FTT changes. The downside of having this amount of scattered events in the timeline is that the timeslots of these events should not overlap one another. This would disturb the measurement of the FTT variable. In the two period DID data there were instances where certain timeslots overlapped each other. For this reason the data of March 1984 and January 1991 for Sweden is removed from the two period DID dataset.

The difference in difference estimator is applied on the following OLS model:

$$\Delta Y_{t,i,j} = \beta_2 \Delta X1_{t,i,j} + \beta_3 \Delta X2_{t,i,j} + \beta_4 \Delta X3_{t,j} + D_t + \varepsilon_{t,i,j}$$

Definitions:

$\Delta Y_{t,i,j}$ = Monthly volatility of the stock for company i in country j at month t differenced[127] by one or two months before. This is either Historical Volatility or High – Low Volatility.

$\Delta X1_{t,i,j}$ = The difference in volume of stocks traded for company i in country j at month t decreased by one or two months before.

$\Delta X2_{t,i,j}$ = The difference in market value of company i in country j at month t decreased by one or two months before.

$\Delta X3_{t,j}$ = The difference in FFT rate that the country is subjected to in month t decreased by one or two months before.

D_t = Fixed-effect dummy for time periods.

[127] Differencing is done by taking the volatility of t0 and reducing it with t-1 or t-2

Chapter 6 Data

In this chapter the data will be discussed. In paragraph 6.1 the search method of the data is explained including the scope and sources. In paragraph 6.2 the data will be analyzed. There are two sets of data, historical volatility and high low volatility. Both of these volatilities will be analyzed in this section with the help of a cross correlations.

6.1 Data and stock selection

In order to study the volatility effect on a European stock panel it is important to first select a proper scale to the data set. The FTT is proposed to, eventually, be a global tax (Tobin, 1978). The European Commission would like this global tax to start in Europe[128]. In this study the stocks are selected from the most developed part of Europe starting from 1980. It is important to start with European countries with the most advanced integration of financial instruments. This has led to the selection of the EEG[129] as an ideal starting point for the search of the appropriate European stock panel. Table 2 depicts the first stage of the selection process, namely, selecting countries which have compatible stock information as well as a FTT present during 1980 to 2014. The first step of the selection process results in the following countries to be selected: Belgium, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, United Kingdom and Sweden.

The second step in the selection process puts more emphasis on data compatibility. There can already be certainty that the countries have or had an FTT active within the time window of 1980 to 2014. Now the search goes out for stocks that have a history stretching from January 1st 1980 to April 1st 2014. This can be a challenging step as certain companies go out of business, merge and divest or other forms of material restructuring. With these high prerequisites in mind for the European stock panel, the process ends up with only the most extensively reported stocks of the panel countries. These are by that definition also the biggest and oldest stocks available per country within Thompson DataStream. The most important requirements for the panel stocks are: 1) they most have available price data from January 1st 1980 to April 1st 2014 and 2) in order for each FTT country to be representative in the panel they must have a decent amount of stocks in the panel. This selection process forms no obstacle in the more financially developed region of Europe (UK, Netherlands,

[128] Financial Transaction Tax: Making the financial sector pay its fair share, European Commission - IP/11/1085 28/09/2011

[129] European Economic Group Members: Belgium since March 25th 1957, Denmark since January 1st 1973, Germany since March 25th 1957, France since March 25th 1957, Greece since January 1st 1981, Ireland since March January 1st 1973, Italy since March 25th 1957, Luxemburg since March 25th 1957, Netherlands since March 25th 1957, Portugal since January 1st 1986, Spain since January 1st 1986, United Kingdom since January 1st 1973.

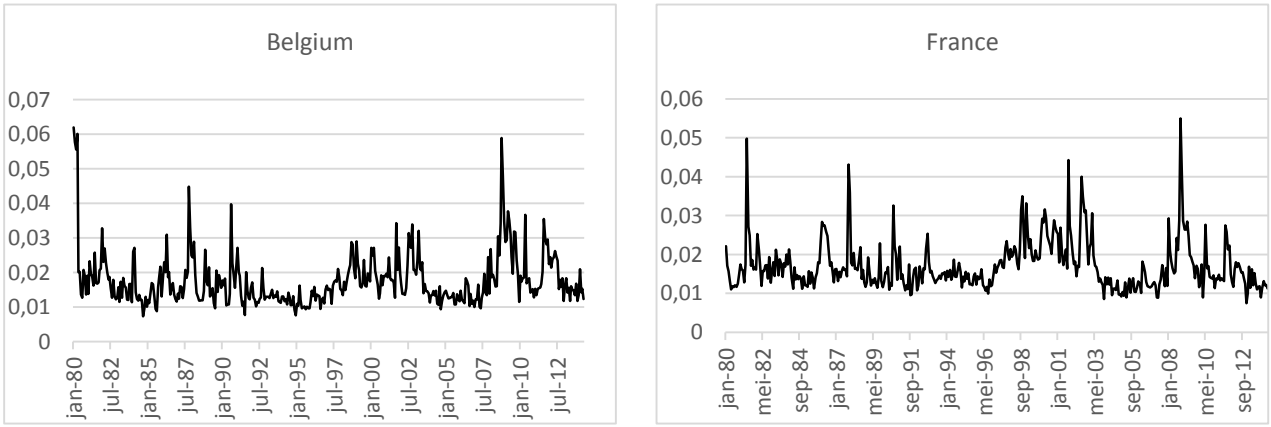
Germany, Belgium, Spain, Italy, Sweden, and France). In less financially developed and smaller economies (Luxemburg, Denmark, Portugal and Greece) there is a less representative data available. Nonetheless, the aim of this study is to keep the scope of the European stock panel as wide and long as possible.

Appendix B2 summarizes the European stocks that are selected for this study in detail. These tables specify information like company identification, stock index, cross listing and effective start date of all the variables. These stocks were handpicked on the basis of the index system of Datastream and were visually inspected for their viability in the panel regression. The tables also note corresponding indexes to their particular stocks as well as their longest registered cross listing. The start date indicates at which moment the full set of variables[130] are available. This information is especially useful for future research on this subject.

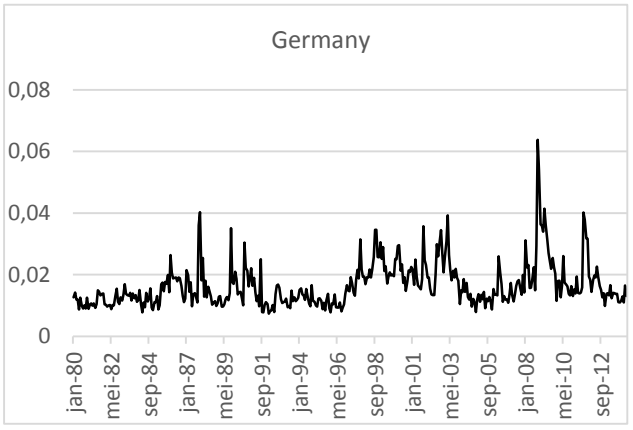
6.2 Data analysis

To properly understand this vast amount of data, this section will focus on the aggregate time series of the two type of volatilities that were calculated from the data. The first step is to compute the average volatility of historical volatility and high-low volatility of each respective country. The graphs of these time series are part of figure 3 and figure 4. The y-axis indicates the degree of volatility and the x-axis indicates the date. The next step of the analysis is to calculate the correlations between countries, within and across both sets of volatility (see Appendix B5 and B6 for the correlations matrixes).

Figure 3: Historical volatility graphs per EEG country 1980-2014



[130] Full set of variables: Price High, Price Low, Price Opening, Price Close, Volume and Market Value.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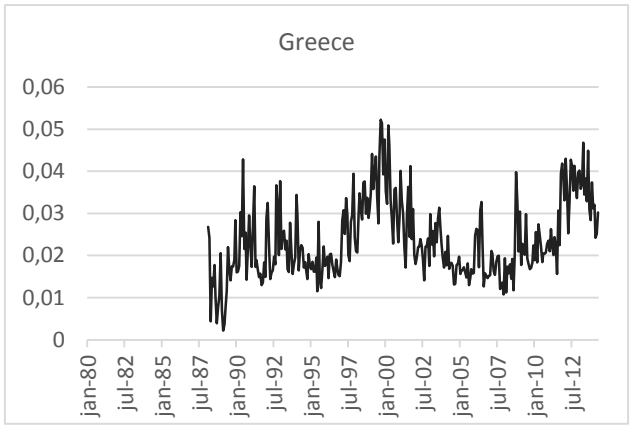
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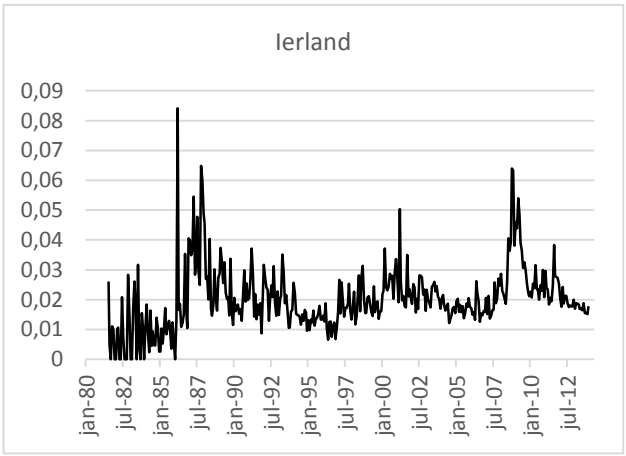
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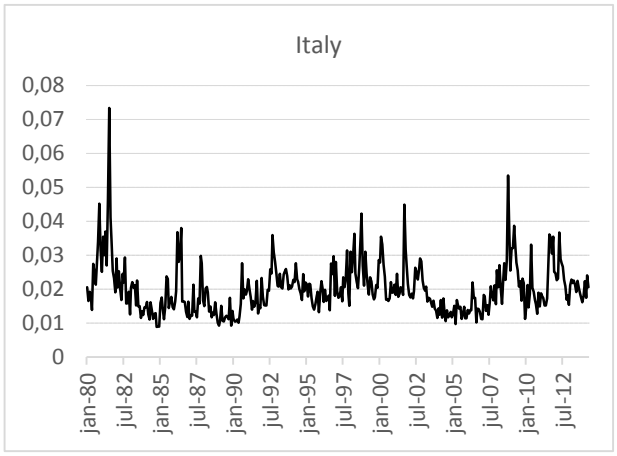
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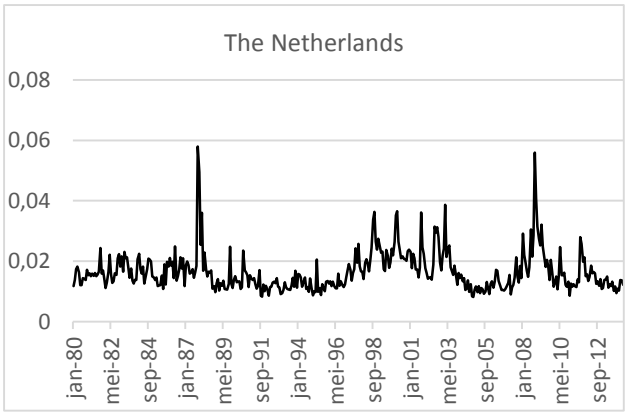
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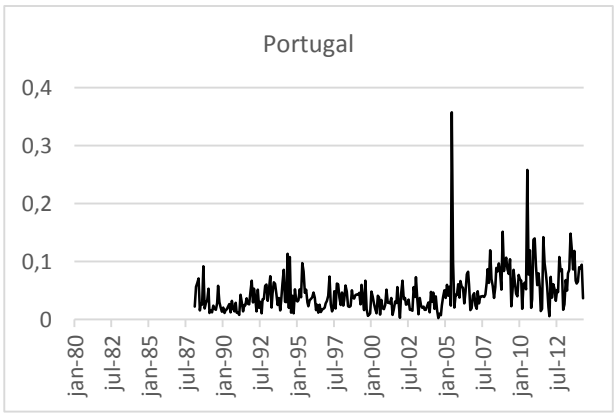
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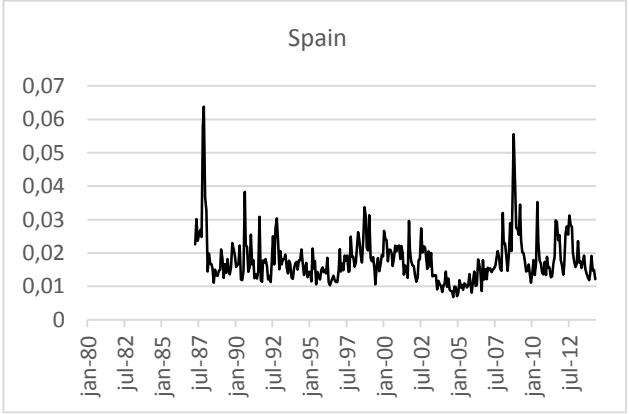
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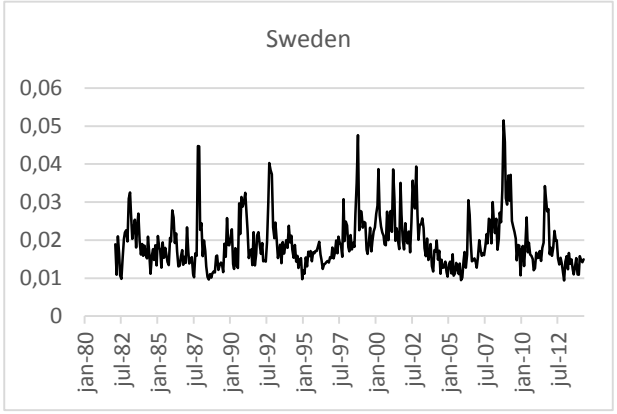
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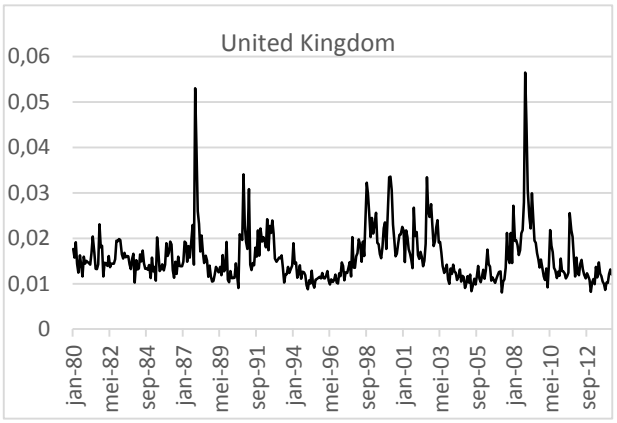
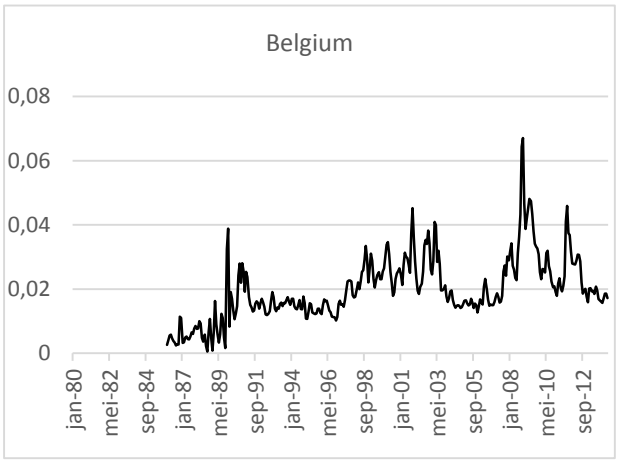
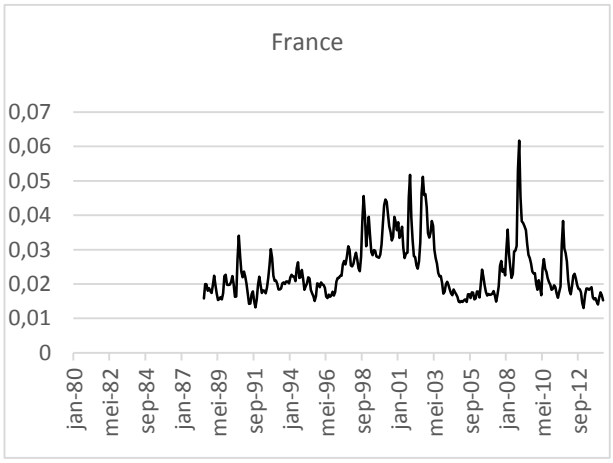
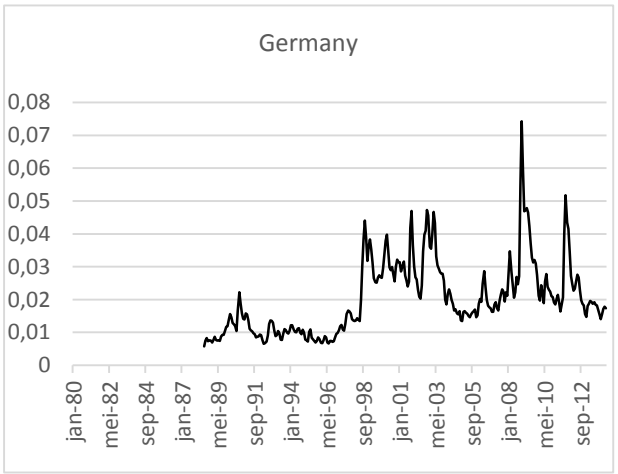
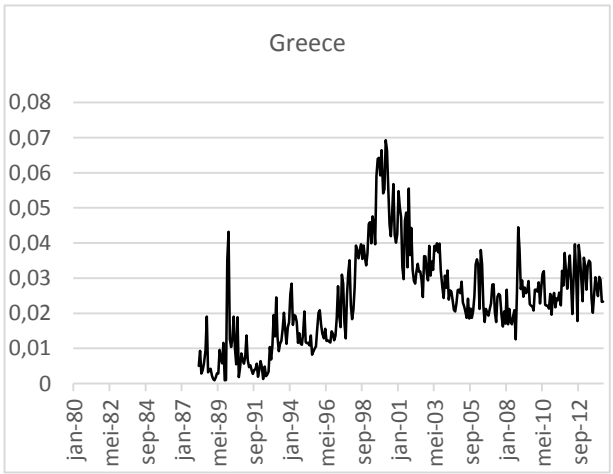


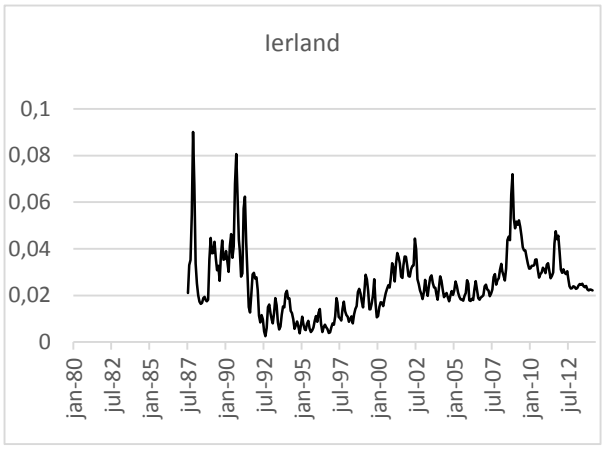
Figure 4: High-Low volatility graphs per EEG country 1980-2014







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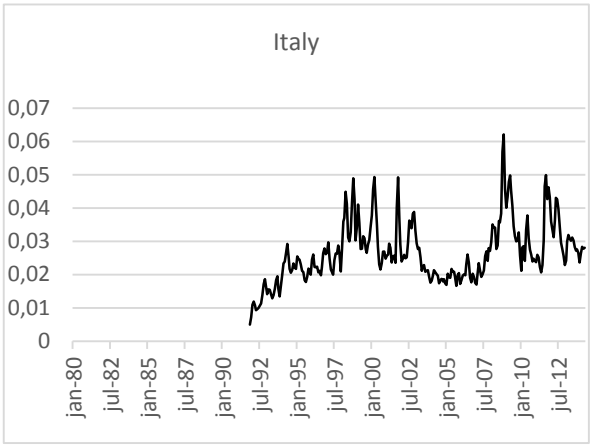
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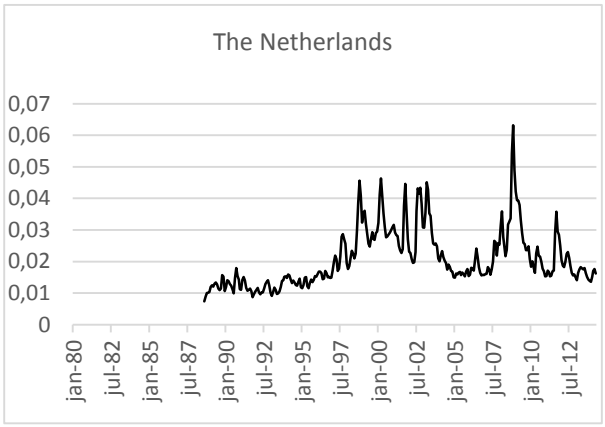
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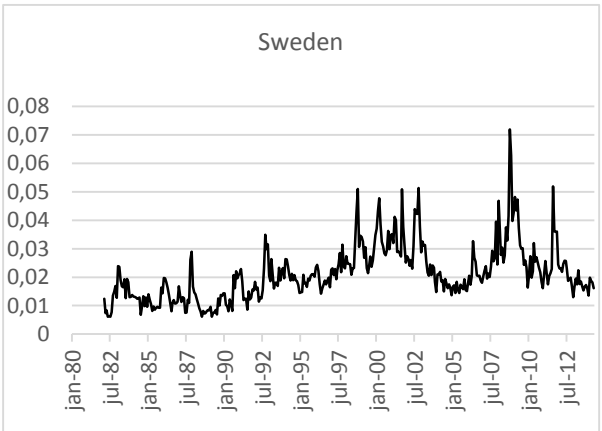
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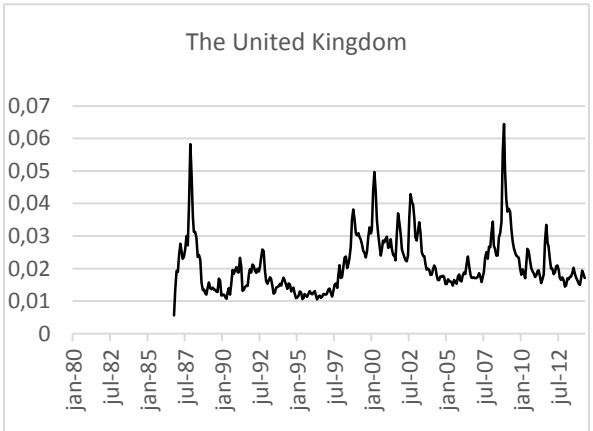
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According to the correlation matrix of historical volatility, most of the countries show a high positive cross correlation except for Greece and Portugal[131]. When looking at High-Low volatility[132], the results are quite similar. With again high positive correlation between the EEG countries. However, Portugal and Greece show a low correlation. Taken this into consideration, the preferred specification should additionally be estimated without these two countries in the panel. An interesting part of this data analysis is that we can compare the two volatility benchmarks to one another. In appendix B7 it is made apparent that both historical and high-low volatility share a correlation of around 0.6 to 0.9. These correlation suggest that both measures differ substantially from one another. With this said, it will be interesting to too see which volatility measures is more susceptible in capturing the effects of FTT's. Taking a quick look at the control variables shows us spurious results. While some companies market value and volume do correlate with volatility but in other companies/countries that correlation is very low. The average correlation of volatility with volume and market value over all 99 stocks is close to zero.

Table 4: Correlation between both sets of volatility and the control variables over the entire panel

Correlation	Volatility	High-Low Volatility
Market Value	-0.011	0.033
Volume	-0.007	0.055

Table 5: Correlation between both sets of volatility and the control variables for the Royal Dutch Shell in the Netherlands

Correlation	Volatility	High-Low Volatility
Market Value	0.334	0.480
Volume	0.460	0.564

By running regressions on individual stocks, it quickly becomes apparent that market value has significant coefficients on around 50% of the panel. While volume only has a significant coefficient on 10% of the panel. The effect of volume and market value seems to differ between countries and stocks.

Table 6: Descriptive statistics of historical volatility, high-low volatility, volume and market value

Descriptive Statistics	Volatility	High Low Volatility	Volume	Market Value	FTT rate
Mean	0.018938	0.022333	81614.52	17450.72	0.002356
Median	0.016159	0.019823	12704.10	3.887.600	0.000000
Maximum	0.357633	0.280217	7529323.	1540476.	0.020000
Minimum	0.000000	0.000000	0.000000	0.150000	0.000000

[131] Appendix B5
[132] Appendix B6

Standard deviation	0.011928	0.013926	247891.8	47005.54	0.004174
Skewness	3.766.699	2.041.959	8.556.572	1.177.922	2.257048
Kurtosis	4.764.755	1.625.720	1.185.607	2.563.210	8.253413
Jarque-Bera	2324791	238006	15475287	73397162	81532.20
Observations	37.499	29.686	27.963	37.614	40.787

The table above presents a summary of descriptive statistics of all collected data on basis of the four variables. In comparison to historical volatility, high-low volatility has a lower skewness and kurtosis. High-low volatility and volume have considerably less observations then historical volatility and market value. The FTT variable is also included in the table to interpret the coefficients is the following chapter. The FTT variable is denoted as 0.001 to one percent, in the data.

Chapter 7 Results

In this chapter the results are given following the methodology and data discussed in the previous chapters. Paragraph 7.1 will report the results from the preferred specification. In paragraph 7.2 the results from various robustness checks are presented and in paragraph 7.3 the results from the modified DID analysis are discussed.

7.1 preferred panel specification results

The preferred specification is a variant of the regression model specified in paragraph 6.1. This specification is selected taking various fixed-effects combinations into account. This specification includes time fixed-effects and country fixed-effects. Country fixed-effects is taken over stocks fixed-effect because FTT's are restricted (in these cases) to each country's jurisdiction. The differentiation between countries is more relevant than the differentiation between stocks because of the nature of FTT's. The preferred specification is the following model:

$$Y_{t,i,j} = \alpha_{t,i,j} + \beta_1 Y_{t-1,i,t} + \beta_2 X1_{t,i,j} + \beta_3 X2_{t,i,j} + \beta_4 X3_{t,j} + D_i + D_j + D_t + \varepsilon_{t,i,j}$$

The following table includes the results of the preferred specification further distinguished by time periods and a robustness check by excluding the first order time lag:

Table 7 Historical Volatility

Estimation	1980-2014	1980-2014 excl. time lag	1985-1995	1995-2005	2005-2014
FTT	-0.0217 (0.0479)	-0.0680 (0.0889)	-0.1911*** (0.0560)	0.6651** (0.2794)	1.0650*** (0.3721)
Volume	0.0003 (0.0031)	0.0094 (0.0077)	-0.0022 (0.0045)	0.0075 (0.0095)	0.0011 (0.0034)
Market Value	0.0009 (0.0047)	-0.0009 (0.0093)	-0.0880* (0.0454)	0.0012*** (0.0832)	0.0081* (0.0042)
R sqaure	0.495	0.334	0.356	0.473	0.589
Durbin Watson	2.144	0.973	1.964	2.179	2.209
N	27897	27917	5995	10838	10940

The asterisks ***, **, * indicate a significance level of 1%, 5% and 10%. Country fixed effects are included. The coefficients and standard errors for Volume and Market Value are multiplied by 1mln to adjust for magnitude. The values between parentheses are white period standard errors.

Table 8 High-Low volatility

Estimation	1980-2014	1980-2014 excl. time lag	1985-1995	1995-2005	2005-2014
FTT	-0.0151 (0.0610)	-0.0155 (0.1667)	-0.2771** (0.1274)	1.0365*** (0.3467)	0.5660** (0.2325)
Volume	-0.0001 (0.0003)	0.0008 (0.0011)	0.0042** (0.0058)	0.0003*** (0.0006)	-0.003* (0.001)
Market Value	-0.0006 (0.0039)	-0.0044 (0.0109)	-0.0173 (0.0479)	0.0046*** (0.0012)	-0.0065*** (0.0022)
R square	0.631	0.388	0.242	0.694	0.776
Durbin Watson	2.416	0.735	2.184	2.336	2.391
N	27187	27230	5278	10835	10950

The asterisks ***, **, * indicate a significance level of 1%, 5% and 10%. Country fixed effects are included. The coefficients and standard errors for Volume and Market Value are multiplied by 1mln to adjust for magnitude. The values between parentheses are white period standard errors.

The first table show the regression results of the historical volatility. The second table shows the results in high-low volatility. When we look at the entire timeframe, the FTT variable has an insignificant sign. The same goes for the remainder of the variables in the preferred specification for both sets of volatility. When panel is divided into sub-periods around the most active FTT events, the FTT variable captures more significant results. Historical volatility captures significant results in all time periods with a negative sign at a significance of 1 % in 85-95, a positive sign at a significance 5% in 95-05 and a positive sign at a significance 1% in 05-14. The volume variable reports no significant results. The market value variable report significant results in all time periods with a negative sign at a significance of 10 % in 85-95, a positive sign at a significance 1% in 95-05 and a positive sign at a significance 10% in 05-14.

High-Low volatility on the other hand reports a negative sign at significance of 5% in 85-95, a positive sign at significance of 1% in 95-05 and significant positive sign in 05-14 at 5% significance. Among the control variables however, volume has become more significant with a positive significant sign of 5% in 85-95 and 1% in 95-05. But a negative significant sign at 10% in 05-14. In 95-05 and 05-14, market value has a significant sign at 1%. However that sign changes from positive in 95-05 to negative in 05-14. There is direct indication that the effects of these three variables on volatility can change over time.

The Durbin Watson statistic indicates an autocorrelation in the residuals which is corrected by using the volatility of the preceding month.

7.2 Coefficient FTT

In this section some robustness checks are presented. By adding and subtracting fixed-effects, variables, and outliers. The treatment effect of the FTT variable can be examined.

Table 9 Treatment effect

Period	**1980-2014**		**1980-2014 (no lag)**		**1985-1995**		**1995-2005**		**2005-2014**	
Measure	HV	HL	HV	HL	HV	HL	HV	HL	HV	HL
Benchmark specification	-0.021	-0.015	-0.068	-0.015	-0.191***	-0.277**	0.665**	1.036***	1.065***	0.566**
2. Time FE only	0.061	0.031	0.117	0.091	-0.045	-0.064	0.109	0.008	0.110	0.068
3. Time + Stock FE	-0.033	-0.030	-0.073	-0.047	-0.224***	-0.363**	0.768**	1.384***	1.385***	0.848**
4. Time + Country FE excl. Volume	-0.031	-0.021	-0.078	-0.010	-0.165***	-0.234**	0.508**	0.978***	0.867***	0.531**
5. Time + Country FE excl. Market value	-0.025	-0.013	-0.068	-0.001	-0.170***	-0.273**	0.639**	1.021***	1.082***	0.578**
6. Time + Country FE excl. Outliers	-0.066*	-0.106**	-0.161**	-0.348**	-0.161***	-0.185***	-0.567*	-0.555*	0.659***	0.522**

The asterisks ***, **, * indicate a significance level of 1%, 5% and 10%.

Table 8 shows the significance and FTT sign of the remaining specifications. The benchmark specification is a summary of the results from table 6 and 7 which are used as a benchmark to the other specifications. The second specification includes all variables with only the Time FE taken into account. The results are all insignificant but in comparison to the rest, indicate how important the addition of country and stock fixed effects can be on the results. The third specification uses stock FE instead of country FE. On the use of cross-section FE, stock FE this is a level deeper then country FE. And is therefore interesting to see how the results might be different. In comparison to the benchmark specification, this specification reports larger coefficients and more significant signs overall (High-Low volatility now significant in the remaining time periods, 85-95 and 95-05, for 5% and 1% significance). The fourth and fifth specification report the benchmark specification without each a control variable. The fourth specification excludes the volume variable and reports similar results as preferred specification but with slightly smaller coefficients. The fifth specification runs the preferred specification without market value which results in similar results in comparison to the benchmark specification. The sixth specification runs the preferred specification but without outliers as discussed in the previous chapter. This model report significant result over the entire panel with negative signs between 1% and 10%. The results from historical volatility estimate that when the FFT rate increase with 1%, the historical volatility will decrease with 0.00066. And results from high-low volatility estimate that when the FTT rate increases with 1%, the high-low volatility decreases with 0.00106. When we look at the sub-periods the results remain similar to the previous specifications. The FTT sign remains significant through time but the sign changes from negative to positive. By

supplementing the methodology with the difference in difference method we can further look into this inconsistency. It will be able to look at a more ‘’cleared-out’’ effect to the FTT[133].

7.3 Difference in difference results

The difference in difference method as described in paragraph 5.2 results in the following table. The two volatility measures are used in the 2-period and the 4-period model.

Table 10 Difference in difference

Estimation	Historical 2 period	Historical 4 period	High-Low 2 period	High-Low 4 period
FTT	-0,227** (0,112)	-0,314*** (0,151)	-0,207 (0,058)	-0,155*** (0,054)
Volume	-0.003 (0.004)	0.003** (0.0016)	-0.004* (0.002)	0.005*** (0.009)
Market value	-0.127*** (0.018)	-0.010 (0.007)	0.076*** (0.019)	0.007 (0.007)
R square	0,030	0,129	0,011	0,092
DW	2,114	1,901	2,137	2,025
N	1485	2853	1485	2853

The coefficient of volume and market value is multiplied by 1mln to adjust for magnitude. The values between parentheses are the white period standard error that correct for residual serial correlation. The asterisks ***, **, * indicate a significance level of 1%, 5% and 10%.

In 3 of the 4 cases the sign of the FTT variable is significantly negative. Which indicates that the FTT has a negative impact on volatility. This supports Tobin’s initial theory that a transaction taxes decrease the volatility of financial instruments. Noticeably, the 4-period models has a higher significance than the 2-period models. And historical volatility seems to be having more significant results than high-low volatility. The results indicate a decrease in volatility of around 0.0016 to 0.0031 for an increase of 1% FTT rate. However these result are derived from the differences. In order to calculate the true elasticity these result are multiplied by (mean FTT/ mean volatility). Which results in an elasticity between 0.00020 and 0.00033. Compared with the results from table 8, the results are roughly half of the sixth specification. The FTT variable will only be significant when single FTT event differs significantly from the control group. In the set using historical volatility, market value has a significant negative sign in both the 2 and the 4 period model. When high-low volatility is used, volume has a significant positive sign in both the 2 and the 4 period model. Market value and volume both have significant signs in both sets of volatility and their coefficients are very small due to the magnitude of the variable. For this reason both variables are rescaled by 1mln in table 9. These results are only taken from 1 or 2 months around the FTT change date and therefore cannot conclude for

[133] Paragraph 5.2

volatility over entire timespan. To check for the robustness of these results, the same calculation are run without white period standard errors. These results can be found in appendix B8.

Chapter 8 Conclusion

The European commission published the proposal of a European Financial Transaction Tax on 28 September 2011. One of the main reasons for the introduction of such a transaction tax was to address the dangerous behavior plaguing the financial markets. This paper studies the effect transaction taxes have on Financial Markets to understand the effects of the oncoming EU wide Transaction Tax. The following research question is answered in this paper:

Did the changes in Financial Transaction Taxes in Europe affected volatility of the stock markets?

With many major European economies like Belgium, Germany, France, Italy and Spain already supporting the European commission's proposal, the implication of this paper can shine interesting insights on the subject on implementing FTT's.

In Chapter 2 an outline of the Tobin Tax is given along with the most important opponents and proponent that this discussion has produced in the last thirty years. The Tobin Tax is quintessential to the origin of the European Commission's proposal. With a transaction tax, Tobin wanted to reduce capital mobility. Excessive capital mobility was according to Tobin the reason that central banks and sovereigns could not successfully implement their monetary and fiscal policies because domestic interest rates can not differentiate from another. Another consequence of capital mobility was the rise of more speculation. Speculation can have adverse effects on the real economy of a country. To solve for this, Tobin proposed a worldwide uniform tax on the purchasing of financial instruments on the spot market which are expressed in foreign currency. The tax would also be levied on the import of goods and services from abroad. According to Tobin this would make speculators hesitant to trade which would lead to a reduction of volatility on currency markets. After such a tax would be introduced central banks and sovereigns would be better able to implement their fiscal and monetary policy because of the interest rate difference that would be created when short-term speculation is reduced.
Various countries within the European Economic Group have a history with FTT's. These countries have had an FTT introduced, changed, unchanged, abolished in the last 34 years. The EEG experienced most FTT activity in the 1980's and in the last 5 years. In the early 1990's a clear trend in FTT abolishment can be seen.
With the use of a regression model and two separate benchmarks for volatility, 99 time series of stocks were studied on their monthly values from 1980 to 2014. The proxy for the transaction tax is denoted as a variable that depicts the FTT tariff of the corresponding month. To improve the accuracy of the model monthly volume and market value data were added as control variables. Firms were selected on their availability and size starting from January 1st 1980.

According to the preferred estimation, there are two positive relationships between the FTT variable and the volatility. When we take a look at the robustness checks these relationships are confirmed. However when the model is corrected for outliers the overall results change significantly. In order to investigate further, the difference in difference method is applied to the data. In contrast to earlier results, the difference in difference method supplies this thesis with concrete results. These findings suggest that FTT's have a short-term negative impact on volatility thus indicate decrease in volatility of around 0.00020 to 0.00033 for an increase of 1% FTT rate.

The FTT's researched in this paper are not uniform to one another making these results harder to interpret. If we take that effect into account, a Euro-wide FTT may have a different impact on stocks than past FTT's have on European countries individually.

The model used in this paper makes use of monthly values across a time-span of 34 years which has the consequence that policy adjustments that are impacting smaller timeframes are not appropriately conveyed. FTT's might affect volatility in different ways and on a smaller level than is assumed in this paper. To account for this, future studies should focus on higher frequency values, most preferably, High Frequency Trading data to fully account for gradual or rigid micro-effects on the volatility. It might also be useful to focus on specific company sectors or stocks in order to capture companies that are more susceptible to transaction taxes. Perhaps the most effective way to perform a FTT-on-volatility study is to set up a controlled experiment were a group of traders is subjected to a transaction tax and a control group. Such a set up would more accurately observe the microeconomic behavior of traders in a transaction tax environment.

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APPENDIX A: KPMG Correspondence

Dear Rahul,

Please find in your e-mail below the dates you requested inserted with red color.

Regards,

Ariel Manika
Lawyer/Senior Manager

C. Papacostopoulos & Associates
Law Firm
3, Stratigou Tombra Str.
Aghia Paraskevi
153 42 Athens, Greece

T. +30 210 60 62 325
D. +30 210 60 62 159

amanika@cpalaw.gr
www.cpalaw.gr

From: Rahul Alibux [mailto:321852aa@student.eur.nl]
Sent: Thursday, February 20, 2014 12:43 PM
To: Manika, Antonia Ariel
Cc: Larking, Barry; Iliadis, Angela; Tsotsou, Despina
Subject: RE: Information required for a masters student

Dear Ariel,

Thank you very much for your reply. May I please know the exact dates of the transaction tax changes?

"The 0.3% rate was then increased(*applicable for share transfers performed as of 8 October 1999*) to 0.6% by virtue of article 22 of Law 2742/1999 and subsequently reduced*(applicable for share transfers performed as of 1 January 2001*) to 0.3% by virtue of article 37 par. 5 & 6 of Law 2874/2000 *and then reduced(applicable for share transfers performed as of 1 January 2005*) to 0.15% by virtue of article 12 of Law 3296/2004. Currently the rate is 0.2% (by virtue of article 16 par.2 of Law 3943/2011 for the sales of listed shares performed as of 1 April 2011)."

This information is very helpful for my research. Thank you very much.

Regards,

Rahul Alibux
Erasmus Universiteit Rotterdam

Rahul Alibux
Thu 20/02/14 11:43
Dear Ariel, Thank you very much for your reply. May I please know the exact dates of the transaction tax changes? "The 0.3% rate was then increased(date?) to 0.6% by virtue of article 22 of Law 2742/1999 and subsequently reduced(date?) to 0.3% by virtue of

Manika, Antonia Ariel <amanika@cpalaw.gr>
Wed 19/02/14 16:45
Inbox
Dear Rahul,

Please find our replies inserted in bold italics next to your queries below.

Regards,

Ariel Manika
Lawyer/Senior Manager

C. Papacostopoulos & Associates

Law Firm
3, Stratigou Tombra Str.
Aghia Paraskevi
153 42 Athens, Greece

T. +30 210 60 62 325
D. +30 210 60 62 159

amanika@cpalaw.gr
www.cpalaw.gr

From: Rahul Alibux [mailto:321852aa@student.eur.nl]
Sent: donderdag 30 januari 2014 16:16 uur
To: GO-FM EU TAX; GO-FM contact; Iliakidi, Katerina
Cc: Iliadis, Angela
Subject: Information required for a masters student

Dear KPMG Greece,

I am a economics student from Holland. And I have a small question regarding the research I am doing about FTT's.

I come onto your email addresses via this page:
https://www.kpmg.com/global/en/issuesandinsights/articlespublications/financial-transaction-tax-survey/pages/greece.aspx

My question: Can we consider that the Greek financial transaction tax was completely abolished on 31st of December 2012?*[] Following repetitive amendments of Greek tax legislation, the 5% transaction Greek financial transaction tax that was imposed on the sale of shares of Greek SA companies has been abolished as of 1 January 2014.*

Second question: In 1998 the transaction tax rate on ATHEX shares was reduced from 0,30% to 0,15%. What was the effective date of that change (month and day)?*[] The 0.3% rate was introduced in 1998 by virtue of article 9 par. 2 of Law 2579/1998 and was applicable on the transfer of listed shares that were performed as of 19 February 1998 (i.e. two days after the date that L.2579/1998 was published in the Government Gazette as provided by this law). The 0.3% rate was then increased to 0.6% by virtue of article 22 of Law 2742/1999 and subsequently reduced to 0.3% by virtue of article 37 par. 5 & 6 of Law 2874/2000 and then reduced to 0.15% by virtue of article 12 of Law 3296/2004. Currently the rate is 0.2% (by virtue of article 16 par.2 of Law 3943/2011 for the sales of listed shares performed as of 1 April 2011).*

Kinds regards,

Rahul Alibux
Student at the Erasmus University of Rotterdam

Rahul Alibux
Thu 30/01/14 16:15
Sent Items
Dear KPMG Greece,

I am a economics student from Holland. And I have a small question regarding the research I am doing about FTT's.

I come onto your email addresses via this page:
https://www.kpmg.com/global/en/issuesandinsights/articlespublications/financial-transaction-tax-survey/pages/greece.aspx

My question: Can we consider that the Greek financial transaction tax was completely abolished on 31st of December 2012?

Second question: In 1998 the transaction tax rate on ATHEX shares was reduced from 0,30% to 0,15%. What was the effective date of that change (month and day)?

Kinds regards,

Rahul Alibux
Student at the Erasmus University of Rotterdam

APPENDIX B1: Hausman test

Table B4 Hausman test

Volatility series	***Fixed effect***	***Chi-square statistic***	**Chi-Sq. d.f.**	***Probability > Chi-square***	$\alpha_{i,t}$	$\beta_1 Y_{i,t-1}$	$X1_{i,t}$	$X2_{i,t}$	$X3_{i,t}$
Historical Volatility	Cross-section fixed effect	1108.8116	4	0.0000***	0.0093 (72.0038***)	0.5068 (98.9213***)	-9.5011 (-0.2704)	4.3809 (2.6106***)	-0.0122 (-0.5556)
	Time period fixed effect	23.4857	4	0.0001***	0.0085 (73.6790***)	0.5479 (111.1957***)	-7.7810 (-3.4998***)	-1.0109 (-0.8528)	0.0602 (3.8336***)
High-Low Volatility	Cross-section fixed effect	856.6482	4	0.0000***	0.0080 (57.0219***)	0.6609 (144.8413***)	-1.4110 (-0.3787)	8.1709 (4.6052***)	-0.1197 (-5.1450***)
	Time period fixed effect	73.4727	4	0.0000***	0.0081 (63.5868***)	0.6478 (139.2233***)	5.4411 (0.2423)	-8.0710 (-0.6740)	0.0333 (2.0036**)

The table above depicts the regression results of the following model:

$$Y_{t,i,j} = \alpha_{t,i,j} + \beta_1 Y_{t-1,i,t} + \beta_2 X1_{t,i,j} + \beta_3 X2_{t,i,j} + \beta_4 X3_{t,j} + D_i + D_j + D_t + \varepsilon_{t,i,j}$$

Definitions:

$Y_{t,i,j}$ = Monthly volatility of the stock in company i in month t. This is either Historical Volatility or High – Low Volatility.

$\alpha_{t,i,j}$ = The constant of the estimation of stock in company i and country j in month t.

$Y_{t,i,j-1}$ = Monthly volatility in country j of the stock in company i on month t-1. This is either Historical Volatility or High – Low Volatility.

$X1_{t,i,j}$ = Volume of stocks traded in country j in company i and on month t.

$X2_{t,i,j}$ = Market Value in country j of company i and on month t.

$X3_{t,j}$ = The FTT rate that country j is subjected to in month t.

D_i = Fixed-effect dummy for companies.

D_j = Fixed-effect dummy for countries.

D_t = Fixed-effect dummy for time periods.

$\varepsilon_{t,i,j}$ = Residual of the equation of the stock in country j in company i at time t. We assume that the residuals are independent identically distributed.

Before we discuss the result from the time-series and panel regression we will discuss the result of the Hausman test . This test is for to test the appropriateness of using the fixed-effect model. The Hausman test tests whether random-effects estimation would almost be as good as a fixed-effects model. To test for fixed-effect in the data we formulate the hypothesis of the Hausman test as the following, H_0: is that random-effects would be consistent and efficient and
H_1: is that random-effects would be inconsistent. The result of the test will be distributed chi-square. The Hausman test is run on the full regression model and all available data as described in paragraph 4.2.

The results of the Hausman test indicate that for both cross-section and period data the random-effects model is inconsistent. This statement also counts for both sets of volatility. When testing the stocks and months for a fixed-effect with historical volatility, the Hausman test rejects the null hypothesis at a p-value of 1%. When the Hausman test is run with High-Low volatility it produces similar results

Table 14 indicates that for cross-section and period data, the fixed effect model is more consistent than the random effects model. This step gives permission to use the fixed effects model, which allows for various advantages (see paragraph 5.1) in the following estimations.

APPENDIX B2: Panel list

Table 3 Belgium

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listing
BEKAERT (D)	Bekaert	Yes	BEL20	April 4th 1989	Frankfurt(D:BK8N)
COLRUYT	Colruyt	Yes	BEL20	July 5th 1990	Frankfurt(D:EFC1)
DELHAIZE GROUP	Delhaize Group	Yes	BEL20	March 7th 1989	Frankfurt(D:DHZ)
Barco New	Barco New	Yes	n/a	August 7th 1989	n/a
Deceuninck ECH	Deceuninck ECH	Yes	n/a	October 10th 1989	n/a
RECTICEL	Recitel	Yes	n/a	June 13th 1988	n/a
SOFINA	Sofina	Yes	n/a	June 13th 1988	n/a
SOLVAY	Solvay	Yes	BEL20	June 13th 1988	Frankfurt(D:SOL)
TESSENDERLO	Tessenderlo	Yes	Bel MID	July 6th 1988	Frankfurt(D:TEZ)
UCB	UCB	Yes	BEL20	June 13th 1988	Frankfurt(D:UNC)
UMICORE	Umicore	Yes	BEL20	July 6th 1988	Frankfurt(D:NVJN)

Table 4 Germany

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listing
Bayer	Bayer	Yes	DAX	June 13th 1988	D:BAYX
BMW	BMW	Yes	DAX	June 13th 1988	I:BMW
Continental	Continental	Yes	DAX	June 13th 1988	n/a
E On	E On	Yes	DAX	June 13th 1988	H:VEBA
HeidelbergCement	Heidelberg	Yes	DAX	June 13th 1988	n/a
Linde	Linde	Yes	DAX	June 13th 1988	n/a
Man	Man	Yes	DAX	June 13th 1988	n/a
RWE	RWE	Yes	DAX	June 13th 1988	I:RWE
Siemens	Siemens	Yes	DAX	June 13th 1988	H:SIE
ThyssenKrupp	ThyssenKrupp	Yes	DAX	June 13th 1988	n/a
Volkswagen	Volkswagen	Yes	DAX	June 13th 1988	H:VOLK

Table 5 France

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listings
AIR LIQUIDE	Air Liquide	Yes	CAC40	June 13th 1988	Frankfurt(D:AIL)
DANONE	Danone	Yes	CAC40	June 13th 1988	Frankfurt(D:BSN), Milan(I:DANE)
L'OREAL	L'Oreal	Yes	CAC40	June 13th 1988	Frankfurt(D:LOR), Milan(I:LOR)
LVMH	LVMH	Yes	CAC40	June 13th 1988	Frankfurt(D:MOH), Milan(I:LVMH)
PERNOD-RICARD	Pernod-Ricard	Yes	CAC40	June 13th 1988	Frankfurt(D:PER)
SAFRAN	Safran	Yes	CAC40	June 13th 1988	Frankfurt(D:SEJ1)
SANOFI	Sanofi	Yes	CAC40	June 13th 1988	Frankfurt(D:SNW), Milan(I:SANO)
SCHNEIDER ELECTRIC	Schneider Electric	Yes	CAC40	April 19th 1989	Frankfurt(D:SND)
TOTAL	Total	Yes	CAC40	June 13th 1988	Frankfurt(D:TOTB), London(TTA)
VIVENDI	Vivendi	Yes	CAC40	June 13th 1988	Frankfurt(D:VVU), Milan(I:VIVE)

Table 6 Greece

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listings
ATTICA HOLDINGS	Attica Holdings	Yes	Greece-DS market	January 5th 1988	n/a
FOURLIS HOLDING	Fourlis Holdings	Yes	Athex Composite	April 21st 1988	n/a
GEK TERNA HLDG.RLST.CON.	GEK Terna	Yes	Athex Composite	February 9th 1988	n/a
IONIAN HOTEL	Ionian Hotel	Yes	Greece-DS market	May 18th 1988	n/a
KARELIA TOBACCO	Kerelia Tobacco	Yes	Greece-DS market	January 1st 1988	n/a
LAMPSA HOTEL	Lampsa Hotel	Yes	Greece-DS market	February 10th 1988	n/a
METKA	Metka	Yes	Athex Composite	January 1st 1988	Stuttgart(D:OSQ)
TITAN CEMENT CR	Titan Cement	Yes	Athex Composite	January 1st 1988	Frankfurt(D:TIC)

Table 7 Ireland

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listing
Kerry Group 'A'	Kerry Group	Yes	ISEQ Overall Index	January 1st 1988	D:KRZ
Ryanair Holdings	Ryanair Holdings	Yes	ISEQ Overall Index	June 6th 1997	D:RY4B
Dragon Oil	Dragon Oil	Yes	ISEQ Overall Index	January 1st 1988	DGOL
Permanent TSB Group Holdings	Permanent TSB	Yes	ISEQ Overall Index	November 1st 1994	D:IL0
Glanbia	Glanbia	Yes	ISEQ Overall Index	September 9th 1988	GLBI
Kingspan Group	Kingspan Group	Yes	ISEQ Overall Index	June 2nd 1989	KGP
Greencore Group	Greencore Group	Yes	ISEQ Overall Index	April 25th 1991	D:GCG
Fyffes (ESM)	Fyffes	Yes	ISEQ Overall Index	January 1st 1988	FFYL
Irish Continental Group Unit	Irish Continental	Yes	ISEQ Overall Index	April 14th 1988	ICGC
Kenmare Resources	Kenmare	Yes	ISEQ Overall Index	January 1st 1988	KMRL

Table 8 Italy

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listings
ASTM	Astm	Yes	Milan Comit Global	January 1st 1988	Stuttgart(D:TM3)
BONIFICHE FERRARESI	Bonifiche Ferraresi	Yes	Milan Comit Global	January 1st 1988	n/a
BUZZI UNICEM	Buzzi Unicem	Yes	Milan Comit Global	January 1st 1988	Frankfurt(D:UCM)
CEMENTIR HOLDING	Cementir Holdings	Yes	Milan Comit Global	January 1st 1988	Berlin(D:TI7)
CIR CIE.INDI.RIUN.	CIR	Yes	Milan Comit Global	January 1st 1988	Frankfurt(D:CIR)
FIAT	Fiat	Yes	Milan Comit Global	January 1st 1988	Frankfurt(D:FIAT)
FINMECCANICA	Finmeccanica	Yes	Milan Comit Global	January 1st 1988	Frankfurt(D:FMNB)
ITALCEMENTI FABBRICHE RIUNITE	Italcementi	Yes	Milan Comit Global	January 1st 1988	Frankfurt(D:ITA)
PIRELLI	Pirelli	Yes	Milan Comit Global	January 1st 1988	Frankfurt(D:PIL3)
TELECOM ITALIA	Telecom Italia	Yes	Milan Comit Global	January 1st 1988	Frankfurt(D:TQI), Amsterdam(H:SET)

Table 9 The Netherlands

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listings
ROYAL DUTCH SHELL A	Royal Dutch Shell	Yes	AEX	January 1st 1988	Frankfurt(D:R6C)
UNILEVER CERTS.	Unilever	Yes	AEX	January 1st 1988	Frankfurt(D:UNI3)
HEINEKEN	Heineken	Yes	AEX	January 1st 1988	Frankfurt(D:HNK1)
PHILIPS ELTN.KONINKLIJKE	Philips	Yes	AEX	January 1st 1988	Frankfurt(D:PHI1)
AKZO NOBEL	Akzo Nobel	Yes	AEX	January 1st 1988	Frankfurt(D:AKU)
AHOLD KON.	Ahold	Yes	AEX	January 1st 1988	Frankfurt(D:AHOF)
REED ELSEVIER (AMS)	Reed Elsevier	Yes	AEX	January 1st 1988	Frankfurt(D:ELVA)
WOLTERS KLUWER	Wolters Kluwer	Yes	AEX	January 1st 1988	Frankfurt(D:WOSB)
BOSKALIS WESTMINSTER	Boskalis	Yes	AEX	January 1st 1988	Frankfurt(D:KBWA)
SBM Offshore	SBM Offshore	Yes	AEX	January 1st 1988	Frankfurt(D:IHCB)

Table 10 United Kingdom

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listings
BP	BP	Yes	FTSE100	January 1st 1988	n/a
BRITISH AMERICAN TOBACCO	British American Tobacco	Yes	FTSE100	January 1st 1988	n/a
DIAGEO	Diageo	Yes	FTSE100	January 1st 1988	n/a
ASSOCIATED BRIT.FOODS	Associated British Foods	Yes	FTSE100	January 1st 1988	n/a
BAE SYSTEMS	BAE Systems	Yes	FTSE100	January 1st 1988	n/a
BUNZL	Bunzl	Yes	FTSE100	January 1st 1988	n/a
BARRATT DEVELOPMENTS	Barratt Developments	Yes	FTSE100	January 1st 1988	n/a
GLAXOSMITHKLINE	GlaxoSmithKline	Yes	FTSE100	January 1st 1988	n/a
ITV	ITV	Yes	FTSE100	January 1st 1988	n/a
JOHNSON MATTHEY	Johnson Matthey	Yes	FTSE100	January 1st 1988	n/a
Rio Tinto	Rio Tinto	Yes	FTSE100	January 1st 1988	n/a

Table 11 Spain

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listing
Abertis Infraestructuras	Abertis	Yes	IBEX 35	January 1st 1988	D:AUC
Acerinox 'R'	Acerinox	Yes	IBEX MEDIUM CAP	January 1st 1988	D:ACE1
Acciona	Acciona	Yes	IBEX MEDIUM CAP	January 1st 1988	D:AJ3
Gas Natural SDG	Gas Natural	Yes	IBEX 35	January 1st 1988	D:GAN
Endesa	Endesa	Yes	IBEX MEDIUM CAP	January 1st 1988	D:ENA
Iberdrola	Iberdrola	Yes	IBEX 35	January 1st 1988	D:IBE1
Mapfre	Mapfre	Yes	IBEX 35	January 1st 1988	D:CMAB
Prosegur Compania Securidad	Prosegur Compania	Yes	IBEX MEDIUM CAP	April 19th 1989	D:PRHA
Repsol YPF	Repsol YPF	Yes	IBEX 35	May 10th 1989	D:REP
Sacyr	Sacyr	Yes	IBEX 35	January 1st 1988	D:VHM
Telefonica	Telefonica	Yes	IBEX 35	January 1st 1988	D:TNE5

Table 12 Portugal

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listing
Cipan Limited Data	Cipan	Yes	n/a	January 5th 1988	n/a
Transinsular Limited Data	Transinsular	Yes	n/a	January 5th 1988	n/a

Table 13 Sweden

Available Stock	Name in Dataset	Part in dataset	Index	Start date	Cross listings
HENNES & MAURITZ 'B'	Hennes and Mauritz	Yes	OMX Stockholm 30	1 January 1984	n/a
ERICSSON 'B'	Ericsson	Yes	OMX Stockholm 30	1 January 1984	n/a
VOLVO 'B'	VOLVO	Yes	OMX Stockholm 30	1 January 1984	n/a
ATLAS COPCO 'A'	ATLAS COPCO	Yes	OMX Stockholm 30	1 January 1984	n/a
SCA 'B'	SCA	Yes	OMX Stockholm 30	1 January 1984	Frankfurt(D:SCA)

SKF 'B'	SKF	Yes	OMX Stockholm 30	1 January 1984	n/a
ELECTROLUX 'B'	Electrolux	Yes	OMX Stockholm 30	1 January 1984	Frankfurt(D:ELX)
HOLMEN 'B'	Holmen	Yes	OMX Stockholm 30	1 January 1984	n/a
B&B TOOLS 'B'	B&B Tools	Yes	OMX Stockholm	1 January 1984	n/a

APPENDIX B5: Correlation matrix – Historical volatility EEG

Country	*Belgium*	*Germany*	*France*	*Greece*	*Italy*	*Netherlands*	*Spain*	*Sweden*	*UK*	*Portugal*	*Ierland*
Belgium	1										
Germany	0,627988	1									
France	0,614469	0,750038	1								
Greece	0,285719	0,344513	0,33715	1							
Italy	0,447659	0,483239	0,592715	0,4142	1						
Netherlands	0,607888	0,809711	0,793186	0,34544	0,452568	1					
Spain	0,729403	0,69145	0,7471	0,336338	0,635373	0,748857	1				
Sweden	0,666284	0,747063	0,768876	0,281561	0,622601	0,73048	0,702493	1			
UK	0,589889	0,721557	0,760288	0,298318	0,464322	0,816137	0,727208	0,786988	1		
Portugal	0,144558	0,139141	0,037911	0,04112	0,151306	0,042391	0,16775	0,047865	0,047548	1	
Ierland	0,523552	0,548613	0,450127	0,120998	0,290612	0,483607	0,642572	0,409753	0,547259	0,212893	1

APPENDIX B6: Correlation matrix – High-Low volatility EEG

	Belgium	*Germany*	*France*	*Greece*	*Italy*	*Netherlands*	*Spain*	*Sweden*	*UK*	*Ierland*
Belgium	1									
Germany	0,818913	1								
France	0,688477	0,813326	1							
Greece	0,505538	0,62676	0,536074	1						
Italy	0,815922	0,764981	0,687691	0,512136	1					
Netherlands	0,781657	0,925122	0,888167	0,649671	0,761722	1				
Spain	0,80811	0,734764	0,72495	0,390696	0,837864	0,71504	1			
Sweden	0,782813	0,814928	0,841612	0,579582	0,727884	0,85281	0,777099	1		
UK	0,60977	0,891018	0,877086	0,540756	0,705578	0,909257	0,756823	0,731063	1	
Ierland	0,337819	0,491958	0,305865	0,038599	0,549012	0,320694	0,576678	0,2486	0,469528	1

APPENDIX B7: Correlation between Historical volatility and High-Low volatility EEG

Country	**Correlation between Historical and High-Low volatility**
Belgium	0,649568
Germany	0,836498
France	0,890386
Greece	0,687104
Italy	0,696080
Netherlands	0,883172
Spain	0,865699
Sweden	0,775841
UK	0,829491
Ierland	0,635044

Appendix B8: Robustness on difference in difference results

Estimation	Historical 2 period	Historical 4 period	High-Low 2 period	High-Low 4 period
FTT	-0.2267 0.1581	-0.3139*** 0.1069	-0.2070 0.2731	-0.1545 0.1097
Volume	-0.0034 0.0067	0.0033 0.0029	-0.0043 0.0116	0.0050* 0.0030
Market value	-0.127* 0.0772	-1.03E-08 2.36E-08	-0.0760 0.133	0.0075 0.0242
R square	0.030	0.129	0.011	0.092
DW	2.114	1.901	2.137	2.025
N	1485	2853	1485	2853

The coefficient of volume and market value is multiplied by 1mln to adjust for magnitude.
The asterisks ***, **, * indicate a significance level of 1%, 5% and 10%.

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Appendix C: Eviews output

Testing the Tobin TheoryThe Effect of Financial Transaction Taxes on European Equities

Author: Rahul Alibux
Student number: 321852
Finish date: April 2015
Thesis supervisor: Hendrik Vrijburg

Appendix C: Eviews output

Preferred specification Historical volatility:

Estimation	1980-2014	1980-2014 excl. time lag	1985-1995	1995-2005	2005-2014
FTT	-0.0217 (0.0479)	-0.0680 (0.0889)	-0.1911*** (0.0560)	0.6651** (0.2794)	1.0650*** (0.3721)
Volume	0.0003 (0.0031)	0.0094 (0.0077)	-0.0022 (0.0045)	0.0075 (0.0095)	0.0011 (0.0034)
Market Value	0.0009 (0.0047)	-0.0009 (0.0093)	-0.0880* (0.0454)	0.0012*** (0.0832)	0.0081* (0.0042)
R sqaure	0.495	0.334	0.356	0.473	0.589
Durbin Watson	2.144	0.973	1.964	2.179	2.209
N	27897	27917	5995	10838	10940

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:22				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27897				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.486688	0.034412	1.414.286	0.0000
VOLUME	2.61E-11	3.18E-10	0.082154	0.9345
MARKET_VALUE	8.63E-10	4.75E-09	0.181650	0.8559
FTT	-0.021735	0.047953	-0.453266	0.6504
D10	-0.000379	0.000588	-0.644535	0.5192
D11	0.000844	0.000431	1.958.286	0.0502
D2	0.000236	0.000571	0.413031	0.6796
D3	-0.000950	0.000598	########	0.1123
D4	-0.000360	0.000498	-0.722015	0.4703
D5	0.003164	0.000710	4.456.543	0.0000
D6	0.003000	0.001593	1.883.112	0.0597
D7	0.001100	0.000516	2.132.519	0.0330
D8	-0.000636	0.000632	########	0.3144
D9	0.011895	0.002942	4.043.088	0.0001
C	0.009129	0.000729	1.252.801	0.0000
	Effects Specification			

Period fixed (dummy variables)				
R-squared	0.495287	Mean dependent var		0.018949
Adjusted R-squared	0.487964	S.D. dependent var		0.012053
S.E. of regression	0.008625	Akaike info criterion		########
Sum squared resid	2.045.366	Schwarz criterion		########
Log likelihood	93215.33	Hannan-Quinn criter.		########
F-statistic	6.762.786	Durbin-Watson stat		2.144.556
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:30				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27917				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	9.48E-10	7.69E-10	1.232.678	0.2177
MARKET_VALUE	-9.41E-11	9.35E-09	-0.010059	0.9920
FTT	-0.068080	0.088971	-0.765193	0.4442
D10	-0.000850	0.001151	-0.738240	0.4604
D11	0.001725	0.000829	2.080.523	0.0375
D2	0.000535	0.001112	0.480829	0.6306
D3	-0.001913	0.001152	########	0.0970
D4	-0.000694	0.000964	-0.719842	0.4716
D5	0.006527	0.001356	4.814.047	0.0000
D6	0.006144	0.003102	1.980.559	0.0477
D7	0.001995	0.000979	2.037.555	0.0416
D8	-0.001323	0.001229	########	0.2819
D9	0.024868	0.003468	7.170.591	0.0000
C	0.017818	0.000729	2.444.912	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.334229	Mean dependent var		0.018950
Adjusted R-squared	0.324575	S.D. dependent var		0.012055
S.E. of regression	0.009908	Akaike info criterion		########
Sum squared resid	2.701.074	Schwarz criterion		########

Log likelihood	89410.68	Hannan-Quinn criter.	########
F-statistic	3.462.163	Durbin-Watson stat	0.973299
Prob(F-statistic)	0.000000		

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:37				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 82				
Total panel (unbalanced) observations: 5995				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.356875	0.078570	4.542.108	0.0000
VOLUME	-2.28E-09	4.57E-09	-0.498739	0.6180
MARKET_VALUE	-8.80E-08	4.54E-08	########	0.0529
FTT	-0.191184	0.056015	########	0.0006
D10	0.000785	0.001083	0.725192	0.4684
D11	0.003619	0.001190	3.040.188	0.0024
D2	-0.001725	0.000970	########	0.0755
D3	0.000785	0.001622	0.483709	0.6286
D4	-1.74E-05	0.000986	-0.017652	0.9859
D5	0.003633	0.002312	1.571.615	0.1161
D6	0.003159	0.004270	0.739924	0.4594
D7	0.001872	0.001336	1.401.345	0.1612
D8	-0.000884	0.001265	-0.699031	0.4846
D9	0.008335	0.001913	4.355.809	0.0000
C	0.010710	0.001562	6.855.377	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.356545	Mean dependent var		0.017225
Adjusted R-squared	0.341832	S.D. dependent var		0.011535
S.E. of regression	0.009358	Akaike info criterion		########
Sum squared resid	0.513210	Schwarz criterion		########
Log likelihood	19567.30	Hannan-Quinn criter.		########
F-statistic	2.423.203	Durbin-Watson stat		1.964.066
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:40				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10838				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.470545	0.034555	1.361.736	0.0000
VOLUME	7.53E-10	9.53E-10	0.790750	0.4291
MARKET_VALUE	8.32E-09	1.23E-09	6.766.385	0.0000
FTT	0.665173	0.279416	2.380.585	0.0173
D10	0.000402	0.000669	0.599882	0.5486
D11	0.002095	0.000715	2.929.895	0.0034
D2	0.002065	0.000724	2.850.311	0.0044
D3	-0.002844	0.001137	########	0.0124
D4	0.001839	0.000673	2.733.582	0.0063
D5	0.003911	0.000716	5.463.564	0.0000
D6	-0.002844	0.002943	-0.966368	0.3339
D7	0.002585	0.000780	3.315.154	0.0009
D8	0.001710	0.000816	2.096.580	0.0361
D9	0.008939	0.001205	7.418.810	0.0000
C	0.008077	0.000713	1.132.862	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.473692	Mean dependent var		0.019636
Adjusted R-squared	0.467103	S.D. dependent var		0.010894
S.E. of regression	0.007952	Akaike info criterion		########
Sum squared resid	0.676868	Schwarz criterion		########
Log likelihood	37083.38	Hannan-Quinn criter.		########
F-statistic	7.188.806	Durbin-Watson stat		2.179.359
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY		
Method: Panel Least Squares		
Date: 04/04/15 Time: 02:45		
Sample: 2005M01 2014M04		

Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10940				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.512989	0.093756	5.471.522	0.0000
VOLUME	1.06E-10	3.46E-10	0.305920	0.7597
MARKET_VALUE	-8.11E-09	4.20E-09	-1.931.649	0.0534
FTT	1.065.068	0.372195	2.861.584	0.0042
D10	0.001548	0.001081	1.431.412	0.1523
D11	0.002741	0.001090	2.515.327	0.0119
D2	0.001959	0.001017	1.927.199	0.0540
D3	-0.005242	0.001483	-3.535.087	0.0004
D4	0.000544	0.000877	0.619859	0.5354
D5	0.002142	0.001544	1.386.998	0.1655
D6	-0.005979	0.003121	-1.915.763	0.0554
D7	0.002288	0.000917	2.495.055	0.0126
D8	0.000483	0.001027	0.470497	0.6380
D9	0.023513	0.007007	3.355.471	0.0008
C	0.007262	0.001872	3.879.030	0.0001
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.589075	Mean dependent var		
Adjusted R-squared	0.584325	S.D. dependent var		
S.E. of regression	0.008588	Akaike info criterion		
Sum squared resid	0.797546	Schwarz criterion		
Log likelihood	36586.20	Hannan-Quinn criter.		
F-statistic	1.240.177	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Preferred specification High-Low volatility:

Estimation	1980-2014	1980-2014 excl. time lag	1985-1995	1995-2005	2005-2014
FTT	-0.0151 (0.0610)	-0.0155 (0.1667)	-0.2771** (0.1274)	1.0365*** (0.3467)	0.5660** (0.2325)
Volume	-0.0001 (0.0003)	0.0008 (0.0011)	0.0042** (0.0058)	0.0003*** (0.0006)	-0.003* (0.001)
Market Value	-0.0006 (0.0039)	-0.0044 (0.0109)	-0.0173 (0.0479)	0.0046*** (0.0012)	-0.0065*** (0.0022)

R square	0.631	0.388	0.242	0.694	0.776
Durbin Watson	2.416	0.735	2.184	2.336	2.391
N	27187	27230	5278	10835	10950

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:24				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27187				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.629844	0.070374	8.950.010	0.0000
VOLUME	-1.38E-10	3.43E-10	-0.401673	0.6879
FTT	-0.015173	0.061090	-0.248380	0.8638
MARKET_VALUE	-6.85E-10	3.99E-09	-0.171494	0.8038
D10	0.000843	0.000525	1.604.649	0.1086
D11	0.000982	0.000482	2.038.368	0.0415
D2	0.000628	0.000464	1.352.359	0.1763
D3	0.000487	0.000506	0.962668	0.3357
D4	0.001003	0.000435	2.307.360	0.0210
D5	0.001649	0.000855	1.928.918	0.0538
D6	0.001767	0.001460	1.210.536	0.2261
D7	0.002164	0.000803	2.696.008	0.0070
D8	0.000134	0.000429	0.310888	0.7559
D9	-0.006141	0.001181	-5.198.094	0.0000
C	0.007825	0.001485	5.268.890	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.631202	Mean dependent var		
Adjusted R-squared	0.625708	S.D. dependent var		
S.E. of regression	0.008809	Akaike info criterion		
Sum squared resid	2.078.465	Schwarz criterion		-6.490.761
Log likelihood	90274.26	Hannan-Quinn criter.		
F-statistic	1.149.027	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:31				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27230				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	8.53E-10	1.14E-09	0.747904	0.4545
FTT	-0.015565	0.166738	-0.093351	0.9256
MARKET_VALUE	-4.46E-09	1.09E-08	-0.410032	0.6818
D10	0.002215	0.001380	1.605.006	0.1085
D11	0.002774	0.001166	2.379.676	0.0173
D2	0.001853	0.001187	1.560.910	0.1186
D3	0.001087	0.001348	0.806076	0.4202
D4	0.002835	0.001018	2.786.440	0.0053
D5	0.004334	0.002694	1.608.440	0.1078
D6	0.004451	0.003913	1.137.496	0.2553
D7	0.005568	0.001814	3.068.921	0.0022
D8	0.000337	0.001157	0.291098	0.7710
D9	-0.016447	0.000767	########	0.0000
C	0.021051	0.000668	3.150.760	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.388642	Mean dependent var		0.023191
Adjusted R-squared	0.379550	S.D. dependent var		0.014400
S.E. of regression	0.011343	Akaike info criterion		########
Sum squared resid	3.452.004	Schwarz criterion		########
Log likelihood	83531.33	Hannan-Quinn criter.		########
F-statistic	4.274.661	Durbin-Watson stat		0.735111
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY		
Method: Panel Least Squares		
Date: 04/04/15 Time: 02:38		
Sample: 1985M01 1995M01		
Periods included: 121		

Cross-sections included: 81				
Total panel (unbalanced) observations: 5278				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.269090	0.194909	1.380.588	0.1675
VOLUME	4.25E-09	5.86E-09	0.724398	0.4689
MARKET_VALUE	-1.73E-08	4.79E-08	-0.360988	0.7181
FTT	-0.277105	0.127449	########	0.0297
D10	0.005055	0.001960	2.579.666	0.0099
D11	0.004667	0.002298	2.031.110	0.0423
D2	-0.001100	0.001451	-0.758588	0.4481
D3	0.005590	0.002465	2.267.702	0.0234
D4	0.006027	0.002072	2.908.962	0.0036
D5	-0.000799	0.002660	-0.300220	0.7640
D6	0.003639	0.004970	0.732123	0.4641
D7	0.010785	0.003156	3.416.738	0.0006
D8	0.000534	0.001498	0.356250	0.7217
D9	-0.004772	0.001771	########	0.0071
C	0.008957	0.002711	3.304.123	0.0010
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.242276	Mean dependent var		0.015430
Adjusted R-squared	0.222534	S.D. dependent var		0.014185
S.E. of regression	0.012508	Akaike info criterion		########
Sum squared resid	0.804566	Schwarz criterion		########
Log likelihood	15704.37	Hannan-Quinn criter.		########
F-statistic	1.227.190	Durbin-Watson stat		2.184.808
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:44				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10835				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

H_L_VOLATILITY(-1)	0.707401	0.036714	1.926.794	0.0000
VOLUME	3.34E-10	6.89E-10	0.484342	0.6282
MARKET_VALUE	4.61E-09	1.22E-09	3.787.841	0.0002
FTT	1.036.583	0.346767	2.989.280	0.0028
D10	0.002008	0.000706	2.843.106	0.0045
D11	0.002676	0.000831	3.220.971	0.0013
D2	0.002829	0.000791	3.578.416	0.0003
D3	-0.003294	0.001299	########	0.0112
D4	0.003327	0.000789	4.217.753	0.0000
D5	0.002308	0.000835	2.765.245	0.0057
D6	-0.007872	0.003230	########	0.0148
D7	0.003245	0.001041	3.116.673	0.0018
D8	0.002614	0.000777	3.362.452	0.0008
D9	-0.002986	0.000705	########	0.0000
C	0.004691	0.000804	5.835.045	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.694068	Mean dependent var		0.025528
Adjusted R-squared	0.690237	S.D. dependent var		0.014176
S.E. of regression	0.007890	Akaike info criterion		########
Sum squared resid	0.666046	Schwarz criterion		########
Log likelihood	37158.94	Hannan-Quinn criter.		########
F-statistic	1.811.578	Durbin-Watson stat		2.336.222
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:46				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10950				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.750931	0.026830	2.798.864	0.0000
VOLUME	-3.05E-10	1.64E-10	########	0.0638
MARKET_VALUE	-6.59E-09	2.21E-09	########	0.0029
FTT	0.566008	0.232570	2.433.708	0.0150

D10	0.001594	0.000710	2.247.131	0.0247
D11	0.001723	0.000649	2.656.127	0.0079
D2	0.001000	0.000601	1.661.972	0.0965
D3	-0.002301	0.000835	########	0.0059
D4	0.000428	0.000513	0.834566	0.4040
D5	0.000260	0.001244	0.208667	0.8347
D6	-0.003472	0.001772	########	0.0501
D7	0.002115	0.000621	3.407.165	0.0007
D8	0.000355	0.000603	0.589256	0.5557
D9	-0.004217	0.000676	########	0.0000
C	0.005222	0.000758	6.885.905	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.776400	Mean dependent var		0.024838
Adjusted R-squared	0.773818	S.D. dependent var		0.013386
S.E. of regression	0.006366	Akaike info criterion		########
Sum squared resid	0.438686	Schwarz criterion		########
Log likelihood	39897.36	Hannan-Quinn criter.		########
F-statistic	3.006.715	Durbin-Watson stat		2.391.411
Prob(F-statistic)	0.000000			

Treatment effect

Model 2

Period	1980-2014		1980-2014 (no lag)		1985-1995		1995-2005		2005-2014	
Measure	HV	HL	HV	HL	HV	HL	HV	HL	HV	HL
Benchmark specification	-0.021	-0.015	-0.068	-0.015	-0.191***	-0.277**	0.665**	1.036***	1.065***	0.566**
2. Time FE only	0.061	0.031	0.117	0.091	-0.045	-0.064	0.109	0.008	0.110	0.068

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:56				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27897				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

VOLATILITY(-1)	0.548009	0.031817	1.722.402	0.0000
VOLUME	-7.78E-10	5.85E-10	-1.330.526	0.1834
MARKET_VALUE	-1.00E-09	5.97E-09	-0.167524	0.8670
FTT	0.061384	0.077172	0.795410	0.4264
C	0.008479	0.000592	1.432.425	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.476495	Mean dependent var		
Adjusted R-squared	0.469091	S.D. dependent var		
S.E. of regression	0.008782	Akaike info criterion		
Sum squared resid	2.121.524	Schwarz criterion		
Log likelihood	92705.39	Hannan-Quinn criter.		
F-statistic	6.436.215	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:56				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27187				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.647894	0.070538	9.184.972	0.0000
VOLUME	5.42E-11	3.75E-10	0.144763	0.8849
MARKET_VALUE	-8.29E-10	4.07E-09	-0.203705	0.8386
FTT	0.030655	0.073869	0.414995	0.6781
C	0.008126	0.001580	5.141.769	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.627001	Mean dependent var		
Adjusted R-squared	0.621587	S.D. dependent var		
S.E. of regression	0.008857	Akaike info criterion		
Sum squared resid	2.102.138	Schwarz criterion		
Log likelihood	90120.32	Hannan-Quinn criter.		

F-statistic	1.157.971	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:57				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27917				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	-7.79E-10	1.16E-09	-0.674303	0.5001
MARKET_VALUE	-4.48E-09	1.35E-08	-0.332016	0.7399
FTT	0.116753	0.171760	0.679746	0.4967
C	0.018855	0.000650	2.898.715	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.240848	Mean dependent var		
Adjusted R-squared	0.230120	S.D. dependent var		
S.E. of regression	0.010578	Akaike info criterion		
Sum squared resid	3.079.928	Schwarz criterion		
Log likelihood	87578.53	Hannan-Quinn criter.		
F-statistic	2.245.034	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 02:58				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27230				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	1.33E-09	1.02E-09	1.308.293	0.1908
MARKET_VALUE	-4.30E-09	1.15E-08	-0.374012	0.7084

FTT	0.090907	0.210070	0.432745	0.6652
C	0.022972	0.000636	3.612.863	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.357527	Mean dependent var		
Adjusted R-squared	0.348215	S.D. dependent var		
S.E. of regression	0.011626	Akaike info criterion		
Sum squared resid	3.627.694	Schwarz criterion		
Log likelihood	82855.45	Hannan-Quinn criter.		
F-statistic	3.839.606	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 03:07				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 82				
Total panel (unbalanced) observations: 5995				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.412580	0.074230	5.558.128	0.0000
VOLUME	-6.45E-09	2.98E-09	-2.167.572	0.0302
MARKET_VALUE	-6.93E-08	5.58E-08	-1.241.587	0.2144
FTT	-0.044705	0.055391	-0.807085	0.4197
C	0.010688	0.001415	7.555.414	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.334634	Mean dependent var		
Adjusted R-squared	0.320578	S.D. dependent var		
S.E. of regression	0.009508	Akaike info criterion		
Sum squared resid	0.530686	Schwarz criterion		
Log likelihood	19466.93	Hannan-Quinn criter.		
F-statistic	2.380.815	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 03:08				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 81				
Total panel (unbalanced) observations: 5278				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.324894	0.189528	1.714.227	0.0865
VOLUME	1.14E-08	5.51E-09	2.063.338	0.0391
MARKET_VALUE	-1.37E-09	5.34E-08	-0.025738	0.9795
FTT	-0.063604	0.091587	-0.694462	0.4874
C	0.010223	0.002625	3.894.427	0.0001
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.207760	Mean dependent var		
Adjusted R-squared	0.188696	S.D. dependent var		
S.E. of regression	0.012777	Akaike info criterion		
Sum squared resid	0.841216	Schwarz criterion		
Log likelihood	15586.81	Hannan-Quinn criter.		
F-statistic	1.089.792	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 03:08				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10838				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.524576	0.033825	1.550.862	0.0000
VOLUME	-1.30E-09	1.01E-09	-1.284.680	0.1989
MARKET_VALUE	7.99E-09	1.90E-09	4.204.909	0.0000
FTT	0.109081	0.128157	0.851150	0.3947

C	0.009100	0.000634	1.436.050	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.455505	Mean dependent var		
Adjusted R-squared	0.449202	S.D. dependent var		
S.E. of regression	0.008085	Akaike info criterion		
Sum squared resid	0.700258	Schwarz criterion		
Log likelihood	36899.29	Hannan-Quinn criter.		
F-statistic	7.227.505	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 03:09				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10835				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.742659	0.032743	2.268.118	0.0000
VOLUME	-4.76E-10	5.60E-10	-0.848717	0.3961
MARKET_VALUE	4.52E-09	9.84E-10	4.595.711	0.0000
FTT	0.007969	0.097478	0.081752	0.9348
C	0.006514	0.000860	7.574.146	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.688065	Mean dependent var		
Adjusted R-squared	0.684454	S.D. dependent var		
S.E. of regression	0.007963	Akaike info criterion		
Sum squared resid	0.679115	Schwarz criterion		
Log likelihood	37053.67	Hannan-Quinn criter.		
F-statistic	1.905.172	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY	

Method: Panel Least Squares				
Date: 04/04/15 Time: 03:10				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10940				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.623088	0.026158	2.382.014	0.0000
VOLUME	-4.05E-10	3.80E-10	-1.064.031	0.2873
MARKET_VALUE	-8.57E-09	4.95E-09	-1.731.900	0.0833
FTT	0.110411	0.101125	1.091.821	0.2749
C	0.007263	0.000736	9.871.997	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.560564	Mean dependent var		
Adjusted R-squared	0.555895	S.D. dependent var		
S.E. of regression	0.008877	Akaike info criterion		
Sum squared resid	0.852881	Schwarz criterion		
Log likelihood	36219.27	Hannan-Quinn criter.		
F-statistic	1.200.656	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 03:11				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10950				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.776992	0.024383	3.186.558	0.0000
VOLUME	-7.15E-11	1.88E-10	-0.379647	0.7042
MARKET_VALUE	-5.33E-09	2.51E-09	-2.128.625	0.0333
FTT	0.067892	0.060563	1.121.029	0.2623
C	0.005568	0.000692	8.052.538	0.0000

	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.772890	Mean dependent var		
Adjusted R-squared	0.770479	S.D. dependent var		
S.E. of regression	0.006413	Akaike info criterion		
Sum squared resid	0.445573	Schwarz criterion		
Log likelihood	39812.07	Hannan-Quinn criter.		
F-statistic	3.206.066	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Model 3

Period	1980-2014		1980-2014 (no lag)		1985-1995		1995-2005		2005-2014	
Measure	HV	HL	HV	HL	HV	HL	HV	HL	HV	HL
Benchmark specification	-0.021	-0.015	-0.068	-0.015	-0.191***	-0.277**	0.665**	1.036***	1.065***	0.566**
3. Time + Stock FE	-0.033	-0.030	-0.073	-0.047	-0.224***	-0.363**	0.768**	1.384***	1.385***	0.848**

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:24				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27897				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.419433	0.031846	1.317.077	0.0000
VOLUME	7.88E-11	8.16E-10	0.096539	0.9231
MARKET_VALUE	1.76E-09	4.04E-09	0.436132	0.6627
FTT	-0.033213	0.054531	-0.609067	0.5425
C	0.010999	0.000639	1.722.293	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				

R-squared	0.521293	Mean dependent var	
Adjusted R-squared	0.512788	S.D. dependent var	
S.E. of regression	0.008413	Akaike info criterion	
Sum squared resid	1.939.976	Schwarz criterion	
Log likelihood	93953.21	Hannan-Quinn criter.	
F-statistic	6.128.819	Durbin-Watson stat	
Prob(F-statistic)	0.000000		

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:25				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27187				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.558453	0.083610	6.679.261	0.0000
VOLUME	-7.53E-10	5.55E-10	-1.356.726	0.1749
MARKET_VALUE	-3.02E-09	4.06E-09	-0.742555	0.4578
FTT	-0.030429	0.072029	-0.422451	0.6727
C	0.010430	0.001965	5.307.525	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.647434	Mean dependent var		
Adjusted R-squared	0.641003	S.D. dependent var		
S.E. of regression	0.008627	Akaike info criterion		
Sum squared resid	1.986.983	Schwarz criterion		
Log likelihood	90886.14	Hannan-Quinn criter.		
F-statistic	1.006.749	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY		
Method: Panel Least Squares		
Date: 04/04/15 Time: 04:27		
Sample (adjusted): 1982M02 2014M04		
Periods included: 387		

Cross-sections included: 99				
Total panel (unbalanced) observations: 27917				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	1.49E-09	1.80E-09	0.830271	0.4064
MARKET_VALUE	1.53E-09	7.05E-09	0.217462	0.8279
FTT	-0.073439	0.089509	-0.820469	0.4120
C	0.018951	0.000255	7.419.423	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.415533	Mean dependent var		
Adjusted R-squared	0.405156	S.D. dependent var		
S.E. of regression	0.009298	Akaike info criterion		
Sum squared resid	2.371.218	Schwarz criterion		
Log likelihood	91228.71	Hannan-Quinn criter.		
F-statistic	4.004.304	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:28				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27230				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	5.32E-11	1.80E-09	0.029496	0.9765
MARKET_VALUE	-9.12E-09	9.20E-09	-0.991293	0.3216
FTT	-0.046818	0.164396	-0.284786	0.7758
C	0.023441	0.000405	5.792.938	0.0000
	Effects Specification			

Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.487519	Mean dependent var		
Adjusted R-squared	0.478187	S.D. dependent var		
S.E. of regression	0.010402	Akaike info criterion		
Sum squared resid	2.893.697	Schwarz criterion		
Log likelihood	85933.29	Hannan-Quinn criter.		
F-statistic	5.223.714	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:29				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 82				
Total panel (unbalanced) observations: 5995				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.223335	0.066913	3.337.709	0.0009
VOLUME	2.90E-09	4.31E-09	0.674111	0.5003
MARKET_VALUE	-3.21E-08	3.45E-08	-0.930402	0.3522
FTT	-0.224724	0.052576	-4.274.305	0.0000
C	0.014009	0.001226	1.142.233	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.435205	Mean dependent var		
Adjusted R-squared	0.415204	S.D. dependent var		
S.E. of regression	0.008821	Akaike info criterion		
Sum squared resid	0.450473	Schwarz criterion		
Log likelihood	19958.14	Hannan-Quinn criter.		
F-statistic	2.175.966	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY		
Method: Panel Least Squares		

Date: 04/04/15 Time: 04:31				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 81				
Total panel (unbalanced) observations: 5278				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.146981	0.196914	0.746422	0.4554
VOLUME	4.45E-09	6.06E-09	0.734074	0.4629
MARKET_VALUE	-7.98E-08	4.76E-08	-1.675.086	0.0940
FTT	-0.363358	0.148462	-2.447.490	0.0144
C	0.014549	0.003304	4.403.717	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.315516	Mean dependent var		
Adjusted R-squared	0.287991	S.D. dependent var		
S.E. of regression	0.011969	Akaike info criterion		
Sum squared resid	0.726799	Schwarz criterion		
Log likelihood	15972.63	Hannan-Quinn criter.		
F-statistic	1.146.283	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:36				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10838				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.353106	0.030512	1.157.252	0.0000
VOLUME	7.85E-10	1.75E-09	0.449567	0.6530
MARKET_VALUE	8.49E-10	8.39E-10	1.011.953	0.3116

FTT	0.767897	0.313395	2.450.248	0.0143
C	0.011384	0.000737	1.544.403	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.515808	Mean dependent var		
Adjusted R-squared	0.505681	S.D. dependent var		
S.E. of regression	0.007659	Akaike info criterion		
Sum squared resid	0.622705	Schwarz criterion		
Log likelihood	37535.35	Hannan-Quinn criter.		
F-statistic	5.093.742	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:37				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10835				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.604144	0.044863	1.346.653	0.0000
VOLUME	-8.49E-10	1.60E-09	-0.531596	0.5950
MARKET_VALUE	-2.27E-09	9.78E-10	-2.325.351	0.0201
FTT	1.384.607	0.444052	3.118.118	0.0018
C	0.007996	0.001134	7.049.141	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.712567	Mean dependent var		
Adjusted R-squared	0.706554	S.D. dependent var		
S.E. of regression	0.007679	Akaike info criterion		
Sum squared resid	0.625772	Schwarz criterion		
Log likelihood	37496.84	Hannan-Quinn criter.		

F-statistic	1.185.043	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:42				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10940				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.370136	0.086513	4.278.415	0.0000
VOLUME	3.32E-10	5.96E-10	0.556234	0.5781
MARKET_VALUE	-7.95E-09	8.13E-09	-0.978615	0.3278
FTT	1.385.320	0.439914	3.149.066	0.0016
C	0.009620	0.001927	4.991.972	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.630316	Mean dependent var		
Adjusted R-squared	0.622975	S.D. dependent var		
S.E. of regression	0.008179	Akaike info criterion		
Sum squared resid	0.717502	Schwarz criterion		
Log likelihood	37164.73	Hannan-Quinn criter.		
F-statistic	8.585.896	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 04:43				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10950				
White period standard errors & covariance (d.f. corrected)				
WARNING: estimated coefficient covariance matrix is of reduced rank				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.604078	0.025072	2.409.421	0.0000
VOLUME	-3.67E-10	3.66E-10	-1.002.924	0.3159
MARKET_VALUE	-1.25E-08	7.19E-09	-1.739.712	0.0819
FTT	0.847926	0.331385	2.558.737	0.0105
C	0.008604	0.000824	1.043.958	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.795380	Mean dependent var		
Adjusted R-squared	0.791321	S.D. dependent var		
S.E. of regression	0.006115	Akaike info criterion		
Sum squared resid	0.401449	Schwarz criterion		
Log likelihood	40383.01	Hannan-Quinn criter.		
F-statistic	1.959.252	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Model 4

Period	1980-2014		1980-2014 (no lag)		1985-1995		1995-2005		2005-2014	
Measure	HV	HL	HV	HL	HV	HL	HV	HL	HV	HL
Benchmark specification	-0.021	-0.015	-0.068	-0.015	-0.191***	-0.277**	0.665**	1.036***	1.065***	0.566**
4. Time + Country FE excl. Volume	-0.031	-0.021	-0.078	-0.010	-0.165***	-0.234**	0.508**	0.978***	0.867***	0.531**

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:26				
Sample (adjusted): 1980M02 2014M04				
Periods included: 411				
Cross-sections included: 99				
Total panel (unbalanced) observations: 37388				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.531717	0.018868	2.818.152	0.0000
MARKET_VALUE	6.10E-10	4.38E-09	0.139183	0.8893
FTT	-0.031470	0.024069	########	0.1911
D10	-3.48E-05	0.000521	-0.066882	0.9467

D11	0.000973	0.000372	2.617.930	0.0089
D2	-0.000463	0.000450	########	0.3036
D3	-0.000656	0.000552	########	0.2346
D4	-0.000205	0.000435	-0.471377	0.6374
D5	0.002910	0.000565	5.148.214	0.0000
D6	0.002636	0.001491	1.767.323	0.0772
D7	0.001193	0.000412	2.893.061	0.0038
D8	-0.000459	0.000574	-0.800695	0.4233
D9	0.003921	0.006513	0.602001	0.5472
C	0.008165	0.000471	1.733.853	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.457444	Mean dependent var		0.018396
Adjusted R-squared	0.451236	S.D. dependent var		0.012473
S.E. of regression	0.009240	Akaike info criterion		########
Sum squared resid	3.155.956	Schwarz criterion		########
Log likelihood	122295.0	Hannan-Quinn criter.		########
F-statistic	7.367.710	Durbin-Watson stat		2.280.934
Prob(F-statistic)	0.000000			

Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 29619				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.650777	0.065993	9.861.363	0.0000
MARKET_VALUE	-1.34E-09	4.11E-09	-0.325083	0.7451
FTT	-0.021128	0.052683	-0.401047	0.6884
D10	0.000941	0.000510	1.844.347	0.0651
D11	0.001093	0.000476	2.294.768	0.0218
D2	8.33E-05	0.000327	0.254395	0.7992
D3	0.000617	0.000487	1.266.344	0.2054
D4	0.001317	0.000462	2.847.087	0.0044
D5	0.001414	0.000748	1.889.039	0.0589
D6	0.001527	0.001546	0.987579	0.3234
D7	0.001876	0.000729	2.572.648	0.0101
D8	0.000237	0.000409	0.580719	0.5614
D9	-0.006585	0.001554	########	0.0000
C	0.007110	0.001334	5.328.844	0.0000

	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.650419	Mean dependent var		0.022249
Adjusted R-squared	0.645657	S.D. dependent var		0.014587
S.E. of regression	0.008683	Akaike info criterion		########
Sum squared resid	2.203.044	Schwarz criterion		########
Log likelihood	98756.47	Hannan-Quinn criter.		########
F-statistic	1.365.973	Durbin-Watson stat		2.451.611
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:29				
Sample: 1980M01 2014M04				
Periods included: 412				
Cross-sections included: 99				
Total panel (unbalanced) observations: 37486				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MARKET_VALUE	4.99E-10	9.25E-09	0.053915	0.9570
FTT	-0.077593	0.054010	########	0.1508
D10	-0.000196	0.001123	-0.174709	0.8613
D11	0.001995	0.000800	2.492.973	0.0127
D2	-0.001186	0.000988	########	0.2299
D3	-0.001502	0.001180	########	0.2028
D4	-0.000582	0.000951	-0.611683	0.5408
D5	0.006021	0.001231	4.890.686	0.0000
D6	0.005600	0.003141	1.782.661	0.0746
D7	0.002360	0.000902	2.615.651	0.0089
D8	-0.001175	0.001241	-0.946977	0.3437
D9	0.008202	0.013869	0.591373	0.5543
C	0.017625	0.000735	2.397.881	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.233246	Mean dependent var		0.018404

Adjusted R-squared	0.224495	S.D. dependent var	0.012568
S.E. of regression	0.011068	Akaike info criterion	########
Sum squared resid	4.540.083	Schwarz criterion	########
Log likelihood	115848.6	Hannan-Quinn criter.	########
F-statistic	2.665.303	Durbin-Watson stat	0.916534
Prob(F-statistic)	0.000000		

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:36				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 29720				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MARKET_VALUE	-5.01E-09	1.16E-08	-0.431685	0.6660
FTT	-0.010301	0.150485	-0.068449	0.9454
D10	0.002897	0.001357	2.135.884	0.0327
D11	0.003386	0.001195	2.833.000	0.0046
D2	0.000412	0.000941	0.437942	0.6614
D3	0.001788	0.001332	1.343.065	0.1793
D4	0.004024	0.001047	3.842.579	0.0001
D5	0.004036	0.002491	1.620.547	0.1051
D6	0.003805	0.004391	0.866393	0.3863
D7	0.005341	0.001781	2.998.293	0.0027
D8	0.000871	0.001157	0.752663	0.4517
D9	-0.018699	0.002823	########	0.0000
C	0.020087	0.000691	2.906.673	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.391700	Mean dependent var		0.022198
Adjusted R-squared	0.383443	S.D. dependent var		0.014605
S.E. of regression	0.011468	Akaike info criterion		########
Sum squared resid	3.856.370	Schwarz criterion		########
Log likelihood	90823.91	Hannan-Quinn criter.		########
F-statistic	4.743.860	Durbin-Watson stat		0.695590
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:37				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10877				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.412498	0.043850	9.407.072	0.0000
MARKET_VALUE	-9.84E-08	3.88E-08	########	0.0113
FTT	-0.164976	0.037508	########	0.0000
D10	0.001602	0.000827	1.936.623	0.0528
D11	0.003814	0.000877	4.350.981	0.0000
D2	-0.000332	0.000699	-0.474206	0.6354
D3	0.000918	0.001115	0.823226	0.4104
D4	0.000313	0.000682	0.459355	0.6460
D5	0.002995	0.001841	1.626.970	0.1038
D6	0.005934	0.002511	2.362.745	0.0182
D7	0.001368	0.000705	1.941.379	0.0522
D8	-0.000268	0.001018	-0.263133	0.7925
D9	0.006520	0.002371	2.750.242	0.0060
C	0.009480	0.000904	1.049.261	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.341437	Mean dependent var		0.017330
Adjusted R-squared	0.333284	S.D. dependent var		0.012414
S.E. of regression	0.010137	Akaike info criterion		########
Sum squared resid	1.103.871	Schwarz criterion		########
Log likelihood	34576.38	Hannan-Quinn criter.		########
F-statistic	4.187.810	Durbin-Watson stat		2.193.845
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY		
Method: Panel Least Squares		
Date: 04/04/15 Time: 17:39		

Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 91				
Total panel (unbalanced) observations: 6943				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.385218	0.180260	2.137.018	0.0326
MARKET_VALUE	-1.07E-08	3.63E-08	-0.294291	0.7685
FTT	-0.233898	0.099483	-2.351.134	0.0187
D10	0.005408	0.001982	2.728.456	0.0064
D11	0.004732	0.002113	2.239.391	0.0252
D2	0.000224	0.001295	0.173055	0.8626
D3	0.005627	0.002205	2.551.887	0.0107
D4	0.006134	0.002174	2.821.938	0.0048
D5	-0.000795	0.002128	-0.373828	0.7085
D6	0.007625	0.005754	1.325.138	0.1852
D7	0.004054	0.002481	1.634.101	0.1023
D8	0.001267	0.001349	0.938932	0.3478
D9	-0.003108	0.001460	-2.128.511	0.0333
C	0.006711	0.002314	2.900.241	0.0037
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.296269	Mean dependent var		
Adjusted R-squared	0.282523	S.D. dependent var		
S.E. of regression	0.011767	Akaike info criterion		
Sum squared resid	0.942852	Schwarz criterion		
Log likelihood	21059.71	Hannan-Quinn criter.		
F-statistic	2.155.315	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:43				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (balanced) observations: 11979				
White period standard errors & covariance (d.f. corrected)				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.497327	0.029778	1.670.114	0.0000
MARKET_VALUE	8.24E-09	1.45E-09	5.670.916	0.0000
FTT	0.508169	0.222500	2.283.906	0.0224
D10	0.000301	0.000593	0.507272	0.6120
D11	0.001881	0.000654	2.875.179	0.0040
D2	0.001433	0.000544	2.635.608	0.0084
D3	-0.002083	0.000925	########	0.0244
D4	0.001610	0.000595	2.704.687	0.0068
D5	0.003948	0.000633	6.236.579	0.0000
D6	-0.002542	0.002399	########	0.2893
D7	0.002357	0.000702	3.356.876	0.0008
D8	0.001541	0.000751	2.051.496	0.0402
D9	0.000842	0.005807	0.144980	0.8847
C	0.007814	0.000627	1.246.666	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.453429	Mean dependent var		0.019235
Adjusted R-squared	0.447292	S.D. dependent var		0.011309
S.E. of regression	0.008408	Akaike info criterion		########
Sum squared resid	0.837310	Schwarz criterion		########
Log likelihood	40312.89	Hannan-Quinn criter.		########
F-statistic	7.388.320	Durbin-Watson stat		2.256.518
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:44				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 11507				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.718872	0.034269	2.097.741	0.0000

MARKET_VALUE	4.64E-09	1.36E-09	3.407.383	0.0007
FTT	0.978064	0.345589	2.830.137	0.0047
D10	0.001934	0.000694	2.787.551	0.0053
D11	0.002561	0.000815	3.141.324	0.0017
D2	0.001890	0.000649	2.911.232	0.0036
D3	-0.003032	0.001241	-2.444.097	0.0145
D4	0.003176	0.000767	4.139.801	0.0000
D5	0.002140	0.000806	2.653.964	0.0080
D6	-0.008106	0.003208	-2.527.034	0.0115
D7	0.003116	0.001002	3.110.611	0.0019
D8	0.002516	0.000766	3.282.608	0.0010
D9	-0.003560	0.001041	-3.420.578	0.0006
C	0.004518	0.000785	5.753.234	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.710844	Mean dependent var		
Adjusted R-squared	0.707462	S.D. dependent var		
S.E. of regression	0.007774	Akaike info criterion		
Sum squared resid	0.687303	Schwarz criterion		
Log likelihood	39629.03	Hannan-Quinn criter.		
F-statistic	2.102.157	Durbin-Watson stat		
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:45				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 11048				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.595161	0.062221	9.565.295	0.0000
MARKET_VALUE	-6.48E-09	3.27E-09	########	0.0477
FTT	0.866882	0.318970	2.717.754	0.0066
D10	0.001275	0.000908	1.403.924	0.1604
D11	0.002237	0.000911	2.455.767	0.0141
D2	0.001598	0.000863	1.852.532	0.0640
D3	-0.004274	0.001213	########	0.0004

D4	0.000421	0.000745	0.565168	0.5720
D5	0.001814	0.001261	1.438.352	0.1504
D6	-0.004828	0.002669	########	0.0705
D7	0.001920	0.000767	2.503.407	0.0123
D8	0.000378	0.000865	0.436892	0.6622
D9	0.007924	0.010668	0.742775	0.4576
C	0.006068	0.001333	4.552.945	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.571567	Mean dependent var		0.018956
Adjusted R-squared	0.566703	S.D. dependent var		0.013395
S.E. of regression	0.008817	Akaike info criterion		########
Sum squared resid	0.849236	Schwarz criterion		########
Log likelihood	36654.76	Hannan-Quinn criter.		########
F-statistic	1.175.179	Durbin-Watson stat		2.317.215
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 17:58				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 11058				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.751451	0.026632	2.821.565	0.0000
MARKET_VALUE	-7.22E-09	2.19E-09	########	0.0010
FTT	0.531198	0.229055	2.319.086	0.0204
D10	0.001486	0.000705	2.107.968	0.0351
D11	0.001689	0.000646	2.612.936	0.0090
D2	0.000953	0.000597	1.597.163	0.1103
D3	-0.002250	0.000825	########	0.0064
D4	0.000379	0.000509	0.745320	0.4561
D5	0.000237	0.001245	0.190362	0.8490
D6	-0.003191	0.001745	########	0.0675
D7	0.001947	0.000585	3.325.332	0.0009
D8	0.000280	0.000598	0.468495	0.6394
D9	-0.004756	0.000798	########	0.0000

C	0.005274	0.000749	7.040.234	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.781831	Mean dependent var		0.024596
Adjusted R-squared	0.779356	S.D. dependent var		0.013542
S.E. of regression	0.006361	Akaike info criterion		########
Sum squared resid	0.442349	Schwarz criterion		########
Log likelihood	40299.16	Hannan-Quinn criter.		########
F-statistic	3.159.638	Durbin-Watson stat		2.388.541
Prob(F-statistic)	0.000000			

Model 5

Period	1980-2014		1980-2014 (no lag)		1985-1995		1995-2005		2005-2014	
Measure	HV	HL	HV	HL	HV	HL	HV	HL	HV	HL
Benchmark specification	-0.021	-0.015	-0.068	-0.015	-0.191***	-0.277**	0.665**	1.036***	1.065***	0.566**
5. Time + Country FE excl. Market value	-0.025	-0.013	-0.068	-0.001	-0.170***	-0.273**	0.639**	1.021***	1.082***	0.578**

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 18:36				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27897				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.486661	0.034403	1.414.597	0.0000
VOLUME	5.99E-11	3.70E-10	0.162015	0.8713
FTT	-0.024552	0.051747	-0.474457	0.6352
D10	-0.000380	0.000588	-0.646432	0.5180
D11	0.000900	0.000493	1.823.534	0.0682
D2	0.000245	0.000565	0.433621	0.6646
D3	-0.000934	0.000597	-1.564.026	0.1178
D4	-0.000345	0.000483	-0.714024	0.4752
D5	0.003162	0.000710	4.451.695	0.0000
D6	0.003019	0.001600	1.886.443	0.0592

D7	0.001089	0.000521	2.091.034	0.0365
D8	-0.000630	0.000628	-1.002.935	0.3159
D9	0.011890	0.002944	4.039.126	0.0001
C	0.009136	0.000725	1.259.686	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.495279	Mean dependent var		0.018949
Adjusted R-squared	0.487974	S.D. dependent var		0.012053
S.E. of regression	0.008625	Akaike info criterion		########
Sum squared resid	2.045.398	Schwarz criterion		########
Log likelihood	93215.10	Hannan-Quinn criter.		########
F-statistic	6.779.806	Durbin-Watson stat		2.144.509
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 18:37				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27187				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.629896	0.070329	8.956.470	0.0000
VOLUME	-1.65E-10	3.65E-10	-0.451170	0.6519
FTT	-0.012975	0.061096	-0.212363	0.8318
D10	0.000844	0.000527	1.603.753	0.1088
D11	0.000938	0.000483	1.944.262	0.0519
D2	0.000621	0.000459	1.350.720	0.1768
D3	0.000475	0.000497	0.956018	0.3391
D4	0.000991	0.000420	2.361.160	0.0182
D5	0.001650	0.000855	1.930.729	0.0535
D6	0.001752	0.001458	1.201.804	0.2294
D7	0.002174	0.000805	2.699.496	0.0069
D8	0.000129	0.000431	0.298493	0.7653
D9	-0.006134	0.001175	-5.219.368	0.0000
C	0.007818	0.001479	5.284.634	0.0000
	Effects Specification			

Period fixed (dummy variables)				
R-squared	0.631198	Mean dependent var		0.023211
Adjusted R-squared	0.625719	S.D. dependent var		0.014398
S.E. of regression	0.008809	Akaike info criterion		########
Sum squared resid	2.078.486	Schwarz criterion		########
Log likelihood	90274.13	Hannan-Quinn criter.		########
F-statistic	1.151.939	Durbin-Watson stat		2.416.221
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 18:39				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27917				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	9.44E-10	8.68E-10	1.087.126	0.2770
FTT	-0.067773	0.095571	-0.709139	0.4782
D10	-0.000849	0.001152	-0.737087	0.4611
D11	0.001719	0.000943	1.822.118	0.0684
D2	0.000534	0.001102	0.484077	0.6283
D3	-0.001914	0.001146	-1.669.942	0.0949
D4	-0.000696	0.000934	-0.745056	0.4562
D5	0.006527	0.001356	4.813.295	0.0000
D6	0.006142	0.003117	1.970.426	0.0488
D7	0.001996	0.000987	2.021.957	0.0432
D8	-0.001323	0.001225	-1.080.189	0.2801
D9	0.024869	0.003471	7.164.667	0.0000
C	0.017817	0.000730	2.439.738	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.334229	Mean dependent var		0.018950
Adjusted R-squared	0.324600	S.D. dependent var		0.012055
S.E. of regression	0.009907	Akaike info criterion		########
Sum squared resid	2.701.075	Schwarz criterion		########

Log likelihood	89410.67	Hannan-Quinn criter.		########
F-statistic	3.470.986	Durbin-Watson stat		0.973298
Prob(F-statistic)	0.000000			

Method: Panel Least Squares				
Date: 04/04/15 Time: 18:40				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 99				
Total panel (unbalanced) observations: 27230				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	6.78E-10	1.20E-09	0.566509	0.5711
FTT	-0.001243	0.166350	-0.007470	0.9940
D10	0.002225	0.001385	1.607.073	0.1081
D11	0.002488	0.001185	2.099.597	0.0358
D2	0.001806	0.001181	1.529.916	0.1260
D3	0.001008	0.001323	0.761935	0.4461
D4	0.002758	0.000986	2.796.793	0.0052
D5	0.004344	0.002695	1.611.726	0.1070
D6	0.004359	0.003915	1.113.199	0.2656
D7	0.005633	0.001810	3.111.891	0.0019
D8	0.000305	0.001170	0.260839	0.7942
D9	-0.016409	0.000762	########	0.0000
C	0.021017	0.000665	3.158.289	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.388487	Mean dependent var		0.023191
Adjusted R-squared	0.379416	S.D. dependent var		0.014400
S.E. of regression	0.011344	Akaike info criterion		########
Sum squared resid	3.452.877	Schwarz criterion		########
Log likelihood	83527.89	Hannan-Quinn criter.		########
F-statistic	4.282.776	Durbin-Watson stat		0.734962
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY		
Method: Panel Least Squares		

Date: 04/04/15 Time: 18:42				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 82				
Total panel (unbalanced) observations: 5995				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.362259	0.078621	4.607.684	0.0000
VOLUME	-6.47E-09	4.58E-09	########	0.1580
FTT	-0.169563	0.052255	########	0.0012
D10	0.000877	0.001083	0.809886	0.4180
D11	0.002680	0.001098	2.440.144	0.0147
D2	-0.001963	0.000955	########	0.0398
D3	0.000792	0.001637	0.483806	0.6285
D4	-0.000307	0.000965	-0.318381	0.7502
D5	0.003708	0.002301	1.611.200	0.1072
D6	0.003071	0.004246	0.723205	0.4696
D7	0.001980	0.001355	1.461.358	0.1440
D8	-0.001170	0.001270	-0.921638	0.3568
D9	0.008340	0.001922	4.340.026	0.0000
C	0.010534	0.001553	6.783.322	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.354122	Mean dependent var		0.017225
Adjusted R-squared	0.339466	S.D. dependent var		0.011535
S.E. of regression	0.009375	Akaike info criterion		########
Sum squared resid	0.515143	Schwarz criterion		########
Log likelihood	19556.04	Hannan-Quinn criter.		########
F-statistic	2.416.144	Durbin-Watson stat		1.968.213
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY		
Method: Panel Least Squares		
Date: 04/04/15 Time: 18:43		
Sample: 1985M01 1995M01		
Periods included: 121		
Cross-sections included: 81		
Total panel (unbalanced) observations: 5278		

White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.269299	0.194815	1.382.336	0.1669
VOLUME	3.46E-09	5.62E-09	0.615657	0.5381
FTT	-0.273308	0.124644	########	0.0284
D10	0.005078	0.001968	2.580.527	0.0099
D11	0.004485	0.002058	2.179.472	0.0293
D2	-0.001152	0.001446	-0.796159	0.4260
D3	0.005586	0.002463	2.267.486	0.0234
D4	0.005969	0.002043	2.921.429	0.0035
D5	-0.000775	0.002654	-0.292145	0.7702
D6	0.003630	0.004969	0.730549	0.4651
D7	0.010827	0.003175	3.409.811	0.0007
D8	0.000473	0.001506	0.313967	0.7536
D9	-0.004741	0.001755	########	0.0069
C	0.008935	0.002699	3.310.349	0.0009
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.242209	Mean dependent var		0.015430
Adjusted R-squared	0.222616	S.D. dependent var		0.014185
S.E. of regression	0.012507	Akaike info criterion		########
Sum squared resid	0.804638	Schwarz criterion		########
Log likelihood	15704.13	Hannan-Quinn criter.		########
F-statistic	1.236.202	Durbin-Watson stat		2.184.908
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 18:44				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10838				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.473290	0.035100	1.348.412	0.0000
VOLUME	1.43E-09	1.10E-09	1.299.287	0.1939

FTT	0.638555	0.278386	2.293.772	0.0218
D10	0.000345	0.000673	0.512523	0.6083
D11	0.002573	0.000852	3.020.535	0.0025
D2	0.002123	0.000727	2.920.083	0.0035
D3	-0.002793	0.001128	########	0.0133
D4	0.001935	0.000672	2.879.656	0.0040
D5	0.003894	0.000713	5.465.110	0.0000
D6	-0.002658	0.002929	-0.907526	0.3641
D7	0.002479	0.000774	3.200.581	0.0014
D8	0.001746	0.000800	2.183.358	0.0290
D9	0.008838	0.001209	7.312.597	0.0000
C	0.008090	0.000715	1.131.335	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.472259	Mean dependent var		0.019636
Adjusted R-squared	0.465701	S.D. dependent var		0.010894
S.E. of regression	0.007963	Akaike info criterion		########
Sum squared resid	0.678712	Schwarz criterion		########
Log likelihood	37068.65	Hannan-Quinn criter.		########
F-statistic	7.202.003	Durbin-Watson stat		2.181.379
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 18:48				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10835				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.708173	0.176637	2.349.755	0.0188
VOLUME	7.13E-10	2.98E-09	0.512096	0.6086
FTT	1.020.650	0.402554	1.291.009	0.1967
D10	0.001972	0.001026	-0.141191	0.8877
D11	0.002941	0.001769	########	0.2931
D2	0.002860	0.001455	2.512.543	0.0120
D3	-0.003264	0.001622	1.197.136	0.2313

D4	0.003377	0.005422	########	0.2225
D5	0.002305	0.002524	2.221.947	0.0263
D6	-0.007753	0.000863	0.687880	0.4915
D7	0.003185	0.001700	########	0.0004
D8	0.002631	0.001277	2.127.051	0.0334
D9	-0.003009	0.001281	1.870.048	0.0615
C	0.004710	0.002731	3.609.876	0.0003
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.693808	Mean dependent var		0.020252
Adjusted R-squared	0.690002	S.D. dependent var		0.012817
S.E. of regression	0.007893	Akaike info criterion		########
Sum squared resid	0.666614	Schwarz criterion		########
Log likelihood	37154.32	Hannan-Quinn criter.		########
F-statistic	1.823.130	Durbin-Watson stat		1.644.993
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 18:49				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10940				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.515174	0.051163	1.044.877	0.0000
VOLUME	-1.29E-10	3.53E-10	0.757135	0.4490
FTT	1.082.414	0.407919	1.302.278	0.1928
D10	0.001505	0.000974	0.090073	0.9282
D11	0.001961	0.000990	1.375.408	0.1690
D2	0.001789	0.000941	1.078.269	0.2809
D3	-0.005426	0.001523	########	0.0359
D4	0.000282	0.000881	0.222314	0.8241
D5	0.002155	0.001141	1.656.656	0.0976
D6	-0.006121	0.003554	-0.512070	0.6086
D7	0.002387	0.000893	1.359.223	0.1741
D8	0.000394	0.000953	0.231072	0.8173
D9	0.023466	0.003548	4.594.019	0.0000

C	0.007166	0.001116	6.978.100	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.588600	Mean dependent var		0.019524
Adjusted R-squared	0.583884	S.D. dependent var		0.012805
S.E. of regression	0.008592	Akaike info criterion		########
Sum squared resid	0.798466	Schwarz criterion		########
Log likelihood	36579.90	Hannan-Quinn criter.		########
F-statistic	1.247.848	Durbin-Watson stat		2.250.483
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 18:49				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 99				
Total panel (unbalanced) observations: 10950				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.753763	0.028444	2.610.561	0.0000
VOLUME	-4.93E-10	1.97E-10	-0.785294	0.4323
FTT	0.578058	0.327068	2.387.482	0.0170
D10	0.001550	0.000682	2.334.035	0.0196
D11	0.001086	0.001132	########	0.0133
D2	0.000859	0.000642	2.020.280	0.0434
D3	-0.002444	0.001078	0.616577	0.5375
D4	0.000215	0.002793	########	0.0552
D5	0.000274	0.000708	3.077.056	0.0021
D6	-0.003573	0.000686	1.705.957	0.0880
D7	0.002182	0.000774	########	0.0000
D8	0.000282	0.000730	2.091.388	0.0365
D9	-0.004117	0.000704	2.418.784	0.0156
C	0.005111	0.000848	5.884.067	0.0000
	Effects Specification			
Period fixed (dummy variables)				

R-squared	0.776094	Mean dependent var	0.025891
Adjusted R-squared	0.773529	S.D. dependent var	0.014148
S.E. of regression	0.006370	Akaike info criterion	########
Sum squared resid	0.439288	Schwarz criterion	########
Log likelihood	39889.85	Hannan-Quinn criter.	########
F-statistic	3.025.893	Durbin-Watson stat	2.367.983
Prob(F-statistic)	0.000000		

Model 6

Period	1980-2014		1980-2014 (no lag)		1985-1995		1995-2005		2005-2014	
Measure	HV	HL	HV	HL	HV	HL	HV	HL	HV	HL
Benchmark specification	-0.021	-0.015	-0.068	-0.015	-0.191***	-0.277**	0.665**	1.036***	1.065***	0.566**
6. Time + Country FE excl. Outliers	-0.066*	-0.106**	-0.161**	-0.348**	-0.161***	-0.185***	-0.567*	-0.555*	0.659***	0.522**

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:18				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 89				
Total panel (unbalanced) observations: 25142				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.529798	0.026954	1.965.549	0.0000
VOLUME	-8.17E-11	2.74E-10	-0.297900	0.7658
MARKET_VALUE	1.39E-09	4.14E-09	0.336809	0.7363
FTT	-0.066424	0.037294	########	0.0749
D10	-0.000381	0.000535	-0.711774	0.4766
D11	0.000755	0.000385	1.959.899	0.0500
D2	0.000192	0.000528	0.364313	0.7156
D3	-0.000730	0.000540	########	0.1765
D4	-0.000387	0.000455	-0.850778	0.3949
D6	0.003177	0.000469	2.103.223	0.0355
D7	0.000986	0.001455	2.183.983	0.0290
D8	-0.000700	0.000573	########	0.2217
C	0.008452	0.000621	1.360.173	0.0000
	Effects Specification			

Period fixed (dummy variables)				
R-squared	0.558165	Mean dependent var		0.018127
Adjusted R-squared	0.551076	S.D. dependent var		0.010352
S.E. of regression	0.006936	Akaike info criterion		########
Sum squared resid	1.190.440	Schwarz criterion		########
Log likelihood	89506.72	Hannan-Quinn criter.		########
F-statistic	7.873.752	Durbin-Watson stat		2.288.264
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:19				
Sample (adjusted): 1982M03 2014M04				
Periods included: 386				
Cross-sections included: 89				
Total panel (unbalanced) observations: 24509				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.681141	0.030099	2.262.982	0.0000
VOLUME	-2.24E-10	2.64E-10	-0.846052	0.3975
MARKET_VALUE	-2.01E-10	3.46E-09	-0.058182	0.9536
FTT	-0.105916	0.044906	########	0.0184
D10	0.000666	0.000402	1.232.661	0.2177
D11	0.000869	0.000420	1.686.007	0.0918
D2	0.000495	0.000349	2.224.075	0.0262
D3	0.000708	0.001208	1.983.500	0.0473
D4	0.000776	0.000645	2.874.395	0.0041
D6	0.002396	0.000367	-0.120569	0.9040
D7	0.001855	0.000440	1.513.747	0.1301
D8	-4.43E-05	0.000395	2.201.035	0.0277
C	0.006886	0.000617	1.115.866	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.703518	Mean dependent var		0.023250
Adjusted R-squared	0.698637	S.D. dependent var		0.013307
S.E. of regression	0.007305	Akaike info criterion		########
Sum squared resid	1.286.758	Schwarz criterion		########
Log likelihood	85987.28	Hannan-Quinn criter.		########

F-statistic	1.441.128	Durbin-Watson stat		2.366.772
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:21				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				
Cross-sections included: 89				
Total panel (unbalanced) observations: 25152				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	8.46E-10	7.21E-10	1.174.574	0.2402
MARKET_VALUE	6.81E-10	9.01E-09	0.075592	0.9397
FTT	-0.160932	0.075364	########	0.0327
D10	-0.000929	0.001144	-0.811870	0.4169
D11	0.001716	0.000822	2.088.135	0.0368
D2	0.000469	0.001119	0.419654	0.6747
D3	-0.001646	0.001138	########	0.1482
D4	-0.000806	0.000960	-0.839487	0.4012
D6	0.006969	0.000975	1.963.446	0.0496
D7	0.001915	0.003052	2.283.563	0.0224
D8	-0.001551	0.001217	########	0.2026
C	0.018004	0.000721	2.496.023	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.385366	Mean dependent var		0.018127
Adjusted R-squared	0.375509	S.D. dependent var		0.010351
S.E. of regression	0.008180	Akaike info criterion		########
Sum squared resid	1.656.183	Schwarz criterion		########
Log likelihood	85394.81	Hannan-Quinn criter.		########
F-statistic	3.909.414	Durbin-Watson stat		0.940231
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:21				
Sample (adjusted): 1982M02 2014M04				
Periods included: 387				

Cross-sections included: 89				
Total panel (unbalanced) observations: 24542				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLUME	8.31E-10	1.12E-09	0.741439	0.4584
MARKET_VALUE	-3.80E-09	1.09E-08	-0.347349	0.7283
FTT	-0.348027	0.143638	########	0.0154
D10	0.001966	0.001231	1.382.339	0.1669
D11	0.002879	0.001287	1.605.030	0.1085
D2	0.001701	0.001018	2.499.146	0.0125
D3	0.002065	0.003798	1.989.984	0.0466
D4	0.002544	0.001813	2.999.317	0.0027
D6	0.007558	0.001161	-0.166696	0.8676
D7	0.005439	0.001381	1.424.449	0.1543
D8	-0.000193	0.001175	2.449.655	0.0143
C	0.021555	0.000682	3.162.704	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.446618	Mean dependent var		0.023235
Adjusted R-squared	0.437519	S.D. dependent var		0.013309
S.E. of regression	0.009981	Akaike info criterion		########
Sum squared resid	2.405.435	Schwarz criterion		########
Log likelihood	78442.78	Hannan-Quinn criter.		########
F-statistic	4.908.285	Durbin-Watson stat		0.627954
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:22				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 72				
Total panel (unbalanced) observations: 5312				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.509495	0.027181	1.874.488	0.0000
VOLUME	-2.79E-09	3.62E-09	-0.771857	0.4402

MARKET_VALUE	-6.23E-08	3.32E-08	########	0.0603
FTT	-0.160823	0.043146	########	0.0002
D10	0.000736	0.000807	0.912046	0.3618
D11	0.002764	0.000813	3.400.282	0.0007
D2	-0.001428	0.000734	########	0.0517
D3	0.000689	0.001236	0.557310	0.5773
D4	-8.77E-07	0.000736	-0.001191	0.9990
D6	0.002665	0.003336	0.798846	0.4244
D7	0.001395	0.001023	1.362.944	0.1730
D8	-0.000751	0.000956	-0.784840	0.4326
C	0.008264	0.000846	9.771.034	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.494447	Mean dependent var		0.016379
Adjusted R-squared	0.481562	S.D. dependent var		0.009355
S.E. of regression	0.006736	Akaike info criterion		########
Sum squared resid	0.234983	Schwarz criterion		########
Log likelihood	19091.56	Hannan-Quinn criter.		########
F-statistic	3.837.301	Durbin-Watson stat		2.276.482
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:22				
Sample: 1985M01 1995M01				
Periods included: 121				
Cross-sections included: 72				
Total panel (unbalanced) observations: 4669				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.518948	0.054996	9.436.193	0.0000
VOLUME	1.37E-09	3.71E-09	0.369084	0.7121
MARKET_VALUE	-2.56E-09	3.13E-08	-0.081832	0.9348
FTT	-0.184700	0.070374	########	0.0087
D10	0.003529	0.001136	3.106.099	0.0019
D11	0.002990	0.001363	2.194.148	0.0283
D2	-0.000714	0.000917	-0.778897	0.4361
D3	0.003768	0.001475	2.554.089	0.0107
D4	0.004033	0.001134	3.556.602	0.0004

D6	0.002599	0.003297	0.788228	0.4306
D7	0.007599	0.001533	4.957.818	0.0000
D8	0.000314	0.001003	0.312784	0.7545
C	0.005928	0.000797	7.439.160	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.452572	Mean dependent var		0.016108
Adjusted R-squared	0.436641	S.D. dependent var		0.011986
S.E. of regression	0.008996	Akaike info criterion		########
Sum squared resid	0.367090	Schwarz criterion		########
Log likelihood	15437.98	Hannan-Quinn criter.		########
F-statistic	2.840.924	Durbin-Watson stat		2.272.058
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:32				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 89				
Total panel (unbalanced) observations: 9761				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.476079	0.040651	1.171.128	0.0000
VOLUME	5.67E-10	9.29E-10	0.610317	0.5417
MARKET_VALUE	8.37E-09	1.24E-09	6.776.794	0.0000
FTT	-0.567253	0.311305	########	0.0685
D10	-0.001665	0.000587	########	0.0046
D2	-7.97E-05	0.000593	-0.134389	0.8931
D3	0.001271	0.001304	0.974323	0.3299
D4	-0.000257	0.000571	-0.450380	0.6524
D6	0.007257	0.003434	2.113.637	0.0346
D7	0.000492	0.000676	0.727770	0.4668
D8	-0.000371	0.000764	-0.486044	0.6269
C	0.010080	0.000837	1.204.350	0.0000
	Effects Specification			
Period fixed (dummy variables)				

R-squared	0.468835	Mean dependent var		0.018844
Adjusted R-squared	0.461609	S.D. dependent var		0.010238
S.E. of regression	0.007512	Akaike info criterion		########
Sum squared resid	0.543399	Schwarz criterion		########
Log likelihood	33959.42	Hannan-Quinn criter.		########
F-statistic	6.487.853	Durbin-Watson stat		2.258.508
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:33				
Sample: 1995M01 2005M01				
Periods included: 121				
Cross-sections included: 89				
Total panel (unbalanced) observations: 9761				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.698035	0.043553	1.602.719	0.0000
VOLUME	3.29E-10	7.17E-10	0.459567	0.6458
MARKET_VALUE	4.79E-09	1.27E-09	3.769.560	0.0002
FTT	-0.554679	0.329397	########	0.0922
D10	-0.000686	0.000585	########	0.2407
D2	0.000170	0.000607	0.280834	0.7788
D3	0.001964	0.001342	1.463.593	0.1433
D4	0.000674	0.000581	1.161.023	0.2457
D6	0.005310	0.003214	1.652.060	0.0986
D7	0.000591	0.000872	0.678218	0.4976
D8	-6.35E-05	0.000657	-0.096638	0.9230
C	0.007604	0.001208	6.292.715	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.672892	Mean dependent var		0.025088
Adjusted R-squared	0.668441	S.D. dependent var		0.013255
S.E. of regression	0.007632	Akaike info criterion		########
Sum squared resid	0.560922	Schwarz criterion		########
Log likelihood	33804.53	Hannan-Quinn criter.		########
F-statistic	1.512.039	Durbin-Watson stat		2.361.326
Prob(F-statistic)	0.000000			

Dependent Variable: VOLATILITY				
Method: Panel Least Squares				
Date: 04/04/15 Time: 19:35				
Sample: 2005M01 2014M04				
Periods included: 112				
Cross-sections included: 89				
Total panel (unbalanced) observations: 9928				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLATILITY(-1)	0.567008	0.030063	1.886.076	0.0000
VOLUME	-4.14E-11	2.53E-10	-0.163885	0.8698
MARKET_VALUE	-6.64E-09	3.38E-09	########	0.0494
FTT	0.659317	0.229993	2.866.683	0.0042
D10	0.000866	0.000859	1.008.751	0.3131
D11	0.001868	0.000837	2.231.210	0.0257
D2	0.001202	0.000789	1.523.273	0.1277
D3	-0.003728	0.001003	########	0.0002
D4	-5.69E-06	0.000669	-0.008503	0.9932
D6	-0.002982	0.002013	########	0.1385
D7	0.001633	0.000718	2.276.419	0.0228
D8	-9.68E-05	0.000796	-0.121623	0.9032
C	0.006987	0.000846	8.257.855	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.668604	Mean dependent var		0.018246
Adjusted R-squared	0.664446	S.D. dependent var		0.010879
S.E. of regression	0.006302	Akaike info criterion		########
Sum squared resid	0.389352	Schwarz criterion		########
Log likelihood	36279.44	Hannan-Quinn criter.		########
F-statistic	1.608.123	Durbin-Watson stat		2.308.994
Prob(F-statistic)	0.000000			

Dependent Variable: H_L_VOLATILITY		
Method: Panel Least Squares		
Date: 04/04/15 Time: 19:35		
Sample: 2005M01 2014M04		
Periods included: 112		
Cross-sections included: 89		

Total panel (unbalanced) observations: 9938				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
H_L_VOLATILITY(-1)	0.717284	0.030013	2.389.873	0.0000
VOLUME	-3.12E-10	1.86E-10	########	0.0934
MARKET_VALUE	-7.45E-09	2.49E-09	########	0.0028
FTT	0.522482	0.222976	2.343.222	0.0191
D10	0.001572	0.000748	2.102.172	0.0356
D11	0.001724	0.000680	2.534.681	0.0113
D2	0.000907	0.000626	1.450.429	0.1470
D3	-0.002246	0.000846	########	0.0079
D4	0.000284	0.000529	0.536055	0.5919
D6	-0.002963	0.001657	########	0.0738
D7	0.002181	0.000657	3.318.896	0.0009
D8	0.000178	0.000633	0.280605	0.7790
C	0.006151	0.000827	7.436.005	0.0000
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.797701	Mean dependent var		0.024995
Adjusted R-squared	0.795165	S.D. dependent var		0.012776
S.E. of regression	0.005782	Akaike info criterion		########
Sum squared resid	0.328147	Schwarz criterion		########
Log likelihood	37170.79	Hannan-Quinn criter.		########
F-statistic	3.146.205	Durbin-Watson stat		2.371.736
Prob(F-statistic)	0.000000			

Difference in difference results

Estimation	Historical 2 period	Historical 4 period	High-Low 2 period	High-Low 4 period
FTT	-0,227** (0,112)	-0,314*** (0,151)	-0,207 (0,058)	-0,155*** (0,054)
Volume	-0.003 (0.004)	0.003** (0.0016)	-0.004* (0.002)	0.005*** (0.009)
Market value	-0.127*** (0.018)	-0.010 (0.007)	0.076*** (0.019)	0.007 (0.007)
R square	0,030	0,129	0,011	0,092
DW	2,114	1,901	2,137	2,025
N	1485	2853	1485	2853

Dependent Variable: D_VOL				
Method: Panel Least Squares				
Date: 12/02/14 Time: 23:30				
Sample: 1984M01 2013M03				
Periods included: 15				
Cross-sections included: 99				
Total panel (balanced) observations: 1485				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	-3.44E-09	4.40E-09	-0.782811	0.4339
D_MARKET_VALUE	-1.27E-07	1.77E-08	-7.184.255	0.0000
D_FTT	-0.226719	0.111563	-2.032.202	0.0423
C	-0.000443	0.000223	-1.987.393	0.0471
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.030022	Mean dependent var		-0.000429
Adjusted R-squared	0.018782	S.D. dependent var		0.010927

S.E. of regression	0.010824	Akaike info criterion	-6.202.023
Sum squared resid	0.171878	Schwarz criterion	-6.137.743
Log likelihood	4.623.002	Hannan-Quinn criter.	-6.178.064
F-statistic	2.670.937	Durbin-Watson stat	2.113.560
Prob(F-statistic)	0.000248		

Dependent Variable: D_VOL_HL				
Method: Panel Least Squares				
Date: 12/02/14 Time: 23:36				
Sample: 1984M01 2013M03				
Periods included: 15				
Cross-sections included: 99				
Total panel (balanced) observations: 1485				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	-4.38E-09	2.34E-09	-1.869.460	0.0618
D_MARKET_VALUE	-7.60E-08	1.95E-08	-3.896.358	0.0001
D_FTT	-0.207080	0.150660	-1.374.487	0.1695
C	-0.000908	0.000485	-1.871.199	0.0615
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.010986	Mean dependent var		-0.000896
Adjusted R-squared	-0.000475	S.D. dependent var		0.018690

S.E. of regression	0.018695	Akaike info criterion	-5.109.116
Sum squared resid	0.512699	Schwarz criterion	-5.044.835
Log likelihood	3.811.519	Hannan-Quinn criter.	-5.085.157
F-statistic	0.958537	Durbin-Watson stat	2.137.317
Prob(F-statistic)	0.503519		

Dependent Variable: D_VOL				
Method: Panel Least Squares				
Date: 12/03/14 Time: 00:05				
Sample: 1984M01 2013M04				
Periods included: 29				
Cross-sections included: 99				
Total panel (unbalanced) observations: 2853				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	3.34E-09	1.60E-09	2.088.284	0.0369
D_MARKET_VALUE	-1.03E-08	7.38E-09	-1.402.449	0.1609
D_FTT	-0.313926	0.057781	-5.433.052	0.0000
C	1.70E-05	0.000193	0.088499	0.9295
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.129139	Mean dependent var		4.60E-05
Adjusted R-squared	0.119569	S.D. dependent var		0.011017

S.E. of regression	0.010337	Akaike info criterion	-6.294.993
Sum squared resid	0.301442	Schwarz criterion	-6.228.188
Log likelihood	9.011.808	Hannan-Quinn criter.	-6.270.902
F-statistic	1.349.427	Durbin-Watson stat	1.900.820
Prob(F-statistic)	0.000000		

Dependent Variable: D_VOL_HL				
Method: Panel Least Squares				
Date: 12/03/14 Time: 00:06				
Sample: 1984M01 2013M04				
Periods included: 29				
Cross-sections included: 99				
Total panel (unbalanced) observations: 2853				
White period standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	5.04E-09	9.08E-10	5.546.689	0.0000
D_MARKET_VALUE	7.58E-09	7.14E-09	1.062.468	0.2881
D_FTT	-0.154586	0.053777	-2.874.589	0.0041
C	5.10E-05	0.000194	0.262371	0.7931
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.092122	Mean dependent var		7.43E-05
Adjusted R-squared	0.082146	S.D. dependent var		0.011067

S.E. of regression	0.010603	Akaike info criterion	-6.244.265
Sum squared resid	0.317129	Schwarz criterion	-6.177.459
Log likelihood	8.939.443	Hannan-Quinn criter.	-6.220.173
F-statistic	9.233.782	Durbin-Watson stat	2.025.414
Prob(F-statistic)	0.000000		

Difference in difference results (robustness)

Estimation	Historical 2 period	Historical 4 period	High-Low 2 period	High-Low 4 period
FTT	-0.2267 0.1581	-0.3139*** 0.1069	-0.2070 0.2731	-0.1545 0.1097
Volume	-0.0034 0.0067	0.0033 0.0029	-0.0043 0.0116	0.0050* 0.0030
Market value	-0.127* 0.0772	-1.03E-08 2.36E-08	-0.0760 0.133	0.0075 0.0242
R square	0.030	0.129	0.011	0.092
DW	2.114	1.901	2.137	2.025
N	1485	2853	1485	2853

Dependent Variable: D_VOL				
Method: Panel Least Squares				
Date: 04/23/15 Time: 05:45				
Sample: 1984M01 2013M03				
Periods included: 15				
Cross-sections included: 99				
Total panel (balanced) observations: 1485				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	-3.44E-09	6.72E-09	-0.512435	0.6084
D_MARKET_VALUE	-1.27E-07	7.72E-08	-1.650720	0.0990
D_FTT	-0.226719	0.158165	-1.433434	0.1519
C	-0.000443	0.000281	-1.574671	0.1155
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.030022	Mean dependent var		-0.000429
Adjusted R-squared	0.018782	S.D. dependent var		0.010927

S.E. of regression	0.010824	Akaike info criterion	-6.202023
Sum squared resid	0.171878	Schwarz criterion	-6.137743
Log likelihood	4623.002	Hannan-Quinn criter.	-6.178064
F-statistic	2.670937	Durbin-Watson stat	2.113560
Prob(F-statistic)	0.000248		

Dependent Variable: D_VOL				
Method: Panel Least Squares				
Date: 04/23/15 Time: 05:58				
Sample: 1984M01 2013M04				
Periods included: 29				
Cross-sections included: 99				
Total panel (unbalanced) observations: 2853				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	3.34E-09	2.95E-09	1.131664	0.2579
D_MARKET_VALUE	-1.03E-08	2.36E-08	-0.438205	0.6613
D_FTT	-0.313926	0.106962	-2.934940	0.0034
C	1.70E-05	0.000194	0.087907	0.9300
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.129139	Mean dependent var		4.60E-05
Adjusted R-squared	0.119569	S.D. dependent var		0.011017
S.E. of regression	0.010337	Akaike info criterion		-6.294993
Sum squared resid	0.301442	Schwarz criterion		-6.228188
Log likelihood	9011.808	Hannan-Quinn criter.		-6.270902
F-statistic	13.49427	Durbin-Watson stat		1.900820
Prob(F-statistic)	0.000000			

Dependent Variable: D_VOL_HL				
Method: Panel Least Squares				
Date: 04/23/15 Time: 05:54				
Sample: 1984M01 2013M03				
Periods included: 15				
Cross-sections included: 99				
Total panel (balanced) observations: 1485				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	-4.38E-09	1.16E-08	-0.377321	0.7060
D_MARKET_VALUE	-7.60E-08	1.33E-07	-0.570018	0.5688
D_FTT	-0.207080	0.273169	-0.758065	0.4485
C	-0.000908	0.000486	-1.869522	0.0617

	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.010986	Mean dependent var		-0.000896
Adjusted R-squared	-0.000475	S.D. dependent var		0.018690
S.E. of regression	0.018695	Akaike info criterion		-5.109116
Sum squared resid	0.512699	Schwarz criterion		-5.044835
Log likelihood	3811.519	Hannan-Quinn criter.		-5.085157
F-statistic	0.958537	Durbin-Watson stat		2.137317
Prob(F-statistic)	0.503519			

Dependent Variable: D_VOL_HL				
Method: Panel Least Squares				
Date: 04/23/15 Time: 06:01				
Sample: 1984M01 2013M04				
Periods included: 29				
Cross-sections included: 99				
Total panel (unbalanced) observations: 2853				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D_VOLUME	5.04E-09	3.02E-09	1.665337	0.0960
D_MARKET_VALUE	7.58E-09	2.42E-08	0.313203	0.7541
D_FTT	-0.154586	0.109709	-1.409048	0.1589
C	5.10E-05	0.000199	0.256308	0.7977
	Effects Specification			
Period fixed (dummy variables)				
R-squared	0.092122	Mean dependent var		7.43E-05
Adjusted R-squared	0.082146	S.D. dependent var		0.011067
S.E. of regression	0.010603	Akaike info criterion		-6.244265
Sum squared resid	0.317129	Schwarz criterion		-6.177459
Log likelihood	8939.443	Hannan-Quinn criter.		-6.220173
F-statistic	9.233782	Durbin-Watson stat		2.025414
Prob(F-statistic)	0.000000			