MASTER OF SCIENCE IN

FINANCE

MASTERS FINAL WORK

DISSERTATION

THE INTRODUCTION OF FINANCIAL TRANSACTION TAX – EUROPEAN UNION SCOPE

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SUPERVISION:

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Abstract

Since the first concrete notion about FTT was presented, several were the pros and cons that came associated with this notion. With the study of the country experiences, the idea of introducing a FTT gained other dynamic. The literature presented about the introduction of a FTT at a wider scale, where it is consider several countries from the EU, is scarce. This study is innovative in the way that is not focused in a specific country, as it happens in traditional studies, but in several countries in EU, with the specific objective of foreseeing what should be the impact of a FTT in the field of tax revenue.

To perform this study, it was collected data on specific economic, financial and tax variables, from January 2011 until December 2016, and performed a scenario hypothesis test, a Monte Carlo Simulation and a Value at Risk analysis. The results reached, showed that there is not a clear impact about the adoption of an FTT and it depends in several external factors.

Resumo

Desde que a primeira noção sobre impostos sobre operações financeiras (IOF) foi apresentada, varias foram as vantagens e desvantagens associadas a este tipo de imposto. Com os estudos sobre as experiencias de cada país com este tipo de imposto, a ideia da sua introdução ganhou outra dinâmica. A literatura apresentada sobre a introdução de um IOF a uma grande escala, onde é considerado ao mesmo tempo diversos países pertencentes a União Europeia, é deveras escassa. Este estudo é assim inovador, na medida em que não está especificamente orientado para um só país, como é o caso dos estudos tradicionais, mas sim para diversos países pertencentes a União Europeia, tendo sempre como principal objetivo a previsão de qual será o impacto da introdução de um IOF, na perspetiva de receitas fiscais obtidas.

Para efetuar este estudo, foi recolhido dados sobre variáveis económicas, financeiras e fiscais, desde Janeiro de 2011 até Dezembro de 2016. Foi efetuado um teste de hipóteses, uma Simulação de Monte Carlo e um "Value at Risk" teste. Os resultados obtidos, indicam que não existe um impacto certo a nível de carga fiscal, variando assim os resultados devido a fatores externos.

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List of Abbreviations

ADR – American Depositary Receipts

CTT – Currency Transaction Tax

EC – European Commission

EU – European Union

FTT – Financial Transaction Tax

GNP – Gross National Product

GDP – Gross Domestic Product

MC – Monte Carlo

OTC – Over the Counter

OTR – Order to trade ratio

STT – Security transaction tax

SDRT – Stamp duty reserve tax

SDLT – Stamp duty land tax

HFT – High frequency trading

IMF – International Monetary Fund

VaR – Value at Risk

1. Introduction

Over the years, and especially after 2008 financial crisis, several countries change their posture in the financial environment. If before the crisis, the concern with adoption of policies that allowed to create funds to help in the "after-crisis" was low, the post crisis revealed a completely different scenario. Changes in the macroeconomic policies were perceptible in vast fields of the business environment. One special concern was in the field of financial transactions, where, due to the massive "contributions" of financial institutions to deteriorate the world economy, the imposition of a financial tax started to gain supporters from several countries. Allied to this concern raised the questions: "Is it fair that the taxpayers always support entirely the bad financial decisions from private institutions?" and "Why the taxpayers need to bailout private institutions, and when things go right they do not receive nothing?". Based on the historic financial transaction taxes, introduced in countries such as UK and Sweden, the European Commission started to develop a directive plan for introducing an FTT at a European scale.

The "imposition" through a council directive of an FTT in the EU, created a division between the 27-member states, where despite the arguments presented by the EU and appealing to enhanced cooperation (consists in a procedure where several countries in EU can establish advanced cooperation or integration in the EU structures without involving the other member states), only 11-member states decided to create measures to implement an FTT.

Through the analysis of a vast literature it was possible to reach a brief conclusion: if in one hand there is a concern about the impact that an FTT has in country economies, in the other hand, it does not exist a generalized study

that combines the major part of the EU countries with the directive EC tax rate and impact that the tax has in tax revenue and volume of transactions.

In this dissertation it is planned to answer the question "What is the impact of adopting a financial transaction tax, in terms of tax revenue, for the European countries?" and in order to answer it, it is firstly present the origin and development of the FTT concept according several authors. With an extensive literature review the pros and cons of introducing the sort of tax is also presented. Finally, in the topic of the literature review, it is enumerated some country experiences with this form of tax.

In what concerns the empirical part of this dissertation, it was selected 21 countries from the European Union and collected historical data from their principal financial indices, in order to simulate several scenarios of tax revenue. In a second part of the data, it is given special focus to 6 countries (Austria, Belgium, Germany, Finland, Portugal and Spain), where it is proceeded a Scenario Analysis, a Value at Risk procedure and a Monte Carlo Simulation.

In the end, it is presented the results of the study and enumerated the main conclusions and advices for future researches.

2. Literature Review:

2.1 Concept

The first concrete notion about FTT´s, dates to 1936, appearing after the Great Depression with Keynes (1937), proposing a creation of a tax that discourages market speculation. Keynes (1937) defended that by introducing a FTT in the financial system, it would lead to a discouragement of market speculation, meaning that market returns would be determined by

expectations and not by speculation. Overall this would originate a more stable financial market and at the same time an increase in public revenues. Later, Tobin (1974) proposed the introduction of a CTT[1], and despite the similarities with an FTT, the initial purpose of the CTT was to create financial penalties about the speculative financial movements, in order to enhance better effectiveness of macroeconomic policies (Raffer, 1998). With the introduction of the so called "Tobin Tax"[2], Tobin (1996) wanted to achieve exchange rates less susceptible to speculative transactions and at the same time, give more autonomy to national governments when proceeding with their monetary and fiscal policies.

Due to the contributions of Keynes and later by Tobin and other authors, nowadays an FTT is defined as an "ad valorem tax" (Burman, et al., 2016; EC, 2013b) that affects part of the transactions in financial markets, with the main purpose of collecting revenues (Nissanke, 2003).

At this point it is important to clearly define the scope of a financial transactions, in order to better understand in which type of operations there are incidence of the tax. According to article 2 of the council directive presented by the European Commission (EC, 2013b), it is considered a financial transaction: *"a) the purchase and sale of a financial instrument before netting or settlement; b) the transfer between entities of a group of the right to dispose of a financial instrument as owner and any equivalent operation implying the transfer of the risk associated with the financial instrument, in cases not subject to point (a); c) the conclusion of derivatives*

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[1] Currency Transaction Tax Is a type of FTT that is only applied on currencies of several types of transactions
[2] "Tobin Tax" was essentially an even tax on all spot conversions of one currency, into another that was proportional to the size of the transaction (Tobin, A Proposal for International Monetary Reform, 1978)

contracts before netting or settlement; d) an exchange of financial instruments; e) a repurchase agreement, a reverse repurchase agreement, a securities lending and borrowing agreement;"

Taking in consideration what is referred in the EC directive, this tax should be imposed on transactions of all types of financial assets and will not have restrictions when considering specific markets as proposed by Keynes (1936) for the stock market and Tobin (1978) for the foreign exchange market.

The main purposes of an FTT are thus: to gather revenues with each transaction that occurs (Burman, et al., 2016), where Baker (2008) defends that the imposition of an FTT could generate 100 billion euros a year, even considering a large decrease in the trading volume; Secondly reduce the activity that is being taxed trying to harmonize at maximum the chargeability and taxable amounts (Darvas & Weizsacker, 2010), in order to avoid distortions in internal markets; and at last it can also be seen as a tool that complements financial market regulation (Schafer, 2012). Adding to this, in the proposal of 28th September 2011, and following article 113 of the TFEU[3] (EC, 2011a), it was authorized the introduction of an FTT via enhance cooperation [4] between eleven-member states (Austria, Belgium, Estonia, France, Germany, Greece, Italy, Portugal, Slovenia, Slovakia and Spain). The objectives of the proposal were stablished in: a creation of a consensus legislation in respect of indirect taxation on financial transactions; a fair contribution of financial institution that covers the costs of the recent crisis;

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[3] Treaty on the Functioning of the European Union

[4] Enhanced cooperation, introduced by the Treaty of Amsterdam, is known as the practice where at minimum nine EU member states can establish protocols of cooperation in a certain area within the EU structures, without the others member states being included - (PWC, 2013)

and the creation of disincentives for transactions that not enhance efficiency in financial markets (PWC, 2013).

Schulmeister (2009) stated that the FTT is a better option than other forms of taxes, since it does not discriminate against specific types of markets, and due to the specifications of financial markets and transactions. The high volume of transactions allows the imposition of a small tax rate but at the same time allows considerable tax receiving's.

In the last decades, it was possible to notice a set of financial innovations that allowed to originate exponentially growth in the turnover volume levels of the asset markets (Schulmeister, 2009), with this growth came a rising asset price volatility that the economic policies could not alleviate.

With the crisis of 2008/9 and the debt levels of the economies, the introduction of an FTT gain more evidence, with some authors such as Wang & Yau (2012) and Darvas & Weizsacker (2010). Another consideration was from authors such as Vlasenko (2016) and the EC (2013b), focusing that an FTT would distribute more equally the "bill of the crisis", since that companies that needed bailout also took an active part when causing the crisis.

Schulmeister, Schratzenstaller, & Picek (2008) defended that a tax charged only on spot and derivatives transactions would be the first stage of implementing a FTT, it would be basically sufficient to apply this tax on UK and Germany, since almost 99% of all spot and derivatives transactions on exchanges (in EU) occur in these two countries.

In EU, the tax rate of a FTT is different from the non-derivative transactions and from the notional value of derivative transactions (Vlasenko, 2016; Darvas & Weizsacker, 2010). Depending on the member state, the tax

rate changes. To avoid fiscal evasion, the tax functions according to the residence principle, which consists in the consideration of the place where the financial institution is located and applies the tax rate of that state (Vlasenko, 2016; PWC, 2013; Genschel & Schawrz, 2011). It also functions according to the issuance principle, where it consists in the transaction being taxed whenever and wherever the transaction takes place (Credit Suisse, 2013; EC, 2013a; EC, 2013b).

2.2 Advantages and Disadvantages of introducing an FTT

2.2.1 Key Arguments in favor of Financial Transaction Taxes

Regarding the FTT, literature presents several advantages for the adoption of this form of tax, they are the following: a) Usable tool of prevention/ recovery from financial crisis; b) Compensates distortion effects; c) Collects revenue; d) Reduce excessive trading; e) Stabilize effect; f) Discourage high frequency trading; g) Decreases the attractiveness of some financial instruments. Table 1 synthetizes the key advantages in favor.

a) According Vlasenko (2016), Vella (2012) and the EC (2011b) an FTT can be seen as a tool of prevention and/or recovery from future financial crisis. The tax has a regulatory framework that discourages risky transactions that do not enhance stability and efficiency. The regulatory function of the tax is supported also by the fact that it can help reduce the systemic risk of markets (Schafer, 2012), reducing the probability of occurring future crisis;

b) Due to the VAT exemptions (Joumard, 2001) on financial services, there are some distortion effects that occur. With the introduction of an FTT, there will be a compensation of this effects, in order to rebalance the gap originated by

the fact that VAT is not incorporated in financial services (Schulmeister, 2014; Schulmeister, 2009);

c) Several authors such as Burman et al (2016), Vlasenko (2016), Hemmelgan & Nodème (2010), Schulmeister (2009) and Baker (2008), agrees that the imposition of an FTT enable to collect great amounts of revenue, even if the tax rate is at a very small proportion. The considerable revenues that are raised with the tax, can be used in fiscal consolidation or in the achievement of policy goals;

d) Excessive volume of trading is originated due to market speculation, and according to Tobin (1978) speculation on future prices should be one of the top concerns of market participants, because excessive trade encourages market inefficiency and instability. Habermeier & Kirilenko (2001) defend that in order to discourage this type of behavior, that threatens price stability and employment, the adoption of an FTT allows diminishing this action by increasing the costs of transaction.

e) Steadying financial markets by reducing speculative and technical trading can be attained with an FTT, as it will increase the cost of transactions (Hemmelgarn & Nicodème, 2010; Schulmeister, 2009). Keynes (1936) defends that with exceeding exchange rates, stock prices, interest rates and commodities prices, the speculation over enterprises tends to rise, causing a decrease in economic growth and employment. With the implementation of a FTT, it enables to act as a corrective tax, enhancing the stability on financial markets and achieving higher levels of efficiency (Vlasenko, 2016; Spahn, 1996; Stiglitz, 1989);

f) The introduction of a FTT reduces certain types of order flows such as the one´s in form of computerized automatic trading controlled by algorithms, commonly known as high-frequency trades (HFT). Since these types of trades are based on algorithms, acting according observed trade patterns, they are blamed for contributing to the formation of bubbles and financial crisis (Schafer, 2012). Since HFT earnings are based on tiny gains in each transaction, they are very sensitive to transaction costs, and so with an FTT the trading volume would likely fall. This sort of tax is recommended also due to the fact that the tax falls specifically upon speculative short-term transactions (Buckley, 2012);

g) According to Schafer (2012), the transaction costs associated with the implementation of an FTT, decreases permanently the attraction of some instruments, such as CDS[5] since they work by speculation and have a low cost of entry into the markets. With the imposition of an FTT, the costs associated with speculation increases and that behavior stops to be appealing;

Advantage	Description	Authors
a) Prevent/Recover from financial events	Due to the specifications of the tax, it creates disincentives to transactions that do not pursue market efficiency; With the revenue of the taxes it is possible to use the amounts to help recover economies/companies;	Schafer (2012); Vella (2012); EC (2011b); Schulmeister, (2009);
b) Compensate distortion effects	Due to the VAT exemption on financial sector, an FTT compensate the distortion effects caused by the non-presence of VAT;	Schulmeister (2014); Schulmeister (2009);
c) Collects Revenue	Based on low taxes and high volume of transactions, it is possible to gather revenue;	Burman, et al. (2016); Vlasenko (2016); Hemmelgarn & Nicodème (2010); Schulmeister (2009); Baker (2008); ECB (2004);

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[5] A type of a swap, were the credit exposure of a fixed income is transferred to one or more parties

d)	Reduce Excessive Trading	With a uniform FTT, the cost of transaction will be higher, reducing excessive trading (speculative transactions).	Schulmeister (2009); Habermeier & Kirilenko (2001); Tobin (1978);
e)	Stabilize Effect	Due to the exceeding exchange rates, stock prices, interest rates and commodities prices, the speculation over enterprises tends to rise causing a decrease in economic growth and employment, an FTT will have a stabilize effect in this issue;	Vlasenko (2016); Hemmelgarn & Nicodème (2010); Schulmeister (2009); Spahn (1996); Stiglitz (1989); Keynes (1936)
f)	Discourage High Frequency Trading	An FTT discourage certain type of order flows such as high frequency trading, by reducing the profitability;	Buckley (2012); Schafer (2012);
g)	Decrease attractiveness of some financial instruments	CDS (credit default swaps) tends to grow exponentially due to the low cost of market entry, with an FTT the attractiveness of these instruments decrease;	Schafer (2012);

Table 1 – Advantages of introducing an FTT

2.2.2 Key Counter Arguments of Financial Transaction Taxes

Concerning the counter arguments, literature presents several disadvantages that discourage the introduction of an FTT as described below: a) Negative impact on GDP; b) Liquidity reduction and decrease in short term trading; c) High tax burden; d) Distortionary and imprecise tool; e) Increase in cost of funding; f) Transaction migration; g) Financial crisis. Table 2 synthetizes the main disadvantages of introducing an FTT.

a) According studies from the EC (2013b) and considering the initial proposals from the EC, the imposition of an FTT can lead to a reduction in the GDP of countries. About 0.28% decrease in GDP (EC, 2013b) following the reviewed proposal and 2.42% decrease (Oxera, 2011) according the original proposal. Based on the EC own assumptions, the tax will not be efficient in collecting revenue, since more than half of the revenue will be lost due to the negative impact in other sort of taxes (Oxera, 2011). Even adjusting some assumptions to more favorable

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scenarios, there is a loss of almost 1% of GDP. For the EU-27 GDP, the EC(2013b) and Oxera (2012) estimates that the loss of GDP will be superior than the expected tax revenue collected with the tax;

b) Despite the reduction on speculative trading, due to the FTT transaction costs, with less market transactions (Darvas & Weizsacker, 2010) arises the problem of decreasing the liquidity of financial markets, because, although the tax restrains speculative trading it also restrains productive trading[6] (Burman et al, 2016; Tobin, 1972). According Habermeier & Kirilenko (2001), a decrease in the liquidity can lead to a reduction in market efficiency and contributes to an increase in the volatility. Summers & Summers (19a89) defends that restrains in short-term even in speculative trading, discourages more the positive than the negative feedback;

c) When leading with the distributive function of the tax, Deutsche Borse (2013) states that due to the cascade effects of the tax and despite the tax is levied in financial enterprises, the effective tax burden will be passed to the private households and business, not attaining the objectives of the tax (that is to tax financial transactions). Overall the tax will distort the financing forms and hedging instruments (Oxera, 2011) in the short-run;

d) Deutsche Borse (2013), states that the use of a FTT as a steering mechanism is highly imprecise and distortionary (due to the high tax burden). The nature of the tax cannot respond effectively to the demand of policy makers as a tool of avoiding speculative trading and systemic

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[6] due to the inability of the tax to distinguish the nature of trades (Deutsche Borse , 2013)

risk. Masciandaro & Passarelli (2012) showed also that regulation would be highly inefficient;

e) The introduction of a FTT will directly increase the cost of funding through equity (Darvas & Weizsacker, 2010), and so it will become more expensive as mean of funding relative to debt. For example, a 0.2% FTT is estimated to increase the cost of capital by 0.5% (Coelho, 2014), so overall transaction taxes reduce the supply of funds that are available, by increasing their costs (Summers & Summers, 1989);

f) Despite economic theory suggests that small tax rates do not cause large migratory movements (Raffer, 1998), the imposition of a FTT is an incentive to operate in financial centers that are not subject to the tax (ECB, 2004; Spahn, 1996). An example of a migratory trading volume movement, was in the Stockholm financial market with the adoption of a transaction tax, were due to the less costly brokerage services offered offshore there was a displacement to that areas (Habermeier & Kirilenko, 2003)

g) Overall, the imposition of a FTT increases market fragility (market distortion, increasing volatility and reducing liquidity), raising the odds of occurring a financial crisis (Wang & Yau, 2012).

Disadvantage	Description	Authors
a) Negative impact on GDP	Taking in consideration the structure of an FTT, it will have a negative impact on GDP growth	EC (2013b); Oxera (2012); Oxera (2011);
b) Reduction of liquidity and Decrease in short term trading	Despite the FTT restrict speculative trading, it will also cause a reduction on market liquidity, this because it raises the cost of capital and discourages investments; Due to the impact of an FTT being more pronounced in speculative strategies that involves high transaction volumes, the taxation of	Burman et al (2016); Cochrane (2013); Darvas (2010); Habermeier & Kirilenko (2001); Summers & Summers (1989); Tobin (1972);

		each transaction reduces the volume of transactions, especially in short term;	
c)	Higher Tax Burden	Due to cascade effects, there will be a higher effective tax burden;	Deutsche Borse Group (2013); Oxera (2011);
d)	Distortionary and imprecise tool	Due to the demand of policy makers for sustainable steering function, the FTT will be highly imprecise and distortionary;	Deutsche Borse Group (2013);
e)	Increase in Cost of Funding	With an FTT, the cost of financing (when using stock market) is more expensive, since it is needed to pay taxes when stocks are traded;	Coelho (2014); Darvas (2010); Summers & Summers (1989);
f)	Migration of Transactions	Due to the FTT, it causes a migration on transaction to other markets that are subjected to payment of FTT	ECB (2004); Habermeier & Kirilenko (2003); Raffer (1998); Campbell & Froot (1994)
g)	Financial Crisis	The imposition of an FTT will increase the market fragility and will probably increase the occurrence of a financial crisis;	Wang & Yau (2012);

Table 2 – Disadvantages of introducing an FTT

2.3 Country Experiences with a Financial Transaction Tax

Despite the concept of FTT started to gain more attention with the recent crisis that affected the world economy, several countries in the world had already introduced an FTT before of this financial event. In other way, there were other countries that due to the impact of the crisis in the country economy, decided to introduce this form of tax with the purpose of increase the welfare of their economy. It is presented below, several cases of countries that have experienced a FTT in their financial markets, before and after the crisis in a European context.

2.3.1 Swedish Case

In 1984 and due to the lack of regulation in financial markets and the "unjustifiable" high salaries of financial professionals (Umlauf, 1993), the government of Sweden chooses to tax domestic brokerage services, extending

after to fixed income securities market with a 0.5% tax each round (purchase or sale) and a 0.002% tax on fixed income (PWC, 2013). The brokerage services had the responsibility of collecting the tax. Some financial instruments such as warrants and forward rate agreements were exempted.

With the purpose of regulating the financial services, Umlauf (1993) found no evidence that the volatility in financial markets decreased with the introduction of this sort of tax. To worsen, the imposition of the tax leaded to a migration of market transaction to other stock exchanges, mainly to the London Stock Exchange (Umlauf, 1993), causing a decrease of 2.2% in the Swedish All-Equity indices (Habermeier & Kirilenko, 2003).

In the year of 1985, the total tax revenue collect was about SEK 1.17 billion and in 1986, after the tax rate being reviewed from 1%[7] to 2%, the collected revenues reached a level of SEK 4.01 billion, meaning that a 100% increase in tax rate resulted in a 22% increase in revenue (Habermeier & Kirilenko, 2003; Campbell & Froot, 1994; Umlauf, 1993).

In 1991, the FTT was abolished from Sweden mainly due to the disappointing level of revenues collected (only 3% from the forecasted revenues) and due to the general avoidance of taxes through the migration of transaction to other market exchange and off-shores (Habermeier & Kirilenko, 2001).

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[7] Full round – purchase and sale

2.3.2 French Case

Introduced in 2012[8], with the purpose to increase public revenue and to regulate the market (Coelho, 2014), it was agreed to introduce a FTT with incidence in equity from companies that have a market capitalization higher than 1000 million euros (PWC, 2014), in HFT and in CDS, adopting a tax rate of 0.2%, 0.01% and 0.01% respectively (Credit Suisse, 2013). Despite the introduction of this tax, there were some financial instruments that were exempted from the payment of this sort of tax, instruments such as convertible bonds, primary market transactions, deposit securities, transactions inside the same economic group and temporary transactions.

With the adoption of the tax, it was verified a large decrease in the volume of French securities traded, while at simultaneously the volume of non-French securities traded have risen. According to the Deutshe Borse (2013), the French government was forced to review the estimations of the tax revenues collected from 1.6 billion euros to 300 million euros. TAAB Group (2013) reported that this sort of tax had limited impact on the equity traded volume, were the market fell from 17.3% in 2011 to 15.3% in 2012.

In what concerns the impact that the FTT had in the volatility, the conclusions are mixed, because Credit Suisse (2012) states that this tax led to a more volatile indice on the effective date, on the other side Becchetti et al. (2013) states that the french FTT has reduced intraday volatility.

Overall the introduction of this tax did not work as the way previewed, since the effective tax revenue collected was lower than the expected,

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[8] Approved in March 2012 by the French parliament and implemented in 1st of August 2012

approximately 200 million euros (Crouzel, 2013), and in a perspective of raising equity it turned out to be more expensive to use as a tool of financing companies because getting a loan by appealing to equity was more expensive.

2.3.3 Italian Case

Adopted on March 2013, the FTT was introduced with the purpose of increasing revenue and regulate financial markets (Coelho, 2014). For this reason, all the transaction shares that were issued by Italian resident companies with a capitalization equal or higher than 500 million euros, were subject to pay a 0.1% tax on equity, 0.02% on OTC[9] transactions and 0.02% on other type of operations (Sarmento, 2014). Despite the scope of the tax, there were some financial instruments that were exempted from the payment of the tax, the case of pension funds, social security entities and liquidity contract transactions.

With a tax incidence in equity, CDS, HFT and derivatives, the responsibility of collecting the tax revenues was imputed to the financial companies that were involved in the transactions. Ensuring in 2013 to collect approximately 160 million euros (Vlasenko, 2016).

With the adoption of this tax, the financial market registered a decrease in the volume of transactions, especially OTC market, (Capelle-Blancard, 2017). In PWC (2013) report and Coelho (2014) is evidenced that the decline in trading volume is more severe than in the French case (TAAB Group, 2013), much due to the wider scope of the tax. According to data collected

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[9] Consist in securities that are traded on contexts that are different from the formal exchanges such as Euronext, NYSE. It refers to stocks, debt securities or other financial instruments that normally are traded via a dealer network, meaning that they are not traded on a centralized exchange

from Reuters, the Italian average daily turnover felt by approximately 38%, between the beginning of 2013 and March 2013 (PWC, 2013). From data collected from the Borsa Italiana, it is verified that the turnover felt by 16%, a different value reached by the TAAB Group (PWC, 2013).

Overall this shows that the implementation of this form of the tax did not have the expected return, since the revenue collected was lower than the expected and the measures adopted barely affect the market functioning (Capelle-Blancard, 2017).

2.3.4 Hungarian Case

Implemented in January 2013[10] and being the tax rates reviewed on August of that year, the tax was introduced because the country was not able to rely in some European institutions to recover from the financial crisis[11], proceeding to the bailout with the help of IMF (Citi Bank Group, 2013).

One imposition of the IMF was that the country needed to tax financial transactions, in order to collect revenues to support the funds obtained, and so it was adopted a tax with incidence in bank transfers, direct debits, deposits and cash withdrawals, giving exemptions only on transactions between the same owner's accounts and cash pooling[12]. Keeping the Hungary State Tax Authority, the responsibility of collecting the revenues from the financial services tax payments, (Citi Bank Group, 2013; PWC, 2013).

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[10] The Hungarian Financial Transaction Tax (FTT) was introduced by Act 116 of 2012 on financial transaction tax (the ″FTT Act″) as amended by Act 178 of 2012 (the ″Amendment Act″), with effect at 1st January 2013 - (Citi Bank Group, 2013)

[11] Hungary did not belong to the Eurozone and so it could not rely with some mechanisms that other countries from Eurozone have access

[12] Technique used by companies that allows to combine their debit and credit positions in various accounts into one account

It was adopted a tax rate of 0.6% on withdrawals, 0.1% for securities transactions, 0.01% for securities related derivative transaction, 0.3% on other type of operations and a cap of 20 euros that is applied in all transactions under the scope of the tax, except for withdrawals (PWC, 2013). Despite the efforts from the Hungarian government, the collected revenue is less than the revenue forecasted, forcing the government to adopt an additional FTT, that raises the tax rate in 208% in comparison to the initial FTT paid by financial institutions during the period of January – April 2013 (Fitch Ratings, 2013). The imposition of the transaction tax raised less revenues than the expected, gathering in the initial four months HUF 38.8 billion instead of the 82 billion predictable, and causing the migration of several companies to other countries with less tax incidence (PWC, 2013).

2.3.5 The UK case

The case of United Kingdom is slightly different from the rest of the world in matter of financial transaction taxes. In UK, instead of having a FTT, there is a stamp duty created in 1694 with the purpose of gather revenue for the crown as payment of the majesty services, such as protection. Several decades after, it was introduced a 0.5% stamp duty reserve tax (SDRT[13]) with incidence on equity, options and securities (Persaud, 2012) where the London Stock Exchange and UK central securities depository were in charge to collect the tax revenues (Persaud, 2012). Despite the introduction of and SDRT, there were several financial instruments that were exempted from the

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[13] Created and introduced under the Finance Act 1986 in order to guarantee that a tax equivalent to Stamp Duty would continue to be executed on transactions of uncertified shares

payment of this sort of tax, being the case of transactions that occur in the primary market, temporary securities transactions, treasury bonds and non-convertible debt securities.

According Saporta & Kan (1997) the British stamp duty is not on domestic consumption of trading services but a worldwide tax on ownership transfer of companies incorporated in UK, meaning, that regardless to the place where the transaction occurs the tax is paid by firms that are part of the economy (Persaud, 2012; Schulmeister, Schratzenstaller, & Picek et al, 2008).

In what concerns tax avoidance, the tax is designed to restrict the incentives that companies normally have, to escape the tax. Since the tax is applied for financial transactions of companies that are part of the economy, it cannot be avoided by trading overseas (Schulmeister, Schratzenstaller, & Picek, 2008; Saporta & Kan, 1997).

3. Methodology and Data

In this dissertation, the objective is to answer the question "What is the impact of adopting a financial transaction tax, in terms of tax revenue, for the European countries?". It is intended to estimate the impact that an introduction of an FTT can have when collecting tax revenues for several EU countries. To do that, we have collected **financial tax variables**[14] from several sources ("Ameco" for the GDP, "Bloomberg" for the historical data, European Commission for the directive tax and "Yahoo Finance" for the financial indices). Firstly, we created several scenario analyses, to simulate possible outcomes of tax revenues through the imposition of an FTT. Then, it

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[14] Due to scarcity of data available in the platforms, the financial information obtained is based on the most traded equity financial indices of each country

was collected daily data from January 2011 until December 2016, with a total of 1532 observations, with the main purpose of calculating the tax revenue and to proceed with the MC Simulation. At last, it was executed an Value at Risk test.

3.1 Variables

Since the intention is to study if the introduction of an FTT in the European Union will have a relevant impact in the tax revenues, we selected several variables that we consider crucial to the explanation of our research question.

Financial Indices – based in a selection of 21 countries in the European Union, that did not introduced an FTT until this date, we selected the principal equity indices of each country. The indices are: *ATX5, BEL20, BSE Sofix, CROBEX, Cyprus Main Market, PX, OMXC20, Tallin SE General, OMX Helsinki 25, DAX, EuroStoxx 50, Athens General, ISEQ Oeverall, Riga General, Vilnius SE General, AEX, WIG20, WIG30, PSI20, BET, SAX, IBEX35.*

Volume of Transactions – to forecast the tax revenue that an FTT could assemble, we collected daily and monthly data from January 2011 until December 2016. This variable is the total daily/monthly amounts of transactions (buy and sell) in the principal indices previously selected;

Indices Volatility – calculated in a daily/monthly based, the volatility of the indices is a significant tool to measure the sensibility of the financial indices to economic information and other external factors;

GDP – the country gross domestic product is a variable vital to measure the ratio between the transaction volume and the GDP and the ratio between the tax revenue and GDP;

3.2 Methodologies

3.2.1 Scenario Analysis

In our approach, we executed a basic scenario analysis. This type of approach consists in potential outcomes that can be achieved by changing some variables. In our case, the variables were different decreases in the volume of transactions, considering positive scenarios, negative scenarios and scenarios based in historical data.

The mainly advantage of choosing a scenario analysis, is that it helps to consider a wide range of possibilities of outcomes, from the most positive to the most negative outcomes.

3.2.2 The Monte Carlo Simulation

Usually applied to problems of optimization, numerical integration and probability distribution, this method consists in a computerized technique based in random variables and simulations that model the probability of different outcomes, which cannot be easily predicted, to happen. It simulates a wide range of outcomes and probabilities of occurring for any choice of action.

This procedure is considered a useable tool to account the risk inherent to quantitative analysis and decision making. The main advantage of this method can also be the main disadvantage, due to the fact that the assumptions need to be reasonable, in order to the output to be as good as the input. Another disadvantage is that this approach tends to underestimate the probability of extreme events, such as financial crisis, due to the inability to predict behavioral finance and the irrationality of the market participants.

The objective here is to, according the MC simulation and a central scenario, simulate the worst and best output that can happen. To ensure this, we will execute one thousand simulations, and draft a histogram graphic with the results obtained.

3.2.3 Value at Risk (VaR)

The value at risk is mainly a statistical technique that measures and quantifies the level of financial risk that exists in a firm or a portfolio, during a specific time frame. Since we are working with financial indices, it makes complete sense to evaluate the risk that is inherent to our financial data. The result of this procedure tells us the maximum losses that our portfolio could get, considering a confidence level of 95% or 99%.

We use VaR in order to calculate the potential losses in the value of the indices, predicting several scenarios of tax revenues with the introduction of an FTT. The great advantage of using this method is that the result is given in an absolute value or percentage that is very easy to interpret. But if the model has its advantages, it also has limitations, and the most prominent is that it can lead the analyst to a false sense of security, since even if the confidence interval is 99%, it is not 100%, and this 1% difference can be very significant. In the 2008 financial crisis some of the fragilities of this tool were exposed, such as the fact that it underestimated the occurrence of potential risk events (portfolios with subprime mortgages) and the underestimation of the magnitude of the risk incurred.

4. Analysis

4.1 Scenario Analysis results

Through a basic procedure of simulating scenarios, it was created a table (table 11 and 12 presented in the appendix), were it is presented the GDP and the transaction volume of financial indices of several EU countries. With this data, possible outcomes were simulated taking in consideration several scenarios and the EC directive tax of 0.1%. It was assumed in this table (11 and 12) that a country that can generate tax revenues higher than 5 million euros/year with the scenario of a 50% decrease in the volume of transactions is a stronger candidate for the introduction of an FTT.

For the time frame of 2011-2015 (table 11) and the time frame of 2016 (table 12) hypothetical scenarios were considered, namely, not reducing the volume; reducing in 10%; reducing in the same percentage that was verified in France when the FTT was introduced; reducing in the same percentage that was verified in Italy when the FTT was introduced; and reducing the volume in 50% (more negative but still plausible scenario). Note that, in the tables presented for the period of 2011-2015 and for 2016, there are several countries that, as a result of the decrease in the volume of transactions, did not see its tax revenue reaching 1million euros. Countries such as Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Latvia, Lithuania and Slovenia, present a low value of volume of transactions, such that the imposition of an FTT at a 0.1% level represent an even smaller value, resulting in a low percentage of the country GDP.

In other hand, the imposition of an FTT in countries such as Finland, Germany, Greece, Ireland, Netherlands, Portugal and Spain, represents a higher tax revenue, that are always higher than 6 million euros, even considering a 50% decrease in the volume of transactions.

For the remainder of our study, our sample is restricted to only 6 countries (Austria, Belgium, Germany, Finland, Portugal and Spain). The chosen countries were selected considering the robustness of their financial indices and for reflecting different financial welfare in the EU. Table 3 presents, for different time frames, the average transaction volume (considering daily data), the levels of indices volatility and the forecasted tax revenue at a 0.1% directive tax, with the assumption of an FTT not reducing the transaction volume.

Values in M€	Austria	Belgium	Germany	Finland	Portugal	Spain
AVG. Transaction Volume 2011-2015	6.36	16.79	836.13	52.16	268.94	385.88
AVG. Transaction Volume 2016	4.78	29.78	655.51	43.77	287.94	392.00
Tax Revenue (year) 2011-2015	1.54	4.06	202.34	12.62	65.08	93.38
TAX Revenue 2016	1.16	7.21	158.63	10.59	69.68	94.86

Table 3 – Tax Revenue considering historical data

The tax revenue was calculated considering the following equation:

$$Average\ daily\ transact.vol. * 244\ trading\ days * directive\ tax\ rate \quad (1)$$

The values presented in table 3 take as assumption the fact that the tax is implemented in all the E.U. countries at the same time, in order not to give rise to a massive capital migration, which has been enumerated as disadvantage in the literature review.

4.2 Monte Carlo Simulation results

The MC Simulation gives very useful data about the possible tax revenues collected. From daily data collected for six countries, and through the data analysis, 1000 random trials were generated taking in consideration the average and standard deviation of the historical data. The purpose was to evaluate three possible scenarios, considering a confidence interval of 95% and the normal distribution. After the 1000 trial simulation, we used

descriptive statistics in order to obtain a mean and the value of the other variables, with a confidence level of 95%.

The three forecasted scenarios mentioned before were made considering the mean obtain in the descriptive statistics. These scenarios were named as the "worst scenario", "central scenario" and "best scenario". To calculate the "worst scenario" we took the value of the mean[15] obtained in the descriptive statistics and subtracted the value of the confidence interval. Then we multiplied the value obtained for 244 days[16] and for the directive tax of 0.1% given by the EC. For the "central scenario", the procedure was similar but without subtracting the value of confidence interval in the mean. Finally, for the "best scenario", instead of subtracting the value of the confidence interval in the mean, we added the value. Table 4 represents the tax revenue obtained for the six countries considering the different scenarios.

Country	Worst Scenario	Central Scenario	Best Scenario
Austria	1.66 (0.00%)	1.71 (0.00%)	1.76 (0.00%)
Belgium	4.73 (0.00%)	4.87 (0.00%)	5.02 (0.00%)
Germany	195.28 (0.01%)	200.66 (0.01%)	206.04 (0.01%)
Finland	12.39 (0.01%)	12.78 (0.01%)	13.16 (0.01%)
Portugal	85.74 (0.05%)	89.46 (0.05%)	93.18 (0.05%)
Spain	93.07 (0.01%)	95.51 (0.01%)	97.96 (0.01%)

Table 4 – Forecast of the Tax Revenue in M€ (%GDP), through the MC Simulation

Through a brief analysis from the values presented in table 4, it is possible to see that for all the three scenarios, the tax revenue obtained is very low in terms of percentage of the GDP for each country. Despite the low values obtained, it is not a discriminatory factor since it is important to remind that

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[15] It represents the daily average volume of transactions
[16] Average yearly trading days

all values only consider the more active stock index in each country. With a more profound investigation, that can have access to all the financial instruments, it would be possible to reach a more certain forecast about the tax revenue in financial markets, resulting in even more reliable outputs. The values reached are accurate and despite being low values in percentage of GDP, they can be very significant when in need to assist a bailout or any other type of operations.

By other perspective, when not only considering the amounts of tax revenue collected and contemplating the advantages of and FTT presented in the literature review, the imposition of and FTT can generate welfares in the field of regulation and stabilization.

4.3 Value at Risk results

VaR is a method used with the purpose of quantifying the financial risks that are associated with specifics financial variables. Based on the values (historical or simulated) of a specific financial variable/portfolio, we calculate the average and standard deviation of the interval in study. With the computation of the variables mentioned above, it is needed to choose a confidence interval. After choosing the confidence interval and using an excel spreadsheet, it is done the VaR calculation trough the inverse function of the cumulative distribution and inserting the several parameters. For our study in specific, we chose a 95% confidence interval and a VaR at a 5% and 10% level.

$$T_i = \frac{\sum v_j}{i} \tag{2}$$

$$NormInv_i = (P; \bar{x}; \sigma_i) \tag{3}$$

$$aT_i = T_i * (NormInv_i + 1) \tag{4}$$

Where T represents the total transaction volume for a period i (i= 2011; 2012;...; 2016), v is the monthly (j) transaction volume, P represents the probability, $\bar{x}$ the average returns between the monthly transactions volume, σ represents the standard deviation of the transaction volume and aT_i represents the total volume of transaction considering the correction from the inverse of the normal function. We reach the VaR value by the difference from equation 4 and 3.

Taking the methodology mentioned above in consideration, we performed the VaR procedure, reaching the results that are presented in the tables 5 and 6. Table 6 presents the possible annual tax revenue considering the values reached in Table 5 and the table 16 presented in the appendix shows the value of the tax revenue "in risk" due to the VaR results.

Values in M€	Austria	Belgium	Germany	Finland	Portugal	Spain
VaR for 2011 - 2015						
1%	206,64	920,44	20.188,46	3.808,49	20.071,12	10.179,36
5%	128,78	637,40	13.384,70	2.520,54	10.901,53	5.942,27
VaR for 2016						
1%	229,02	492,81	21.833,71	3.177,19	36.919,47	15.791,92
5%	145,98	137,30	16.609,89	2.251,25	27.588,38	11.288,05

Table 5 – VaR in M€ of the average volume of transactions

Values in M€	Austria	Belgium	Germany	Finland	Portugal	Spain
VaR for 2011 - 2015						
1%	1,37	4,90	191,85	9,64	48,90	88,72
5%	1,45	5,18	198,65	10,93	58,07	92,96
VaR for 2016						
1%	1,71	7,15	146,63	6,34	38,90	84,95
5%	1,80	7,50	151,86	7,27	48,23	89,46

Table 6 – Annual tax revenue collected according the different levels of VaR

Through the tables above and table 15 and 16 (in the appendix), it is possible to observe the possible outcomes of tax revenue considering the confidence intervals of 99% and 95%. This results show that for example for the case of Portugal and considering the period of 2016 and a confidence

interval of 95%, the value at risk inherent to the transaction volume is 27 588.38 million euros where the annual tax revenue at risk is approximately 48 million. These comparisons can be done for all the other countries presented in the table. These results reflect the utility of this method, where considering several variables it is possible to estimate the losses with some degree of certainty.

5. Conclusion and Future Research

With the objective of finding and measuring the impact that an FTT would have in terms of tax revenue in some countries from the European Union, we used different methodologies approaches, in order to see if the results of all the methods converge. With the scenario analysis it was possible to have a general notion about the capacities of collecting revenues, with the Monte Carlo simulation, it was possible to forecast three types of scenarios and the tax collected from those scenarios. Finally, with the VaR method it was possible to know, according an confidence interval, the amounts of tax that were threatened with the imposition of an FTT and also the possible tax collected from the several countries.

Since Keynes envisaged the FTT concept in 1936, several were the discussions about whether a country should introduce this tax or not. From the different perspectives showed in the literature, as market regulation or migration of capitals, it is not possible to clearly state the impact that an FTT will have in the country economies. The success of this sort of tax is somehow subjective, since it does not depend strictly from financial factors, where external factor such as tax acceptance, consumption patterns, moral standards or investor behavior have a major role. Some countries have experienced

positive impacts and others did not found the experience with this tax so fulfilling.

In countries such as UK, the adoption of an FTT, despite some particularities of the structure of the tax, goes back from several centuries ago and it is nowadays still running. This is a country that has experienced a positive impact from this tax. Countries such as Sweden, Hungary, Italy and France, have experienced the other perspective and despite the different motivations that led to the implementation of and FTT, all of these countries suffered from decrease in the transaction volumes, migration of capitals and the general failure of goal of introducing an FTT.

Despite the several advantages and disadvantages of introducing an FTT, and even considering the experiences that countries had with this form of tax, at the first sight it would be impulsive to state that the adoption of an FTT would lead to negative results. These type of statements motivated this dissertation, because even considering the low tax revenue obtained in our trials and even with the historical tax revenues enumerated in the literature, it is not accurate to envisage an FTT with the exclusively perspective of revenues. There are functions of the tax that surpasses the revenue. There is a need to always keep in mind the handicaps of financial markets such as distortion effects and market deregulation that frequently occur. It was for this type of behaviors that this tax arose, in order to counteract them and seek financial efficiency.

Although this being the first study that considers at the same time several countries in the European Union and that have empirical and theoretical components, there is still a long way to go.

The first limitation was the lack of financial instruments data available to do prosecute with more elaborated calculus. Since the beginning of the dissertation, it was verified a scarcity of data to prosecute with more robust and meticulous analysis, such as information about HFT volume, ADR´s and other instruments. Other limitation was the lack of a wider time series. These two limitations together made impossible the creation of an econometrical regression. Finally, other major limitation was the fact that there is a gap of information about country experiences with this sort of tax, mainly due to the fact that not many countries introduced an FTT until the date of this dissertation.

It is for all the limitations mentioned before, that we consider this a pioneer dissertation and that there is so much do for future researches. With access to a wider time series and to more financial data it would be possible to implement other methodologies that could result in more accurate outputs. For all that is exposed in this dissertation, we invite researchers to prosecute with more exhaustive studies, where other methodologies can be adopted and also more information can be reached.

The usefulness of the FTT concept is almost undeniable but more investigations need to be conducted and wider perspectives need to be considered.

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Appendix:

Table 7 – Literature Review on FTT, theory studies
This table presents the literature review about the studies on FTT. Presenting different researches from different methodology's and conclusions of several authors about FTT´s and other similar instruments.
STET[17], FTT, GDP, DSGE, CTT, STT and HFT stand for securities turnover excise tax, financial transaction taxes, gross domestic product, dynamic stochastic general equilibrium, currency transaction tax, securities transaction tax and high frequency trading, respectively.

Authors	Methodology	Main Conclusions
Vlasenko (2016)	• Review of the purposes and benefits of FTT´s; • Creation and examination of a proposal of an FTT to be implemented in the EU;	• With the introduction of a FTT, will force the financial institutions to make fair and substantial contributions to member states government and to EU; • With the adoption of a FTT, and so a more coordinated FTT between the member states, will allow a more accurate regulation over the financial sector; • With the introduction of taxes on financial transactions, it will be possible to discourage high risk transactions and promote the stability of the financial markets; • It is possible to national governments and the EU to gather substantial revenues at lower costs;
Deutsche Borse (2013)	• Summary of the observations of the real impact in economy of the concepts and real economy ramifications that has not been given the sufficient consideration;	• FTT is not capable of achieving the necessary sustainable tax financing; • Effective tax burden will be higher than the nominal tax rate due to cascade effects; • FTT is a highly imprecise, inefficient and distortionary tool, not being capable to correspond to the demand of policy makers for a sustainable steering function, that tries to avoid speculative excesses and systemic risks;
Credit Suisse (2013)	• Review of an FTT, implementation in the EU countries and the countries that already implemented FTT´s; • Review of the impact in the Fund industry;	• The key factor when implementing an FTT is "who" is involved in the transaction and not where the transaction is carried out – known as the principle of establishment; • Any financial transaction is subjected to tax if it occurs in any member states of the EU – principle of issuance; • Buying fund units in the secondary markets is also considered a financial transaction, and so, it is subjected to taxation;
EC (2013a)	• European Commission (EC) rectification of the initial proposal FTT; • Study conducted by the EC based on observations that summarizes the flaws in FTT concept;	• There are three major functions of the introduction of an FTT: To gather revenue; To fairly distribute the tax burden; Steering Function; • Despite the main objectives of introducing an FTT, it is pointed the main reasons why an FTT will probably not succeed;
EC (2013b)	• Literature review based on the concept of FTT, previous studies about the impact of the introduction of FTT, macro-economic effects under enhanced	• The cost of the 2008 crisis is estimated to be 15% to 20% of the GDP of EU-27;

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[17] Low tax on every stock, swap or other trade

	cooperation and possible models to forecast the behavior of the implementation of FTT;	• The introduction of a common system of FTT at the global level is not possible, also introducing this system at EU-27 level was also not possible, it was implemented the third best solution, introduce the common system of FTT at the level of EU-11; • According to a DSGE model, it is estimated that, the adoption of a FTT will have a negative impact on GDP, about 0.28%;
PWC (2013)	• Literature Review, focused in the European Commission council directive and the impacts and arguments of adopting FTT;	• Arguments in favor of the EC proposal: Helps to recover from financial crisis, compensates the fact that financial markets are VAT exempted, reduces the profitability of some type investment behaviors such as HFT; • Arguments against the EC proposal: it will possibly have a negative impact on GDP, the fact that currently financial sector has a high tax burden, the incapability with some EU treaties, the ability that financial services have to pass the burden to final consumers and the negative impact on financial markets; • Impact on EU-11 financial markets: Equity markets, Sovereign and corporate debt markets, repo markets, money market funds, derivatives markets;
Schafer (2012)	• Through literature, the author describes the behavior of FTT in the markets, their behavior and benefits. It also takes in consideration the tax burden and trade activity; • The author also compares the case of UK with the Swedish case.	• After the implementation of FTT, savers for retirement should select the fund with less total costs; • Due to the specifications of FTT´s it can prevent financial crisis; • FTT causes a decrease in trading values, especially regarding the high frequency trading; • FTT is seen as an important tool that connects financial markets with real economy;
Vella (2012)	• Through literature, the author presents several facts that support the existence of a FTT, taking in special consideration the proposal of the European Commission; • Through the Euro-barometer survey, it was possible to conclude that 64% of people were in favor of an FTT and 81% were in favor of a tax on profits made by banks;	• FTT can possibly reduce the systematic risk and somehow prevent a future crisis; • The introduction of a FTT is a good measure to compensate for the implicit bailout guarantees that banks enjoy but most of the times do not pay and FTT is also good to correct some behaviors that contributed to the crisis of 2008; • Despite the benefits of FTT, the author states that there are other taxes superior to the FTT in achieving the goals mentioned above;
Buckley (2012)	• Theoretical Framework based on the creation of a reform in the regulation system;	• Taxes tends to mitigate growth in financial sector; • FTT is a much more broadly based tax than one just on currency, meaning that is more difficult to transact around and avoid;
Persaud (2012)	Through the European Commission studies and surveys the author reaches: • Perspective of the issues of revenues, tax avoidance and the economic impact of the introduction of an FTT; • How much it is possible to raise with an FTT;	• A 0,1% FTT on equity and bond, and a 0,01% tax on derivative transaction will gather approximately 9 billion pounds in UK and 48 billion pounds in Europe; • In "boom times", the result of an FTT incomes can be relatively lowered;

Masciandro & Passarelli (2012)	• Theoretical Framework based on a political economy argument for a general pollution problem	• The choice between regulation and taxation is made by looking at the externalities and distribution of costs; • Regulation is very likely to be too restrictive, while taxation is likely to be low; • Taxation tends to be less progressive than regulation, in some cases it can be regressive; • Majority of low-risk portfolio owners prefer regulation;
Oxera (2012)	• Review of the principal elements of the European Commission economic impact assessment; • Consideration about whether FTT is an efficient measure to gather public funds;	• FTT is not an efficient way of gathering public funds; • "To raise 1% of FTT tax revenue, the European economy is estimated to sacrifice 2% of annual GDP"; • For every €1 increase in annual tax revenue, there is a reduction of €10 in annual GDP; • In the long run, the potential impact of the FTT can be a reduction in annual GDP of 0.28%, without considering some other factor that can increase the impact; • The tax efficiency tends to deteriorate when the commission assumptions are adjusted to reflect more realistic scenarios;
Genschel & Schwarz (2011)	• Explains in what consists the baseline model - where two countries share one internationally mobile tax base; • Studies the tax mobility through the legal framework of taxation, considering that tax mobility and tax arbitrage differs across taxes; • Conceptual and empirical analysis about the fact that tax mobility may trigger tax cooperation and tax competition;	• Due to international tax arbitrage, it was possible to improve tax cooperation and tax competition; • In the future, there will be a slowdown of capital and corporate tax competition, due to the domestic constraints; • In the future, there will be a substantial rise in international tax cooperation;
European Commission (2011a)	• Proposal for a council regulation on the methods and procedure for making available the own resource based on the FTT;	• It is not presented conclusions, since the article presents the directives that member states need to have in consideration when leading with FTT;
European Commission (2011b)	• Amended proposal for a council decision on the system of own resources of the European Union;	• It is not presented conclusions, since the article presents a correction about the directives (articles) that member states need to have in consideration when leading with FTT;
Oxera (2011)	• Report considering the principal elements of Commission economic impact assessment and consideration of selected unintended consequences not included in the statement; • In the study is considered the deficiencies or gaps in the analysis that could change the conclusions of the assessment, for example economic models or relevant sources;	• Part of the tax burden will fall on direct and indirect owners of traded financial instruments (the end users of securities). FTT increases is passed from the financial institutions to end-investors; • In the way that the FTT is designed, it is likely to have a highly and uncertain negative impact on the economy of EU; • Taking in consideration the unintended consequences of the FTT it is uncertain if the tax is capable of gathering the expected revenue;
Hemmelgarn & Nicodème (2010)	• Discussion between tax policy and financial crisis, taking special consideration to the house bubble, executive compensations, securitization and tax arbitrage; • Relates the existent evidences with the tax policy;	• Taxes can influence the volatility of house market; • Tax incentives may have played an incentive in the development of the housing bubble, but is impact is difficult to measure;

	• The publication also summarizes some possible tax options to prevent future crisis, with focus on FTT as a way to follow;	• Risk taking behaviors possibly have been aggravated by tax provisions when considering executive compensation and by tax arbitrage possibilities across distinct types of investors; • The introduction of an FTT is not a recent idea, and is implementation would lead to a reduction in volatility and bring additional tax revenues, despite this conclusion, some studies also consider that an FTT would bring an increase in volatility;
Darvas & Weizsacker (2010)	• Realization of a poll in UK to evaluate the support of introducing financial transaction taxes; • Literature review to support the theoretical perspective; • Key question of the paper is "Should Financial Transaction be taxed?"; • Comparison of the stock market volatility for countries with and without FTT;	• Financial taxes discourage short term arrangements; • FTT increase the real cost of funding of the economies through the stock markets; • Should opt by a small *Pigouvian* financial transaction tax;
Schulmeister (2009)	• Summary of the six main arguments in favor and against FTT; • Summary about the usefulness of an FTT; • Revenue potential about a general FTT;	• Small FTT would mitigate price volatility not only in the short run but also in the long run; • FTT would yield a great amount of revenues; • Revenue raised by an FTT in Europe is about 1.6% of GDP, when using a tax rate of 0.05%;
Baker (2008)	• Description of what consists financial transaction taxes, through a briefly outline; • The article considers the revenue potential of an FTT, the basic design issues and the potential benefits; • Construction of a range of revenue projections based on extreme responses;	• A combination of a financial tax like the stamp tax on stock could raise significant revenue annually; • The applicability of such tax would be efficient since it would reduce the resources used by the financial sector and at the same time the effectiveness in allocating capital;
ECB (2004)	• Opinion of the ECB at the request of the Belgian Ministry of Finance on a draft law introducing a tax on exchange operations involving foreign exchange, banknotes and currency; • Literature review about the effectiveness of transaction taxes;	• The ECB comprehends that the rationale for the draft law are according the three main arguments for invoking such a tax: Excessive short-term trading; The tax is considered to have potential to gather revenue; Some variants of the tax have been proposed as instrument to prevent speculative attacks; • Literature reveals lack of evidence that Tobin tax (as a transaction tax) would reduce exchange rate volatility; • Lack of literature evidence that monetary and exchange-rate would benefit with such taxes; • Tax, raises transaction costs and create incentives to market participants to operate in financial markets that are not targeted with such a tax; • The tax is incompatible with the free movement of capital and payments between member states; • The ECB defends that such introduction of a tax is incompatible with the European Commission Treaty;

Habermeier & Kirilenko (2003)	• Examination of the finance research about the impact of securities transaction taxes on financial markets; • Presentation with literature support that transaction taxes have negative effects on price discovery, volatility and market liquidity in securities markets; • This paper studies the impact of transaction taxes considering four questions: "How important is trading? What causes price volatility? How are prices formed? How valuable is the volume of transactions?"	• Taxing financial transactions will not reduce the volatility due to the "noise" traders; • Transaction taxes cause volume fragmentation and so, it decreases the market efficiency and inefficient price discovery; • Major problems of implementing STT´s is that if an STT is applied in one market, but not in others there will be a migration of the volume of transactions for the other market; • Volatility Is explained by four components: public information, private information, transaction costs and other market frictions;
Nissanke (2003)	• Survey method to obtain the revenue potential of the CTT´s;	• The introduction of the euro had an impact in the foreign Exchange market turnover, by reducing him; • CTT is supposed to reduce the trade volume in short term, but is incapable to differentiate between noise trading and liquid trading; • CTT should be implemented cautiously, starting with a very low tax rate;
Joumard (2002)	• Overview of the features of tax systems in EU and some of the policy issued that have been raised; • Overview about: consumption taxes, income taxes,	• When leading to high tax wedges on labor market, it sometimes discourages the second earner of getting a job; • Low wage groups, older worker and spouses of low income earners, feels motivated to remain outside the labor market because of the tax and transfer systems; • If the tax burden on labor is reduced, it could probably increase labor supply and demand, resulting in a increase of the economic growth and employment;
Habermeier & Kirilenko (2001)	• Through the use of a framework based on the literature, it is showed that the volume migrates to assets that not suffer influence of taxes; • Arguments based in the Swedish experience;	• Prices, volatility and liquidity suffer negative effects due to transaction taxes or any kind of capital controls. Overall it contributes to the reduction of informational efficiency of markets.
Raffer (1998)	• Theoretical review about the proposal of James Tobin international financial tax Vs Keynesian ideas, government influence, international projects and the neoliberalism; • Summary of the results of the book edited by ul Haq et al (1996);	• The origin of the Tobin Tax goes back to Keynes, where he said that a transaction tax could improve the weight of long range fundamentals; • Tobin Tax is an instrument that enhances the autonomy of national economy policies and have has main objective distribute equally the tax burden; • Tobin Tax cannot serve as an instrument of disincentive of large scale speculation against currencies, but it can reduce interest arbitrage and the attractivity of small exchange rate changes, producing revenue; • With agreements such as Maastricht and Dublin, the EU centers in neoliberal policies thus excluding Keynesian policies; • Tax evasion is one of the arguments against Tobin Tax, defending that unless all countries impose a Tobin tax, transactions would move to tax havens; • Another major objection to Tobin Tax is the problem of administering taxation;

Spahn (1996)	• Finding an alternative to the Tobin Tax, taking in consideration the tax base; • Identifying taxable transactions, setting tax rates and distributing tax revenues	• Exchange surcharge allow smooth adjustments of exchange rates, avoid negative effects of some monetary policies and eliminates expectations of recurrent bailouts by central banks; • Exchange surcharge promotes stability and stability reduces the scope for price bubbles and false signals.
Campbell & Froot (1994)	• Analysis of the international experience with STT´s; • Provision of an overall framework for understanding in what consists an STT; • Considerations about the Swedish and British case;	• In the case of UK and Sweden, the introduction of transaction taxes reduced the overall trading, more accentuated in UK; • Migration of trading into offshore for the taxed securities, the effect in this case was more pronounced in Sweden than UK; • Migration of trading into local substitutes securities, in the case of UK the local trading of ADR´ (American Depositary Receipts) s and in Sweden the trading of forward contracts; • Demand for domestic equity brokerage is highly elastic, due to the facilities of trading abroad the own country, using foreign brokers instead of the domestic ones; • The UK stamp tax is more successful than the Swedish STT, since it taxes registration;
Summers & Summers (1989)	• Construction of a table that contains news events that could justify market movements; • Conducted a study that seek to compare stock price movements with movements in fundamental values; • Study about how to apply a STET, the exemptions and the impact of the measure.	• Taxes reduces market liquidity, that in consequence discourage investment and an increase in risk borne by the owners of capital; • Transaction taxes can have as consequence the reduction of supply funds available for investment, because of the increase in the costs of investment; • STET can work in modern financial economy without overwhelming distortions and without "injure" national securities.
Stiglitz (1989)	• Through the example of practical problems, the author explains the consequences of applying a financial tax in the economy – A turnover tax;	• Turnover taxes will probably increase the efficiency in economy and may also enhance the efficiency in stock markets; • Turnover tax will probably not increase volatility but might well reduce it;
Tobin (1978)	• Presentation about the basic problem of exchange rates and exchange markets – the problem of inter currency – the excessive international mobility of private financial capital;	• A basic problem are the goods and labor moves; • International difficulties in reliance on monetary policy in floating rate regime; • Governments cannot be indifferent to changes in the values of their currencies in exchange markets
Keynes (1937)	• Theoretical framework about wealth, interest rates, outputs, inputs, distribution of income, propensity to spend, that tries to differ from the traditional theory; • The name of the publication is "Theory of Employment" because it explains in any circumstances, employment is what it is; • Presentation of arguments against the orthodox theory;	• Consumption expenditure is constituted by the level of income and the people propensity to spend; • Investment is the basis of the level of output and employment; • The amount of goods consumed depend in the amount of the amount that is invested in the production of that goods;

Table 8 – Literature Review on FTT, empirical studies

This table presents the literature review about an FTT, by different perspectives and mathematical models, the authors study the introduction of FTT´s in different economies, in order to evaluate the effects of an FTT, revenues, tax burden, and others.

OTR stands for order to trade ratio.

Authors	Period	Country/Region	Methodology	Dependent Variable	Independent Variable	Main Conclusions
Capelle-Blancard (2017)	2010 - 2013	Italy	• Generalized version of difference-in-difference method (DiD); • Performed a test of regression discontinuity design (RD)	• V_{it} – Market Liquidity/Volatility for firm i, day t; • $V_{i,t}$ – trading value; • $T_{i,t}$ – Turnover ratio; • $ES_{i,t}$ – estimated spread; • $LR_{i,t}$ – Liquidity ratio; • $R_{i,t}$ – continuously compounded return; • $R_{i,t}$ – continuously calculated return; • $SR_{i,t}$ – Squared return; • $Conditional\ variance_{i,t}$ • $HLR_{i,t}$ – high-low range; • R – fiscal revenue;	• D_i – firm dummy variable; • D_t – time dummy variable; • OTR_{it} – dummy variable for Italian firms after the introduction of the OTR on April 2012; • STT_{it} – dummy variable for large Italian firms after the introduction of the STT on March 2013; • FTT_{it} – dummy variable for large Italian firms after the tax was extended to derivatives on September 2013; • ε_{it} - is an error term; • $\alpha_3, \alpha_4, \alpha_5$ – measure the impact of OTR, STT and FTT on liquidity and volatility;	• Measures such as STT and OTR have barely affected the market functioning. • With the estimations done, it was showed that the tax measures have no net impact on the bid-ask spread or the liquidity ratio, and a residual negative effect on volatility; • The conclusion from this paper is not only applied to the Italian case, since it is not based on specific elements of the Italian stock market, where based on previous studies, the conclusions are similar to the French case; • It is reasonable to state that similar FTT levied on other countries will produce the same effects;

					P_{it} – closing price for stock i on day t; $MV_{i,t}$ – market value of stock i at close of market on day t; $NBST_{i,t}$ – number of shares traded in stock i, on day t; $NOSH_{i,t}$ – total number of ordinary shares of stock i, on day t; $NOSHFF_{i,t}$ – the percentage of available shares to ordinary investors of stock i, on day t; $PH_{i,t}$ – highest price achieved for stock i on day t; $PL_{i,t}$– lowest price achieved for stock i on day t; $GARCH$ (1,1) B – Fiscal base; τ – nominal tax rate; V– total traded value; δ – global exemption rate;	

Burman et al (2016)	2014	USA	• Through a dynamic distributional estimation based on actual FTT revenues, it was made an estimation that reflects the behavioral responses of traders to tax; • An alternative was made, through the estimation of the FTT under the assumption that an FTT is borne entirely by financial wealth;		• Stocks; • Bonds; • Option premiums; • Foreign Exchange spot transactions; • Underlying notional of equity and futures; • Interest rate swaps;	• At a base rate of 0.34% an FTT could raise at maximum 0.4% of GDP; • Revenues from FTT are procyclical; Creation of a FTT lead to decrease in the asset value; • FTT is seen as a second-best solution in terms of potential taxes, considering economic costs, benefits, fairness and cost of administration and compliance; A FAT or VAT can be more effective and less distortionary;
Coelho (2014)	2012 - 2013	France and Italy	• Basic partial equilibrium model of the impact of a proportional transaction tax on asset valuation; • Based on Fama and French (2003) it is created a Difference in differences augmented CAPM to estimate the value and turnover elasticity of stock to the tax rate as a proportional increase of transaction costs; • Based on survey estimates from the Committee of European Securities regulators;	• $V(0)$ – tax inclusive price of a share to the buyer after implementation; • $R = r-g$; • r_{igt} - Price return on security i of group g on date t; • $\epsilon_{platform}$ - Platform shifting elasticity; • $\epsilon_{anticipation}^{OTC}$- Anticipation response elasticity OTC; • $\epsilon_{anticipation}^{FTT}$- Anticipation response elasticity FTT; • Observed overall lock-in; • $\epsilon_{derivative}$- Derivative elasticity; • $ILLIQ_{i,t}$- Average daily price impact of order flow; • τ^*- Optimal tax rate;	• N – number of periods; • g – dividend growth rate; • r – discount rate; • i – security/asset; • g – group of assets; • t – date; • r_{mt} - Market return; • s– event; • γ_{igt}- Abnormal return caused by the event s for asset i; • HFT_{Share} – High frequency trading of shares; • HFT_{MTR} – High frequency trading of MTR; • "FTT" – non HFT trading volume; • R_{iyd}- Daily absolute return on the stock;	• Huge differences in timing between OTC, sharp lock-in effect of HFT and big divergences of trading across platforms to exploit tax arbitrages; • Equity is relatively more expensive than debt when relating to the way of funding, but only because of this, it is not expected that large firms in France will restrain investments; • An increase in the FTT would lead to an increase in the cost of capital, due to the relation between required rates of return and transaction costs;

					• $VOLE_{iyd}$ - Trading volume in €; • D_{iy} - Days for which data is available for stock i in year y; • ϵ - Elasticity of nominal volume transacted with respect to a change in the net of tax rate;	
Wang & Yau (2012)	2007 – 2008	United States of America	• Simple equation model that estimate the different variables (e.g. elasticity, post tax volume, etc); • Two equation structured model;	• R – Revenues; • TR%TC - transaction tax revenue as a percentage of the total fixed transaction costs (TR%TC); • 0.02 percent trans- action tax revenue on the S&P 500 futures transactions based on the notional value; • PTV – Post tax volume; • ΔTV - change in trading volume; • PTR – Post tax revenue;	• τ - Flat tax rate; • P – volume-weighted average price level; • Q – Quantity of transactions; • Δ - Change in variables; • OR – other government revenues; • S&P 500 futures transactions based on the notional value; • TFC – total fixed transaction cost; • TV – trading volume; • Contract; • Average Yearly Price (2010); • Post Tax Revenue Naïve Method ($)a; • Post Tax Revenue Elasticity Adjusted ($)b;	• The impact of a FTT on market, determine the potential of such tax on gathering revenues for the government; • The current estimated elasticity of trading volume is higher than the elasticity referred in the literature; • Transaction tax increases costs while trading volume reduce them; • Imposition of a FTT will increase market fragility and will probably increase the possibility of a financial crisis; • Trading volume of S&P 500 index futures is very sensitive to changes in transaction costs; • The magnitude of the impact in the PTV depends on the importance FTT to the total fixed cost and/or the elasticity of trading volume with respect to transaction costs on each future; • The impact of an FTT on transaction costs varies with the types of futures;

						• The transaction cost estimated by the PTV or by an implausible elasticity can overestimate the potential of tax revenue;
Schulmeister (2012)	1999 - 2012	European Countries	• The author, based on a Moving Average models present several arguments in favor of a general FTT; • Based on literature the author presents several objection and counterarguments about FTT;	• Growth rate of interest rate on Italian Government Bonds and CDS premium; • Growth rate of interest rate on Greek Government Bonds and CDS premium; • Growth rate of Stock Prices in Germany, UK and USA; • Growth Rate of Dollar Exchange rate and oil price;	• US $ per barrel; Germany Stock Prices; • UK Stock Prices; • USA Stock Prices; • Oil Price; • Oil Futures; • Daily dollar/euro exchange rate; • CDS premium; • Greek Bond Rates; • Italian Bond Rates; • Spanish Bond Rates; • French Bond Rates; • German Bond Rates; • World GDP;	• Financial markets cannot produce systematically wrong price signals; • The implementation of FTT is not a question of technical problem but a question of getting out of a theoretical paradigm to a more realistic worldview.
Alesina & Passarelli (2011)	2011	World	• It is elaborated a model that following some prepositions represent the activity that produces negative externalities;	• C - cost function; • $\varepsilon(b_i)$ - externality produced by the individual with behavior b_i;	• t_i - individual i; • b_i - behavior of individual i; • ρ - rule;	• A tax cannot be too restrictive when a rule is too permissive; • Depending on the impact of a tax, namely how it affects the behavior

			• Through a equilibrium model based on utilities, it is study the majority vote equilibrium when the policy instrument is a compulsory rule;	• G(b) - cumulative distribution of behaviors; • Ui - utility of individual; • F(t) - cumulative distribution of types; • W(ρ) - sum of all players utilities; • Υ(g) - individual utility from a public good;	• tm - median type; ρ*m - bliss point; • τ - quota; • g - public good; • μ - proportional tax;	of high and low types, a tax can be too restrictive if a quota is too permissive; • Regarding to policy tools, the median voter most of the times do not chose the efficient level of policy instruments; • When regulation is chosen, it is always more restrictive compared to taxation; • When majorities have the opportunity to choose the policy instrument, they would not necessarily choose the most efficient;
Saporta & Kan (1997)	1997	UK	• The paper investigates the effects of stamp duty in terms of level and volatility of equity prices; • The paper has two major contributions: It considers the effect of stamp duty on equity prices and conducts an empirical investigation of the effects of stamp duty on UK equity volatility;	• R_t^{us} - underlying adjusted ADR; • R_t^{*as} - foreign adjusted ADR return on stock s at the end of week t; • y_t - compounded returns series;	• ε_T^S - white noise; • u_t^s - disturbance, MA(1); • d_0 - constant; • τ_t - stamp duty rate; • h_t - conditional volatility of the innovations;	• Changes in the rate of stamp tax have been followed by significant changes in UK equity index; • If the stamp-duty is reflected in price, it is expected that returns on ADRs would be lower than their pre-stamp duty expected returns on underlying shares;

Table 9 – Countries experiences on FTT
This table presents a summary about the FTT in the different countries in Europe, enumerating the year of introduction, the reasons why it was introduced an FTT, their tax incidence, the passive subject (the entity in charge of collect the tax), the respective tax rate in the countries from the different instruments and the exemptions that are given in each country. SDRT, SDLT and OTC stand for stamp duty reserve tax, stamp duty land tax and over the counter respectively;

Countries	Year of Introduction	Reasons	Tax Incidence	PS	Tax Rate	Exemptions
Sweden	1984	• Concern about "high salaries" on financial professionals; • More regulation in financial markets;	• Equity; • Bonds; • Derivatives;	• Brokerage services;	• 1% (purchase and sale); • 0.002% to fixed income; • 2%	• Warrants; • Forward rate agreements;
France	2012	• Increase public revenue and for market regulation;	• Equity from companies with market cap. Higher than 1000 million euros; • HFT; • CDS;	• Tax paid by the financial broker;	• 0.2% for equity; • 0.01% to HFT • 0.01% to CDS	• Convertible bonds; • Primary market transactions; • Deposit securities; • Transaction inside the same economic group; • Temporary transactions;
Italy	2013	• Raise revenues and regulation of the market;	• Equity; • CDS; • HFT; • Derivatives;	• The financial company that is involved in the transaction;	• 0.1% on equity; • 0.02% on OTC transactions; • 0.02% in other operations;	• Pension funds and social security entities; • Liquidity contract transactions;
Hungary	2013	• Financial bailout of the IMF, due the country not belonging to the euro zone, the country cannot rely in some European institutions;	• Bank transfers; • Direct Debit; • Deposits; • Cash Withdrawals;	• Tax paid in a monthly basis by the financial services to the Hungary State Tax Authority;	• 0.6% on withdrawals; • 20€ tax for each transaction; • 0.1% for securities transactions; • 0.01% for securities related derivative transaction; • 0.3% for other operations;	• Movements between same owner accounts; • Cash pooling
United Kingdom	1694 – Stamp Duty; 1986 - SDRT;	• Initially the purpose was to gather revenue for the crown, as payment of the majesty services;	• Equity; • Options; • Securities;	• London Stock Exchange and UK central securities depository;	• 0.5%;	• Transactions in the primary market; • Temporary securities transactions; • Treasury bonds; • Non-convertible debt securities;

Table 10 – Major features of selected financial transaction taxes and the proposal from the European Union

	United Kingdom (Current)	France (Current)	Sweden (Repealed)	Italy (Current)	Hungary (Current)	Proposed Taxes: European Union
Tax determined by:						
Residence of issuer	Yes	Yes	No			Yes
Residence of buyer/seller	No	No	No			Yes
Location of transaction	No	No	Yes (brokerage)			No
Tax rate (%)[18]						
Equities	0.5%	0.2%	1.0%[19]	0.1%	0.1%	0.2%
Debt	N/A	N/A	0.002%	N/A	N/A	0.2%
Currency	N/A	N/A	N/A	N/A	N/A	N/A
Derivatives	N/A[20]	N/A	2%[21]	0.02%	0.01%	0.02%
Value	N/A	N/A	Premium Price			Notional Value
Tax on original issuance?	No	No	No			No
Tax on secondary markets?	Yes	Yes	Yes			Yes
Market Makers included?	No	No	Unknown			Yes
Government debt included?	No	No	Yes			Yes
International coordination?	No	No	No			Yes

[18] The tax represents the total combined rate on both buyers and sellers

N/A – Not Applicable

[19] The tax rate was reviewed in 1986 from 1% to 2%

[20] The UK stamp duty taxes derivatives at 0.5 percent only for stock options that are exercised and physically settled

[21] This tax rate is only applied on stock options

Table 11 – Scenario Analysis, of a introduction of an FTT for the period of 2011-2015, taking in consideration the EU directive tax of 0.1%, in the principal financial market indices, considering different impacts (decrease) in the volume of transactions. All values presented in million €

Countries	GDP Average 2011-2015	Revenue with no Vol. Decrease	Revenue with 10% Vol. Decrease	Revenue with Vol. Decrease equal to France – 20%	Revenue with Vol. Decrease equal to Italy – 16%	Revenue with Vol. Decrease of 50%
Austria	323 720.02	1.58	1.42	1.26	1.35	0.79
Belgium	393 894.80	4.29	3.86	3.43	3.69	2.15
Bulgaria	42 659.90	0.09	0.08	0.07	0.08	0.04
Croatia	43 790.74	0.03	0.02	0.02	0.02	0.01
Cyprus	18 504.16	0.61	0.55	0.49	0.52	0.30
Czech Republic	161 368.62	30.65	27.59	24.52	26.36	15.33
Denmark	259 643.30	212.04	190.83	169.63	182.35	106.02
Estonia	18 700.52	3.41	3.07	2.73	2.93	1.71
Finland	202 997.00	0.00	0.00	0.00	0.00	0.00
Germany (DAX)	2 848 874.00	0.01	0.01	0.01	0.01	0.00
Germany (EuroStoxx50)	2 848 874.00	0.11	0.10	0.09	0.09	0.05
Greece	186 505.02	13.64	12.27	10.91	11.73	6.82
Ireland	195 601.34	17.17	15.45	13.73	14.76	8.58
Latvia	22 618.34	25.53	22.98	20.43	21.96	12.77
Lithuania	34 709.23	18.38	16.54	14.70	15.81	9.19
Netherlands	656 076.00	0.01	0.01	0.01	0.01	0.01
Poland (Wig20)	401 071.04	0.19	0.18	0.16	0.17	0.10
Poland (Wig 30)	424 268.40	6.66	6.00	5.33	5.73	3.33
Portugal	173 483.46	3.02	2.72	2.42	2.60	1.51
Romania	144 278.24	68.97	62.07	55.17	59.31	34.48
Slovakia	74 426.51	0.64	0.58	0.51	0.55	0.32
Slovenia	36 943.66	5.17	4.65	4.14	4.45	2.59
Spain	1 049 693.80	98.90	89.01	79.13	85.05	49.5

Table 12 – Scenario Analysis, of a introduction of an FTT for the period of 2016, taking in consideration the EU directive tax of 0.1%, in the principal financial market indices, considering different impacts (decrease) in the volume of transactions. All values presented in million €

Countries	GDP 2016	Revenue with no Vol. Decrease	Revenue with 10% Vol. Decrease	Revenue with Vol. Decrease equal to France – 20%	Revenue with Vol. Decrease equal to Italy – 16%	Revenue with Vol. Decrease of 50%
Austria	349 493.00	1.94	1.75	1.55	1.67	0.97
Belgium	421 974.00	7.64	6.87	6.11	6.57	3.82
Bulgaria	47 364.07	0.06	0.05	0.05	0.05	0.03
Croatia	45 557.09	0.03	0.03	0.03	0.03	0.02
Cyprus	17 901.40	0.62	0.56	0.50	0.54	0.31
Czech Republic	174 410.40	0.91	0.82	0.73	0.79	0.46
Denmark	276 805.30	3.85	3.47	3.08	3.31	1.93
Estonia	20 916.43	0.11	0.10	0.09	0.10	0.06
Finland	214 062.00	9.52	8.57	7.62	8.19	4.76
Germany (DAX)	3 132 670.00	24.74	22.27	19.79	21.28	12.37
Germany (EuroStoxx50)	3 132 670.00	168.47	151.62	134.77	144.88	84.23
Greece	175 887.90	21.34	19.20	17.07	18.35	10.67
Ireland	265 834.80	25.72	23.15	20.58	22.12	12.86
Latvia	25 021.33	0.01	0.01	0.01	0.01	0.00
Lithuania	38 631.03	0.14	0.12	0.11	0.12	0.07
Netherlands	697 219.00	27.37	24.64	21.90	23.54	13.69
Poland (Wig20)	424 268.40	6.68	6.01	5.35	5.75	3.34
Poland (Wig 30)	424 268.40	9.52	8.57	7.61	8.19	4.76
Portugal	184 931.20	75.81	68.23	60.65	65.20	37.91
Romania	169 577.10	7.27	6.54	5.81	6.25	3.63
Slovakia	80 958.00	0.00	0.00	0.00	0.00	0.00
Slovenia	39 769.08	0.01	0.01	0.01	0.01	0.00
Spain	1 113 851.00	100.74	90.67	80.60	86.64	50.37
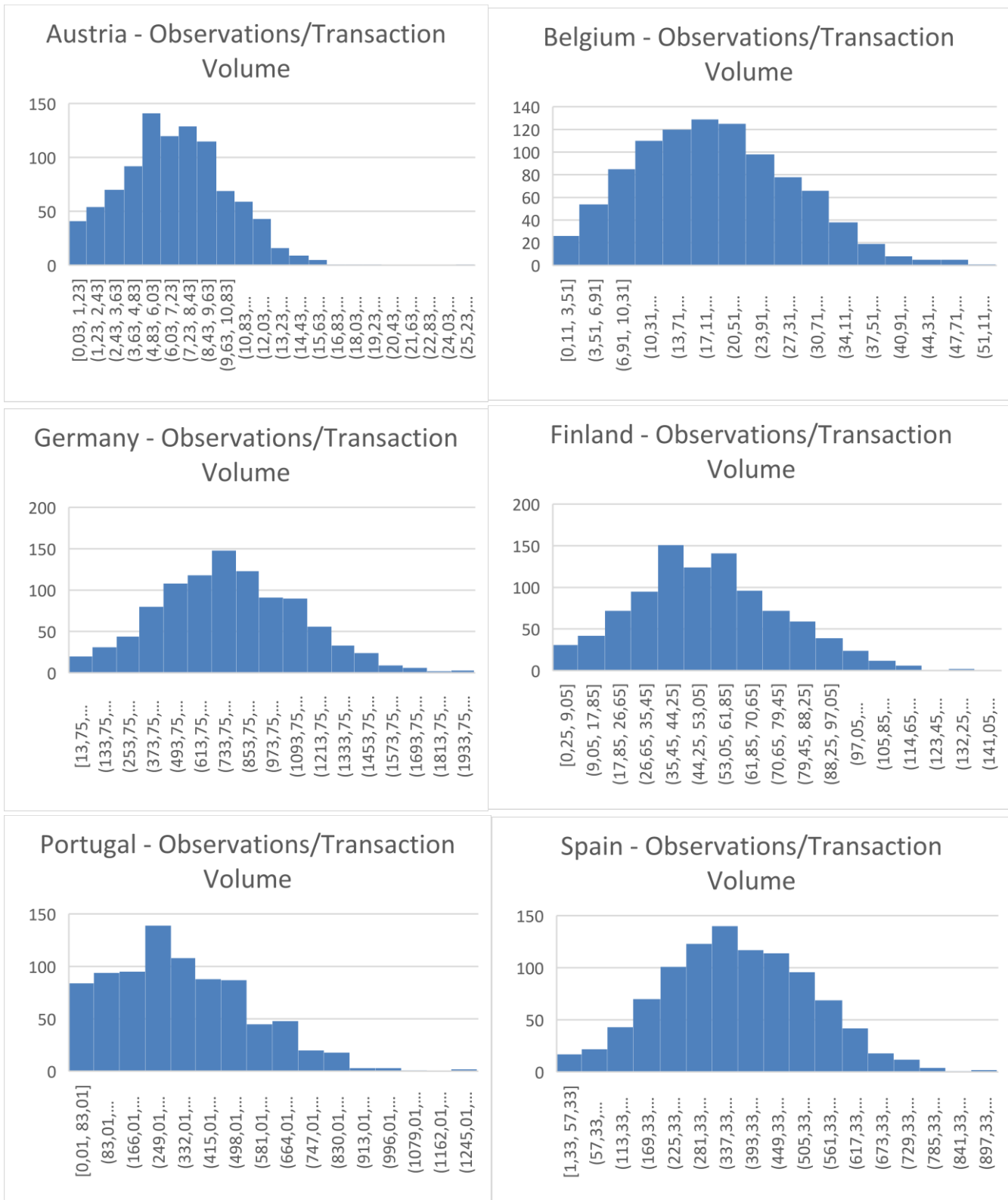
Table 13 – Monte Carlo Simulation for the six countries selected

Column1 - Austria		Column2 - Belgium		Column4 -Finland	
Mean	7,004562231	Mean	19,97752869	Mean	52,36286783
Standard Error	0,111047035	Standard Error	0,310861989	Standard Error	0,800043995
Median	6,891801143	Median	19,59803274	Median	50,87475463
Mode	0,152532669	Mode	7,1068573	Mode	17,90255041
Standard Deviation	3,453187851	Standard Deviation	9,666758256	Standard Deviation	24,87866698
Sample Variance	11,92450633	Sample Variance	93,44621517	Sample Variance	618,9480707
Kurtosis	0,603263921	Kurtosis	-0,190509564	Kurtosis	-0,06267777
Skewness	0,392045446	Skewness	0,351772976	Skewness	0,346801694
Range	25,93215008	Range	52,98906663	Range	141,1993206
Minimum	0,033399004	Minimum	0,114956687	Minimum	0,25485442
Maximum	25,96554909	Maximum	53,10402331	Maximum	141,454175
Sum	6773,411678	Sum	19318,27024	Sum	50634,89319
Count	967	Count	967	Count	967
Confidence Level(95,0%)	0,217921231	Confidence Level(95,0%)	0,610042648	Confidence Level(95,0%)	1,57002456

Worst	6,786641	Worst	19,36748604	Worst	50,79284327
Central	7,004562231	Central	19,97752869	Central	52,36286783
Best	7,222483462	Best	20,58757133	Best	53,93289239

Column3 - Germany (EuroStoxx 50)		Column5 - Portugal		Column6 - Spain	
Mean	822,3676129	Mean	366,6327054	Mean	391,4547592
Standard Error	11,23156964	Standard Error	7,764280536	Standard Error	5,10715372
Median	802,7080837	Median	335,8302579	Median	384,9427197
Mode	187,7307913	Mode	570,8817192	Mode	126,9655504
Standard Deviation	352,6784405	Standard Deviation	224,3594964	Standard Deviation	160,7739778
Sample Variance	124382,0824	Sample Variance	50337,18362	Sample Variance	25848,27195
Kurtosis	-0,02273199	Kurtosis	0,114931344	Kurtosis	-0,213358469
Skewness	0,238167573	Skewness	0,589938483	Skewness	0,129429939
Range	1996,430413	Range	1265,567703	Range	920,0593882
Minimum	13,74960005	Minimum	0,012934561	Minimum	1,327760753
Maximum	2010,180013	Maximum	1265,580638	Maximum	921,387149
Sum	810854,4663	Sum	306138,309	Sum	387931,6664
Count	986	Count	835	Count	991
Confidence Level(95,0%)	22,04055477	Confidence Level(95,0%)	15,23982686	Confidence Level(95,0%)	10,02209001

Worst	800,3270581	Worst	351,3928785	Worst	381,4326692
Central	822,3676129	Central	366,6327054	Central	391,4547592
Best	844,4081677	Best	381,8725322	Best	401,4768493

Table 14 – Descriptive statistics for the six countries selected

% of Transaction Volume	Austria	Belgium	Germany	Finland	Portugal	Spain
VaR for 2011 - 2015						
1%	13,12%	15,82%	9,52%	28,31%	29,10%	10,29%
5%	8,17%	10,96%	6,31%	18,74%	15,81%	6,01%
VaR for 2016						
1%	11,79%	6,45%	12,96%	33,37%	48,70%	15,68%
5%	7,52%	1,80%	9,86%	23,64%	36,39%	11,20%

Table 15 – VaR in % of the total transaction volume

Values in M€	Austria	Belgium	Germany	Finland	Portugal	Spain
VaR for 2011 - 2015						
1%	0,21	0,92	20,19	3,81	20,07	10,18
5%	0,13	0,64	13,38	2,52	10,90	5,94
VaR for 2016						
1%	0,23	0,49	21,83	3,18	36,92	15,79
5%	0,15	0,14	16,61	2,25	27,59	11,29

Table 16 – Amount of tax revenue "in risk" considering the VaR values