

Securities Transaction Tax in Europe: First Impact Assessments[◇]

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This study proposes a global impact assessment of the securities transaction taxes introduced in France in 2012 and Italy in 2013. Recent empirical evidence shows that this tax coincided with a decrease in traded value, but had no impact on market liquidity or volatility.

1. Introduction

The idea to tax financial transactions is an old chestnut, but it has received a renewed interest in the aftermaths of the global financial crisis. In 2011, the European Commission had presented a plan to introduce a financial transaction tax (FTT) at the EU level. The proposal was ambitious and generated intense critics. After discussions failed to achieve a unanimous support, 11 out of the 27 EU member states decided to move forward with the EU FTT under enhanced cooperation. The EU FTT has been initially scheduled to be introduced at the beginning of 2014, but it is still postponed (see Gabor, 2013). In the meanwhile, securities transaction taxes (STT) have been introduced in France in August 2012, and in Italy in March 2013. Of course, the French and Italian STT have been carefully scrutinized, particularly their impact on trading volumes.

Several press articles report a sharp decrease of traded value consecutive to the introduction of the STT in France and Italy. Opponents to the taxation of financial transactions have used this preliminary evidence to decry a measure deemed counterproductive, arguing that a decrease of the value of shares traded will hurt market quality. Actually, the decline in traded

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value is nothing but a surprise. But, it will be wrong to conclude so far that the introduction of SST has been harmful.

A decrease in stock market activity does not automatically mean a decrease in market liquidity. Market liquidity is a broad concept and traded value is a poor measure. Moreover, the ultimate issue is the impact on volatility, and the result depends on what type of traders is driven from the market (Bloomfield, O'Hara and Saar, 2009). In this regard, the academic literature offers two opposing arguments. In the framework of the Efficient Market Hypothesis, increasing liquidity and speculation are stabilizing factors. Accordingly, the increase in transaction costs due to the FTT will reduce liquidity by driving away rational agents, thus, automatically amplifying market volatility (e.g. Schwert & Seguin, 1993; Kupiec, 1996; Subrahmanyam, 1998). Alternatively, if noise traders (either uniformed or not perfectly rational) prevent stock prices from converging to their fundamental value, increasing trading is destabilising. By discouraging noise traders' activity, the FTT will dampen market volatility (e.g. Stiglitz, 1989; Summers & Summers, 1989; Eichengreen, Tobin & Wyplosz, 1995).

In this study, I propose to survey the first impact assessments related to the introduction of STT in France and Italy.¹ Of course, such impact assessments are of great consequence, as the French and the Italian STT pave the way for the future EU FTT. From an academic point of view, it is also very interesting since these STT are somewhat unique. First, they are levied on both exchange-based and over-the-counter market and they apply regardless of where the transaction is executed, or the country of residence of the counterparty. Second, in both cases, the tax is levied only on large firms: above € 1 billion in the French case and above € 500 million in the Italian case. Hence, these taxes provide quasi-natural experiments with reliable control groups: smaller firms and foreign firms (listed on the same plate-form or not).

I voluntarily adopt a step-by-step approach. First, I consider aggregated data at a low frequency. Then, gradually, I present evidence based on daily individual data. Both approaches have their merits. The latter is, of course, more rigorous from an econometric point of view, but the former provides very useful insights with a large and historical perspective.

This paper is organized as follow. In section 2, I examine the evolution of the total value of stock traded on all trading platforms (stock exchanges, MTFs, and OTC) for French and

¹ A comprehensive literature survey on FTT is provided in Matheson (2011) or McCulloch and Pacillo (2011).

Italian equities, compared to other European equities. In section 3, I summarize the recent econometrical evidence on the impact of the French STT on market liquidity and volatility (so far, there is no similar econometric study on the Italian market). Section 4 concludes.

2. The value of stocks traded have decreased, but turnover ratios remain high

2.1 The dynamic of total traded values

First, I examine the dynamic of stock trading activity for the main European countries between January 2010 and December 2013. I use the Monthly Market Share Reports from Thomson-Reuters which provide a comprehensive measure of the value of stocks traded. The value of stock traded is the total number of stocks traded multiplied by their prices (data are in euro millions using currency spot rates from the date of trade). The data are aggregated from individual trades reported by all European Exchanges, MTFs, and OTC trade reporting venues. These data are summarized on an index basis or on a per market basis; that is, they represent trading activity for large-caps on one hand, and for all stocks on the other hand. Attribution by country is based on the domicile of the stocks (with reference to the two character country code of each ISIN).

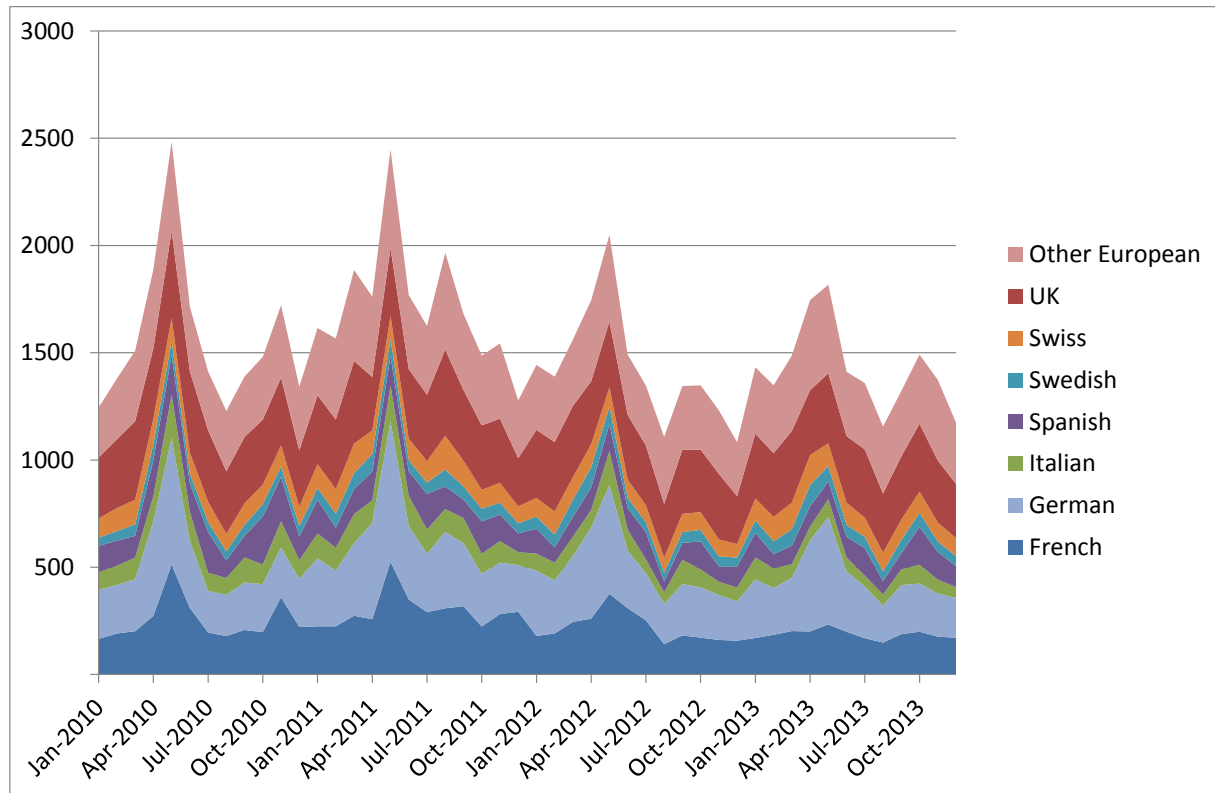
To begin, let's take a global and simple approach. Figure 1 (Panel A) documents the total value of stock traded for European equities over the period 2010-2013. Overall, traded value has been decreasing in Europe in 2012 and 2013 compared to 2010 and 2011. Almost all countries experienced a decline. Traded value in French and Italian equities decreased by 26% and 30% in 2012-2013 compared to 2010-2011. The decrease for German and UK equities is only of 11% and 7%. Accordingly, in terms of market shares within Europe, traded value have decreased from 16% to 13% percent for French equities and from 7% to 5% for Italian equities (Panel B).

Interestingly, the decrease in traded value for Spanish equities is similar to that of the French ones, and just less than the Italian ones. This is important to note since Spanish equities are *not* subject to STT.

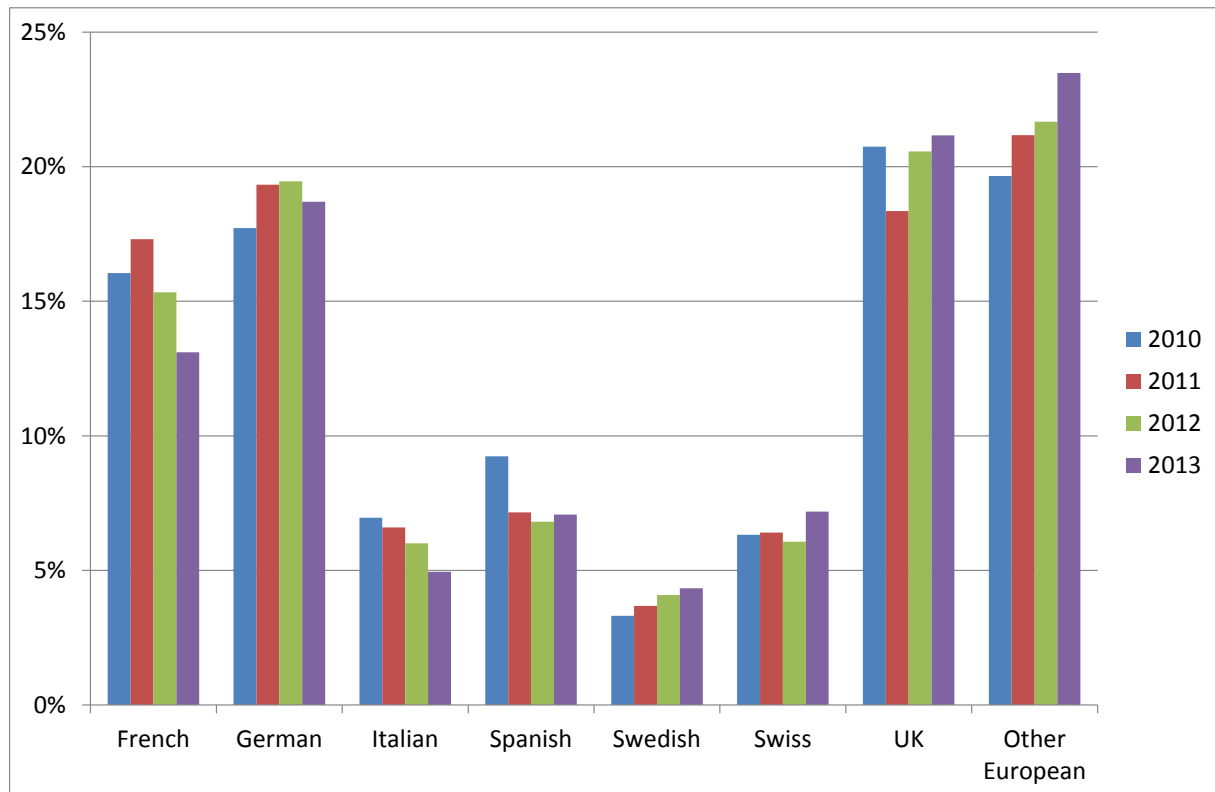
Figure 1. Total value of European stocks traded

Aggregated data from individual trades reported by all European Exchanges, MTFs, and OTC trade reporting venues. Source: Thomson Reuters (Monthly Market Share Reports).

Panel A. Monthly traded value in euros billion.



Panel B. Market shares



Now, let's look more closely at how trading volumes reacted following the introduction of the STT. Table 1 presents the total value of stock traded before and after the introduction of the French STT in August 2012 for several samples of European equities, by country. In Panel A, I consider blue-chips and in Panel B, I consider all equities. The total value of stock traded are computed over periods of 6 or 10 months, but it does not change the results. Table 2 is similar, but the total value of stock traded is computed around the introduction of the Italian STT in March 2013. In addition, Figures 2 and 3 offer a clear view of the dynamics of total traded volumes (for blue-chips), with all figures equal to 100 on January 2010.

Table 1. Traded value before and after the introduction of the French STT

Aggregated data from individual trades reported by all European Exchanges, MTFs, and OTC trade reporting venues. Source: Thomson Reuters (Monthly Market Share Reports). Figures in euros billion.

	6 months before (Feb. 2012 - Jul. 2012)	6 months after (Aug. 2012 - Jan. 2013)	after/ before	10 months before (Oct. 2011 - Jul. 2012)	10 months after (Aug. 2012 - Apr. 2013)	after/ before
Panel A: Blue chips						
AEX	534	487	-9%	863	851	-1%
CAC 40	1,416	915	-35%	2,299	1,663	-28%
FTSE 100	1,638	1,515	-7%	2,678	2,633	-2%
FTSE MIB	565	474	-16%	895	769	-14%
IBEX 35	677	594	-12%	1,193	941	-21%
OMX	426	333	-22%	675	648	-4%
Swiss	482	393	-18%	775	799	3%
DAX	1,664	1,118	-33%	2,515	2,313	-8%
S&P 500	12,620	11,742	-7%	20,903	20,107	-4%
Panel B: All equities						
All European	9,583	7,546	-21%	15,334	13,944	-9%
French	1,634	984	-40%	2,611	1,805	-31%
UK	1,837	1,674	-9%	2,978	2,935	-1%
Italian	574	478	-17%	908	779	-14%
Spanish	624	543	-13%	1,102	872	-21%
Swedish	408	294	-28%	626	602	-4%
Swiss	574	480	-16%	921	964	5%
German	1,975	1,329	-33%	2,983	2,721	-9%
US	26,594	24,172	-9%	44,805	42,020	-6%

Table 2. Traded value before and after the introduction of the Italian STT

Aggregated data from individual trades reported by all European Exchanges, MTFs, and OTC trade reporting venues. Source: Thomson Reuters (Monthly Market Share Reports). Figures in euros billion.

	6 months before (Sep. 2012 - Feb. 2013)	6 months after (Mar. 2013 - Aug. 2013)	after/ before	10 months before (May. 2012 - Feb. 2013)	10 months after (Mar. 2013 - Dec. 2013)	after/ before
Panel A: Blue chips						
AEX	489	445	-9%	837	662	-21%
CAC 40	938	1,024	9%	1,868	1,629	-13%
FTSE 100	1,549	1,660	7%	2,573	2,697	5%
FTSE MIB	511	363	-29%	877	636	-28%
IBEX 35	599	563	-6%	1,045	1,041	0%
OMX	349	413	18%	574	660	15%
Swiss	434	535	23%	695	833	20%
DAX	1,142	1,559	37%	2,127	2188	3%
S&P 500	11,959	12,010	0%	19,822	19,713	-1%
Panel B: All equities						
All European	7,787	8,975	15%	13,783	14,335	4%
French	1,027	1,153	12%	2,106	1,888	-10%
UK	1,720	1,869	9%	2,859	3,022	6%
Italian	516	376	-27%	889	653	-26%
Spanish	560	551	-2%	963	1,029	7%
Swedish	312	401	29%	529	624	18%
Swiss	525	649	24%	848	1,015	20%
German	1,358	1,870	38%	2,543	2,709	7%
US	24,544	27,077	10%	41,518	45,243	9%

In the six months that follow the introduction of the French STT, traded value decreased for all group of European equities. The decrease is the largest for French equities, whether blue-chips (-35%) or all equities (-40%). However, the decrease is also of a large scale for Germany (-33% for the two groups), while German securities was *not* subject to a tax on transactions.

Similarly, after the introduction of the Italian STT, traded value in Italian equities drop (-29% for blue-chips and -27% for all equities the first six months after). However, the trend in traded value in Europe was increasing, suggesting that the decrease might be effectively due to the tax.

Figure 3. Total value of stock traded 6 months before and after the introduction of the French STT

Aggregated data from individual trades reported by all European Exchanges, MTFs, and OTC trade reporting venues. Source: Thomson Reuters (Monthly Market Share Reports).

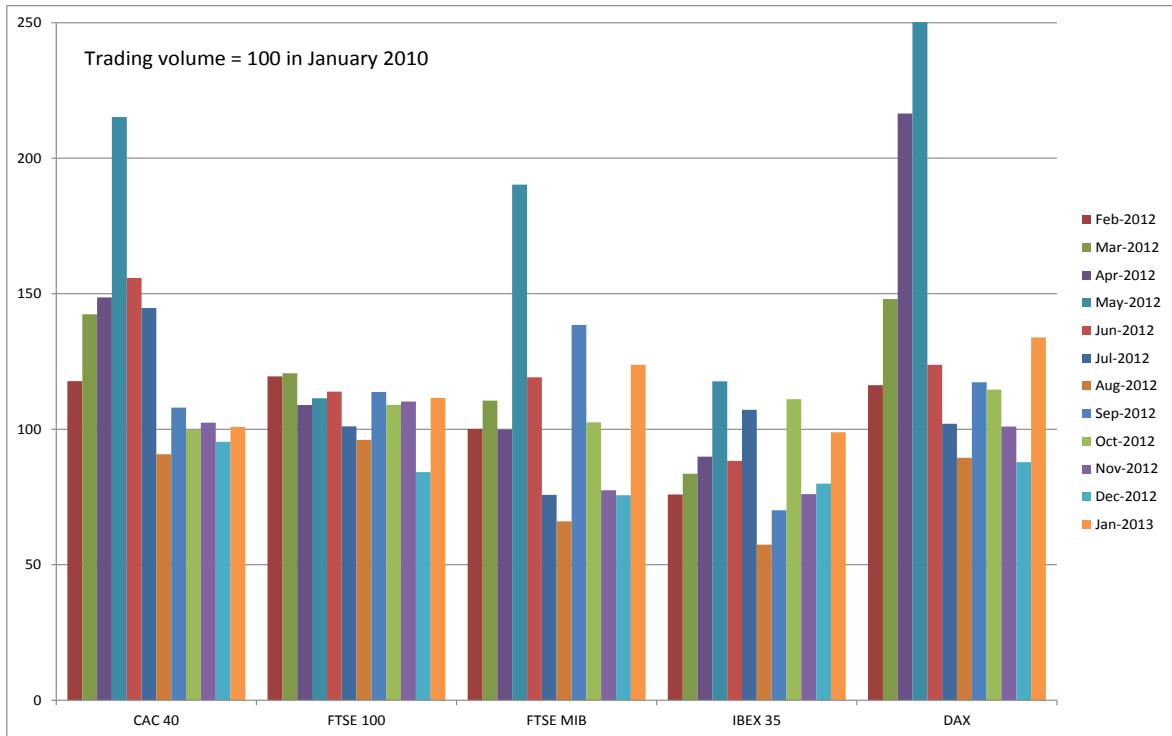
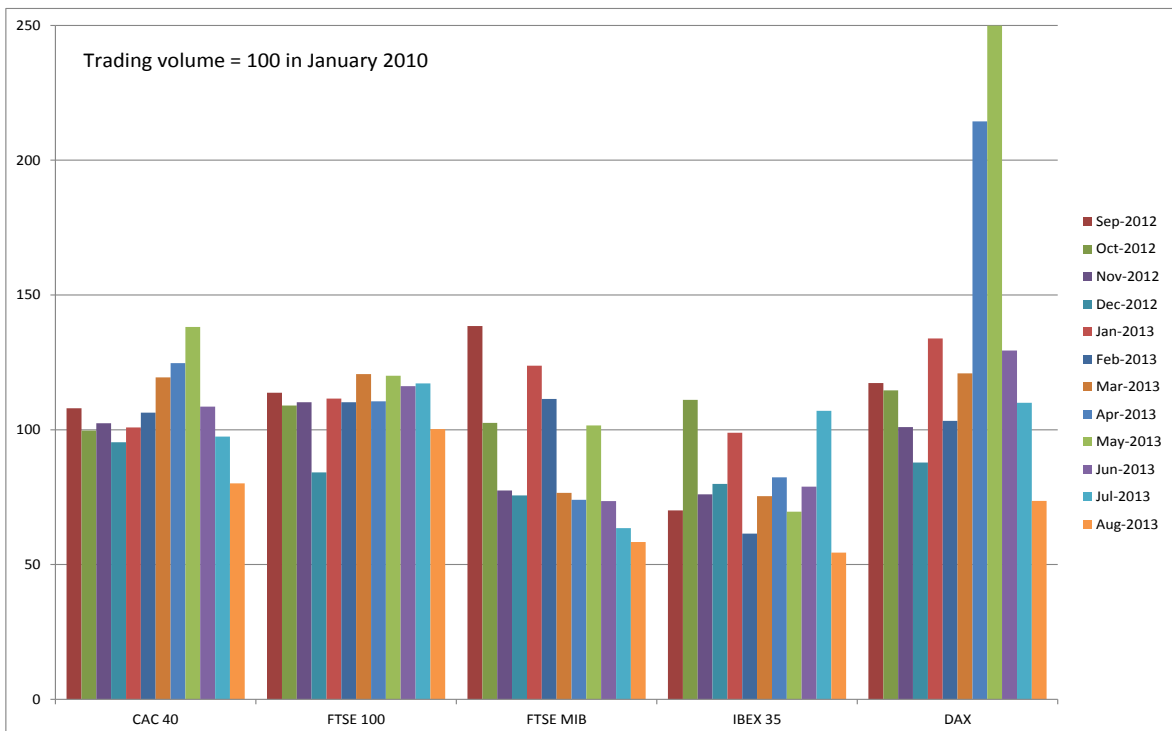


Figure 4. Total value of stock traded 6 months before and after the introduction of the Italian STT

Aggregated data from individual trades reported by all European Exchanges, MTFs, and OTC trade reporting venues. Source: Thomson Reuters (Monthly Market Share Reports).



2.2 A long term perspective

Although declining, traded values in 2012 and 2013 for French and Italian equities are still very high. Actually, it is important to put the evolution of trading in European equities into its historical context. Stock market development worldwide has been tremendous since the 1990s. Between 1990 and 2000, the value of share traded in the world's exchanges was multiplied by nine, from 5.7 to 49.8 billion of US dollars. Then, between 2000 and 2007, it doubled further to reach 113.0 billion of US dollars.² And these figures do not take into account the recent growth of alternative platforms (multilateral trading facilities, dark pools, over-the-counter trades...). At the same time, there is a sharp downward trend of the financial market transaction costs. Comerton-Forde, Hendershott, Jones, Moulton, and Seasholes (2010) report, for instance, that the value-weighted effective spread in the NYSE was divided by ten between 1994 and 2005.

Data from the Monthly Market Share Reports do not go back before 2010, unfortunately. Thus, to have a long-term perspective, I consider data from the World Bank (Source: Standard & Poor's, Global Stock Markets Factbook and supplemental S&P data). There is a concern, however. Data on traded value are not directly comparable from one source to another. Over the period 2010-2012, traded values as reported by the Monthly Market Share Reports are approximately two times higher than traded values reported by the World Bank! The difference seems due to the fact that the former provides a comprehensive view of equity trading³, while the latter is (apparently) limited to transactions on traditional exchanges and does not take into account alternative platforms of trading.

Failing to have more suitable data, I hypothesize that traded volume reported by the World Bank is a fairly good proxy of the total traded value over the period 2000-2007, before the entry into force of the Markets in Financial Instruments Directive (MiFID) in Europe and the Regulation National Market System (Reg NMS) in the US. For the period 2010-2012, I use the Monthly Market Share Reports. Between these two periods, I choose not to consider any data: Monthly Market Share Reports are not available and the World Bank database seems unreliable.

Under these hypotheses, I computed for the main European countries and the US the turnover ratio, defined as the ratio of annual traded value to the year-end market capitalization. Data for market capitalization are also from the World Bank, and for the whole period. Turnover

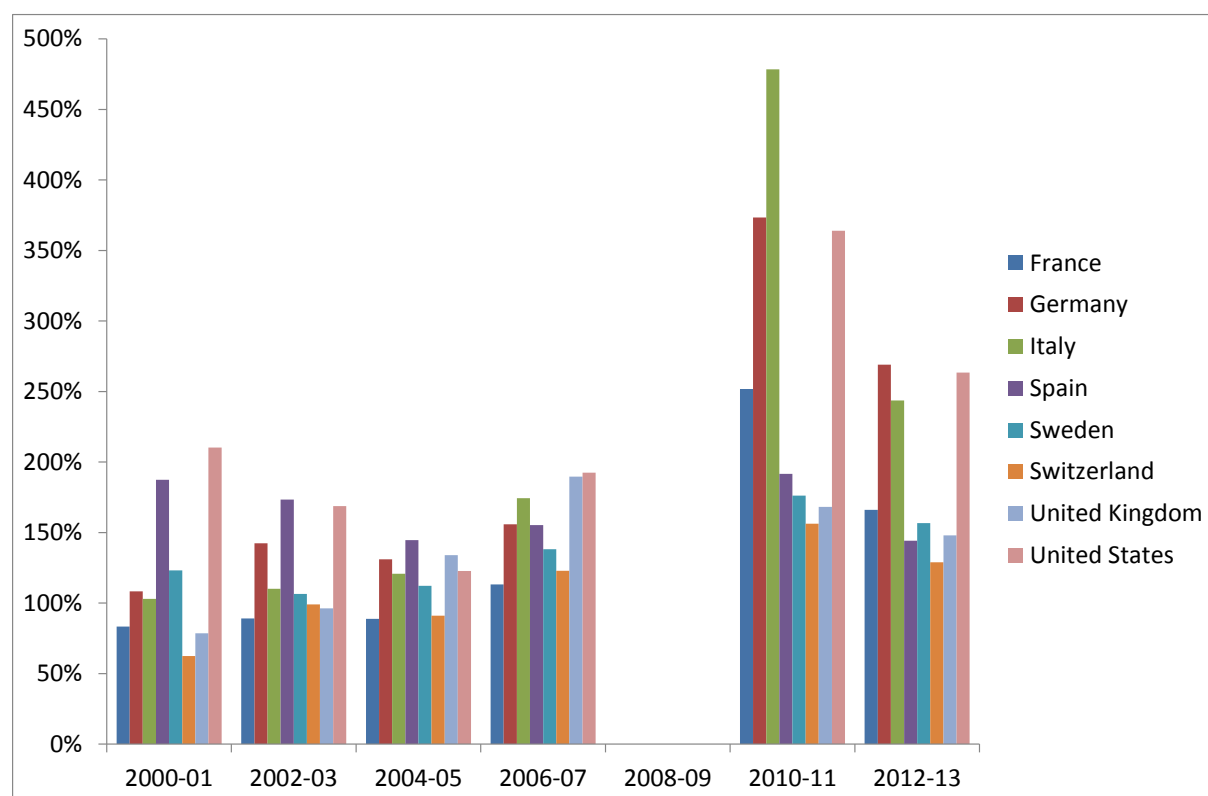
² Data from the World Federation of Exchanges. See Michie (2010).

³ Figure A in Appendix presents European trading volume by trade types.

ratios are reported Figure 2; they are averaged over two years for easier reading.

Figure 2. Turnover ratios

The turnover ratio is defined as the ratio of annual traded value to the year-end market capitalization. Data on market capitalization is from the World Bank. Data on traded value is from the World Bank for the period 2007-2007 and from Thomson Reuters (Monthly Market Share Reports) for the period 2010-2013. The ratio for 2008-2009 is not computed as data are unreliable or not available. The turnover ratio is averaged over two years for easier reading.



Overall, turnover ratios are higher at the beginning of the 2010s than a decade before. In France, the ratio rose from 0.83 in 2000-2001 to 1.66 in 2012-2013, that is a twofold increase. In Italy, over the same periods, the ratio increased at a similar pace, from 1.03 to 2.44 (with a spectacular peak at nearly 5 in 2010-2011). It should be noted also that, in 2012-2013, the turnover ratio for French equities is higher than for Spanish, Swedish, Swiss or UK equities; the turnover ratio for Italian equities is one of the highest, just below the ratios for Germany and the US.

2.3 A first econometric assessment based on turnover ratios

Most of the debates on the impact of the French and Italian FTT consider traded value (or

market share). However, the total value of stock traded might be affected by a change in stock prices. If countries experienced different macroeconomic events, independently from the introduction of a STT, different changes in stock prices might bias the comparison.

During the second half of 2012, economic confidence in the euro area first stabilized and then gradually improved amid signs of a global economic recovery. Between August 2012 and December 2013, all stock indexes in Europe experienced an increase, albeit at quite different rate. For instance, the CAC 40 index has increased by 30%, while the DAX index has increased by 36%. The relative negative performance of the French market biases downward the comparison of trading activity before and after the introduction of STT. To address this problem, once again, turnover ratios might be useful.

Market capitalization from the World Bank is only available at a yearly frequency and I use MSCI stock indexes (all-caps) to build monthly series over the period 2010-2013. While the number of observations is quite low (48 obs.), I propose to use an econometric specification based on the fact that turnover ratios are highly correlated between European countries.

To test the impact of the French STT, I estimate the simple following econometric model⁴:

$$Turn_FR_t = \alpha_0 + \sum_{k \neq FR} \alpha_k Turn_k_t + \alpha_1 FSTT_t + \varepsilon_t \quad (1)$$

where $Turn_FR_t$ is the monthly turnover ratio for French equities at time t ($T = 48$), $Turn_k_t$ is the monthly turnover ratio for the country $k \neq FR$ (Germany, Italy, Spain, Sweden, Switzerland, and United Kingdom), $FSTT_t$ is a dummy variable that is equal to 1 after the introduction of the French STT in August 2012, and ε_t is an error term. The coefficient of interest is α_1 .

Similarly, for the impact of the introduction of the Italian STT, I consider the following model:

$$Turn_IT_t = \alpha_0 + \sum_{k \neq IT} \alpha_k Turn_k_t + \alpha_1 ISTT_t + \varepsilon_t \quad (2)$$

where $ISTT_t$ is a dummy variable that is equal to 1 after the introduction of the Italian STT in March 2013.

Results are provided Table 3.

⁴ I used also different specifications with additional control variables (US turnover, VIX index, Sovereign Spreads, monthly fixed-effects...), but the introduction of these variables does not change the results.

Table 3. The impact of the French and Italian STT on turnover ratios

$Turn_k$ = Monthly turnover ratio defined as the monthly value of stock traded divided by the end-month stock market capitalization for the country k . SST is a dummy variable = 1 after the introduction of the French STT (August 2012) in models (1) & (2) and after the introduction of the Italian STT (March 2013) in models (3) & (4). Period: Jan. 2010 – Dec. 2013. Robust standard errors in parentheses.

	(1) <i>Dependent variable: Turn_FR</i>	(2) <i>Dependent variable: Turn_FR</i>	(3) <i>Dependent variable: Turn_IT</i>	(4) <i>Dependent variable: Turn_IT</i>
<i>Turn_FR</i>	–	–	0.8288** (0.3208)	0.6367** (0.2342)
<i>Turn_IT</i>	0.1589** (0.0679)	0.0433 (0.0468)	–	–
<i>Turn_DE</i>	0.7764*** (0.1219)	0.9542*** (0.0990)	–0.3342 (0.4073)	
<i>Turn_SP</i>	0.2042 (0.2144)	0.3896** (0.1806)	1.4802*** (0.2778)	1.5684*** (0.2546)
<i>Turn_SW</i>	0.3234 (0.2919)		–1.8488*** (0.5644)	–1.9186*** (0.5412)
<i>Turn_CH</i>	0.4159 (0.2482)		–1.3962** (0.5435)	–1.4411** (0.5247)
<i>Turn_UK</i>	–1.9458*** (0.3136)	–1.4009*** (0.2581)	5.5696*** (0.5905)	5.1577*** (0.4585)
<i>STT</i>	–0.0132 (0.0093)	–0.0187* (0.0099)	–0.0452** (0.0191)	–0.0416** (0.0178)
<i>Constant</i>	0.0331 (0.0406)	0.0083 (0.0347)	–0.3343*** (0.0586)	–0.3395*** (0.0593)
<i>N</i>	48	48	48	48
<i>adj. R²</i>	0.915	0.908	0.915	0.916

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Econometric results based on aggregated data suggest that the impact of the introduction of the STT in France and Italy had a significant negative effect on turnover ratio. However, this effect is small. The monthly estimated coefficient is lower (in absolute value) than 0.02 for French equities and lower than 0.05 for Italian equities (those approximations are quite conservative). That is, for French equities, the estimated impact on an annual basis is $-0.02 \times 12 = -0.24$, while the average annual turnover ratio is approximately equal to 1.5 (–16%). For Italian equities, the impact is $-0.05 \times 12 = -0.60$, while the average annual turnover ratio is approximately equal to 2.2 (–27%).

2.4 Preliminary conclusion based on aggregated data

At the end, what can be drawn from these aggregate figures? The French and Italian STT caused a decrease in the total value of stock traded. However, its magnitude is difficult to assess properly on an aggregated basis since: i) traded value varies a lot from one year to another; ii) other factors may impact trading activity. Be that as it may, traded value in Europe is historically very high, including in France and in Italy after the introduction of the STT. Turnover ratios (the ratio of annual traded value to the year-end market capitalization) are higher than before the crisis in all European countries; further, they are higher in France and Italy than in Spain, Sweden, Switzerland or the UK.

Recall that a high level of traded value is not an end in itself. The genuine issues are the impact of the STT on liquidity and volatility, but it requires the use of more complex indicators. In the next section, I present a detailed survey of the recent econometric studies related to the impact of the STT.

3. A review of econometric assessments: no impact on liquidity or volatility

A number of recent papers (see Table 4) study the introduction in of the French STT and its impact on market quality measured by market liquidity and volatility (Becchetti, Ferrari & Trenta, 2013, Capelle-Blancard & Havrylchyk, 2013; Colliard & Hoffman, 2013; Haferkorn & Zimmermann, 2013; Meyer, Wagener & Weinhardt, 2013). To my knowledge, as of the beginning of 2014, there is no similar study on the Italian market.

Table 4. Summary of the impact assessments of the French STT – data & methodology

Authors	Period	Data	Sample	Methodology
Becchetti, Ferrari & Trenta, (2013)	90 trading days surrounding the event	<i>Source:</i> Bloomberg <i>Type:</i> daily data (Paris Bourse)	<i>Sample:</i> 106 French firms <i>Control group:</i> 220 French midcaps and small-caps	Non parametric individual tests, Difference-in-difference
Colliard & Hoffman (2013)	4 months surrounding the event	<i>Source:</i> Thomson Reuters <i>Type:</i> tick data (Euronext)	<i>Sample:</i> 90 French firms <i>Control group:</i> 28 Dutch firms + 20 French midcaps	Difference-in-difference <i>Sub-samples:</i> 20 stocks above and 20 stocks below the threshold
Haferkorn & Zimmermann (2013)	20 or 80 trading days surrounding the event	<i>Source:</i> Thomson Reuters <i>Type:</i> tick data (Euronext & Chi-X)	<i>Sample:</i> 36 French blue chips <i>Control group:</i> 30 German blue chips	Difference-in-difference <i>Sub-samples:</i> clusters by market capitalization and price level
Meyer, Wagener, & Weinhardt (2013)	80 trading days surrounding the event	<i>Source:</i> Thomson Reuters <i>Type:</i> tick data (Euronext & Chi-X)	<i>Sample:</i> 94 French firms <i>Control group:</i> 99 UK firms	Difference-in-difference, Matching <i>Sub-samples:</i> size effect
Capelle-Blancard & Havrylchuk (2013)	1 year surrounding the event	<i>Source:</i> Thomson Reuters <i>Type:</i> daily data (Euronext & Deutsche Boerse)	<i>Sample:</i> 88 French firms <i>Control group:</i> 106 foreign firms + 49 French midcaps	Difference-in-difference, Propensity score matching <i>Robustness and sub-samples:</i> size effect

Interestingly, unlike previous STT, to prevent tax avoidance, these taxes are due regardless of the place of establishment of the regulated market on which the security is traded, regardless of the place of establishment or residence of the parties to the transaction, and regardless of the place where the contract was entered into. Moreover, in both cases, the tax is levied only on large firms: above € 1 billion in the French case and above € 500 million in the Italian case. Hence, these taxes provide quasi-natural experiments with reliable control groups: smaller firms and foreign firms (listed on the same plate-form or not).

Previous academic studies on the impact of STT had to rely on control groups in different institutional environments, such as foreign or over-the-counter markets. For instance, Umlauf (1993) – by far the most cited paper on this topic – analyzed the impact of the STT on the Swedish market, relying on the US and the UK markets as control groups. Given the large distance (geographical, economical, institutional...) between Sweden and the UK or the US in the 1980s, these stock markets do not seem very suitable as control groups.⁵

To identify the impact of the STT, all the recent studies rely on the difference-in-difference (DiD) methodology, while they use different control groups: French mid- and small-caps (Becchetti, Ferrari & Trenta, 2013, Capelle-Blancard & Havrylchyk, 2013), foreign firms listed on Euronext (Capelle-Blancard & Havrylchyk, 2013; Colliard & Hoffman, 2013), German firms listed on the Deutsche Boerse (Capelle-Blancard & Havrylchyk, 2013; Haferkorn & Zimmermann, 2013), or UK firms (Meyer, Wagener & Weinhardt, 2013). They also consider different time interval: from 20 trading days surrounding the introduction of the FTT (Haferkorn & Zimmermann, 2013), to one year (Capelle-Blancard & Havrylchyk, 2013). Moreover, they use either daily data (Becchetti, Ferrari & Trenta, 2013, Capelle-Blancard & Havrylchyk, 2013) or tick-by-tick data (Colliard & Hoffman, 2013; Haferkorn & Zimmermann, 2013; Meyer, Wagener & Weinhardt, 2013). Lastly, they consider different proxies of liquidity and volatility (see hereafter).

Overall, they estimate the following econometric model:

$$V_{it} = \alpha_0 + \alpha_1 D_i + \alpha_2 D_t + \alpha_3 STT_{it} + \varepsilon_{it} \quad (3)$$

where V_{it} is a measure of market liquidity or volatility for the firm i at time t , D_i is a firm dummy variable, D_t is a time dummy variable, STT_{it} is a dummy variable that is equal to 1 for

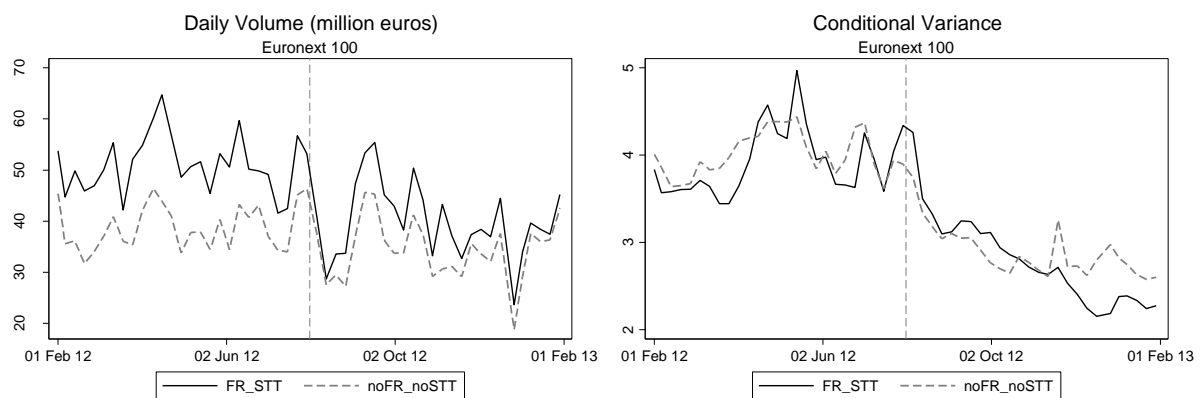
⁵ To give an idea, the correlation of returns between Sweden and the UK or the US in the 1980s was about 10-20%. Conversely, the correlation between European main stock indexes is higher than 80% in the recent period.

treated firms after the introduction of the STT and ε_{it} is an error term. The coefficient of interest is α_3 .

Overall, the impact of the introduction of the French STT can be summarized by Figure 1. While there is a decrease in traded volume, the FFT had no impact on volatility.

Figure 5. Impact of the STT introduction on traded value and volatility

These figures present weekly un-weighted average for French firms subject to the tax (FR_STT) and a control group that consists of foreign firms traded on the Euronext that are not subject to the tax (noFR_noSTT). *Daily Volume* $_{i,t}$ = Number of shares traded for the stock i on day t * $P_{i,t}$ where $P_{i,t}$ is the closing price for the stock i on the day t . *Conditional variance* $_{i,t}$ is estimated with a GARCH(1,1).



Source: Capelle-Blancard & Havrylchik (2013).

In detail, the results might be summarized as below.

First, the introduction of the French STT has reduced traded value of securities that are subject to the tax, relatively to untaxed securities (Capelle-Blancard & Havrylchik, 2013; Colliard & Hoffman, 2013; Meyer, Wagener & Weinhardt, 2013). The decline was around 30% in the short run (August) and around 20% for the first semester after the introduction of the FTT (while is surprisingly not significant in Haferkorn & Zimmermann, 2013). The STT has also decreased turnover (Capelle-Blancard & Havrylchik, 2013), the number of trades (Haferkorn & Zimmermann, 2013), market depth (Colliard & Hoffman, 2013; Haferkorn & Zimmermann, 2013) and the frequency of quotes (Meyer, Wagener & Weinhardt, 2013). Actually, this confirms previous evidence based on aggregated data.

Second, all the academic results produced so far on the impact of the French STT suggest that both rational and irrational investors have been driven away, roughly equally. Accordingly, evidence on the bid-ask spread is mixed and very sensitive to the chosen control group: there

is a widening of the spread compared to the German market (Capelle-Blancard & Havrylchyk, 2013; Haferkorn & Zimmermann, 2013) but there is no significant change compare to foreign firms and small French firms listed on Euronext (Capelle-Blancard & Havrylchyk, 2013; Colliard & Hoffman, 2013) or compared to UK firms (Meyer, Wagener & Weinhardt, 2013). Moreover, there is no significant impact on theoretically-based measures of liquidity, such as price impact which captures the ability to trade large quantities quickly, at low cost, and without moving the price (Capelle-Blancard & Havrylchyk, 2013; Meyer, Wagener & Weinhardt, 2013).

Third, and perhaps more fundamentally, the impact of the transaction tax on volatility is statistically insignificant, notwithstanding its measure. Capelle-Blancard & Havrylchyk (2013) measure volatility by absolute or squared returns, conditional variance, high-low range; Colliard & Hoffman (2013) rely on realized volatility, Haferkorn & Zimmermann (2013) compute standard deviation of prices and high-low range. The only exception to these results constitutes the finding of a negative effect on high-low range by Becchetti, Ferrari & Trenta (2013).⁶

4. Conclusion

The introduction of the French and Italian STT decreased traded values. But this result needs to be relativized. First, traded values remain high in an historical perspective, as indicated by the turnover ratios. Second, traded values in some European countries which do *not* experienced STT has also decreased, in a similar extent in some cases. Third, the decrease in trading activity did not harmed market liquidity and, hence, had no impact on volatility.

⁶ From the methodological point of view, it is crucial to have a reliable control group. As shown in Figure 5, market volatility (measured by conditional variance) has decreased for all stocks during the period due to upturn in the euro area. Without a reliable control group, this decrease in volatility could have been attributed, wrongly, to the STT.

Table 5. The impact of the French STT on market liquidity (diff-in-diff)

	Traded value	Number of trades	Turnover	Frequency of quotes	Spread	Depth	Low-latency	Price impact	Liquidity ratio	Price reversal
Becchetti, Ferrari & Trenta, (2013)	Not significant				Not significant					
Colliard & Hoffman (2013)	Decrease				Not significant	Decrease	Decrease			
Haferkorn & Zimmermann (2013)	Not significant	Decrease			Increase	Decrease				
Meyer, Wagener, & Weinhardt (2013)	Decrease			Decrease	Not significant	Decrease		Not significant		
Capelle-Blancard & Havrylchuk (2013)	Decrease		Decrease						Not significant	Not significant

Table 6. The impact of the French STT on market volatility and inter-market arbitrage (diff-in-diff)

	Standard deviation	Squared returns	Conditional variance	Daily high-low range	Realized volatility	Price dispersion
Becchetti, Ferrari & Trenta, (2013)				Decrease		
Colliard & Hoffman (2013)					Not significant	
Haferkorn & Zimmermann (2013)	Not significant			Not significant	Not significant	Increase
Capelle-Blancard & Havrylchuk (2013)		Not significant	Not significant	Not significant		

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Appendix

Figure A. Trading in European equities by trade types

Aggregated data from individual trades reported by all European Exchanges, MTFs, and OTC trade reporting venues. *Order Book - Lit* = trades generated by trading on electronic open limit order book excluding trades executed during an auction period or trades resulting from orders that were not visible on the book. This does include orders executed against iceberg orders. *Order Book - Hidden* = trades executed on electronic open limit order books where one side of the order was not visible on the book. *Order Book - Auction* = trades executed during an auction period operated by electronic open limit order book. *Dark Order Book Total* = trades generated by a dark pool of liquidity operated as an MTF. *Off Order Book* = trades reported under the rules of an exchange which may be as a result of trading on quotes from market makers or just OTC trades reported under the rules of a regulated market or ATS/MTFs. *MiFID OTC* = trades reported through pure reporting venues like Markit BOAT or the equivalent services offered as off-exchange reporting by the exchanges such as Euronext or Nasdaq OMX. Source: Thomson Reuters (Monthly Market Share Reports).

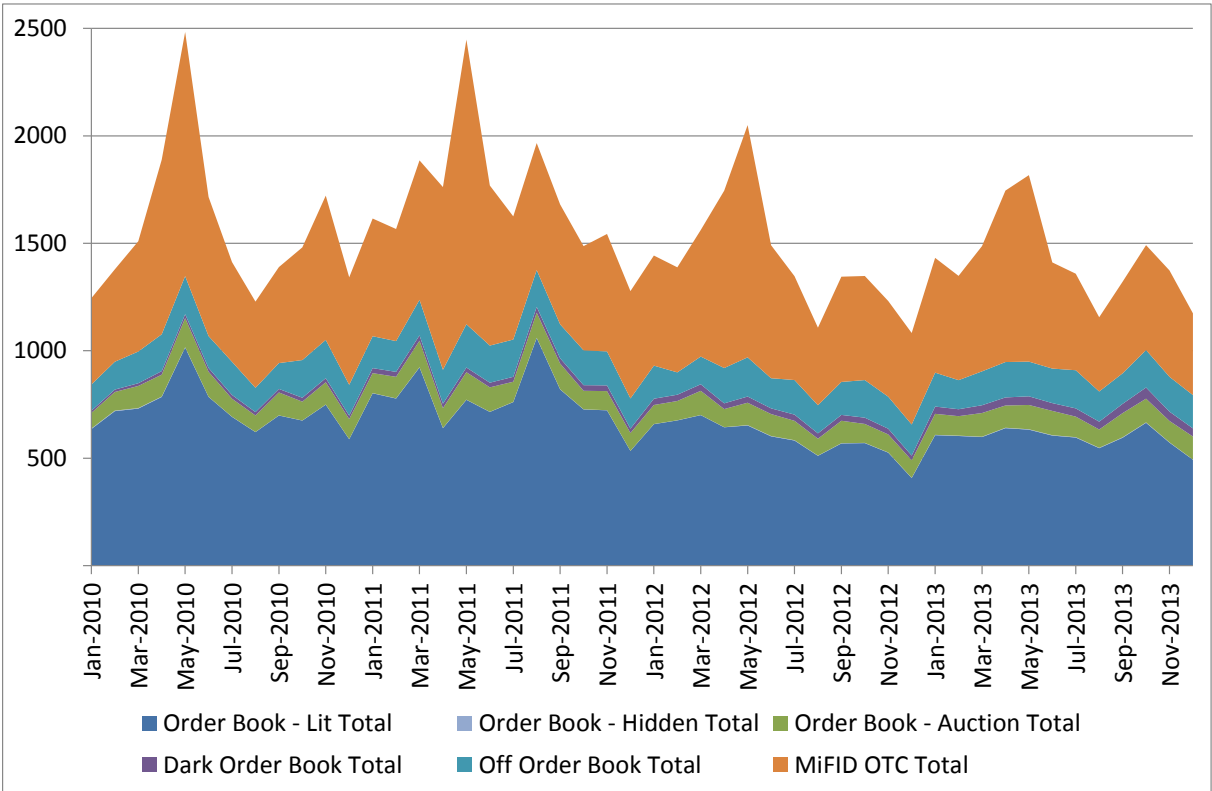


Figure B. European blue-chip stock indexes

Monthly closing stock index prices. Indexes = 100 in January 2012.

