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The impact of financial transaction taxes: Evidence from Italy

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Abstract

This study gives first evidence on the consequences of the introduction of a transaction tax in Italian financial markets in 2013. We discuss the consequences of this tax on trading volume, volatility, and trading costs of FTSE MIB stocks. The structure of the tax introduction gives us the opportunity to see the particular consequences of a market-wide tax on high-frequency trading behavior.

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1. Introduction

As one of the first European countries, in 2013, Italy introduced a transaction tax on a variety of equity-related transactions in a two-stage release. In the first step in March 2013, a tax on transactions of shares, financial instruments and securities representing equity investment, issued by companies resident in Italy, as well as a tax on high frequency trading on these instruments was introduced. The tax rate is generally 0.2% of the transaction value. For transfers on regulated markets or multilateral trading facilities the rate is halved[1]. For order changes and cancellations occurring within a time frame shorter than 0.5 seconds the tax rate is 0.02%. "The tax is calculated on a daily basis and is payable where - in a single trading day - the ratio between the sum of canceled orders and modified orders, and the sum of entered orders and modified orders exceeds 60 per cent with reference to the single financial instruments" (Italian Ministry of Economy and Finance 2013). Marking the second step in September 2013, derivative markets and other transferable securities as well as high frequency trading on these instruments were also included in the system. The percentage rate payable for derivatives strongly depends on the instrument, the value of the transaction and whether it is traded OTC or on a regulated market.

In particular, we focus on the more recent second step in our analysis. One major argument in favor of high-frequency trading is that it leads to market-wide higher liquidity and smaller transaction costs. Thus, a transaction tax on such trades is expected to cause the opposite effect and a decrease in market liquidity. The two-step release enables that we can identify the effect of the market-wide introduction of high-frequency and financial taxes, since stock specific taxes, including the stock specific high-frequency tax, have been introduced in the first step six months earlier. The market wide introduction including the tax on derivatives is particularly relevant for trading in stocks, since higher costs for trading derivatives might reduce hedging abilities of market participants. Furthermore derivative markets are often seen as a price discovery vehicle for stock markets. Many studies find a leading relationship of volume and prices of derivatives on their underlying stocks as pointed out by De Jong and Donders (1998), while it has to be noted that Ansi and Ben Ouda (2009) report mixed results here. An impact of higher transaction costs on the characteristics of markets for derivatives might therefore spill over on stock markets. In addition, the second stage was accompanied by high media attention in which it was assumed that the second step can have major consequences for the whole Italian financial market [2].

Previous empirical literature on financial transaction taxes for other countries finds significant results: for the French transaction tax, Meyer et al. (2013) find a significant decrease in trading volume and depth of the order book but no increase in spreads. Baltagi et al. (2006) find evidence for strongly decreasing trading volume and increasing volatility after a tax increase in the Chinese stock market. Jones and Seguin (1997) investigate a cost decrease in US stock exchanges and find a volatility decrease. Umlauf (1993) analyzes the Swedish transaction tax and also finds evidence for higher volatility and lower transaction volume after tax introduction.

[1]The rates were introduced with values of 0.22% and 0.12% in 2013 and reduced to 0.2% and 0.1% for the following years.

[2]See for instance Clinch (2013) and Stafford (2013).

Proponents of financial transaction taxes often claim that an introduction leads to a reduction in market volatility due to less noise trading in the market - and recent discussions surrounding high frequency trading especially considered this. However, previous empirical literature finds the opposite effect. When trading volume is decreasing due to the introduction, this may be due to the "lower liquidity-higher volatility" relation that is often claimed, and analyzed in detail by Jawadi and Ureche-Rangau (2013) for example. We add to the literature by identifying both the direction and magnitude of the effect of a tax that focuses on a whole financial market of a country and especially on high-frequency trading. By doing so, we are able to identify the isolated effects of taxes on volume, transaction costs, and volatility.

2. Data and estimation setup

Daily data on major indices for the last five years is used to identify if there is a long-run trend in key variables, while the main analysis is based on intraday data on a 5-minute frequency for 120 days surrounding the introduction date (September 1, 2013). For the main analysis, we use data of the current constituents of the Financial Times Stock Exchange Milano Italia Borsa index (FTSE MIB) and the Financial Times Stock Exchange 100 index (FTSE 100, control sample). The FTSE MIB index consists of the 40 most important Italian stocks and form our sample. The British FTSE 100 stocks are used as a benchmark or control group. EUR/GBP exchange rates on 5-minute frequencies are used to convert prices from Pound Sterling to Euro. Additionally, we utilize daily data of the VSTOXX index, which measures the volatility for the EURO STOXX 50 (ES50) constituents. All data are drawn via Bloomberg.

The main analysis consists of a difference-in-difference panel regression approach similar to the one in Meyer et al. (2013). We consider it a good practice to use this method to identify the isolated effects. Difference-in-difference regressions enable this as they account for treatment/policy changes in treatment groups compared to non-treatment groups and (for the time) before and after the treatment. First, we match each of the 38 FTSE MIB constituents[3] to a respective stock of the FTSE 100 index by minimizing the matching error (ME). This matching error is based on the stock price (P) and the market capitalization (MC) over all matches, as proposed by Davies and Kim (2009):

$$ME_{i,j} = (|MC_i - MC_j|)/(0.5(MC_i + MC_j)) + (|P_i - P_j|)/(0.5(P_i + P_j)) \quad (1)$$

The variables used for matching are the end-of-day values on June 3, which is the first date in our sample. Subindexes i and j indicate stocks from the FTSE MIB and stocks from the FTSE 100 indices, respectively. Following the matching, we perform three difference-in-difference panel regressions based on 5-minute data for the time between June 3 and

[3]Due to a missing data problem we had to exclude two FTSE MIB stocks. This procedure enables us to stick to balanced panel regression.

November 20, 2013:

$$|R_{i,t}| - |R_{j,t}| = \alpha_0 + \alpha_1 TAX_t + \alpha_2 VSTOXX_T + \alpha_3 NT_{i,t} + \alpha_4 VT_{i,t} + \alpha_5 NT_{j,t} + \alpha_6 VT_{j,t} + \alpha_7 MC_{i,T} + \alpha_8 MC_{j,T} + \alpha_9 \bar{P}_{i,T} + \alpha_{10} \bar{P}_{j,T} + \beta D + \varepsilon_t \quad (2)$$

$$S_{i,t} - S_{j,t} = \alpha_0 + \alpha_1 TAX_t + \alpha_2 VSTOXX_T + \alpha_3 NT_{i,t} + \alpha_4 VT_{i,t} + \alpha_5 NT_{j,t} + \alpha_6 VT_{j,t} + \alpha_7 MC_{i,T} + \alpha_8 MC_{j,T} + \alpha_9 \bar{P}_{i,T} + \alpha_{10} \bar{P}_{j,T} + \beta D + \varepsilon_t \quad (3)$$

$$V_{i,t} - V_{j,t} = \alpha_0 + \alpha_1 TAX_t + \alpha_2 VSTOXX_T + \alpha_7 MC_{i,T} + \alpha_8 MC_{j,T} + \alpha_9 \bar{P}_{i,T} + \alpha_{10} \bar{P}_{j,T} + \beta D + \varepsilon_t \quad (4)$$

The explanatory variable of interest is the TAX dummy variable, which is 0 for the time before September 1, 2013, and 1 afterwards. This variable indicates whether there is a change on the left side of the equation that is due to the introduction of the tax. The three endogenous variables that are expected to be affected by the tax are the following:
1. $|R|$: The absolute percentage 5-minute return in basis points as a measure of volatility.
2. S: The quoted percentage spread in basis points at the end of each 5-minute period as a measure of liquidity.
3. V: The Euro volume of trade per 5-minute period as a measure of trade activity.

All other variables on the right side of the equation are control variables. As mentioned above, $VSTOXX_T$ is the daily EURO STOXX 50 volatility index and controls for European market-wide volatility changes. VT is the average trade size measured in thousand Euros per 5-minute period, and together with the number-of-trades variable NT, it serves as a control measure for a change in market activity for the first two equations. Daily market capitalization and average stock price serve as stock-specific control variables. The variable D stands for a group of dummy variables to account for stock-pair-specific constants as well as daytime dummies to control for different intraday patterns.

3. Results

First, looking at daily data statistics for the FTSE MIB index and other main indices such as the Dow Jones Industrial Average (DJIA) and the FTSE 100, we do not see strong evidence for a market-wide tax introduction impact in the FTSE MIB index. Table 1 gives an overview over the average daily turnover in the different indices. We can see that there is a sharp drop in this variable for the FTSE MIB index during the three months before the implementation of the second tax stage. However, this holds true for all major indices in our sample for this period, and there is some recovery after the second stage was introduced.

Table 2 shows mixed results. While the average annualized absolute percentage return (APR) measure indicated that the volatility did not change much after the introduction of the tax, the annualized standard deviation (AV) measure shows a decrease. However, the volatility of other European stock indices seems to have decreased stronger than Italian stock volatility during the last months based on both measures. Thus, on relative grounds, we

Table 1: Average daily turnover

	DAX	FTSE MIB	FTSE	ES50	DJIA
01.11.2009-28.02.2013	3802.66	2508.43	4199.86	10404.85	6311.46
01.03.2013-14.11.2013	3051.82	1944.78	3394.26	7750.56	4976.90
01.12.2012-28.02.2013	2778.88	2124.16	3165.88	7384.88	4933.62
01.03.2013-31.05.2013	3269.43	2017.41	3560.12	7980.10	5099.66
01.06.2013-31.08.2013	2920.28	1648.00	3330.36	7116.35	4873.33
01.09.2013-14.11.2013	2954.55	2221.11	3263.28	8261.23	4945.42

Table 1 shows the average daily turnover in the respective index, measured in million units of the respective local currency.

Table 2: Volatility measures for daily data

	DAX		FTSE MIB		FTSE		ES50		DJIA	
Date	APR	AV	APR	AV	APR	AV	APR	AV	APR	AV
01.11.2009-28.02.2013	0.174	0.164	0.218	0.201	0.148	0.151	0.188	0.176	0.141	0.156
01.03.2013-14.11.2013	0.109	0.099	0.163	0.120	0.094	0.081	0.121	0.105	0.078	0.065
01.12.2012-28.02.2013	0.097	0.089	0.165	0.163	0.073	0.065	0.110	0.119	0.081	0.083
01.03.2013-31.05.2013	0.119	0.104	0.175	0.123	0.093	0.074	0.132	0.109	0.068	0.056
01.06.2013-31.08.2013	0.127	0.108	0.165	0.130	0.113	0.098	0.132	0.119	0.084	0.073
01.09.2013-14.11.2013	0.075	0.071	0.145	0.104	0.071	0.057	0.093	0.074	0.086	0.065

Table 2 shows the average annualized absolute percentage return (APR) and the annualized standard deviation (AV), as measures of volatility.

might indeed have found an initial indication of a volatility effect from the tax introduction. If this holds true, it should show up in the difference-in-difference analysis as well.

Turning to the difference-in-difference estimations, we find strong evidence for an influence of the transaction tax introduction on important market variables. The estimation results are presented in Table 3. For the sake of parsimony, the control dummy variable results are not reported here but are available upon request.

The left column in Table 3 shows the impact on the difference of absolute 5-minute returns. The constant term results strongly depend on the stock-pair specific dummy variable, which was omitted due to the dummy variable trap and accordingly is not further interpreted here. The average value of the absolute percentage return differences is 3.26 basis points, indicating a higher volatility in Italian stocks on average.

The main variable of interest, the TAX dummy, is statistically significant and positive. This means that the magnitude of returns of Italian stocks was higher after the introduction of the tax than before, relative to the matched British stocks. Although the coefficient seems to be quite small (at 0.586 basis points), it indicates an 18% increase in comparison to the British stocks (based on the average absolute percentage return difference of 3.26 basis points).

Table 3: Estimation results

	Abs. Return: $\lvert R_{i,t}\rvert - \lvert R_{j,t}\rvert$	Spread: $S_{i,t} - S_{j,t}$	Volume: $V_{i,t} - V_{j,t}$
Constant	-6.9217***	-8.9621***	51442.78***
C	(1.2872)	(0.4810)	(3213.32)
TAX Dummy	0.5865***	0.2180***	-117.89
TAX	(0.0550)	(0.0258)	(81.81)
Eurozone Volatility	0.1137***	0.0667***	-50.15***
VSTOXX	(0.0117)	(0.0054)	(20.52)
Number of Trades	0.0896***	-0.0019***	
NT(I)	(0.0016)	(0.0002)	
Volume per Trade	0.1379***	-0.0006	
VT(I)	(0.0131)	(0.0023)	
Number of Trades	-0.1016***	0.0084***	
NT(GB)	(0.0020)	(0.0004)	
Volume per Trade	-0.0004***	0.000005	
VT(GB)	(0.000045)	(0.000022)	
Market Capitalization	-0.0003***	0.000163***	0.7575***
MC(I)	(0.000029)	(0.000010)	(0.0837)
Market Capitalization	0.0005***	0.000054***	-0.6900***
MC(GB)	(0.000033)	(0.000010)	(0.1580)
Average Stock Price	0.0409***	-0.0777***	64.41***
P(I)	(0.0107)	(0.0056)	(13.53)
Average Stock Price	-0.0037***	0.0021***	5.0465***
P(GB)	(0.0005)	(0.0002)	(0.8590)
R-Sq.	0.1268	0.2516	0.1937

Table 3 shows the estimation results of the difference in difference estimations. Variables are used as described in text. *** indicates significance at the 1% level. All estimations were conducted using Newey-West heteroscedasticity- and autocorrelation-robust standard errors.

All other control variables are highly significant and show the expected sign. The coefficient of daily volatility in the Eurozone has a significant positive impact, which means that a higher Eurozone-wide volatility is accompanied by a higher dispersion in the Italian stock market. The number of trades and the Euro volume per trade of Italian stocks have a significant positive impact, while the corresponding British variables have a significant negative one. This indicates that higher trading activity in Italian stocks leads to an increase in return size relative to British stocks, while an increase in British trading activity leads to a decrease. This is quite reasonable from a market microstructure perspective, since one can assume that on days with new information, trading activity rises because investors want to alter their investment decision. However, for these days, we assume to see a higher change in prices which will lead to a higher absolute return in our data, and explains the estimated coefficients. The coefficients for market capitalization and average daily price are also highly significant and reasonable: their changing sign suggests that with higher market capitalization and lower price level of the stock under consideration, volatility is smaller. Thus, a higher market capitalization or lower price level on the Italian side leads to a decrease in our difference on the left side of the equation. The coefficients for the British stocks show the expected opposite signs, as is naturally expected.

The results for the consequences of the tax on quoted bid-ask spreads are found in the mid column of Table 3. On average, the spread difference between Italian and British stocks is 2.07 basis points. The TAX coefficient again shows a statistically positive impact of the tax on Italian stock spreads. The effect is about 10% in comparison to British stocks (based on the average spread difference). With respect to the average spread of Italian stocks of about 12.6 basis points, the coefficient of 0.218 indicates an increase of 1.73% in Italian stocks spreads after the tax introduction. Though this is fairly small, it is highly significant.

Furthermore, the results indicate higher spreads of Italian stocks relative to British ones with increasing Eurozone volatility. This is reasonable since higher volatility leads to more uncertainty about the fundamental value of stocks and about future prices, which leads to spread increases, and this should affect the Euro-area stocks in Italy more than the non-Euro area stocks in the UK. The number of trades in Italian stocks has a negative impact on the spread difference. This can be explained again by microstructure considerations. A higher number of trades can be seen as a measure of liquidity, which makes it easier to quickly sell stocks as it reduces holding risks. The British variable shows the expected opposite sign. All findings in this paragraph are in line with (for example) Rühl and Stein (2013). Volume per trade does not seem to have any significant impact however. This does not alter the implications from above, as it simply indicates that there is apparently no premium to be incurred for block transactions.

Interestingly, market capitalization has a positive impact on our spread difference. However, since market capitalization is measured in million Euros, the effects are too small to show a major impact. The average daily stock price is negatively significant for Italian stocks and positive for British ones, indicating a lower percentage quoted spread with a higher price level.

Finally, the right column of Table 3 presents the effects on trading volume, measured in thousand Euros. The TAX dummy has a negative sign as expected by the literature mentioned in the introduction. However, it is not significant. This can be because the first stage of the transaction tax including the high-frequency tax on shares was introduced in

March and a change in trading volume had occurred already then. Higher Eurozone-wide volatility leads to less trading volume relative to the trading volume on British stock markets. Normally, high volatility is expected to be observed along with trading on low volumes, what would explain this observation. A higher market capitalization leads to a higher trading volume in the respective stock market, explaining the positive and negative signs of the respective Italian and British variables; however, the coefficient size is fairly small. Further, higher average stock prices of Italian stocks lead to a higher trading volume; surprisingly, the British variable shows the same sign here.

4. Conclusion

In this study, we have investigated whether there are effects of the Italian financial transaction tax on key financial market variables. Focusing on the second stage of the tax introduction and using British stocks as a control group, we show that there has been an increase in volatility and quoted spreads after the tax introduction. With regards to the liquidity-volatility relation, the spread increase indicates liquidity constraining from the tax effect and the volatility effect indeed is upwards as suggested by the relation. This effect has the opposite direction when compared to the assumed intention of regulators what casts doubts on the effectiveness at least with respect to market volatility. In addition, as a decrease in trading volume cannot be seen from our analysis, this change could have occurred already during the first stage of the tax introduction - since the second stage focused on derivatives and the respective high-frequency trading. Unfortunately, data for this period were not available. Nevertheless, the structure of the tax introduction and our findings make it possible to argue that market-wide taxation on high-frequency trading and financial transactions leads to an increase in bid-ask spreads and market volatility.

References

[1] Ansi, Alef; Ben Ouda, Olfa (2009) "How Option Markets Affect Price Discovery on the Spot Markets: A Survey of the Empirical Literature and Synthesis" *International Journal of Business and Management* 4(8), 155-169.

[2] Baltagi, Badi H.; Li, Dong; Li, Qi (2006) "Transaction tax and stock market behaviour: evidence from an emerging market" *Empirical Economics* 31(2), 393-408.

[3] Clinch, Matt (2013) "Italy launches tax on high-frequency transactions" CNBC: http://www.cnbc.com/id/101002422

[4] Davies, Ryan J.; Kim, Sang Soo (2009) "Using matched samples to test for differences in trade execution costs" *Journal of Financial Markets* 12(2), 173-202.

[5] De Jong, Frank; Donders, Monique W. M. (1998) "Intraday Lead-Lag Relationships Between the Futures-, Options and Stock Market" *European Finance Review* 1(3), 337-359.

[6] Jawadi, Fredj; Ureche-Rangau, Loredana (2013) "Threshold linkages between volatility and trading volume: evidence from developed and emerging markets" *Studies in Nonlinear Dynamics & Econometrics* 17(3), 313-333.

[7] Jones, Charles M.; Seguin, Paul J. (1997) "Transaction Costs and Price Volatility: Evidence from Commission Deregulation" *American Economic Review* 87(4), 728-737.

[8] Meyer, Stephan; Wagener, Martin; Weinhardt, Christof (2013) "Politically Motivated Taxes in Financial Markets: The Case of the French Financial Transaction Tax" SSRN working paper, forthcoming in *Journal of Financial Services Research*.

[9] Ministry of Economy and Finance (2013) "FTT Decree": http://www.tesoro.it/primo-piano/article_0099.html

[10] Rühl, Tobias R.; Stein, Michael (2013) "The Cost of New Information - ECB Macro Announcement Impacts on Bid-Ask Spreads of European Blue Chips" *Ruhr Economic Papers* number 452.

[11] Stafford, Philip (2013) "Italy introduces tax on high-speed trade and equity derivatives" Financial Times: http://www.ft.com/intl/cms/s/0/378dcace-117e-11e3-8321-00144feabdc0.html#axzz2pdEIHG9i

[12] Umlauf, Steven R. (1993) "Transaction taxes and the behavior of the Swedish stock market" *Journal of Financial Economics* 33(2), 227-240.