Journal of Economic Dynamics & Control 36 (2012) 1248–1266

Contents lists available at SciVerse ScienceDirect

Journal of Economic Dynamics & Control

journal homepage: www.elsevier.com/locate/jedc

The impact of a financial transaction tax on stylized facts of price returns—Evidence from the lab

Jürgen Huber [a], Daniel Kleinlercher [a,1], Michael Kirchler [a,b,*]

[a] University of Innsbruck, Department of Banking and Finance, Universitätsstrasse 15, 6020 Innsbruck, Austria
[b] University of Gothenburg, Department of Economics, Centre for Finance, Vasagatan 1, 40530 Gothenburg, Sweden

ARTICLE INFO

Article history:
Received 7 February 2011
Received in revised form
30 August 2011
Available online 4 April 2012

JEL classification:
C91
E62
F31

Keywords:
Financial transaction tax
Stylized facts
Fat tails
Volatility clustering
Experiment

ABSTRACT

As the introduction of financial transaction taxes is increasingly discussed by political leaders we explore possible consequences such taxes could have on markets. Here we examine how "stylized facts", namely fat tails and volatility clustering, are affected by different tax regimes in laboratory experiments. We find that leptokurtosis of price returns is highest and clustered volatility is weakest in unilaterally taxed markets (where tax havens exist). Instead, tails are slimmest and volatility clustering is strongest in tax havens. When an encompassing financial transaction tax is levied, stylized facts hardly change compared to a scenario with no tax on all markets.

1. Introduction

In the wake of the financial crisis of 2007–2009 and the European debt crisis since 2010 the debate over the introduction of financial transaction taxes (FTT, a Tobin tax being the most prominent example for foreign exchange markets) got new impulses and new supporters. Especially in the EU, where chancellor Angela Merkel of Germany is the most outspoken advocate, the implementation of such a tax has become far from unthinkable. Whenever such major changes to markets are seriously considered it seems prudent to explore – as far as possible – consequences this could cause in affected markets. In this paper we do this by means of laboratory experiments. By exposing human traders to markets that mimic the key elements of the markets under consideration, we try to capture the main consequences that could result from this tax regime change.

The idea of a FTT has gained popularity as an instrument to reduce speculation and stabilize financial markets especially since the seminal work of Tobin (1978). Its originally intended effects include a decrease in volatility and an increase in market efficiency, as speculators (noise traders) are forced to reduce trading frequency. Scientific research on the impact of FTTs has mainly started in the 1990s with contributions by e.g. Stiglitz (1989), Summers and Summers (1989), Schwert and Seguin (1993), Jones and Seguin (1997), Subrahmanyam (1998), Dow and Rahi (2000), and Baltagi

* Corresponding author at: University of Innsbruck, Department of Banking and Finance, Universitätsstrasse 15, 6020 Innsbruck, Austria. Tel.: +43 512 507 7587; fax: +43 512 507 2846.
E-mail addresses: juergen.huber@uibk.ac.at (J. Huber), daniel.kleinlercher@uibk.ac.at (D. Kleinlercher), michael.kirchler@uibk.ac.at (M. Kirchler).
[1] Recipient of a DOC/DOC-fFORTE-fellowship of the Austrian Academy of Science.

0165-1889/$ - see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.jedc.2012.03.011

et al. (2006). There is broad consensus in the literature on some issues such as negative effects of a FTT on trading volume and market shares of taxed markets (compared to untaxed ones). Empirically, the decrease in trading volume is usually quite substantial when a financial transaction tax is introduced.[1] Other issues, notably price volatility and market efficiency are still controversially and hotly debated. In general, studies which use agent-based models with either boundedly rational agents (i.e., chartist/fundamentalist approach) or with zero-intelligence traders mainly report lower price volatility as a reaction to the imposition of a FTT (e.g., Westerhoff, 2003; Ehrenstein et al., 2005; Westerhoff and Dieci, 2006). Instead, empirical studies either look at historical examples of FTTs or indirectly measure FTTs as increased transaction costs. They mainly report no or a positive relationship of transaction costs and price volatility when different types of FTTs were imposed (e.g., Aliber et al., 2003; Hau, 2006).

The effects of FTTs have also been investigated in the laboratory. Hanke et al. (2010) report increased volatility in small unilaterally taxed markets when tax havens exist. Due to a shift in liquidity, volatility decreases in the tax haven at the same time. Kirchler et al. (2012) investigate the impact of market microstructure on the effects of FTTs.[2] Similarly to Hanke et al. (2010) they observe that volatility increases in unilaterally taxed markets without market makers, whereas it decreases when market makers provide permanent liquidity in unilaterally taxed markets. Importantly, both experimental studies report that an encompassing Tobin tax has no impact on volatility and market efficiency compared to a regime with no tax. Recently, a comprehensive survey on the impact and feasibility of the Tobin tax and FTTs has been published by McCulloch and Pacillo (2011). They review related scientific contributions since the 1970s and conclude that a Tobin tax is feasible and would generate substantial revenues without causing major distortions to market efficiency and price volatility. The latter is unlikely to decrease and could even increase.

In this paper we extend the body of literature by focusing on another implication of a FTT which has not been investigated so far—the impact of a FTT on so called "stylized facts" of price returns. As mentioned, the introduction of a FTT has effects on market liquidity, trading volume and price returns. In financial markets the distribution of the latter usually displays excess kurtosis ("fat tails" or leptokurtosis) and the time series is heteroscedastic ("volatility clustering"). These stylized facts are universal to financial markets and have been found in laboratory experiments as well.[3] As the implementation of a FTT has an impact on price returns, it is possible that stylized facts are affected as well.

To shed light on this issue we explore changes in leptokurtosis and volatility clustering in laboratory markets with different tax regimes. In each session two double auction markets for the same currency pair run simultaneously and a FTT is introduced in none, one, or both markets (i.e. no FTT on both markets; unilateral FTT, the other market being the tax haven; encompassing FTT). By using two simultaneously running markets we account for potential tax avoidance which allows us to analyze the impact of a FTT in unilaterally, and in comprehensively taxed markets, as well as in tax havens. Furthermore, we use two different microstructures that dominate real markets: (i) exchanges where market makers ensure permanent liquidity and (ii) over-the-counter markets where trading happens between individual parties without market makers. Some segments at real-world exchanges like at the CME and the LIFFE are examples of the former, while electronic trading platforms for currencies like EBS and Reuters3000 as well as the international money markets are examples of the latter. The choice of this specific setting is inspired by Pellizzari and Westerhoff (2009) which point out the high importance of market microstructure when a FTT is levied. If a FTT is imposed, they report a reduction in volatility in dealership markets where market makers provide permanent liquidity compared to a double-auction setting without market makers. Consequently, two treatments, Treatment "over the counter" (OTC) and Treatment "trading requirement" (TR), use the latter and Treatment "market maker" (MM) is applied with the former market microstructure. There are no specific limitations or requirements to trade in Treatment OTC, where each subject can post limit and market orders. With all other things being equal to Treatment OTC half of the subjects have a trading requirement in Treatment TR, i.e. a minimum amount of trading they have to carry out in each period to avoid a penalty. Instead, in Treatment MM computerized market makers provide a constant liquidity flow, while human subjects can only post market orders, i.e. accept limit orders posted by market makers.

We find leptokurtosis of the distribution of returns under each tax regime. The following results hold for each treatment: (i) fat tails are largest and significantly larger in unilaterally taxed markets compared to most other tax regimes, while they are smallest in tax havens. Furthermore, (ii) we report clustered volatility under most tax regimes, most prominently in the tax havens. Instead, (iii) the autocorrelation function (ACF) of normalized absolute returns decays very quickly towards zero in unilaterally taxed markets, i.e. there are no volatility clusters in this tax regime. This finding is caused by the low trading frequency in unilaterally taxed markets since intervals of hectic trading, which are the main volatility clusters, almost never occur. Finally, (iv) we observe hardly any changes in leptokurtosis and volatility clustering when an encompassing FTT is applied in comparison to both markets being untaxed.

The importance of investigating price return distributions under different tax regimes is straightforward. For instance, the pricing of options and other structured products depends on the underlying distribution of returns. Fatter tails under a

[1] For example, volume fell by more than 30% after an existing transaction tax of 0.1% was increased to 0.3% on the Shanghai Stock Exchange in May 2007. In Sweden the introduction of a FTT of 0.5% in 1984 led to the markets for futures and for bills to dry up almost completely and more than half of share trading to move abroad, mostly to London (Umlauf, 1993).

[2] Two of the three treatments we analyze here are also included in their paper, though with a different research focus.

[3] See e.g. Mandelbrot (1963), Mandelbrot and Taylor (1967), Cont (1997), Plerou et al. (1999), Mantegna and Stanley (2000), Bouchaud and Potters (2001) for literature on stylized facts in general and Plott and Sunder (1982), Scalas et al. (2006), Kirchler and Huber (2009) for stylized facts in laboratory experiments.