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Some effects of transaction taxes under different microstructures☆

Paolo Pellizzari[a,*], Frank Westerhoff[b]

[a] Ca' Foscari University, Dept. of Applied Mathematics, Dorsuduro 3825/E, 30123 Venice, Italy
[b] University of Bamberg, Department of Economics, Feldkirchenstrasse 21, 96045 Bamberg, Germany

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ABSTRACT

We show that the effectiveness of transaction taxes depends on the market microstructure. Within our model, heterogeneous traders use a blend of technical and fundamental trading strategies to determine their orders. In addition, they may become inactive if the profitability of trading decreases. We find that in a continuous double auction market the imposition of a transaction tax is not likely to stabilize financial markets since a reduction in market liquidity amplifies the average price impact of a given order. In a dealership market, however, abundant liquidity is provided by specialists, and thus a transaction tax may reduce volatility by crowding out speculative orders.

1. Introduction

As, for instance, illustrated by Shiller (2000), financial markets are quite volatile and may display severe bubbles and crashes. Since asset prices are determined by the orders of market participants, one may argue that speculative activity is at least at some times excessive in financial markets. Keynes (1936) and Tobin (1978) therefore suggested introducing a Transaction Tax (TT) in financial markets in order to curb speculative activity. Their basic argument rests on the assumption that there are two types of market participants: stabilizing long-term investors and destabilizing short-term speculators. A low transaction tax presumably has no impact on long-term investors, meaning that their stabilizing influence on the market should remain intact. However, even a modest transaction tax may have a strong impact on the profitability of short-term speculators. Keynes and Tobin suspect that this trader type is the main trigger for the recurrent turbulent behavior of financial markets. If destabilizing short-term speculative orders decrease, financial markets should become more efficient.

The optimistic view of Keynes and Tobin has been supported by a number of prominent economists, including Stiglitz (1989), Summers and Summers (1989) and Eichengreen et al. (1995). For a general discussion of this topic see Schwert and Seguin (1993), Ul Haq et al. (1996) and Spahn (2002). There are, however, also opponents to this proposal. For instance, a few empirical papers conclude that transaction taxes may not contribute to the stabilization of financial markets (Umlauf, 1993; Jones and Seguin, 1997; Aliber et al., 2003; Hau, 2006). However, one should note that these empirical studies are faced with some restrictions. For instance, the paper by Umlauf investigates the case where Sweden introduced a transaction tax rate of 2 percent, whereas nowadays no one is likely to recommend such a high transaction tax. Further sceptical

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* Corresponding author. Tel.: +39 0412346924; fax: +39 0415221756.
E-mail addresses: paolop@unive.it (P. Pellizzari), frank.westerhoff@uni-bamberg.de (F. Westerhoff).

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comments concerning the empirical research may be found in Werner (2003). Another problematic aspect of transaction taxes may be that policy makers could have an incentive to maximize their tax revenues and thereby select a tax rate which is not efficient with respect to market stability. Note that Tobin always stressed that the key goal of transaction taxes should be the stabilization of financial markets, and that the implicit generation of tax revenues is merely a side effect.

According to survey studies (e.g. Taylor and Allen, 1992), market participants rely on both technical and fundamental trading rules to determine their orders. Guided by these observations, models have been developed that explore the impact of heterogeneous interacting agents upon the market dynamics. This approach, recently reviewed in Hommes (2006), LeBaron (2006) and Lux (in press), has proven to be quite successful. For instance, these models are able to replicate some important stylized facts of financial markets, such as bubbles and crashes, excess volatility and fat tails for the distribution of returns, thereby adding to our understanding of the working of financial markets. Key contributions include Day and Huang (1990), Kirman (1991), Chiarella (1992), De Grauwe et al. (1993), Lux (1995), Brock and Hommes (1998), Farmer and Joshi (2002) and Rosser et al. (2003).

Given the power of these models, it seems natural to use them as artificial laboratories to test the effectiveness of transaction taxes. An early contribution in this direction is Frankel (1996). This paper develops a simple exchange rate model with two types of agents: investors believe that the exchange rate will return towards its fundamental value while speculators are convinced that the exchange rate will trace out a bubble path. Frankel analytically shows that an exogenous increase in the fraction of investors leads to a reduction in the variability of the exchange rate. The opposite is true when the proportion of speculators increases. According to Frankel, a transaction tax could be expected to lower the fraction of speculators or to raise the fraction of investors. Either way, he suspects that the volatility of the exchange rate will decrease.

Westerhoff (2003) and Westerhoff and Dieci (2006) develop models in which agents may endogenously select between technical and fundamental trading rules. In addition, they may be inactive. The agents' choice process depends on the strategies' past performance. A strategy that did well in the past will be followed by more agents in the future. These two models predict that the imposition of a low transaction tax is likely to increase market stability, since it crowds out speculative activity. Only when the tax rate is set too high may market efficiency decrease.

Ehrenstein et al. (2005) and Mannaro et al. (2006) claim that transaction taxes may have a negative impact on market liquidity. This is an important observation since market liquidity is inversely related to the price responsiveness of a given order (see Lillo et al., 2003; Farmer et al., 2004; Lillo and Farmer, 2005). This means that the lower the liquidity, the stronger the price change is with respect to a given incoming order. Both papers find that if this effect is taken into account, the stabilizing impact of a transaction tax decreases.

So far, most models focus on the case of a (constant) uniform tax on all transactions. Spahn (2002) contains the early suggestion to couple the size of the tax rate to the current price volatility. For instance, during an outburst of volatility a small transaction tax may not be sufficient to prevent destabilizing speculation. A mechanism which automatically increases the tax rate in such a situation clearly appears to be worth further research.[1]

The goal of our paper is to systematically reconcile the apparently contrasting results provided in the aforementioned literature. For this reason, we develop a model along the lines of Chiarella and Iori (2002) (CI), in which agents rely on a blend of technical, fundamental and random trading strategies. However, if past trading generates losses, a trader may also (temporarily) retreat from the market. The price adjustment is modelled in both a continuous double auction and in a dealership environment. Both settings have the potential to generate reasonable price dynamics. Therefore, our model allows a comparison of the implications of transaction taxes within different institutional market settings.

Our simulation experiments reveal that the consequences of transaction taxes depend on the total liquidity provided. When abundant exogenous liquidity is provided, the tax is stabilizing. This result, however, does not hold in other settings, as in the presence of market protocols where liquidity is endogenous and fluctuating. Most of the theoretical work, e.g. Westerhoff and Dieci (2006), is indeed based on a market-maker scenario in which infinite liquidity is provided. On the other hand, most empirical work collects data from more realistic market structures where liquidity imperfections are amplified by the tax, resulting in little effect or even in a deterioration of market quality. More subtly, our work suggests that finer details in the functioning of the market may ultimately decide whether the introduction of a Tobin tax has a stabilizing effect. Levying a transaction fee always reduces the volume, which, in turn, is only harmful if liquidity is affected and this triggers an increment in volatility. However, if market-makers offer liquidity widely, the tax is effective and produces less volatility. Surprisingly, the imposition of a transaction tax does not have a clear relation to the distortion, i.e. to the average absolute deviation between prices and fundamentals.

The paper is organized as follows. In Section 2, we discuss how market participants determine their orders. Our setup is related to the one presented by CI, yet we additionally assume that the market entry decision of traders is endogenous and depends on profit considerations. In Section 3, we introduce the market protocols. Order induced price adjustments take place either within a continuous double auction market or within a dealership market. In Section 4, we present our results. The last section concludes this paper and one Appendix A provides additional information on the simulated time series.

[1] We thank an anonymous referee for pointing out this aspect to us.