

**Assessment of:**  
**Transaction Taxes and Traders with Heterogeneous Investment Horizons  
in an Agent-Based Financial Market Model**

**by**  
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(Version November 10, 2009)

**What the paper is about**

The main message of the paper is a confirmation that, although reducing the profitability of short-term trading in favour of longer-term trading strategies, taxing the transactions on financial markets is not stabilizing *per se*. Taxation seems to work for sufficiently low tax rates, while beyond a certain threshold it is found to be destabilizing. This is an important result that in principle could even be communicated to policy makers.<sup>1</sup>

The agent-based model presented in this paper provides a laboratory within which these phenomena can be thoroughly studied. In my view, it actually marks out a very attractive playing ground for this purpose. First, it is a small-scale model with only a few groups of alternative trading strategies. While it may be desirable to keep track of each agent and, in particular, of his liquidity position, in the present type of model one has a better chance to understand the basic dynamic mechanisms that lead to the results obtained.

Second, the level of abstraction that is chosen here sets a stage for the most relevant trading strategies. We have the usual simple fundamentalist and chartist trading rules, between which the agents can switch according to their differential fitness (as specified by the standard discrete choice model). However, each of the rules distinguishes two reaction coefficients, which are interpreted as corresponding to a short (daily) and long (somewhat longer than a month) investment horizon, where the parameterization is nicely done. In addition, the agents are allowed to remain inactive. This option should not be underestimated as it is not only useful to have for conceptual reasons (or even realism), but it also proves to be important for some of the results (cf. the discussion on p. 20).

Third, the model is able to replicate a number of stylized facts for financial

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<sup>1</sup>Notwithstanding the strong doubts one may have about whether “during phases of financial instability” they really “are often tempted to the introduction of financial market taxes” (p. 27).

markets at a daily frequency. This contributes to the credibility of the model (which with additional work could be further improved, as discussed below).

Basically, this is a well motivated and (with exceptions) well written paper that applies a well suited agent-based model to learn more about the implications of a transaction tax on financial markets. It therefore deserves to be included in the *Journal Articles*. Nevertheless, as indicated later, some revisions should be made to improve the presentation and readability. Before turning to these relatively minor points, which could be treated without much effort, I would like to make some remarks that, starting out from the present model, can give a perspective for future work and may also be (briefly) discussed in a revised version from the author's point of view.

## Observations and Perspectives

1. In combination with the switching dynamics between different trading rules, the perturbations  $\beta_t, \alpha_t$  in equations (1) and (2) constitute what in Franke and Westerhoff (2009a,b) has been identified as structural stochastic volatility (SSV; Frank Westerhoff in his comment on the paper did not make this point out of modesty). Although combined with a different switching device, it is shown there that SSV is a key mechanism to generate the stylized facts of volatility clustering and long memory in the daily returns, and there is every reason to believe that the same is true for the present model.<sup>2</sup>
2. I guess that there is a (very) wide region of numerical parameter values that are equally able to match the qualitative features described in the text and the three (significant) summary statistics given in Table 2. Therefore the concern in previous comments for the robustness of the results under different, so far equally meaningful parameter scenarios.

The parameters underlying the policy experiments would be more relevant if they were calibrated to a larger set of quantitative summary statistics; for example, similar to the ones used in Franke and Westerhoff (2009a,b). Judging from the results reported there, I am very confident that the present model will be quite as good in replicating these stylized facts, if not better.<sup>3</sup>

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<sup>2</sup>The noise in the price impact function (5) is not needed for this purpose. Furthermore, in estimations it would probably be very hard to disentangle  $\sigma_\varepsilon$  from  $\sigma_\alpha$  and  $\sigma_\beta$ .

<sup>3</sup>To begin with, I am thinking of a trial-and-error procedure until a reasonable good match is found. Estimation (by the method of simulated moments) and identification would be another topic

3. A special point is the reference to the kurtosis as a statistic to match and to evaluate a policy. Apart from the information of whether being compatible or not with a normal distribution, it is not a very robust measure.<sup>4</sup> Would the feature that excessive returns occur more often than in the normal distribution not better be captured by the Hill estimator as a measure of fat tails of returns?
4. As has already been alluded to in one of the comments on this paper, it would be desirable to test the taxation results for other meaningful parameter combinations. On the basis of the remarks from above, this suggests to calibrate the model to a major stock market (it does not matter whether  $s_t$  in the model is an exchange rate or a stock market index). Just as in Franke and Westerhoff, it can also here be expected that this would change some of the parameters in a more or less “significant” way. Since the policy results obtained so far are intuitive and sufficiently well explained by the mechanisms in the model, it can furthermore be expected that they are essentially preserved. Nonetheless, this remains to be verified, a more specific question being whether the critical threshold value of the tax rate will be lower or higher than for the FX market calibration (one may begin with an educated guess).
5. Stochastic noise is added to the demand of the short-term fundamentalists and chartists, but not to the demand of the long-term traders, because “we assume longer term trading rules to be more robust compared to the one period rules” (p. 9). That’s an assumption—OK. On the other hand, since the noise can be said to capture a within-group heterogeneity (see Franke and Westerhoff, 2009a), it may also be argued that there is a higher variability in the agents’ long-term extrapolations of their short-term trading principles. Hence a noise term in (3) and (4) seems as appropriate as in (1) and (2), unless more.

To keep things simple, this consideration suggests an alternative noise scenario: random perturbations in (3), (4) instead of (1), (2). The author may make an(other) educated guess as to how this respecification may, or may not, affect the results (after a possible recalibration of the model). Regard-

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(beyond the scope of the present paper) to establish the model as a useful and credible working horse.

<sup>4</sup>I remember work of Gilli and Winker where they decided to give up their previous use of the kurtosis as a moment to match, because it is too sensitive.

ing the introduction of noise in all four trading rules, I do not know whether this would be too artificial, or necessary for a better evaluation of the other results.

6. The most obvious parameter to examine robustness is  $N$  as the specification of the “long term”. Incidentally, this parameter need not necessarily be identical for the fundamentalists and chartists. In addition, it now comes to my mind, what about introducing medium-term agents, i.e., fundamentalists and chartists with investment horizon  $N/2$ ? This proposal may not be regarded as a lack of modelling discipline; it rather asks the question whether or not some of the previous results would not tend to be washed out if there is a larger variety of trading rules. Any conjecture?

#### **Issues of presentation (in no particular order)**

1. Does the specification  $s_{t+1}^f = s_t^f + 0.01\varepsilon_{t+1}$  mean that on average the fundamental value changes by 1 per cent, or by 0.01 per cent? From the other notation I infer the first case, but this seems strongly exaggerated (especially for the major exchange rates)—or not? Besides, concerning the note on Figure 8, a time-varying value that “is normalized to zero” sounds strange.
2. Can the price collapse in Figure 1 near  $t = 1500$  be explained in greater detail? The sharp increase in the number of short-term chartists does not seem to be all that is involved here, since a similar increase can be observed around  $t = 500$ , where the bubble is smaller and shorter.
3. Comparing the first panel of Figures 8 and 9, distortion increases with the introduction of the transaction tax. In the latter case it would even be a disaster? In contrast, according to the (large sample) statistic in Figure 10 the misalignment is reduced. This appears to be somewhat puzzling.
4. I suppose that each of the “100 time series of 5000 days trading days” (p. 15) is exclusive of an initial period with its possible transitory effects. This information may be added for completeness.
5. The introduction may be concentrated into a few salient points.
6. There are some repetitions, which the author should try to remove; especially in the references to the literature, some of which are gratuitous, too.

7. In contrast to one of the prompter referees, I find the listing of the requirements and assumptions on p. 7 helpful (if repetitions with the other text are avoided).
8. As not every reader will like the game of assigning the symbols in Table 1 and the notes on the figures to the symbols in the text, the notation should be correspondingly adjusted. Besides, what are the “fundamental and non-fundamental news” mentioned in Table 1?
9. Not only the eye would appreciate it if the longer paragraphs were subdivided into two or three portions.
10. The description of the model in equations (1)–(15) forgets the (alternative) specification(s) of the fundamental price  $s_t^f$ .
11. The information from Figures 2–5 may be condensed in a few representative panels (mentioning, for example, that some of those not shown look similar or dissimilar to some of the ones exhibited). And the panels should be larger.
12. When the Conclusion on p. 26 summarizes that tax rates above a threshold make longer-term fundamentalist trading unprofitable relative to the longer-term trend-chasing trading, the reason for this phenomenon should be reiterated, too.

## References

FRANKE, R. AND WESTERHOFF, F. (2009a): Validation of a structural stochastic volatility model of asset pricing. Universities of Kiel and Bamberg.

FRANKE, R. AND WESTERHOFF, F. (2009b): Estimation of a structural stochastic volatility model of asset pricing. Universities of Kiel and Bamberg.

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[http://www.uni-bamberg.de/vwl-wipo/leistungen/team/prof\\_dr\\_frank\\_westerhoff/](http://www.uni-bamberg.de/vwl-wipo/leistungen/team/prof_dr_frank_westerhoff/)