Tobin Tax Reconsideration:  
A Micro-Foundation Approach

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TOBIN TAX RECONSIDERATION: 
A MICRO-FOUNDATION APPROACH

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Abstract

The Tobin Tax is widely discussed in the literature, especially in those journals that with pan-Keynesian ideology with macro-foundation analysis. This paper provides a micro-foundation analysis of Tobin Tax. We can see that speculative activities are deterred after imposing the Tobin Tax.

1. Introduction

James Tobin, the 1981 Nobel Prize laureate, has just passed away in March 11, 2002. His significant impact may not be his analysis of financial markets or macroeconomic theory. Tobin has proposed a kind of transaction tax in 1978 which so-called ‘Tobin Tax’ thereafter’. During the recent years, ‘Tobin Tax’ has become the theoretical center of Anti-Globalization movements that held by the Left Wings. The Left also make March 13, that by chance is just 2 days after his death, as ‘Tobin’s Day’ in memorial of James Tobin and his ‘Tobin Tax’.

The Tobin Tax is widely discussed in the literature, especially in those journals that with pan-Keynesian ideology. As being a votary of Keynes, this inspire my curiosity to investigate. But after my survey in literature, I found that there’s rare formal research of Tobin Tax that written in Chinese. The only one formal research in Taiwan is given by

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施盈瑩 (2001) which is the thesis of her master degree using rational expectation methods. The another example is 林建山 (1999). But he only treats Tobin Tax as an introduction of international tax systems. As for English bibliography, all discussing papers analyzed with macro-approach or become ideological debates. This paper is going to provide a micro-foundation analysis of Tobin Tax.

2. Historical Notes

The Tobin Tax was first proposed in 1978 by James Tobin. Tobin proposed a very small tax on foreign exchange transactions to deter short-term currency speculation. The tax rate was designed to be low enough not to have an adverse effect on trade in goods and services or long-term investments in order to ‘throw some sand in the wheels’ but rather to cut into the profits of speculators. Tobin Tax is also nicked as ‘Robin Hood Tax’, because the tax revenue is using to give relief to the poor. As far as my knowledge, there’re only two countries—Chile and Columbia have ever levied such kind of tax.

In the ‘Policy Forum’ of Economic Journal, Eichengreen, Tobin, and Wyplosz (1995) have argued the volatility in foreign exchange markets due to speculation can have ‘real economic consequences devastating for particular sectors and whole economies’. The argument is based on Tobin’s presidential address conference in 1978. Tobin (1978) has proposed such a transaction tax in order to discourage the incentive of speculations. And by such a mean, thus can increase more stability to financial markets. Without any mathematical proofs, the original intention of Tobin is just unwitting but attracts many discussions among it.

Dimand and Dore (2000) provide a historical note that illustrates how Tobin Tax is discussed and reformed. Dimand and Dore (2000) used the phrase ‘Keynes’s casino capitalism’ to make his conclusion. Davidson (1997) is a pro of Tobin Tax. Davidson (1997) has point out that the idea of Tobin Tax is rooted in Keynes’s theory by using context analysis.

It becomes not only debates between schools, but also the belief of market mechanism. We can see the debate between de Angelis (1999-2000) and Davidson (1999-2000) in Journal of Post Keynesian economics that argued over the ideological belief of market stability.
There’re also many economists such like Garber and Taylor (1995), Shome and Stotsky (1995), Spahn (1995) argued that it’s difficult to distinguish between regular transactions and speculative transactions. They also argue that Tobin Tax will also make bad influence to volatility of capital movement.

There’re too large part in literature with left-ideology where can be checked on Econlit or SSCI to cited in my paper. So I intend to ignore them and that’s not related to my analysis.

3. The Model

The basic idea of this paper comes from Davidson (1997). Davidson (1997) analyzed the behavior of a portfolio manager, which is affected by the expect differences of exchange rates. I extend this idea and take time factor into consideration.

3.1 The Speculator’s Problem

Suppose there exists a representative agent whose behavior can represent speculators’ behavior. He considers the difference of exchange rates, which can make him arbitrage from those. The difference of exchange rate denoted by . Assume for simplicity that the market interest rate is , which under competitive market equals to discount rate is constant over time. The indirect utility comes from the profit he gains. So the problem of the representative speculator illustrated as follow:

\[
\begin{align*}
\max & \quad E[V(Y, T)] = \int_0^T \left[ V \left( \rho \int_0^T \left( p_{bull} \right) e^{-tr} ds \right) + (1-\rho) \int_0^T \left( p_{bear} \right) e^{-tr} ds \right] f(t) dt \\
\text{where } & \quad Y = \rho \int_0^T \left( p_{bull} \right) e^{-tr} ds + (1-\rho) \int_0^T \left( p_{bear} \right) e^{-tr} ds, \text{ and } e^{-tr} \text{ is discount factor of profits.}
\end{align*}
\]

The agent is trying to maximize his von Neumann-Morgenstern expect
indirect utility $E[V(Y, T)]$ by choosing total time $T$ he plays in arbitrage activities. If $p > 0$, then the agent become ‘bull’\(^1\) so denoted by $p_{bull}$. By the contrast, $p < 0$ is the ‘bear’\(^2\), denotes $p_{bear}$. The profit function is $\pi_1(p_{bull})$ when the agent is ‘bull’. It’s $\pi_2(p_{bear})$ when the agent is ‘bear’.

Illustrated as follow:

\[
\begin{cases}
\text{If } p > 0, \text{ denoted by } p_{bull}, \text{ then } \pi_1 = \pi_1(p_{bull}) \\
\text{If } p < 0, \text{ denoted by } p_{bear}, \text{ then } \pi_2 = \pi_2(p_{bear})
\end{cases}
\]

where $\pi_1(p_{bull}) > \pi_2(p_{bear})$

### 3.2 Sorting Technique

Imagine that the agent who plays $T$ times arbitrage activities, which is assumed to be continuous and $T \in [0, \infty)$. He will gain in several times and maybe lose in other times. So we can sort the ‘bull times’ together and ‘bear times’ together. We assume that the agent gains $t$ times (bull times), and $t \in [0, T]$ which is a random variable with a probability density function $f(t)$ on $[0, T]$. Define that $\rho$ is equal to the probability the agent gains. So that $\rho = F(t)$, where $F(t)$ is the cumulated distribution function of $t$. And the probability of ‘bear times’ becomes $(1 - \rho)$. Note that $\rho$ is not necessary equal to $(1 - \rho)$.

### 3.3 Zero-Sum Assumption

Before solving this optimization problem, we have to do something to reduce the difficulty. It’s plausible to assume that it is a zero-sum game that the net gain of the speculator must be the net loss of the speculator in the opposite side of exchange market.

We now let $\rho \int_0^T \pi_1(p_{bull}) e^{-rs} ds = (1 - \rho) \int_0^T \pi_2(p_{bear}) e^{-rs} ds$, so $Y$ becomes

\(^1\) The word ‘bull’ means the arbitrager gains from arbitrage.

\(^2\) The word ‘bear’ means the arbitrager loses from arbitrage.
\[ Y = 2(1 - \rho) \left[ \int_0^T \pi_2 \left( p_{\text{bear}} \right) e^{-rt} \, ds \right] \]

\[ = 2(1 - \rho) \left[ \frac{1}{r} \pi_2 \left( p_{\text{bear}} \right) e^{-rT} - \frac{1}{r} \pi_2 \left( p_{\text{bear}} \right) e^{-rt} \right] \]

Take the first order condition with respect to \( T \), we get

\[ \frac{\partial E[V(Y, T)]}{\partial T} = 2E[V_T(Y, T)(1 - \rho)] \pi_2 e^{-rT} = 0 \]

As we can see, that the term \( 2\pi_2 e^{-rT} \neq 0 \), so there must be two kinds of circumstances, which are \( V_T(Y, T) = 0 \) or \( (1 - \rho) = 0 \), or both.

### 3.4 Risk Attitude

The problem aroused as above. The attitude toward risk seems becomes critical to the solution. We can distinguish as follow: the agent is risk neutral, risk lover, or risk averter.

So as \( V_T(Y, T) = 0 \), implies the agent is risk neutral. \( V_T(Y, T) > 0 \), then the agent is a risk lover. \( V_T(Y, T) < 0 \), if the agent is a risk averter.

(i) If \( V_T = 0 \), \((1 - \rho) = 1 - F(t) \neq 0 \), which is unable to determine \( T \), which stands for the time the agent plays.

(ii) If \( V_T > 0 \), \((1 - \rho) = 1 - F(t) = 0 \Leftrightarrow F(t) = 1 \Leftrightarrow t = T \). It's an interesting result that of course the agent will maximize his expect utility whenever he gains all the time.

(iii) If \( V_T < 0 \), the same result will hold as (ii).

But we still cannot determine \( T \), so it maybe infinite or zero, means the portfolio managers decide to arbitrage in exchange market or not, because the function must be discontinuous at 0 or \( \infty \). It's a reasonable result. It's no wonder that there're always plenty of speculators every time and everywhere. The problem of exact value of
Now introduce the Tobin Tax into the system. Imposing a tax whose tax rate is $\tau$ on $p$. So the problem becomes:

$$Y_t = \rho \left[ \pi_1 \left( 1 - \tau \right) p_{\text{bull}} e^{-rs} ds \right] + \left( 1 - \rho \right) \left[ \pi_2 \left( 1 - \tau \right) p_{\text{bear}} e^{-rs} ds \right]$$

$$\text{Max} \ E[V(Y_t, T)]$$

By the same manipulation, we got

$$\frac{\partial E[V(Y_t, T)]}{\partial T} = 2E[V_T'(Y_t)(1 - \rho)]\pi_2 e^{-rT} = 0$$

Take totally differential with respect to $\tau$ and $T$, the result is much clear.

$$\frac{dT}{d\tau} = \frac{-E \left[ 2V_T'(Y_t)(1 - \rho) \pi_2 \left( 1 - \tau \right) p_{\text{bear}} e^{-rT} - V_T'(Y_t) p_{\text{bear}} \right]}{E \left[ 2V_T'(Y_t)(1 - \rho) \pi_2 \left( 1 - \tau \right) p_{\text{bear}} e^{-rT} - V_T'(Y_t) \pi_2 r \right]} < 0$$

As we can see, $T$ is discouraged after imposing Tobin Tax. Recall that $p_{\text{bear}} < 0$, so the numerator term is positive and so $\frac{dT}{d\tau}$ must be negative. Remember that $T$ may be infinite or zero. But now, ‘zero’ is less possible. The number of times of speculative activities is deterred from $\infty$. But the elasticity of determent denoted by $\xi_{\tau T} = \frac{dT}{d\tau} \frac{\partial \tau}{T}$ is a

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$^3$ If $T = 0$, $dT = -\alpha \frac{d\tau}{d\tau}$ and $d\tau > 0$. So $dT < 0$, then $T + dT < 0$. How could it be possible?
small number, because $T \to \infty$ and $\tau$, by the original proposal of Tobin (1978), is a small ratio. So we can conclude that the speculative activities will be deterred by Tobin Tax, but not so much. We can conservatively say that Tobin Tax won’t cause the wheels of international finance collapsed.

5. Conclusion

There are more questions aroused: is the exchange market become more stable when speculative activities decrease? Is there a trade-off between capital volatility and stability? As we can now understand, there is quite sure no doubt that Tobin Tax will discourage speculative activities or even though regular transactions. But the point of view is quite different in the first question that related to the faith of the stability mechanism of markets. And this is the original of all the controversy between pan-Keynesians and other schools such like New Classical Economic School.

However, the Tobin Tax now is executed not based on the theory of mainstream economic schools but being advocated by Marxian and The Left. Mr. Tobin has interviewed by the celebrated left-ideological German magazine Der Spiegel. The answer by Mr. Tobin to the reporter is suitable for me to make the conclusion of this paper, “The brilliant applause always comes from the adverse side.” Even the ideology of Mr. Tobin has nothing in common with them.
References