

## 1. Introduction

The connection between rational speculation and price volatility in financial markets has been the subject of controversy. Some claim that rational speculation must reduce price volatility. The classic statement comes from Milton Friedman (1953): “People who have argued that speculation can be destabilizing seldom realize that this is largely equivalent to saying that speculators lose money, since speculation can be destabilizing in general only if speculators sell when the currency is low in price and buy when it is high”. He points out that those speculators who regularly lose money this way will be driven out of the market<sup>1</sup>. Therefore, only rational speculators will survive in the market, and that rational speculation cannot be destabilizing. Contrary to Friedman’s argument, Carlson and Osler (2000) show that rational speculators can but need not increase exchange rate volatility. The speculators’ effect on exchange rate volatility varies according to the types of shocks hitting the market. Others with a similar view on speculative activity have discussed the imposition of tax on international currency transactions to reduce currency instability, commonly known as the Tobin tax (Tobin, 1978). Its intention is to discourage disruptive speculation in foreign-exchange markets by raising the cost of engaging in such activities.

Similarly, in the stock market, which is one of the financial market, many scholars have discussed the relationship between the policy-induced reduction of speculation and the market volatility. Some argue that the imposition of tax would dampen the stock price volatility. Somer (1948) points out that a tax on capital gains will induce the “lock-in” effect that causes investors to postpone the sale of the stock

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<sup>1</sup> Here we think of the speculators who buy at high price and sell at low price as the irrational speculators. On the other hand, speculators who buy at low price and sell at high price and therefore make money with such successful strategies are considered as the rational speculators.

which have appreciated in price, and dispose of the stock which have depreciated in value. Thus, the tax acts to increase the supply of stocks in a falling market and reduce the supply of stocks in a rising market, increasing the fluctuation of the stock price. What is more, Atkins and Dyl (1997) provide an empirical study by documenting the cross-sectional relationship between volatility, trading frequency, and transaction cost for common stocks trading on the New York Stock Exchange (NYSE). Their finding is that the volatility is actually associated with high transaction cost. However, on the other hand, some scholars present that the transaction cost is not associated with the stock price volatility. Umlauf (1993) reports that the security transaction tax in Sweden reduced trading volume, but not volatility. Jones and Seguin (1995) also finds that the abolition of fixed commissions for NYSE stocks in May of 1975 did not increase the volatility. Since most of those findings come from empirical evidences and have not reached a consensus, it provides us an incentive to construct a theoretical model for the stock market to examine the relationship between the tax rate and the price volatility.

Theoretical articles about the stock market have always been proposed. Blanchard (1981) develops a model of the determination of output, the stock market and the term structure of interest rates. It has shown the interaction between output and the stock market. Based on Blanchard's concept on equity market, Chu (2003) sets up an equity-market model considering the role of foreign capitals. She brings the foreign rational speculators into the market to investigate whether foreign capital stabilizes or destabilizes the local equity market. The finding is that an increase in foreign speculators' taste for risk may decrease or increase the conditional variance of the equity price depending on whether an unanticipated disturbance will change the desired holdings of equity assets held by foreign speculators. Based on this model,

Chu (2004) then further analyzes the relationship between capital controls and the equity market volatility. This research discusses whether an imposition of foreign income tax stabilizes the local equity market and concludes that capital controls can reduce market volatility sometimes but not all the times. In addition to Chu (2003), Hsu (2003) proposes a model involving the domestic rational speculation. He explains the stock price volatility by the speculators' stock-holding adjustment and finds that whether an increase in speculation dampens the stock price depends on the type of unexpected shocks. The framework of our model is based on Hsu's. However, different from Hsu, we further impose a tax rate on capital gains. In addition, in Hsu's model, we notice that the speculators' holding adjustment depends on both the capital gains and the variance of price. However, Hsu only takes the effect of capital gains into account when studying the stock-holding adjustment process, but ignores the influence of the variance. In contrast to Hsu's, our analysis will suggest a possible explanation considering both effects of the capital gains and the variance of price to provide a better understanding of the speculators' behavior.

Briefly speaking, the purpose of this paper is to study whether a tax on capital gains can reduce the stock market volatility. Our model is based on Hsu's, but further imposes a tax on capital gains. In particular, we tend to advance the way that Hsu explains for the stock market volatility. There are four sections in this paper. Besides this section, Section 2 develops and solves the model. Section 3 analyzes how the stock market volatility changes as the tax rate on capital gains rises, and Section 4 concludes.