附件：封面格式

行政院國家科學委員會補助專題研究計畫成果報告

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※ ROLL的有效買賣差價模型的再修正及實證研究 ※
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計畫類別：☑個別型計畫 □整合型計畫
計畫編號：NSC NSC89-2416-H-032-018
執行期間：88年8月1日至89年7月31日

計畫主持人：陳達新
共同主持人：

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執行單位：淡江大學財務金融學系

中 華 民 國 89 年 10 月 31 日

行政院國家科學委員會專題研究計畫成果報告

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一、中文摘要

國科會自八十七年度起補助專題計畫成果報告準備方式有所變革，本文提供一個統一格式*，可供主持人撰寫報告時參考使用。

關鍵詞：專題計畫、報告格式、國科會

Abstract

An optimizing model of a foreign currency dealer's spread decision is analyzed. It is shown that the optimal spread is a function of the dealer's risk aversion parameters, price and volume volatility, the current value of the currency traded, domestic and foreign interest rates, and the opportunity costs of committing funds to currency trading. The comparative statics of the spread estimator are analyzed. The optimal spread generates unambiguous results for some explanatory factors like price risk, currency price level and the opportunity cost of credit, but holds forth the possibility of a richer set of interaction among other variables. For instance, it allows for spreads to increase or decrease as trading volume and volume volatility increase.

Keywords: bid, ask , spread, foreign currency

二、緣由與目的

The objective of this paper is to simulate the dealer's decision-making process and to see how certain critical factors influence the process of bid-ask spread determination in the foreign exchange market. To meet this objective, a two-period bid-ask spread model similar in spirit to those of Stoll (1978) and Shen (1993) is developed.

In this study, we extend the works of Stoll and Shen in several directions, which include explanatory roles for foreign interest rates, opportunity costs of credit lines, and price and volume variability. Even though originally designed for the equity market, their models assume the liquidation of inventory, which we believe, is consistent with the usual observations of repeated passage of inventory imbalances among dealers in the foreign exchange market. (See, for example, Lyons (1995).)

In Stoll's model, the dealer's decision problem is to set prices for one transaction period. She will buy or sell the asset at time 0 and will liquidate the asset at time 1. The dealer finances her inventory by borrowing at the risk-free rate. At the same time she can lend excess funds at the risk-free rate. In Shen's model, the dealer also stays in the business for only one period and the dealer's pricing strategy is to balance (1) the profit function resulting from fees for providing the dealing service and the changing value of inventory value and (2) the quadratic loss function due to an unbalanced inventory and uncertain future price changes. However, Stoll's model considers the domestic risk-free rate as an opportunity cost measure and Shen's model does not even consider the interest rate factor.

Nevertheless, interest rate differentials are important in spread determination in the foreign exchange market. Thus the models of Stoll and Shen, which both focus on the equity market and do not incorporate interest rate differentials, need to be modified in order to be used in the foreign exchange market. Surprisingly, no theoretical bid-ask

spread model in the foreign exchange market explicitly incorporates domestic and foreign interest rates, even though there is evidence showing that they are an important opportunity cost measure as well as a risk measure. Our bid-ask spread estimator does include both domestic and foreign interest rates.

It can be shown that if the domestic and foreign interest rates are all zero and the amount of line of credit is also zero, then the comparative statics of Shen's model is subsumed within our model. Nevertheless our methodological approach is completely different from theirs. The assumption of the dealer explicitly recognizing the opportunity cost of capital, the role of lines of credit from banks, and the derivation process for the optimal spread are unique to this model.

Shen's optimal spread solution is obtained by balancing the revenue and loss functions, but in this paper the optimal spread simply results from a dealer's utility maximization problem. Altogether, these different features distinguish our model from Stoll's and Shen's bid-ask spread models in the equity market and can shed new insights into the behavior of currency dealers in the foreign exchange market.

三、討論與結果

This paper develops a theoretical bid-ask spread model to simulate the behavior of a foreign currency dealer and to provide a causal link between the magnitude of the spread and the characteristics of the currency. Our model considers several factors such as the foreign interest rate, rate paid on domestic interest bearing assets, the opportunity cost of credit lines and both price and volume volatility. These factors have been considered to be important in different models of optimal spread determination but have not been addressed simultaneously within the confines of one theoretical model.

We model the currency dealer, as a risk-averse, expected utility of wealth maximizer in a two-period model. She chooses the optimal spread to maximize her utility of end-of-period wealth. The comparative statics of the optimal spread estimator shed new insights on the relationship between the spread and the characteristics of the traded currency.

In contrast to the existing bid-ask spread models focusing on the equity and currency markets, our currency bid-ask model predicts that price risk, volume volatility, and the opportunity cost of trading do affect the optimal spread. Moreover, the interest rate differential, between domestic and foreign money market assets, also plays a critical role in the spread determination. Consequently, the percentage spread varies positively with price risk, foreign interest rate, and the amount and rate of the line of credit, but varies negatively with the domestic interest rate and the expected currency price level.

Contrary to the spread model in the equity markets, our full model predicts that spreads may not necessarily decrease with the trading volume. There is also no clear-cut relationship between the spread and the volatility of the trading volume, nor is there a definitive relation between spread and contract maturity. Nevertheless, the restricted version of our model produces consistent comparative statics with the previous studies. That is, spreads should decrease with trading volume but increase with expected currency price risk.

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