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# Common knowledge and the value of defending a fixed exchange rate—an explanation of a currency crisis

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**Abstract**

Based on a framework originally developed by Morris and Shin [Discussion paper, No. 95-24, 1995, University of Southampton], this model shows how a currency crisis may be triggered by a lack of common knowledge regarding government type. Speculators receive noisy differential information concerning the value a government places on maintaining an exchange rate parity. When this value falls in a particular region, the government will abandon the peg if a sufficient number of speculators sell their currency. However, it will maintain the peg if no attack is launched. This paper shows that, in this region, it is always optimal for the speculators to attack the currency, thereby forcing a devaluation. © 2002 Elsevier Science Inc. All rights reserved.

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## 1. Introduction

This paper illustrates how informational events can trigger currency crises using a model based on that of Morris and Shin (1995, 1998). They show how a self fulfilling speculative attack can be launched on a currency when there is a lack of common knowledge among speculators over the state of the economy. This model extends their analysis to consider the case where the fundamentals are known by each investor. Instead it is the value placed by the government on defending a fixed exchange

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rate which is viewed with a degree of uncertainty. Arguably, this is a more realistic scenario since figures relating to the state of the economy are widely available. However, the government's degree of commitment to a fixed exchange rate regime is often the cause for debate. This has been seen in terms of the European exchange rate mechanism in 1992 and more recently for the East Asian economies in 1997. In each case, speculators have faced uncertainty regarding the extent to which the national government will intervene in defense of its currency.

This adaptation of the Morris and Shin model assumes that the value placed by the government on maintaining an exchange rate parity is viewed by speculators with an error. It is shown that while the value may only be observed with the smallest degree of error, it can nevertheless culminate in a self fulfilling attack on the currency. Furthermore, this framework raises the issue of capital controls. In particular, the Tobin tax is shown to be effective under particular circumstances in acting as a deterrent to a speculative attack.

The paper is organized as follows. Section 2 provides an overview of the framework while Section 3 outlines the mathematics of the basic model. Section 4 considers the role of information in the model. It is set up to show what would happen if all information were observed without error and then extended to consider the scenario with noisy differential information. The results of the model are discussed in Section 5 with particular emphasis given to the implications of a Tobin tax and also to the choice of distribution in the framework. The final Section contains concluding remarks.

## 2. Overview of the framework

This paper adapts the Morris and Shin framework so as to allow the state of the economy to be known to all players. However, the value placed by the government in retaining a fixed exchange rate is observed by each of the speculators with a degree of error. It is assumed that a tough government places a large value on sustaining the regime whereas a weak government places a small value on maintaining the parity.

There are three possible regions for the value of maintaining an exchange rate. In the stable region, a fixed rate regime will be maintained even if all speculators sell their holdings of the currency since the cost of intervention falls short of the value of sustaining the regime. In the unstable region, the cost of maintaining the regime exceeds the benefit irrespective of the actions of the speculators. In the 'ripe-for-attack' region, the decision to sustain a fixed rate regime depends crucially on the behavior of the speculators. If they all sell, it is optimal for the government to abandon the regime. However, if they all retain their holdings of the currency, it is then optimal to maintain the fixed rate regime. In the ripe-for-attack region each investor will sell his holdings of the currency if there is a lack of common knowledge among the speculators concerning the value placed by the government on maintaining a fixed rate.

When each speculator receives differential information concerning the value of an exchange rate, the outcome will be sensitive to this differential information. This is