



# Exchange rate regime credibility, the agency cost of capital and devaluation

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Received 9 July 2001

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## Abstract

Hong Kong pegs their currency to the US dollar with a currency board. In the wake of the Asian financial crisis in 1997, the US–Hong Kong interest rate differential jumped from  $\frac{1}{2}\%$  to 4–6%. Investors feared Hong Kong would abandon the peg.

This paper analyzes the crucial role of credibility in a stochastic dynamic rational expectations regime switch model. I parameterized the model using estimates of the exchange rate process for Hong Kong. The model generated interest rate differentials are consistent with the interest differentials in Hong Kong before the Asian financial crisis in July of 1997 but not after the crisis. © 2002 Elsevier Science B.V. All rights reserved.

*JEL classification:* F31; C63

*Keywords:* Credibility; Devaluation; Exchange regimes

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## 0. Introduction

Joseph Yam, Chief Executive Hong Kong Monetary Authority in the Wall Street Journal 8/20/98

... the actions of currency speculators can be blamed for a significant part of the interest-rate premium in the Hong Kong dollar over the US dollar. This premium has been unfairly attributed to the possibility that the government, operating under a currency-board system, may lose its nerve...

Agency problems increase the cost of capital when the agent cannot credibly commit to the principals that he would not take actions that harm them. When the Central Bank does not credibly commit to maintaining an exchange regime, investors demand

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an agency currency premium in addition to the normal cost of capital. This paper analyzes the crucial role of imperfect credibility in a currency crisis with a stochastic dynamic rational expectations regime switch model. The innovation in the paper is to isolate and quantify the cost of imperfect credibility. If the country would credibly commit, e.g., by dollarizing, then the time-series average of the (risk-adjusted) cost of domestic capital would equal the time-series average cost of capital in the foreign country. The failure to commit adds an agency currency premium to the country's cost of capital. Numerical solution exercises indicate that the agency currency premium is small. It increases the average cost of capital in Hong Kong by approximately  $\frac{1}{2}\%$ . This is consistent with the average interest rate differential in Hong Kong before the Asian financial crisis in July 1997. But the model-generated agency currency premium is not large enough to explain the observed interest rate differentials of 4–6% after July 1997. The paper's main empirical result—that a lack of credible commitment cannot generate large interest rate differentials in a sound currency regime—is robust.

The model in this paper is stylized, but the results are rich. It generates multiple rational expectations equilibria and a variety of patterns linking the exchange rate to the interest rate differential. Investors and the Bank optimize. Investors fear devaluation and demand a currency premium because the Bank cannot make a credible commitment. The Bank abandons the exchange regime when the *expected present value* of the deadweight welfare loss from the agency currency premium outweighs the expected present value of the benefit from remaining in the regime. The agency premium and the Bank's abandonment threshold are endogenous. The rational expectations equilibria function is S shaped; a fully credible equilibrium always exists, and usually less than full credibility equilibria also exist. In a less than full credibility equilibrium, the agency cost is a simple monotonically increasing function of the deviation of the exchange rate from central parity. The interest rate differential is a non-monotonic function of the deviation of the exchange rate from central parity that depends on the agency premium and the Bank's control rule.

The basic technical difference between this model and most models with an optimizing policy maker is that this model has richer dynamics. The model has no analytic solution. I compute and analyze the solution with numerical techniques. I use Tauchen's (1986) algorithm to approximate the continuous state Markov regime switch process for the exchange rate with a finite state Markov regime switch process. I modify Nyström's method for solving integral equations to numerically approximate the solution to the Bank's stopping problem. Then I search the finite state space for all the rational expectations equilibria.

The paper is organized as follows: Section 1 presents the model and defines equilibrium. Section 2 gives the results from numerical solutions. Section 3 gives the conclusion. Appendix A gives the details of the solution algorithm. Appendix B presents sensitivity analysis results to the model parameterization.

## 1. Model and equilibrium

This is a simple market equilibrium model of the exchange rate. The exchange rate follows a Markov regime switch process. In the “managed regime”, the Bank

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