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the IMF or capital controls). In other words, the severity of a crisis cannot entirely be captured by the author's variable if the outcome shows up in ways other than declining reserves or depreciation. Finally, there can be a fourth variable, reflecting the real and financial links across countries, which will likely manifest itself as regional links. For example, prediction of a crisis for Latin American and Asian countries may be improved, if it is made conditional on the occurrence of a crisis in Mexico (for 1994–95) and in Thailand (for 1997), respectively. These and other refinements may enhance the usefulness of Tornell's approach to understanding how a crisis may spread across countries.

Comment

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Objectives of the Paper

This paper addresses two major issues about the currency crises in 1995 and 1997:

1. What are the "fundamental" determinants of these two crises?
2. Could the Asian crisis have been predicted given the lessons learned from the Tequila crisis and knowledge about the fundamentals above?

Main Findings

Regarding the first issue, the author has constructed a "crisis index" as a weighted average of the loss in reserves and the depreciation against the U.S. dollar, and found that its severity in both the Tequila and Asian crises is determined by three common factors.

1a. Central bank liquidity or foreign-exchange reserve adequacy as proxied by the M2/reserve ratio; the higher the ratio, the more severe the crisis.

1b. Strength of the banking system as proxied by the "lending boom" (LB) index (defined as inflation-adjusted percentage change in total domestic credit less government claims); the higher the LB index, the more severe the crisis.

1c. Extent of real exchange rate (RER) appreciation (where RER is defined as a trade-weighted average of bilateral RER's against the U.S. dollar, the Deutsche mark, and the Japanese yen); the higher the RER (the smaller the appreciation), the less severe the crisis.

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Related to issue number 1 at the beginning of this comment, the author also finds that three other factors usually believed to be important determinants of currency crises—namely, ratios of government consumption, capital inflows, and current account deficits to gross domestic product (GDP)—have significant effects on the crisis index only if the effects from the three common factors (1a, 1b, and 1c) mentioned above are excluded.[1] He then claims that these three alternative factors have only indirect effects on currency crises through their effects on the lending boom and real appreciation.

Regarding issue number 2, the author finds that the "fitted" crisis indexes based on the Asian crisis data are very close to the "predicted" crisis indexes based on parameter estimates from the Tequila crisis data and actual values of the three "fundamental" determinants (1a, 1b, and 1c) from the Asian crisis. In other words, he obtains good out-of-sample forecasts,[2] implying that the Asian crisis could have been predicted given the lessons learned from the Tequila crisis in 1994 and knowledge about the fundamentals in 1997.

Analysis

Let me classify my discussion into three categories: the conceptual framework and definition of variables, "fundamentals" vs. "self-fulfilling expectations" as crisis determinants, and the predictability of the Asian crisis.

Conceptual Framework and Definition of Variables

In analyzing which country will be most prone to currency attacks, the author proposes a conceptual framework that suggests that risk-neutral speculators will pick countries with low reserves and high costs of interest rate adjustment and, among these countries, specifically those which are expected to suffer sizable depreciation when attacked. To most readers, this framework may sound very intuitive and clear. My personal experience with the Hong Kong dollar indicates that countries with high reserves and strong banking systems may nonetheless be subject to speculative attacks even when the speculators do not expect their actions to induce a sizable depreciation. Under the currency board system, any attack on the Hong Kong dollar will drive up the interest rate through an automatic

1. In examining capital inflows as an additional determinant of crisis, one should take into account the composition of these capital flows. In particular, portfolio debt flows can serve as a partial substitute for bank lending. As a result, with both capital inflows and the lending boom as right-hand side variables in the regression equation, there may exist a collinearity problem.

2. Instead of regressing the "97 crisis" on the "out-of-sample predicted 97 crisis" to show that these forecasts are good, the author could have simply reported the mean squared errors from the prediction exercise.

adjustment mechanism. Given the negative correlation between the interest rate and stock prices, this will lead to a drop in the prices of Hong Kong stocks. Anticipating these dynamics, speculators can engineer a "double-market play" to make profits by attacking the Hong Kong dollar in the foreign exchange market and short-selling Hong Kong stocks in the market for stock futures—without actually causing any collapse or depreciation in the Hong Kong dollar. In other words, expectation of a sizable depreciation is not a necessary condition for a currency attack. What is necessary instead is the existence of some sort of expected profits resulting from the attack.

In his conceptual framework, the author lists three possible responses of a country to a currency attack: (a) loss of reserves, (b) depreciation, and (c) rise in interest rate. It is not clear why, in constructing his crisis index, he considers only (a) and (b) and leaves out (c). In addition, there is some inconsistency between the definition of depreciation in his crisis index and that in his RER (the real exchange rate) index. In his crisis index, "depreciation" means depreciation of a country's currency against the U.S. dollar only; whereas in his RER index, it includes depreciation against the Deutsche mark and the Japanese yen in addition to depreciation against the U.S. dollar.

Another important variable in this paper is the weakness of the banking system as proxied by the "lending boom." While it is evident why excessive bank lending may give rise to a crisis, this may not be the case if the total asset value of the banking system as a whole is also growing. I thus think that the lending boom should be redefined to adjust for the values of the banks' loanable assets.

"Fundamentals" vs. "Self-Fulfilling Expectations" as Determinants of the Tequila and Asian Crises

In the speculative attacks literature, there has been a debate on whether fundamentals or self-fulfilling expectations are a more important driving force for currency crises. According to the benchmark regression analysis in section 2.3.1 of the paper, both the Tequila and Asian crises were driven by a common set of fundamentals. This may seem to suggest that the first-generation model of currency crisis (based on fundamentals) better fits the Tequila and Asian stories. A little reflection indicates, however, that the second-generation model (based on self-fulfilling expectations) may fit the stories just as well. This is because the latter has never denied the role of fundamentals in speculative attacks. Instead, it maintains that, in the presence of multiple equilibria, whether self-fulfilling currency attacks will actually occur depends on the range of critical values that the fundamentals fall into.

In fact, the author has gone halfway to addressing this issue by introducing two dummy variables—reserve adequacy (D^{hr} and "fundamentals"

(D^{sf}) reflecting the severity of the lending boom and the extent of RER appreciation—in the interaction terms in his benchmark regression.[3] Some sensitivity analysis is also carried out in table 2.4 by varying the benchmark values of these dummies. Nonetheless, it still cannot resolve the puzzle as to how important fundamentals are relative to self-fulfilling expectations in driving these two crises.

Predictability of the Asian Crisis

Turning to the issue of predictability of the Asian crisis based on the Tequila crisis, I am not sure how useful this exercise really is. This is because the finding that the out-of-sample forecasts are reasonably good is conditional on the absence of structural changes from one crisis to the next (which the author has shown by running a Chow test) and is thus known *after* the fact. However, what is necessary for prediction analysis of the kind examined in this paper (i.e., using reduced-form regression estimates from an earlier crisis to predict the likelihood or severity of a later crisis) is knowledge about the absence of structural changes *before* the fact. Using the same prediction method, can we be sure that we can get accurate forecasts about the crisis index in, say, the year 1999 or 2000 based on the regression estimates from the Tequila and Asian crises? The answer is "no" because there is no way we can know for sure that there will not be any structural change in the year 1999 or 2000. The issue I am raising here is actually well known and general—i.e., the curse of reduced-form regressions and the need to go for structural estimation for prediction purposes when one is uncertain about the possibility of structural change.

In conclusion, the paper has uncovered a common set of fundamentals that drives the Tequila and Asian crises. It remains unclear, however, whether the same will apply to future crises.

3. It is not clear why reserve adequacy is treated separately from lending boom and RER appreciation and not counted as fundamentals as well.