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Comment   Nouriel Roubini

This paper presents an empirical study of the causes of the Korean crisis of 1997–98. The authors analyze whether the crisis was due to domestic fundamentals or external interdependence (or contagion). They present a variety of evidence, both econometric and more qualitative.

There has been a broad debate on whether the Korean crisis was due to fundamentals or rather was caused by a liquidity run (with foreign banks suddenly withdrawing interbank lines) exacerbated by international contagion. In a sense, these alternative explanations are not contradictory but rather complementary. Seriously weak fundamentals may have initially triggered the crisis, but international contagion from East Asia to Korea

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(and vice versa) and a self-fulfilling bank-run psychology and panic may have exacerbated it. So, the issue is more one of the relative weight of alternative explanations. My reading of this paper and of the overall evidence for Korea is that fundamentals certainly played an important role. Although traditional fundamentals were not important in Korea (as public deficits and debt were low; inflation low; and savings and investment rates high), other structural weaknesses related to the financial system and distorted investment and borrowing incentives were very important. To summarize, the fundamental weaknesses of Korea, even before the onset of the currency crisis at the end of 1997, were as follows:

1. A severe recession in early 1997, well before the currency crisis.

2. Severe corporate distress (with seven out of the top thirty *chaebols* being effectively bankrupt by the middle of 1997). The distress of the corporations led to significant distress for a wide range of financial institutions (merchant and commercial banks).

3. Large current account deficits in 1996 driven by excessive investment and severe terms of trade shock (the fall in semiconductor prices) and a moderate amount of real appreciation of the currency.

4. Current account deficits mostly financed by short-term unhedged foreign currency loans (mostly cross-border interbank loans).

5. Short-term debt to foreign reserves (an important early warning signal) was high at the onset of the crisis and inward FDI very low given restrictions and regulations to FDI.

6. Dominance of the economy by "empire maximizing" *chaebols* that were overinvesting and inefficient.

7. Excessive investment was partly driven by "connected lending" and "directed lending" policies. Moral hazard-inducing implicit and explicit guarantees also distorted investment and borrowing and lending decisions of *chaebols* and financial institutions. Poor supervision and regulation of the financial system worsened such distortions.

8. High leverage of the *chaebols* with debt-to-equity ratios being on average over 300 percent even before the crisis, and devaluation further increased the burden of foreign currency debt.

9. Low profitability of investment with two-thirds of *chaebols* having losses in 1996 and the return on capital being low in the 1990s.

The qualitative and quantitative evidence presented in the paper is consistent with this assessment, suggesting an important role for fundamentals in triggering the crisis. The authors find some role for both contagion and domestic fundamentals.

The econometric analysis of the role of fundamentals and contagion is performed in sections 10.2 and 10.3. In section 10.2, using a standard probit model with data from about 100 countries, the authors find that fundamental weaknesses played a role, although contagion channels were

also important (more geographic proximity than trade). A few comments on these results: First, traditional probit models are unable to capture non-traditional fundamentals because data on variables other than standard macro ones are not easily available. As the previous discussion suggests, the weaknesses of Korea were in its financial system and corporate structure rather than just traditional macro weaknesses. However, such structural variables are hard to measure and are not usually included in empirical models of the likelihood of a currency crisis. This may explain why the predictive power of the model is good but statistically not very large. Second, because proxies for geographic proximity and trade are highly correlated, it is not clear whether the stronger statistical significance of "proximity" relative to trade links is driven by such trade links. Third, it would have been useful to derive some direct proxies of financial contagion (such as common creditor links) rather than rely on proximity as a proxy for such contagion links. Fourth, the decomposition in table 10.3 of the contribution of various variables to the crisis probability is qualitatively interesting and sensible, but the quantitative contribution of significant factors (e.g., FDI, high debt to reserves, and terms of trade shocks) is modest. Given the significant contribution of the contagion variable, more could be done to figure out what this variable really proxies for: Is it "rational" contagion or "irrational" contagion?

Section 10.3 considers in more detail the contagion question by studying daily data on exchange rates and sovereign spreads for a set of emerging market economies. Interestingly, the authors relate these asset prices to news on Korea's economy and financial markets. They find that negative news about financial distress of *chaebols* and financial institutions drives such asset prices. The analysis is interesting and the results sensible. There are a number of general limitations to this approach: The country sample is small; there are missing macro variables in the regressions, given the use of daily data; and other asset prices such as stock prices and domestic interest rates could also have been analyzed.

Some remarks on the exchange rate results: First, the correlation between the value of the won and the yen may be spurious and driven by movement of the U.S. dollar; i.e., statistical correlation may occur even if the two exchange rates are statistically independent. One could use a numeraire to deal with this issue. Second, high correlation may be due to heteroscedasticity (high variance in turbulent times). Third, some correlations are low (as for the Japan correlations), but splitting the sample into subperiods (such as those in 1998 when the yen weak and falling) may provide better results. Fourth, the VAR results on the contagion from East Asia to the Korean currency are interesting; conversely, one may argue that the free fall of the won in the fall of 1997 led to another round of contagious effects from Korea to the rest of the region.

The results on sovereign spreads are somewhat surprising: Korea's

spreads seem to be more correlated with those of Latin America than those of Asia. This may be due to some "cross-hedging" across markets. Also, the robustness of this result in subsamples of turbulent periods may have to be tested. Also, the results of the Granger causality tests showing causality going from Korea to East Asia but not vice versa are a bit at odds with the exchange rate results suggesting contagion from East Asia to Korea.

The results on the effects of news on asset prices are novel and interesting; they confirm the view that negative domestic news about *chaebols* and financial distress of commercial and merchant banks as well as government bailout policies negatively affected asset markets. Two issues here: Although bailout news signals that there are serious distress problems, they should reduce panic and runs as long as the bailout commitment is credible. The results instead seem to suggest that bailout news is perceived as negative by investors. Second, finding a significant effect of bad news on asset prices does not rule out the possibility that such prices overreacted to the news; it is one thing to find that news matters, and another to infer that such significant relations between news and prices imply no overshooting of such prices to the news. In the absence of a fundamental model of the quantitative effect of such news, it is again hard to assess whether Korean financial markets and foreign investors overreacted to the negative news that came out of the Korean economy at the end of 1997. Although fundamentals played a strong role, as the paper convincingly argues, at the end of 1997 some run psychology and panic may have been triggered by such negative developments and may have led Korea to the brink of default. Only the negotiated agreement at the end of 1997 between Korea and its international creditor banks to roll over short term cross-border lines avoided this potentially disastrous outcome.

In conclusion, this is an interesting empirical study of the causes of the Korean crisis; it confirms the view that fundamentals mattered in triggering the crisis but that external interdependence (contagion) also mattered. The results appear to be convincing. Perhaps the authors could have tried to probe a little more the alternative view that Korea's crisis was caused by a self-fulfilling bank run and panic.

Comment   Ponciano S. Intal, Jr.

I would like to congratulate Dongchul Cho and Kiseok Hong for their admirable effort in analyzing the causes of the recent currency crisis in Korea. I start my comments on a few technical points. Afterwards, I will

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