An investigation on the effect of central bank money injection on creating currency crisis

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C H R O N I C L E	A B S T R A C T
	This paper investigates the effects of different factors influencing on supplement of currency in Iran and the likelihood of currency crises. The study implements two methods of Logit to determine the likelihood of currency crises based on the historical data over the period 1989-2012. In this study, currency crisis is defined in terms of three variables of currency change on market, interest rate and central bank foreign deposits. The results of the study indicate that the ratio of government (non-government) liabilities to central bank/Growth domestic product (GDP) has positive (negative) relationship with currency crises.

1. Introduction

Currency crisis is one of the most important issues in modern economies and there are various studies on learning different factors influencing currency crises (Kruger et al., 2000; Brüggemann & Linne, 2002; Gunsel et al., 2010). Frankel and Rose (1996), for instance, applied a panel of annual data for over 100 developing countries from 1971 to 1992 in order to investigate currency crashes. They defined a currency crash as a large change of the nominal exchange rate, which was also a substantial increase in the rate of change of nominal depreciation. They examined the composition of the debt as well as its level, and other macroeconomic external and foreign factors. They reported that crashes take place when output growth becomes low; the growth of domestic credit and the level of foreign interest rates increase. For many years, many researchers have claimed success in systematically forecasting which countries are more likely to suffer currency crises, most notably Kaminsky, Lizondo and Reinhart (1998) method called KLR approach. Berg and Pattillo (1999) evaluated the KLR approach to anticipating currency crises, developed and examined an alternative.

Goldfajn and Valdés (1998) studied whether exchange rate expectations and overvaluations were predictors of currency crises and reported that overvaluation had predictive power in describing the crises. Lestano and Jacobs (2004) compared different currency crisis dating techniques adopting various definitions of currency pressure indexes and ad-hoc and extreme value based thresholds. Marchesi (2003) examined the existence of an empirical relationship between the adoption of an IMF program and the concession of a debt rescheduling by commercial creditors based on a bivariate probit model. The study confirmed the existence of a significant impact of the adoption of an IMF program on the subsequent concession of a debt rescheduling by private creditors. Burkart and Coudert (2002) identified common features of currency crises in 15 emerging countries based on quarterly data over the period 1980–1998. They applied Fisher's linear discriminant analysis to construct an early-warning system. Fratzscher (2003) analyzed the role of contagion in the currency crises in emerging markets during the 1990s. The study used a non-linear Markov-switching framework to compare three distinct causes of currency crises including contagion, weak economic fundamentals, and sunspots. They reported that in particular the degree of financial interdependence and real integration among emerging markets were crucial not only in explaining past crises but also in forecasting the transmission of future financial crises.

2. The proposed study

This paper investigates the effects of different factors influencing on supplement of currency in Iran and the likelihood of currency crises. The study implements two methods of Logit to determine the likelihood of currency crises based on the historical data over the period 1989-2012. In this study, currency crisis is defined in terms of three variables of currency change on market, interest rate and central bank foreign deposits. The dependent variable is a dummy variable, which receives a value one if the currency encounters crisis and zero, otherwise. The crisis is defined as follows,

$$\text{Crisis} = \begin{cases} 1 & \text{if } \text{EMPI} > 1.5 \ \sigma_{\text{EMPI}} + \mu_{\text{EMPI}} \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

The study adopts exchange market pressure index (EMPI) from the study developed by Lestano and Jacobs (2004) as follows,

$$\text{EMPI}_T = \frac{\Delta e_t}{e_t} - \frac{\sigma_e}{\sigma_r} \frac{\Delta r_t}{r_t} + \frac{\sigma_e}{\sigma_i} \Delta i_t, \tag{2}$$

where e_t represents actual rate of currency, σ_e is standard deviation of central bank foreign currency deposit, r_t stands for foreign currencies and σ_r is standard deviation. Finally, σ_i represents standard deviation in inflation rate with $\Delta i_t = i_t - i_{t-1}$. Let BBD be the ratio of governmental loans to banks on growth domestic product (GDP), $BBGD$ be the ratio of non- governmental loans to banks on growth domestic product (GDP), ZAM and ZAB be the net value of foreign assets in central bank and other banks, respectively. The Logit regression model used by the proposed study is as follows,

$$\text{logit(p)} = \ln \frac{p}{1-p} = z = \beta_0 + \beta_1 BBD + \beta_2 BBGD + \beta_3 ZAM + \beta_4 ZAB . \tag{3}$$

Any change on the likelihood of occurrence is calculated as follows,

$$\frac{\partial p}{\partial x} = \frac{e^{\beta x}}{\left(1 + e^{\beta x}\right)^2} \beta_i = p\left(1-p\right)\beta_i . \tag{4}$$

In addition, the elasticity to change in likelihood of crisis is calculated as follows,

$$e_k = \left(\frac{e^{\beta x}}{\left(1 + e^{\beta x}\right)^2} \beta_i \right) \frac{x}{p} = \left(1 - p\right) \beta_i x_{ik} \,.$$ (5)

Next, we present details of our findings on performing regression analysis.

3. The results

In this section, we present details of our findings on the implementation of the regression function. Table 1 demonstrates the results of our findings.

Table 1
The summary of regression analysis

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO	ELASTICITY AT MEANS	WEIGHTED AGGREGATE ELASTICITY	MARGINAL EFFECT	VARIABLE MEANS
ZAM	-0.00421	0.002055	-2.0524	-0.10570	-0.0855	-0.00101	62.012
BBD	0.057828	0.01929	2.9963	-0.12622	-0.12527	0.013925	-5.4008
BBGD	-0.14299	0.034526	-4.1415	-0.14700	-0.16367	-0.03443	2.5438
CONSTANT	1.3259	0.36874	3.5957	0.53583	0.41709	-	-

LOG OF LIKELIHOOD FUNCTION = -50.731
LOG-LIKELIHOOD(0) = -65.790
LIKELIHOOD RATIO TEST = 30.1176   P-VALUE= 0.00000
ESTRELLA R-SQUARE   0.29971 CRAGG-UHLER R-SQUARE   0.36094
MADDALA R-SQUARE   0.26928 MCFADDEN R-SQUARE   0.22889
PERCENTAGE OF RIGHT PREDICTIONS = 0.72917
Test statistic for heteroskedasticity LM2 =3.61247   p-value 0.30647

As we can observe from the results of Table 1, *Likelihood ration test* is equal to 30.1176, which is meaningful when the level of significance is one percent. In addition, t-student values are statistically significant for all coefficients. The positive sign of BBD ($\beta_1 = 0.057828$) indicates that as government receives more loans from the central bank, the likelihood of currency crisis increases. In addition, the negative sign of BBDG ($\beta_2 = -0.14299$) indicates that as the ratio of non- governmental loans to banks on growth domestic product (GDP) increases, the likelihood of currency crisis decreases.

4. Conclusion

One of the most important issues in developing countries is have stable currency. When currency loses its value, the whole economy goes under uncertainty. Many people purchase foreign currencies trying to protect themselves from currency de-evaluation. Therefore, it is important to find important factors influencing currency crisis and take necessary action against it. In this paper, we have presented an empirical investigation to find out more about the effect of government liabilities towards central banks. The study indicates that as the government receives financial assistance from the government, the chances of facing currency crisis increases. In addition, as the ratio of non-governmental loans to banks on growth domestic product (GDP) increases, the likelihood of currency crisis decreases.

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