

〔研究ノート〕

## Exchange Rate Volatility and Growth

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### Abstract

This paper examines the effect of exchange rate stability on growth. The approach considers international trade, international capital, and macroeconomic stability as the main transmission elements from exchange rate stability to growth. The influence of exchange rate volatility on growth provides clear evidence. The evidence is strong for emerging Europe, which impacted high macroeconomic instability. Central, Eastern, and South-Eastern European countries benefits from intra-European trade, low interest rates, and macroeconomic stabilization.

### 1. Introduction

In 1997/1998, Asian currency crisis occurred. The downsides of softly fixed exchange rates that many suspect will encourage speculative capital flows, moral hazard, and over-investment have occurred (Fischer, 2001). At that time, proponents of flexible exchange rate systems emphasized the merit of macroeconomic flexibility in the face of asymmetric shocks. On the other hand, proponents of fixed exchange rate systems have stressed the benefits of low transaction costs for trade as well as the impact of trade

integration on the probability of asymmetric economic development (Frankel and Rose 1998,2002). Since then, the success and growing role of the euro as a currency prompts the question about the pros and cons of exchange rate stabilization.

Exchange rate stability is often viewed as preferable to international trade and therefore economic growth. The well known report of the European Community, “One Market, One Money,” mentions increased trade as one of the main benefits of introducing a common currency in Europe. However, the substantial empirical literature that examines the link between exchange rate stability and trade has not found a consistent relationship.

Trade integration has become the important criteria about the pros and cons of fixed exchange rates. Moreover, financial markets and macroeconomic stability should be considered.

The existing works on economic growth have tended to find weak evidence in favor of a positive impact of exchange rate stability on economic growth. Ghosh, Gulde and Wolf (2003), Edwards and Levy-Yeyati (2003), and Eichengreen and Leblang (2003) are examples. However, Eichengreen and Leblang (2003) also showed that the results of such estimations depend on the sample period and the countries.

This paper focuses on the effects of exchange rate stability on economic growth. The structure of this paper is as follows : Section 2 provides theoretical background of the relationship between exchange rate stability and economic growth. Section 3 provides some empirical analysis based on the Section 2. Finally, this paper ends with a brief summary.

## **2. Background**

Exchange rate stability has been increasing. Some countries peg their currencies to the euro or the US dollar. Exchange rate volatility of the countries has decreased

considerably. Table 1 compares the two-year rolling standard of deviations of monthly percentage changes to the respective anchor currency. Country groups are calculated as arithmetic averages. East Asia includes China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand. Central and South America includes Argentina, Bahama, Barbados, and Belize.

**Table 1. Exchange Rate Volatility (%)**

	Jan-00	Jan-01	Jan-02	Jan-03	Jan-04	Jan-05	Jan-06	Jan-07
East Asia (U. S. dollar)	6.30	1.84	1.85	1.90	1.45	1.28	1.39	1.2
EMU Periphery (Euro)	3.05	3.78	3.09	2.55	2.48	1.99	1.45	1.22
Central and South America (U. S. dollar)	8.34	7.65	8.33	5.44	6.37	6.27	4.41	3.12

The increasing degree of exchange rate stability in the region prompts us to question the motivations for stabilization of exchange rates in general and of the peg to euro or US dollar. This paper focuses on the effects of exchange rate stability on economic growth. Growth is one of the most important goals for policy makers.

It seems that exchange rate stability would cause economic growth. Traders avoid risks for trading. They can avoid exchange rate risks directly. However, whether or not exchange rate stability brings growth deserves much attention and discussion for both the theoretical aspect and empirical one.

Traditionally, flexible exchange rate systems have been considered an important tool for dealing with asymmetric shocks (Friedman, 1953 ; Meade, 1951). On the other hand, fixed exchange rate systems must rely upon relative price and productivity changes, which are slow and costly. The outcome leads to slower economic growth.

Mundell (1961) argued that shock absorption within a heterogeneous group of countries is easier if monetary and exchange rate policies remain independent. On the other hand, McKinnon (1963) emphasized the benefits of fixed exchange rate regimes for small open economies. For the small open economies for which international price level is given and traded goods make up a high share of the domestically consumed goods, exchange rate stability promotes stable domestic prices. Stable exchange rates bring growth because they provide a preferred environment for investment and consumption.

Financial markets have played an increasing role in exchange rate stabilization and economic growth. Recently some study has been presented (Aghion et al., 2006 ; De Grauwe and Schnabl, 2005). Fixed exchange rates can impact economic growth by providing a more efficient international allocation of capital when transaction costs for capital flows are removed in the short term (McKinnon, 1973). From a long-term view, exchange rates provide risks for growth in emerging economies as they affect the banks and enterprises where foreign debt tends to be dominated in foreign country (Eichengreen and Hausmann, 1999). Surely, it seems that fixed exchange rates can enhance growth in small open economies by encouraging capital inflows; however, excess capital inflows into countries with shallow financial markets can contribute to excess volatility (Fratzcher and Bussiere, 2004). This problem should also be examined carefully.

The impact of exchange rate volatility on trade has two dimensions (Schnabl, 2007). From a microeconomic perspective, exchange rate volatility is linked with high transaction costs because uncertainty is high and hedging/covering foreign exchange rate risks is costly. Collecting high quality information and judging on them are also expensive. The macroeconomic dimension arises from the fact that the long-term exchange rate affects the competitiveness of international trade. In small open economies, economic growth is strongly influenced by long-term exchange rate fluctuations. This is not an exception for large economies. However, a systematic positive effect of exchange rate on trade and thereby growth has remained mixed and

confused. Bacchetta and van Wincoop (2000) found that exchange rate stability is not necessarily associated with more trade. Some empirical studies have supported such results (Frankel and Rose, 2002 ; Micco, Stein, and Ordonez, 2003).

### 3. Empirical Evidence

As shown above, the theoretical evidence on the impact of exchange rate stability on economic growth remains mixed. The impact of exchange rate volatility on growth remains an empirical problem. Empirical analyses provide one solution. To identify the effect of exchange rate volatility on growth, a fragmented cross-country panel model is employed.

The estimation is simple as follows :

$$\text{Growth}_{it} = \alpha_i + \gamma_i \beta_{it} + \varepsilon_{it} \quad (3)$$

where  $\text{Growth}_{it}$  is the vector of yearly real growth rates. The explanatory variable  $\beta_{it}$  consists of the indicators of exchange rate volatility and some variables. This paper takes into account international trade, financial market, and macroeconomic stability as the main transmission channels from exchange rate stability to growth. For international trade, export growth rate is employed. Interest rates are money market rates. Yearly CPI inflation is employed as a proxy for macroeconomic stability. All three measures are highly correlated with exchange rates. Two dummies for Asian currency crisis (1997/1998) and EU integration are included<sup>1</sup>. Data sources are International Financial Statistics (IMF) and World Economic Outlook (IMF). All data are yearly. The volatility is calculated as yearly averages of monthly percentage exchange rate to SDR changes. Standard deviations of monthly exchange rate changes measure exchange rate volatility. The estimated period is from 1990 to 2005.

As an estimation, a generalized least square (GLS) fixed effect model and a dynamic

panel estimation model are employed. GLS is appropriate as the concern with respect to endogeneity between exchange rate volatility and economic growth. GLS also can give information with respect to the fit of the model, in particular with respect to the cross-section. Moreover, the GLS approach is more robust for a smaller sample size. On the other hand, the GLS sometimes suffers from endogeneity bias regarding control variables. For instance, inflation is likely to affect growth performance and growth is likely to affect inflation. To cope with this problem, this paper employs a dynamic panel of estimations with a robust, two-step standard error model as proposed by Arellano and Bond (1991) and Arellano and Bover (1995). The estimators optimally exploit all of the linear moment restrictions that follow from particular specifications and are extended to cover the case of unbalanced panel data. The results are shown in Table 2.

**Table 2. GLS Estimation Results**

	Constant	Exchange Rate Volatility	Yearly Change	Interest Rate	Export Growth	Inflation	Crisis	Adj. R <sup>2</sup>
EMU Periphery	0.070*** (20.13)	-0.260*** (10.62)	0.013*** (10.32)	-0.130*** (8.23)	0.013*** (7.28)	0.002 (1.12)	0.001 (0.68)	0.320
East Asia	0.102*** (24.45)	-0.248** (2.02)	0.09** (2.11)	-0.161*** (6.66)	0.009*** (4.61)	0.080** (1.91)	0.014* (1.68)	0.451
Central and South America	0.098** (32.776)	-0.190*** (7.60)	0.099*** (13.25)	-0.143*** (8.62)	0.006*** (3.67)	0.005 (1.10)	0.005 (1.02)	0.490

Note. \*\*\* is significant at 1% level, \*\* is 5%, and \* is 10%.

The result shows evidence of a negative correlation between exchange rate volatility and growth. The yearly exchange rate has a positive sign suggesting a positive (negative) impact of depreciation (appreciation) on growth.

An alternative specification traces the impact of exchange rate volatility for measures

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that use the lowest volatility against the US dollar, the euro, or Japanese yen. The fit of this specification is better than for the previous model. The results are very similar, which suggests a robust negative relationship between exchange rate volatility and growth. The results are shown in Table 3.

**Table 3. GLS Estimation Results (Min)**

	Constant	Exchange Rate Volatility	Yearly Change	Interest Rate	Export Growth	Inflation	Crisis	Adj. R <sup>2</sup>
EMU Periphery	0.056*** (20.15)	-0.271*** (10.69)	0.012*** (10.18)	-0.128*** (8.25)	0.011*** (7.40)	0.002 (1.14)	0.001 (0.69)	0.323
East Asia	0.105*** (24.60)	-0.204** (2.04)	0.10** (2.18)	-0.167*** (6.70)	0.009*** (4.71)	0.083** (1.98)	0.015* (1.64)	0.459
Central and South America	0.099** (32.80)	-0.192*** (7.64)	0.096*** (13.21)	-0.146*** (8.68)	0.008*** (3.69)	0.005 (1.14)	0.005 (1.13)	0.497

*Note.* \*\*\* is significant at 1% level, \*\* is 5%, and \* is 10%.

To control for possible endogeneity bias, the model is re-estimated on the framework as proposed by Arellano and Bond (1991) and Arellano and Bover (1995). The results are in line with the GLS estimation. The results are shown in Tables 4 and 5. The sample periods are divided into two parts. The upper parts are 1995-2006 and the lower is 1980-1994.

The two results are in line with the results of the whole sample. For East Asian countries, there is no effect of exchange rate volatility on growth. The measures of exchange rate volatility have in most cases the expected signs but are not significant. There seems to be several reasons<sup>2</sup>.

As Aghion et al. (2006) and Chmelarova and Schnabl (2006) suggested, countries

**Table 4. GMM Estimation Results**

	Constant	Exchange Rate Volatility	Yearly Change	Interest Rate	Export Growth	Inflation	Crisis	Adj. R <sup>2</sup>
EMU Periphery	0.073*** (20.16)	-0.266*** (10.77)	0.012*** (10.36)	-0.132*** (8.25)	0.015*** (7.30)	0.002 (1.14)	0.002 (0.70)	0.326
	0.066*** (20.03)	-0.208*** (5.62)	0.011*** (10.18)	-0.132*** (8.25)	0.011*** (7.11)	0.002 (1.11)	0.001 (0.55)	0.314
East Asia	0.104*** (24.55)	-0.250** (2.08)	0.10** (2.17)	-0.168*** (6.69)	0.010*** (4.67)	0.088** (1.96)	0.015* (1.70)	0.456
	0.102*** (24.45)	-0.231 (1.32)	0.09** (2.11)	-0.161*** (6.66)	0.009*** (4.61)	0.080** (1.91)	0.014* (1.68)	0.451
Central and South America	0.099** (32.88)	-0.195*** (7.55)	0.103** (13.45)	-0.146*** (8.67)	0.008*** (3.75)	0.006 (1.13)	0.006 (1.12)	0.493
	0.082** (32.33)	-0.191*** (7.44)	0.022*** (14.18)	-0.198*** (17.69)	0.011*** (7.23)	0.006 (0.81)	0.003 (0.22)	0.445

Note. \*\*\* is significant at 1% level, \*\* is 5%, and \* is 10%.

**Table 5. GMM Estimation Results (Min)**

	Constant	Exchange Rate Volatility	Yearly Change	Interest Rate	Export Growth	Inflation	Crisis	Adj. R <sup>2</sup>
EMU Periphery	0.072*** (20.13)	-0.265*** (10.76)	0.011*** (10.32)	-0.133*** (8.26)	0.017*** (7.34)	0.002 (1.14)	0.002 (0.71)	0.3261
	0.067*** (20.02)	-0.208*** (5.63)	0.012*** (10.19)	-0.131*** (8.26)	0.010*** (7.10)	0.002 (1.11)	0.001 (0.55)	0.314
East Asia	0.103*** (24.53)	-0.250** (2.09)	0.10** (2.17)	-0.168*** (6.69)	0.010*** (4.67)	0.089** (1.98)	0.015* (1.70)	0.456
	0.103*** (24.47)	-0.230 (1.31)	0.10** (2.12)	-0.162*** (6.67)	0.009*** (4.62)	0.080** (1.91)	0.014* (1.68)	0.451
Central and South America	0.010** (32.90)	-0.196*** (7.57)	0.103** (13.45)	-0.146*** (8.67)	0.009*** (3.75)	0.006 (1.13)	0.006 (1.12)	0.493
	0.081** (32.31)	-0.191*** (7.44)	0.025*** (14.20)	-0.198*** (17.69)	0.011*** (7.23)	0.006 (0.81)	0.003 (0.22)	0.445

Note. \*\*\* is significant at 1% level, \*\* is 5%, and \* is 10%.



with underdeveloped financial markets are vulnerable to exchange rate volatility as they do not have the instruments for hedging foreign exchange rate risks. In particular, depreciation sometimes causes serious inflation. This implies a strong inclination toward smoothing exchange rate fluctuations. In contrast, the vulnerability to exchange rate volatility is less in developed countries. Before 1998 and the Asian currency crisis, emerging Europe and the CIS experienced a rather high degree of macroeconomic instability. Since that time, however, the situation has improved. Some countries in Europe have started to prepare to participate in the EU. Moreover, some large countries (United States and Japan) have set interest rates low. Capital inflows have brought about macroeconomic stability.

#### 4. Conclusions

This paper analyzed the effect of exchange rate volatility on economic growth. There is a positive impact of exchange rate stability on growth in a catch-up process as exchange rate stability contributes to more trade, capital inflows, and macroeconomic stability. The influence of exchange rate volatility on growth provides rather clear evidence. The evidence is strong for emerging Europe, which impacted high macroeconomic instability. Central, Eastern, and South-Eastern European countries benefits from intra-European trade, low interest rates, and macroeconomic stabilization.

#### Endnotes

1. There are a large number of other macroeconomic variables that affect growth and therefore may be considered control variables, including investment, consumption, and government expenditure ; however, including these variables in the equation decreases the degree of freedom.
2. Note that as the sample size is small, exchange rate stability has not changed much and there is a

lower degree of vulnerability to exchange rate fluctuations.

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