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RESEARCH ARTICLE

Do good institutions undermine the impact of exchange rate volatility on economic growth ?

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Abstract

This paper analyzes the role of good institutions in undermining the effect of exchange rate fluctuations on economic growth. Utilizing the recent dynamic panel GMM estimation techniques for 38 middle and high incomes economies over the period 1999- 2013 , we found that the direct effect of exchange rate fluctuations measured by normal volatility (using the GARCH models) and extreme volatility (or crisis) on economic growth is negative and significant. When we considered the institutional variables in the model, we concluded that good institutions are able to mitigate the exchange rate fluctuations impact on economic growth.

Introduction

Exchange rate, as an important concept in macroeconomics, has a significant role in explaining the movements of the other economic variables. Fundamental models of exchange rate determination support a relationship between exchange rate and macroeconomic volatility, more precisely output, inflation, interest rate and money growth volatility.

Given this importance accorded to exchange rate, several researchers have focused on its fluctuations. Some economists find that its movements still have sizable effects on exports and imports (IMF, 2015). Exchange rate volatility decreases international trade and economic welfare (Hall and al., 2010). It also can rise the risk factor of domestic firms trading internationally (Giannellis and papadopoulos, 2011). Grossmann and al. (2014) find that the responses of macroeconomics and financial variables to the high frequency components are much more significant than to the overall volatility.

In general, economic fluctuations is measured in the literature by normal volatility and extreme volatility or crisis (Wolf, 2004,a). Extreme volatility is defined as observation beyond an absolute threshold (e.g. variations of more than 10%) or distributional threshold (the greatest declines are 5%) or a deviation criterion (two standard deviation above the mean).

Many theoretical and empirical studies have strongly supported that exchange rate crisis is harmful to the economy. It has a heavy costs (falling incomes and rising unemployment). Companies go bankrupt and banks may become illiquid or insolvent (P.L. Shimpalee and J.B. Breuer, 2006).

This paper contributes to the literature by, not only examining the effects of normal and extreme exchange rate volatilities on economic growth but also the vital role of good institutions in undermining these impacts.

Institutions are an explanatory factor of economic and financial changes (Chen and Feng, 1996, Huang, 2010). Cavallo and Cavallo (2010) show that political institutions can affect economic growth through their interaction with

crises. The impact of crisis on long- term growth depends on the prevailing institutional environment. The negative effect of crises in countries having democratic institutions can be mitigated. While, in countries with autocratic institutions, the impact may increase.

In light of all these considerations, the remainder of this paper is structured as follows : Section 2 exposes the model and the methodology adopted. Section 3 analyzes estimation results and section 4 concludes.

2. Methodology and data

This section exposes the model used to assess the impact of exchange rate fluctuations on economic growth in an institutional context and the technique applied to study this impact. It also describes the data set used in the paper.

2. 1. Empirical Model

In order to study the effect of exchange rate fluctuations on economic growth, the following model is estimated:

$$y_{it} = \alpha_j + \sum_{j=1}^{m} \mu_j y_{it-j} + \sum_{j=1}^{m} \beta_j \sigma_{TCit-j} + \sum_{j=1}^{m} \phi_j X_{it-j} + \sum_{j=1}^{m} \lambda_j \left(\sigma_{TC} * I_{it-j}\right) + \delta_i + \varepsilon_{it}$$

Where y_{it} is GDP per capita growth of country i at year t.

σ_{TC} is exchange rate fluctuations in country i at time t. This variable is measured by :

σ_{TC1} : GARCH models using monthly exchange rate series.

σ_{TC2} : crisis. We consider when the variable of exchange rate volatility, measured by σ_{TC1} is greater than 1.5 standard deviation above its mean as the periods of exchange rate crisis. $\sigma_{TC} = 1$ defined a period of exchange rate crisis, and $\sigma_{TC} = 0$ otherwise.

X_{it-j} is a vector of control variables which includes domestic credit to private sector (% of GDP) as a measure of financial development (FD), cash surplus/ deficit (% of GDP) as a measure of fiscal policy (FP), M_2 growth rate and trade openness (= (exportations+ importations)/PIB) (open).

I_{it-j} is a vector of institutional variables which includes twelve institutional indicators : bureaucracy quality (BQ), corruption (C), democratic accountability (DA), ethnic tensions (ET), external conflict (EC), government stability (GS), internal conflict (IC), investment profile (IP), law and order (LO), military in politics (MP), religious tensions (RT) and socioeconomic conditions (SC). A high rating equates to very low risk and a low rating points to very high risk.

$\left(\sigma_{TC} * I_{it-j}\right)$ is an interaction term between the exchange rate volatility and institutions.

δ_i is a country specific effect

ε_{it} is an error term.

2. 2. Methodology

We use the generalized method of moments (GMM) estimation technique developed in Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) to estimate the impact of exchange rate fluctuations on economic growth. We consider a dynamic model for an unbalanced panel between 1999 and 2013 for 38 countries (middle and high income countries).

2. 3. Data

Data of GDP per capita growth and all control variables are drawn from the world Development Indicators (2011) and the website www.worldbank.org

Data of exchange rate variable are taken from the website : http://www.bis.org/statistics/eer/

Institutional variables are obtained from ICRG database.

3. Estimation results

This section presents regression analysis of the relationship between exchange rate fluctuations and economic growth.

Column (1) of table 1 shows that the coefficient of exchange rate volatility is negative and statistically significant at 1% level. This negative effect on economic growth is confirmed in the literature. For example, Arratibel and al. (2011) analyze the relationship between nominal exchange rate volatility and some macroeconomic variables like real output growth. They conclude that lower exchange rate volatility is associated with higher growth. Badinger. H (2009) also studies a causal effect of output volatility on economic growth. He finds a negative effect of volatility on growth.

Columns (2) to (13) of the table (1) report estimation results of institutional impacts on the relationship between exchange rate volatility and economic growth. The coefficient of the interaction terms "$\sigma_{TC1} * I_{it-j}$" (the interaction of exchange rate volatility with institutional variables) is negative and statistically significant in each of our regressions, and it's higher in absolute value than the coefficient of the exchange rate instability effect in column (1).

Table 1. Impact of exchange rate volatility (measured by GARCH models) on economic growth

Variables	**(1)**	**(2)** σ_{TC1}*BQ	**(3)** σ_{TC1}*C	**(4)** σ_{TC1}*DA	**(5)** σ_{TC1}*ET	**(6)** σ_{TC1}*EC	**(7)** σ_{TC1}*GS	**(8)** σ_{TC1}*IC	**(9)** σ_{TC1}*IP	**(10)** σ_{TC1}*LO	**(11)** σ_{TC1}*MP	**(12)** σ_{TC1}*RT	**(13)** σ_{TC1}*SC
Y	-0.100*** (0.014)	-0.140*** (0.038)	-0.276*** (0.091)	-0.176*** (0.036)	-0.097*** (0.024)	-0.253* (0.137)	-0.205*** (0.074)	-0.122*** (0.045)	-0.135*** (0.051)	-0.149** (0.069)	-0.214*** (0.075)	-0.215** (0.088)	-0.237*** (0.055)
σ_{TC1}	-0.041*** (0.007)	-0.004*** (0.001)	-0.009*** (0.003)	-0.003** (0.001)	-0.015*** (0.003)	-0.028** (0.013)	-0.025*** (0.005)	-0.016*** (0.005)	-0.007*** (0.002)	-0.006** (0.003)	-0.007* (0.004)	-.010** (0.004)	-0.005* (0.003)
FD	0.455* (0.271)	-0.326 (0.280)	-0.336 (0.323)	-0.713** (0.331)	0.461** (0.222)	2.008** (0.945)	-0.358 (0.386)	-0.300 (0.387)	-1.077* (0.562)	-1.161*** (0.235)	-1.096*** (0.325)	-1.013*** (0.356)	-1.144*** (0.270)
Open	1.512*** (0.228)	1.543*** (0.252)	1.123*** (0.199)	1.733*** (0.452)	0.728 (0.532)	-0.071 (0.729)	0.750 (0.551)	1.157*** (0.359)	1.477*** (0.351)	1.854*** (0.457)	1.582*** (0.600)	1.144*** (0.294)	2.063*** (0.560)
FP	0.168*** (0.026)	0.039 (0.041)	0.027 (0.089)	0.197*** (0.027)	-0.172** (0.077)	-0.389*** (0.178)	0.251* (0.145)	0.161*** (0.052)	0.248*** (0.080)	0.277*** (0.089)	0.289*** (0.068)	-0.019 (0.062)	0.289*** (0.086)
M2	-0.178*** (0.046)	-0.190*** (0.035)	-0.038 (0.085)	-0.087 (0.067)	0.504*** (0.170)	0.369 (0.378)	0.150** (0.065)	0.017 (0.038)	0.058 (0.044)	-0.048 (0.077)	-0.030 (0.074)	-0.161*** (0.057)	-0.015 (0.063)
constante	-3.003*** (0.825)	-3.176 (0.879)	-0.894 (2.185)	-2.585 (1.769)	-3.986 (2.864)	-2.043 (3.326)	4.025* (2.289)	0.851 (1.431)	0.811 (2.082)	-1.010 (1.626)	0.030 (2.040)	2.911 (2.573)	-1.982 (1.860)
Diagnostics													
observations	119	109	109	109	109	109	109	109	109	109	109	109	109
Test AR(2) P-value	0.843	0.817	0.317	0.942	0.233	0.181	0.936	0.811	0.804	0.983	0.910	0.774	0.937
Test de Hansen (P-value)	0.488	0.629	0.422	0.798	0.217	0.121	0.283	0.357	0.267	0.246	0.211	0.199	0.180

Standard errors in parentheses. Statistical significance: *p<0.10 ; **p<0.05 ; ***p<0.01

Table 2. Impact of exchange rate crisis on economic growth

Variables	**(1)**	**(2)** σ_{TC2}*BQ	**(3)** σ_{TC2}*C	**(4)** σ_{TC2} *DA	**(5)** σ_{TC2} *ET	**(6)** σ_{TC2} *EC	**(7)** σ_{TC2} *GS	**(8)** σ_{TC2}*IC	**(9)** σ_{TC2}*IP	**(10)** σ_{TC2} *LO	**(11)** σ_{TC2} *MP	**(12)** σ_{TC2} *RT	**(13)** σ_{TC2} *SC
Y	-0.350*** (0.061)	-0.387*** (0.110)	-0.327*** (0.079)	-0.370*** (0.088)	-0.403*** (0.093)	-0.372*** (0.098)	-0.470*** (0.103)	-0.383*** (0.098)	-0.419*** (0.099)	-0.324*** (0.096)	-0.265*** (0.086)	-0.254*** (0.098)	-0.434*** (0.081)
σ_{TC2}	-0.561*** (0.063)	-0.424*** (0.145)	-0.207*** (0.074)	-0.318*** (0.078)	-0.276*** (0.079)	-0.222*** (0.054)	-0.295*** (0.052)	-0.203*** (0.057)	-0.208*** (0.058)	-0.329*** (0.074)	-0.438*** (0.072)	-0.384*** (0.098)	-0.185*** (0.055)
FD	-0.435*** (0.049)	-0.546*** (0.159)	-0.811*** (0.080)	-0.731*** (0.078)	-0.545*** (0.109)	-0.477*** (0.163)	-0.755*** (0.061)	-0.489*** (0.162)	-0.486*** (0.133)	-0.591*** (0.095)	-0.636*** (0.094)	-0.555*** (0.150)	-0.495*** (0.109)
Open	0.047 (0.129)	0.276** (0.126)	0.584*** (0.104)	0.262*** (0.095)	0.372** (0.146)	0.403*** (0.099)	0.167 (0.164)	0.414*** (0.100)	0.392 ** (0.182)	0.408*** (0.093)	0.209* (0.107)	0.391** (0.163)	0.449*** (0.156)
FP	0.213*** (0.038)	0.233*** (0.028)	0.173*** (0.013)	0.232*** (0.031)	0.254*** (0.034)	0.218*** (0.032)	0.237*** (0.033)	0.223*** (0.031)	0.228*** (0.034)	0.221*** (0.035)	0.210*** (0.034)	0.198*** (0.034)	0.196 *** (0.025)
M2	0.406*** (0.043)	0.409*** (0.058)	0.150** (0.075)	0.419*** (0.070)	0.463*** (0.074)	0.467*** (0.087)	0.637*** (0.103)	0.464*** (0.083)	0.501*** (0.093)	0.387*** (0.051)	0.431*** (0.074)	0.412*** (0.083)	0.269*** (0.067)
constante	1.691*** (0.409)	1.107 (1.139)	1.892*** (0.280)	1.987*** (0.725)	0.509 (0.888)	0.017 (1.218)	1.790** (0.793)	0.035 (1.229)	0.036 (1.163)	0.788 (0.704)	1.679** (0.706)	0.579 (1.270)	0.732 (0.933)
Diagnostics													
observations	119	109	109	109	109	109	109	109	109	109	109	109	109
Test AR(2) P-value	0.990	0.991	0.593	0.973	0.794	0.805	0.568	0.810	0.745	0.981	0.985	0.983	0.703
Test de Hansen (P-value)	0.296	0.439	0.468	0.287	0.540	0.479	0.517	0.469	0.550	0.461	0.452	0.559	0.456

Standard errors in parentheses. Statistical significance: *p<0.10 ; **p<0.05 ; ***p<0.01

The results imply that the insertion of institutional indicators in our model undermines the impact of exchange rate fluctuations on economic growth. This finding is consistent with some works which study institutional implications effect on the currency exchange market. Honig (2007) concludes that improved institutional quality reduces unofficial dollarization, while the exchange rate regime plays no direct role in promoting dollarization. Mobarak (2005) shows that good institutional quality and especially a high level of democracy can reduce economic volatility.

Table (2) presents estimation results of equation (1) using the variable "crisis" to measure macroeconomic fluctuations. Column (1) indicates that a crisis can decrease economic growth by 0.56%. The coefficient of "crisis" has a negative and significant sign. This result is consistent with most results in the economic crises literature. For instance, Kaminsky, G and Reinhart, C (1999) documented that financial crises are associated with severe recessions. Also, Cerra and Saxena (2008) find that large output loss associated with financial and political crises is highly persistent.

Columns (2) to (13) of the table 2 report estimation results of crisis on GDP growth rate, taking into account the effect of institutions. We find a statistically significant effect of crisis in all regressions. The coefficient value of the interaction term between crisis and institutional variables ($\sigma_{TC2} * I_{it-j}$) decreases considerably in absolute value relative to that of the column (1). This may indicate that the implementation of good institutions can reduce the impact of crisis on economic growth. The result is consistent with the findings of previous research that institutional quality can smooth excessive fluctuations and enhance economic stability. Duchene, G and Zouari, S (2006), for example, show that the quality of institutions plays a positive role on the stability of the countries. Cavallo, A and Cavallo, E (2010) find that only countries with strong institutions can potentially benefit from crises and use them as opportunities to improve long-term growth.

In summary, the link between exchange rate volatility and economic growth is negative. Excessive exchange rate volatility (measured by the GARCH model or by the extreme volatility) may indicate lower economic growth. The good institutions indicators seem to undermine the negative impact of exchange rate volatility on economic growth.

4. Conclusions

This paper emphasizes the role of good institutions in mitigating the negative effect of exchange rate fluctuations on economic growth. Using the generalized method of moments (GMM) estimation technique, our results, firstly, show that the direct effect of exchange rate volatility measured by GARCH model is negative and significant. The insertion of institutional variables in the model mitigates this negative impact.

Secondly, we found that exchange rate crisis reduces economic growth. Its coefficient is negative and significant. When we estimate the interaction term effect, we conclude that good institutions undermine the crisis impact on economic growth.

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Annex

list of countries

1. Algeria	20. Austria
2. Argentina	21. Canada
3. Brazil	22. Chile
4. Bulgaria	23. Croatia
5. China	24. Cyprus
6. Colombia	25. Czech Republic
7. Hungary	26. Denmark
8. India	27. Estonia
9. Indonesia	28. Hong Kong
10. Malaysia	29. Iceland
11. Mexico	30. Ireland
12. Peru	31. Israel
13. Philippines	32. Japan
14. Romania	33. Lithuania
15. South Africa	34. Luxembourg
16. Thailand	35. Netherlands
17. Turkey	36. New Zealand
18. Venezuela	37. Sweden
19. Australia	38. Switzerland