Short-term and long-term growth effects of exchange rate adjustment

Evžen Kočenda[1], Mathilde Maurel[2], Gunther Schnabl[3]

Abstract. During the European sovereign debt crisis the discussion concerning the pros and cons of exchange rate adjustment in the face of asymmetric shocks has been revived. Whereas one side has recommended (in the spirit of Keynes) the exit from the euro area to regain rapidly international competitiveness, exchange rate stability cum structural reforms have been argued (in the spirit of Schumpeter) to be a beneficial long-term strategy towards the reanimation of a robust growth performance. Previous literature has estimated the average growth performance of countries with different degrees of exchange rate volatility. We augment this literature by econometrically separating between the short-term and long-term growth effects of exchange rate volatility based on a panel-cointegration framework for a sample of 60 countries clustered in five country groups. The estimations show that countries with a low degree of exchange rate volatility exhibit a higher long-term growth performance, whereas over the short-run exchange rate flexibility provides some benefits.

Keywords: Exchange rate regime, crisis, shock adjustment, theory of optimum currency areas, Mundell, Schumpeter, cointegration, competitive depreciations.

JEL Classification: F31, F32
AMS Classification: 62J12, 62P20

1   Introduction

The recent wave of financial, balance of payments and sovereign debt crises has revived the discussion about the appropriate adjustment strategy in the face of asymmetric shocks. In most crisis events such as the 1997/98 Asian crisis, the 1998 Japanese financial crisis, the 1998 Russian flu, the 2001 collapse of the Argentine currency board and even the US subprime market crisis, the crisis countries opted for monetary expansion and depreciation as crisis solution strategies. In contrast during the most recent European sovereign debt crises a set of European crisis countries opted for staying in the Economic and Monetary Union (EMU) (the EMU crisis countries) or maintaining tight exchange rate pegs to the euro (such as the Baltic countries). The consequence was a strong pressure to curtail government expenditure and to cut nominal wages.

The different adjustment strategies in the face of crisis based on inflation or deflation are embedded into different theoretical frameworks. Keynes [13] and Mundell [17] favoured monetary expansion and depreciation to provide a quick fix for missing international competitiveness and high unemployment. In contrast, Schumpeter [21] and Hayek [8] had stressed the positive long-term growth effects of wage and price cuts to increase the marginal efficiency of private investment. In the context of the choice of the exchange rate regime, Mundell [17] stressed the benefits of exchange rate adjustment in the face of asymmetric shocks to stimulate growth (short-term), whereas McKinnon [15] highlighted the role of fixed exchange rates for macroeconomic stabilization and therefore as a tool for preserving the long-term growth performance. From an economic historical perspective Bordo [2] argues that the exchange rate stability of the gold standard has fostered global trade and growth, whereas Eichengreen [6] sees the early exit from the gold standard as the reason for UK's early recovery from the world economic crisis.

Empirical studies on the impact of the exchange rate regime on growth have come to mixed results. For instance, Levy-Yeyati and Sturzenegger [11] who examine the impact of the exchange rate regime on growth for a sample of 183 countries in the post-Bretton-Woods era (1974-2000) based on a pooled regression framework find a negative impact of exchange rate stability on growth for emerging market economies. In contrast, Maurel

[1]CERGE-EI, Charles University, Politických vězňů 7, 111 21 Prague Czech Republic, evzen.kocenda@cerge-ei.cz.
[2]CES, Université Paris 1, Panthéon-Sorbonne, 106-112 Boulevard de l'Hopital, 75647 Paris cedex 13, France, mathilde.maurel@univ-paris1.fr.
[3]Gunther Schnabl, University of Leipzig, Grimmaische Straße 12, 04109 Leipzig, Germany, schnabl@wifa.uni-leipzig.de.

and Schnabl [16] use static and dynamic panel estimations to find a positive impact of exchange rate stability on growth for a set of 60mostly emerging market economies.

We aim to augment this literature by isolating the long-term and short-term growth effects of exchange rate stability / flexibility based on a cointegration framework. This research allows us – with the help of a panel of 60 countries in East Asia, Europe, Latin America and the CIS for the period from 1980 to 2011 – to reconcile Mundell's [17] and McKinnon's [15] view on the impact of exchange rate flexibility/volatility in the face of asymmetric shocks.

2 Short-Term and Long-Term Growth Effects of (Non-) Exchange Rate Adjustment

From 2008 to 2012 European debt crisis has revealed the different adjustment strategies to asymmetric shocks and crisis. When many European periphery countries were hit by bursting bubbles, the reversal of capital inflows and (near to) unsustainable debt levels, the membership in the EMU barred the way towards depreciation as a quick fix for the adjustment of unit labour costs to regain international competitiveness.

The loss of an independent monetary policy and the exchange rate as adjustment tools to asymmetric shocks made price and wage adjustments necessary, which amplified the crisis and triggered different policy responses. Whereas Ireland (like the Baltic countries in the east of the European Union) embarked on doughty adjustment measures in the private and public sector, in Greece political resistance retarded reforms. The delayed reforms in Greece were reflected in substantial rescue packages and rising imbalances in the TARGET2 mechanism (Sinn and Wollmershäuser [20], Abad et al. [1]), which both provided a substitute for pre-crisis private capital inflows as financing mechanism of persistent current account deficits.

The real exchange rate adjustment, which is needed to rebalance the current account position of crisis countries, is framed by the theories of optimum currency areas. Mundell [17] assumed that countries with a high probability of asymmetric shocks need to preserve the exchange rate as an adjustment mechanism to stabilize growth, if labour markets are rigid. This reflects the Keynesian assumption of (short-term) price and wage rigidity and the crucial role of the government for macroeconomic stabilization. In contrast, McKinnon [15] argued that in small and open economies a fixed exchange rate needs to serve as a macroeconomic stabilizer by absorbing nominal shocks to promote growth. To maintain a fixed exchange rate, sufficient price and wage flexibility is necessary, which is line with Hayek's [8] and Schumpeter's [21] notion that declining prices and wages are the prerequisite for a robust recovery after crisis.

The growth effects of the crisis adjustment strategies based on exchange rate or wage adjustment has a short-term and a long-term dimension as well as a goods market and a capital market perspective. Keynes [13] stressed the short-term dimension with a focus on goods markets. Depreciation in the case of crisis can help to "jumpstart" the economy as monetary expansion and real depreciation restore instantaneously the international competiveness. Real wages decline without burdensome wage negotiations as inflation increases, in particular via the import price channel in timely manner.

Hawtrey [12], who dedicated his academic work to the deflationary consequences of the return to the gold standard, pioneered the financial market based arguments for a monetary expansion during crisis. Interest rate cuts and liquidity injections into the financial sector help to stabilize the financial system. Low-costs credit prevents a monetary tightening during crisis due to increasing risk perception in the private banking sector. The monetary expansion prevents a credit crunch and the dismantling of investment projects (which lead into a cumulative process downwards). New investment during the crisis is encouraged which helps to speed up the recovery. As a fundamental restructuring process in the economy is prevented, dire wage adjustment becomes dispensable, which helps to maintain economic activity via the consumption channel.

Hayek [8] and Schumpeter [21] help to understand the long-term growth effects of crisis therapy via monetary and depreciation, when restructuring and structural reforms are postponed. In Schumpeter's ([21]: 350) real overinvestment theory the recession is a process of uncertainty and disorder, which forces a reallocation of resources on the enterprise sector ("cleansing effect"). The reallocation is a pre-requisite for long-term growth for the following reasons: Speculative investment is abandoned. Inefficient enterprises leave the market. The efficiency of the remaining enterprises is strengthened. New enterprises, products and production processes emerge at the cost of old ones. An exchange rate depreciation due to a crisis is an impediment to long-term growth as the

"unadapted and unlivable" persists (Schumpter [21]: 367).[4] Hence, an exchange rate regime matters, as a fixed exchange rate (or membership in a monetary union) imposes the need for reforms.

The monetary overinvestment theory of Hayek [8] allows approaching the long-term growth effects of monetary expansion and depreciation from a capital market perspective. The pivotal point is the impact of monetary expansion on the marginal efficiency of investment. During the upswing artificially low interest rates set by the central bank encourage investment with declining marginal efficiency. When rising inflation urges the central bank to lift interest rates again, investment projects with a low marginal return have to be dismantled. The resulting cleansing effect is the prerequisite for a sustained recovery. If, however, the central bank responds to the crisis by decisive interest rate cuts, investment projects with low marginal returns, i.e. a distorted production structure; are conserved (Hoffmann and Schnabl [9], [10]). A structurally declining interest rate deprives the interest rate of its allocation mechanism – which separates high-return investment from low-return investment – thereby putting a drag on long-term growth (Schnabl [19]).

This implies that – depending on the theoretical framework – exchange rate adjustment in face of crisis has a positive or negative growth effect depending on the time horizon. As stressed by Mundell [17] the question of if the exchange rate regime has a positive or negative effect on the growth performance of countries may – with an asymmetric world monetary system – further hinges on the degree of business cycle synchronization with the (potential) anchor country. Because of underdeveloped goods and capital markets small and open economies have an inherent incentive to stabilize exchange rate versus the currency of a large anchor country (usually the dollar or the euro) (Calvo and Reinhart [4]). If business cycles are synchronized with the anchor country, the monetary policy of the anchor country will be in line with the macroeconomic needs of the small open economy. If, however, business cycles are idiosyncratic, there is a larger need to create a growth stimulus via depreciation.

Previous papers have tested for the overall growth effects of exchange rate flexibility, partially contingent on business cycle synchronization. We augment this literature by separating between the long-term and short-term growth effects of exchange rate flexibility based on a sample of 60 small, open emerging market economies based on an error correction framework.

3 Sample, Volatility Measures and Business Cycle Correlation

To trace the short-term and long-term impact of exchange rate flexibility, i.e. exchange rate volatility, on growth, we choose five country groups for which the choice of the appropriate exchange rate regime has been high on the political agenda: In the EU15 as well as in Central, Eastern and Southeastern Europe (Emerging Europe), the discussion about membership in the EMU and/or the optimum degree of exchange rate stability against the euro continues to be high on the political agenda. Empirical results of Kočenda and Poghosyan [14] imply that to contribute to further stability of the domestic currency, the new EU members should strive to implement stabilization policies aimed at achieving nominal as well as real convergence with the core EU members since both real and nominal factors play important roles in explaining the variability of their foreign exchange risk premium.

The discussion about the pro and cons of EMU membership and exchange rate stability against the euro was revived during the most recent crisis. In East Asia and South America the optimum degree of exchange rate stability against the dollar continues to be discussed, in particular since the Asian crisis and drastic US interest rate cuts following the subprime crisis. Most recently, Japan, China and Brazil have been involved in a discussion on "currency wars" and competitive interest rate cuts (McKinnon [15]). In the Commonwealth of Independent States, Russia's move towards a currency basket and the depreciation of the CIS currencies during the recent crisis has revived the question about the optimum exchange rate policy. In this context, the choice of the anchor currency and therefore the degree of business cycle synchronization with the anchor country play an important role.

The five country groups include all countries of the respective region excluding microstates – which may bias the sample towards a very high positive effect of exchange rate stability on growth (Rose [18]) – and countries with insufficient data such as Turkmenistan, Uzbekistan, and Guyana etc. This brings us to a sample size of 60 countries. They are grouped into the regions with prevailing anchor currencies and, hence, the reference countries for measuring business cycle correlation. For the countries in East Asia, South America and the CIS the dollar has been the prevailing target of exchange rate stabilization. Business cycle correlation is measured versus the US. For the European countries before the introduction of the euro in 1999, the German mark has been the dominant anchor currency. Since then, the euro has become the natural anchor for the European non-EMU coun-

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[4] Schumpeter's [21] argument which has been designed for the private enterprise sector can be applied for the government sector as well. A strong recession will trigger only structural reforms if there are restrictions on fiscal and monetary expansion in place.

tries. Exchange rate volatility is measured against the German mark before 1999 and against the euro after 1999. Once a country has entered the EMU the proxy for exchange rate volatility is set to zero. Business cycle correlation in Europe is measured versus Germany, which is the largest European economy (and therefore a country with a high degree of business cycle correlation with the euro area). For Germany, France as the second largest European economy is used as a reference country to measure business cycle correlation.

The data source is mainly the IMF International Financial Statistics. Missing or inconsistent data are completed and cross-checked with national statistics, mainly national central banks. For all macroeconomic data we use quarterly frequencies. Quarterly GDP growth rates are calculated as year-over-year quarterly growth rates to filter out seasonal pattern and lower the volatility of the transformed series. Quarterly volatility measures for exchange rates are computed based on monthly data. The sample period starts in January 1994 to avoid putting in the analysis the first years of the nineties, which for most of the European and CIS countries implied high volatility linked to the transition process.

4   Empirical Analysis

Given the different time dimensions of economic theories concerning the impact of exchange rate stability/flexibility on growth, the issue of crisis adjustment via exchange rate flexibility is an empirical one. In contrast to previous papers, we aim to address the question about the optimum exchange rate regime by identifying the impact of exchange rate flexibility on both short-run and long-term growth. Hawtrey [12], Keynes [13] and Mundell [17] argued that exchange rate adjustment during crisis increases the (short-term) growth performance of countries with a high likelihood of asymmetric shocks. In contrast, for Schumpeter [21], Hayek [8] and McKinnon [15] exchange rate stability during crisis enhances the need for internal adjustment, what is seen as a prerequisite for dynamic long-term growth. The foregoing empirical analysis aims to distinguish the long-term and short-term effect of exchange rate flexibility on growth, which may possibly, reconcile both strands of literature by attributing a time dimension to them.

4.1   Model Specification and Estimation Procedure

Equation (1) is our benchmark equation. The explanatory variables are exchange rate volatility, inflation, interest rate, and openness and trend as additional control variables.

$$w_{it} = a + b_1 ERV_{it} + b_2 ERV_{it}^{assy} + c\ inflation + d\ interestrate + controlvariables + ec\big(\beta_1 ERV_{it} + \beta_2 ERV_{it}^{assy} + \gamma\ inflation + \delta\ interestrate\big) \qquad (1)$$

In specification (1) w_{it} are the quarterly real growth rates from 1994 to 2010. ERV_{it} stands for the three measures of exchange rate volatility: standard deviations, mean of percent exchange rate changes against the anchor currency, and z-score (see Maurel and Schnabl [16] for details). *Interest rate* stands for short-term interest rates of the respective reference country as one of the most important determinants of global growth. Average *inflation*, proxied by the average of monthly year-over-year changes of the consumer price index controls for (negative) growth effects originating in macroeconomic instability, which is linked to exchange rate volatility. We control for the fact that countries with asymmetric business cycles face bigger constraints to achieve the same growth by using the dummy *Dbbc* (see earlier explanation in Section 3). Combined dummy variable ERV_{it}^{assy} is constructed as ERV_{it} times *Dbbc* and is set equal to one for countries characterized by asymmetric business cycles, and zero otherwise. The term after error correction term *ec* in parentheses refers to the short-run adjustment while the first part of the equation displays the long-term relationship. Control variables in the long-run equation are *trade openness*, *time*, and *squared time*, to better fit the non-linear pattern of growth especially in transition countries during the first years of the nineties. We assume that those variables make sense for assessing the long-run economic performance while they do not matter in the short-run.

There is a large number of other potential explanatory variables like investment, government spending, schooling etc. which could increase the fit of the model, but also generate endogeneity (for instance investment and growth) and multicollinetarity bias (for instance between government spending and inflation) (De Grauwe and Schnabl [5]). Therefore, we opt for a parsimonious specification, restricted to the control variables mentioned above.

Our objective is threefold: to highlight the impact of exchange rate volatility on growth, to quantify the weight of countries with asymmetric business cycles (which we call asymmetric countries) in this impact, and to disentangle the short-run versus long-run effect of exchange rate volatility. Our prior is that the impact of exchange rate volatility should be positive in the short-run, especially for asymmetric countries, but negative in the long-run.

An error-correction version of specification (1) is estimated and allows concluding that the effect of exchange rate volatility if negative in the long-run, while it is positive in the short-run, especially for countries with a high probability of asymmetric shocks, as emphasized by Mundell [17]. The results are obtained via the pooled mean group estimation. The restriction of the pooled mean group against the mean group model is tested by performing Hausman tests.

4.2 Estimation Results

We present results of our estimation in Table 1. The null hypothesis of equality of coefficients cannot be rejected at 1% level. This evidence favors the pooled mean group model against the mean group estimator. The pooled mean group results are consistent with those reported in other studies, they hold whatever indicator for exchange rate volatility (standard deviation, average yearly change, and z-score) is used. Their effect is economically important. They provide evidence of a significant negative long-run correlation between exchange rate volatility and growth as well as a positive short-run correlation between exchange rate volatility and growth. They are in line with Furceri and Zdzienicka [7] who show that flexible exchange rates attenuate crises in the short and medium term but tend to have a negative effect on long-term growth, given that the cleansing effects did not materialize. All long-run coefficient estimates are highly significant (at 1 and 5% significance levels) and display the expected signs. A sound macroeconomic policy keeping inflation low is conducive to growth, while lower interest rates imply more opportunities for investment, which translates into higher growth.

Table 1 Short- and Long-Run Effects (pooled mean group estimators)

	Exchange Rate Volatility Measures		
Variable	Average change	Standard deviation	z-score
Long-run coefficients			
Time	-0.0019*** (0.001)	-0.0024*** (0.001)	-0.0023*** (0.001)
$(Time)^2$	0.0000* (0.000)	0.0000** (0.000)	0.0000** (0.000)
Trade openness	0.0331*** (0 .008)	0.0497*** (0.013)	0.0530*** (0.013)
ER volatility	-0.1825 (0.121)	-0.5971*** (0.122)	-0.4916*** (0.096)
ERvolatility (asymmetric)	-0.5382*** (0.204)	0.1497 (0.187)	0.0921 (0.144)
Inflation	0.0006 (0.019)	-0.0246 (0.021)	-0.0033 (0.020)
Interest rate	-1.3052*** (0.165)	-1.2316*** (0.156)	-1.2779*** (0.158)
Short-run coefficients			
Error correction coefficient	-0.2644*** (0.018)	-0.2618*** (0.014)	-0.2640*** (0.014)
Trade openness	0.0830 (0.078)	-0.0760 (0.055)	-0.0803* (0.042)
ERvolatility	0.0289 (0.109)	0.1534** (0.067)	0.1256** (0.057)
Inflation	0.0396* (0.021)	0.0322* (0.019)	0.0284 (0.019)
Interest rate	1.6898*** (0.179)	1.6823*** (0.190)	1.6862*** (0.181)
Intercept	0.0346*** (0.003)	0.0360*** (0.003)	0.0358*** (0.003)

Significance levels at 1, 5, and 10% are denoted by ***, **, and *, respectively.
Note: ER volatility denotes one of the three exchange rate volatility measures used; e.g. average yearly change, standard deviation, and z-score. Numbers in parentheses are standard errors.

With respect to the short-term elasticities, the pooled mean group results suggest that interest rates and average inflation have highly significant short-run effects on growth. Exchange rate volatility is negatively signed, but its magnitude is significantly lower than for the long-run. The interaction terms capture the impact of exchange rate volatility on growth for asymmetric countries. They are significant, meaning that the impact of exchange volatility is magnified for asymmetric countries. Those findings support the view of exchange rate flexibility helping to smooth out asymmetric shocks only in the short run.[5] They do not serve the objective of a dy-

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[5]Bubák et al. [3] document the existence of volatility spillovers between the Central European foreign exchange markets as well as the fact that exchange rate volatility increases in medium-term for those countries with troubled financial sector development.

namic long-term growth performance. The estimated adjustment parameter is negatively signed and significant, implying that short-run deviations from the long-run growth path dampen over time.

5 Conclusion

With the European sovereign debt crisis a controversial discussion concerning the optimum monetary policy and exchange rate strategy to asymmetric shocks has reemerged. We have aimed to derive from our econometrical exercise for a panel of 60 countries a policy recommendation for crisis countries. Our estimation results have provided evidence that exchange rate adjustment stimulates growth in the short-term, but puts a drag on the long-term growth performance. As the overall effect is negative, the policy implication is to keep exchange rates stable to promote growth via price and wage flexibility, in the spirit of Schumpeter [21], Hayek [8] and McKinnon [15].

Based on our findings we recommend to the crisis countries consequent structural reforms and real wage cuts. Painful restructuring and declining output today are likely to be rewarded with a robust economic recovery and rising income in the future. In contrast, monetary expansion and depreciation as a crisis solution strategy can be expected to provide short-term relief, but long-term pain.

Acknowledgements

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