On crises, international trade and exchange rate regimes.

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Abstract

The main objective of this paper is to study the performance of exchange rate regimes on international trade during crisis episodes. To that end, a gravity equation is estimated for a sample of 194 countries over the period 1970-2011, by adding a set of regressors built from a *de facto* classification of exchange rate arrangements and the dates of recognized financial crises. This paper studies the behaviour of the different exchange rate regimes in the context of both global and domestic economic crises. The results indicate that sharing a common currency seems to be the best exchange rate arrangements in terms of its effect on trade during crisis episodes. The results also suggest that the fixer the regime is, the more intense is its promoting impact on trade during crises.

1. Introduction

The current global financial crisis has stimulated academic efforts trying to identify the causes and consequences of financial crises. What is more, this topic has played a central role in the history of the economic thought. To that respect, many efforts have been put in determining the influence of macroeconomic imbalances and shocks and more irrational factors on the probability and the magnitude of financial crises (Claessens and Kose, 2013).

Literature on financial crisis recognizes that trade linkages can spread the crises across countries. Glick and Rose (1999) and Tsangarides (2010) found that international trade amplifies the geographical scope of monetary crises. This finding is confirmed by Dasgupta et al (2011), suggesting that international trade and also institutional factors and financial linkages explain the direction of the spread of crises. Also Haidar (2012) proposes mechanisms of currency crisis transmission through international trade and presents an explanation for its regional nature. On the other hand, a recent literature explores the influence of Exchange Rate Regimes (ERRs) on the volume of international trade. Most of this work focuses on the analysis of the effect of sharing a currency on trade concluding that a common currency seems to produce a major impact on international trade flows (Rose and Stanley, 2005). Only few papers, such as Klein and Shambaugh (2006), Adam and Cobham (2007) and Qureshi and Tsangarides (2010), explore the influence of other ERRs suggesting that fixed exchange rate regimes promote trade.

As a matter of fact, the impact of financial crises on the real economy may be increased and transmitted through a reduction of bilateral trade flows. In that case, ERRs may be a key factor on mitigating the magnitude and the spread of crises by stimulating trade.

This reasoning is of interest for the design of the exchange rate policy even more during crisis episodes. Traditionally, the arguments behind the choice of the exchange rate regime have aroused an intense debate in international economics. Theoretical framework and empirical work provide inconclusive answers to this question. Furthermore, the consequences of the exchange rate policy in terms of growth and inflation have been extensively studied. In both cases the empirical literature has not found a clear link between exchange rate regimes and macroeconomic performance. This last is not surprising since it was one of the six major puzzles of the international economics as proposed by Obstfeld and Rogoff (2001).

The nature of the choice of the exchange rate regime still remains as an empirical mystery. According to Rose (2010), this poor progress in understanding such choice is not dramatic since it often seems to have little consequence. However, international trade may be an additional ground where the choice may have noticeable consequences. Precisely the impact of the exchange rate arrangements on trade has been less explored. A relevant ground where the effect of different exchange rate regimes may be compared is during crisis periods. In this sense, Bubula and Otker-Robe (2003) suggest that intermediate regimes have been characterized by a higher incidence during crises than hard pegs and floating regimes.

The main objective of this paper is to analyze the influence of exchange rate policy on trade during crisis episodes. Indeed this study shows that the choice of the ERR is non-neutral in terms of international trade when an economy is suffering a financial crisis. To that end, the intensity of the effect of exchange rate arrangements on trade during crisis episodes is estimated for three crises with global effects: the breakdown of the Bretton-Woods System in (1971-1973), the crisis of the European Monetary System in (1992-1993) and the current global financial crisis (2008-2011). Also a dataset of country-based systematic banking crises provided by Laeven and Valencia (2012) is studied. The contribution of this paper is threefold: (i) a large dataset covering 194 countries over the period 1970-2011 is used, (ii) the effect of exchange rate policy on trade is estimated and (iii) the behaviour of exchange rate regimes during crisis is explored.

The paper is organized as follows. Section 2 presents the main antecedents, paying especial attention to both the analysis of exchange rate regimes performance in terms of trade and the study of crisis, international trade and exchange rate policy. Section 3 describes data and methodology used in this paper. Section 4 presents the results and Section 5 draws some conclusions.

2. Background

As mentioned above, the main purpose of this paper is to analyse the performance of ERRs in terms of international trade during crisis periods. To that end, different exchange rate regimes that imply different levels of exchange rate volatility are defined, as well as many global and country-specific crisis episodes are considered. This section presents the main antecedents about ERRs, international trade and financial crises.

Financial crisis has been a very frequent phenomenon and it has stimulated many efforts trying to identify its nature and consequences. For countries representing the 90% of world GDP, Reinhart and Rogoff (2008) show that financial crises have been very frequent and diverse events affecting countries in the last eight centuries. Also Laeven and Valencia (2012) present a chronology of recent crises in the last forty years, finding similarities among crisis episodes but differences in the political responses between advanced and developing economies. This heterogeneity is confirmed by Quian et al (2010) showing that the graduation of crises is quite sensitive to their causes. In this sense, Claessens and Kose (2013) provide an exhaustive review of the literature on crises, putting the attention in causes, types and real and financial consequences. Also they emphasize the recognition of the literature about the relevance of international trade and other linkages as channels of transmission and contagion.

Following Forbes (2012), trade can cause contagion through two ways. Firstly a crisis in one country can reduce income and the corresponding demand for imports, thereby reducing exports from other countries through bilateral trade. Secondly if a country suffering a crisis devalues its currency, this can improve the country's relative export competitiveness in third markets. Most empirical papers find that trade linkages are significant channels for the transmission of crises. Glick and Rose (1999) for past crisis episodes, and Tsangarides (2010) for the current financial crisis estimate that international trade amplifies the geographical scope of monetary crises. Glick and Rose (1999) hold that currency crises tend to be regional; that is they affect countries in geographic proximity. Thus, patterns of international trade are important in understanding how currency crises spread, above and beyond any macroeconomic phenomenon during crisis episodes. This finding is confirmed by Dasgupta et al (2011), suggesting that international trade and also institutional factors and financial linkages explain the direction of the spread of crises. Also Haidar (2012) proposes mechanisms of currency crisis transmission through international trade and presents an explanation for its regional nature.

In our view, ERR could be a factor promoting trade and as a consequence reducing the transmission of crises through a stimulus of international trade. Recent literature explores the impact of ERRs on international trade flows, where most of these papers study the relevance of sharing a currency in the determination of the volume of bilateral trade. The seminal paper by Rose (2000) is perhaps the most influential international economics paper of the last decade (Frankel, 2008). Rose found a shocking result, i.e., two countries sharing a currency traded over three times as much as similar pairs of countries. Consequently, his paper opens a path in the international trade literature since many authors revised the effect of this particular exchange rate regime on trade flows[1]. On the contrary, research on other exchange rate regimes different from a currency union has received less attention.

An important issue on this topic is that Rose's findings contrast with the inconclusive estimated effect of exchange rate volatility on trade. On the one hand volatility does not seem to be a major factor of determination of the volume of trade but, on the other hand, a zero-volatility exchange rate seems to be quite relevant. Clark et al (2004) conclude that a robust negative effect of exchange rate volatility on trade flows cannot be found. This empirical result is in accordance with theoretical framework recognizing that exchange rate volatility is the result of shocks such as economic policy (McKenzie, 1999). So trade liberalization together with more exchange rate flexibility may lead to an increase in trade.

[1] See Rose and Stanley (2005) for a survey of this literature.

In our paper, we hold that exchange rate volatility could not be a good proxy for exchange rate risk as perceived by agents, and exchange rate regime may be a better way to capture it. Agents could be interpreting exchange rates and their volatilities in a superficial way rather than studying in depth its associated volatility. Precisely, the calculus of de facto exchange rate regimes may be interpreted as putting labels for different ranges of volatility.

As mentioned above, only few papers in the literature have analysed the effect of exchange rate regimes on trade. Klein and Shambaugh (2006) found that fixed exchange rate regimes (currency unions and pegs) promote trade. Qureshi and Tsangarides (2010) contribute to this literature by addressing both the relevance of de jure and de facto ERRs. Doing this, the authors show that the effect of ERRs is more intense when words and actions are aligned. Furthermore, the impact of pegs and currency unions seem to evolve over time. Adam and Cobham (2007) try to be extensive by introducing 27 different exchange rate arrangements in a gravity equation but they obtain non-clear conclusions.

Some of these papers include both volatility and exchange rate regimes as explanatory variables of trade. Their argument is that the influence of exchange regimes by other ways different from exchange volatility is what is tried to be measured. But, what are such other ways? On the one hand, currency conversion fees only are reduced by the adoption of a particular exchange rate arrangement, i.e., the common currency. On the other hand, when de jure exchange rate regimes are used, the story would be that an announced exchange rate policy alters agents' expectations and, as a consequence, their trade decisions. However, when de facto exchange rate regimes are considered, and they are the most used classification of exchange rate arrangements, this channel vanishes. Moreover, these papers also include indirect exchange rate arrangements. For instance, if both countries A and B maintain a peg with respect to the currency of country C, then A and B would maintain an indirect peg between them. The definition of these indirect regimes is clearly weak since its impact relative to other exchange rate regimes cannot be formulated before the estimation. Indeed, an indirect peg could present higher or lower volatility than the direct pegs which permit their calculation.

The debate on which exchange rate regimes are less crisis prone has received attention in the analysis of financial crisis. On the one hand, Mundell (1961) recognises that flexible exchange rate regimes allow an independent monetary policy while fixed regimes are expected to be susceptible to speculative attacks and devaluation. On the other hand, fixed exchange rate regimes may become a commitment to reducing the probability of crises, as it would discipline policy makers (Eichengreen and Rose, 1998). If a fixed regime is credible, it may insulate a country from contagion and rumours. Nevertheless, the literature is not conclusive to that respect. Bubula and Otker-Robe (2003) obtain that intermediate regimes are more crisis prone than hard pegs and floating regimes, consistent with a bipolar view of exchange rate arrangements. For its part, Domac and Martinez-Peria (2003) found evidence that fixed regimes reduces the likelihood of banking crises among developing countries. However, the real costs are higher under fixed exchange rate regimes when crises occur. However, the research on the performance of exchange rate regimes in terms on trade during crisis periods is scarce if not absent. Henceforth, the present paper also aims to contribute to fill this gap by identify which exchange rate regimes perform better in terms of trade during crisis episodes.

3. Data and methodology

In this paper, a standard augmented gravity equation is defined to explain bilateral trade. The model is estimated for a large dataset that includes bilateral exports flows between 194 trading countries for the period 1970-2011. Our benchmark augmented gravity equation is defined as follows:

$$\begin{aligned} lnExports_{ijt} = & \beta_0 + \beta_1 lnGDPpc_{it} + \beta_2 lnGDPpc_{jt} + \beta_3 lnPop_{jt} + \beta_4 lnDist_{ij} + \beta_5 lnBorder_{ij} \\ & + \beta_6 Lang_{ij} + \beta_7 Colony_{ij} + \beta_8 ComCol_{ij} + \beta_9 SmCtry_{ij} + \beta_{10} Relig_{ij} + \beta_{11} Landlocked_{ij} \\ & + \beta_{12} Island_{ij} + \beta_{13} RTA_{ijt} + jCrisis_{ijt} + \alpha' ERR_{ijt} + u_{ijt} \end{aligned} \quad [1]$$

where ln denotes natural logs; i and j indicate exporter and importer countries, respectively; t is time, and the variables introduced in equation [1] are defined as: $Exports_{ijt}$ is exports between an exporter country i and a partner country j in year t; $GDPpc_{it}$ and $GDPpc_{jt}$ denote the real GDP per capita of country i and j, respectively; Pop_{jt} is the population of the importing country j; $Dist_{ij}$ is the great circle distance between capital cities of countries i and j; $Border_{ij}$ is a binary variable which is unity if i and j share a common land border; $Lang_{ij}$ is a binary variable which is unity if i and j share a common spoken language; $Colony_{ij}$ is a binary variable which is unity if one country ever colonized the other or vice versa; $ComCol_{ij}$ is a binary variable which is unity if countries i and j have or have had a common colonizer; $Relig_{ij}$ is a dummy variable that takes the value one if both countries in the pair share a common main religion; $SmCtry_{ij}$ is a binary variable which is unity if countries i and j belonged to the same country; $Landlocked_{ij}$ is a dummy variable that takes the value one if there is a landlocked country in the pair; $Island_{ij}$ is a dummy variable that takes the value one if there is an island region in the pair; RTA_{ijt} is a binary variable which is unity if countries i and j belong to the same free trade agreement in year t. regarding the variables of interest, $Crisis_{ijt}$ is a dummy variable that takes the value one if a crisis occurs in any country in the pair in year t, while *ERR* represents a set of binary variables corresponding to several exchange rate regimes, that is currency union, peg, crawling peg, crawling band and managed float. If one of them is unity, countries in the pair share that particular bilateral exchange rate regime at time t. Finally, β is a set of coefficients, φ and α are the parameters of interest and u_{ijt} is a well-behaved disturbance term

International exports is defined in million of US$ and is obtained from Direction of Trade dataset of the International Monetary Fund. This variable requires to be converted into real terms by using US GDP deflator. US GDP deflator, GDP per capita, and population were obtained from the World Development Indicators of the World Bank and, when missing, completed with data from the UNCTAD Handbook of Statistics. The distance variable and dummy variables *Lang, Border, Colony, ComCol, SmCtry* and *Landlocked* were collected from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) dataset while *Island* was obtained from Andrew K. Rose's website and the CIA Factbook. Finally, *RTA* dummy variable was taken from the Regional Trade Agreement dataset from the World Trade Organization while *Relig* is constructed with data from the World FactBook by the Central Intelligence Agency

To build the bilateral exchange rate regime variables, the updated dataset of de facto exchange rate regimes estimated by Ilzetzki, Reinhart and Rogoff (2010) is used. This is one of a number of classifications produced in recent years in attempts to discriminate between regimes on the basis of what countries actually do rather (*de facto*) than what they say they do (*de jure*). It makes particular use of parallel market data as well as official exchange rate data. Table 1 presents the definition of dummies included in the gravity equation. These ERRs are associated with different degrees of exchange rate volatility. In particular, dummy variables for five different exchange rate regimes are defined: CU_{ijt}, Peg_{ijt}, $CrawPeg_{ijt}$, $CrawBand_{ijt}$ and $ManFloat_{ijt}$ for currency union, peg or currency board, crawling peg, crawling band and managed floating, respectively. In that case, the excluded categories would be flexible exchange rate regimes (freely floating and freely falling) and dual market in which parallel market data is missing.

[Table 1, here]

It is worth to mention that the case of the euro as both common currency and anchor is not being considered in our analysis. As argued by Frankel (2008), the estimates effect of the euro on trade is below the traditional estimated effect of other currency union cases which involve small and/or poor countries. Moreover, the inception of the euro substitutes traditional anchors such as French franc and German mark in favour to this new currency. On the euro's formation, these countries acquired fixed rates against the other Eurozone members, in addition to their historical anchors. Barlanga (2011) shows that these policy changes were exogenous to trade, and are associated with significantly smaller effects on trade than the typical peg where countries tend to select fixed exchange rate regimes with major trading partners. Thus, the case of the euro, as both common currency and anchor, is not being considered.

Regarding the crisis variable, both global and country-specific (or domestic) crisis episodes are considered. Crisis1 variable refers to global financial crisis where three main crisis episodes with consequences worldwide (affecting all the countries in the sample) are conisdered: (i) the breakdown of the Bretton-Woods System (1971-1973); (ii) the crisis of the European Monetary System (1992-1993) and (iii) the global financial crisis (2008-2011). Crisis2 refers to country-specific crisis that affect particular countries at a specific year. To create this dummy variable, a dataset of country-based financial crises provided by Laeven and Valencia (2012) is used. The authors distinguish between systematic banking crises, currency crises and sovereign crises. In our sample, 112 systematic banking crisis, 155 currency crisis and 50 sovereign debt crisis episodes are identified according to this classification.

Following Cheng and Wall (2005), the gravity equation is estimated by Ordinary Least Squares (OLS), adding country specific-effects γ_i and δ_j and year effects λ_t (OLS-CFE). This is in accordance with Rose and van Wincoop (2001) by recognizing the relevance of not only the bilateral resistances but also the multilateral resistances that allow to control for idiosyncratic factors of specific countries in the determination of the volume of international flows (Anderson and van Wincoop, 2003).

Ruiz and Vilarrubia (2007) pointed out that the omission of time-varying multilateral trade resistance terms in the estimation of a gravity equation introduces important biases in the results. Thus, time-varying (or country-year) fixed effects, as an extension of the methodology proposed by Feenstra (2002) for cross-sectional data, are considered in the empirical analysis. To that end, a two high-dimensional fixed effects approach (2WFE) developed by Guimaraes and Portugal (2010) is also used.

Finally, since there is a large percentage of zero trade flows in our sample, the Heckman sample selection model is applied.[2] Dropping these observations, as OLS automatically does because the logarithm of zero is undefined, immediately gives rise to concerns about sample selection bias. The sample from which the regression function is estimated is not drawn randomly from the population (all trade flows), but only consists of those trade flows which are strictly positive. Heckman (1979) propose a model to deal with this sample selection bias which considers a two-stage estimation procedure: in the first step, a probit equation is estimated to define whether two countries trade or not. In a second step, the expected values of the trade flows, conditional on that country trading, are estimated using OLS. Indeed, Gomez-Herrera (2013) compares different methods to estimate trade gravity equations and obtain that for a dataset covering 80% of world trade, the Heckman sample selection model performs better overall for the specification of gravity equation selected. Therefore, equation [1] is estimated by using the Heckman sample selection model (Heckman) and in both stages, exporter, importing and year fixed effects are included[3].

4. Results

In this section, the results of the empirical analysis are presented. As stated above, the main objective of this paper is to explore the performance of different exchange rate regimes in terms of trade during both global and domestic crisis episodes. To that end, equation [1] estimated by three alternative methods gravity equation augmented by the introduction of a set of variables representing exchange rate regimes is estimated by OLS-CFE; 2WFE and Heckman procedures.

Firstly, the effects of different exchange rate regimes on trade flows during global crises are studied. Thus, *Crisis1* variable is introduced in equation (1) as well as dummy variables related to the different ERRs. In columns (a) the estimates of the Crisis1 and ERRs dummy variables are estimated separately, while columns (b) interactive terms compute as the product of the *Crisis1* and the ERRs' dummies are also added to equation [1][4].

[Table 2, here]

The gravity equation defined seems to work well since it explains around a 70% of bilateral exports and the sign, size and significance of the explanatory variables are, in general, as expected. Precisely, economically larger countries, in terms of GDPpc and population, trade more while more distant countries trade less. Moreover, sharing a common land border, speaking a common language, sharing a colonial relationship, have ever been part of the same country, sharing a common major religion or belonging to the same regional trade agreement significantly increase trade. Contrary, being an island and/or a landlocked country reduce trade. These results are very similar regardless the estimation method considered.

[2] In our sample, for a total of 959,294 observations, 525,676 presents positive zero trade flows. That is, a 45% of the pairs in our sample present zero trade flows.

[3] This methodology requires that a variable considered in the probit equation is excluded in the second stage. In our case, as commonly done in the empirical literature, the excluded variable is $Relig_{ij}$

[4] Table A.1 in the appendix presents the estimates by disaggregating global crisis according to the three main crisis episodes: the breakdown of the Bretton-Woods System (BW); the crisis of the European Monetary System (EMS) and (iii) the global financial crisis (GF).

Focusing on the variables of interest, episodes of global financial crises have an inconclusive effect on exports. It is negative for the OLS-CFE procedure while it is positive in the first and second stage on the Heckman estimates, meaning that suffering a crisis increase the probability of exporting as well as the volume of exports[5]. To that respect, Ma and Chen (2005) explore the effect of financial crises on international trade. Their theoretical analysis predicts that imports will decrease during and after a banking crisis, whereas exports will rise during but fall after the crisis. Theoretical analysis predicts imports and exports will fall during currency crises but the effect after the crisis depends on the source of external shocks. By estimating a model of bilateral trade between 50 countries over a period of 19 years with real world data, they observed that the empirical results are generally consistent the theoretical predictions. Consequently, the true effect of financial crises on trade remains inconclusive.

With respect to the effect of different exchange rate regimes on trade, results presented in columns (a) indicate that fixer exchange rate regimes promote international trade. Particularly for the Heckman estimates where sample selection bias is corrected, a currency union appears as the optimal exchange rate regimes in terms of encouraging trade (associated to an increase of about 166%), followed by crawling pegs (51%), pegs (39%) and crawling bands (8%) while managed floating seems to have a negative influence on international trade (-14%).

Then, columns (b) introduce the effect of an interactive term to analyse if the ERRs behaved differently during crisis episodes. Considering again Heckman estimates, these interactive terms show that Currency Union and Crawling Peg increase their positive effect on trade during global crisis while having a Managed Floating exchange rate regime supposes an even more negative impact on trade flows. The interactive terms are not statistically significant for Peg and Crawling Band, so they do not behave differently during global crises. When the total effects are compute by adding up the parameters of the *Crisis1*, ERRs and interactive terms, we can conclude that fixer exchange rate regimes, such as currency unions, pegs and crawling pegs, have larger effect of trade than regimes associated to higher exchange rate volatility, even during global crisis episodes.

Secondly, the effects of different exchange rate regimes on trade flows during domestic (or country-specific) crises are studied. Now, *Crisis2* variable is introduced in equation (1) as well as dummy variables related to the different ERRs. In columns (a) the estimates of the *Crisis2* and ERRs dummy variables are estimated separately, while columns (b) add an interactive terms compute as the product of the *Crisis2* and the ERRs' dummies[6].

[Table 3, here]

Results presented in table 3 are very similar to the ones in Table 2. Paying attention to columns (a) of Table 3, it can be observed how *Crisis2* also presents a mixed impact on

[5] Since Crisis1 takes the value 1 for all countries in the sample during the global crisis episodes, it is a country specific-time variant variable. Thus, the 2WFE procedure doesn't allow to estimate its effect. Crisis2 affects a particular country during the crisis episode, thus it is country pair-time variant variable and can be estimated by 2WFE.

[6] Table A.2 in the appendix presents the estimates by disaggregating country-specific crisis according to the classification by Laeven and Valencia (2012): Systematic Banking Crisis (SB), Currency Crisis (C) and Sovereign Debt Crises (SD). In the probit equation, some of the interactive terms are dropped since they exists only for positive exports flows.

trade depending on the estimation method. It is negative for OLS-CFE and Heckman while it is positive for 2WFE. Moreover, the ERRs estimated effects are near the same as ones the presented in Table 2. Columns (b) of Table 3 present estimates of interactive terms between *Crisis2* and ERRs. Results suggest that Peg and Crawling Band increase their positive effect on trade during domestic crisis while managed floating supposes an even more negative impact on trade flows. Furthermore, the interactive terms are not statistically significant for Currency Union and Crawling Peg, so they do not behave differently during global crises. Similarly, when the total effects are compute, we can still conclude that fixer exchange rate regimes have a larger effect of trade than more flexible exchange rate regimes.

5. Concluding remarks

The empirical literature on the effect on exchange rate volatility on trade yield inconclusive results. Sharing a common currency, which implies zero-volatility, has a large positive effect on trade flows, but volatility does not seem to be a major factor of determination of the volume of trade. To that sense, exchange rate volatility could not be a good proxy for exchange rate risk as perceived by agents, and exchange rate regime may be a better way to capture it. Additionally, many papers show that trade linkages are significant channels for the transmission of crises. However, in our view, ERR could be a factor promoting trade even during crisis episode and as a consequence reducing the transmission of crises through a stimulus of international trade.

The main objective of this paper is to analyze the influence of exchange rate policy on trade during crisis episodes. To that end, the intensity of the effect of exchange rate arrangements on trade during crises is estimated for three crises with global effects: the breakdown of the Bretton-Woods System in (1971-1973), the crisis of the European Monetary System in (1992-1993) and the current global financial crisis (2008-2011). Also a dataset of country-based systematic banking crises, sovereign debt crisis and currency crises is used.

On the basis of a gravity equation the impact of several de facto exchange rate arrangements on trade are estimated. The results suggest that other intermediate exchange rate regimes, between completely fixed and completely flexible, promote flows of goods between countries. In particular, less flexibility in the exchange rate arrangements generates a positive effect on trade. Furthermore the performance in terms of trade during crises is addressed. Estimates suggest that fixer exchange rate regimes such as currency unions, pegs and crawling pegs have a larger impact on trade than more flexible exchange rate regimes such as crawling bands or managed floating, even when crises occur. These results may contribute to the controversial debate on the choice of the exchange rate regime. Since fixity seems to expand trade, it could encourage growth via an increase of the market size. Moreover, having a fixed exchange rate regime may help countries to recover after global financial crisis.

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Tables:

Table 1. De facto exchange rate regimes based on Reinhart and Rogoff (2004)

Dummy	Definition	**Implications**
CU	It assumes that both countries share the same currency	Extreme regime. It implies a volatility of zero but also avoids some transaction costs and enhances price transparency
Peg	Currency Board or Peg of a currency to the other one in the pair	Nearly fixed, although does not avoid transaction costs
CrawPeg	Crawling peg between currencies in the pair	It could promote trade and tourism in two ways: (1) low uncertainty and (2) a continuous trend to depreciation that importers interpret as a signal of cheap country
CrawBand	De facto crawling band or moving band	It allows a higher volatility than crawling pegs although the currency still fluctuates around a reference currency
ManFloat	Both countries present a managed floating regime	Higher uncertainty than the other regimes

Table 2. Effect of ERRs during global crisis episodes

	(a)				(b)			
			Heckman				Heckman	
	CFE	CYFE	Probit	ML	CFE	CYFE	Probit	ML
LnGDPpcexp	**0.867**		**0.181**	**0.866**	**0.867**		**0.181**	**0.866**
	(34.10)		(29.37)	(78.22)	(34.11)		(29.37)	(78.25)
LnGDPpcpart	**0.614**		**0.174**	**0.618**	**0.615**		**0.174**	**0.618**
	(24.94)		(27.37)	(53.10)	(24.95)		(27.37)	(53.12)
Lnpoppar	**0.565**		**-0.267**	**0.574**	**0.565**		**-0.267**	**0.573**
	(11.99)		(-20.75)	(25.75)	(11.99)		(-20.75)	(25.74)
LnDist	**-1.317**	**-1.3535**	**-0.604**	**-1.335**	**-1.317**	**-1.354**	**-0.604**	**-1.335**
	(-73.83)	(-78.23)	(-198.10)	(-270.67)	(-73.83)	(-78.24)	(-198.10)	(-270.68)
Border	**0.372**	**0.2860**	**0.102**	**0.383**	**0.372**	**0.287**	**0.102**	**0.384**
	(4.09)	(3.21)	(6.29)	(19.62)	(4.10)	(3.21)	(6.29)	(19.65)
Language	**0.443**	**0.4450**	**0.358**	**0.464**	**0.443**	**0.445**	**0.359**	**0.464**
	(12.22)	(12.63)	(59.45)	(46.78)	(12.22)	(12.63)	(59.46)	(46.77)
Colony	**1.240**	**1.3180**	**0.326**	**1.244**	**1.240**	**1.318**	**0.325**	**1.244**
	(14.65)	(15.48)	(12.86)	(58.57)	(14.66)	(15.48)	(12.82)	(58.59)
Comcol	**0.644**	**0.6570**	**0.284**	**0.650**	**0.644**	**0.657**	**0.284**	**0.650**
	(13.22)	(13.90)	(41.06)	(50.21)	(13.22)	(13.90)	(41.06)	(50.21)
Cmctry	**0.609**	**0.5649**	**0.200**	**0.607**	**0.609**	**0.564**	**0.200**	**0.607**
	(4.39)	(4.20)	(9.32)	(21.83)	(4.39)	(4.19)	(9.32)	(21.83)
Relig	**0.123**	**0.1328**	**0.054**		**0.123**	**0.133**	**0.054**	
	(4.79)	(5.22)	(12.45)		(4.79)	(5.22)	(12.45)	
Landl	**-0.664**	**-0.7162**	**-0.338**	**-0.668**	**-0.664**	**-0.716**	**-0.338**	**-0.668**
	(-9.04)	(-9.87)	(-28.30)	(-30.39)	(-9.04)	(-9.86)	(-28.30)	(-30.39)
Island	**-0.650**	**-0.6903**	**-0.196**	**-0.651**	**-0.650**	**-0.690**	**-0.196**	**-0.651**
	(-9.67)	(-10.67)	(-19.20)	(-35.14)	(-9.67)	(-10.67)	(-19.19)	(-35.14)
RTA	**0.440**	**0.4312**	**0.241**	**0.440**	**0.439**	**0.431**	**0.241**	**0.440**
	(14.05)	(12.97)	(31.63)	(43.54)	(14.05)	(12.95)	(31.63)	(43.54)
Crisis1	**-0.049**		**0.141**	**0.044**	**-0.050**		**0.141**	**0.044**
	(-2.50)		(8.82)	(2.04)	(-2.54)		(8.83)	(2.02)
CU	**0.957**	**0.9299**	**0.509**	**0.979**	**0.920**	**0.852**	**0.520**	**0.943**
	(5.25)	(5.13)	(16.27)	(22.04)	(5.01)	(4.61)	(15.22)	(19.38)
Peg	**0.349**	**0.3378**	**-0.142**	**0.332**	**0.354**	**0.315**	**-0.186**	**0.337**
	(2.95)	(2.87)	(-3.00)	(8.93)	(2.79)	(2.48)	(-3.60)	(8.01)
CrawPeg	**0.431**	**0.3852**	**0.806**	**0.413**	**0.361**	**0.308**	**0.802**	**0.341**
	(2.95)	(2.69)	(3.85)	(6.66)	(2.30)	(1.98)	(3.83)	(4.90)
CrawBand	0.092	0.1052	0.050	**0.076**	0.112	0.120	0.077	**0.096**
	(0.84)	(0.94)	(0.65)	(1.64)	(1.01)	(1.05)	(0.90)	(1.91)
ManFloat	-0.123	-0.0441	**0.427**	**-0.143**	-0.090	-0.090	**0.426**	**-0.109**
	(-1.55)	(-0.51)	(2.72)	(-3.31)	(-1.03)	(-0.93)	(2.71)	(-2.13)
Crisis1*CU					**0.172**	**0.360**	-0.058	0.169
					(2.12)	(3.69)	(-0.82)	(1.80)
Crisis1*Peg					-0.021	0.095	**0.231**	-0.021
					(-0.32)	(1.36)	(1.96)	(-0.27)
Crisis1*CrawPeg					**0.308**	**0.347**		**0.310**
					(2.01)	(2.04)		(2.19)
Crisis1*CrawBand					-0.103	-0.079	-0.151	-0.107
					(-1.10)	(-0.78)	(-0.81)	(-0.91)
Crisis1*ManFloat					**-0.110**	**0.156**		-0.112
					(-1.65)	(1.92)		(-1.23)
lambda			0.052				0.052	
rho			0.026				0.026	
sigma			2.033				2.033	
Number of obs	525676	573600	959294	525676	525676	573600	959294	525676
R-squared	0.6938	0.7173			0.6938	0.7173		

Robust standard errors are compute. T-statistics appear between parentheses
Bold values indicate significance at 5% or 10% level

Table 3. Effect of ERRs during country-specific crisis episodes

	(a)				(c)			
			Heckman				Heckman	
	CFE	CYFE	Probit	ML	CFE	CYFE	Probit	ML
LnGDPpcexp	**0.867**		**0.181**	**0.867**	**0.867**		**0.181**	**0.867**
	(34.14)		(29.43)	(78.29)	(34.14)		(29.43)	(78.29)
LnGDPpcpart	**0.615**		**0.174**	**0.618**	**0.615**		**0.174**	**0.618**
	(24.94)		(27.44)	(53.11)	(24.95)		(27.44)	(53.12)
Lnpoppar	**0.563**		**-0.266**	**0.571**	**0.563**		**-0.265**	**0.572**
	(11.95)		-(20.64)	(25.65)	(11.95)		(-20.63)	(25.66)
LnDist	**-1.317**	**-1.3536**	**-0.604**	**-1.335**	**-1.317**	**-1.3536**	**-0.604**	**-1.335**
	(-73.82)	(-78.24)	-(198.13)	(-270.70)	(-73.83)	(-78.24)	(-198.13)	(-270.72)
Border	**0.372**	**0.2863**	**0.102**	**0.383**	**0.372**	**0.2867**	**0.102**	**0.384**
	(4.09)	(3.21)	(6.28)	(19.61)	(4.10)	(3.22)	(6.27)	(19.63)
Language	**0.443**	**0.4450**	**0.359**	**0.465**	**0.443**	**0.4451**	**0.359**	**0.465**
	(12.22)	(12.63)	(59.45)	(46.80)	(12.23)	(12.63)	(59.45)	(46.81)
Colony	**1.240**	**1.3180**	**0.325**	**1.244**	**1.239**	**1.3175**	**0.326**	**1.243**
	(14.65)	(15.49)	(12.85)	(58.58)	(14.64)	(15.48)	(12.85)	(58.53)
Comcol	**0.644**	**0.6571**	**0.285**	**0.650**	**0.644**	**0.6571**	**0.285**	**0.650**
	(13.21)	(13.90)	(41.07)	(50.20)	(13.21)	(13.90)	(41.07)	(50.20)
Cmctry	**0.610**	**0.5648**	**0.200**	**0.607**	**0.609**	**0.5645**	**0.200**	**0.607**
	(4.39)	(4.20)	(9.31)	(21.84)	(4.39)	(4.19)	(9.31)	(21.83)
Relig	**0.123**	**0.1327**	**0.054**		**0.123**	**0.1327**	**0.054**	
	(4.79)	(5.22)	(12.45)		(4.79)	(5.22)	(12.45)	
Landl	**-0.664**	**-0.7162**	**-0.338**	**-0.668**	**-0.664**	**-0.7162**	**-0.338**	**-0.668**
	(-9.04)	(-9.86)	(-28.29)	(-30.39)	(-9.04)	(-9.86)	(-28.29)	(-30.40)
Island	**-0.650**	**-0.6903**	**-0.196**	**-0.651**	**-0.650**	**-0.6903**	**-0.196**	**-0.651**
	(-9.66)	(-10.67)	(-19.22)	(-35.13)	(-9.67)	(-10.67)	(-19.22)	(-35.14)
RTA	**0.439**	**0.4316**	**0.241**	**0.440**	**0.440**	**0.4318**	**0.242**	**0.440**
	(14.05)	(12.98)	(31.64)	(43.53)	(14.06)	(12.99)	(31.64)	(43.56)
Crisis2	**-0.064**	**0.0760**	**0.035**	**-0.064**	**-0.066**	**0.0742**	**0.035**	**-0.066**
	(-7.82)	(1.82)	(6.61)	(-6.80)	(-7.94)	(1.77)	(6.50	(-6.99)
CU	**0.956**	**0.9306**	**0.510**	**0.978**	**0.951**	**0.9241**	**0.507**	**0.972**
	(5.25)	(5.14)	(16.29)	(22.03)	(5.19)	(5.10)	(15.44)	(20.92)
Peg	**0.348**	**0.3378**	**-0.141**	**0.331**	**0.330**	**0.3201**	**-0.163**	**0.312**
	(2.95)	(2.87)	(-2.99)	(8.91)	(2.72)	(2.65)	(-3.41)	(8.15)
CrawPeg	**0.431**	**0.3852**	**0.805**	**0.413**	**0.409**	**0.3686**	**0.801**	**0.390**
	(2.95)	(2.69)	(3.85)	(6.66)	(2.66)	(2.45)	(3.83)	(5.95)
CrawBand	0.090	0.1052	0.050	**0.074**	0.067	0.0893	0.014	0.049
	(0.83)	(0.94)	(0.65)	(1.62)	(0.60)	(0.78)	(0.18)	(1.02)
ManFloat	-0.120	-0.0419	**0.426**	**-0.140**	-0.102	-0.0427	**0.426**	**-0.122**
	(-1.51)	(-0.48)	(2.71)	(-3.24)	(-1.27)	(-0.48)	(2.71)	(-2.66)
Crisis2*CU					0.049	0.0597	0.025	0.062
					(0.45)	(0.47)	(0.28)	(0.51)
Crisis2*Peg					**0.259**	**0.2494**	**0.706**	**0.260**
					(2.71)	(2.37)	(2.21)	(1.98)
Crisis2*CrawPeg					0.189	0.1506		0.193
					(1.51)	(1.08)		(1.03)
Crisis2*CrawBand					**0.278**	**0.1881**	0.437	**0.289**
					(3.13)	(1.72)	(1.49)	(1.84)
Crisis2*ManFloat					**-0.158**	0.0073		-0.162
					(-2.22)	(0.09)		(-1.23)
lambda			0.053		0.053			
rho			0.026		0.026			
sigma			2.033		2.033			
Number of obs	525676	573600	959294	525676	525676	573600	959294	525676
R-squared	0.6938	0.7173			0.6938	0.7173		

Robust standard errors are compute. T-statistics appear between parentheses
Bold values indicate significance at 5% or 10% level

Appendix:

Table A.1. Effect of ERRs per global crisis episodes

			Heckman	
	CFE	CYFE	Probit	ML
Crisis1	**-0.516**			**0.045**
	(-2.61)			(2.05)
CU	**0.920**	**0.8516**	**0.521**	**0.942**
	(5.01)	(4.60)	(15.25)	(19.37)
Peg	**0.356**	**0.3152**	**-0.185**	**0.339**
	(2.81)	(2.48)	(-3.59)	(8.06)
CrawPeg	**0.364**	**0.3082**	**0.803**	**0.345**
	(2.31)	(1.98)	(3.84)	(4.94)
CrawBand	0.114	0.1203	0.078	**0.098**
	(1.02)	(1.05)	(0.92)	(1.95)
ManFloat	-0.090	-0.0898	**0.427**	**-0.109**
	(-1.03)	(-0.93)	(2.72)	(-2.13)
BWCU	0.370	0.1688	0.116	**0.364**
	(1.58)	(0.81)	(1.09)	(2.08)
BWPeg	-0.052	0.1638	0.109	-0.042
	(-0.49)	(1.48)	(0.79)	(-0.34)
BWCrawPeg	**-1.260**	-0.8041		-1.278
	(-1.78)	(-1.12)		(-1.25)
BWCrawBand	**-0.697**	-0.3221	-0.327	**-0.696**
	(-2.87)	(-1.25)	(-1.28)	(-3.21)
BWManFloat	**0.502**	**0.7108**		0.513
	(3.20)	(2.82)		(1.57)
EMSCU	**0.216**	**0.3156**	0.008	0.222
	(1.67)	(2.12)	(0.07)	(1.25)
EMSPeg	-0.050	-0.0387	**0.731**	-0.048
	(-0.56)	(-0.37)	(2.48)	(-0.29)
EMSCrawPeg	**0.251**	**0.3764**		0.259
	(1.76)	(2.25)		(0.95)
EMSCrawBand	0.128	0.0214	-0.048	0.121
	(1.15)	(0.17)	(-0.16)	(0.60)
EMSManFloat	**0.863**	0.4199		**0.882**
	(5.19)	(1.41)		(2.35)
GFCU	0.062	**0.4564**	**-0.344**	0.056
	(0.36)	(2.62)	(-3.03)	(0.46)
GFPeg	0.017	0.1083	0.169	0.007
	(0.12)	(0.72)	(0.63)	(0.06)
GFCrawPeg	**0.357**	**0.3743**		**0.357**
	(1.80)	(1.64)		(2.26)
GFCrawBand	0.078	0.0121	0.080	0.074
	(0.58)	(0.07)	(0.19)	(0.45)
GFManFloat	**-0.193**	0.1083		**-0.196**
	(-2.57)	(1.17)		(-2.08)
lambda			0.053	
rho			0.026	
sigma			2.033	
Number of obs	525676	573600	959294	525676
R-squared	0.6938			

Robust standard errors are compute. T-statistics appear between parentheses
Bold values indicate significance at 5% or 10% level
Estimate coefficients of the explanatory variables are not presented

Table A.2. Effect of ERRs per country-specific crisis episodes

			Heckman	
	CFE	CYFE	Probit	ML
Crisis2	**-0.066**	**0.0744**	**0.035**	**-0.066**
	(-7.90)	(1.74)	(6.56)	(-6.94)
CU	**0.960**	**0.9337**	**0.518**	**0.982**
	(5.25)	(5.16)	(15.86)	(21.20)
Peg	**0.332**	**0.3223**	**-0.163**	**0.315**
	(2.74)	(2.67)	(-3.40)	(8.22)
CrawPeg	**0.410**	**0.3690**	**0.800**	**0.391**
	(2.67)	(2.46)	(3.83)	(5.97)
CrawBand	0.070	0.0906	0.012	0.053
	(0.62)	(0.80)	(0.15)	(1.09)
ManFloat	-0.100	-0.0433	**0.426**	**-0.120**
	(-1.25)	(-0.49)	(2.71)	(-2.65)
CCU	**-0.174**	0.0293	-0.008	-0.168
	(-1.87)	(0.24)	(-0.08)	(-1.28)
CPeg	0.156	0.2769	0.491	0.165
	(0.95)	(1.32)	(0.62)	(0.51)
CCrawPeg	-0.192	-0.3305		-0.185
	(-0.96)	(-1.39)		(-0.43)
CCrawBand	0.223	**0.3908**	0.204	0.237
	(1.17)	(2.05)	(0.52)	(0.74)
CManFloat	**0.806**	**0.8472**		**0.842**
	(4.69)	(3.53)		(2.23)
SBCU	0.176	0.0706	0.054	0.180
	(1.48)	(0.48)	(0.45)	(1.02)
SBPeg	0.149	0.1337	**0.959**	0.149
	(1.52)	(1.24)	(1.98)	(0.97)
SBCrawPeg	**0.322**	**0.2648**		0.325
	(2.58)	(1.82)		(1.48)
SBCrawBand	**0.274**	0.1630	0.652	0.281
	(2.96)	(1.35)	(1.45)	(1.53)
SBManFloat	**-0.228**	**-0.0969**		**-0.232**
	(-5.60)	(-1.91)		(-2.46)
DCU	-0.025	-0.0999	-0.056	-0.011
	(-0.15)	(-0.53)	(-0.35)	(-0.05)
SDPeg	**0.606**	**0.5324**	0.333	**0.621**
	(3.53)	(2.87)	(0.41)	(1.63)
SDCrawPeg	**-0.936**	-0.9160		-0.943
	(-4.65)	(-3.53)		(-1.05)
SDCrawBand	-0.208	-0.1971		-0.208
	(-0.73)	(-0.62)		(-0.30)
SDManFloat	**0.891**	**0.8517**		0.885
	(2.08)	(1.94)		(0.86)
lambda			0.054	
rho			0.027	
sigma			2.033	
Number of obs	525676	573600	959294	525676
R-squared	0.6938	0.7173		

Robust standard errors are compute. T-statistics appear between parentheses
Bold values indicate significance at 5% or 10% level
Estimate coefficients of the explanatory variables are not presented