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2013

# working paper series

**EXCHANGE RATE REGIMES  
FOR POST-CONFLICT RECOVERY**

**Ibrahim Elbadawi and Raimundo Soto**

**Working Paper No. 748**

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**April 2013**

An earlier extended version of this paper was prepared for the World Bank-McGill University research project on “Peace and Development”. The views expressed in this article do not necessarily represent the official positions of the Dubai Economic Council

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First published in 2013 by  
The Economic Research Forum (ERF)  
21 Al-Sad Al-Aaly Street  
Dokki, Giza  
Egypt  
[www.erf.org.eg](http://www.erf.org.eg)

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## Abstract

This paper asks whether the choice of the exchange regime matters for economic recovery after civil conflicts. This important aspect of the macroeconomic agenda for post-conflict countries has been largely ignored by the literature. We estimate the effect of the main exchange rate regimes (fixed, managed floating and free float) on overall GDP and export growth. We use a panel of 132 countries (38 post-conflict countries and a control group of 94 economies) for the period 1970-2008. The GDP per capita and export growth impact of the three Exchange rate regimes was assessed in terms of the conditional aid effectiveness in "good" policy environment, where the latter is given by the real exchange rate undervaluation. The evidence suggests that the managed floating regime appears to have an edge on economic performance for post-conflict reconstruction.

**JEL Classification:** P1, P5

**Keywords:** Post-Conflict, Aid, Exchange Rate, Growth, Exports

## ملخص

تتسأل هذه الورقة عما إذا كان اختيار نظام الصرف يعد هاماً للانتعاش الاقتصادي بعد الصراعات الأهلية. تم تجاهل هذا الجانب الهام من جدول أعمال الاقتصاد الكلي للبلدان في مرحلة ما بعد الصراع إلى حد كبير من الأدب. نقوم في هذه الورقة بتقدير تأثير نظم أسعار الصرف الرئيسية (الثابتة، التعويم المدار والتعويم الحر) في الناتج المحلي الإجمالي ونمو الصادرات. نستخدم مسح من 132 بلداً (38 بلداً في مرحلة ما بعد الصراع ومجموعة تحكم من 94 اقتصاداً) لفترة 1970-2008. وجرى تقييم الناتج المحلي الإجمالي للفرد الواحد وتأثير نمو الصادرات من نظم أسعار الصرف الثلاث من حيث فعالية المعونة المشروطة في بيئة "جيدة" من السياسة العامة، حيث يتم تقدير هذا الأخير بسعر صرف حقيقي مقدر بأقل من قيمته. وتشير الأدلة إلى أن نظام التعويم المدار يمكن يبدو أن يكون له ميزة على الأداء الاقتصادي لإعادة الإعمار بعد انتهاء الصراع.

## 1. Introduction

The economic agenda for post-conflict transition has been dominated by issues of aid effectiveness. This is because countries coming out of civil wars usually have great humanitarian and developmental needs. Therefore, aid can play an important role in the post-conflict reconstruction of these economies as well in consolidating peace and reducing risks of future conflicts. And because of their huge potential for catch-up growth these economies tend to have high absorptive capacities and aid can be super-effective, even with modest improvements in the institutional and policy environments. However, following the immediate few years of the peace onset, growth sustainability in the medium-to-longer runs depends not only upon continued flows of adequate and timely aid but also on its effectiveness (e.g. Elbadawi et al. 2008; Collier and Hoeffler 2004a). Therefore, the agenda has so far almost exclusively focused on fiscal institutions and appropriate mechanisms for delivery, absorption and spending of aid. These are now standard issues in the aid effectiveness literature and have already attracted considerable academic and policy interest<sup>1</sup>.

This paper, however, argues that the received literature has been lopsided in that it has largely ignored the important issue of what constitutes an optimal exchange rate and monetary regime for post-conflict countries. Therefore, this paper contributes to this literature by assessing the post-conflict macroeconomic implications of three broad types of exchange rate-monetary regimes: fixed, managed and floating. In this context the paper asks whether aid effectiveness in promoting exports and overall economic growth is conditional on the choice of exchange rate regime. The received literature suggests that, among other things, restoring growth is critical for minimizing the risk of post-conflict relapse in the aftermath of civil wars (e.g. Elbadawi 2008).

The literature also suggests that as institutions for contract enforcement start to break down during civil wars and social order collapses, agents disengage from transactions-related activities (e.g. transport and trade) and asset-providing activities (transport, financial services), as well as from economic activities that are intensive in assets and/or transactions, like most exports. Consequently, the major growth deceleration experienced by most conflict countries, including outright growth collapse in many, has been associated with disproportionately higher decline in their exporting capacity (Collier 1999). Unfortunately, extending the growth spells in post-conflict countries long enough to allow the reduction of post-conflict risks to relatively safe levels has been an elusive goal for most post-conflict countries. For example, in his analysis of post-conflict growth in Sub-Saharan Africa Elbadawi (2012) finds that the median country would rebound from a negative per capita growth rate of about -1% in the year before peace onset to more than 2% in the second year; and despite the high volatility across countries the average median growth hovered around 2.5% up to the sixth year. However, growth tends to falter and decelerates to around 0.1% thereafter.

Therefore, the post-conflict policy agenda has focused on the quality of institutions for managing aid, especially with regard to infrastructure and the delivery of social services. Moreover, and due to the high share of oil and other mineral exporting countries among post-conflict countries, the literature has also focused on management of commodity booms and institutions for ensuring the fairness and transparency of granting minerals and oil concessions (e.g. Radon 2007). It is of course, a no brainer to stress that this agenda are absolutely critical and should be diligently pursued. However, these policies need time to take hold. On the other hand, recent evidence from the growth literature suggests that real

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<sup>1</sup> For a comprehensive review, see Boyce and O'Donnell (2007).

exchange rate (RER) undervaluation promotes growth<sup>2</sup> and that countries that managed to engineer extended undervaluation episodes are also likely to achieve sustained growth transitions (see for example, Aghion et al. 2009; Aguirre and Calderon 2006; Elbadawi et al. 2012; Rodrik 2008). Moreover, some contributors to this literature have characterized real exchange rate undervaluation as the centerpiece of the recent successful export-oriented development strategies of low and middle income countries<sup>3</sup>. China being the most notable example but numerous other experiences can be cited as well Rodrik 2008).

Taking into account the above issues, this paper estimates extended empirical per capita GDP and export growth models accounting for their standard determinants as well as the impact of aid and RER undervaluation under the three broadly defined exchange rate regimes. In particular, this analysis allows testing for the extent to which real exchange rate undervaluation enhances aid effectiveness for promoting economic recovery and whether the aid-RER interaction effect differs across exchange rate regimes.

The paper is organized as follows. Section 2 briefly reviews the received knowledge about the factors that affect the onset of civil conflict, the impact such conflicts have on an economy and its inhabitants, and the recovery process after peace is achieved. Our aim is to identify the salient features that a framework for choosing monetary and exchange rate regimes ought to consider. Section 3 reviews the empirical evidence on the macroeconomic performance of economies with significant armed conflicts. One purpose of this section is to validate previous finding by other scholars using a database comprising 38 civil conflict countries in the 1970-2008 period and a control group of 94 countries. More importantly, this section aims at identifying additional stylized facts we deem may be important when choosing exchange and monetary regimes in post-conflict economies. Section 4 undertakes the empirical testing of the set of questions raised in the previous sections. We first replicate the main results of the empirical literature on the determinants of overall economic and export growth. Later these models are extended to consider the differential role of exchange and monetary regimes in conflict economies. Our database comprises an unbalanced panel of 132 economies and eight consecutive five-year periods covering the period 1970-2008. The econometric estimations are performed using the generalized method-of moments (GMM) estimator for dynamic models of panel data. These estimators deal effectively with dynamic models, unobserved country-specific effects, and the potential problem of endogeneity of the explanatory variables. Finally, Section 5 collects the main results, which form the basis of the policy recommendations of this paper.

## **2. Received Knowledge**

At the theoretical level, economic research on the causes of civil conflicts initially focused on the ‘greed vs. grievance’ issue and find that civil wars are explicable by the former, while the latter set of factors do not have a robust relationship with the risk of conflicts (Collier and Hoeffler 2004b). However, more recently Bodea and Elbadawi (2008) argue that once political violence is correctly modeled as a complex process with multiple manifestations, one of which is civil war, both grievance (e.g. political exclusion, social polarization) and

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<sup>2</sup> Simply put, a country will experience a real currency undervaluation (overvaluation) when it produces a given basket of goods and services that can be traded across international borders at a lower (higher) cost than what would be consistent with its sustainable economic fundamentals –such as the external terms of trade; the level of sophistication of its economy or the stock of wealth generated by or endowed with the economy. Moreover, real exchange rate (real currency) undervaluation (overvaluation) is consistent with higher price of traded goods relative to non-traded domestic goods and services. When a currency is over-or-undervalued, it is necessarily misaligned relative to its long-term equilibrium level.

<sup>3</sup> For example, Williamson (1997) argues that, to overcome the initially limited capability for exporting manufactures and other non-traditional products and to give exporters a competitive edge in the international market, the real exchange rate may have to depreciate quite considerably, overshooting its eventual equilibrium value so as to make the non-traditional export sector an appealing destination for investment. See also Elbadawi and Helleiner (2004) for similar arguments in the African context.

economic factors (e.g. poverty, appropriable natural resources, uneducated males, etc.) are all relevant for explaining the risk of civil war. Empirically, researchers tend to conclude that countries engaging in civil wars have lower levels of economic development and reliance on primary exports (Collier and Hoeffler 1998), higher levels of polarization and ethnic fractionalization (Elbadawi and Sambanis 2002), abundance of natural resources (Collier and Hoeffler 2004b), weak central governments in financial, organizational, and political terms (Fearon and Laitin 2003), and be located in areas prone to conflict spillovers (Murdoch and Sandler 2002). However, these studies had been criticized for the absence of a causal explanation for civil conflict (Sambanis 2004) and their lack of robustness (Hegre and Sambanis 2006).

While there may be disagreement on the best way to model the determinants of conflicts, a broad consensus has emerged that civil conflicts are quite costly. Based on a sample of 19 civil wars in the period 1960-1989, Collier (1999) finds that on average it reduces annual real per capita GDP growth by as much as two percentage points and that the negative impact persists long after the conflict has ended<sup>4</sup>. Beyond the activity decline, Caplan (2002) finds evidence in a sample of 66 countries over the period from 1950-1992 that the negative growth effect is shaped by changes in fiscal policy, as the composition of government spending switches from social to military spending. Staines (2004) finds that the damage to growth caused by poor macroeconomic policies was nearly as great as the direct impact of conflict.

External assistance had been identified as affecting conflict duration and the recovery process after peace. Early studies identified foreign aid as an important factor in sustaining conflicts in the aftermath of the Cold War era (Michailof et al. 2002). Recent studies, nevertheless, indicate that donors now generally reduce assistance sharply during conflicts but tend to increase assistance equally sharply after the conflict (Staines 2004). This may have contributed to more severe economic contractions and imbalances experienced by countries in these later conflicts and plausibly also contributed to their shorter duration.

The costs of civil conflicts are high even after they end. However, and contrary to Collier's (1999) earlier results, Chen et al. (2008) find that post-war economic recovery is quite rapid in cases where resolution of conflicts led to at least ten years of uninterrupted peace. For a sample of 22 countries, they observe a tremendous postwar surge in per-capita income growth, which rises about 2.5 percent points above the prewar level. The strong recovery in income is linked to the high potential for catch-up growth following the destruction of war and is supported by an increase in both investment and capacity utilization. The length of the conflict, nevertheless, negatively affects the speed of recovery. Also, while it takes several years to re-establish the pre-conflict income levels, institutions and social indicators take much longer to improve.

External aid flows also play a significant role in affecting the aftermath of conflicts. Based on a sample of 27 post-conflict countries in the 1990s, Collier and Hoeffler (2004a) find that during the first three post-conflict years absorptive capacity for aid is no greater than normal, but that in the rest of the first decade it is approximately double its normal level. Consequently, they advocate for reversing the current profile of post-conflict aid flows, which tend to be initially high, similar to pre-conflict levels, but prematurely taper out over the course of the decade when the recipient countries have achieved the required capacity for absorbing more aid.

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<sup>4</sup> For more recent evidence on the growth impact of civil war and other manifestations of political violence, see Bodea and Elbadawi (2008)

In spite of its beneficial financing role, foreign aid flows can have significant side effects on exchange markets. Civil wars disproportionately affect the traded goods sector and the extent of recovery in this sector is thus likely to have a significant effect on post-conflict growth. While aid can directly contribute to the growth of the traded-goods sector, it also raises concerns on its potential capacity to overvalue the currency. In this regard, the evolution of the real exchange rate (RER) is an important indicator of the evolution of post-conflict economies. Elbadawi et al. (2012) provide evidence that aid promotes growth but with diminishing returns and that RER overvaluation has direct negative level effects on growth and also indirectly through its interaction with aid. Simulations of the effect of a one standard deviation increase in RER overvaluation suggest that the loss in per capita growth for post-conflict countries that are highly dependent on aid and have weak financial sectors could be as high as half a percentage point per year.

In summary, the existing research provides ample evidence on the causes and impacts of armed conflicts. However, it falls short of investigating the effects that the choice of monetary and exchange rate regimes can have on post-conflict economic recovery. Although there is a large literature on the choice of the exchange regime in developing countries, researchers have largely neglected the study of post-conflict economies. However, it is for these economies that the choice of the exchange regime and monetary policy is crucial, since they start from very weak economic foundations and face the substantial institutional and political challenges imposed by post-war reconstruction. Choosing the appropriate exchange regime (floating, managed float, or fixed) and a consistent monetary policy could help achieving sustained income recovery and export expansion. On the contrary, a wrongly chosen regime can distort incentives to production via a severely misaligned real exchange rate, increase macroeconomic risk, reduce investment efforts and hamper sustained economic growth. From these considerations, the following two questions are studied in this paper: (a) which exchange rate regime is more conducive to fast and high post-conflict economic growth? and, (b) does export growth depend on the choice of the monetary and exchange rate regimes.

### **3. Stylized Facts**

We review the empirical evidence on the macroeconomic performance of economies with significant armed conflicts to validate previous findings and identify additional stylized facts that we deem important when choosing exchange and monetary regimes. We collected data for 38 countries with significant armed conflicts in the period 1970-2008 and a control group of around 94 economies. Table 1 identifies the countries and time periods of civil-conflicts in our sample.

Clearly, wars initiated in the 1970s and 1980s lasted much longer than those initiated in the 1990s, a fact that is consistent with the evidence in Staines (2004). Our sample does not significantly overlaps with that of Staines, since we use a more strict definition of what constitutes a significant conflict and consider a longer period of time and larger number of countries.<sup>5</sup> The average length of conflict before 1990 is around 15 years, while afterwards they last around five years. Note also that the majority of conflicts are located in Africa (50%), while the rest spread evenly between Latin America, Middle East and North Africa, and Asia.

We follow Chen et al. (2008) in using an event study methodology in which calendar time is transformed into “event time” in order to aggregate a collection of experiences that share a particular event in common and extract meaningful conclusions from them. While this is useful, one should bear in mind the potential limitations of combining experiences that

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<sup>5</sup> We use PRIO Type 1 and 2 (see UCDP/PRIO Armed Conflict Dataset v4-2009), while Staines includes also Type 3 conflicts.



actually occurred at different periods of time. The econometric analysis in Section 4 overcomes this limitation.

Table 2 provides selected indicators of the macroeconomic performance of the countries in our sample, which we split into conflict economies and other emerging economies. Some of the stylized facts of the literature found by other authors are reproduced in our sample. We find that civil wars are very costly: the annual growth in GDP per capita during the conflict is around two percent points below that of other developing countries. Productivity growth actually declines in war ravaged countries. When compared to non-conflict emerging countries, economies with significant civil conflicts also suffer from higher levels of inflation, substantially lower levels of foreign direct investment and more restrictive capital controls. Contrary to other papers of this literature, we do not find evidence of higher military expenditures prior, during, or after the civil conflict; all emerging economies spend around 2.7 percent points of GDP in the military. However, this comparison does not account for the usually clandestine military aid to both sides of the civil war. As extensively documented in the literature, military aid is just one of many forms of external interventions on civil wars<sup>6</sup>.

Countries that have suffered a civil war tend to have had poor macroeconomic performances before the onset of the conflict. This shows in several indicators in Table 2. On one hand, economic growth faltered for at least five years before the conflict, as reflected in a very slow growth in per capita GDP and in labor productivity (a proxy for labor wages and household income); as a benchmark consider that the developed economies have sustained a productivity growth rate of around 1.4% per year in the entire 20th century (Kehoe and Prescott 2002). Likewise, civil wars place a big burden on the exporting capacities of conflict economies, in particular in countries affected by short-term wars, as resources are diverted away from international trade. After conflicts end there is a vigorous and significant expansion in exports. Other macroeconomic indicators associated with higher degrees of development indicate conflict countries were lagging behind before the strife erupted, including financial development (credit to the private sector), trade openness (exports as ratio to GDP), capital account openness,<sup>7</sup> and foreign direct investment.

The evidence in our sample indicates that countries engaging in civil conflicts see aid flows diminish somewhat –though not by as much as noted by Staines (2004)— and confirms that donors increase their transfers substantially after conflicts end. On the other hand, conflicts affect somewhat fiscal revenues, which decline by around two percentage points of GDP but quickly recover pre-conflict levels after achieving the peace. Finally, countries emerge from conflicts with more open capital accounts, which is congruent with higher levels of foreign direct investment.

We also found that short duration conflicts –less than eight years— tend to be far more intense than long-term wars. Short conflicts lead to substantial drops in per-capita GDP of around three percentage points per year. On the contrary, economic growth in countries that suffer long-term conflicts is reduced by around one percent point with respect to non-conflict economies, but maintains a positive long-run trend, including achieving positive in-conflict growth. Note, however, that while GDP growth is not affected substantially in long-duration conflicts, labor productivity growth was very low for prolonged periods of time (14 years on average).

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<sup>6</sup> See, for example, Brown (1996), Regan (2000, 2002), and Walter (1999).

<sup>7</sup> Chinn-Ito's index of capital account openness weighs IMF data on the presence of multiple exchange rates; restrictions on current account transactions; restrictions on capital account transactions; and the requirement of the surrender of export proceeds. It is, thus, an index on de jure restrictions ranging from -1.8 to 2.5, where a higher value indicates fewer restrictions. See Chinn and Ito (2006).

Beyond economic growth and exports expansion, conflict economies do not appear to show macroeconomic indicators significantly different before, during and after the conflict. In fact, Table 2 suggests that civil-war economies are not radically different from non-conflict countries. Nevertheless, further scrutiny shows that there are significant differences in economic performance and key macroeconomic indicators in conflict economies when looking at the exchange regime. We use Reinhart and Rogoff (2004) classification of exchange rate regimes, which we extend to 2008 based on IMF information. For empirical purposes, we group the data in three categories: fixed exchange systems (dollarization, currency boards, and participation in monetary unions), intermediate systems (from adjustable and crawling pegs to managed floats) and free floats.

In Table 3, we observe that before the conflicts economic growth was much higher among countries that had intermediate exchange rate regimes as compared to countries in either fixed or floating exchange systems. After conflicts ended, nevertheless, economic growth has rebounded strongly across regimes. Labor productivity naturally follows a similar path. On the other hand, countries with fixed exchange rates before the conflict started show a higher growth rate in exports than managed float countries, perhaps as a reflex of higher investment in the presence of the lower currency risks. After conflicts, export capacities recovered in a very similar form across exchange regimes. Inflation rates before conflicts differed notably: the high inflation observed in floating exchange regimes (65% per year) is largely due to the presence of Latin American economies that historically have had chronic high inflation. Notably, inflation declined substantially in all countries after conflicts, independent of their exchange regime.

The vigorous economic recovery after civil conflicts also shows in the substantial expansion in domestic credit ratio to the private sector for the case of countries with fixed and floating exchange rate regimes, while no such expansion materialized for the case of managed floating regimes. On the other hand, though private credit ratios in post-conflict economies were much lower than the ratios prevailing in non-conflict emerging economies (at 31%), the gap was much larger for the floating regime, which despite the strong recovery has, nevertheless, remained low at about 16%. Recovery, on the other hand, also shows in expanding exports in fixed exchange rate countries and, less so, in floating exchange economies, but countries with managed-float systems do not exhibit any expansion over the pre-conflict levels. Finally, foreign direct investment increases notably from its pre-war levels in all three regimes, but countries benefit more when the exchange rate is allowed to adjust.

In addition, the evidence suggests that tax collection does not improve substantially after the conflict ends. Moreover, there are virtually no differences between countries adopting fixed or floating exchange regimes. Theoretically the choice of the optimal monetary and exchange rate regime ought to depend to some extent on the fiscal policy stance. Our evidence, nevertheless, does not support that theory.

An important element that should be noted is that there exists substantial “persistence” in exchange rate systems. That is, countries tend to maintain their pre-conflict exchange rate system for as long as possible and, most often than not, enter the peace period with the same system they had at the onset of the conflict. As shown in the diagonal of Table 4, of the 40 countries in our sample, 28 maintained or adopted after the transition to peace exactly the same system they had before the onset of the armed conflict (i.e., 70%). Countries that remained in fixed exchange rate systems largely belong to African currency unions. Most of the changes in exchange regime resulted from countries abandoning fixed or pegged regimes towards floating schemes, thus increasing degrees of exchange flexibility after conflicts. Only

two economies chose to implement fixed exchange regimes after the conflict, one of those choosing to dollarize its economy to control inflation (El Salvador).

#### 4. Empirical analysis

In this section we undertake the empirical testing of the set of questions raised in the previous sections. We proceed first to replicate the main results of the empirical literature on the determinants of overall economic and export growth. We then extend these models to consider the role of exchange and monetary regimes in conflict economies.

We estimate dynamic panel-data models of per capita GDP and export growth. Our sample is dictated by data availability, particularly that for conflict economies. It contains 132 countries representing all major world regions (see Appendix B for a complete list). The regression analysis is conducted using averages of five-year periods. Each country has a minimum of three and a maximum of eight non-overlapping five-year observations spanning the years 1970–2008. Since one observation must be reserved for instrumentation, the first period in the regression corresponds to the years 1975–1979. Due to the presence of missing observations the actual number of countries and observations varies from model to model; however, each table identifies the number of countries used in the estimation.

Our main econometric methodology is the generalized method-of moments (GMM) estimator developed for dynamic models of panel data, which was introduced by Holtz-Eakin, Newey, and Rosen (1988), Arellano and Bond (1991), and Arellano and Bover (1995). These estimators deal effectively with the three challenges posed by our different models. First, the regression equation is dynamic in the sense that it represents a lagged-dependent variable model. Second, the regression equation includes an unobserved country-specific effect, which cannot be accounted for by regular methods (such as the within estimator) given the dynamic nature of the model. Third, the set of explanatory variables includes some that are likely to be jointly endogenously determined with the dependent variable. Moreover, the GMM estimator is best suited for the case of panel data models with a large number of cross section units and a relatively short time periods.

##### 4.1 Economic growth

To study the impact of exchange rate regimes on the economic growth of post-conflict economies, we draw from the extensive empirical literature and posit an encompassing model which seeks to link a country's economic growth rate to economic, political, and social variables. We estimate the following variation of a growth regression:

$$y_{it} - y_{it-1} = \alpha y_{it-1} + \beta' X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where  $y_{it}$  is the log of per capita output,  $X_{it}$  is a set of variables postulated as growth determinants,  $\lambda_t$  is a period-specific effect,  $\mu_i$  represents unobserved country-specific factors, and  $\varepsilon_{it}$  is the regression residual. The subscripts  $i$  and  $t$  refer to country and time period, respectively. The expression on the left-hand side of the equation is the growth rate of per capita output in a given period. On the right-hand side, the regression model includes the level of per capita output at the start of the period (to account for transitional convergence) and a set of explanatory variables measured during the same period. The time-specific effect,  $\lambda_t$ , allows us to control for international conditions that change over time and affect the growth performance of all countries in the sample. The term  $\mu_i$  accounts for unobserved country specific factors that both drive growth and are potentially correlated with the explanatory variables.

##### *Growth determinants*

In the last twenty years, an extensive literature on the determinants of economic growth has developed. We focus on those economic and social variables that have received the most

attention in the academic literature and in policy circles as potential determinants of economic development. Following Loayza and Soto (2002) these variables are divided into five groups: transitional convergence, cyclical reversion, structural policies and institutions, stabilization policies, and external conditions (see Appendix A for details on definitions and sources).

**Transitional convergence:** one implication of the modern models is that the growth rate depends on the initial position of the economy. The conditional convergence hypothesis maintains that, *ceteris paribus*, poor countries should grow faster than rich ones because of decreasing returns to scale in production. We control for the initial position of the economy by including the *initial level of real per capita GDP* in the set of explanatory variables.

**Cyclical reversion:** while our model focuses on long-run economic growth, in the econometric estimation we are required to work with relatively short time periods (five-year averages). At these frequencies, cyclical effects are bound to play a role. We thus include the *output gap at the start of each period* as a growth determinant.<sup>8</sup> The output gap used in the regression is obtained as the difference between potential and actual GDP around the start of the period. We use the Hodrick-Prescott filter (Hodrick and Prescott 1997) to decompose GDP and estimate annual series of potential (trend) and cyclical output for each country in the sample.<sup>9</sup>

**Structural policies and institutions:** Evidence collected in previous research indicates that economic growth can be affected by public policies and institutions. We consider explanatory variables representing all major categories of public policies. The first area of structural policies is *education and human capital formation* in general. Human capital can counteract the forces of diminishing returns in other factors of production—such as physical capital—to deliver long-run growth. Apart from its direct role as a factor of production, education and human capital determine the adoption rate of technological innovations. We measure the policies directed toward increasing education and human capital with the rate of educational attainment obtained from Barro and Lee’s database (Barro and Lee 2010).

The second area is *international trade openness*. There are several channels through which trade affects economic growth: (a) inducing higher total factor productivity as a result of specialization and the exploitation of comparative advantages, (b) producing market expansion and use of scale economies, (c) helping diffusing technological innovations and improved managerial practices, (d) lessening anticompetitive practices of domestic firms, and (e) reducing incentives for firms to conduct rent-seeking activities that are mostly unproductive. Our measure of openness is the volume of trade (real exports plus imports) over GDP, adjusted for the size (area and population) of the country, for whether it is landlocked, and for whether it is an oil exporter.

The third area is related to the *government burden*. Although a government can play a beneficial role for the economy, it can be a heavy burden if it imposes high taxes, uses this revenue to maintain ineffective public programs and a bloated bureaucracy, distorts markets incentives, and interferes negatively in the economy by assuming roles most appropriate for the private sector. We account for the burden of government through the ratio of government consumption to GDP. The fourth important area of policy involves the availability of *public services and infrastructure*. Whether they are treated as classic public goods or as subject to congestion, public services and infrastructure can affect growth by entering directly as inputs

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<sup>8</sup> Apart from improving the regression fit, controlling for the initial output gap allows us to avoid overestimating the speed of transitional convergence, which is inferred from the coefficient on initial per capita output.

<sup>9</sup> Other filters proposed in this literature –such as Baxter-King or Christiano-Fitzgerald— have the drawback of losing observation at the beginning and end of the sample, thus reducing much needed degrees of freedom. See Christiano and Fitzgerald, 1999.

of the production function, by serving to improve total factor productivity, and by encouraging private investment as they help protect property rights. There are a few alternative measures of public services and infrastructure. Among these, the variable with the largest cross-country and time series coverage is telecommunications capacity, measured by the number of telephone lines per capita. The last area is related to the institutional quality of government, including the respect for civil and political rights, bureaucratic efficiency, absence of corruption, enforcement of contractual agreements, and prevalence of law and order. We use the first principal component of four indicators reported by Political Risk Services in their publication *International Country Risk Guide* (ICRG). These indicators relate to the prevalence of law and order, quality of the bureaucracy, absence of corruption, voice, and political stability and accountability of public officials.

**Stabilization policies:** We include stabilization policies as determinants of economic growth for two reasons. From an econometric viewpoint it improves the regression's fit and forecasting power increases over horizons that are relevant to economic policy (say, five to ten years). From an economic perspective, stabilization policies affect not only cyclical fluctuations, but also long-run growth. Fiscal, monetary, and financial policies that contribute to a stable macroeconomic environment and avoid financial and balance-of-payments crises are important for long run growth. By reducing uncertainty, they encourage firm investment, reduce societal disputes for the distribution of ex post rents, and allow economic agents to concentrate on productive activities (rather than trying to manage high risk). The first area in this category is related to the *lack of price stability*, which we measure by the average inflation rate. The second area is related to *external imbalances and the risk of balance-of-payments crises*. This factor is measured by an index of real exchange rate undervaluation, which reflects a strategy of providing an economy-wide subsidy to exports and tradable activities in general, given their importance for post-conflict recovery. However, to the extent that such a strategy is based upon a misaligned currency, it will eventually have to give way to a neutral equilibrium real exchange rate policy. On the other hand, the other face of the real exchange rate misalignment, namely, RER overvaluation captures the distortions in the allocation of resources between the exporting and domestic sectors. This misallocation usually leads to large external imbalances, whose correction is frequently accompanied by balance-of-payments crises and followed by sharp recessions. The third area concerns the occurrence of *systemic banking crises* and serves to account for the deleterious effect of financial turmoil on economic activity, particularly over short and medium horizons. The occurrence of banking crises is measured by the fraction of years that a country undergoes a systemic banking crisis in the corresponding period.

**External conditions:** Economic growth is shaped not only by internal factors, but also by external conditions that influence the domestic economy in both the short and long runs. We include two additional variables in the growth regression: the *terms-of-trade shocks* affecting each country individually and a *period-specific shift* affecting all countries in the sample. Terms-of-trade shocks capture changes in both the international demand for a country's exports and the cost of production and consumption inputs. The period-specific shifts (or time dummy variables) summarize the prevalent global conditions at a given period of time and reflect worldwide recessions and booms. Finally, and very importantly, we also include the level of *external aid* as share of GDP following recent papers that have found evidence that donor's support can play a significant role in affecting economic growth in developing economies, especially those coming out of civil wars (e.g. Elbadawi et al. 2008; Collier and Hoeffler 2004a). As we will be discussed below the received post-conflict literature and the extended econometric models we plan to estimate in this paper are anchored on the concept of conditional aid effectiveness.

### *Estimation Results*

Table 5 presents the results obtained by estimating the empirical model using around 537 observations for 90 countries. The specification tests (serial-correlation tests) support the GMM system estimator of our model. Column (1) in the table corresponds to the base specification; column (2) displays the results for a model that includes interaction terms designed to capture non-linear effects stemming from the presence of significant aid flows under real exchange rate misalignment, measured as undervaluation, which is presumed to enhance the effectiveness of aid, while RER overvaluation (the negative of undervaluation) should reduce aid effectiveness; and column (3) extends the latter model to include in a candid way a dummy for each exchange rate regime (fixed, floating, and intermediate).

*Transitional convergence.* The coefficient on the initial level of per capita GDP is negative and statistically significant. It is consistent with conditional convergence—that is, holding constant other growth determinants, poorer countries grow faster than richer ones. Given the estimated coefficients, the implied speed of convergence is roughly 4 percent per year, with a corresponding half-life of about sixteen years (this is the time it takes for half the income difference between two growing countries to disappear solely due to convergence). Our estimates are higher than those in the literature (e.g., Loayza and Soto 2002). The estimated coefficient on the initial output gap is also negative and significant. This indicates that the economies in the sample follow a trend-reverting process. In other words, if an economy is undergoing a recession at the start of the period, it is expected that its growth rate will be higher than otherwise in the following years, so as to close the output gap.

*Structural policies and institutions.* All variables related to structural policies present coefficients with expected signs and statistical significance. Economic growth increases with improvements in education, financial depth, trade openness, and infrastructure. It decreases when governments impose an excessive burden on the private sector. These results are broadly consistent with a vast empirical literature on endogenous growth, including Barro and Lee (2010) on the role of education and government burden; Dollar (1992) on trade openness; Canning et al. (1994) on public infrastructure; and Levine et al. (2000) on financial depth.

*Stabilization policies.* All estimated coefficients for these variables carry the expected signs and statistical significance. Economic growth generally decreases when governments do not carry out policies conducive to macroeconomic stability, including the absence of financial and external crises. Like Fischer (1993), we find that an increase in the inflation rate leads to a reduction in economic growth. Finally, the frequency of systemic banking crises has a particularly negative effect on economic growth.

*External conditions.* Negative terms-of-trade shocks have the effect of slowing down the economy's growth rate. As noted by Easterly et al. (1993), for instance, good luck (in the form of favorable terms-of-trade shocks) is as important as good policies in explaining growth performance over medium-term horizons (such as decades). In a recent paper confined to conflict-affected countries in Sub-Saharan Africa, David et al. (2011) find that changes in the terms of trade are the most important growth determinant in the aftermath of conflicts. Foreign aid, as suggested by the received literature (e.g. Collier and Hoeffler 2004a; Elbadawi et al. 2008) plays a significant role in supporting economic growth though such effect exhibits decreasing returns, as indicated by the estimated coefficient for the squared term.

We extend the basic regression to include an interaction term to test the notion that RER undervaluation not only has direct positive effects on growth but also indirectly through its interaction with aid. Plausibly, if undervaluation can be achieved even when aid is following, possibly through allocation of the latter to productivity-enhancing investment, such as much

needed infrastructure<sup>10</sup>, RER undervaluation can increase aid effectiveness in promoting economic growth. While we find aid to have the usual non-monotonic effect, we fail to find a significant level effect for the real exchange rate. However, as found in Elbadawi et al. (2012), we obtain that aid has a much more effective growth-enhancing effect in a macroeconomic environment of exchange rate undervaluation (see column 2). We also extend the model to study interactions between the exchange undervaluation and the degree of development of the financial sector, but find no statistically significant effect. We, therefore, could not corroborate earlier evidence in the literature, which suggests that financial development can ameliorate the negative effects of RER overvaluation on growth; or renders the growth promoting effect of RER undervaluation ineffective (e.g. Aghion et al. 2009; Elbadawi et al. 2012)<sup>11</sup>.

We extend once more the basic regression to include one dummy for each exchange rate regime taking value 1 if the country has a fixed, managed float or floating exchange rate system and zero otherwise. We denote these variables by  $D_j$  ( $j=1, 2, 3$ ). We report the results in column (3) of Table 5. Two main conclusions emerge from this naïve econometric exercise. First, none of the estimated parameters are statistically different from zero, which indicates that *per-se* exchange rate regimes do not directly affect growth in a systematic way. This is not surprising as economic theory and policy practice would indicate there is nothing special in the choice of exchange regimes with respect to economic growth, but in the manner economic policy is managed conditional on such choice. Second, the estimated parameters of the other explanatory variables do not change in any significant manner, statistically or economically, with the only exception of the variables linked to RER undervaluation, for which the corresponding coefficients were significantly reduced. This, on one hand, suggests that our econometric evidence regarding the standard growth controls is robust and, on the other hand, that the effects of RER undervaluation are linked to, and depend upon, the nature of the exchange regime.

In order to study the indirect impacts of the exchange regime on economic growth, we expand our econometric model. We posit that exchange regimes can induce different levels of misalignment in the RER, thereby affecting directly the performance of an economy, and indirectly via the effects of foreign aid and financial development. The dummy variables described above are crossed with the regressors to generate interaction terms of the form  $D_j X_{it}$ . Consequently, there will be three additional variables for each interaction term in our basic regression, one for each exchange regime we study. The complete model is thus:

$$y_{it} - y_{it-1} = \alpha y_{it-1} + \beta' X_{it} + \gamma D_j + \theta_j D_j RERunderval_{it} + \varphi_j D_j AID_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

When reporting the results in the Table 6 we omit those for the standard controls in order to save space and focus on the purpose of this study. The results in column (1) indicate that all the interactions between RER undervaluation and the different exchange regimes are not statistically significant. This in turn suggests that there are no differences across exchange regimes in the positive effects of RER undervaluation on economic growth. Consequently, we focus hereafter only on indirect effects of currency undervaluation.

Column (2) decomposes the effects of the interaction between external aid and undervaluation on economic growth by exchange regime and post-conflict periods. It can be seen that the basic message replicates: aid positively affects long-run growth in all economies, but, compared, to the fixed regime, undervaluation is less effective in enhancing aid effectiveness on growth under the floating and managed floating regimes, as indicated by

<sup>10</sup> See, for example, Sachs (2007).

<sup>11</sup> However, it is important to note that, unlike our simple RER undervaluation measure, the RER misalignment index used in Elbadawi, for example, was based on a fully specified behavioral RER model.

the significant estimated negative interaction effects (-2.26 and -1.05, respectively). Moreover, we found that in countries with floating exchange regimes undervaluation actually reduces growth when financial markets are sufficiently developed. This could be explained by the fact such countries tend to have larger non-tradable than tradable sectors. Therefore, undervaluation produces higher percentage contraction on the aggregate GDP than can be compensated for by the tradable sector.

When studying these interactions in post-conflict economies noteworthy results appear: economic growth in countries with floating exchange regimes suffer considerably from the combined effects of significant aid flows and real exchange rates undervaluation. On the contrary, in countries with fixed and managed float regimes economic recovery after conflicts is enhanced by a currency undervaluation strategy, as indicated by the sizable positive coefficient which removes altogether the negative cross-country effect. Likewise, the growth impact of undervaluation in post-conflict economies with fixed and managed float is not affected by the level of financial development, while under the floating regime undervaluation further reduces growth in post-conflict countries with advanced financial markets. In a nutshell, the results of Table 6 suggest that aid recipient post-conflict countries with fixed or managed float regimes should consider a strategy of real exchange rate undervaluation for enhancing post-conflict aid effectiveness and accelerating growth. However, those adopting a floating regime should pursue an equilibrium real exchange rate policy or even a mild overvaluation to the extent that they have a sizable non-tradable sector. We are hastened, however, to emphasize that there are very few such examples; only nine out of 40 post-conflict countries adopting a floating regime (Table 4).

#### 4.2 Exports

The empirical literature on export-demand functions and economic development is vast and far reaching. At its basis lies the notion that fast, sustainable growth largely depends on the fate of the exporting sectors. The spectacular development of the Asian Tigers (Hong Kong, Singapore, Korea, Taiwan) and other newly industrialized countries, has been clearly the result of a deliberate policy effort to support and expand tradable sectors as the starting point to acquire higher productivity technologies and managerial capabilities, market access, foreign direct investment and improve the quality of the human capital of their labor force. One area that has captured the interest of researchers is the dependence of exports (and imports) on relative prices, in particular the real exchange rate: the higher the income elasticity of the export demand, the more powerful exports will be as an engine of growth. The higher the price elasticity, the more competitive is the international market for exports of the particular country, and thus the more successful will a real devaluation be in promoting export revenues. The recent literature is divided on how a real devaluation affects imports and exports. Rose (1991) and Ostry and Rose (1992) find that a real devaluation has generally no significant impact on the trade balance, while Marquez and McNeilly (1988) and Reinhart (1995) find that it does affect the trade balance.

##### *Exports determinants*

Based on the papers by Santos-Paulino and Thirlwall (2004) and Ostry and Rose (1992) we posit the following dynamic model for the growth of exports (expressed in real US\$):

$$\Delta \log Exports_{it} = \alpha \Delta \log Exports_{it-1} + \beta' X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

where vector  $X_{it}$  includes the standard determinants of a demand function (i.e., relative prices and income levels) as well as other complimentary determinants that account for the cross section-time series data we use in the estimation.

Among these complimentary variables, we include those which relate to institutional aspects that largely determine the efficiency of exports and their competitiveness in global markets.



In the empirical work we control for financial development and infrastructure. On the other hand, since we work with 5-year averages, cyclical phenomena are bound to play a role in affecting export performance: we thus control for the fluctuations of the world economy, shocks to terms of trade and the domestic cycle. The latter is justified on the grounds that the short-term growth in exports is limited to some extent by the availability of factors (capital and labor) used to manufacture exported goods: countries with substantial output-gaps would find it easier to export than those with over-heated economies.

Recent research suggests that taxes affect profitability and export growth. We include as a measure of export taxes the openness variable already used in the long-run growth section, namely the volume of trade over GDP adjusted for the area and population of each country and dummies for being landlocked and/or an oil exporter. We also consider as a potential determinant the government burden on the grounds that although government can promote exports, it can also become a heavy burden if it imposes high taxes, distorts markets incentives, and maintains an inefficient bureaucracy. Lastly, we add inflation to our set of regressors as it represents both an indirect tax and indicator of economic instability.

Finally, in order to continue the analysis of the previous section we include in our model foreign aid and its interactions with the undervaluation of the real exchange rate and the development of the financial sector. As discussed in the growth section, the macroeconomic impacts of aid on the exports of an emerging economy are multiple. On the positive side aid might help support investment, reduce taxation by balancing government budgets, and avoid balance of payments risks. On the negative side, aid can overvalue the currency thus hampering export profitability.

#### *Estimation Results*

Table 7 presents the results of the estimation procedure which, as in previous cases is based on the system GMM estimator and considers 106 countries and over 500 observations. Since we include time-specific dummies, we have effectively controlled for the world economic cycle and its impact on each country's export performance. The results in column (1) indicate that exports sectors in richer economies tend to be less dynamic, a result that is consistent with fact that higher income economies rely more on domestic goods sectors and services. Smaller economies, on the contrary, depend more on foreign trade. Likewise, economies that are on the troughs of their own cycles would tend to see exports rebound quite rapidly, as indicated by the negative estimated parameter of the cyclical reversion variable. Concordantly, economies at their peak of their cycle would reduce export growth as a result of excess domestic expenditure relative to their long-run equilibrium.

The estimation of the parameters of the rest of the variables exhibit the expected correlation to exports growth: more open economies would see exports become more competitive, lower inflation, better infrastructure and government consumption would promote higher export growth. Our financial development proxy has the expected positive sign but, somewhat surprisingly, is statistically insignificant.

Aid by itself seems to support exports, as indicated by the positive estimated parameter, although, as for the growth results, aid is much more effective when the real exchange rate is undervalued, which increases the profitability of the tradable export sector, as indicated by the strong positive estimate of the interaction term 1 of regression 1. The undervaluation of the currency—compounded by external financing—can jumpstart the disproportionately negatively impacted export sector during conflict by providing an economy-wide subsidy to the sector. Interaction 2, which measures the eventual amelioration of the currency undervaluation effect by the level of development of the financial sector, is insignificant thus prompting us to discard this transmission channel. Finally, exchange regimes seem to affect directly export performance: countries with floating exchange regimes exhibit lower export

growth than countries with less flexible currencies. This could result from the fact that exporters in countries with floating currencies face currency risks that they cannot diversify away through the financial sector.

It is precisely the latter observation that prompted us to extend our model to include interaction terms that aim to capture differential effects of RER undervaluation and financial development in countries with different exchange regimes. The results are presented in column (2) of Table 7. It can be seen that the results for the standard control variables remain unaffected and, thus, we can concentrate on the interaction terms. We find that RER undervaluation compounded with aid have a positive effect under the floating regime, while it tends to reduce export growth under the other two less flexible regimes. On the other hand, the aid-financial development interaction was insignificant under all three exchange rate regimes. These results prompt us to drop the interaction terms involving financial development, but undertake further investigation to assess the impact of the post-conflict aid-undervaluation effect across the three regimes (column 3). We find that during post-conflict RER undervaluation promotes aid effectiveness under floating and managed floating regimes, while it reduces aid effectiveness under fixed regimes. The net effect of the RER undervaluation compounded with aid during post-conflict was negative for the fixed regime (at -0.03); while it remains positive for the more flexible regimes: 0.051 for the managed float and 0.255 for the floating regime. RER undervaluation requires strong fundamentals under floating regimes, but, as our results suggest, if it can be achieved it will have a large impact on aid effectiveness in promoting export growth.

## 5. Conclusions

This paper contributes to the macroeconomic agenda of post-conflict reconstruction by addressing the relatively under-researched area of monetary policy and exchange rate regimes. Specifically the paper asks whether the choice of exchange rate regime matters for aid effectiveness in promoting rapid growth. In this context the paper considers three broad exchange rate regimes: fixed, managed and floating. The experience of 38 countries that endured onset and end of civil wars during 1970-2008, suggests that the post-conflict performances of the fixed and managed regimes were very similar, and was superior to that of the floating regime. In terms of per capita GDP growth, the median country grew by 3.0 and 2.7% under the fixed and managed regimes, respectively, compared to the slightly lower 2.1% for the floating regime. Similarly for exports, while they grew by 7.8 and 7.6%, respectively, under the former two regimes; growth under the floating regime was much lower at 5.2%.

Though the preliminary evidence suggests that the fixed and managed regimes might have an edge in promoting post-conflict economic recovery and macro stabilization, a proper assessment requires formal modeling of the marginal contribution of the three regimes in fully specified models of the two pivotal macroeconomic variables: per capita GDP and export growth. The paper estimates extended versions of these models in a panel over 1970-2008 covering 132 countries, including the 38 post-conflict countries and 94 peaceful ones as a control group. The regressions results for the standard determinants of the two macroeconomic performance indicators are, of course, not new and are consistent with the evidence from the received literature. The new and, in our view, novel results relate to the findings associated with the impact of the exchange rate regimes, especially with regard to their interactions with aid and the real exchange rate.

Firstly, in post-conflict economies the exchange rate regime has no statistically significant direct effect on overall GDP growth, but the free floating regime has a significantly negative effect on export.

Secondly, as discussed earlier in this paper, we regard the interaction term between aid and RER undervaluation as the most appropriate metric for assessing the conditional aid effectiveness in “good” policy environment, given the centrality of tradable economic activities for post-conflict growth. The estimated effect of this variable suggests that aid was very effective in promoting growth under the fixed and managed regimes, provided that the authorities manage to engineer an RER undervaluation in the aftermath of civil wars. On the other hand, the combination of aid and undervaluation has had a negative impact on growth under the floating regime. This latter result may reflect the dominance of the non-tradable sector in the few post-conflict economies (only nine out of forty) adopting fully floating exchange rate regime.

Thirdly, on the other hand, the post-conflict aid-undervaluation effect was found to be positively associated with export growth under the managed and floating regimes, while it has a negative impact under the fixed regime. However, the latter effect is not economically meaningful, with a rather miniscule order of magnitude.

In conclusion, the above evidence suggests that the free floating exchange regime is not appropriate for countries coming out of civil wars. On the other hand, though these countries appear to do almost just as well under the other two regimes in terms of growth; the managed regime appears to have an edge on some critical areas of economic performance. First, under the managed regime aid promotes post-conflict exports. Second, due to its positive influence on exports, aid under the managed regime is likely to be a more reliable growth fundamental than under the fixed regime. Third, the estimated aid effectiveness on output and export growth is conditional on RER undervaluation. However, engineering an RER undervaluation is rather difficult under a fixed exchange rate regime. Indeed, the real exchange rate literature suggests that, compared to managed floating regimes, the data shows a much higher frequency of RER overvaluation episodes under fixed exchange rate regimes (e.g. Elbadawi et al. 2012). The recent evidence from the open economy macroeconomic literature that suggests that nominal and real exchange rates tend to track each other very closely for a few years (e.g. Levy-Yeyati and Sturzenegger 2007). The implication of these findings is that the RER is likely to be directly influenced by nominal exchange rate policy, at least for the short-to-medium terms. Therefore, since the nominal exchange rate is a policy instrument under the managed regimes, while it is not under the hard fixed regimes, aid cannot be effective for post-conflict countries under the latter.

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**Table 1: Countries, Duration, and Dates of Conflicts**

| Africa                           | Latin America           | Asia                    |
|----------------------------------|-------------------------|-------------------------|
| Angola (1976-2002)               | Argentina (1974-1977)   | Bangladesh (1975-1992)  |
| Burundi (1994-2001)              | Colombia (1978-2004)    | India (1985-2008)       |
| Central African Rep. (2004-2008) | El Salvador (1979-1992) | Indonesia (1975-2002)   |
| Chad (1976-2008)                 | Guatemala (1975-1995)   | Nepal (1996-2002)       |
| Congo (1997-1999)                | Haiti (1995-1999)       | Pakistan (1975-1977)    |
| Congo Dem. Republic (1996-2001)  | Nicaragua (1978-1979)   | Philippines (1970-2008) |
| Ethiopia (1975-1991)             | Peru (1980-1983)        | Sri Lanka (1983-2001)   |
| Guinea-Bissau (1998-1999)        |                         | Thailand (1975-1982)    |
| Mali (1990-1995)                 |                         |                         |
| Mauritania (1975-1978)           |                         |                         |
| Mozambique (1975-1992)           |                         |                         |
| Rwanda (1991-1994)               |                         |                         |
| Senegal (1989-1997)              |                         |                         |
| Sierra Leone (1991-2001)         |                         |                         |
| South Africa (1976-1988)         |                         |                         |
| Sudan (1982-2002)                |                         |                         |
| Uganda (1978-1986)               |                         |                         |
| Zimbabwe (1974-1979)             |                         |                         |

Source: Own elaboration based in data from PRIO and Elbadawi et al. (2012).

**Table 2: Main Macroeconomic Indicators of Conflict and Non-Conflict Emerging Economies (1970-2008)**

|   | Non Conflict Countries | During conflict | Five years before start of conflict | Conflict Economies               |                          |                         |
|---|------------------------|-----------------|-------------------------------------|----------------------------------|--------------------------|-------------------------|
|   |                        |                 |                                     | Five years after end of conflict | Short duration conflicts | Long duration conflicts |
| Economic Growth <sup>a</sup>                | 2.0                    | 0.3             | 0.8                                 | 2.6                              | -2.4                     | 1.0                     |
| Labor Productivity Growth <sup>b</sup>      | 1.3                    | -0.6            | 0.5                                 | 1.9                              | -3.9                     | 0.3                     |
| Annual Inflation Rate <sup>c</sup>          | 8.1                    | 10.9            | 10.9                                | 8.5                              | 9.8                      | 11.0                    |
| Dom. Credit to Private Sector <sup>d</sup>  | 31.1                   | 21.9            | 19.2                                | 22.6                             | 18.2                     | 22.7                    |
| Capital Account Openness Index <sup>e</sup> | -0.27                  | -0.80           | -0.74                               | -0.50                            | -0.80                    | -0.79                   |
| Tax Revenue <sup>d</sup>                    | 16.4                   | 11.2            | 13.2                                | 13.1                             | 10.7                     | 11.4                    |
| Military Expenditures <sup>d</sup>          | 2.6                    | 2.7             | 2.2                                 | 2.6                              | 2.7                      | 2.7                     |
| Exports Growth <sup>f</sup>                 | 5.5                    | 0.5             | 3.4                                 | 7.2                              | -2.6                     | 1.2                     |
| Exports Level <sup>d</sup>                  | 35.7                   | 21.9            | 20.3                                | 22.3                             | 22.7                     | 22.2                    |
| External Aid <sup>d</sup>                   | 6.8                    | 6.0             | 7.9                                 | 11.8                             | 10.2                     | 4.9                     |
| Foreign Direct Investment <sup>d</sup>      | 3.3                    | 1.3             | 0.5                                 | 1.7                              | 0.7                      | 1.5                     |

Notes: (a) annual change in real GDP per capita (%); (b) annual change in real GDP at PPP Prices per worker (%); (c) annual rate for the median country (%); (d) annual average, as percent of GDP, (e) Chinn-Ito index, and (f) annual change in real US\$.

Source: own elaboration based on IMF and World Bank data (see Appendix A for details on definitions and sources).

**Table 3: Macroeconomic Indicators of Conflict Economies According to Exchange Systems**

|  | Average of Five Years Before Conflict Started |         |          | Average of Five Years After Conflict Ended |         |          |
|--|---|---------|----------|--|---------|----------|
|  | Fixed   | Interm. | Floating | Fixed                                      | Interm. | Floating |
| Economic Growth <sup>a</sup>                   | 0.2   | 2.1     | -2.6     | 3.0  | 2.7     | 2.1      |
| Labor Productivity Growth <sup>b</sup>         | 0.0   | 1.7     | -3.2     | 2.3  | 1.9     | 1.7      |
| Annual Inflation Rate <sup>c</sup>             | 5.6   | 14.3    | 64.8     | 4.7  | 7.6     | 16.3     |
| Domestic Credit to Private Sector <sup>d</sup> | 17.4  | 22.6    | 9.2      | 23.6                                       | 21.1    | 15.6     |
| Capital Account Openness Index <sup>e</sup>    | -0.39   | -1.00   | -0.81    | -0.54                                      | -0.33   | -0.79    |
| Tax Revenue <sup>d</sup>                       | 11.0  | 17.6    | n.a.     | 11.4                                       | 13.0    | 15.1     |
| Military Expenditures <sup>d</sup>             | 2.0   | 2.4     | n.a.     | 2.3  | 2.8     | 2.1      |
| Exports Growth <sup>f</sup>                    | 5.3   | 1.5     | n.a.     | 7.8  | 7.6     | 5.2      |
| Exports Level <sup>d</sup>                     | 22.6  | 19.5    | 17.7     | 30.4                                       | 18.0    | 21.3     |
| External Aid <sup>d</sup>                      | 8.0   | 9.0     | 2.1      | 11.1                                       | 10.5    | 17.4     |
| Foreign Direct Investment <sup>d</sup>         | 0.5   | 0.5     | 0.9      | 1.3  | 1.7     | 2.3      |

Notes: (a) annual change in real GDP per capita (%); (b) annual change in real GDP at PPP Prices per worker (%); (c) annual rate for the median country (%); (d) annual average, as percent of GDP, (e) Chinn-Ito index, and (f) annual change in real US\$; n.a. indicates less than five observations.

Source: own elaboration based on IMF and World Bank data (see Appendix A).

**Table 4: Exchange Rate Systems Before and After Conflicts**

|                    |              | After conflict |              |          |           |
|--------------------|--------------|----------------|--------------|----------|-----------|
|                    |              | Fixed          | Intermediate | Floating | Total     |
| Before<br>conflict | Fixed        | 12             | 2            | 4        | 18        |
|                    | Intermediate | 2              | 14           | 3        | 19        |
|                    | Floating     | 0              | 1            | 2        | 3         |
|                    | <b>Total</b> | <b>14</b>      | <b>17</b>    | <b>9</b> | <b>40</b> |

Source: own elaboration based on IMF and World Bank data (see Appendix A).

**Table 5: Econometric Results: Growth in Per Capita Real GDP**

| Variable  | (1)             | (2)               | (3)              |
|---|-----------------|-------------------|------------------|
| <b>Standard Controls</b>                                      |                 |                   |                  |
| <b>Initial GDP per capita</b> (in logs)                       | -3.81 (0.50)*** | -3.58 (0.48)***   | -3.23 (0.49)***  |
| <b>Cyclical reversion</b> (Initial output gap)                | -0.21 (0.04)*** | -0.22 (0.04)***   | -0.22 (0.04)***  |
| <b>Education</b> (secondary attainment, in logs)              | 1.61 (0.62)***  | 3.05 (0.72)***    | 2.64 (0.75)***   |
| <b>Trade Openness</b> (% of GDP, in logs)                     | 2.51 (0.63)***  | 2.77 (0.68)***    | 2.44 (0.67)***   |
| <b>Government Burden</b> (gov. consumption % of GDP, in logs) | -2.62 (0.63)*** | -2.31 (0.73)***   | -2.32 (0.73)***  |
| <b>Government quality index</b> (higher index=higher quality) | 3.27 (1.35)**   | 2.65 (1.44)**     | 2.54 (1.40)*     |
| <b>Inflation</b> (log (1+inflation rate))                     | -0.66 (0.18)*** | -0.65 (0.20)***   | -0.58 (0.21)***  |
| <b>Systemic Banking Crisis</b> (dummy)                        | -5.55 (1.26)*** | -5.94 (1.39)***   | -5.88 (1.39)***  |
| <b>Terms of Trade Shocks</b> (dev. from HP trend)             | 0.05 (0.03)**   | 0.04 (0.03)       | 0.03 (0.03)      |
| <b>Infrastructure</b> (telephones per capita, in logs)        | 0.74 (0.25)***  | 0.76 (0.25)***    | 0.93 (0.26)***   |
| <b>Additional Controls</b>                                    |                 |                   |                  |
| <b>RER undervaluation</b> (dev. from HP trend)                | 0.03 (0.03)     | 0.06 (0.04)       | 0.03 (0.04)      |
| <b>Aid</b> (as % of GNI)                                      | 0.14 (0.06)**   | 0.24 (0.07)***    | 0.25 (0.07)***   |
| <b>Squared Aid</b> (as % of GNI)                              | -0.002 (0.001)* | -0.003 (0.001)*** | -0.003(0.001)*** |
| <b>Interaction 1:</b> Aid*RER undervaluation                  |                 | 0.79 (0.27)***    | 0.73 (0.27)**    |
| <b>Interaction 2:</b> Fin. Development *RER undervaluation    |                 | 2.44 (1.58)       | 1.92 (1.60)      |
| <b>Exchange Rate Regime</b>                                   |                 |                   |                  |
| Fixed Exchange Rate   |                 |                   | -0.68 (1.53)     |
| Managed Float Exchange Rate                                   |                 |                   | -0.92 (1.50)     |
| Floating Exchange Rate  |                 |                   | -2.05 (1.49)     |
| <b>Constant</b>   | 30.3 (3.55)***  | 25.4 (3.40)***    | 23.8 (3.66)***   |
| <b>Serial correlation test of order 1</b>                     | -3.34 ***       | -3.56***          | -3.24***         |
| <b>Serial correlation test of order 2</b>                     | -1.13           | -0.97             | -0.93            |

Note: Number of countries=90, number of observations=537, maximum number of instruments=49, time dummies and country dummies included. (\*, \*\*, \*\*\*)= significant at 90%, 95% and 99% confidence, respectively.



**Table 6: Econometric Results: Growth in Per Capita Real GDP (Standard controls not Reported)**

| Variable  | (1)               | (2)                 |
|---|-------------------|---------------------|
| <b>RER undervaluation</b> (deviations from HP trend)                  | -0.026 (0.161)    | - 0.029 (0.046)     |
| <b>Aid</b> (as % of GNI)  | 0.257 (0.071)***  | 0.116 (0.074)*      |
| <b>Aid<sup>2</sup></b> (as % of GNI)                                  | -0.003 (-0.001)** | -0.001 (0.001)      |
| <b>Interaction 1: Aid*RER undervaluation</b>                          | 0.774 (0.274)***  | 1.623 (0.370)***    |
| <b>Interaction 2: Financial Development *RER undervaluation</b>       | 0.699 (1.800)     | 2.852 (2.566)       |
| <b>Interaction 3: RER undervaluation*Exchange Regime</b>              |                   |                     |
| Fixed Exchange Rate   | -0.031 (0.172)    |                     |
| Managed Float Exchange Rate   | -0.044 (0.163)    |                     |
| Floating Exchange Rate  | -0.089 (0.161)    |                     |
| <b>Interaction 4: Aid*RER undervaluation*Exchange Regime</b>          |                   |                     |
| Fixed Exchange Rate   |                   | 0.951 (1.221)       |
| Managed Float Exchange Rate   |                   | -2.267 (0.769)**    |
| Floating Exchange Rate  |                   | -1.054 (0.677)*     |
| <b>Interaction 5: Financial Develop.*RER undervaluation*</b>          |                   |                     |
| Fixed Exchange Rate   |                   | 0.928 (4.846)       |
| Managed Float Exchange Rate   |                   | 2.223 (3.067)       |
| Floating Exchange Rate  |                   | -6.541 (3.025)**    |
| <b>Post Conflict Periods</b>  |                   |                     |
| <b>Interaction 6: Aid*RER undervaluation* Post Conflict</b>           |                   |                     |
| Fixed Exchange Rate   |                   | 5.693 (2.457)**     |
| Managed Float Exchange Rate   |                   | 3.073 (0.899)***    |
| Floating Exchange Rate  |                   | -4.629 (1.326)***   |
| <b>Interaction 7: Fin. Develop.*RER undervaluation* Post Conflict</b> |                   |                     |
| Fixed Exchange Rate   |                   | -28.855 (25.229)    |
| Managed Float Exchange Rate   |                   | -10.395 (11.826)    |
| Floating Exchange Rate  |                   | -515.12 (132.17)*** |
| <b>Constant</b>   | 22.60 (3.37)***   | 24.92 (3.46)***     |
| <i>Serial correlation test of order 1</i>                             | -3.50 ***         | -3.86***            |
| <i>Serial correlation test of order 2</i>                             | -1.04             | -1.65               |

Note: Number of countries = 90, number of observations = 537, maximum number of instruments = 63, time dummies and country dummies included. (\*, \*\*, \*\*\*)= significant at 90%, 95% and 99% confidence, respectively.

**Table 7: Econometric Results: Annual Exports Growth (%)**

|   | (1)               | (2)               | (3)               |
|---|-------------------|-------------------|-------------------|
| <b>Standard Controls</b>  |                   |                   |                   |
| <b>Initial Real GDP per capita</b> (in logs)                    | -0.041 (0.012)*** | -0.037 (0.012)*** | -0.037 (0.012)*** |
| <b>Cyclical reversion</b> (Initial output gap)                  | -0.002 (0.001)*   | -0.003 (0.001)*   | -0.003 (0.001)*   |
| <b>Trade Openness</b> (% of GDP, in logs)                       | 0.126 (0.02)***   | 0.130 (0.021)***  | 0.125 (0.021)***  |
| <b>Government Burden</b> (gov. consumption % of GDP, in logs)   | -0.104 (0.02)***  | -0.091 (0.020)*** | -0.094 (0.020)*** |
| <b>Inflation</b> (log (1+inflation rate))                       | -0.010 (0.006)*   | -0.010 (0.006)    | -0.004 (0.006)    |
| <b>Infrastructure</b> (telephones per capita, in logs)          | 0.027 (0.007)***  | 0.022 (0.007)***  | 0.025 (0.007)***  |
| <b>Financial Development</b>                                    | 0.005 (0.004)     | 0.004 (0.004)     | 0.006 (0.004)     |
| <b>Additional Controls</b>                                      |                   |                   |                   |
| <b>RER undervaluation</b>                                       | 0.001 (0.001)     | 0.152 (0.132)     | 0.185 (0.110)*    |
| <b>Aid</b> (% of GNI, in logs)                                  | 0.029 (0.001)***  | 0.003 (0.001)**   | 0.003 (0.001)**   |
| <b>Interaction 1: Aid*RER undervaluation</b>                    | 0.037 (0.009)***  |                   |                   |
| <b>Interaction 2: Financial Develop. *RER undervaluation</b>    | 0.038 (0.050)     |                   |                   |
| <b>Exchange Regime</b>  |                   |                   |                   |
| Fixed Exchange Rate   | -0.041 (0.052)    | -0.049 (0.052)    | -0.023 (0.053)    |
| Managed Float Exchange Rate                                     | -0.061 (0.049)    | -0.063 (0.051)    | -0.042 (0.051)    |
| Floating Exchange Rate  | -0.119 (0.048)**  | -0.117 (0.049)**  | -0.104 (0.050)**  |
| <b>Interaction 1: Aid*RER undervaluation*Exchange Regime</b>    |                   |                   |                   |
| Fixed Exchange Rate   |                   | -0.018 (0.011)*   | -0.007 (0.011)*   |
| Managed Float Exchange Rate                                     |                   | -0.025 (0.012)**  | -0.035 (0.012)**  |
| Floating Exchange Rate  |                   | 0.021 (0.011)*    | 0.117 (0.049)*    |
| <b>Interaction 2: Aid*Fin. development*Exchange rate regime</b> |                   |                   |                   |
| Fixed Rate  |                   | 0.023 (0.104)     | -                 |
| Managed Float Exchange Rate                                     |                   | 0.007 (0.049)     | -                 |
| Floating Exchange Rate  |                   | 0.022 (0.077)     | -                 |
| <b>Interaction 3: Post Conflict*Aid*RER Under*Exc. Regime</b>   |                   |                   |                   |
| Fixed Exchange Rate   |                   |                   | -0.025 (0.106)    |
| Managed Float Exchange Rate                                     |                   |                   | 0.086 (0.045)*    |
| Floating Exchange Rate  |                   |                   | 0.138 (0.064)**   |
| <b>Constant</b>   | 0.592 (0.097)***  |                   | 0.532 (0.101)***  |
| <i>Serial correlation test of order 1</i>                       | -4.96***          | -4.97***          | -4.54***          |
| <i>Serial correlation test of order 2</i>                       | 1.32              | -1.51             | -1.38             |

Note: Number of countries=106, number of observations=520, maximum number of instruments=52, time dummies and country dummies included. (\*, \*\*, \*\*\*)= significant at 90%, 95% and 99% confidence, respectively.

## Appendix A: Definitions and Sources of Variables Used in Regression Analysis

| Variable   | Definition   | Source   |
|--|--|--|
| Real GDP per capita                              | Ratio of total GDP to total population. GDP is in 2005 PPP-adjusted US\$   | World Development Indicators (2009)  |
| Population                                       | Total population   | World Development Indicators (2009)  |
| Labor Productivity                               | Real GDP per worker in US\$ of 2000 at PPP prices.   | The Conference Board, Total Economy Database, June 2009.                       |
| Normalized Inflation Rate                        | CPI inflation rate/(1+CPI inflation)   | World Development Indicators (2009).   |
| Domestic credit to the private sector (% of GDP) | Ratio to GDP of the stock of claims on the private sector by deposit money banks and other financial institutions.   | World Development Indicators (2009).   |
| Capital Account Openness Index                   | Index based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions | Chinn, M. and H. Ito (2006) updated database.                                  |
| Tax Revenue                                      | Ratio of total tax revenue to GDP at current prices.   | International Financial Statistics.  |
| Military Expenditures                            | Military expenditure (% of GDP)  | World Development Indicators (2009).   |
| Exports  | Ratio of total tax revenue to GDP at current prices.   | World Development Indicators (2009).   |
| External Aid                                     | Ratio of official development assistance to GDP (both in current US\$)   | World Development Indicators (2009).   |
| Foreign Direct Investment                        | Ratio of official development assistance to GDP (both in current US\$)   | World Development Indicators (2009).   |
| Dollarization                                    | In-shore deposit dollarization in the financial sector as ratio to GDP.  | From Levy Yeyati (2006)  |
| Exchange Rate Regime Classification              | Fixed exchange systems include dollarization, currency boards, and monetary unions. Intermediate systems include from crawling pegs to managed floats. Other systems are considered free floats.                   | Author's calculations, based on data from Reinhart and Rogoff (2004)           |
| Initial output gap                               | Difference between the log of actual GDP and (the log of) potential (trend) GDP around the start of the period. The Hodrick-Prescott filter is used to decompose the log of GDP.                                   | Author's calculations, based on data from World Development Indicators (2009). |
| Gross secondary-school enrollment                | Ratio of total secondary enrollment, regardless of age, to the population of the age group that officially corresponds to that level of education.   | Barro and Lee (2010) and World Development Indicators (2009).                  |
| Trade Openness (% of GDP)                        | Residual of a regression of the log of the ratio of exports and imports (in 2005 US\$) to GDP (in 2005 US\$), on the logs of area and population, as well as dummies for oil-exporting and landlocked countries.   | Author's calculations, based on data from World Development Indicators (2009). |
| Government consumption (% GDP)                   | Ratio of government consumption to GDP (in 2005 US\$)  | World Development Indicators (2009).   |
| Governance (index)                               | First principal component of four indicators: prevalence of law and order, quality of bureaucracy, absence of corruption, and accountability of public officials.  | <i>International Country Risk Guide</i> (ICRG).                                |
| Main telephone lines per 1,000 workers           | Telephone lines connecting a customer's equipment to the public switched telephone network. Data are presented per 100 populations for the entire country.   | World Development Indicators (2009)  |
| Systemic banking crises                          | Number of years in which a country underwent a systemic banking crisis, as a fraction of the number of years in the corresponding period.  | Author's calculations, based on data from Laeven and Valencia (2008)           |
| Terms-of-trade shocks                            | Measured as the deviation of the actual terms of trade from its long-run trend computed using the Hodrick-Prescott filter. Terms of trade are defined as customary.  | Author's calculations, based on data from World Development Indicators (2009). |
| Real Exchange Rate Misalignment                  | Measured as the deviation of the actual RER from its equilibrium computed using the Hodrick-Prescott filter.   | Author's calculations, based on data from World Development Indicators (2009). |
| Period-specific shift                            | Time dummy variable.   | Authors' construction.   |

## Appendix B: Countries Included in the Sample

|                      |                     |                    |
|----------------------|---------------------|--------------------|
| Albania              | Algeria             | Angola             |
| Argentina            | Armenia             | Aruba              |
| Australia            | Austria             | Bahrain            |
| Bangladesh           | Barbados            | Belgium            |
| Belize               | Benin               | Bhutan             |
| Bolivia              | Botswana            | Brazil             |
| Brunei Darussalam    | Bulgaria            | Burkina Faso       |
| Burundi              | Cameroon            | Canada             |
| Central African Rep. | Chad                | Chile              |
| China                | Colombia            | Congo, Dem. Rep.   |
| Congo, Rep.          | Costa Rica          | Cote d'Ivoire      |
| Croatia              | Cyprus              | Czech Republic     |
| Denmark              | Dominica            | Dominican Republic |
| Ecuador              | Egypt, Arab Rep.    | El Salvador        |
| Equatorial Guinea    | Ethiopia            | Finland            |
| France               | Gabon               | Gambia, The        |
| Georgia              | Ghana               | Greece             |
| Guatemala            | Guinea-Bissau       | Guyana             |
| Haiti                | Honduras            | Hong Kong, China   |
| Hungary              | Iceland             | India              |
| Indonesia            | Iran, Islamic Rep.  | Ireland            |
| Israel               | Italy               | Jamaica            |
| Japan                | Jordan              | Kazakhstan         |
| Kenya                | Korea, Rep.         | Kyrgyz Republic    |
| Latvia               | Lesotho             | Luxembourg         |
| Madagascar           | Malawi              | Malaysia           |
| Mali                 | Mauritania          | Mauritius          |
| Mexico               | Moldova             | Mongolia           |
| Morocco              | Mozambique          | Namibia            |
| Nepal                | Netherlands         | New Zealand        |
| Nicaragua            | Niger               | Nigeria            |
| Norway               | Oman                | Pakistan           |
| Panama               | Papua New Guinea    | Paraguay           |
| Peru                 | Philippines         | Portugal           |
| Rwanda               | Saudi Arabia        | Senegal            |
| Seychelles           | Sierra Leone        | Singapore          |
| Slovenia             | South Africa        | Spain              |
| Sri Lanka            | Sudan               | Suriname           |
| Swaziland            | Sweden              | Switzerland        |
| Syrian Arab Republic | Tanzania            | Thailand           |
| Togo                 | Trinidad and Tobago | Tunisia            |
| Turkey               | Uganda              | United Kingdom     |
| United States        | Uruguay             | Venezuela, R.B.    |
| Yemen, Rep.          | Zambia              | Zimbabwe           |