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Exchange Rate and Monetary Policy for  
Sustainable Post-conflict Transition

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## INDEX

ABSTRACT

1. INTRODUCTION	1
2. RECEIVED KNOWLEDGE	4
3. STYLIZED FACTS	7
4. EMPIRICAL ANALYSIS	13
4.1 Economic Growth	14
4.2 Exports	23
4.3 Money Holdings	27
4.4 Inflation	32
4.5 Remnants of the past	19
5. CONCLUSIONS	35
REFERENCES	38

# *Exchange Rate and Monetary Policy for Sustainable Post-conflict Transition*

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## **Abstract**

This paper asks the question as to whether the choice of the exchange rate regime matters for post-conflict economic recovery and macro stabilization. Though an important aspect of the macroeconomic agenda for post-conflict, it has however, been largely ignored by the literature. We identify three main exchange rate regimes (fixed, managed floating and free float) and estimate their marginal contributions to post-conflict economic recovery and macro stabilization in the context of fully specified models of four pivotal macroeconomic variables: per capita GDP and export growth, the demand for money balances and inflation. 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 evidence suggests that the managed floating regime appears to have an edge on some critical areas of economic performance for post-conflict reconstruction.

## 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 large needs, both humanitarian and developmental. 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, growth sustainability in the medium-to-longer runs, following the immediate few years of the peace onset, depends not only upon continued flows of adequate and timely aid but also on its effectiveness (e.g. Collier and Hoeffler, 2004b). 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. 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, overall economic growth or macro stability is conditional on the choice of exchange rate regime. The received literature suggests that, among other things, these key macroeconomic targets are 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). Moreover, the demand for domestic money, as an asset that facilitates

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<sup>1</sup> See, for example, Boyce and O'Donnell (2007), Collier and Hoeffler (2004a).

transactions and stores value, would also shrink during conflict (e.g. Elbadawi and Schmidt-Hebbel, 2008). Therefore, restoring growth in post-conflict requires a vigorous recovery by the export sector and an adequate re-monetization process. 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 (2010) 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. Collier, 2009). 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 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, 2006; Aguirre and Calderon, 2006; Elbadawi et al, 2007; and 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).

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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 under-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.

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 various 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.

Beyond revitalizing exports and growth, the third pivotal macroeconomic policy objective for post-conflict is restoring macroeconomic stability through promoting the recovery in the demand for money. Adam, Collier, and Davies (2008) discuss the financing implications for the government of the decline in the demand for money associated with reduced income and asset substitution away from domestic money during conflicts. This, they argue, is likely to worsen the tradeoff between seigniorage and inflation, given that governments fighting civil wars are in need to finance higher military expenditure with limited borrowing options. Under these conditions, they formally show that the equilibrium rate of inflation that the government is willing to tolerate for a given level of seigniorage will be much higher than under normal peaceful conditions. As a result of the slow recovery in the demand for money in the aftermath of conflict and the high level of financing, inflation is not likely to decline even after war ends.

The key insight of Adam et al. is that without aid, conflict and post-conflict countries are likely to experience explosive inflation; aid can help reestablish the pre-conflict equilibrium level of inflation. This paper extends their analysis based on the observation that the ability of aid to finance post-conflict monetary reconstruction may depend in a substantial manner on the choice of the exchange regime. As long recognized, exchange rate regimes provide for different degrees of independence to monetary policy, protection against real shocks, and macroeconomic stabilization. Consequently, the support that aid can give to monetary reconstruction is likely to be different in fixed or managed float systems.

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 economic growth, inflation, money demand 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, 2004a). 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 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, 2004a), 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). 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) find that on average it reduces annual real 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 (2001) find 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. Gupta et al. (2002) and Adam et al. (2008) provide evidence that conflicts lead to higher inflation and argue that, most likely, is a direct consequence of the government's need to finance increased military expenditures in a context where borrowing is unlikely to be an option. 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.

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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)

The rebound in growth is also associated with a rapid decline in inflation and a realignment of fiscal policy away from military expenditure, a much needed policy since there is a tendency for countries to emerge from conflict with severely reduced domestic revenues and damaged tax administration (see Fallon et al. 2004). Chen et al. (2008) found that military expenditure (as a percentage of government expenditure) reveals a clear and significant declining trend in the aftermath of war. On the other hand, they find that inflation is significantly higher after the war. Staines (2004) notes, nevertheless, that in most of the post-1990 conflict countries inflation declined to single digits within two years.

Price stabilization tends to significantly affect monetary holdings in economies transiting from conflict to peace. Elbadawi and Schmidt-Hebbel (2008) study the stability of money demand in emerging economies –including 48 post-conflict countries— between 1975 and 2004. They conclude that M1 money demand (and therefore real monetary holdings) is highly unstable between conflict and non-conflict countries and over the conflict cycle. After peace onset, significant real monetization takes place in countries that have suffered conflicts. This monetization results from output recovery and inflation stabilization observed immediately after conflict resolution.

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 (2004b) 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 situation where aid flows tend to be initially similar to pre-conflict levels and to taper out over the course of the decade. Adam et al. (2008), on the other hand, indicate that post-conflict aid stimulates the demand for money directly, by substituting for seigniorage, and indirectly, by restoring income growth and supporting a modest portfolio shift in favor of domestic money. However, the recovery in the demand for money is slow and inflation is not likely to decline rapidly if government financing remains high. Consequently, post-conflict countries are likely to experience explosive inflation unless foreign aid is available to finance fiscal imbalances and help reestablish the pre-conflict equilibrium level of inflation.

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. (2008) 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 sources 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, in particular on sustained growth and macroeconomic stability. Although there is an ample 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, export expansion and low inflation. 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 questions are studied in this paper: (a) which exchange rate regime is more conducive to fast and high post-conflict economic growth?; (b) does export growth depend on the choice of the monetary and exchange rate regimes; (c) which exchange regime allows for easier monetization after conflicts and thus to regain normal operations of monetary policy; and, do the different monetary and exchange rate regimes allow for different speeds in achieving macroeconomic stability (e.g., low inflation)?,

### **3. Stylized Facts**

We review the empirical evidence on the macroeconomic performance of economies with significant armed conflicts to validate previous finding 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 do 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 actually occurred at different periods of time. The econometric analysis in Section 4 overcomes this limitation.

**Table 1**  
**Countries, duration, and dates of conflicts**

<u>Africa</u>	<u>Latin America</u>	<u>Asia</u>
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)	<u>Mid. East &amp; N. Africa</u>	
Rwanda (1991-1994)	Algeria (1991-2008)	
Senegal (1989-1997)	Egypt (1994-1997)	
Sierra Leone (1991-2001)	Iran (1978-2008)	
South Africa (1976-1988)	Morocco (1975-1989)	
Sudan (1982-2002)	Syria (1979-1982)	
Uganda (1978-1986)		
Zimbabwe (1974-1979)		

Source: Own elaboration based in data from PRIO and Elbadawi et al. (2008).

<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.

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>.

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

	Non Conflict Countries	Conflict Economies				
		During conflict	Five years before start of conflict	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

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

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\$.

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

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 percent 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 effected substantially in long-duration conflicts, labor productivity growth is very low for prolonged periods of time (14 years on average).

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

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<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).

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 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 which, in the cases of countries with fixed and intermediate exchange rate regimes, approaches the level of non-conflict emerging economies. Floating exchange regimes lag behind. 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.

**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
Dollarization <sup>g</sup>	0.19	0.35	0.29	0.13	0.23	0.43

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

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, (f) annual change in real US\$ and (g) deposit dollarization over total deposits ratio; n.a. indicates less than five observations.

One issue that remains unaddressed is that of currency substitution. Agents living in economies that undergo dramatic events (hyperinflation, financial collapse, or civil wars) usually defend their financial assets by holding foreign currency. As discussed by Feige (2002) the existence of a typically unknown amount of foreign currency in circulation makes the outcome of domestic monetary policy uncertain. The effective money supply may be much larger than the domestic money supply and be subject to endogenous behavioral responses reflecting currency substitution on the part of the public. Eichengreen and Hausmann (1999) note that the market for domestic government debt may be completely missing in highly dollarized countries, with adverse consequences for government financing and economic growth. On the other hand, dollarization will tend to dampen government efforts to employ inflationary finance to impose implicit taxes on domestic monetary assets. As shown in Table 3, dollarization in fixed exchange rate regimes did not change markedly between the pre and post-conflict period. In floating exchange regimes dollarization increased substantially while in intermediate regimes it declines significantly.

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 for 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).

**Table 4**  
**Exchange rate systems before and after conflicts**

		After conflict			<b>Total</b>
		Fixed	Intermediate	Floating	
Before conflict	Fixed	12	2	4	<b>18</b>
	Intermediate	2	14	3	<b>19</b>
	Floating	0	1	2	<b>3</b>
	<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).

#### 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 economic growth, inflation, money demand and export growth. We then extend these models to consider the role of exchange and monetary regimes in conflict economies.

We estimate a series of dynamic panel-data models of per capita GDP growth rates, inflation money holdings and exports 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 identify 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:

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

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 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

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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.

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 policy area is related to *financial depth*. Well-functioning financial systems promote long-run growth as they facilitate risk diversification, help identify profitable investment projects and mobilize savings to them. Our measure of financial depth is the ratio of the deposit bank assets to those of the central bank. The third 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 fourth 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 fifth 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 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, 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. Moreover, 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. Collier and Hoeffler, 2004b).

## 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 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 apply 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). Foreign aid, as suggested by Collier and Hoeffler (2004b), play a significant role in supporting economic growth but we also find evidence that 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. (2008), 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,

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

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, 2007)<sup>11</sup>.

**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.

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 affect growth in a systematic way. This is not surprising as economic theory and

<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.

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:

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

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 in 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 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.

**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.

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\$):

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

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 overheated 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 governments can promote exports, it can also become a heavy burden if it imposes high taxes, distorts markets incentives, and maintain 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 their 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 and government consumption would promote higher export growth as well as better infrastructure. 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.

**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*RERundervaluation*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.

It is precisely the latter observation which prompted us to extend our model to include interactions terms aiming 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.

### 4.3 Money Holdings

As discussed before, civil war reduces GDP growth by around 2 percent over a period of seven years. Hence, the demand for money is likely to be reduced for a prolonged period both directly, as a result of the fall in income, and indirectly, as a result of the attempts of agents to protect assets from the ravages of war through capital flight. The decline in the demand for money reduces seigniorage and exacerbates the difficulties of governments to finance expenditures, which are typically heightened by military spending. As noted by Adam et al. (2008), seigniorage is strategic, both because as revenue of last resort it reveals government preferences and because the ability to raise it reflects the degree of confidence of private actors in a fundamental government commitment. While the restoration of the demand for money is beyond the capacity of the typical post-conflict government, it is both an important objective in itself and a useful indicator of the broader restoration of confidence.

We use a very simple demand for real money based on the following specification:

$$\log M_{it} = \alpha' \log SV_{it} + \beta' AC_{it} + \gamma_j AID_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where  $M$  is money (as % of GDP),  $SV$  are scale variables (e.g., the log of real GDP),  $AC$  are variables representing the alternative cost of holding money,  $AID$  is foreign aid flow (as % of GDP) and parameters  $\mu$ ,  $\lambda$ , and  $\varepsilon$  represent country-fixed effects, time-fixed effects and innovations, respectively.

## Money Determinants

The choice of money is not innocuous. Narrow money definitions (such as M1) tend to produce highly unstable econometric estimations in particular in dollarized economies, as reported in several studies (see Elbadawi and Schmidt-Hebbel, 2008; Oomes and Ohnsorge, 2005; Feige, 2002). Broad money demand estimations –including foreign cash holdings— tend to be more stable but also tend to become less representative of domestic monetary policies. Regarding the selection of the appropriate scale variable, standard portfolio theory of asset demands suggests using financial wealth while transaction theories of money would indicate the use of flow variables such as real GDP or real private consumption. Data availability forces us to use real GDP as the main scale variable, which we complement with population to allow for the possibility that the per-capita income elasticity of the demand for money deviates from 1.

The alternative cost of holding money would include both the CPI-based inflation tax and the pure alternative cost in terms of foregone interest. Domowitz and Elbadawi (1987) and Easterly et al. (1995) claim that in countries where financial assets are not good substitutes for cash balances or which experience high inflation, the rate of inflation is a dominant measure of the opportunity cost of holding money. Foregone interest, on the other hand, presents practical complications as the data on interest rates is scarce and usually contaminated with government controls, in particular in the 1970s and 1980s. We focus only in a measure of inflation tax, namely  $\pi_t/(1 + \pi_t)$ , which is theoretically consistent for discrete-time variables and therefore the most appropriate measure of the inflation cost of holding money (see Calvo and Leiderman 1992).

## Estimation Results

For our econometric estimation we use data for both M1 and M2 as percent of GDP for around 120 countries (650 observations). In Table 8, it can be seen that the estimated model for M1 in column (1) is an unlikely description of the data as the parameters are insignificant or have the

wrong signs. The instability of this specification do not reduce if interaction terms for the impact of aid flows and non-linear effects are included in the estimation, as shown in column (2).<sup>12</sup> On the contrary, the results in column (3) indicate that the model for broad money provides an economically sound description of monetization: the estimated coefficients for the scale variables (real GDP and population size) and aid flows are statistically significant and economically meaningful. The cost variable displays a negative sign as expected and is in line with other studies (Elbadawi and Schmidt-Hebbel, 2008). When conflict as well as post-conflict interaction terms are included in the estimation, our results indicate that the only non-linear effects arise from the aid channel, where aid flows allow the conflict and post conflict economy to maintain higher levels of monetization. On the contrary, there is no evidence of non-linear impacts from economic activity and/or inflation.

**Table 8**  
**Econometric Results: Monetary Holdings (% of GDP)**

Variable	Log M1 (% of GDP)		Log M2 (% of GDP)	
	(1)	(2)	(3)	(4)
<b>Standard Controls</b>				
<b>Real GDP</b> (in logs)	0.007 (0.028)	0.006 (0.028)	0.209 (0.02)***	0.203 (0.02)***
<b>Population</b> (in logs)	-0.190 (0.066)***	-0.205 (0.067)***	0.325 (0.06)***	0.305 (0.06)***
<b>Inflation</b> (log (1+inflation rate))	-0.052 (0.018)***	-0.052 (0.020)***	-0.095 (0.02)***	-0.095 (0.02)***
<b>Aid</b> (% of GNI, in logs)	-0.002 (0.002)	-0.002 (0.003)	0.798 (0.25)***	0.380 (0.29)
<b>Additional Controls</b>				
<b>Interaction 1: Conflict*Real GDP</b>		-0.002 (0.005)		-0.004 (0.005)
<b>Interaction 2: Conflict*Aid</b>		0.017 (0.006)**		0.009 (0.005)**
<b>Interaction 3: Conflict*Inflation</b>		0.066 (0.058)		0.043 (0.049)
<b>Interaction 4: Post Conflict*real GDP</b>		-0.011 (0.008)		-0.010 (0.006)
<b>Interaction 5: Post Conflict*Aid</b>		0.014 (0.004)***		0.013 (0.004)***
<b>Interaction 6: Post Conflict*Inflation</b>		0.015 (0.069)		0.023 (0.059)
<b>Constant</b>	1.667 (1.538)	2.006 (1.535)	-8.429 (1.00)***	-7.965 (1.01)***
<i>Serial correlation test of order 1</i>	-1.40	-1.79*	-0.92	-1.24
<i>Serial correlation test of order 2</i>	-0.07	-0.14	-1.41	-1.65

Note: Number of countries=117, number of observations=653, maximum number of instruments=44, time dummies and country dummies included. (\*,\*\*,\*\*\*)= significant at 90%, 95% and 99% confidence, respectively.

<sup>12</sup> Currency substitution could account for the instability of narrow-money demand functions as it could well be reflecting the fact that agents hold both domestic and external currency and can easily switch from one to the other. Consequently, monetary aggregates –such as base M1— would exhibit instability and unpredictability complicating monetary policy. On the other hand, currency substitution could explain the fact that monetization is equally strong under flexible and floating exchange rates after conflicts end. The data for dollarization is scarce and plagued with methodological shortcomings, in particular in conflict economies, which precludes us from undertaking an econometric test.

We now investigate the possible differences in monetization across exchange regimes and present the results in Table 9. Again, the model for M1 is not successful in providing an adequate description of the data: the estimated coefficients for aid and economic activity (real GDP) are not significantly different from zero, and that for population has an unexpected negative sign. The model for M2 is more consistent with the underlying data generating mechanisms: the estimated parameters are highly significant both statistically and economically and by being similar to those in table 8 they indicate that the estimation is robust. The results indicate that countries with polar exchange regimes do not see monetization decline during the civil conflicts, contrary to the conclusions by several authors. It is the countries with managed float regimes that suffer from de-monetization during civil wars as a result of the decline in external aid. However, the estimated conflict-growth interaction term for the case managed float is rather implausible, as it predicts monetization when the economy contracts. Inflation changes in conflict economies do not explain movements in monetization in any exchange regime.

After conflicts end, monetization again does not appear to be linked in a systematic fashion to economic activity in polar exchange regimes. However, in managed float economies monetization is lower after conflicts end, as indicated in the negative sign obtained for the estimated coefficient. On the contrary, our evidence indicates that aid flows induce higher degrees of monetization in post-conflict economies if they have set up fixed or managed float exchange systems. Finally, inflation taxes in post-conflict countries do have differential impacts on monetization. There are no perceivable effects in fixed exchange rate countries, reflecting both the stability of inflation rates in these economies (as reported in Table 3) and the fact that agents care only for total holdings of currency and not for their composition in terms of domestic and foreign monies. In countries with managed floating exchange rates, there has been a significant re-monetization of the economy as a result of the inflation decline that characterizes post-conflict periods. Contrarily, in economies with purely floating exchange systems, the decline in inflation has also been accompanied by a reduction of monetary holdings, perhaps as a reflection of the fact that in countries with managed float systems households maintain rather large fractions of their wealth in foreign currencies, perhaps due to doubts about the ability of these countries in controlling inflation in the absence of a credible anchor.

**Table 9**  
**Econometric Results: Monetary Holdings (% of GDP)**

	Log M1 (% of GDP)	Log M2 (% of GDP)
<b>Standard Controls</b>		
<b>Real GDP</b> (in logs)	0.006 (0.028)	0.206 (0.022)***
<b>Population</b> (in logs)	-0.205 (0.067)***	0.271 (0.052)***
<b>Inflation</b> (log (1+inflation rate))	-0.052 (0.020)***	-0.104 (0.017)***
<b>Aid</b> (% of GNI, in logs)	-0.002 (0.003)	0.003 (0.003)
<b>Additional Controls</b>		
<b>Interaction 1: Conflict*Real GDP</b>		
Fixed Exchange Rate	-0.007 (0.012)	-0.008 (0.012)
Managed Float Exchange Rate	-0.014 (0.007)**	-0.014 (0.007)**
Floating Exchange Rate	0.002 (0.089)	0.002 (0.089)
<b>Interaction 2: Conflict*Aid</b>		
Fixed Exchange Rate	-0.005 (0.009)	0.005 (0.009)
Managed Float Exchange Rate	0.033 (0.010)**	0.033 (0.010)**
Floating Exchange Rate	0.013 (0.033)	0.014 (0.033)
<b>Interaction 3: Conflict*Inflation</b>		
Fixed Exchange Rate	0.008 (0.107)	0.008 (0.107)
Managed Float Exchange Rate	-0.007 (0.072)	-0.007 (0.072)
Floating Exchange Rate	0.133 (0.2487)	0.133 (0.249)
<b>Interaction 4: Post Conflict*Real GDP</b>		
Fixed Exchange Rate	-0.007 (0.012)	0.005 (0.011)
Managed Float Exchange Rate	-0.014 (0.007)**	-0.045 (0.015)***
Floating Exchange Rate	0.002 (0.089)	0.032 (0.021)
<b>Interaction 5: Post Conflict*Aid</b>		
Fixed Exchange Rate	-0.005 (0.009)	0.015 (0.006)***
Managed Float Exchange Rate	0.033 (0.010)**	0.015 (0.005)***
Floating Exchange Rate	0.013 (0.033)	0.005 (0.029)*
<b>Interaction 6: Post Conflict*Inflation</b>		
Fixed Exchange Rate	0.008 (0.107)	0.114 (0.077)
Managed Float Exchange Rate	-0.007 (0.072)	-0.300 (0.155)**
Floating Exchange Rate	0.133 (0.248)	0.826 (0.455)*
Constant	2.188 (1.292)***	-7.547 (0.97)***
<i>Serial correlation test of order 1</i>	-2.02***	-1.59
<i>Serial correlation test of order 2</i>	0.18	-1.68

Note: Number of countries=117, number of observations=653, maximum number of instruments=56, time dummies and country dummies included. (\*,\*\*,\*\*\*)= significant at 90%, 95% and 99% confidence, respectively.

#### 4.4 Inflation

After the emergence of a consensus in the 1980s on the harmful effects of inflation, the last two decades have witnessed a marked reduction in inflation rates across the world. Empirical evidence collected from large cross-country analyses and numerous case studies indicated that the negative effects of high and variable inflation on macroeconomic stability, economic growth, and

income distribution largely outweigh the potential benefits derived from financing fiscal deficits through monetization. However, controlling inflation has not been an easy task and monetary policies have largely been coordinate to exchange regimes. Some countries have resorted to fixing the exchange rate in order to curtail the growth in nominal prices. Others have implemented harsh monetary policies under floating exchange rates. Calvo and Vegh (1999) study these stabilizations attempts and conclude that beyond an initial boost to economic activity, these policies tend to appreciate the currency –even when policies are credible—, raise interest rates, and worsen the current account and the balance of payments. It is thus useful to study the case of post-conflict economies that, in addition to the difficulties of post-war economic reconstruction, had to deal with substantial aid flows and/or currency misalignment.

Based on previous research on the determinants of inflation we posit an empirical dynamic model of the form:

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

where  $\pi_{it}$  is the annual inflation rate,  $X_{it}$  is a vector of fundamentals and, as before,  $\lambda_t$  is a period-specific effect,  $\mu_i$  represents unobserved country-specific factors, and  $\varepsilon_{it}$  is the regression residual. As in the previous section, we estimate a dynamic panel-data model of inflation using 500 observations from around 110 countries.

## Inflation determinants

With regards to the fundamentals, we follow De Brouwer and Ericsson (1998) and others and posit a cost based explanation for the long-run course of consumer prices in the countries of our sample, which we extend to consider the role of active monetary policies. We thus include variables reflecting the state of the aggregate demand (which we proxy using the real interest rate) and the cost of domestic vs. imported production goods (which we proxy using the real exchange rate).

We also include a dummy to recognize the effect of monetary policies with an explicit inflationary target. This relatively novel scheme for monetary policy conduct has been positively appraised by several studies. An early cross-country study by Corbo et al. (2002) conclude, on the basis of a variety of econometric models, that inflation-targeting countries perform consistently

better than the control group in terms of controlling inflation and, most importantly, without inducing additional volatility in output. Some 25 countries are inflation targeters in our sample.

In addition, since we work with a sample of heterogeneous countries with very different institutional frameworks, we control for more structural variables such as the level of development (which we proxy with per-capita GDP at PPP levels), the degree of openness of the capital account, and the depth of the financial sector. Finally, we include as a regressor the flows of foreign aid as ratio to the GDP, on the grounds that its presence influences aggregate demand and, evidently, inflation. Because we include time-specific dummies, we can effectively control for the world economic inflation and their transmission to each country's performance.

## Estimation Results

The results are collected in Table 10. In column 1, which corresponds to the baseline regression, indicate that inflation tends to decline —as expected— with higher degrees of development of the financial sector, higher openness of the capital account, tight monetary policy as reflected in a high real interest rate and when central banks adopt an inflation targeting scheme for monetary policy. Aid flows only have a very mild inflationary effect. Note that RER undervaluation (overvaluation) leads to higher (*lower*) inflation, which could be the result of the attempt by monetary authorities of using a rigid nominal exchange rate as a tool for stabilization. This latter observation prompts us to extend our base model to include dummy variables for testing whether exchange regimes make some difference on inflation levels. The results in column (2) indicate that countries with fixed or managed float exchange regimes tend to have lower inflation levels. Note also that at the same time the estimated coefficient for RER undervaluation is now insignificant. This would suggest that monetary authorities intervene in the foreign exchange market to control inflation even at the cost of incurring a currency overvaluation that, as discussed in the previous section, could be costly to economic recovery.

**Table 10**  
**Econometric Results: Inflation (annual %)**

	(1)	(2)	(3)
<b>Standard Controls</b>			
<b>Initial Real GDP per capita</b> (in logs)	0.467 (0.164)***	0.295 (0.154)*	0.293 (0.154)*
<b>Capital Account Openness</b> (Ito-index)	-0.209 (0.049)***	-0.149 (0.047)***	-0.154 (0.046)***
<b>Inflation Targeting</b> (Dummy)	-0.450 (0.195)**	-0.521 (0.179)***	-0.504 (0.176)***
<b>Real Interest Rate</b> (% <sub>t</sub> , ex-post)	-0.957 (0.404)***	-1.138 (0.371)***	-0.646 (0.387)
<b>Financial Development</b> (log private credit)	-0.513 (0.169)***	-0.362 (0.158)**	-0.371 (0.159)**
<b>Additional Controls</b>			
<b>RER undervaluation</b> (log dev. from HP trend)	0.022 (0.012)*	0.008 (0.012)	0.024 (0.012)**
<b>Aid</b> (% of GNI, in logs)	0.020 (0.011)*	0.013 (0.010)	0.012 (0.011)
<b>Exchange Regime</b>			
Fixed Exchange Rate		-1.419 (0.511)***	-1.405 (0.505)***
Managed Float Exchange Rate		-0.999 (0.493)**	-0.945 (0.487)***
Floating Exchange Rate		0.210 (0.474)	0.182 (0.466)
<b>Interaction 1: Conflict*Aid</b>			
Fixed Exchange Rate			0.050 (0.023)**
Managed Float Exchange Rate			-0.005 (0.026)
Floating Exchange Rate			0.578 (0.360)*
<b>Interaction 2: Conflict*RER undervaluation</b>			
Fixed Exchange Rate			0.026 (0.064)
Managed Float Exchange Rate			-0.038 (0.052)
Floating Exchange Rate			0.044 (0.073)
<b>Interaction 3: Post Conflict* Aid</b>			
Fixed Exchange Rate			-0.015 (0.014)
Managed Float Exchange Rate			0.000 (0.015)
Floating Exchange Rate			-0.647 (0.262)***
<b>Interaction 4: Post Conflict* RER undervaluation</b>			
Fixed Exchange Rate			-0.058 (0.080)
Managed Float Exchange Rate			-0.024 (0.055)
Floating Exchange Rate			-0.554 (0.489)
<b>Constant</b>	-6.093 (1.482)***	-3.802 (1.497)**	-3.439 (1.48)**
<i>Serial correlation test of order 1</i>	-5.66 ***	-5.54***	-5.56***
<i>Serial correlation test of order 2</i>	-0.79	-0.76	-0.38

Note: Number of countries=107, number of observations=498, maximum number of instruments=54, time dummies and country dummies included. (\*, \*\*, \*\*\*)= significant at 90%, 95% and 99% confidence, respectively.

We supplement to our previous specification with interaction terms with the aim of studying the existence of differential indirect effects of fundamentals in the conflict and post conflict periods. We concentrate again on the impact of the inflationary impact of RER undervaluation when compounded with aid flows. The specification is thus:

$$(4) \quad \pi_{it} = \alpha\pi_{it-1} + \beta' X_{it} + \gamma D_j + \theta_j D_j RERunderval_{it} + \varphi_j D_j AID_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

The results in column 3 of Table 10 indicate that there is evidence to support the notion that external aid during conflicts has an inflationary impact on economies with polar exchange regimes, even if one controls for the eventual overvaluation (negative undervaluation) of the currency induced by aid flows (interaction 1). From an economic viewpoint, nevertheless, only the effect in countries with floating exchange rates is significant. Note also that there are no indirect effects of RER undervaluation, as all coefficients in the interaction 2 are insignificant. On the other hand, external aid given to countries with floating exchange regimes after conflicts end, tend to support stabilization efforts as indicated in the negative estimated coefficient in interaction 3 of Table 10.

## 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 and restoring macroeconomic stability. 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%. The same story carries over to the re-monetization of private economic activities and inflation. While inflation was in single digits under the fixed and floating regimes, it was more than 16% under the floating regime. Also, while the share of domestic credit to the private sector reached more than 20%age points of GDP under the two former regimes, it was less than 16% under the latter.

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 require formal modeling of the marginal contribution of the three regimes in fully specified models of the four pivotal macroeconomic variables: per capita GDP and export growth, the demand for money balances and inflation. 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 four macroeconomic 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 and the demand for money, but the free floating regime has a significantly negative effect on export, while both of the fixed and managed regimes have direct stabilizing effects on inflation.

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 40) 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.

Fourthly, aid was found to help restore the post-conflict demand for broad money (M2) under all three regimes, while it would promote the demand for narrow money (M1) only under the managed and floating regimes. Instead, aid was found to have a deleterious effect on the M1 demand for the case of fixed regime.

Finally, aid has no direct effect on post-conflict inflation under the fixed and managed regimes, while it was found to have a stabilizing impact under the floating regime.

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 and inflation; 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 and helps restore the demand for money balances. 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. Moreover, also because it promotes the demand for money under managed float, the monetary reconstruction role of aid (a-la Adam et al, 2008) is likely to be more effective under this exchange rate regime. The indirect impact of aid under managed float is important because aid was not found to have a direct effect on inflation under the two less flexible regimes, while it tends to directly reduce inflation under the floating 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, 2007). This is explained by 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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Appendix Table 2  
Main Macroeconomic Indicators of Short and Long Term Conflict Economies

	All Conflicts	Short Duration Conflicts	Long Duration Conflicts
<b>Economic Growth</b> (annual change in real GDP per capita)	0.3	-2.8	1.0
<b>Labor Productivity Growth</b> (real GDP at PPP Prices per worker)	0.1	-2.0	0.4
<b>Annual Inflation Rate</b> (for the median country)	11.5	9.7	11.3
<b>Money</b> (M2 as percent of GDP)	106.5	451.7	32.8
<b>Domestic Credit to Private Sector</b> (average, as percent of GDP)	25.3	18.0	26.9
<b>Government Revenue</b> (average, as percent of GDP)	18.9	14.0	20.0
<b>Military Expenditures</b> (average, as percent of GDP)	3.2	2.7	3.3
<b>Exports</b> (average, as percent of GDP)	23.3	22.7	23.5
<b>Merchandise Trade</b> (average, as percent of total exports)	40.0	38.3	40.3
<b>External Aid</b> (average, as percent of GDP)	5.5	8.9	4.7
<b>Foreign Direct Investment</b> (average, as percent of GDP)	1.4	1.0	1.5

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

## 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 (ICRG)</i> .

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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 population 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).
Money M1	Currency and demand deposits outstanding at the end of the year as percentage of GDP.	International Financial Statistics.
Money M2	M1 plus currency and demand deposits outstanding at the end of the year.	International Financial Statistics.
Price Level	End-of-year consumer price index (CPI).	World Development Indicators (2009).
Interest Rate	Nominal interest rate offered for demand deposits, end-of-period.	International Financial Statistics.
Nominal Exchange Rate	End-of-period nominal exchange rate, local currency per US\$ dollars.	International Financial Statistics.
International Interest Rate	LIBOR nominal interest rate.	Author's calculations, based on data from International Financial Statistics.
Period-specific shift	Time dummy variable.	Authors' construction.

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## Appendix B: Countries included in the sample

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