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## Are Remittances Conflict-Abating in Recipient Countries?

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## Abstract

This paper represents the first attempt to formalise the relationship between remittances inflow and social violence by developing a model which predicts that migrants' remittances would lead to the reduction of social conflict in the recipient economy under the condition that remittances increase the average product of labour. Using homicides data as an indicator of social violence, we test our model's prediction. Duly controlling for the endogeneity problem using appropriate instruments, we find that remittances tend to reduce social violence. We perform sensitivity analysis on remittances in the empirical model and find it robust with an unchanged negative sign.

## Keywords

remittances
international migration
social conflict
homicide
social violence
economic development

## JEL Classification

O17; F22; F24; D74.

## 1. Introduction

Remittances by immigrant workers are an important source of funds for many developing countries and their inflows have been rapidly growing. Analyses of World Bank data have confirmed a number of broad generalisations based on statistical calculations: During 2007 and 2008, the growth rate in remittances was 15 percent[1].

The ratio of remittances to GDP exceeds one percent in 60 countries. A significant proportion of these inflows are for altruistic reasons to support consumption and the living standards of family members, some are also motivated by pecuniary gains and take advantage of the incentives offered by the recipient countries. Migrants making remittances out of altruism have a strong desire to compensate their members of the households in order to offset or prevent income shortfalls due to negative impacts of economic fluctuation or external shocks in the home country. In this sense remittances motivated by altruism can be seem as compensatory transfers indicating remittances tend to increase when the recipient country is in relative recession and decrease when the origin country has above trend relative income which leads to the hypothesis that remittances exhibit countercyclical behaviour. Chami *et al.* (2005, 2008) have found support for this hypothesis in a large panel of countries which is complemented by Mishra (2005) who has found remittances to be countercyclical in Caribbean countries and Sayan (2006) who finds similar evidence in low and lower-middle income countries.

The countercyclicality of remittance flows leads to the hypothesis of smoothing. Using a large data set on bilateral remittances Frankel (2011) has shown that remittances tend to smooth consumption and investment intertemporaly. As a result of this consumption and investment smoothing effect, remittances can reduce economic fluctuations in the recipient economies. Chami *et al.* (2008, 2009) have shown that remittances do act as automatic output stabiliser and reduce output volatility. Yang and Choi (2007) using micro data have examined whether remittances sent by overseas migrants respond to income shocks experienced by Philippine households. They exploit rainfall shocks as instrument variables to capture the exogenous variation for income changes and find that in households with overseas migrants income shocks cause remittances receipts to change in the opposite direction. This finding is consistent with the hypothesis that remittances act as an insurance reducing income volatility and smoothing consumption. In addition, for a cross-section of countries, Combes and Ebeke (2011) have provided further evidence in favour of smoothing by showing that remittances tend to

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[1] Ratha *et al.* (2009). Barajas *et al.* (2009) and Chami *et al.* (2008) have reported that during 2007 remittances through official channels were $300 billion in addition to unknown transfers through unofficial channels, which are estimated to be about 40 percent of flows through the official channels.

significantly reduce consumption instability besides being a hedge against shocks arising from natural disaster, agricultural production or financial crises that could be sources of consumption volatility.

Other than those outlined above, several studies have been undertaken to investigate socio-economic impact of remittances. These studies have found multidimensional effects of remittances inflow on various outcome variables. For example, remittances contribute to the reduction of poverty, alleviation of credit constraint, improvement in the educational and health outcome of the recipient households (for details see Adams and Page 2005, Gupta, Pattillo and Wagh 2009, Hanson and Woodruff 2003, Cox-Edwards and Ureta, 2003, Frank and Hummer 2002 and Hildebrant and Mckenzie 2005).

It is important to stress that none of these studies have investigated the impact of remittances on political or social conflict. Since remittances are an outcome of migration which is sometimes prompted by conflict in the home country, there may exist a causal link between these two variables. Lindley (2009) using data from Somalia has shown that compared to peaceful setting remittances behaviour is different in a conflict afflicted area, however she does not formalise a connection between conflict and remittances flow.

The motivation of this paper is to develop a theoretical framework to formalise the relation between remittances and conflict and establish a unidirectional causal link between them using appropriate empirical strategy.

There are multiple hypotheses regarding the central causes of violent conflict. One set of theories stresses the role that political repression in driving conflict. The other set of theories focuses on economic conditions as paramount, rather than political factors. According to this view poverty and falling income are key to engender civil conflicts (Collier and Hoeffler 2002). In a seminal paper, Miguel, Satyanath, and Sergenti (2004) show that drop in per capita income due to economic shocks increases the likelihood of a civil conflict in the following year by nearly fifty percent. This finding highlights the pivotal role that income volatility has played in generating armed violence.

Since remittances can lead to the reduction in income volatility our research question is: Are inward flows of remittances conflict abating in the recipient countries? Our hypothesis is that inflow of remittances does lower the extent of social conflict at the cross-country level.

The intuition behind our hypothesis is that remittances received by the households in the source countries can increase the average product of labour in the

overall economy through the act of investment in small businesses by the recipient households and also through the increases that are documented in the health and educational outcome of migrant families. This leads to a positive impact in terms of employment and wages in the overall labour market and thus lowers the incentive for people to engage in conflict. Our hypothesis is formalised in later section through a model that we develop to show the interaction between remittances and conflict followed by an empirical specification where we test our hypothesis. To check the robustness of the empirical results, we use the extreme bounds analysis (EBA) of Leamer (1983, 1985) to undertake a sensitivity analysis of remittances in explaining the variable conflict. Estimates based on the EBA reduce model uncertainty and are claimed to be robust. EBA is especially useful when there are several potential explanatory variables and it is necessary to select a few robust explanatory variables.

The paper is structured as follows. Section 2 reviews the literature on the determinants of social conflict within the political and socio-economic context. Section 3 presents our theoretical model. The empirical model is specified and results are presented in section 4. A brief discussion of EBA and the resulting estimation is presented in Section 5. Section 6 concludes.


## 2. Social Conflict: Political and Socio-Economic Context

In recent years there has been much on-going research to understand the nature, causes and consequences of organised political violence such as civil war. On the contrary there have been few cross-country studies to understand the causes and consequences of interpersonal violence, aka 'social' violence which is to be understood as act of violence between individuals or small groups of individuals without any attempt to contest the state's authority (Fox and Hoelscher 2012). Examples of such violence are inclusive of assault, murder, gang violence and communal violence. Since individuals living in a geographical boundary are bound by political, social and economic conditions, all of these can be theoretical determinants of social conflict. At the political level, a hybrid political regime – a regime in between full autocracy to full democracy – can increase the likelihood of political instability and conflict (see, for example, Gates *et al.* 2006, Goldstone *et al.* 2010). In addition, LaFree and Tseloni (2006) and Eisner (2001) have both found a link between political regime and homicide rate. The latter found an inverted-U shaped relation where homicides rates declines both in absolute autocracy and in full democracy but increase in hybrid regimes. Barros *et al.* (2013a,b) show that land conflicts in Brazil are a state-based phenomenon led by left wing groups with left wing government's support.

Turning to socio-economic conditions determining violence the most important variables identified in the political and social violence literature are inequality and poverty. While some studies have found correlation between poverty and political violence (Collier and Hoeffler 2004) and between inequality and low-level conflict (Alesina and Perotti 1996), the connection between gross inequality and political violence remains less robust. In contrast, these variables seem to be robust determinants of social violence. There is evidence such as poverty being associated with higher levels of less violent property related crimes whereas inequality is being more strongly correlated with violent crimes such as assault and homicide (Thorbecke and Charumilind 2002). In addition to these two variables, ethnic dominance and ethnic fractionalisation have been found to escalate civil conflict (Collier and Hoeffler 2004 and Hegre and Sambanis 2006).

Apart from the political and socio-economic factors discussed above, some variables have been found important determinants of social conflict. The first is demographic related to population age structure. An unusually high proportion of young persons in the adult population – phenomena of 'youth bulge' – can lead to political instability and violence (Goldstone 2002). The second is rate of urbanisation creating confrontation between individuals and groups competing for scarce resources (Cole and Gramajo 2009). Finally countries at war experience higher rates of social violence (Archer and Gartner 1984) because war deteriorates country's law and order enforcement. In addition, it is also reported that countries that produce illegal drugs or serve as transhipment hub unlawful narcotics are likely to experience more violence in terms of higher homicide rates (Fajnzylber, Lederman and Loayza 2000).

The studies reviewed above give an outline of the political and socio-economic determinants of conflict. To our knowledge there is no study which explicitly refers to the role of remittances in conflict. However, Lindley (2009) addresses the question how the inflow of remittances is related to violence and policy instability. Although the paper does not consider the conflict abating role of remittances inflows, it does point out that these two variables are related and shows that remittance dynamics in conflict situations differ from those in more peaceful settings.

In this paper we establish a direct link between remittances and conflict. However, inflow of remittances can also be indirectly linked to social violence. For instance, incidence of poverty and existence of economic inequality have been characterised as major and robust determinants of social violence (Thorbecke and Charumilind 2002). Remittances have been found to cause reduction in both poverty and inequality. Page and Plaza (2006), for example, find that remittances allow the recipients to meet consumption expenditure over and above the subsistence level

and thus reduce poverty. Quarterly and Blanson (2004) also shows that remittances are contercylical flows which is inversely proportional to economic shocks and therefore reduce household poverty. Although there is a consensus that remittances reduce poverty, there is some conflicting evidence regarding the its impact on inequality. McKenzie and Rapoport (2004) find that remittances have decreased inequality in Mexico while Adams (2005) reports that they increased inequality in Ghana and De and Ratha (2005) document a decrease in inequality in Sri Lanka due to remittances.

In this article we seek to explain social conflict in a cross-country setting by bringing in an important variable – remittances – which has been overlooked in prior studies. The overarching contribution of our paper is that of policy. Since the conflict escalating variables which are found robust in previous literature are mainly institutional in nature, there is little scope to device conflict reduction policy even in the medium term. In contrast we establish a direct link between conflict and remittances and provide evidence in favour of this. Our framework is thus suitable to providing counter-conflict policy within the short to medium term time frame.


### 3. The Model

In order to relate remittances with conflict we construct a simple model which highlights the importance of emigration for job creation and explore the role of conflict on emigration, job market and employment dynamics.

The model is an extension to that developed by Mancellari *et al*. (1996) and Léon-Ledesma and Piracha (2004). They used Aghion and Blanchard (1994) model of economic transition as baseline model. Mancellari *et al.* (1996) and Léon-Ledesma and Piracha (2004) introduced migration into Aghion and Blanchard (1994) model and analysed the condition for a rise in the rate of emigration to increase job creation.

It is assumed that an individual can be either employed or unemployed. The option for the unemployed is to remain in the country or emigrate. If the unemployed remains in the country he can earn unemployment benefits, *B*. If he migrates he finds a job and earns wages *W\**. The emigration decision incorporates any cost, including temporary unemployment in the destination region.

A fraction *a* of the unemployed *U*, emigrate *E*, the remainder (1-*a*) remain in the country:

$$E = a(C)U \tag{1}$$

In (1) it is assumed that if there is conflict $C$, in the country, conflict may accelerate the decision to emigrate, so we assume that the share $a$ is an increasing function of conflict $C$:

$$a(C) = \theta C \qquad\qquad 0 < \theta C < 1 \qquad\qquad (2)$$

Job creation $H$, depends on the gap between the average product of labour $Y$, and the cost of labour to the firm, which comprises the wage rate $W$, and taxes per employee $T$:

$$H = \alpha(Y - W(C) - T) \qquad\qquad (3)$$

Following Mancellari *et al.* (1996) and Léon-Ledesma and Piracha (2004) we assume that emigrants save part of their earnings and send them as remittances to finance and build up businesses at home. In addition we assume that migrants send remittances as compensatory transfer to raise the health and educational outcome of their family members. Remittances, as a consequence, affect positively domestic average product:

$$Y = Y'(C) + \beta a(C)W * \qquad\qquad (4)$$

In Eqs. (3) and (4), it is assumed that the average product of labour in absence of emigration $Y'$, and domestic wage rate $W$, are negatively affected by conflict since conflict has disruptive impacts on the labour market:

$$Y'(C) = y(1 - z_1 C) \qquad\qquad (5)$$

$$W(C) = w(1 - z_2 C) \qquad\qquad (6)$$

where $0 < z_1 < 1$, $0 < z_2 < 1$.

Using (2), (4), (5) and (6) we can rewrite the equation for job creation (Eqs. (3)) as:

$$H = \alpha(y(1 - z_1 C) + \beta\theta C W * - w(1 - z_2 C) - T) \qquad\qquad (3')$$

The value function for an unemployed person can be written as:

$$rV_U = (1 - \theta C)B + \theta C W * + \frac{H}{U}(V_N - V_U) + \frac{dV_U}{dt} \qquad\qquad (7)$$

where $V_U$ is the value of being unemployed $V_N$ is the value of being employed $r$ is the interest rate $H$ is job creation and $W*$ is the wage earned by emigrants abroad. In Eq. (7), the rate of return of unemployment is equal to the sum of the expected return of unemployment

this period ($(1-\theta C)B + \theta CW*$), the difference between the value of being employed and of being unemployed [which is assumed positive and constant], $k \equiv V_N - V_U > 0$, weighted by the rate of outflow from unemployment $\dfrac{H}{U}$, and the change in the value of being unemployed through time $\dfrac{dV_U}{dt}$.

In the same vein, the value function for the employed person is given by:

$$rV_N = W(C) + \frac{dV_N}{dt} \tag{8}$$

The wage equation is derived by subtracting Eq.(7) from Eq.(8) yielding:

$$w = \left[ (1-\theta C)B + \theta CW* + k\left( r + \frac{H}{U} \right) \right](1-z_2 C)^{-1} \tag{9}$$

It is worth noticing that when conflict is greater than a given threshold level it is useful to think that basic functions of the government vanish, such as taxation and distribution of unemployment benefits. Therefore without loss of generality we assume that T=0, and B=0.

Substituting Eq. (9) into Eq. (3'), taking into account that T=0, and B=0, yields:

$$H = \frac{\alpha U}{U + \alpha k}[y(1-z_1 C) - (1-\beta)\theta CW* - rk] \tag{10}$$

Rewriting Eq. (10) for conflict yields:

$$C = \frac{\left[ y - H\left( \dfrac{U + \alpha k}{\alpha U} \right) - rk \right]}{z_1 y + (1-\beta)\theta W*} \tag{11}$$

The impact of remittances, $\beta\theta W*$, on conflict is:

$$\frac{\partial C}{\partial \beta\theta W*} = \frac{\left[ y - H\left( \dfrac{U + \alpha k}{\alpha U} \right) - rk \right]}{[z_1 y + (1-\beta)\theta W*]^2} \tag{12}$$

Remittances have a negative impact on conflict, $\dfrac{\partial H}{\partial \beta \theta W^*} < 0$, if the following two conditions are fulfilled:

(a) $y - H\left(\dfrac{U + \alpha k}{\alpha U}\right) - rk < 0$

(b) $z_1 y + (1 - \beta)\theta W^* < 0 \Rightarrow \beta > 1 + \dfrac{z_1 y}{\theta W^*}$

Note that for remittances to have impact on conflict, there must be conflict, that is, C>0. Conditions (a) and (b) guarantee that C>0. It is important to stress that condition b) implies that $\beta$ >1, which is the same condition in Mancellari *et al.* (1996) and Léon-Ledesma and Piracha (2004) for migration to have a positive impact on the labour market, increasing the average product of labour and generating investment and human capital formation through remittances.

Therefore our result that remittances reduce conflict is consistent with the findings of Mancellari *et al.* (1996) and Léon-Ledesma and Piracha (2004) that migration has a positive impact on the source country labour market.

## 4. Empirical Analysis

Our model presented in the last section predicts that inward flows of remittances would reduce conflict but mainly under one condition. The condition that would ensure remittances reduce conflict is migrants' remittances raise the average product of labour in the source country and thereby increase income causing a positive impact in overall labour market.

To test prediction of our model, we measure conflict following Fox and Hoelscher (2012) as social violence proxied by number of deaths due to intentional injury per 100,000 population. The data estimated by the WHO's Global Burden of Disease Project (WHO, 2004, 2008). So far WHO has produced the violence related deaths data for 191 countries for two years – 2002 and 2004. We use 160 countries from this data base by collapsing the database into pure cross-section including the average for these two years[2].

In order to test the prediction of our theoretical model we estimate the following econometric specification:

$$Confict_i = \alpha_i + \beta_1 \times \text{Re} m \, \text{it} + \mathbf{X}_i' \times \beta_2 + \varepsilon_i \qquad (13)$$

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[2]  In the regression some countries are dropped due to lack of data in other variables.

where *Conflict* represents social conflict defined logged number of deaths due to intentional injury per 100,000 population. The explanatory variables include *Remit* (our variable of interest) representing logged remittances inflow in USD and some other important determinants of social conflict found significant in the literature.

The vector **X** controls for these political and socio-economic determinants of social conflict discussed in Section 2. These include a variable to measure the hybrid political regime (*Hybrid*); ethnic fractionalisation (*Ethnic*); logged number of deaths due to war (*War*); gross Gini coefficient as a measure of inequality (*Gini*) and a dummy if the country is drug producing (*Drug*). The same regression is re-estimated including regional dummies in order control for the unobserved regional fixed effects.

We provide estimate of (13) using ordinary least square (OLS) at first but also note that there could be an identification issue which may arise from the possibility that the onset of conflict might as well serve as an indicator of political instability and thus could be reducing the flow of remittances. We control for this reverse causality by using suitable instruments that capture the exogenous variations in remittance. Our main interest lies in the estimated sign of the variable *Remit* and according to our hypothesis we expect $\beta_1$ to be negative and significant.

We begin with a graphical representation of our data, a scatter plot between *Conflict* and *Remit*. All variables in our analysis are averaged for 2002 and 2004. Therefore the scatter plot is produced by average values. We have included a linear trend to identify the type and degree of relationship these two variables possess albeit without controlling for any other factors. This is presented in Figure 1.



Figure 1
Remittance and Social Violence
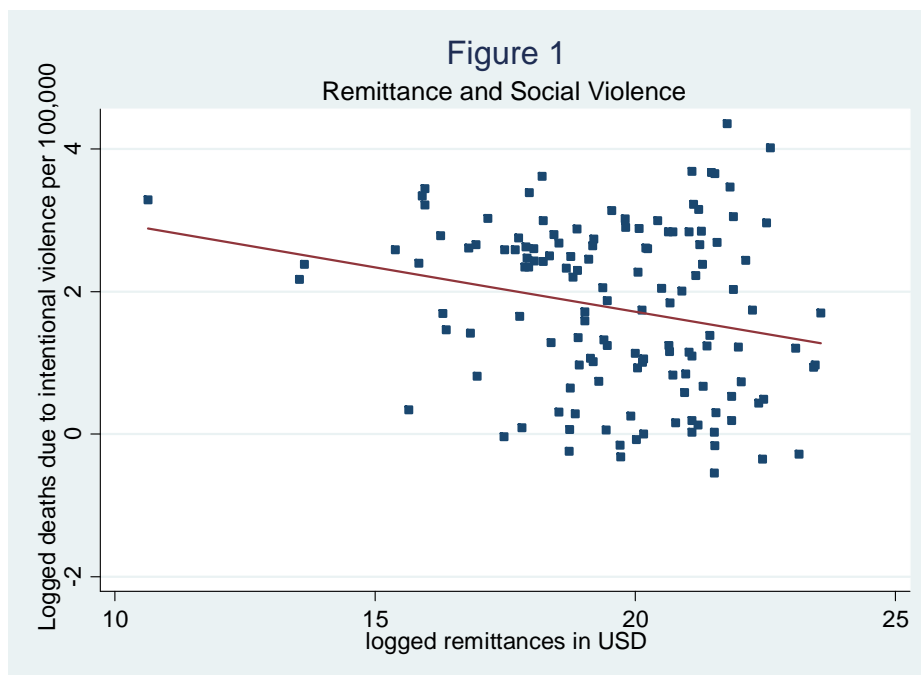
Following the discussions in the previous section we now present our empirical findings on the effect of remittances on social violence controlling for the other political and social-economic factors. The results are summarised in Table 1.

**Table 1. Remittances and Social Violence**
Dependent Variable:
The number of logged deaths due to intentional injury per 100,000 population (*Conflict*)

| | OLS | | IV-2SLS | | LIML |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| *Remit* | -0.054 | -0.021 | -0.185 | -0.196 | -0.296 |
| | (-1.56) | (-0.61) | (-2.01)** | (-2.27)** | (-1.90)* |
| *Gini* | 0.071 | 0.049 | 0.061 | 0.042 | 0.045 |
| | (7.25)*** | (3.79)*** | (5.52)*** | (2.97)*** | (2.48)** |
| *Ethnic* | 1.345 | 1.087 | 0.804 | 0.501 | 0.453 |
| | (4.08)*** | (3.08)*** | (2.15)** | (1.31) | (0.98) |
| *Hybrid* | -0.009 | -0.030 | 0.452 | 0.562 | 0.472 |
| | (-0.70) | (-2.05)** | (2.15)** | (2.64)*** | (1.78)* |
| *Drug* | 0.022 | -0.193 | 0.219 | 0.135 | 0.221 |
| | (0.11) | (-0.79) | (0.93) | (0.53) | (0.76) |
| *War* | 0.441 | 0.487 | 0.360 | 0.354 | 0.318 |
| | (3.43)*** | (3.70)*** | (2.62)*** | (2.50)** | (1.73)* |
| EAP | | -0.024 | | 0.268 | 0.303 |
| | | (-0.09) | | (1.02) | (1.02) |
| LAC | | 0.733 | | 0.482 | 0.400 |
| | | (2.22)** | | (1.42) | (0.99) |
| MENA | | -0.650 | | -0.425 | -0.341 |
| | | (-2.16)** | | (-1.43) | (-0.99) |
| SA | | -0.075 | | 0.175 | 0.356 |
| | | (-0.19) | | (0.41) | (0.68) |
| SSA | | 0.454 | | 0.496 | 0.409 |
| | | (1.67)* | | (1.75)* | (1.12) |
| Cons | -0.557 | -0.305 | 2.312 | 3.091 | 5.058 |
| | (-0.68) | (-0.38) | (1.17) | (1.77)* | (1.63) |
| Obs | 110 | 110 | 110 | 110 | 110 |
| Adjusted-$R^2$ | 0.57 | 0.61 | | | |
| Centered-$R^2$ | | | 0.53 | 0.58 | 0.45 |
| Root MSE | 0.75 | 0.72 | 0.79 | 0.74 | 0.85 |
| Cragg-Donald *F* | | | 2.932 | 3.098 | |
| Kleibergen-Paap *F* | | | | | 3.036 |
| Sargan stat: $\chi^2(5)$: p –value: | | | 0.323 | 0.187 | |
| Hansen J stat: $\chi^2(5)$: p –value: | | | | | 0.583 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$. *t* statistics in parenthesis. For *LIML* estimations in column in column (5) robust standard errors.

The results in Table 1 show the OLS estimates in the first two columns. We can see that in (1) that the coefficient on Remit is negative indicating a possible negative association between remittances flows and conflict. However, this estimate is not significant at conventional level. The other control variables which include *Gini* as proxy for economic inequality and *Ethnic* to proxy for ethnic fractionalisation, have the signs expected from the literature although *Hybrid* which is a categorical variable representing the hybrid political regimes in between full autocracy and full democracy has a negative sign though not significant but rather should have been positive.

In order to control for the unobserved regional effects, we augment the estimated model in column (1) with the regional dummy variables and present these results in column (2). It can be observed that the estimated negative effect of remittances flow has become a bit stronger with the magnitude changing from -0.05 to -0.02 but still is not statistically significant. Both ethnicity and inequality remains significant with a correct sign in addition to hybrid political factor which now becomes significant with a wrong a sign. It should be noted that in both OLS regressions, the variable *War* - measuring number of deaths due to war - is highly significant and has coefficient around 0.48 which is relatively large indicating a one percent increase in death due to war will increase social conflict by 0.48 percent.

The main concern with the OLS estimates is that there may be bias because the estimator may fail to meet one of its important properties. The OLS estimation of our baseline econometric specification is based on the critical assumption that none of the explanatory variables is correlated with the error term in (13). This assumption may be violated because conflict can often result in migration, forced or voluntary, of the local population in search of safer environment or better livelihood. After migration has taken place it is only natural that these migrants send remittances back to their relatives and family who are left behind. As a result, migration – an excluded variable from the model – which is only supposed to affect *Conflict* via the error term causes remittances to become correlated with disturbance terms. Therefore, remittances (*Remit*) which is our variable of interest, rather causing an effect on the dependent variable *Conflict*, might as well be caused by it. In the presence of endogenous covariates, the OLS estimator will be both biased and inconsistent. In such a scenario, an alternative estimator is required to estimate the econometric model which is efficient even with the presence of the endogeneity problem. Therefore we shall use the instrumental variable (IV) technique using the 2SLS estimator.

The IV approach controls for the reverse causality between *Remit* and *Conflict*, by using suitable instruments for the explanatory variable *Remit*. The idea is that these instruments will be correlated with the endogenous covariate but not with the

dependent variable as a result they will not be correlated with the error term. Among all the instruments that we have used for *Remit*, some are found to be relevant in the literature, which are as follows: Instrument1: mean distance to coast or river; Instrument2: percentage land area temperate zones; Instrument3: percentage land area in geographical tropics; Instrument4: co2 emission per capita.

Instrument1 measures how far the country's location is from coast or river signifying that lower the distance easier to migrate and therefore greater probability of receiving remittances. Instrument2 signifies the temperate zones which traditionally have been migrant destinations because these geographic locations are comparatively wealthier. In contrast, Instrument3 represents the geographical area from where a sizable portion of out-migration takes place because the tropics have the highest population density in the world. All of these geographical variables thus tend to be correlated with remittances via migration. In addition, Instrument4 which is co2 emission per capita, is used as a proxy for the industrial production which tend to be correlated with employment in destination countries that sends remittances. Apart from these, we also construct a fifth and sixth instruments. The Instrument5 directly measures the labour market condition of the remittances sending economies which is computed by taking the average unemployment rate in the OECD economies weighted by the remittances to GDP ratio of each country in our sample.

The final instrument which we construct, Instrument6, represents the size of the national income of a particular country in our sample relative to the aggregate GDP of all the countries in our sample as a mean to predict the directional flow of factor income. Instrument6 is constructed as:

$$1 - \frac{GDP_j}{\sum_{i=1}^{n} GDP_i}.$$

A lower GDP ratio implies country *j* has a higher share in world income and therefore economically more developed and thus sends more remittances.

Given that we are using six instruments for one endogenous covariate, we have an overidentified model. As a result we need to check whether that these instruments are relevant as well as if the overidentifying restrictions are valid which is done later. Now we shall discuss the results based on the IV-2SLS estimator which are presented in columns (3) and (4) of Table 1.

First, from column (3) the estimated coefficient on *Remit* is both negative and significant at 5 percent. The estimated coefficient measures elasticity which implies

that a 1 percent rise in remittances can lower the number of deaths due to intentional injury per 100,000 population (*Conflict*) by 0.19 percent. Given that the mean deaths in our sample is 10.83, our estimated coefficient suggests that inflow of *Remit* can reduce *Conflict* by (10.83*0.19) = 2.06. That is slightly over 2 deaths per 100,000 population can be reduced.

Secondly, with regard to the bias in the OLS estimates on *Remit* coefficient, we believe that probably an omitted variable such as migration which is positively correlated with remittances, is causing an endogeneity problem and thus the OLS estimates should be biased upward. Comparing the OLS estimate in column (1) which -0.054 with that of the 2SLS estimate in column (3) we can see that it is indeed so. The other control variables which include *Gini* and *Ethnic* have the expected positive signs and their magnitudes are not too different from their OLS counterpart.

Interestingly, the political regime variable *Hybrid* has now the correct positive sign indicating that neither democratic nor autocratic regimes escalate the extent of conflict. The estimated coefficient on Hybrid is also quite high when compared with the same in the OLS regressions. The variable *War* still remains highly significant as before.

In column (4), we conduct the same IV exercise using 2SLS estimations by adding dummies to control for the regional effects. There is little deviation from the model in column (3). There is only a marginal decline in the estimated coefficient on *Remit* which is still negative and significant at five percent and the magnitude still shows that slightly over two deaths per 100,000 population can be reduced remittances increase by one percent. The only noticeable change is that ethnic fractionalisation (*Ethnic*) which has so far been significant is no longer so at the conventional level.

By analysing the IV-2SLS estimates, we can see that the coefficients on *Remit* are negative and significant, and therefore we obtain some evidence in favour of our hypothesis that remittances flows can reduce conflict as measured by number of deaths due to intentional injury per 100,000 population by smoothing consumption and investment and thereby stabilising income. However, since we have used an instrumental variable approach, we need to make sure two conditions are met. The first is to ensure that instruments are not weak such that they are sufficiently correlated with the endogenous variable. And second is to make sure when the number of instruments exceed the number of endogenous covariates, that these overidentifying restrictions are valid.

The Sargan statistics reported at the end of the 2SLS estimations in columns (3) and (4) show that the overidentifying restrictions are valid because the $p > 0.05$. However, one problem we have encountered is that of a relatively low Crag-Donald $F$ statistic which may lead to weak instrument problem in the sense that the first stage regression has a poor fit according to a rule of thumb suggested by Staiger and Stock (1997), that the joint $F$ statistic on the excluded instruments in the first stage should be at least 10. However, in practice there is no clear critical value for $F$ statistic to test for instrument relevance because it depends on many factors such as the criteria used, number of endogenous variables and number of overidentifying restrictions (Cameron and Trivedi 2005, 2009). Nonetheless, with the presence of weak instruments, the precision of 2SLS estimator can be reduced and may also lead to biases and inconsistencies that are potentially larger than biases in the OLS estimator (Hayashi, 2000). Therefore, as suggested in the literature, alternative estimators need to be used which have the same large-sample distribution as 2SLS but have better finite-sample property when instruments are weak. The leading example is the limited-information maximum likelihood (LIML) estimator (see Murray 2006). Because of the weak instruments problem in our IV-2SLS model, we re-estimate our model with LIML estimator, and the results are presented in column (5) of Table 1. Furthermore, LIML makes the assumption of joint normality of the errors in the structural and first-stage equations, so robust standard errors are used.

The results based on LIML estimator are almost similar to those of the 2SLS counter parts except for the estimate on the coefficient on remittances is now -0.29 and significant at 10 percent indicating that the 2SLS estimates could have been biased upward because of the weak instrument problem. The estimated elasticity now implies that a 1 percent increase in remittances could lead to the reduction of 3.2 deaths per 100,000 populations. All estimated coefficients have retained previous signs and like *Remit* for variables such as *Gini*, *Hybrid* and *War* the level of significance have been reduced because robust standard errors are used. In terms of the weak identification test, the Kleibergen-Paap $F$ statistic is larger the than 20 percent maximal LIML size and the Hansen J statistic do not reject the null that overidentification restrictions are valid. Therefore we find the results based on LIML most reliable and conclude that remittances are conflict abating in recipient economies.

## 5. Robustness Analysis

In this paper we provide a valuable link between remittances and social conflict and we have shown that inward remittances flows are conflict abating under various alternative estimators. However, in most empirical exercises there is model uncertainty. Although we have provided a theory of why remittances and conflict

may be negatively related, no theory is ever adequate to explain which variables should appear in the 'true' model. When our objective is to investigate whether a variable, say *R* is a major determinant of a dependent variable *C* then often it is observed the significance of the former is sensitive to what other variables are included or excluded from the model. To overcome this problem we employ extreme bounds analysis (EBA) as developed by Leamer (1983, 1985).

The EBA technique is used to identify the robustness of the determinants of the dependent variable. EBA enables the investigator to find upper and lower bounds for the parameter of interest from all possible combinations of potential explanatory variables. The central idea of EBA is that out of a range of possible models it enables to examine how sensitive parameter estimates are to different specifications. According to Leamer and Leonard (1983) the extreme values of the coefficient on the variable of interest presents inferential ambiguity about the coefficient induced by model uncertainty. The relationship between the dependent variable and a given explanatory variable, which in our case is remittances, is considered robust if the estimated coefficient remains statistically significant and maintains the same sign when the set of explanatory variables are changed.

EBA can be briefly explained as follows. The general form of the regression, which is usually estimated in EBA is:

$$\Lambda = \mathbf{a}_j + b_{yj}\mathbf{y} + b_{zj}\mathbf{z} + b_{xj}\mathbf{x} + \mathbf{u}_j \tag{14}$$

where $\mathbf{y}$ is a vector of important explanatory variables that always appear in the regressions (e.g., the always significant variables in our model), $\mathbf{z}$ denotes the variable of interest whose robustness we want to check, i.e. the EBA variable (e.g., *Remit* in our model) and $\mathbf{x}$ is a vector of four variables selected from the pool $\mathbf{x}$ of additional plausible control variables, including all the political and socio-economic determinants of social conflict which are found important in the literature.

To check for the robustness of the EBA variable under consideration, for each model *j* one estimate of $b_{zj}$ and the corresponding standard deviation $\sigma_{zj}$ are made. The lower extreme bound for this parameter is defined as the lowest value of $b_{zj} - 2\sigma_{zj}$ and the upper extreme bound is the largest value of $b_{zj} + 2\sigma_{zj}$. If the lower extreme bound is negative and the upper extreme bound is positive, according to Leamer (1983, 1985) and Levine and Renelt (1992), the effect of the variable is fragile and if the lower and upper extreme bounds have the same sign, then the variable under scrutiny is robust.

To estimate the robustness of our choice variable *Remit*, in Table 2 we present the EBA exercise. Note that our EBA variable (i.e., **z** variable) is always Remit. The **y** variable varies in each EBA exercise. The **x** vector includes all the potential explanatory variables of conflict which are used in our model including the regional dummies as well as the variables such as youth-bulge, log of infant mortality rate and urbanisation rate. The included **y** variable or variables are always excluded from the **x** vector.

**Table 2. Extreme Bounds Analysis for Remittances and Social Violence**

*Dependent Variable*

The number of logged deaths due to intentional injury per 100,000 population (*Conflict*)

| z-variable | | $b_z$ | t | 0.95 C.I. | | y-variable | Robust/Fragile |
|---|---|---|---|---|---|---|---|
| *Remit* | Min | -0.136 | -3.05*** | -0.224 | -0.048 | Nil. | Robust |
| | Max | -0.071 | -2.01** | -0.141 | -0.001 | | |
| *Remit* | Min | -0.082 | -2.07** | -0.161 | -0.003 | *Hybrid* | Robust |
| | Max | -0.082 | -2.07** | -0.161 | -0.003 | | |
| *Remit* | Min | -0.092 | -2.33** | -0.171 | -0.014 | *Gini* | Robust |
| | Max | -0.071 | -1.99** | -0.142 | -0.001 | | |
| *Remit* | Min | -0.094 | -2.15** | -0.181 | -0.007 | *War* | Robust |
| | Max | -0.071 | -2.01** | -0.141 | -0.001 | | |
| *Remit* | Min | -0.078 | -2.12** | -0.151 | -0.005 | *Gini, War* | Robust |
| | Max | -0.071 | -1.99** | -0.142 | -0.001 | | |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 2 presents all together five EBA exercises. The first examines the robustness of *Remit* without including any y-variable. A total of 715 combinations of our **z**-variable and four regressors from the 13 variables of **x** vector were used. We can see that the lower extreme bound (Min) and the upper extreme bound (Max) of the coefficient $b_z$ did not alter sign hence, hence the variable under scrutiny, that is, *Remit* is robust. In a similar fashion the second EBA exercise is carried but *Hybrid* is included in the y-variable and excluded from x vector which now has 12 variables. We can see that the upper and lower bound of $b_z$ is exactly same with no changes in sign. This is because Hybrid is an indicator variable. In the third and fourth EBA exercises *Gini* and *War* are respectively included in the **y**-variable and no changes are observed in the signs of the lower and upper extreme bounds of choice variable which thus is considered robust. In the final EBA exercise both *Gini* and *War* included together in the **y**-variables which gives out 495 combinations of four regressors from the 12 variable of the **x**-vector. We can see that the lower extreme bound and upper extreme bounds of the EBA variable has the same sign and significant at the five percent. Hence we conclude that the remittances is robust variable in our empirical analysis.

## 6. Conclusions

This article analyses the effect of remittances on social conflict in countries for which intentional violence data are available. We test the hypothesis that inflow of remittances leads to reduction in social violence. Our argument is based on the observation that following an income shock in the home country, remittances tend respond in opposite directions. Prior studies have identified income volatility as a major source of conflict and because remittances stabilise income and smooth consumption, it is also conflict abating. We develop a formal model to show under what conditions remittances can lead to conflict reduction, and then use a large cross-sectional data including 160 countries, to empirically assess our hypothesis factoring in the endogeneity and weak instruments problem. We also check the robustness of results using the extreme bounds analysis.

Our finding is useful to shape public policy. Many of the traditional determinants of conflict, such as political regimes or ethnic fractionalisation are institutional in nature. To reduce the level of conflict these variables cannot be changed in the short term or even in the medium term. However, both remittances sending and receiving economies can undertake counter conflict short term policies by reducing transaction costs to ensure free flow of remittances.

**Data Appendix**

| Variable Name | Variable Descriptions |
| --- | --- |
| *Conflict* | Natural log of deaths due to injury per 100,000 populations. (*Source*: WHO 2004, 2008). |
| *Remit* | Log of remittances in current USD. (*Source:* World Development Indicator, World Bank). |
| *Gini* | Inequality Index. (*Source:* World Development Indicator, World Bank). |
| *Ethnic* | Ethnic and Linguistic Fractionalisation score. (*Source:* Alesina *et al*. 2003). |
| *Hybrid* | Political Regime Type representing countries which are neither fully autocratic nor fully democratic. (*Source:* Fox and Hoelscher 2012). |
| *Drug* | Dummy variable coded 1 if the country is drug producing or transiting. (*Source:* Fox and Hoelscher 2012). |
| *War* | Natural log of deaths due to war per 100,000 population. Average value for 2002 and 2004 (*Source:* WHO 2004, 2008). |
| *Regional Dummies* | |
| EAP | East Asia and the Pacific |
| LAC | Latin America and the Caribbean |
| MENA | Middle East and North Africa |
| SA | South Asia |
| SSA | Sub Saharan Africa |

# References

Adams, R., and Page, J. (2005). Do International Migration and Remittances Reduce Poverty in Developing Countries? *World Development, 33*(10), 1645-1669.

Adams, R., and Page, J. (2005). Do International Migration and Remittances Reduce Poverty in Developing Countries? *World Development, 33*(10), 1645-1669.

Adams, R. J. (2005). Remittances, household expenditure and investment in Guatemala *Policy Research Working Paper Series 3532*. Washington DC: The World Bank.

Aghion, P., Blanchard, O. (1994 ). On the speed of transition in central Europe *Discussion Paper in Economics no. 87*. Oxford: Nuffield College, Oxford University

Alesina, A., and Perrotti, R. (1996). Income Distribution, Political Instability and Investment. *European Economic review 40*(6), 1203-1228.

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., and Wacziarg, R. (2003). Fractionalization. *Journal of Economic Growth, 8*(2), 155–194.

Archer, D., and Gartner, R. (1984). *Violence and Crime in Cross-National Perspective*. New Haven: Yale University Press.

Barajas, A., Chami, R., Fullenkamp, C., Gapen, M., and Montiel, P. (2009). Do Workers' Remittances Promote Economic Growth? *IMF Working Paper No. WP/09/153*. Washington, D.C.: International Monetary Fund

Barros, C., Araújo, A., and Faria, J. (2013b). Brazilian land tenure and conflicts: The landless peasants' movement. *Cato Journal 33*(47-75).

Barros, C., Faria, J., and Araújo, A. (2013a). Brazilian land tenure conflicts: A spatial analysis. *Journal of International Development, forthcoming*.

Cameron, A., and Trivedi, P. (2005). *Microeconometrics: Methods and Applications*. New York: Cambridge University Press.

Cameron, A., and Trivedi, P. (2009). *Microeconometrics Using Stata*. TX: Stata Press.

Chami, R., Barajas, A., Cosimano, T., Fullenkamp, C., Gapen, M., and Montiel, P. (2008). Macroeconomic Consequences of Remittances *Occasional Paper No. 259*. Washington, D.C. : International Monetary Fund

Chami, R., Fullenkamp, C., and Jahjah, S. (2003). Are Immigrant Remittance Flows a Source of Capital for Development? *IMF Working Paper 03/189*. Washington, DC: International Monetary Fund.

Chami, R., Fullenkamp, C., and Jahjah, S. (2005). Are Immigrant Remittance Flows a Source of Capital for Development. *IMF Staff Papers, 52* (April), 55-81.

Collier, P., and Hoeffler, A. (2004). Greed and Grievance in Civil War. *Oxford Economic Papers, 56*(4), 563-595.

Combes, J., and Ebeke, C. (2011). Remittances and Household Consumption Instability in Developing Countries. *World Development, 39*(7), 1076–1089.

Cox Edwards, A., and Ureta, M. (2003). International Migration, Remittances and Schooling: Evidence from El Salvatdor. *Journal of Development Economics, 72* (2), 429-461.

De, P., and Ratha, D. (2005). Remittance Income and Household Welfare: Evidence from Sri Lanka Integrated Household Survey *Development Research Group*. Washington, DC: The World Bank.

Eisner, M. (2001). Modernization, Self-Control, and Lethal Violence: The Long-term dynamics of European Homicide Rates in Theoretical Perspective. *British Journal of Criminology 41*(4), 1203-1250.

Fajnzylber, P., Lederman, D., and Loayza, N. (2000). Crime and victimization: An economic perspective. *Economia 1*(1), 219–302.

Fox, S., and Hoelscher, K. (2012). Political Order, Development and Social Violence. *Journal of Peace Research, 49*(3), 431-444.

Frank, R., and Hummer, R. (2002). The Other Side of the Paradox: The Risk of Low Birth Weight among Infants of Migrant and Nonmigrant Households within Mexico. *International Migration Review, 36*(3), 746-765.

Frankel, J. (2011). Are Bilateral Remittances Countercyclical *Open Economics Review, 22*, 1-16.

Gates, S., Hegre, H., Jones, M., and Strand, H. (2006). Institutional Inconsistency and Political stability: Polity Duration, 1800-2000. *American Journal of Political Science, 50*(4), 893 -908.

Goldstone, J. (2002). Population and Security: How Demographic Change Can Lead to Violent Conflict. *Journal of International Affairs, 56*(1), 3-22.

Goldstone, J., Bates, R., Epstein, D., Gurr, T., Lustik, M., Marshall, M., et al. (2010). A Global Model for Forecasting Political Instability. *American Journal of Political Science, 54*(1), 190-208.

Gupta, S., Pattillo, C., and Wagh, S. (2009). Effect of Remittances on Poverty and Financial Development in Sub-Saharan Africa. *World Development 37*(1), 104-115.

Hanson, G., and Woodruff, C. (2003). *Emigration and Education Attainment in Mexico*. mimeo. University of California. Riverside.

Hayashi, F. (2000). *Econometrics*. NJ: Princeton University Press.

Hegre, H., and Sambanis, N. (2006). Sensitivity Analysis of Empirical Results on Civil War Onset. *Journal of Conflict Resolution 50*(4), 508-535.

Hildebrant, N., and McKenzie, D. (2005). The Effect of Migration on Child Health in Mexico *World Bank Policy Research Working Paper 3573 and Department of Economics, Stanford University*. Washington, DC: The World Bank.

LaFree, G., and Tselsoni, A. (2006). Democracy and Crime: A Multilevel Analysis. *Annals of the American Academy of Political and Social Science, 605*, 26-49.

Leamer, E. (1983). Let's Take the Con Out of Econometrics. *American Economic Review, 73*, 31–43.

Leamer, E. (1985). Sensitivity Analyses Would Help. *American Economic Review, 75*, 308–13.

Leamer, E., and Leonard, H. (1983). Reporting the Fragility of Regression Estimates *Review of Economics and Statistics, 65*(307-317).

Leon-Ledesma, M., and Piracha, M. (2004). International Migration and the Role of Remittances in Eastern Europe. *International Migration Review, 42*(4), 65–83.

Levine, R., and Renelt, D. (1992). A Sensitivity Analysis of Cross Country Growth Regressions. *American Economic Review, 82*(942-963).

Lindley, A. (2009). Remittances in Conflict: Some Conceptual Considerations. *Journal of Economics and Statistics [Jahrbücher f. Nationalökonomie u. Statistik], 229* (6), 774-786.

Mancellari, A., Papapanagos, H., and Sanfey, P. (1996 ). Job creation and Temporary Migration: the Case of Albania. *The Economics of Transition, 4*, 471-490.

McKenzie, D., and Rapoport, H. (2004). Network Effects and the Dynamics of Migration and Inequality: Theory and Evidence from Mexico. *BREAD Working Paper No 063*.

Miguel, E., Satyanath, S., and Sergenti, E. (2004). Economic Shocks and Civil Conflict: An Instrumental Variables Approach. *Journal of Political Economy 112*(4), 725–753.

Mishra, P. (2005). Macroeconomic Impact of Remittances in the Caribbean *IMF Working Paper*. Washington, DC: International Monetary Fund.

Murray, M. (2006). Avoiding Invalid Instruments and Coping with Weak Instruments. *Journal of Economic Perspectives, 20*(4), 111-132.

Page, J., and Plaza, S. (2006). Migration Remittances and Development: A Review of Global Evidence. *Journal of African Economies, 15*(2), 245-336.

Quarterly, P., and Blankson, T. (2004). Do Migrant Remittances Minimize the Impact of Macro-Volatility on the Poor in Ghana: Global Development Network (GDN).

Ratha, D. (2009). Leveraging Remittances for Development *Policy Brief, June*. Washington D.C.: Migration Policy Institute.

Sayan, S. (2006). Business Cycles and Workers' Remittances: How do Migrant Workers Respond to Cyclical Movements of GDP at Home? *IMF Working Paper No. 06/52*. Washington, DC: International Monetary Fund.

Staiger, D., and Stock, J. (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica, 65*(557–586).

Thorbecke, E., and Charumilind, C. (2002). Economic Inequality and Its Social Impact. *World Development, 30*(9), 1477-1495.

WHO. (2004). The Global Burden of Disease in 2002 Geneva: World Health Organization.

WHO. (2008). Global Burden of Disease: 2004 Update. Geneva: World Health Organization

Yang, D., and Choi, H. (2007). Are Remittances Insurance? Evidence from Rainfall Shocks in the Philippines. *World Bank Economic Review 21* (2), 219–248.