Do Remittances Diminish Social Violence?

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Abstract:
This paper represents the first attempt to formalise the relationship between remittances and social violence by developing a model that predicts that migrants’ remittances lead to the reduction of social violence in the recipient economy under the condition that remittances increase the average product of labour. Using homicide data as an indicator of social violence, we tested our model’s prediction. Controlling for the endogeneity problem with appropriate instruments, we found that remittances tend to reduce social violence. We performed sensitivity analysis on remittances in the empirical specification and found it robust with an unchanged negative sign.

JEL classification: O17; F22; F24; D74.

Key Words: Remittances; International Migration; Social Conflict; Homicide; Social Violence; Economic Development.

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1. Introduction

Remittances sent by migrant workers to their families have become important sources of funds for many developing countries. The growth rate of remittances worldwide has been quite remarkable in the last two decades. Analyses of World Bank data show that during 2007 and 2008, the growth rate in remittances was 15 percent\(^1\).

Remittances provide a number of benefits to recipients. For example, remittances are credited with the reduction of poverty, alleviation of credit constraint, and improvements in the educational and health outcomes of the recipient households (see; Adams & Page, 2005; Cox-Edwards & Ureta, 2003; Frank & Hummer, 2002; Gupta at al., 2009; Hanson & Woodruff, 2003; Hildebrant & Mckenzie, 2005; Page & Plaza, 2006; Quartey & Blankson, 2004). Remittances are instrumental in generating savings and accumulation of productive assets by removing investment constraints (see; Arun & Ulku, 2011; Chiodi at al., 2012). Remittances are compensatory flows generating countercyclical behaviour that enables transfer recipients to smooth their consumption and minimise its volatility (see; Chami at al., 2008, Chami et al., 2005; Combes & Ebeke, 2011; Kurosaki, 2006; Mishra, 2005; Sayan, 2006). Countercyclical remittances can work as automatic output stabilisers and reduce income volatility (see; Chami et al., 2008, 2009; Yang & Choi, 2007). The inflow of remittances does, however, pose several development challenges, specifically in terms of controversial effects on economic
growth (see; Chami et al., 2003; World Bank, 2006; IMF, 2005), and their capacity to appreciate the real exchange rate, causing a Dutch disease effect (see; Amuedo-Dorantes & Pozo, 2004; Acosta et al., 2007; Chami et al., 2008; Hassan & Holmes, 2013; Montiel, 1999).

It was recently noted by Abdih at al. (2012) that remittances can affect the quality of governance. The authors showed that remittances can lower civic engagement by playing a buffer role between government and citizens, and deteriorate the quality of institutions and governance in receiving countries by reducing the incentives for citizens to monitor and hold their government accountable. Families receiving remittances may be oblivious to the quality of governance because they are better insulated, as a result of income received from overseas, from the bad decisions made by their governments.

In this paper we study a related theme stemming from the basic observation of Abdih et al. (2012). We investigate whether a lower level of civic engagement, due to inflow of remittances, can reduce social violence in countries receiving a substantial amount of foreign income transfers. To our knowledge, this is the first such exercise measuring the impact of remittance flows on social violence².

Given that remittances are small, numerous, unrequited household-to-household non-market private income transfers, at first sight one might not expect a robust relation between these private income transfers and social violence. However, families that receive remittances are also less likely to be concerned by the bad behaviour of their neighbours or other people in their social circles, because they are better insulated from the opinions or behaviours of these people. Thus the common factor linking Abdih et al’s. (2012) research and ours is that receipt of remittances
lowers civic engagement. While Abdih et al. (2012) showed that remittances reduce positive civic engagement (voting and monitoring the government), we show that they also reduce negative civic engagement (social or interpersonal violence) because remittances can ease people’s tensions and reasons for engaging into violence with each other. There is also an economic intuition behind our proposition. Remittances can increase average incomes in the overall economy through asset accumulation and by removing investment constraints on the recipient households. As individuals’ economic prospects improve, they are likely to commit fewer acts of violent crime, since such acts now become less attractive relative to other opportunities. We therefore argue that remittance income increases the opportunity cost of committing an act of violence and reduces the incentive to engage in violent activities.

In an effort to create a synergy between past literature on remittances and social violence, we turn to its determinants. Studies that use homicide data as a measure of social/interpersonal violence have found that cross-country variations in homicide rates can be primarily explained by income inequality and poverty, the level of development as proxied by real GDP per capita, average years of education of the population, and the level of urbanization (see; Fajnzylber et al., 2002a, 2002b; Neumayer, 2003, 2004; Pridemore, 2008; Thorbecke & Charumilind, 2002). Poverty and falling income are also key factors in engendering civil conflicts (Collier & Hoeffler, 2004; Miguel et al., 2004). These determinants of violence were used as dependent variables in studies assessing the welfare-enhancing effects of remittances where remittances are treated as an exogenously determined variable. Therefore, it is rational to expect that remittances will have spillover effects onto social violence through their determinants. There are several channels via which this
spillover effect can take place, but the more significant ones are income, poverty and education. Firstly, by removing households’ credit constraint and enabling asset accumulation, remittances can increase the income of the average household in addition to reducing their income volatility, which enhances economic opportunities for the people and lowers their incentive to engage into conflict\(^3\). Secondly, remittances allow recipients to meet consumption expenditure over and above the subsistence level and cope with economic shocks, and thus help reduce poverty or ‘absolute deprivation.’ This subsequently reduces social violence because poverty can create high levels of stress among individuals that may lead them to commit violence or other crimes\(^4\). Thirdly, remittances are credited with augmenting educational outcomes in recipient families, and therefore can be instrumental in reducing conflicts in society because a more educated person is less likely to commit an act of violence.

Recently, income inequality has been identified as one of the major determinants of homicide rates (see; Fajnzylber et al., 2002a, 2002b) and this is confirmed in our own empirical exercise. However, there are some ambiguities regarding whether the effect of remittances on violence is channelled through inequality or not, because the effect of remittances on income inequality in migrants’ countries of origin is not clear. At the theoretical level, remittances and economic inequality may be represented by an inverse U-shaped relationship (see; Stark at al., 1986, 1988). Because of initially high migration costs, only high-income groups can access the higher income opportunities available abroad and, consequently, remittances tend to increase inter-household inequality. As the number of migrants increases, migration costs tend to decrease due to migrants’ networks, making migration affordable to lower-income households so that
ultimately economic inequality in the country of origin decreases. Hence at the cross-country level and at a particular point in time, the effect of remittances on inequality may be neutralised: some countries which are at the early stages of migration may experience a negative effect while in others with a relatively established history of emigration, the effect can be positive. The empirical literature on remittances and inequality thus confirms a mixed effect: Adams (2005) found that remittances increased inequality in Ghana, while McKenzie and Rapoport (2004) and De and Ratha (2005) found that remittances decreased inequality in Mexico and Sri Lanka respectively. Therefore, further studies are needed to fully understand the link between remittances and social violence vis-à-vis income inequality. At present, we continue to stress that the variables constituting a link between remittances and violence are mainly income, poverty and education.

In light of the discussion above, the main research question in this paper is: can remittances diminish social violence in recipient countries? This study tests the hypothesis that remittances do lower the extent of social conflict at the cross-country level.

The major contribution of our study is to explain social violence in a cross-country setting with the aid of an important variable – remittances – which has been overlooked in earlier studies. We develop a simple theoretical framework to formalise the relationship between conflict and remittances and then adopt an appropriate empirical strategy to establish the causal link between remittances and violence and then check the robustness of the results. Our findings are mainly important because of the role of policy. The existing literature sees homicide rates primarily determined by structural determinants, which are difficult, if not impossible, to change via policy. However, like Neumayer (2003), who showed that
good policies can lower homicide rates, our findings should provide useful guidance to policy makers to undertake counter-conflict policies within short- to medium-term time frames. These policies are not only inclusive of those that accelerate the rate of growth of remittance receipts but also incorporate those that affect the speed at which the money is transferred within the economy.

The rest of 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 results are presented in section 4. A brief discussion of extreme bounds analysis (EBA) and the resulting sensitivity analysis is presented in Section 5. Section 6 concludes.


Intentional injury is a common part of the defining features of both homicide and civil war. Although the socio-economic determinants of homicide and civil war are similar, in this paper we focus on social violence, as measured by homicide rate, perpetrated by individuals or small groups rather than armed rebellion. First, we need to clarify what we mean by social violence. Violence itself means the exercise of physical force with the intention to harm the welfare or physical integrity of the victim (Neumayer, 2004). We define social violence as the exercise of such force that is not politically motivated. The World Health Organisation (WHO) gives a comprehensive definition of violence in its World Report on Violence and Health (WRVH): “the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm,
maldevelopment, or deprivation”. Our definition of social violence is closely related to interpersonal violence, which is mainly an act of violence between individuals or small groups of individuals without any attempt to contest the state’s authority. The distinguishing factor of our definition is that it contrasts with that of political violence, which is understood to be perpetrated by organised groups of armed individuals acting with the explicit aim of defying or challenging the authority of a state to monopolise the legitimate use of violence within its borders.

The causes of homicides were studied by Fajnzylber et al. (2002a, 2002b) who found that income inequality is more important than the level of GDP as an explanatory variable. Fajnzylber et al. (2002a) found that across countries the most significant determinants of homicides and robberies were the growth rate of GDP and income inequality, with the direction of causality flowing from inequality to homicide. Fajnzylber et al. (2002b) also showed, using panel data for a sample of developed and developing countries, that the major determinant of homicide is increased income inequality and that crime tends to be countercyclical, with a significant presence of criminal inertia.

Pridemore (2008) showed that it is not inequality as such (relative deprivation), but poverty (absolute deprivation) that is the driving factor in homicide rates. Because international poverty measures are not strictly comparable, he used infant mortality rates as a proxy and found a lesser role for inequality in explaining homicide rates. Similarly, using cross-country panel data for homicides, Neumayer (2003) showed that income inequality may have no effect on violent crime, whereas economic growth, higher income levels and high levels of democracy are associated with lower homicide rates. The transition from autocracy to democracy may be accompanied by a rising homicide rate.
There are other political and socio-economic determinants of social violence. At the political level, a hybrid political regime – one falling between full autocracy and full democracy – can increase the likelihood of political instability and conflict (Eisner, 2001; Gates et al., 2006; Goldstone et al., 2010; LaFree & Tseloni, 2006). Barros et al. (2013a, 2013b) showed that land conflicts in Brazil are a state-based phenomenon led by left-wing groups with left-wing government support. In addition, ethnic dominance and ethnic fractionalisation have also been found to escalate civil conflict (Collier & Hoeffler, 2004; Hegre & Sambanis, 2006).

Demographics and urbanisation can also play key roles in determining social conflict. A high proportion of young people in the adult population – a phenomenon known as a ‘youth bulge’ – can lead to political instability and violence (Goldstone, 2002). Similarly, a high rate of urbanisation can create tension and confrontation between individuals and groups competing for scarce resources (Cole & Gramajo, 2009).

On-going war in a country can also escalate social violence within its territory, because war damages a country’s law and order enforcement (Archer & Gartner, 1984). Those countries which either produce illegal drugs or serve as transhipment hubs for unlawful narcotics are also likely to experience more violence in terms of higher homicide rates (Fajnzylber et al., 2000).
3. **The Model**

In order to relate remittances with conflict we constructed a simple model which highlights the importance of emigration for job creation and explores the role of foreign wages (remittances) on conflict via job market and employment dynamics.

The model is an extension of that developed by Mancellari et al. (1996) and Léon-Ledesma and Piracha (2004), who introduced migration into Aghion and Blanchard’s (1994) model of economic transition as a baseline and analysed the conditions required 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 an unemployed person remains in his native country he can earn unemployment benefits, $B$. If he migrates, he finds a job and earns wages $W^*$. The emigration decision incorporates any costs, including temporary unemployment in the destination region.

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

$$E = a(C)U$$

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 $C$:

$$a(C) = \theta C$$

where $\theta$ is the impact of conflict on the decision to emigrate. Note that $0 < \theta C < 1$. 
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, $T$:

$$H = \alpha [Y - W(C) - T]$$  \hspace{1cm} (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 transfers to raise the health and educational outcomes of their family members. Remittances, as a consequence, positively affect the average domestic product:

$$Y = Y'(C) + \beta \alpha(C)W^*$$  \hspace{1cm} (4)$$

where $W^*$ is the wage rate in the foreign country, and $\beta$ captures two different aspects of migration: 1) the extent to which foreign earnings are used to finance business creation and 2) the effect of migration on average product of labour through skill formation.

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

$$Y'(C) = y(1 - z_1 C)$$  \hspace{1cm} (5)$$

$$W(C) = w(1 - z_2 C)$$  \hspace{1cm} (6)$$

where $z_1$ is the impact of conflict on the average domestic product of labour, $0 < z_1 < 1$, and $z_2$ is the impact of conflict on the domestic wage rate, $0 < z_2 < 1$.

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

$$H = \alpha [y(1 - z_1 C) + \beta \theta CW^* - w(1 - z_2 C) - T]$$  \hspace{1cm} (3')$$
The value function for an unemployed person can be written as

\[ rV_U = (1 - \theta C)B + \theta CW^* + \frac{H}{U} (V_N - V_U) + \frac{dV_U}{dt} \]  

(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 in 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 equalling \( k \equiv V_N - V_U > 0 \), weighted by the rate of outflow from unemployment \( \frac{H}{U} \), and the change in the value of being unemployed over time \( \frac{dV_U}{dt} \).

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

\[ rV_N = W(C) + \frac{dV_N}{dt} \]  

(8)

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

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

(9)

When conflict is greater than a given threshold level, it is useful to assume that basic functions of the government such as taxation and distribution of unemployment benefits cease to operate. Therefore without loss of generality, we can assume that \( T=0, \) and \( B=0 \).

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

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

(10)
Rewriting Eq. (10) for conflict yields:

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

The impact of remittances, \( \beta \partial W^* \), on conflict is:

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

Remittances have a negative impact on conflict, \( \frac{\partial C}{\partial \beta \partial W^*} < 0 \), if the following two conditions are fulfilled:

1) \( y - H \left( \frac{U + \alpha k}{\alpha U} \right) - rk < 0 \)

2) \( z_1 y + (1 - \beta) \partial W^* < 0 \Rightarrow \beta > 1 + \frac{z_1 y}{\partial W^*} \)

Note that for remittances to have an impact on conflict, there must be conflict, i.e., \( C > 0 \). Conditions 1) and 2) guarantee not only that there is conflict, \( C > 0 \), according to Eq. (11), but also that the impact of remittances on conflict is negative, \( \frac{\partial C}{\partial \beta \partial W^*} < 0 \), according to Eq. (12).

Condition 1) says that the gross average product of labour in the absence of emigration, \( y \), should be less than the sum of the present value of the difference between the value of being employed and of being unemployed, \( rk \), and the product of job creation with the weighted ratio of the benefit of being employed versus unemployed, \( H \left( \frac{U + \alpha k}{\alpha U} \right) \). Condition 1) is fulfilled whenever the direct and indirect effects of remittances in the overall economy through job
creation and employment exceed the average product of labour in the absence of emigration. As emigration helps by employing the unemployed as well as by creating jobs, this condition is not difficult to meet.

Condition 2) implies that $\beta > 1$, that is the business and skill formation related to migration, given by $\beta$, should be greater than the weighted ratio of the gross average product of labour, $y$, and the foreign wage rate, $W^*$. Note that the weight is given by the ratio $\frac{z_i}{\theta}$, where $z_i$ is the impact of conflict on the average domestic product of labour and $\theta$ is the impact of conflict on the decision to emigrate. Condition 2) is fulfilled whenever remittances are able to create more income through new business and skills and human capital formation than would normally be generated in the country in the absence of emigration.

In sum, the above model suggests that the positive impact of remittances on source country incomes reduces conflict and violence under the conditions that remittances reduce the number of unemployed people, create investment opportunities and facilitate human capital formation.
4. Empirical Analysis

Although we adopted a cross-country regression methodology, it has various shortcomings. First, there can be measurement error due to inaccurate data entry at the country level, leading to inaccurate estimates. Second, since countries are not from a distinct population, it is not entirely clear whether many different countries should be put into one regression (Harberger, 1987). Third is the problem of unobservable heterogeneity which relates to the impossibility of controlling for all the possible ways in which countries might differ. Fourth is the degrees-of-freedom problem which is the possibility of having more hypotheses than there are data points (Mankiw, 1995). Apart from these, cross-country regressions generally suffer from the problems of endogeneity, model uncertainty and outliers, which are controlled for in the present study.

In our empirical analysis, we measured conflict, our dependent variable, via the homicide rate, which is a good indicator of social violence (see; Fox & Hoelscher, 2012).

We used the WHO data set on ‘violence’ because it is widely regarded as the most reliable (La Free, 1999). The WHO provides data on the number of deaths due to 'intentional injury per 100,000 population' as estimated by the WHO’s Global Burden of Disease Project (WHO, 2004, 2008). Within the ‘intentional injury’ category, there are three sub-categories: self-inflicted injury; violence; and war. Our measure of social violence uses the estimates of deaths due to the ‘violence’ sub-category, which includes deaths resulting from stabbing, firearms, fights, blunt objects, and abuse. This information is based on death certificates issued by doctors and is generally considered to be more robust than other cross-country crime
statistics such as those produced by the United Nations Office on Drugs and Crime (UNODC). In UNODC data, homicide is defined as 'death purposely inflicted by another person, including infanticide' and this information is collected through victimisation surveys which differ widely in their collection methodologies, definitions and reliability (UNODC, 1999).

Our econometric specification is not necessarily derived as a testable hypothesis from our theoretical model. Rather, the theoretical model assigns an *a priori* sign to the expected relationship between violence and remittances to ensure that the observed relationship is not spurious. The empirical analysis is motivated to confirm or disapprove the *a priori* expectation. To allow comparison, our empirical model is built upon previous studies on the determinants of homicides and specified as follows:

\[
\text{Conflict}_i = \alpha + \beta_1 \times \text{Remit}_i + \mathbf{X}_i' \times \beta_2 + \epsilon_i \tag{13}
\]

where *Conflict* represents social violence defined as the logged number of deaths due to intentional injury per 100,000 populations. The explanatory variables include *Remit* – our variable of interest – which represents the logged remittance inflow in USD, and the vector *X* which controls for hybrid political regimes (*Hybrid*); ethnic fractionalisation (*Ethnic*); logged number of deaths due to war (*War*); gross Gini coefficient as a measure of inequality (*Gini*), a dummy if the country is a drug producer (*Drug*), log of GDP per capita (*GDPpc*), log of gross secondary enrolment ratio (*School*), annualised urban growth rate (*Urban*) and youth population (*Youth*)\(^{10}\). Our main interest lay in the estimated sign of the coefficient on *Remit* and according to our theoretical model, the *a priori* expected sign of \( \beta_1 \) is negative.
A scatter plot of Conflict and Remit, averaged for 2002 and 2004, shows a strong negative relationship between these two variables albeit without controlling for any other factors. This is presented in Figure 1.

**INCLUDE FIGURE 1 HERE**

Our empirical findings on the effect of remittances on social violence, controlling for other political and social-economic factors, are presented in Table 1.

**INCLUDE TABLE 1 HERE**

Table 1 shows the OLS estimates in the first two columns. In column (1) the coefficient for Remit is not significant at the conventional level. The control variables, Gini, Ethnic, and Hybrid have the expected signs. Next, regional dummies were added to the OLS model and the results are shown in column (2). The coefficient of remittance flows was still found to be not statistically significant.

OLS estimates may suffer from endogeneity bias because it is quite plausible that conflict in the source country could accelerate the rate of emigration, which itself could lead to increased remittances. We used the instrumental variable (IV) technique using the 2SLS estimator which is efficient even in the presence of an endogeneity problem.

Following the IV approaches used in the remittances literature for pure cross-section data (Abdih et al., 2012; Adams & Page, 2005), we instrumented properly for Remit by finding variables which were correlated with remittance flows but not with the dependent variable, except through the included regressors11.

We chose two categories of instruments: geographical and economic. The first three instruments are based on geographic characteristics. Instrument1 is the
mean distance to the nearest coastline or sea-navigable river in kilometres. This variable is likely to affect conflict primarily through included regressor remittances, because a shorter distance to a coast or ocean-navigable river is generally associated with a lower travel cost, and as a result a higher ratio of emigrants to the total population, which for obvious reasons leads to higher remittances on average. Instrument2 is the percentage of area of the country in the geographical temperate zone, which includes the geographically favoured core economic zones of the modern world including Western Europe, Northeast Asia, and North America. These regions are the overwhelming providers of capital goods in global trade, the world’s financial centres, and the generators of a large proportion of global production. These areas have been a destination for large numbers of immigrants and consequently generate a stable outflow of remittances. Instrument3 is the percentage of land in the geographical tropics, inhabited by a third of the world’s population in mostly low-income regions. Such areas are characterised by a higher emigration to population ratio because people migrate to escape poverty and to search for better economic prospects, which leads to higher remittance inflows.

We also constructed three economic instruments. Instrument4, CO2 emission per capita, is a direct measure of pollution, but can used as a proxy for industrial production that tends to be correlated with worldwide remittance flows but is not expected to directly affect conflict. Instrument5 is a weighted measure of the labour market conditions in the remittance-sending economies that is computed by taking the average unemployment rate in the OECD economies and multiplying it by each country’s remittances to GDP ratio in our sample to obtain a country-specific measure – the idea is that host countries’ economic conditions affect the sending of remittances but not conflict in the source country directly. Instrument6 represents
the rest of the world’s GDP, as a measure to predict the net inflow of remittances. It
is constructed as follows: $1 - Y_i / \sum_{i=1}^{n} Y_i$, where $Y$ is GDP in constant 2005 US$. The
ratio measures world GDP which is $\sum_{i=1}^{n} Y_i$ (where $n$ is all the 160 countries in our
sample) net of country $i$. Remittances are likely to be correlated with economic
activities in the rest of the world, but rest of the world’s GDP is unlikely to affect
our dependent variable ($\text{conflict}$) or violence in the country of origin except through
the included regressors$^{12}$.

Given that we were using six instruments for one endogenous covariate we
checked for the instruments’ validity, and the overidentifying restrictions, which are
discussed later. Firstly we discuss the results based on the IV-2SLS estimator,
which are presented in columns (3) and (4) of Table 1.

In column (3) the estimated coefficient of $\text{Remit}$, which measures elasticity,
is both negative and significant at the 5 percent level, implying that a 1 percent rise
in remittances can lower the number of deaths due to intentional injury per 100,000
population ($\text{Conflict}$) by 0.19 percent. With the mean number of deaths in our
sample equalling 10.83$^{13}$, this suggests that $\text{Remit}$ can reduce $\text{Conflict}$ by
$(10.83 \times 0.19) = 2.06$, i.e., just over 2 deaths per 100,000 population. In terms of
actual number, this means slightly over 800 deaths can be avoided$^{14}$.

Secondly, the 2SLS estimates confirm that the OLS estimates are biased
upward because migration – an omitted variable – is positively correlated with
remittances. The other control variables have the expected signs.

In column (4) we have added regional dummies to the IV estimates. Only a
marginal decline in the estimated coefficient of $\text{Remit}$ is seen, while it is still
negative and significant at the 5 percent level. The magnitude is still slightly over 2 deaths per 100,000 population that can be reduced when remittances increase by one percent. The only noticeable change in the other control variables is that ethnic fractionalisation (Ethnic) becomes insignificant.

The IV approach requires that instruments are sufficiently correlated with the endogenous variable and that when the number of instruments exceeds the number of endogenous covariates, the overidentifying restrictions are valid.

The Sargan statistics reported at the end of the 2SLS estimations in columns (3) and (4) of Table 1 show that the overidentifying restrictions are valid because $p > 0.05$. However, the Cragg-Donald $F$ statistic is low, implying weak instruments (Staiger and Stock, 1997). In practice, however, there is no clear critical value for the $F$ statistic to test for instrument relevance because it depends on many factors (Cameron and Trivedi, 2005, 2009). Nonetheless, with the presence of weak instruments, the precision of the 2SLS estimator can be reduced (Hayashi, 2000). Therefore, we used the limited information maximum likelihood (LIML) estimator as an alternative, which has better finite-sample properties when instruments are weak (Murray, 2006). The LIML estimator assumes joint normality of the errors in the structural and first-stage equations, therefore robust standard errors are used and the results are presented in column (5) of Table 1.

The coefficient of remittances is -0.29 in the LIML estimation and is significant at the 10 percent level, indicating some bias in the 2SLS. The estimated elasticity now implies that a 1 percent increase in remittances could lead to the reduction of 3.2 deaths per 100,000 population, which in actual numbers represents
1247 fewer deaths. The rest of the estimated coefficients of the included explanatory variables have the correct signs.

In order to ensure that our estimations were not affected by any influential observations and outliers, we removed 7 countries\textsuperscript{15}: Belarus, Bolivia, Burundi, El Salvador, Morocco, Russia and Singapore from our sample (see Figure 2), based on the detection and ‘deletion’ diagnostics methodologies (see; Belsley et al., 1980; Donald & Maddala, 1993; Fiebig, 1992) and re-estimated our preferred LIML regression, which is reported in column (6) of Table 1. While the estimated coefficient of Remit remains unchanged at –0.29, it is now significant at the 5 percent level\textsuperscript{16}.

To control for the effect of income levels in our empirical model, we added the log of real GDP per capita (GDP\textsubscript{pc}). While the effect of Remit on the homicide rate is still significantly negative (-0.285) the effect of income level is positive (column 7), which contradicts the findings of Fajnzylber et al. (2002a, 2002b). In our view, this distortion is due to the collinearity\textsuperscript{17} of remittances and income, because Remit can also affect the GDP\textsubscript{pc}. Therefore, to remove the impact of remittances on income, we regressed GDP\textsubscript{pc} on Remit and used the obtained residuals (GDP\textsubscript{pc_res}) to control for income level instead of GDP\textsubscript{pc}. An important determinant of homicide is education (Fajnzylber et al., 2002a, 2002b) but Remit can also affect education. Similarly, the impact of remittances on education is removed by obtaining the residual (School\textsubscript{res}) from the regression of log of secondary school enrolment (School) on Remit. Thereafter, using GDP\textsubscript{pc_res} and School\textsubscript{res} to control for income level and education respectively, we re-estimated our model using LIML, as presented in column (8). Remittances were still found to lessen homicide rates, but the overall magnitude of the coefficient of Remit dropped
to -0.181 while being statistically significant at 1 percent level, implying that at the current estimate, remittances can reduce around 800 deaths. The coefficient of \( GDPpc_res \) is negative and significant at 1 percent level (-0.460), which means that in previous estimations the coefficient of \( Remit \) was capturing part of the effect of income level on the reduction of homicide rates. Education is, however, insignificant even after making it orthogonal to remittances, thus it is not an important determinant of homicide rate in our sample. In our final model, we added the structural determinants of homicide rates: the rate of growth of urbanisation (\( Urban \)) and the proportion of youth in the population (\( Youth \)) in addition to controlling for income and education. The results of the full model are presented in column (9), where it appears that the structural determinants are not significant. The coefficient of \( Remit \) (-0.187) is significant at 5 percent level and shows that just over 2 deaths per 100,000 population or around 800 deaths could be avoided with a one percent increase in remittances. The other significant explanatory variables are \( GDPpc_res \), \( Gini \), \( Ethnic \), \( Hybrid \), and \( War \), all having the expected signs. The Kleibergen-Paap F statistic is greater than 10% maximal LIML, which suggests that the model no longer suffers from weak identification, and the Hansen J statistic shows that overidentifying restrictions are valid.

**INSERT FIGURE 2 HERE**
5. Robustness Analysis

How robust is the empirical exercise in linking remittances and social violence? Model uncertainty exists in most empirical exercises because the significance of the variable under investigation is sensitive to what other variables are included or excluded from the model (Leamer & Leonard, 1983). To check the robustness of our results we carried out sensitivity analysis on remittances using extreme bounds analysis (EBA) (Leamer, 1983; Leamer, 1985).

Table 2 presents the EBA exercises. The $z$-variable is always Remit, whose sensitivity we want to investigate. The $y$-variable is always included in the sensitivity analysis. Four variables from a vector of $x$ control variables are included in each EBA exercise, but the included $y$-variable or variables are always excluded from the $x$ vector.

INCLUDE TABLE 2 HERE

Table 2 presents 5 EBA exercises checking for the robustness of Remit. The first one does not include any $y$-variables, while the next three contain Hybrid, Gini and War, respectively, as $y$-variables and the fifth includes both Gini and War as $y$-variables. In all five EBA exercises, the lower extreme bound (Min) and the upper extreme bound (Max) of the coefficient $b_z$ do not alter in sign, and are significant at the 5 percent level. Therefore we conclude that the variable Remit is robust in our empirical analysis.
6. Conclusion

We analysed the effect of remittances on social violence in countries for which intentional violence data are available. We tested the hypothesis that inflow of remittances leads to the reduction of social violence. The idea behind our hypothesis was that remittances can diminish social violence by increasing average income, reducing poverty and forming human capital. We developed a model to derive the conditions under which remittances reduce social violence. With the aid of cross-sectional homicide data, we found evidence in favour of our hypothesis, factoring in the endogeneity and weak instruments problem.

While the existing literature sees homicide rates primarily determined by structural determinants which are difficult, if not impossible, to change via policy, our findings do have implications for public policy. To diminish the level of social violence in the short or medium-term, both the source and host economies can undertake policies to reduce the transaction costs associated with sending and receiving remittances. In addition, developing economies can adopt policies under the existing regulatory environment to advance digital technology that provides a low-cost way for people to complete financial transactions; for example transferring money using their mobile phones to family members in need, or receiving remittances from their kin working abroad.
The death rate is given by: \[
\left[ \frac{\text{number of deaths}}{\text{population}} \right] \times 100,000 = 2.06.
\]

Given that the average population in our study is 182,000 and 598,000, respectively (WHO, 2004 & 2008).

Lindley (2009), using data from Somalia, showed that compared to a peaceful setting the sending of remittances is different in a conflict-afflicted area, although she did not formalise a connection between these two variables.

Endnotes:

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.

2 Our comprehensive definition of social violence is provided in section 2.

3 We have used the terms social violence and conflict interchangeably in the paper.

4 There is an ancient Bengali proverb “deprivation degrades human character and soul”.

5 Lindley (2009), using data from Somalia, showed that compared to a peaceful setting the sending of remittances is different in a conflict-afflicted area, although she did not formalise a connection between these two variables.

6 In terms of number of deaths, most countries have homicide rates that exceed the threshold of one thousand combat-related deaths during a year that is the standard criterion for civil war.


8 Conflict here indicates high levels of violence and crime. According to data produced by the WHO, in 2002 there were approximately 170,000 war-related deaths but over 500,000 deaths due to interpersonal violence worldwide, while in 2004 the counts were 182,000 and 598,000, respectively (WHO, 2004 & 2008).

9 Our study focuses on the W-158 sub-category labelled as ‘violence’ under “deaths caused by intentional injuries,” in WHO (2004, 2008), whereas there are two latest waves of WHO data (available for year 2000 and 2012), where ‘interpersonal violence’ is labelled as the second sub-category in “deaths caused by intentional injury” and coded as GHE-162. We are unsure about the comparability of these two data sets, hence preferred to use the ‘violence’ data which have been reliably used in past studies. Our choice was also determined by data limitation on some of the control variables in our paper, mainly hybrid political regimes, which were unavailable beyond 2005.

10 Please refer to Online Appendix – I for data definitions and sources.

11 Various studies have used different samples, estimation methods and specifications and identification strategies which vary according to the data and objectives of the studies and their findings are not strictly comparable. Given the nature of our data and research question, we have used the most appropriate instrumentation strategy. However, the instrumentation strategy that was adopted in this paper and in the remittances literature in general, differs from the same in related topics such as the aid and growth relationship explored in Rajan and Subramanian (2008). The main difference is that our data, being purely cross-sectional, enables the use of time-invariant geographic variables in addition to time varying economic variables as instruments. In Rajan and Subramanian (2008), the idea behind the instrumentation strategy was to exploit the noneconomic explanations for donor behaviour in giving aid to capture the exogenous variation which was measured by the bilateral colonial relationship between donor and recipient countries. Remittances on the other hand involve a series of small private household-to-household transfers and do not possess any such donor-recipient relationship. With respect to the aid and corruption literature, Tavares (2003) instrumented aid by exploiting the bilateral characteristics of developing countries and OECD economies. This is a useful approach and the construction of our Instrument5 is similar to this method, but rather than using a specific group of OECD economies and bilateral data, we used the aggregate data.

12 Another potential instrument could have been the migration data compiled by Ozden et. al. (2011) because remittances and migration tend to be highly correlated. Whilst this satisfies the ‘instrument relevance’ condition very well, it falls short of the ‘exclusion principle’ which requires migration to have no direct effect on violence except through remittances or other included regressors. This clearly not so – emigration can directly lead to more or less violence being perpetrated, or can be caused by violence.

13 Please refer to Online Appendix – II for descriptive statistics.

14 The death rate is given by: \[
\left[ \frac{\text{number of deaths}}{\text{population}} \right] \times 100,000 = 2.06.
\]

Given that the average population in our sample is 38,979,770, the actual number of deaths is thus 802.98.

15 Please refer to Online Appendix – IV to see the list of countries.

16 In order to check the robustness of the IV-LIML results we have obtained so far, we also took only a sub-set of instruments and carried out additional IV estimates by dropping individual instruments or sets of instruments. These results are reported in Table A1 of Online Appendix – V. To make comparison easier, we first report the results with all six instruments, and then subsequently drop one or more instruments. The results with a sub-set of instruments are similar to those using all six instruments.

17 Please refer to the correlation matrix in Online Appendix – III.

18 For a detailed technical discussion on extreme bounds analysis (EBA), please refer to Online Appendix – VI.

19 EBA is one way to test for robustness. Robustness can also be checked by running one regression only, employing the general-to-simple (GETS) approach a obtain a parsimonious representation of the general
unrestricted model (GUM), which is an approximation to the data generation process (DGP), where only the robust regressors are retained (Hendry & Krolzig, 2004). However, this methodology requires the use of the specialised software \textit{PtGETS} to run the GETS algorithm from GUM to the specific model.

\textsuperscript{20} bKash – a company using mobile phone-based digital technology in Bangladesh, provides banking services such as paying bills or transferring money, to customers who do not have access to formal financial services. (http://online.wsj.com/articles/gates-links-technology-banking-services-for-poor-1412299200).
References:


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


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

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>IV-2SLS (2)</th>
<th>LIML (3)</th>
<th>LIML (4)</th>
<th>LIML (5)</th>
<th>LIML (6)</th>
<th>LIML (7)</th>
<th>LIML (8)</th>
<th>LIML (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remit</td>
<td>-0.045 (-1.37)</td>
<td>-0.015 (-0.47)</td>
<td>-0.185 (-2.01)**</td>
<td>-0.196 (-2.27)**</td>
<td>-0.296 (-1.90)*</td>
<td>-0.297 (-2.59)**</td>
<td>-0.285 (-1.86)*</td>
<td>-0.181 (-2.60)**</td>
<td>-0.187 (-2.23)**</td>
</tr>
<tr>
<td>GDPpc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.061 (0.37)</td>
<td></td>
<td></td>
<td>-0.460 (-3.92)**</td>
<td>-0.537 (-2.85)**</td>
</tr>
<tr>
<td>GDPpc_res</td>
<td>0.062 (6.23)**</td>
<td>0.036 (2.84)**</td>
<td>0.061 (5.52)*****</td>
<td>0.042 (2.97)*****</td>
<td>0.045 (2.48)**</td>
<td>0.053 (3.13)*****</td>
<td>0.054 (2.89)*****</td>
<td>0.022 (2.02)**</td>
<td>0.024 (2.16)**</td>
</tr>
<tr>
<td>Gini</td>
<td>0.062 (6.23)*****</td>
<td>0.036 (2.84)*****</td>
<td>0.061 (5.52)*****</td>
<td>0.042 (2.97)*****</td>
<td>0.045 (2.48)**</td>
<td>0.053 (3.13)*****</td>
<td>0.054 (2.89)*****</td>
<td>0.022 (2.02)**</td>
<td>0.024 (2.16)**</td>
</tr>
<tr>
<td>School_res</td>
<td>1.005 (3.06)*****</td>
<td>0.593 (1.70)*</td>
<td>0.804 (2.15)**</td>
<td>0.501 (1.31)</td>
<td>0.453 (0.98)</td>
<td>0.508 (1.11)</td>
<td>0.545 (1.16)</td>
<td>0.745 (2.03)**</td>
<td>0.747 (2.04)**</td>
</tr>
<tr>
<td>Ethnic</td>
<td>0.536 (2.88)*****</td>
<td>0.721 (3.90)*****</td>
<td>0.452 (2.15)**</td>
<td>0.562 (2.64)*****</td>
<td>0.472 (1.78)*</td>
<td>0.459 (2.10)**</td>
<td>0.538 (2.19)**</td>
<td>0.389 (1.86)*</td>
<td>0.436 (2.18)**</td>
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<td>Hybrid</td>
<td>0.071 (0.36)</td>
<td>-0.021 (-0.10)</td>
<td>0.219 (0.93)</td>
<td>0.135 (0.53)</td>
<td>0.221 (0.76)</td>
<td>0.309 (1.35)</td>
<td>0.309 (1.28)</td>
<td>0.057 (0.30)</td>
<td>0.134 (0.65)</td>
</tr>
<tr>
<td>Drug</td>
<td>0.394 (3.17)*****</td>
<td>0.431 (3.44)*****</td>
<td>0.360 (2.62)*****</td>
<td>0.354 (2.50)**</td>
<td>0.318 (1.73)*</td>
<td>0.401 (2.11)**</td>
<td>0.393 (2.02)**</td>
<td>0.325 (1.62)</td>
<td>0.327 (1.66)*</td>
</tr>
<tr>
<td>War</td>
<td>-0.159 (-0.43)</td>
<td>0.175 (0.41)</td>
<td>0.356 (0.68)</td>
<td>0.217 (0.43)</td>
<td>0.279 (0.49)</td>
<td>-0.377 (-0.91)</td>
<td>-0.332 (-0.78)</td>
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<td></td>
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<tr>
<td>Urban</td>
<td></td>
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<td></td>
<td>-0.071 (-0.95)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Youth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1.196 (-0.48)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAP</td>
<td>0.204 (0.85)</td>
<td>0.268 (1.02)</td>
<td>0.303 (1.02)</td>
<td>0.395 (1.56)</td>
<td>0.450 (1.48)</td>
<td>0.168 (0.79)</td>
<td>0.283 (1.11)</td>
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<tr>
<td>LAC</td>
<td>0.636 (2.07)**</td>
<td>0.482 (1.42)</td>
<td>0.400 (0.99)</td>
<td>0.237 (0.67)</td>
<td>0.241 (0.65)</td>
<td>0.633 (2.56)**</td>
<td>0.691 (2.46)**</td>
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<td>MENA</td>
<td>-0.575 (-2.16)**</td>
<td>-0.425 (-1.43)</td>
<td>-0.341 (-0.99)</td>
<td>-0.142 (-0.59)</td>
<td>-0.134 (-0.50)</td>
<td>-0.349 (-1.32)</td>
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<td>SA</td>
<td></td>
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<td></td>
<td>-0.159 (-0.43)</td>
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<tr>
<td></td>
<td>SSA</td>
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<tr>
<td></td>
<td>0.654(2.60)**</td>
<td>0.496(1.75)*</td>
<td>0.409(1.12)</td>
<td>0.413(1.30)</td>
<td>0.513(1.41)</td>
<td>-0.143(-0.46)</td>
<td>-0.041(-0.13)</td>
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<td>Cons</td>
<td>-0.658(-0.85)</td>
<td>-0.432(-0.58)</td>
<td>2.312(1.17)</td>
<td>3.091(1.77)*</td>
<td>5.058(1.63)</td>
<td>4.767(2.01)**</td>
<td>3.871(1.66)*</td>
<td>3.674(2.35)**</td>
<td>4.159(1.72)**</td>
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<td>Obs</td>
<td>112</td>
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<td>Adjusted-R²</td>
<td>0.61</td>
<td>0.65</td>
<td></td>
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<td>Centered-R²</td>
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<td>0.45</td>
<td>0.55</td>
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<td>Cragg-Donald F</td>
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<td>2.932</td>
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<td>Kleibergeren-Paap F</td>
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<td></td>
<td></td>
<td></td>
<td>3.036</td>
<td>2.25</td>
<td>1.992</td>
<td>3.924</td>
<td>4.966</td>
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<td>Sargan stat: (\chi^2(5): p)-value:</td>
<td></td>
<td>0.323</td>
<td>0.187</td>
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<td>Hansen J stat: (\chi^2(5): p)-value:</td>
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<td>0.817</td>
<td>0.543</td>
<td>0.496</td>
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</table>

* p<0.1; ** p<0.05; *** p<0.01. \(t\) statistics in parentheses. Robust standard errors reported for LIML estimations in column (5). \(^1\) \(GDPpc\_res\) is the residual obtained from regressing \(GDPpc\) on \(Remit\). \(^2\) \(School\_res\) is the residual obtained from regressing log of secondary school enrolment ratio (\(School\)) on \(Remit\).
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*)

<table>
<thead>
<tr>
<th>z-variable</th>
<th>$b_z$</th>
<th>$t$</th>
<th>0.95 C.I.</th>
<th>y-variable</th>
<th>Robust/Fragile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Remit</strong></td>
<td>Min</td>
<td>-0.136</td>
<td>-3.05***</td>
<td>-0.224</td>
<td>-0.048</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>-0.071</td>
<td>-2.01**</td>
<td>-0.141</td>
<td>-0.001</td>
</tr>
<tr>
<td><strong>Remit</strong></td>
<td>Min</td>
<td>-0.082</td>
<td>-2.07**</td>
<td>-0.161</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>-0.082</td>
<td>-2.07**</td>
<td>-0.161</td>
<td>-0.003</td>
</tr>
<tr>
<td><strong>Remit</strong></td>
<td>Min</td>
<td>-0.092</td>
<td>-2.33**</td>
<td>-0.171</td>
<td>-0.014</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>-0.071</td>
<td>-1.99**</td>
<td>-0.142</td>
<td>-0.001</td>
</tr>
<tr>
<td><strong>Remit</strong></td>
<td>Min</td>
<td>-0.094</td>
<td>-2.15**</td>
<td>-0.181</td>
<td>-0.007</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>-0.071</td>
<td>-2.01**</td>
<td>-0.141</td>
<td>-0.001</td>
</tr>
<tr>
<td><strong>Remit</strong></td>
<td>Min</td>
<td>-0.078</td>
<td>-2.12**</td>
<td>-0.151</td>
<td>-0.005</td>
</tr>
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<td>Max</td>
<td>-0.071</td>
<td>-1.99**</td>
<td>-0.142</td>
<td>-0.001</td>
</tr>
</tbody>
</table>

* p<0.1; ** p<0.05; *** p<0.01
## Online Appendix I. Data Descriptions

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Descriptions &amp; Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conflict</strong></td>
<td>Natural log of deaths due to intentional injury per 100,000 populations. (Source: WHO 2004, 2008).</td>
</tr>
<tr>
<td><strong>Remit</strong></td>
<td>Log of remittances in current USD. (Source: World Development Indicator, World Bank).</td>
</tr>
<tr>
<td><strong>Gini</strong></td>
<td>Standardized World Income Inequality Dataset (Solt, 2009)</td>
</tr>
<tr>
<td><strong>Ethnic</strong></td>
<td>Ethnic and Linguistic Fractionalisation score (Source: Alesina et al., 2003).</td>
</tr>
<tr>
<td><strong>Hybrid</strong></td>
<td>Political Regime Type representing countries which are neither fully autocratic nor fully democratic. (Source: Fox and Hoelscher, 2012).</td>
</tr>
<tr>
<td><strong>Drug</strong></td>
<td>Dummy variable coded 1 if the country is drug producing or transiting. (Source: Fox and Hoelscher, 2012).</td>
</tr>
<tr>
<td><strong>War</strong></td>
<td>Natural log of deaths due to war per 100,000 population. Average value for 2002 and 2004 (Source: WHO 2004, 2008).</td>
</tr>
<tr>
<td><strong>GDPpc</strong></td>
<td>Log of real GDP per capita (Source: World Development Indicators, World Bank)</td>
</tr>
<tr>
<td><strong>School</strong></td>
<td>Log of gross secondary enrolment ratio (Source: World Development Indicators, World Bank).</td>
</tr>
<tr>
<td><strong>Urban</strong></td>
<td>Annualised rate of urban growth 2000 – 2005 (Source: Fox and Hoelscher, 2012)</td>
</tr>
<tr>
<td><strong>Youth</strong></td>
<td>Total percentage youth population (15 to 24/15+) (Source: World Development Indicators, World Bank)</td>
</tr>
<tr>
<td><strong>Instruments 1, 2, 3</strong></td>
<td>Center for International Development, Harvard University, Research Dataset (<a href="http://www.cid.harvard.edu/ciddata/ciddata.html">http://www.cid.harvard.edu/ciddata/ciddata.html</a>)</td>
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<td><strong>Instrument4</strong></td>
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</tr>
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<td><strong>Instruments 5, 6</strong></td>
<td>Computed by the authors</td>
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<td><strong>Regional Dummies</strong></td>
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</tr>
<tr>
<td><strong>EAP</strong></td>
<td>East Asia and the Pacific</td>
</tr>
<tr>
<td><strong>LAC</strong></td>
<td>Latin America and the Caribbean</td>
</tr>
<tr>
<td><strong>MENA</strong></td>
<td>Middle East and North Africa</td>
</tr>
<tr>
<td><strong>SA</strong></td>
<td>South Asia</td>
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<tr>
<td><strong>SSA</strong></td>
<td>Sub Saharan Africa</td>
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### Online Appendix II. *Descriptive Statistics.*

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<tr>
<th>Variable</th>
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<th>Mean</th>
<th>Std. Deviation</th>
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<th>Max</th>
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<tr>
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<td>1.79</td>
<td>1.18</td>
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<td>4.35</td>
</tr>
<tr>
<td>Remit</td>
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<td>19.61</td>
<td>2.16</td>
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<tr>
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<td>38.32</td>
<td>8.6</td>
<td>23.07</td>
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<td>0.46</td>
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<tr>
<td>Drug</td>
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<td>0</td>
<td>1</td>
</tr>
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<tr>
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<td>2.06</td>
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</tr>
<tr>
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<td>0.99</td>
<td>-1</td>
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</tr>
<tr>
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<td>0.40</td>
<td>0.09</td>
<td>0.20</td>
<td>0.57</td>
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Online Appendix III. Correlation Matrix.

*(Observations = 91)*

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<th>Gini</th>
<th>Ethnic</th>
<th>Hybrid</th>
<th>Drug</th>
<th>War</th>
<th>GDPpc</th>
<th>School</th>
<th>Urban</th>
<th>Youth</th>
</tr>
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<td></td>
</tr>
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<tr>
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<tr>
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<td>0.1366</td>
<td>0.4027</td>
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<tr>
<td>War</td>
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</tr>
<tr>
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<td>0.2605</td>
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<td>0.2751</td>
<td>-0.5006</td>
<td>-0.2214</td>
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<tr>
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<td>0.5809</td>
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<td>0.2478</td>
<td>0.3246</td>
<td>-0.8441</td>
<td>-0.3982</td>
<td>0.5148</td>
<td>1</td>
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</tbody>
</table>
Online Appendix IV. List of Countries.

| Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belarus, Belgium, Benin, Bhutan, Bolivia, Bosnia, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo Brazzaville, Congo Kinshasa, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Djibouti, Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Korea North, Korea South, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Morocco, Mongolia, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia and Montenegro, Sierra Leone, Singapore, Slovak Republic, Slovenia, Solomon Islands, Somalia, South Africa, Spain, Sri Lanka, Sudan, Swaziland, Sweden, Switzerland, Syria, Tajikistan, Tanzania, Thailand, Togo, Trinidad, Tunisia, Turkey, Turkmenistan, UAE, Uganda, Ukraine, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe. |
Online Appendix V. Additional Results.

Table A1. Remittances and Social Violence
Dependent Variable: The number of logged deaths due to intentional injury per 100,000 population (Conflict)

<table>
<thead>
<tr>
<th></th>
<th>LIML (Outlier removed)</th>
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</thead>
<tbody>
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<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
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<tr>
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<td>-0.299</td>
<td>-0.278</td>
<td>-0.288</td>
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<td></td>
<td>(-2.59)**</td>
<td>(-2.13)**</td>
<td>(-2.00)**</td>
<td>(-2.11)**</td>
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<tr>
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<td>0.053</td>
<td>0.053</td>
<td>0.053</td>
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<td>(3.13)**</td>
<td>(3.13)**</td>
<td>(3.21)**</td>
<td>(3.21)**</td>
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<td>0.529</td>
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<td></td>
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<td>(1.07)</td>
<td>(1.18)</td>
<td>(1.12)</td>
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<tr>
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<td>0.458</td>
<td>0.466</td>
<td>0.460</td>
</tr>
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<td></td>
<td>(2.10)**</td>
<td>(1.98)**</td>
<td>(2.06)**</td>
<td>(1.99)**</td>
</tr>
<tr>
<td>Drug</td>
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<td>0.311</td>
<td>0.274</td>
<td>0.281</td>
</tr>
<tr>
<td></td>
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<td>(1.29)</td>
<td>(1.17)</td>
<td>(1.16)</td>
</tr>
<tr>
<td>War</td>
<td>0.401</td>
<td>0.403</td>
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<tr>
<td></td>
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<td>(2.02)**</td>
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<td>(2.27)**</td>
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<tr>
<td>Regional Dummies</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cons</td>
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<td>4.813</td>
<td>4.378</td>
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<td></td>
<td>(2.01)**</td>
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<td>(1.63)</td>
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<td>1, 5, 6</td>
<td>5, 6</td>
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<td>Obs</td>
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<td>103</td>
<td>104</td>
<td>104</td>
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<td>Centered-R²</td>
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<td>0.566</td>
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<td>Root MSE</td>
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<td>0.76</td>
<td>0.73</td>
<td>0.74</td>
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<tr>
<td>Kleibergen-Paap F</td>
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<td>2.607</td>
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<tr>
<td>Hansen J stat: δ²(5): p–value:</td>
<td>0.99</td>
<td>0.95</td>
<td>0.77</td>
<td>0.49</td>
</tr>
</tbody>
</table>

* p<0.1; ** p<0.05; *** p<0.01. t statistics in parentheses. Robust standard errors reported for LIML estimations in column (5).

Note: Instrument1: mean distance to nearest coastline or sea-navigable river in kilometres; Instrument2: percentage of area of the country in the geographical temperate zone; Instrument3: percentage of land in the geographical tropics; Instrument4: CO₂ emission per capita; Instrument5: average unemployment rate in the OECD economies times each country’s remittances to the GDP ratio; Instrument6: rest of the world GDP.
Online Appendix VI. Extreme Bounds Analysis (EBA).

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 within a range of possible models, it enables examination of how sensitive parameter estimates are to different specifications. According to Leamer and Leonard (1983) the extreme values of the coefficient of the variable of interest present 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:

\[ \Lambda = a + b_2y + b_3z + b_4x + u \]  

(A1)

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

To check for the robustness of the EBA variable under consideration, for each model \( j \), one estimate of \( b_{2j} \) and the corresponding standard deviation \( \sigma_{2j} \) are made. The lower extreme bound for this parameter is defined as the lowest value of \( b_{2j} - \sigma_{2j} \) and the upper extreme bound is the largest value of \( b_{2j} + \sigma_{2j} \). 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, while if the lower and upper extreme bounds have the same sign, the variable under scrutiny is robust.

References:

