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Can Remittances Buy Peace?

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Can Remittances Buy Peace?[☆]

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Abstract

In this paper I study the effect of remittance flows on conflict incidence, onset, and duration in recipient countries. I improve on previous studies by controlling for unobserved country specific effects, serial correlation, and the possible endogenous relationship between conflict and the tendency for a country to receive remittances. I found that remittance flows have a significant negative causal effect on the incidence and continuation of conflicts. There is no such effect for conflict onset. I also develop a theory which demonstrate that increases in remittance flows can alter the incentives of participating in a rebellion thereby encouraging a deescalation of hostilities and, consequently, a reduction in the number of battle-related deaths.

Keywords: Remittances, conflict, opportunity cost, endogeneity
JEL: D74, F22, F24

1. Introduction

Since World War II civil wars around the world have killed approximately 20 million people and displaced at least 67 million (World Bank, 2005). During this period the incidence of civil wars have been systematically related to poor economic conditions. Countries with low income, widespread poverty and hunger among the population face high risks of prolonged conflicts. In the midst of these conflict zones are civilians who suffer as a result of disruption or loss of their livelihoods. With only small amounts of emergency international aid reaching zones of conflict, civilians are left to come up with their own coping strategies for fulfilling basic needs (Fagen and Bump, 2006). Coping strategies include economic support, in the form of remittances, from relatives who have migrated.

It is important to recognize that civilians in conflict zones are an important source of rebel labor. Rebellions are staffed with recruits who are motivated either by political (grievance) or economic (greed) reasons (Collier and Hoeffler, 2004).[1] Economic variables such as GDP, commodity prices, poverty, income inequality, and foreign aid have long been considered as important determinants of conflict (Nunn and Qian, 2014; de Ree and Nillesen, 2009; Miguel et al., 2004; Collier, 2000). However, less attention have been given to remittances as a possible economic determinant of conflict.[2] It is well established that one of the causes of conflict are economic hardships that feed the grievances of citizens (Collier and Hoeffler, 2004; Collier, 2000). It is also well known that remittances help relax the liquidity constraints of their recipients (Chami et al., 2008). Therefore, with less economic hardship there is not much of an economic incentive for remittance recipients to participate in a rebellion. One of my contributions is a theory of conflict where remittance could alter the incentives of participation in rebellions. Using a micro-founded model of insurrection, I argue that opportunity cost is a plausible channel through which remittance can influence participation. Remittances can raise the opportunity cost of participation which could lead

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[1]Economic hardship, along with political grievances and ethnic feuds, are important factors that motivate individuals to participate in rebellions or insurrections.

[2]To the best of my knowledgeRegan and Frank (2014) is the only paper which studied the connections between remittances and conflicts to date.

to pacification, that is the reduction in both the number of rebels and the force used by the government forces.

The idea that remittances can buy peace motivated me to empirically test its effect on conflicts across recipient countries. While it is straightforward to produce correlations between remittances and conflicts, teasing out a causal effect is a challenge. Three reasons explain this difficulty all of which, if failed to be accounted for, could lead to biased estimates. First, there is the problem of unobserved heterogeneity among recipient countries. The unobserved heterogeneity can come from culture, institutions and the like. These unobserved factors need to be controlled for as they likely have simultaneous impacts on remittance and conflict. Second, conflicts are persistent. The probability of having conflict in the next period depends on having conflict in the current period. Hence, there is a need to explicitly model state dependency of conflicts. Third, and most importantly, there can be a reverse causation between remittance and conflict. Conflict often results to forced displacement of people, which in turn, can lead to higher remittance inflows. For instance, Sri Lanka receive a significant amount of remittances (6% of its GDP on average) coming mostly from Tamils who fled that country because of decades-long conflict.

Unlike previous studies these three issues were taken into consideration in the empirical analysis. In this paper I found a robust and consistent negative relationship between remittance and conflict. The results are robust and consistent to the extent that my empirical approach recognizes the importance of fixed effects, serial correlation, and the possibility that conflicts are endogenous to remittance flows. Following Acemoglu et al. (2001) the causal analysis exploits the variation in settler mortality rates across remittance recipient countries and their tendency to receive remittances. At its core this paper provides empirical evidence that countries which receive significant amounts of remittance inflows are less prone to conflicts.

1.1. Related literature

This paper is closely related to Regan and Frank (2014) where they found that remittance flows during crises can lower the risk of civil war. My study builds on their previous work by testing the efficacy of remittances in "buying off" conflicts measured through incidence, onset, and duration. I improve on their identification strategy by taking into account the possibility of reverse causation between remittance flows and conflicts, as well as recognize the importance of fixed effects and dynamics. My findings are not at odds with theirs as I also found that remittance flows dampen the risk of civil unrest.

There is a growing literature about terrorism and remittances. This literature is related to the current paper in a sense that rebellion and terrorism are indistinguishable at least from the point of view of conventional economic analysis.[3] Two papers stand out in this literature. The first paper is by Elu and Price (2012) which found that "approximately one terrorism incident is financed in sub-Saharan Africa for remittance inflows that range between approximately one quarter of a million dollars and one million dollars". The other paper is by Mascarenhas and Sandler (2014) where they found that remittances have a positive impact on domestic and transnational terrorism. These two papers deserve scrutiny for several reasons. Both papers used formal remittance data to explain terrorism events. It is reasonable to suspect that remittances for terrorism purposes are sent clandestinely outside the formal channels. If this is the case, formal remittances are not enough a proxy for informal remittances to explain terrorism activities. Also, these papers did not look into the possibility that conflicts are endogenous to the tendency of a country to receive remittances.

My study is also at the crossroads of the literature on foreign aid and conflicts. Although both remittance and aid flows are wealth transfers the way they are disbursed is different. Foreign aid is disbursed by donors to governments of receiving countries or to multilateral organizations which allocate them to projects or humanitarian assistance. In contrast, remittances are received directly by individuals often from relatives of migrants. Some forms of aid, such as food aid and humanitarian assistance, have the same effects as remittance, that is to mitigate the shortfall in resources of their recipients. This strand of the literature has grown in popularity in recent decades so I will mention only few and relevant papers. de Ree and Nillesen (2009) found a significant and negative relationship between foreign aid

[3]The distinction between terrorism and rebellion in conventional economic analysis is murky at best. Grossman (1999) finds that "in such insurrections the insurgents [in civil conflicts] are indistinguishable from bandits or pirates."

flows on the probability of conflicts to continue. Their approach takes into account that conflicts are dynamic and could be affected by unobserved variables. I used their approach, discussed extensively in section 4, in carefully teasing out the causal relationship between remittance flows and conflict. Foreign aid can also play a proximate role in the outbreak of violence. Nielsen et al. (2011), using rare-event logit analysis and matching methods, found that negative aid shocks significantly increase the probability of armed conflict onset. Nunn and Qian (2014) found a similar result where increases in US food aid increases the incidence and duration of conflicts.

There is the hypothesis that remittances can be a source of rebel financing (Collier, 2000). As an example, Angoustures and Pascal (1996) review the evidence that the Tamil Tigers in Sri Lanka receive funding from the Tamil diaspora in North America. These remittances are usually sent through channels outside of mechanisms to record amounts or recipients (Regan and Frank, 2014). The lack of information about informal remittance transactions make it difficult to determine whether remittances are indeed used to bankroll rebellions.[4] In contrast, remittances are formal if they are sent through established channels such as banks or money transfer agencies (i.e. Western Union). Transactions for remittances of this type are mostly transparent and subject to financial regulations in the sending country making it difficult to get into the pockets of rebel leaders. In this paper I focus only on formal remittances and their effects on conflicts.

The rest of this paper is summarized as follows: The next section present a theoretical model of conflict and wealth transfers. Sections 3 and 4 discuss the data and stylized facts, respectively, on remittances and conflict. The predictions of the theoretical model are empirically evaluated in section 5. Section 6 concludes.

[4]Ratha (2003) estimates that informal remittances might reach the level of 50% of those transmitted through formal channels. The IMF estimates for informal remittances around 35%-250% of formal remittances (Freund and Spatafora, 2008)

2. A sequential game of insurrections with wealth transfers

2.1. The peasants

Consider a simple production economy populated by N peasants ruled by a dictator.[5] In this production economy peasants are given 1 unit of time in which they can allocate to labor activities h, rebellion activities r, or leisure $l = 1 - h - r$. Peasants derive utility from consumption and leisure activities. For tractability, I assume that a representative peasant's utility is described by the following logarithmic utility function:

$$U = \log(c) + \log(l). \tag{1}$$

Peasant output is given by αh where $\alpha > 0$ is a productivity parameter. The dictator extract a fraction $t \in [0, 1]$ from the peasants' output as rent. Assuming that a rebellion is successful, peasants who participate in the insurrection collect from the loot and are paid $\beta > 0$ per unit of time spent in their efforts to overthrow the dictator.[6] Peasants are assumed to receive exogenous wealth transfers, $x > 0$, which can be in the form of remittances from relatives of peasants overseas or assistance from other enemies of the dictator.[7] To ensure that h and r are non-negative I assume that remittances are not excessively high, $x < (1-t)\alpha$ and $x < \beta$, respectively. Peasants take x, t, α, and β as given. The budget constraint of a representative peasant can be written as follows:

$$(1-t)\alpha h + \beta r + x \geq c. \tag{2}$$

Maximizing (1) subject to (2), the (a) allocation of time to production by each and every peasant satisfies:

$$h^\star = \begin{cases} 0 & \text{if } (1-t)\alpha < \beta \\ \left(0,\ \frac{1}{2}\left(1 - \frac{x}{(1-t)\alpha}\right)\right) & \text{if } (1-t)\alpha = \beta \\ \frac{1}{2}\left(1 - \frac{x}{(1-t)\alpha}\right) & \text{if } (1-t)\alpha > \beta, \end{cases}$$

[5]Variables in the aggregate are denoted in uppercase.

[6]The potential reward for participating in the rebellion is independent of efforts of the dictator to suppress it. If r or β depends on G then it becomes difficult to find a unique equilibrium without imposing further restrictions.

[7]It should be recognized that there are many forms of wealth transfers and these produce the same effects to economic choices of peasants (labor supply and consumption). For instance, a form of wealth transfer could be cash transfers from the dictator to the peasants. In this paper I consider a specific form of wealth transfer from relatives of peasants abroad.

and (b) the allocation of time to insurrection activities by each and every peasant satisfies:

$$r^{\star} = \begin{cases} \frac{1}{2}\left(1 - \frac{x}{\beta}\right) & \text{if } (1-t)\alpha < \beta \\ \left(0,\ \frac{1}{2}\left(1 - \frac{x}{\beta}\right)\right) & \text{if } (1-t)\alpha = \beta \\ 0 & \text{if } (1-t)\alpha > \beta. \end{cases}$$

The results here are similar to Grossman (1991) in the sense that the optimal employment and insurrection choices indicate that peasants will allocate none of their time to any activity whose return is less than the benefit from either of the other activity. In the same vein, peasants would devote all of their time to activities whose return is more than the benefits from other activities. My premise is that rebellions are rooted in economic hardship. Peasants will decide to participate in rebellions if economic hardship becomes intolerable such that participation gives them a higher a return than by not fighting.[8] Given α and β, there is economic hardship if the dictator's extraction rate is high enough, that is:

$$t \geq 1 - \frac{\beta}{\alpha}. \tag{3}$$

If the above condition does not hold then $r^{\star} = 0$.

With leisure being a normal good it is obvious that as wealth transfers increase $h^{\star}$ and $r^{\star}$ decreases. An increase in wealth transfers, such as remittances, raises the opportunity cost of engaging in productive activities and utility-maximizing peasants allocate their time to leisure activities instead.[9] It should be clear that this paper is not about how wealth transfers are chosen rather the focus is on its effects. In the case of remittances, I assume that migrants remit because of the social bonds (or obligations) that exist between them and their relatives in the home country (Yang and Choi, 2007).

[8]It is possible that returns to labor and insurrection activities can be equal. Equalization of returns gives rise to the situation that a peasant can simultaneously engage in labor and insurrection activities. This situation is possible not just for two-person conflicts and but for large-scale civil conflicts as well. As an example, Grossman (1991) cites the case of the Shining Path (or *Sendero Luminoso*) rebellion in Peru where peasant families simultaneously engage in soldiering, rebellions, and labor production.

[9]The negative effect remittances have on labor supply has been previously studied in the literature. For instance, Acosta (2006) found that remittances have a negative relationship with labor supply for adult females in El Salvador. In Tajikistan, Justino and Shemyakina (2012) found that "on average men and women from remittance-receiving households are less likely to participate in the labor market and supply fewer hours when they do".

2.2. The dictator

The power (or income) of the dictator comes from two sources: (1) the aggregate rent she receives from the peasants, tH where $H = \alpha h N$, and (2) those that are independent of the peasants' actions, $\bar{z} \geq 0$. The first source is affected positively and exogenously by the dictator's extraction rate t and worker productivity α, and endogenously by the size of the labor force H. In extreme cases where peasants decide not to work or the extraction rate is zero the rent becomes zero and the dictator's source of power will just be $\bar{z}$. The second source $\bar{z}$ is entirely exogenous and consist of production not attributable to the peasants. Think of $\bar{z}$ as a transfer of military resources such as soldiers and armaments from an ally to 'prop up' the dictator.[10]

Let G be the effort of the dictator to suppress the rebellion and $R = rN$ be the aggregate effort of the rebel force. There are four possible outcomes for the dictator which are contingent on her actions as well as actions of the rebel forces. First, when both parties, the dictator and the rebels, decide not to fight each other the dictator keeps all of the rent, that is $tH + \bar{z}$. Second, the dictator can decide to flee in the face of a rebellion in this case she gets nothing. Third, there can be a situation where the dictator decides to exert some force but the rebels decide not to fight. In this case the dictator's net payoff is $tH + \bar{z} - G$. And fourth if both parties decide to fight then the dictator's net payoff is a function of the strength of the rebel force and her own forces, that is $G(tH + \bar{z})/(G + H) - G$. The outcome payoff Ω for the dictator contingent on the sizes of G and R can be summarized as follows:

$$\Omega = \begin{cases} tH + \bar{z} & \text{if } R = 0 \text{ and } G = 0 \\ tH + \bar{z} - G & \text{if } R = 0 \text{ and } G > 0 \\ \frac{G}{R+G}(tH + \bar{z}) - G & \text{if } R > 0 \text{ and } G > 0 \\ 0 & \text{if } R > 0 \text{ and } G = 0. \end{cases}$$

[10]History is replete with examples of countries like Russia or the United States supporting autocrats like Hafez Assad, Fidel Castro, Salvador Allende, Ferdinand Marcos, etc. A more recent example would be the case of Syria's Bashar Assad. An article in The Economist reported that "Russian warplanes are in the skies over Syria. For the past several weeks, the Kremlin has been beefing up its presence, sending aircraft and sophisticated air defence systems. For Mr. Putin clearly, an important goal is the propping up of his long-time ally, Bashar Assad, who controls some 20% of his country after four years of bloody civil war" (The Economist, 2015).

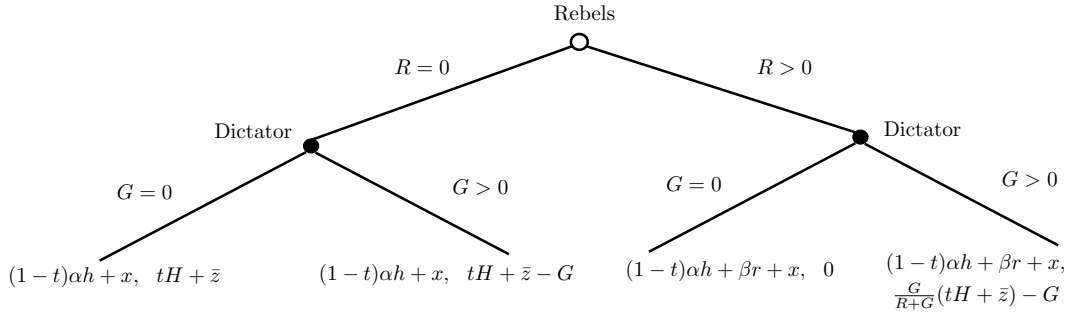

Figure 1: A game tree representation of the dynamic game between rebels and the dictator.

2.3. Casualties of conflict

To include the scale of casualties in the model I follow Collier (2000) by having a multiplicative relationship between the size of the opposing forces and the mortality rate. In particular the 'iso-causalty' curve takes the form:

$$\bar{D} = v(GR), \tag{4}$$

where $\bar{D}$ capture the level of battle-related deaths. I, as in Collier (2000), assume $v' > 0$ meaning that the number of casualties is an increasing function of the opposing forces.

2.4. Timing

The timing of actions in this economy is as follows: In the first stage, given α, β, and the dictator's extraction rate t, peasants decide whether or not they will participate in the rebellion. In this stage the peasants solve their time allocation problem, as well as determine their consumption levels. In the second stage the dictator observes the decision of the peasants and decides whether or not to exert effort to quell the insurrection, and the number of casualties are determined. The structure of the game follows dynamic game with complete information and is graphically depicted in depicted in figure 1 using a game tree format. There are two sub-games contingent on whether or not peasants wish to participate in the rebellion.[11] I use backward induction to solve the game.

2.5. Equilibrium analysis

Consider the sub-game where peasants decide not to participate in the rebellion ($R^\star = 0$) shown in the left node of figure 1. In this sub-game the dictator has two options. If the dictator decides to fight she will receive $tH^\star + \bar{z} - G$ and if not she will receive $tH^\star + \bar{z}$. She will be better off not fighting should the peasants decide not to fight. Regardless of the actions of the dictator the peasants will recieve $(1-t)\alpha h^\star + x$ as their income. Hence, the sub-game perfect Nash equilibrium in this scenario is $R^\star = 0$ and $G^\star = 0$. If both rebels and dictator decide not to fight then casualties are zero.

Consider the other sub-game where peasants decide to fight ($R^\star > 0$) shown in the right node in figure 1. The dictator is faced with two choices. The dictator can either flee in which case all of her income will be lost or she can fight back in which case she gets $G(tH^\star + \bar{z})/(G+R) - G$. The obvious course of action for the dictator is to fight back. Regardless of the actions of the dictator, the peasants will recieve $(1-t)\alpha h^\star + \beta r^\star + x$ as their income. The sub-game perfect Nash equilibrium in this case will be $R^\star > 0$ and $G^\star > 0$ for the rebel and dictator's forces, respectively. The aggregate effort of the rebel force is given by

$$R^\star \in \left(0, \quad \frac{N}{2} - \frac{xN}{\beta}\right], \tag{5}$$

and the best response of the dictator is to exert

$$G^\star = \sqrt{R^\star(tH^\star + \bar{z})} - R^\star. \tag{6}$$

Figure 2 provide a graphical depiction of the interaction between the dictator's forces and rebel forces. The hump-shaped curve is the dictator's best response function and equation (5) is given by the vertical line.[12] The sub-game perfect Nash equilibrium is determined where $R^\star$ intersects the dictator's best response function. At the point E_1 the equilibrium rebel force $R_1^\star$ and dictator's force $G_1^\star$ determine the number of casualties $\bar{D}_1$.

[11] The determination as to which sub-game will be played ultimately depends whether equation (3) holds.

[12] The dictator's best response function is determined by choosing G that maximizes the dictator's payoff function $G(tH^\star + \bar{z})/(R+G) - G$.

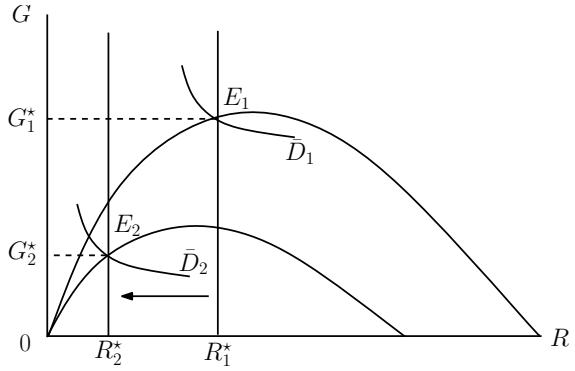

Figure 2: Sub-game perfect Nash equilibrium with conflict and effects of an increase in wealth transfers.

An increase in wealth transfers x, such as remittances, would decrease $R^\star$ and will trigger G to change. The equilibrium level of G, however, will depend on whether $R^\star$ is on the upward or downward sloping portion of the dictator's response function. If $R^\star$ is on the downward sloping part of (6) then a decrease in R would raise G. Conversely, if $R^\star$ is on the upward sloping part of (6) then a decrease in R would reduce G as shown in figure 1. A decrease in R coupled with a weakening of the dictator's forces as a result of an increase in wealth transfers decreases the number of battle-related deaths. From the initial equilibrium E_1 with battle-related deaths D_1, the equilibrium point moves to E_2 with a lower level of casualties given by D_2. The formal proof for the foregoing comparative static result can be found in appendix B. In any case, consumption levels for the peasants increase due to a rise in wealth transfers. Increases in wealth transfers will also raise the opportunity cost of doing productive activities thereby reducing $h^\star$. A lower $h^\star$ will result to a lower rent for the dictator.

3. Data

The data on conflict used in this paper was sourced from the Peace Research Institute Oslo (PRIO) and the Uppsala Conflict Data Program (UCDP). The PRIO-UCDP dataset is the most widely used dataset in the study of conflicts. PRIO-UCDP define conflict as

> "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of at least one is the government of a state, results in at least 25 battle-related deaths."

The PRIO-UCDP categorizes the intensity of conflict into two: *minor conflicts* where battle-related deaths are between 25-999 and *wars* where there at least 1,000 battle related deaths. In defining the dependent variable I use the lower threshold of at least 25 battle-related deaths which is consistent with the extant literature (Miguel et al., 2004; de Ree and Nillesen, 2009; Regan and Frank, 2014). Precisely, a dummy variable for conflict incidence takes a value of 1 if there are at least 25 battle-related deaths observed in a given year. Although there is information about parties to the conflicts there is no information as to how strong these parties are. If a conflict is observed, meaning there are at least 25 battle-related deaths, it is not known whether the deaths are attributed to an escalation of violence from both or just one of the parties.

The main predictor variable in this paper is remittance, measured as remittance in proportion to GDP. Remittances are mainly derived from income earned by workers in countries where they are not residents and those transfers from residents of one country to residents in another (International Monetary Fund, 2010). I calculate remittance as a five year overlapping average of the ratio of remittances to GDP up to period $t-1$. Both remittance and GDP were taken from the World Development Indicators (WDI) and are measured in US dollars.

Not all countries have remittance data. Countries that have fewer than 20 years of continuous remittance data have been excluded to rule out the possibility of attenuation bias due to small number of observations. 41 countries satisfied the criteria of having at least 20 years of continuous remittance observations.

The rest of the data includes conditioning variables that are identical to those used by de Ree and Nillesen (2009), Collier and Hoeffler (2004), and Fearon and Laitin (2003). The conditioning variables include: ratio of agricultural exports to total exports (both linear and squared) to proxy for commodity dependence measured at $t-1$, sourced from the WDI; real output growth measured at $t-1$, sourced from the Penn World Tables (PWT); indicators of democracy computed from the Polity IV dataset, measured at $t-1$; measures of religious fractionalization, sourced from Fearon and Laitin (2003); ratio of oil exports to total exports measured at $t-1$, sourced from the WDI; the log of the proportion of the country that has mountainous terrain, sourced from

Table 1: Conflict and remittances data for recipient countries.

Country	Coverage (years)	Conflict spells (periods)	Conflict incidence	Remittance to GDP ratio	ρ
Algeria	38	1991-2013	0.59	0.01	-0.21
Bangladesh	32	1981-1991, 2005-2006	0.39	0.05	-0.53
Burkina Faso	32	1985, 1987	0.06	0.04	-0.05
Cameroon	29	1984, 1996	0.07	0.00	0.28
China	26	1987-1988, 2008	0.11	0.00	0.13
Colombia	38	1987-2013	1.00	0.01	-
Congo, Rep.	25	1993, 1998-1999, 2002	0.19	0.00	-0.17
Cote d'Ivoire	31	2002-2004, 2011	0.13	0.01	-0.24
Ecuador	22	1995	0.04	0.04	-0.09
Egypt	31	1993-1998	0.19	0.07	-0.10
El Salvador	32	1981-1991	0.33	0.10	-0.42
Ethiopia	30	1992, 1995	0.07	0.01	-0.24
Guatemala	31	1982-1995	0.44	0.05	-0.33
Guinea	22	2000-2001	0.09	0.01	-0.06
India	33	1980-1981, 1984, 1987, 1989-1992, 1996-2003	0.47	0.02	-0.36
Indonesia	25	1988-1992, 1997-2005	0.54	0.01	-0.26
Israel	34	1979-1989, 1997-2005, 2007-2012	0.74	0.01	-0.46
Kenya	38	1982	0.03	0.02	-0.15
Laos	24	1989-1990	0.08	0.01	0.53
Lesotho	33	1998	0.03	0.42	-0.15
Malaysia	21	2013	0.05	0.00	-
Mali	31	1990, 1994, 2007-2008	0.13	0.03	-0.10
Mexico	29	1994	0.07	0.01	0.24
Morocco	33	1980-1989	0.29	0.06	0.01
Mozambique	28	1985-1992, 2013	0.31	0.02	-0.42
Niger	32	1991-1992, 1994, 1997, 2007-2008	0.21	0.01	0.04
Nigeria	31	1983, 2009, 2011-2013	0.16	0.04	-0.02
Pakistan	32	1990, 1994-1996, 2004, 2006, 2010	0.21	0.04	0.00
Papua New Guinea	30	1990, 1992-1996	0.19	0.00	0.31
Paraguay	33	1989	0.03	0.02	0.15
Philippines	31	1991-1992, 1996, 1998	0.13	0.08	-0.22
Rwanda	32	1990-1994, 1996-2002, 2009-2012	0.48	0.01	-0.15
Senegal	32	1990, 1992-1993, 1995, 1997-1998, 2000-2001, 2003, 2011	0.30	0.05	0.03
Sierra Leone	28	1991-2001	0.38	0.01	-0.50
South Africa	38	1975-1980, 1984	0.18	0.00	0.16
Sri Lanka	33	1984-1988, 1991-2001, 2003, 2005-2009	0.65	0.06	-0.19
Sudan	29	1983-2011	0.97	0.03	-0.06
Thailand	33	1980-1982, 2003-2013	0.41	0.01	-0.17
Togo	32	1986	0.03	0.04	-0.02
Trinidad and Tobago	32	1990	0.03	0.00	-0.03
Turkey	34	1984-1990, 1993-2004, 2006-2013	0.77	0.01	0.13

Note: Conflict data was sourced from PRIO-UCDP. Remittance to GDP ratio was sourced from WDI. ρ is the correlation of conflict incidence and remittance to GDP ratio within a country.

Fearon and Laitin (2003); and the log of the national population measured at $t-1$, sourced from the PWT. The foregoing covariates were chosen to rule out violations of exclusion restrictions on the instruments and also because they have been widely used in the extant literature. Descriptive statistics for the conditioning variables are found in appendix A.

4. Stylized facts

Figure 3 summarizes the correlations between the incidence of conflict and remittance to GDP ratio. Figure 3A reveals the (seemingly) lack of relationship between incidence of conflict and remittance to GDP ratio in cross country averages. Running a regression on incidence of conflict with remittance to GDP ratio as an explanatory variable gives a positive beta coefficient but it is not statistically significant. This is shown by the nearly horizontal line that passes through the points in figure 3A. The complicated relationship between remittances and conflict may explain the insignificance of the beta coefficient. A higher incidence of conflict can be explained by a rebel force that has access to better financial resources. Rebel financing can come from numerous sources and remittances is one of them. For instance, Angoustures and Pascal (1996) found that the Tamil Tigers received some financing from the Tamil di-

aspora in North America. It is not clear, however, whether the transfer of financial resources from the Tamil diaspora to the rebels in Sri Lanka were remittances in the formal sense.[13] It is also possible that a lower incidence of conflict could be attributed to remittances. For example, Regan and Frank (2014) postulate that remittances can serve as a smoothing mechanism during times of economic distress thereby lowering the incentives to take up arms.

Conclusions drawn from the cross-country averages in figures 3A and 3C are not convincing because information from these averages can easily be distorted by noise in the data. This observation is validated even if one will consider only those countries that receive a significant amount of remittances. Shown in figure 3B is a subsample of countries whose remittances account for at least 1% of GDP. The regression line that passes through the points is now negatively-sloped but remain statistically insignificant.[14]

The averages over time for the sample of 41 countries is shown in figure 3C. Remittances to GDP ratio have been fairly stable in the 1980s up to 1990s and have steadily increased since. High rates of conflict incidence can be observed from the 1980s and 1990s and has generally declined since the end of the Cold War[15].

Table 1 gives a more detailed information about conflict spells and remittance to GDP ratio for the countries in the sample. There are countries such as Colombia and Sudan that have high rates of conflict incidence for the years covered. There are also relatively 'peaceful' countries like Kenya, Paraguay, Togo, and Trinidad and Tobago, as shown by their low rates of conflict incidence. It should be noted here that many of the sub-Saharan countries included in the sample have relatively low conflict incidence rates a

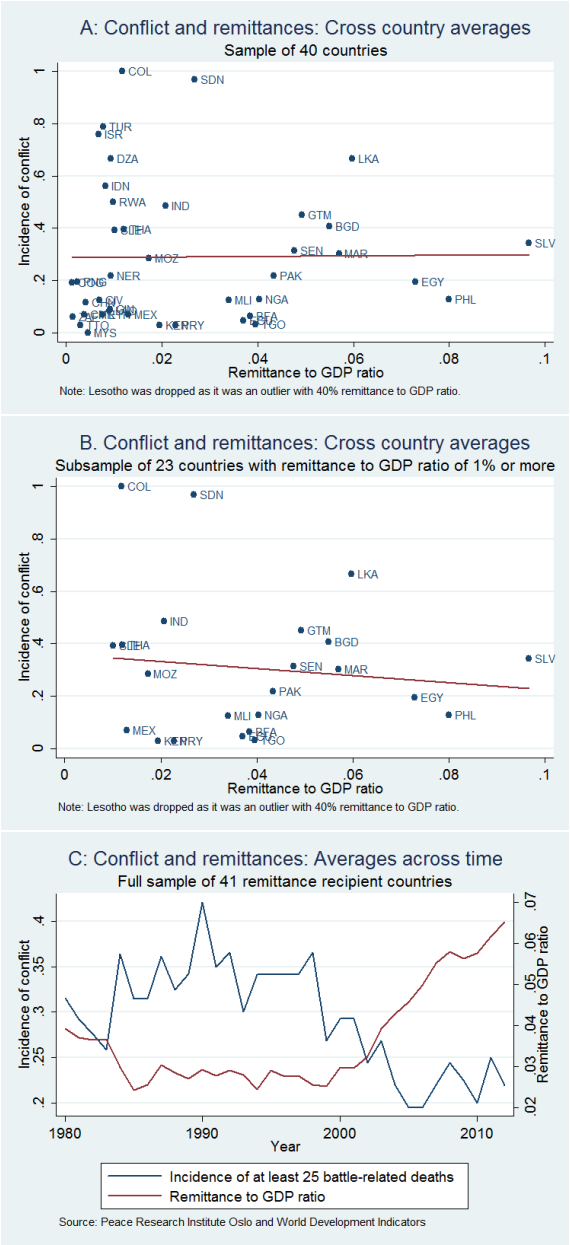

Figure 3: Remittances and incidence of conflict averages.

stylized fact consistent with de Ree and Nillesen (2009). Lesotho, being an outlier, has the highest remittance to GDP ratio at 42% while the country with the second highest (El Salvador) only has a distant 10%. The last column in table 1 shows the computed within-country correlation coefficient for conflict incidence and remittance to GDP ratio. The correlations show that for majority of countries in the sample (65%), more remittances (in proportion to GDP) is associated with less conflict. It is difficult to give meaning to these correlations as the effects of remittances to conflict is convoluted by many competing factors. Finally, not all countries have the same number of years

[13] Formal remittances refer to those remittances that enter a country through official channels such as banks or money transfer agents. Informal remittances are private transfers coursed through friends or relatives. The reported wealth transfers from the Tamil diaspora in the US and Canada may be classified as informal remittances.

[14] In figure 3A the estimated β coefficient is -1.36 with R-squared of 0.01.

[15] The decline in conflicts worldwide has been also documented in the political science literature. For instance, Goldstein (2011) claims that "wars today are measurably fewer and smaller than thirty years ago. By one measure, the number of people killed directly by war violence has decreased by 75 percent in that period. The number of civil wars is also shrinking, though less dramatically, as old ones end faster than new ones begin."

covered due to differences in data availability.

5. Empirical analysis

5.1. Naive regressions and conflict incidence

With the exception of remittances and unless otherwise stated, the econometric model and the discussion in this section were lifted from de Ree and Nillesen (2009). Although applied to foreign aid, their model is appealing as it allows for the analysis of the effects of explanatory variables such as remittances to *both* conflict onset and duration. To the best of my knowledge, this is the first paper to analyze the effects of remittances to conflict duration.[16] To keep matters consistent I follow their notations.

The probability of observing conflict at period t conditional on a vector of explanatory variables $\mathbf{x}_{i,t}$, a lagged conflict dummy variable $c_{i,t-1}$, and fixed effects α_i can be defined as:

$$\begin{aligned} &Pr(c_{i,t}=1|\mathbf{x}_{i,t}, c_{i,t-1}, \alpha_i) = \\ &\quad (\beta^{on}\mathbf{x}_{i,t} + \alpha_i^{on}) \times (c_{i,t-1}=0) \\ &\quad + (\beta^{dur}\mathbf{x}_{i,t} + \alpha_i^{dur}) \times (c_{i,t-1}=1) \end{aligned} \tag{7}$$

The conditional probability of observing conflict in period t contains two linear components that interact with two indicator functions that are typically used in typical onset (i.e., $c_{i,t-1}=0$) and duration (i.e., $c_{i,t-1}=1$) models. The conflict dummy assumes a value of 1 if conflict is observed at period t. The vector $\mathbf{x}_{i,t}$ contains explanatory variables including remittance inflows which is the primary variable of interest in the current study:

$$\mathbf{x}_{i,t}^T = [\ 1 \quad \mathbf{z}_{i,t} \quad \bar{r}_{i,t-5}\ ] \tag{8}$$

where 1 denotes the constant, $\mathbf{z}_{i,t}$ contains other explanatory variables, and $\bar{r}_{i,t-5}$ is the log of five-year overlapping average of remittance-GDP ratio up to $t-1$.

One can run a naive regression with conflict as a dependent variable and $\mathbf{x}_{i,t}$ as control variables. The regression here is naive because important features of conflict data such as dynamics, fixed effects, and endogeneity of remittance are ignored. In effect, the foregoing naive regression simply boils down to estimating the following linear probability model:

$$c_{i,t} = \bar{\beta}\mathbf{x}_{i,t}^T + v_{i,t}, \tag{9}$$

where $v_{i,t}$ is the error term. Here $c_{i,t}$ takes a value of 1 if there are at least 25 battle-related deaths observed for each country i at time t, and 0 otherwise. de Ree and Nillesen (2009) discuss at great length that running a regression without accounting for dynamics, fixed effects, and endogeneity will produce inconsistent estimates of the causal effects remittances have on conflict.[17] I, nevertheless, present estimates from the naive regression model and its variations as these has been used quite frequently in the conflict literature.

Table 2 column (1) present the estimates from the naive regression model. The marginal effect of remittance is negative and significant which suggests that incidence of conflicts are low(er) for countries that receive high(er) remittances (in proportion to GDP). Results from column (1) reveal familiar correlations empirical studies on conflict tend to find. Column (1) shows polity, measured through an index where a higher number means that a country is democratic, is positive and significant suggesting that remittance recipients that are (more) democratic have a higher conflict incidence. It may seem counter-intuitive but Fearon and Laitin (2003) provided an explanation that insurgencies can thrive even in democracies. They argue that authoritarian regimes can suppress dissent which leaves partially democratic regimes more prone to conflict and violence. In the same regression religious fractionalization has a negative effect to conflict incidence and is statistically significant. This finding is consistent to the commonly held view that the chance of a conflict occurring are higher for pluralistic societies. The coefficient for oil (as a percentage of total exports) is positive and statistically significant. There are two reasons for the positive relationship between oil exports and conflict. First, oil revenues raise the stakes for state control (Fearon and Laitin, 2003). And second, countries that rely on oil exports tend to have weaker state apparatuses because the incentive to have an effective system to collect revenues is not there (Fearon and Laitin, 2003; Chaudhry, 1989). Countries with a large percentage of mountainous terrain are found to experience more conflict as shown by its positive (and statistically significant) coefficient. Collier and Hoeffler (2004) explains that forests and

[16] Regan and Frank (2014) investigated the effect of remittances to the onset of civil wars only.

[17] Estimates from equation (9) are consistent if and only if the error term is uncorrelated with the conditioning variables. The condition $E[\eta_{i,t}|x_{i,t}]=0$ is highly restrictive as it ignores dynamics and fixed effects.

Table 2: Remittances and civil conflict: Naive regressions

Dependent variable:	Incidence (1)	Incidence (2)	Incidence (3)	Onset (4)	Duration (5)
Explanatory variables:					
Average remittance$_{t-5}$	-0.059***	-0.059*	-0.012	0.009	-0.066***
	(0.013)	(0.034)	(0.010)	(0.007)	(0.013)
Agriculture exports (%)$_{t-1}$	0.176	0.176	0.132	-0.164	0.062
	(0.385)	(0.906)	(0.279)	(0.204)	(0.383)
Agriculture exports (%)$_{t-1}$ squared	-0.499	-0.499	-0.180	0.203	-0.451
	(0.421)	(1.010)	(0.300)	(0.222)	(0.420)
GDP growth$_{t-1}$	0.842	0.842	0.361	0.198	0.680
	(0.471)	(0.610)	(0.308)	(0.214)	(0.469)
Polity$_{t-1}$	0.014***	0.014*	0.004**	0.002	0.013***
	(0.003)	(0.007)	(0.002)	(0.001)	(0.003)
Religious frationalization	-0.524***	-0.524**	-0.125**	0.091**	-0.563***
	(0.083)	(0.209)	(0.063)	(0.044)	(0.082)
Oil exports (%)$_{t-1}$	0.002***	0.002	0.001**	-0.000	0.001*
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
Log mountanious	0.029**	0.029	0.009	-0.006	0.028**
	(0.012)	(0.035)	(0.009)	(0.006)	(0.012)
Log national population$_{t-1}$	-0.011	-0.011	-0.005	0.011	-0.008
	(0.012)	(0.023)	(0.010)	(0.007)	(0.013)
Linear time trend	-0.004**	-0.004	-0.001	-0.002*	-0.004**
	(0.002)	(0.005)	(0.001)	(0.001)	(0.002)
Conflict$_{t-1}$			0.708***		
			(0.030)		
Constant	8.740**	8.740	3.047	3.744*	8.040**
	(3.937)	(9.612)	(2.921)	(2.084)	(3.889)
First order serial corr t-test (p value)	0.000	0.000	0.000	0.043	0.000
Observations	814	814	814	814	814
R^2	0.103	0.103	0.551	0.003	0.112

Note: Columns 1, 3, 4, and 5 reports robust standard errors allowing for heteroscedasticity in parentheses. Column 2 reports clustered standard errors in parentheses. ***, **, * indicate significance at the 1%. 5%, and 10% level, respectively.

mountains can provide rebels with safe haven, and can hamper the ability of the government to quell insurgencies.

It is well known that countries plagued by persistent conflict spells share common traits such as, among others, low levels of GDP per capita, and weak or non-existent institutions. However, it is possible that these countries also share common unobserved traits. The effect these unobserved common traits have on conflict incidence can be controlled by allowing the error term to be correlated within countries. Failure to control for these unobserved common traits can lead to misleadingly small standard errors. Column (2) reports the estimates where the errors are clustered within countries. In the regression with clustered standard errors, the coefficient for remittance remain negative and statistically significant although the standard errors have increased a bit as expected. The coefficients for polity and religious fragmentation have the same sign as in column (1) and remain significant. The coefficients for oil exports and percentage of mountainous terrain are no longer significant.

Column (3) reports a version of the naive regression model where a lagged dependent variable is included as a regressor. Including a lagged dependent variable allows for state dependence as the constant is allowed to vary across onset and duration models (de Ree and Nillesen, 2009). When a lagged conflict is included in the model with serial correlation it picks up some of the effect of unobserved variables. The coefficient for remittance remain negative but is now insignificant. The lagged dependent variable is positive and highly significant which suggests that conflicts are quite persistent for remittance recipient countries. It is also worth mentioning that a large percentage (55%) of the variation in conflict is explained by the model with lagged dependent variable. In comparison to the estimates without a lagged dependent variable in columns (1) and (2) the R squared is only at 10%.[18]

5.2. Onset and duration models

The next set of regressions departs from the naive model in a sense that the marginal effects of

[18]The naive regressions in table 2 suffer from first order serial correlation. The p values reported in these regressions indicate that the null hypothesis of first order serial correlation cannot be rejected.

the covariates are now allowed to vary from onset to duration. de Ree and Nillesen (2009) define a regression model of this type as follows:

$$c_{i,t} = (\beta^{on}\mathbf{x}_{i,t} + \alpha_i^{on}) \times (c_{i,t-1}{=}0) + (\beta^{dur}\mathbf{x}_{i,t} + \alpha_i^{dur}) \times (c_{i,t-1}{=}1) + \eta_{i,t} \quad (10)$$

where the error term is defined as:

$$\eta_{i,t} = (\alpha_i^{on} + \varepsilon_{i,t}^{on}) \times (c_{i,t-1}{=}0) + (\alpha_i^{dur} + \varepsilon_{i,t}^{dur}) \times (c_{i,t-1}{=}1) \quad (11)$$

The above model can be estimated by running regressions separately with either onset or duration as the dependent variable which is the common practice in the literature. Onset is defined as a binary variable which takes a value of 1 if $c_{i,t-1} = 0$ and 0 otherwise. Duration is also a binary variable that takes a value of 1 if $c_{i,t-1} = 1$ and 0 otherwise.

Columns (4) and (5) in table 3 show the results where onset and duration are dependent variables, respectively. In column (4) remittances are positive in sign and not significant. In the same column religious fractionalization is the only statistically significant variable and is positive in sign. Also, the explanatory power of this regression is very low. In contrast, with the exception of the estimate for oil exports as fraction of total exports, the results in column (5) mirrors those in column (1). Results from these regressions should be taken with caution because there are unobserved country-specific characteristics that may be correlated with remittance. In the next section I will present results where these unobserved fixed effects are accounted for.

5.3. Fixed effects and serial correlation

Conflict, whether it be incidence, onset, or duration, can also be explained by unobserved time invariant characteristics (fixed effects) and may be correlated with explanatory variables in the model. For instance, effects of decolonization, weak or nonexistent state apparatuses, and cultural norms are all important determinants of conflict and may well be correlated with remittance. Thus, there is a need for a regression model where these unobserved characteristics can be accounted for. Consider taking the average of the variables over time t for each country i in equation (10):

$$\bar{c}_i = (\beta^{on}\bar{\mathbf{x}}_i + \alpha_i^{on}) \times (c_{i,t-1}{=}0) + (\beta^{dur}\bar{\mathbf{x}}_i + \alpha_i^{dur}) \times (c_{i,t-1}{=}1) + \bar{\eta}_i, \quad (12)$$

where variables with a bar indicate averages. Subtraction of (12) to (10) gives the transformed regression model which feature a within group estimator free of unobserved fixed effects:

$$c_{i,t} - \bar{c}_i = \beta^{on}(\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i) \times (c_{i,t-1}{=}0) + \beta^{dur}(\mathbf{x}_{i,t} - \bar{\mathbf{x}}_i) \times (c_{i,t-1}{=}1) + \eta_{i,t} - \bar{\eta}_i \quad (13)$$

where the error term is defined as:

$$\eta_{i,t} - \bar{\eta}_i = (\varepsilon_{i,t}^{on} - \bar{\varepsilon}_i^{on}) \times (c_{i,t-1}{=}0) + (\varepsilon_{i,t}^{dur} - \bar{\varepsilon}_i^{dur}) \times (c_{i,t-1}{=}1) \quad (14)$$

Results from the transformed model are presented in table 3. The variables for religious fractionalization and percentage of mountainous terrain have been eliminated in these regressions as a consequence of the transformation. Columns (1)-(3) present the results with incidence of conflict, onset, and duration as dependent variables, respectively. In these three regressions the coefficients for remittance remain negative in sign but significant only for the incidence and duration models.

It is possible that conflicts are affected by time-varying uobservables from the past that carry over to future periods. For instance, grievances and ill-feelings by citizens toward those in power tend to persist over long periods of time which often lead to violent confrontations. Failure to control for these time-varying unobservables can lead to a conclusion that parameter estimates or marginal effects coming from the regressions are more precise than they actually are. In simple terms it is reasonable to suspect that the error term in (13) is serially correlated, possibly following an AR(1) process. To determine if this suspicion is founded I ran a test originally proposed by Wooldridge (2002) to check the presence of first order serial correlation in panel data. Results of these tests reveal that indeed the estimated models in columns (1)-(3) all suffer from first order serial correlation.

Given that many conflicts persist over long periods of time then including a lagged conflict in the regressions seems to be an attractive way to capture the dynamics of conflicts as well as a method of ridding the model of serial correlation at least partially. However, scholars caution that including a lagged dependent variable in a model may cause the coefficients for explanatory variables, such as remittance, to be biased downward (Keele and Kelly, 2005). To account for first order serial correlation in the errors a Baltagi and Wu (1999)

Table 3: Remittances and civil conflict: Panel regressions adjusting for fixed effects and serial correlation

Dependent variable:	Incidence (1)	Onset (2)	Duration (3)	Incidence (4)	Onset (5)	Duration (6)
Explanatory variables:						
Average remittance$_{t-5}$	-0.091**	-0.004	-0.108***	-0.033**	-0.030**	-0.052***
	(0.040)	(0.010)	(0.036)	(0.014)	(0.012)	(0.016)
Agriculture exports (%)$_{t-1}$	0.819	-0.146	0.666	0.308	-0.107	0.276
	(0.757)	(0.140)	(0.792)	(0.376)	(0.309)	(0.430)
Agriculture exports (%)$_{t-1}$ sq.	-1.218	0.059	-1.318*	-0.363	-0.128	-0.689
	(0.738)	(0.164)	(0.759)	(0.479)	(0.385)	(0.528)
GDP growth$_{t-1}$	-0.046	0.208	-0.152	-0.006	0.248	-0.011
	(0.426)	(0.157)	(0.402)	(0.321)	(0.235)	(0.333)
Polity$_{t-1}$	-0.002	0.001	0.001	0.000	0.002	0.005
	(0.007)	(0.003)	(0.007)	(0.004)	(0.003)	(0.004)
Oil exports (%)$_{t-1}$	-0.001	-0.001**	-0.000	-0.000	-0.001	0.000
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Log national population$_{t-1}$	0.205	-0.011	0.169	0.034	-0.002	0.001
	(0.179)	(0.059)	(0.173)	(0.051)	(0.013)	(0.021)
Conflict$_{t-1}$				0.490***	-0.261***	0.354***
				(0.030)	(0.023)	(0.032)
Constant	-3.620	0.255	-3.072	-0.529	0.055	-0.050
	(3.154)	(1.014)	(3.060)	(0.850)	(0.169)	(0.287)
Durbin-Watson stat.				2.067	1.842	2.159
Observations	954	954	954	915	915	888

Note: Robust standard errors allowing for heteroscedasticity in parentheses. Durbin Watson statistic was calculated using the method described in Bhargava et al. (1982). ***, **, * indicate significance at the 1%. 5%, and 10% level, respectively.

procedure was implemented instead.[19] The results for regressions controlling for AR(1) errors are presented in table 3 columns (4)-(6). In these three regressions all of the coefficients for remittance are negative in sign and statistically significant. These models are now free of serial correlation as shown by the modified Bhargava et al. (1982) Durbin-Watson statistics. Accounting for fixed effects and serial correlation, the models thus far produced a *consistent* result that the effect remittance have on conflict is negative whether the measure used is incidence, onset, or duration.

5.4. Instrument variable approach

The foregoing results demonstrate some evidence of correlation between remittances and conflict. Nevertheless, there are several reasons why these results cannot be interpreted as causal. First, there can be a reverse causation between conflict and remittances. Long term conflicts can result in massive displacement of civilian populations with mostly vulnerable family members remaining behind.[20] These family members lack economic means to survive during long periods of conflict and would have to rely on humanitarian assistance or transfers from their relatives overseas.[21] Second, it is possible that there are many omitted determinants of conflict that are naturally correlated with remittances. And finally, remittance data may suffer from measurement errors. The consequence of reverse causality, omitted variables, and measurement errors is that remittances may have become endogenous to the model.

An ad hoc treatment for endogenous determined variables is to include their lags in the regressions. The results with lagged remittances are presented in tables 2 and 3. However, having lagged determined variables implicitly assumes that economic agents to do not anticipate the incidence of civil wars and adjust their economic activities. This is not the case given the dynamic nature of remittances and conflict. Ex ante it is possible that agents will ask for remittances from their relatives abroad whenever they feel that a conflict is imminent. A better procedure to treat endogenous determined variables is to use instrument variables in a two-stage least squares regression. For this I will need a new variable, also

[19] The intuition of their approach is similar to a Cochrane-Orcutt procedure applied to panel data. See Baltagi and Wu (1999) for details on the procedure.

[20] In 2014 an estimated 13.9 million individuals were displaced due to conflicts (UNHCR, 2015).

[21] As an example, there is evidence that remittances were (and possibly still being) channeled by refugees to their family member recipients in war-torn countries like Somalia and Sri Lanka. Tharmalingam (2011) found that, for Somalis and Tamils who reside in Norway, family-oriented remittances are important, and migrants are bound by tradition and moral obligation to send remittances.

Table 4: Remittances and conflict: Two stage least squares regressions.

Panel A: Second stage regressions Dependent variable:	(1) Incidence	(2) Onset	(3) Duration
Explanatory variables:			
Average remittance $_{t-5}$	-0.258*	0.088	-0.232*
	(0.135)	(0.060)	(0.128)
Agriculture exports $(\%)_{t-1}$	0.001	0.001	0.000
	(0.005)	(0.002)	(0.005)
Agriculture exports $(\%)_{t-1}$ squared	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
GDP growth$_{t-1}$	0.556	-0.228	0.415
	(0.715)	(0.318)	(0.681)
Polity$_{t-1}$	0.001	-0.000	0.001
	(0.002)	(0.001)	(0.002)
Oil exports $(\%)_{t-1}$	-0.001	0.001	-0.001
	(0.002)	(0.001)	(0.001)
Log national population$_{t-1}$	0.040***	0.002	0.042***
	(0.014)	(0.006)	(0.014)
Constant	-1.573**	0.420	-1.468**
	(0.686)	(0.305)	(0.653)
Panel B: First stage regressions Dependent variable: Average remittance $_{t-5}$	(1)	(2)	(3)
Instrument:			
Log settler mortality	0.157***	0.157***	0.157***
	(0.053)	(0.053)	(0.053)
First stage statistics			
Endogeneity test (χ^2)	6.13**	6.13**	6.13**
First stage F statistic	9.11***	9.11***	9.11***
First stage controls	Yes	Yes	Yes
Observations	819	819	819

Note: Robust standard errors allowing for heteroscedasticity in parentheses. ***, **, * indicate significance at the 1%. 5%, and 10% level, respectively.

called an instrument, that must satisfy two properties. First, the instrument must be correlated with remittance. And second, the instruments must be legitimately excluded from the equation of interest, in other words, it must be uncorrelated with the error term of the original equation.

It is easy to find a variable that is correlated with remittance but it is a challenge to find one that is not directly correlated with conflicts. In the early versions of this paper I tried using several potential instruments such as growth rates of GDP per capita in the US, number of emigrants from remittance recipient countries, or distance between recipients and remittance source countries. I found that although these variables are significantly correlated with remittance they do not satisfy the exclusion restrictions requirement. However, there is one variable that might satisfy both of these criteria. Acemoglu et al. (2001) found that there is a connection between current institutions of many developing countries and settler mortality. They argue that European colonizers established extractive institutions in locations where settler mortality is high and these extractive institutions persisted to the present. Consequently, countries with extractive institutions are expected to be poor performers economically. I use the same argument such that remittance inflows are expected to be higher in countries with extractive institutions. The idea is that the extractive nature of institutions lead to outcomes (such as poverty) that motivate individuals to send money back to their relatives who live these countries.

It is plausible that the presence of extractive institutions could be an important determinant of conflict which implies a violation of the exclusion restriction. This is possible given that conflicts are rooted on economic reasons such as poverty, income inequality, or lack of employment opportunities (Collier and Hoeffler, 2004). However, extractive institutions are present in both relatively peaceful and conflict-prone countries. For instance, the British introduced extractive insti-

tutions in Jamaica but is considered to be relatively peaceful than countries listed in table 1 (Acemoglu and Robinson, 2012). Another example is Thailand, a country that was not conquered by Europeans but has a long history of conflict. These examples demonstrate that settler mortality (and the presence of extractive institutions) cannot be a direct predictor of conflict. Nonetheless, I acknowledge that it is possible that settler mortality could have some independent effect on conflict beyond its impact working through remittances, though I believe that these other effects are likely to be minor.

Results of the two stage least squares regressions using settler mortality as an instrument is shown in table 4. Panel B shows the first stage where I regress the log of five-year overlapping average of remittance-GDP ratio with settler mortality (as an instrument) and the other conditioning variables. Without doubt there is a positive and significant correlation between the log of settler mortality and remittances. However, the settler mortality instrument is somewhat weak (the F statistic in the first stage is 9.11) suggesting that the instrument variables two stage least squares estimates maybe somewhat biased toward the ordinary least squares estimates in tables 2 and 3 (Staiger and Stock, 1997). I also ran a chi square test to check whether remittance is endogenous to conflict. The results of the chi square test reveal that indeed conflict incidence, onset, and duration are correlated with remittances. Panel B present the second stage regression estimates. The sign of the estimated coefficient for remittances remain negative but significant only at the 10% level for conflict incidence and duration, but not for conflict onset.

6. Concluding remarks

In this article, I have set out a simple model of how remittance as a wealth transfer can influence the interaction between rebels and their ruler. It was shown that higher remittances can lead to higher opportunity costs in participating in a rebellion. Under certain conditions the effect of an increase in remittance is to reduce the amount of time spent in insurrection activities. The ruler, in turn, will respond by lowering the strength of her forces to quell the uprising. Lower number of battle-related deaths will occur as a result of deescalation on both sides.

This article also provided, for the first time, a direct causal evidence on the efficacy of remittance to lower the incidence of conflict, reduce the chance of a conflict breaking out (onset), and shorten its duration. The stylized facts have shown that finding a causal relationship between remittance and conflict can be extremely difficult. This difficulty lies with unobserved (time variant or invariant) country-specific characteristics that may violate the exclusion restrictions, not to mention the potential reverse causation between remittance and conflict. Using a variety of approaches to account for fixed effects, serial correlation, and endogeneity I was able find a consistent negative relationship between remittance and conflict.

Remittances play a crucial role for maintaining the livelihoods of their recipients specially in regions beset by conflict. It cannot be denied that remittance may be used to finance rebellions. However, restricting the flow of remittance in conflict zones may result in further economic hardship which can be exploited easily by rebel leaders to recruit more fighters. Many conflicts are deep-rooted and any policy directed to enhance remittance flows does and will not settle them over the long term. Nevertheless, through remittances, peace can be bought at least in the short term.

Appendix A. Descriptive statistics

Variables	Obs.	Mean	Std dev
Conflict incidence$_t$	1300	0.29	0.46
Conflict onset$_t$	1300	0.06	0.23
Conflict duration$_t$	1300	0.30	0.46
Average remittance$_{t-5}$	1297	-4.60	1.65
Agriculture exports (%)$_{t-1}$	1035	8.34	14.12
GDP growth$_{t-1}$	1300	0.04	0.05
Polity$_{t-1}$	1299	-1.45	15.61
Oil exports (%)$_{t-1}$	1010	18.83	28.00
Log national population$_{t-1}$	1300	16.84	1.51

Appendix B. Comparative statics analysis of wealth transfers

Consider an increase in wealth transfers, x. From the solution to the peasant's optimization problem one can find that as wealth transfers increase

the the aggregate strength of the rebellion and labor force decreases, respectively:

$$R_x < 0, \quad H_x < 0. \tag{B.1}$$

The dictator's best response function can be generally expressed as:

$$G = V(R(x), H(x)) - R(x). \tag{B.2}$$

where $V = \sqrt{R(tH + \bar{z})}$. The slope of the dictator's best response function is given by

$$G_R = V_R - 1, \tag{B.3}$$

which can be either positive, zero, or negative. The derivative of the dictator's best response function with respect to the labor force is given by

$$G_H = V_H, \tag{B.4}$$

which is non-negative as a result of how the dictator's payoff function Ω was specified. Taking the derivative of (B.2) with respect to the wealth transfer parameter x:

$$G_x = (V_R - 1)R_x + V_H H_x. \tag{B.5}$$

The derivative G_x is unambiguously negative if $R^\star$ is located in the upward sloping portion of the dictator's best response function, $V_R > 1$. More generally, $G_x < 0$ must satisfy:

$$(1 - V_R)R_x > V_H H_x. \tag{B.6}$$

Finally, in order for casualties to decrease as a result of an increase in x, D_x must satisfy:

$$-v_G G_x > v_R R_x. \tag{B.7}$$

Since $v_G > 0$ and $v_R > 0$ then D_x is unambiguously negative if $R^\star$ is located in the upward sloping portion of the dictator's best response function.

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