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Sending money home in times of crime: the case of Mexico

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ABSTRACT

We explore at the municipality level how the climate of criminal violence has affected the flow of remittances to Mexico. Using a panel of municipalities in the years 2006 and 2010, we find that drug-related crimes and overall rates of homicides have reduced the percentage of families that receive remittances. This result is robust to controlling for net migration, political variables, and traditional socioeconomic explanations of remittance sending. It is also robust to potential threats to validity. We interpret this result as suggestive of self-interested concerns when sending money home amidst a climate of rampant violence. Nonetheless, mixed motivations to remit are evident in our analysis.

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Drug-related crime; violence; remittances; municipalities; Mexico

1. Introduction

Remittances are central to the Mexican economy and represent an essential subsistence income for many families. According to the ‘Mexico and the World Survey’, in 2014, almost half of the Mexicans interviewed reported having an emigrant relative abroad (Maldonado et al. 2016) and 12% reported receiving remittances. Mexico is the fourth-largest remittance-recipient country in the world in absolute terms, with flows amounting to \$25.7 billion in 2015 (Dilip, Eigen-Zucchi, and Plaza 2016). Remittances continue to be among the top three sources of foreign revenue for the country, together with oil revenue and foreign direct investment.

Economic theories of remittance sending identify altruism and/or self-interest as the main motivations to remit. Emigrants send money home to help those left behind and/or to make investments in their communities of origin, frequently with the expectation of returning. But how are these motivations affected by the presence of high levels of violence in their home countries? Do migrants send more money home to assist those left behind or do they refrain from sending money home under the fear of greater insecurity that may put their investments at risk? In this paper, we seek to understand how patterns of remittance sending have been affected by the recent surge of criminal violence in Mexico that peaked under President Felipe Calderón’s presidency (2006–2012).

We find that Mexican municipalities that experience more violence in general and in particular more violence associated with the wave of drug-related criminality experience

a decline in the percentage of households receiving remittances. This result is robust to the fact that crime has also spurred a wave of international displacement that could have affected the flow of remittances towards home. Moreover, we take into account that violent crime has taken place in the context of a new democracy undergoing a process of consolidation, and look at how electoral politics at the local level have affected remittance sending. We find that high levels of crime have reduced the percentage of families receiving remittances from abroad even if local elections seem to be conducive to an increase in remittance sending in what Nyblade and O'Mahony (2014) describe as political remittance cycles.

Our paper contributes to an incipient literature that seeks to understand non-economic motivations for remittance sending (Carling, Bivand, and Horst 2012; Nyblade and O'Mahony 2014) as well as to the important scholarly and policy debate around the multiple consequences of organised crime in Mexico (Trelles and Carreras 2012; Robles, Calderón, and Magaloni 2013; Ríos 2014, 2015; Schedler 2015; Atuesta and Paredes 2016; Trejo and Ley 2016a, 2016b). The paper proceeds as follows. In Section 2, we give an overview of the economic motivations for remitting and make a case for complementing these explanations by looking at alternative non-economic factors. In Section 3, we give an overview of the recent surge of cartel violence in Mexico to provide the context for our study. In Section 4, we present the empirical strategy and data. Section 5 presents and discusses the results. Finally, we conclude in Section 6.

2. Sending money home

Why do migrants send money home? The decision to remit has been widely explored by economists and sociologists. Starting with the seminal work by Lucas and Stark (1985) based on the case of Botswana, the new economics of labour migration has identified different individual motivations to remit, which vary on the spectrum from pure self-interest to pure altruism. There are excellent review articles on the individual decision to remit, and therefore we confine ourselves to offering a summary of these motivations to help us frame our emphasis on less-explored motivations to send money home (see Rapoport and Docquier 2006; Carling 2008; Lindley 2009; Ruiz and Vargas-Silva 2009; Guha 2011; Yang 2011).

Migrants remit to family and friends on a pure self-interested basis when their main motivation is to start or maintain investments back home, frequently with the expectation of returning. Also, migrants may want to still be considered as potential heirs in the future, which may motivate them to maintain a stream of remittances to their parents to secure their position within the household. Migrants remit in an altruistic way when their main concern is the well-being of the family. They often remit to finance the basic needs of the family and increase the flows they send back home in the event of unexpected shocks that affect household income and potentially increase poverty. Natural disasters and conflict are examples (World Bank 2006; Savage and Harvey 2007; Yang and Choi 2007).

Most often, the decision to remit is a mix of altruistic and self-interested motivations that have to do with reciprocating previous transfers; for instance, family support for skills acquisition or assistance during settlement in the destination country (Carling 2008, 583). The diversification of risks, also known as co-insurance arrangements, are frequently mentioned in this mixed category. These are arrangements by which migrants

assist families in reducing income fluctuations while at the same time the families support their migrant members if needed. These mixed motivations are referred to as tempered self-interest and enlightened altruism. In practice, it is difficult to disentangle these motivations, although strategies such as exploring how the passage of time affects the sending of remittances provide hints as to the motivations to remit. For instance, in the case of Mexico, it has been observed that migrants facing an unstable job situation remit more while those who improve their position in the labour market through more experience remit less. This hints at a decaying role of the insurance motivation of remittances as the migrants' labour market situation becomes more stable (Amuedo-Dorantes and Pozo 2006). While the authors identify this pattern, they also report that variables such as the size of the family left behind positively affect the amount of remittances sent back home. Obviously, altruism, risk, and insurance are not exclusive motives to remit and quite often several opposing forces operate simultaneously.¹

The above are motivations that the economic literature focuses on. But research on how non-economic calculations may impact the decision to remit is less developed. One of the variables likely affecting the decision to remit is crime and violence, a factor that remains surprisingly under-researched.² On one hand, to the extent that violence may affect or threaten household income, it may spur the altruistic sending of remittances to help those left behind. On the other hand, migrants with existing or planned investments back home may be deterred by the existence of a climate of violence that could endanger those investments. For instance, in a study of the decision to remit in Colombia, using a household survey, Vargas-Silva (2009) finds that the likelihood of sending remittances decreases when relatives back home are victimised. Although variables related to altruistic behaviour, such as the employment situation of the household head, were also significant in his study, the author attributes his finding to the self-interested character of remittances, whereby migrants resent the effect that crime may have on migrants' economic activities back home.³ The fact that remittances may attract looters in conflict situations puts emigrants in the dilemma of whether or not to send money home. When there is violence, war, and crime, research has shown that remittance recipients are wary of revealing whether they receive remittances. As research on Somalia shows, in these contexts remittances become 'a highly prized resource attractive to thieves and even warring parties' (Savage and Harvey 2007, 30, 36). Given the lack of consensus and the dual reasoning behind remittance sending amidst a violent environment, we seek to understand whether violence stimulates or depresses remittance flows. **efecto ambivalente**

Regarding the relationship between migration and crime, we do have evidence that criminality and insecurity are important motivations in the decision to emigrate, which in turn may affect patterns of remittance sending. Research consistently shows that violent experiences have a positive effect on the intention to emigrate. Using data from the Latin American Public Opinion Project (LAPOP), Hiskey, Montalvo, and Orcés (2014) have shown that individual levels of victimisation increase the propensity to emigrate across 22 Latin American countries, but more so in those with a poor quality of governance. Similarly, Wood, Ribeiro, and Hamson-Díaz (2010) – using the Latinobarometer data – find that being a victim of a crime or having a family that has been victimised increases the probability of manifesting intentions to emigrate by 30%.

In Mexico, the recent wave of violence has also affected the decision to migrate nationally and internationally. Estimates on how many have migrated as a result of crime differ,

but regardless of the figure, the evidence consistently indicates that criminal violence has pushed individuals to leave their homes. Ríos (2014) estimates that 264,692 Mexicans have changed residency as a result of the increase in cartel violence since 2008, with at least half of this migration being international. Also, a survey conducted by the *Universidad Autónoma de Ciudad Juárez* in 2009 found that in Ciudad Juárez alone, 230,000 migrated in two years due to the increase in violence; 54% of them internationally (Atuesta and Paredes 2016, 482). These studies suggest that in order to accurately assess the impact of crime on remittances, we must take into account changes in migration patterns over this period, together with standard economic explanations.⁴

All in all, several scenarios are possible. First, new emigration of family members triggered by the increase in crime jointly with fears of losing present and future investments due to violence and crime may work in tandem to discourage the sending of remittances to troubled areas. In that case, we should observe that both crime and emigration have a negative effect on the percentage of families receiving remittances. Second, if only crime, but not emigration, has a negative effect on remittance sending, the most plausible explanation is that the decrease in remittances is motivated by migrants' self-interested concerns about the security of their and their families' investments in their communities of origin. Third, remittances could be positively associated with crime even after controlling for net migration flows, in which case an altruistic interpretation of remittance sending amidst rampant violence is most convincing. Of course, motivations to remit are most often mixed as is made evident by the very patterns of remittance spending by families back home: current consumption but also consumption in durables, health, and housing constitute the main destination of family remittances when compared to non-remittance-recipient families (Airola 2007); thus, we can find that while crime discourages remittance sending, other variables in the altruistic decision to remit may continue to be relevant (Vargas-Silva 2009).

Finally, a comprehensive model of the determinants of remittance sending should incorporate the role of politics in home countries. Cross-national estimates of the determinants of remittance sending have conspicuously ignored the role of politics as another potentially relevant factor in the decision to remit. True, the topic of diaspora involvement in home politics has been prominent in studies of transnationalism, resulting in a large volume of excellent conceptual discussion and case study research (see for instance, Levitt 2001; Goldring 2002; Guarnizo, Portes, and Haller 2003; Østergaard-Nielsen 2003; Smith 2003; Waldinger 2008; Kapur 2014).⁵ But cross-national quantitative studies of the political motivations to remit have been practically non-existent. In a study of remittance flows to 81 developing countries, O'Mahony (2013) found that upcoming elections which were deemed to be competitive increased the flow of remittances in what the author described as politically motivated remittances. Nyblade and O'Mahony (2014) corroborate this finding using cross-national data for Latin America and subnational (gubernatorial) elections in Mexico. In both cases, the flow of remittances increased when close electoral races were upcoming, which spurred the desire to remit. Thus, in our empirical models, we take this recent research into account and control for the role of elections and of a tightened electoral climate as determinants of remittance sending largely ignored by the economic literature.

In the empirical section, we explore whether and how criminal violence has affected remittance sending at the municipal level, taking into account traditional economic

explanations for sending money back home; controlling for the fact the criminality has also affected the decision to emigrate; and taking the opportunity to explore the role of politics in the decision to remit, thereby incorporating variables that previous studies on the determinants of remittance sending have overlooked.

3. The context of violence in Mexico

Mexican cartels were involved in marijuana and poppy seed production and trafficking into the United States for most of the twentieth century. However, prior to the 1980s, this traffic was mainly under the control of Colombian drug trafficking organisations. It was not until the United States government shut down the Caribbean route that drug trafficking moved into Mexico. By the 1980s, Mexican cartels had become major players in the international drug trafficking industry (Astorga and Shirk 2010; Bagley 2012).

While the Guadalajara and Gulf cartels had initially led the major expansion of the industry in the early 1980s, by 1990 four cartels dominated Mexico's criminal landscape. The Tijuana, Juárez, and Sinaloa cartels had inherited the Guadalajara Empire and dominated western Mexico. The Tijuana and Juárez cartels controlled drug trafficking routes on the United States–Mexico border and the Sinaloa Cartel dominated the states along the Pacific coast. The Gulf cartel controlled the states along the Gulf of Mexico and the north-eastern states along the United States–Mexico border. These four cartels had coexisted peacefully, but in the mid-1990s they went to war. Scholars attribute this change to the spread of subnational democratisation and the transition from one-party rule to multi-party democracy, which led to the breakdown of informal government protection networks and left cartels on their own to autonomously regulate the drug industry through violence (O'Neil 2009; Astorga and Shirk 2010; Osorio 2013; Ríos 2015; Trejo and Ley 2016b). Criminal wars broke out and sparked large-scale criminal violence.

In December 2006, facing a noticeable rise of inter-cartel violence in central and northern states – as well as a highly questioned election⁶ – President Calderón declared a 'War on Drugs' and ordered the deployment of the military throughout the country to fight organised crime (Presidencia de la República 2006). This new strategy began in Michoacán, one of the top states of origin of Mexicans migrating to the United States and top recipient of remittances. Military operations quickly multiplied across the Mexican states, but this resulted in an unexpected criminal backlash and a dramatic escalation of violence. As a result of the battles between drug cartels, their private armies, and the government's security forces, more than 70,000 died (Shirk and Wallman 2015) and over 20,000 persons are missing (Merino, Zarkin, and Eduardo 2015). In fact, during our period of study, drug-related homicides increased by over 450% – from fewer than 2,000 in 2006 to more than 15,000 by the end of 2010.⁷

As the security forces attempted to weaken drug trafficking organisations by capturing and killing criminal leaders, inter-cartel and intra-cartel fighting and fragmentation increased significantly (Calderón et al. 2015; Phillips 2015). The number of cartels doubled to eight and each spawned multiple local private armies serving the cartels to defend their territories. According to security expert Eduardo Guerrero, more than 200 of these criminal cells are currently operating across Mexico in addition to the thousands of criminal gangs that represent a huge base of support for cartels at the locality level (Guerrero 2010, 2016). In this regard, Magaloni et al. (2015) find that where such criminal

gangs are able to exert local territorial control, they behave as stationary bandits and provide assistance to civilians, but as soon as their territory is contested by competition from other groups, citizens are inevitably trapped in networks of criminal coercion.

In the struggle between each other and against the state, organised crime groups are faced with a new need for resources to finance their wars and have subsequently moved into new illicit markets, including extortion, kidnapping, and human trafficking. Migrants are among the main targets of these crimes. On August 2010, 72 migrants from Central and South America were mass murdered by the criminal organisation Los Zetas (Camar-ena 2010). In fact, between 2008 and 2010, close to 400 migrants were kidnapped, mainly by organised crime groups working in collusion with local authorities (CNDH 2011).

Overall, by the end of the Calderón administration, criminal organisations had multiplied. Their fight was no longer over drug trafficking routes. Other criminal markets became equally valuable and in their attempt to control them, while at the same time fighting the state, they pushed violence to unprecedented levels.

Figures 1 and 2 help illustrate this drastic change in the patterns of violence across Mexico. They show that during the first four years of the Calderón administration, criminal activity, as measured by the drug-related homicide rate, expanded to the northern border as well as throughout the Pacific coastal area. For our subject of study here, it is important to note that together with Chihuahua, certain of the top remittance-receiving states, including Guerrero, Michoacán, Jalisco, Durango, and Zacatecas, were among

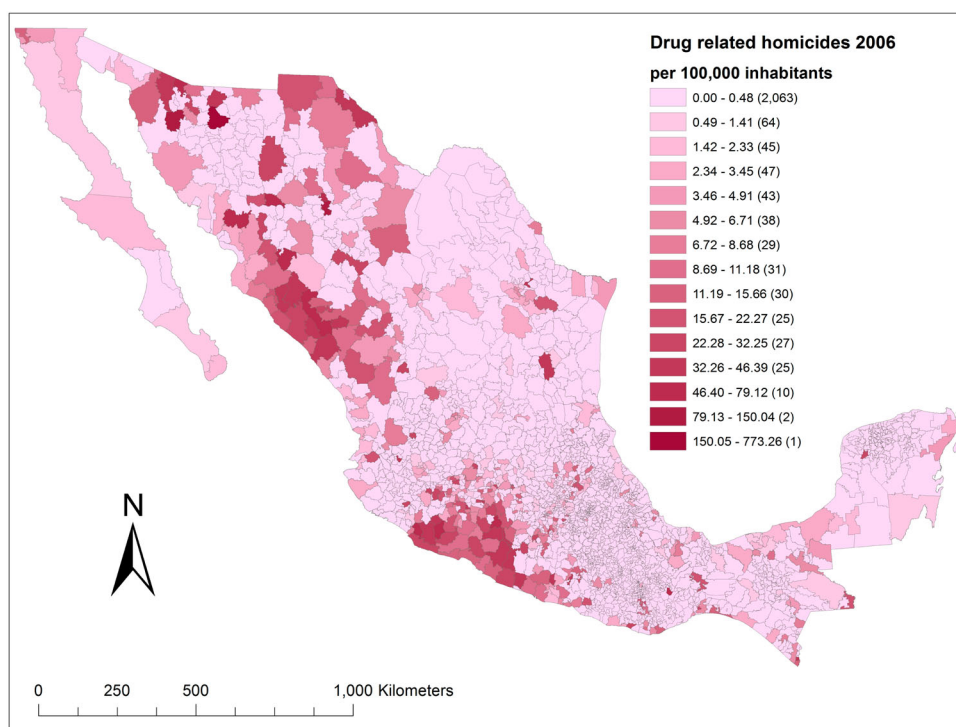


Figure 1. Drug-related homicide rate per 100,000 inhabitants across Mexican municipalities, 2006. Source: Authors.

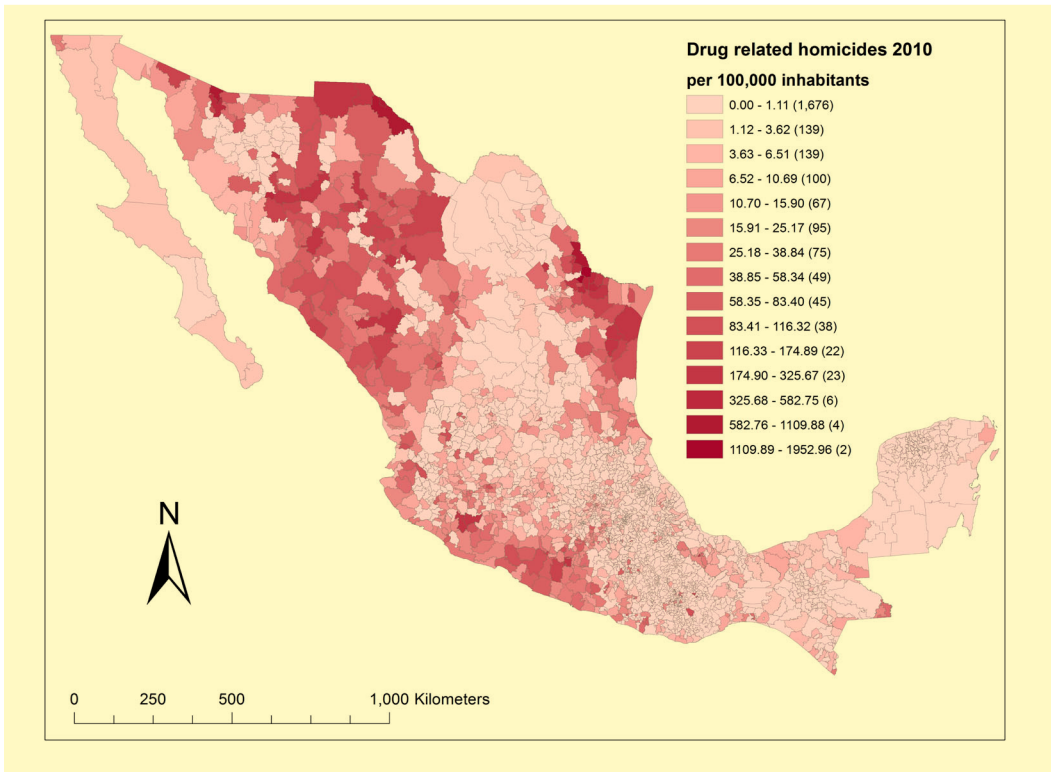


Figure 2. Drug-related homicide rate per 100,000 inhabitants across Mexican municipalities, 2010. Source: Authors.

those most affected by criminal activity. Other high remittance-receiving states, such as Puebla and the State of Mexico were not as affected by crime during our study period.

Recent research has sought to understand the social and political consequences of such criminal violence and specifically how it affects citizens' behaviour. From labour participation to consumption, crime-ridden contexts also influence economic behaviour (Robles, Calderón, and Magaloni 2013; Hope 2015). In Mexico, Ríos (2014) explains that the recent wave of criminality has been characterised by increasing sophistication and diversification of cartel activities, with extortion of legal and illegal businesses being central to cartels' 'fundraising' strategies. According to Ríos (2014), these activities have 'deeply affected business dynamics', which most likely upsets the activities of those remitters with a more entrepreneurial outlook. However, there is hardly any evidence on how the recent spike of violence in Mexico has influenced the flow of remittances to Mexican municipalities, if at all.⁸ In her research on migrants' decision to engage in community projects using collective remittances, Duquette reports that increases in insecurity associated with the drug trade pushed migrants and hometown associations 'to keep a low profile', postponing investments until the security situation improved (Duquette-Rury 2016, 783). Although this type of reaction is consistent with the expectations of a self-interested model to remit, we do not know whether violence has deterred the activities of the investment-oriented remittance sender or whether crime has spurred the altruistic sending of resources to sustain families left behind, or both. In the following sections, we unpack these dynamics.

4. Data and empirical strategy

4.1. Data

The dataset comprises a two-year (2006 and 2010) panel for approximately 2456 Mexican municipalities. The number of municipalities is lower for some variables due to missing data in the respective source. Data were collected from various sources; the National Statistical Institute (INEGI), the Office of the Presidency (*Presidencia*), and CIDAC (*Centre for Development Research*). The summary statistics for both years are reported in Table 1.⁹

Our dependent variable, *remittances*, is measured as the percentage of households receiving remittances in municipality i in year t . This variable comes from an extended questionnaire in the population and household census (INEGI), and it is representative at the municipality level, covering over 2.9 million households.

In 2006, 6.5% of households received remittances. Only those in the 5th percentile did not receive household remittances that year, while those in the 90th percentile had more than 18% of households with incoming remittances (see Figure A1). Figure 3 shows that the municipalities with the highest remittances are roughly located in the centre-west and northwest of Mexico. The percentage of households receiving remittances decreased slightly in 2010, even though there were more households receiving remittances, as the non-recipient municipalities dropped to the 1st percentile, while the 90th percentile fell to 17%. Due to the high positive skew of the remittances variable, we use its logarithmic transformation in our estimations. To deal with zeros, we use the log of percentage of households receiving remittances plus one¹⁰ (Figure 4).

The explanatory variable of interest is the *drug-related crime rate* for each municipality year. As is customary in the literature, crime is measured by the homicide rate per 100,000 inhabitants. Because there are a significant number of municipalities where no homicides were reported or where there are low rates, the distribution is skewed to the right.

Table 1. Summary statistics, Mexican municipalities.

Variables	N	2006				2010			
		Mean	sd	Min	Max	Mean	sd	Min	Max
<i>Remittances</i>									
% Household remittances	2443	6.524	7.704	0	53.71	6.501	7.247	0	48.70
<i>Crime variables</i>									
Rate of drug-related homicides	2337	2.346	17.86	0	773.3	14.77	75.69	0	1,953
Rate of homicides	2454	11.33	24.18	0	551.6	19.73	50.41	0	975.5
Rate of disappearances	2454	0.033	0.612	0	20.45	1.379	9.427	0	282.8
<i>Controls</i>									
Net migration	2443	5.178	5.756	−9.54	34.85	0.361	3.078	−12.15	29.82
Poverty index	2456	34.54	14.59	0	100	34.93	14.91	0	100
Population without social security	2445	31.02	30.20	0	100	66.36	24.26	0	100
Households headed by women	2454	21.31	5.410	4.82	52.01	22.24	5.315	5.473	49.62
Population aged 60 or older	2454	11.07	4.644	2.30	39.10	11.86	4.832	2.200	37.10
<i>Political variables</i>									
Elections held in local government	2017	0.281	0.449	0	1	0.550	0.498	0	1
Party alternation in local government	2017	0.489	0.500	0	1	0.548	0.498	0	1
<i>Instruments</i>									
Number of drug cartels	2456	0.194	0.601	0	6	0.605	1.172	0	9
Rate of homicide convictions	2454	6.073	16.25	0	262.2	4.550	10.66	0	172.9
Rate of drug-related crime convictions	2454	7.789	27.41	0	607.5	9.878	35.10	0	1198

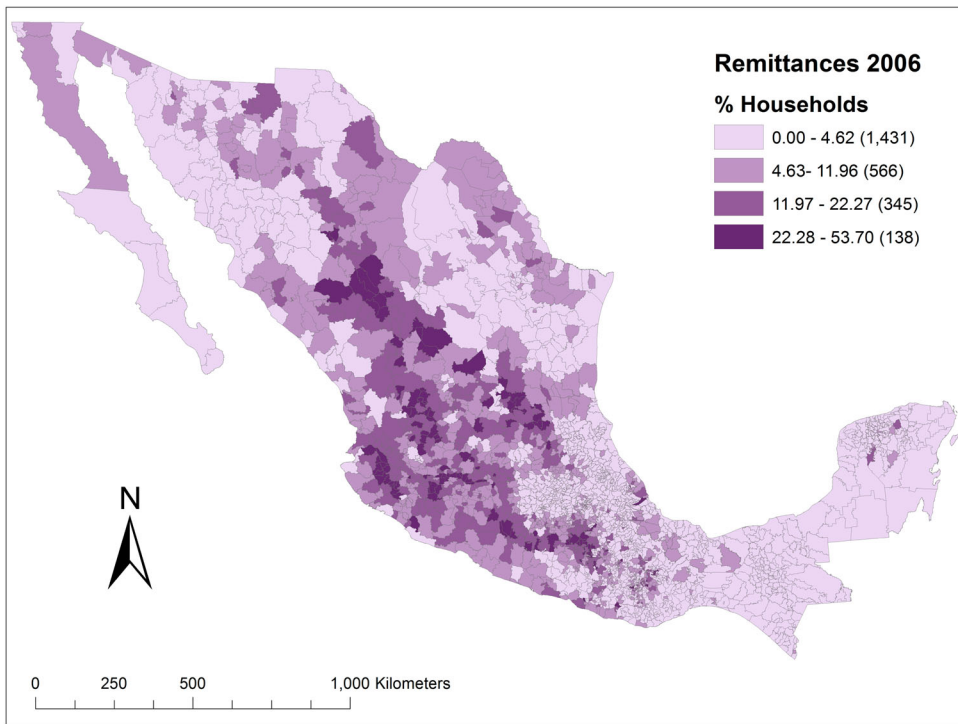


Figure 3. Remittances across Mexican municipalities (% of receiving households), 2006. Source: Authors.

Therefore, we model it as lognormal. Given that the interest here is in examining the effect of the most recent wave of criminality related to drug trafficking, in our preferred specification we use the log of drug-related homicides per 100,000 inhabitants reported by *Presidencia*. The database on drug-related homicides released by Felipe Calderón's administration in 2011 includes 'homicides', in which either the perpetrator or victim is linked to a criminal organisation, and 'confrontations', in which the deaths result from an armed confrontation between cartels and public authorities, or between cartels themselves. The dataset is based on the information presented by multiple federal security agencies. According to the Mexican Presidency, these events were classified as drug-related if they presented any of the following characteristics: (a) use of high-caliber weapons, (b) signs of torture and brutal violence, (c) written messages left on the bodies.

In 2006, the average number of drug-related homicides per 100,000 inhabitants is 2.2, with a maximum of 773.2. The large variance of the distribution is driven by the outliers (the 99th percentile is 40.3 homicides) where drug-related activity was intense during that year. Figure 1 shows the spatial distribution of this type of crime. As can be seen, the greatest intensity of these crimes is concentrated in the northwest, border and western coastal regions. The shape of the distribution changes notably in 2010. The average number of these homicides rises to 14.8; the maximum value is 1953 homicides per 100,000 inhabitants. Figure 2 shows that in general, high crime areas have remained the same over time, but there have been significant spillovers into neighbouring municipalities.

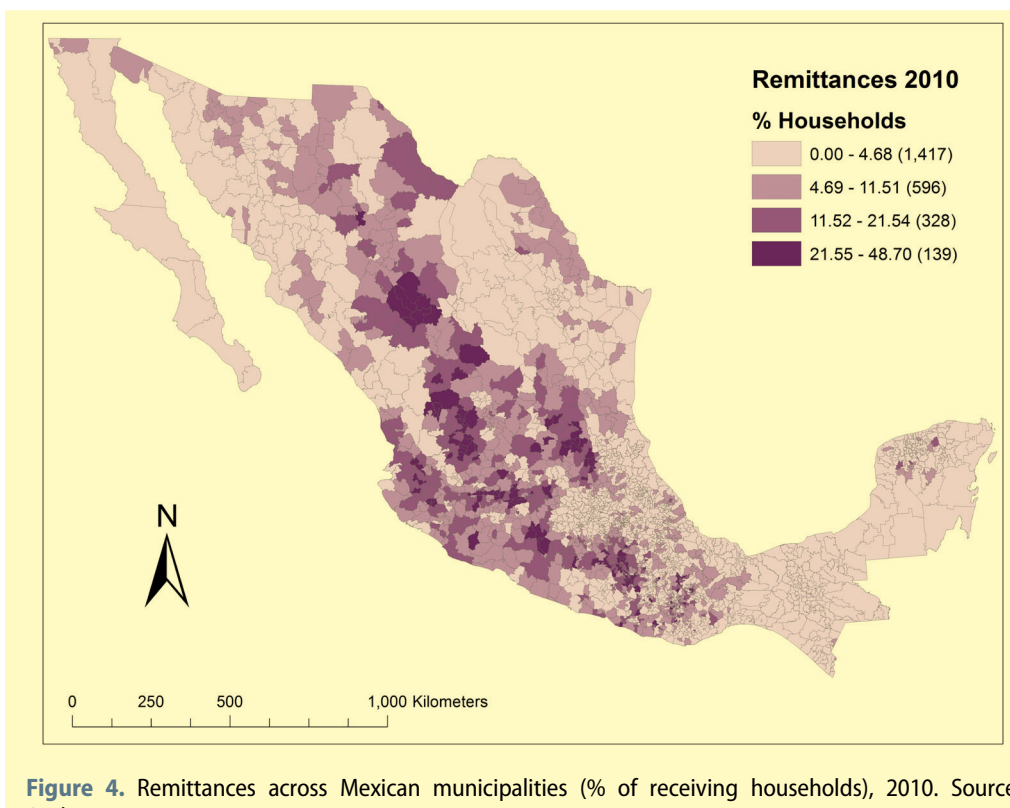


Figure 4. Remittances across Mexican municipalities (% of receiving households), 2010. Source: Authors.

To provide more robust evidence, we use two other variables as the main explanatory variables. The first is the *number of total homicides* per 100,000 inhabitants collected by INEGI. While the overall spatial distribution of this variable was more widespread than drug-related homicides across the territory in 2006, the patterns seem to overlap in 2010 (compare Figures 1 and 2 with Figures A2 and A3). This confirms the significant increase in drug-related criminal activity. Moreover, we can observe persistent violence in certain regions in the country. The second variable is *the rate of disappearances* per 100,000 inhabitants reported by the National Registry of Missing and Lost People. From Table 1, we can see increases in the average disappearance rate, as well as significant increases in the rates in outlier municipalities. This variable should be interpreted with caution given that the available data is limited and problematic. The data rely exclusively on voluntary reports and combine cases of forced disappearances and crime-related disappearances with cases of voluntary absence. Still, we think it is worthwhile to use this indicator as a robustness test. Both variables are modelled as lognormal. Finally, it should be clarified that the data we use include both Mexican nationals and foreigners. We are unable to disaggregate the data and specifically identify foreign migrants exclusively. However, our data do speak to the new trends of criminal violence in the country, which is the core of our argument.

The control variables are also collected from the population census (INEGI). The variable *net migration* is constructed as the difference between out-migration and return

migration. Specifically, it is the percentage of households with emigrants minus the percentage of households with returning migrants. During our period of study, there have been two opposing forces that we need to consider. As mentioned above, criminal violence has spurred a wave of internal and international migration, the latter mainly from border states (Ríos 2014; Atuesta and Paredes 2016). Chort and de la Rupelle (2016, 1463–1466) also report increasing out-migration due to violence from bordering states. However, these authors find less out-migration due to crime in non-border states, such as states located on the more distant southeast migration routes, where crime has been especially virulent against migrants. Emigrating from those states has become a more expensive and dangerous endeavour due to kidnappings and robberies targeted at migrants.

On the other hand, a major economic recession in the United States coupled with draconian border policies had a substantial effect on economic migration from Mexico. According to Villarreal (2014), the rate of Mexico–United States migration declined dramatically from 25 migrants per 1000 in 2005 to an annual international migration rate for Mexican men of 7 per 1000 in 2012. And according to the Centre for Migratory Studies at the National Institute of Migration, there has been a constant return of Mexican migrants estimated at 400,000 migrants annually (García-Zamora 2014, 41).¹¹ Moreover, according to anthropological research, these draconian anti-immigration measures together with displacement of traditional economic activities have left many young male Mexicans based in border states with little alternative but to engage in the lucrative business of drug-trafficking and human smuggling. Anti-immigrant policies have thus aggravated insecurity and illegality in the borderlands (Muehlmann 2014, 75). Consistent with these patterns, our data show that in 2006 the average net migration rate was 5.2%, while in 2010 this figure was close to zero. This means that in 2006, emigrants outnumbered those returning, while in 2010 the numbers were close to equal. Also, the lower bound (negative net migration) was lower in 2010. Research by Bancomer showed that over 275,000 families stopped receiving remittances between 2006 and 2008.¹² And although the evidence is mostly anecdotal, the Great Recession hit Mexican immigrants badly, causing ‘reverse remittances’ to flow north as families supported their unemployed relatives in the United States.¹³ To the extent that migration patterns obviously affect patterns of remittance sending, we need to control for these trends in migration.

To account for the fact that migrants frequently send money home for altruistic purposes, we include several indicators of the degree of need for remittances at the municipality level. We use the *poverty index*, which includes several components pertaining to education, dwelling characteristics, access to basic services and infrastructure, and size of the town or village.¹⁴ The index ranges from 0 to 100, where higher values correspond to higher poverty rates. Given that there is a poverty constraint to migration (Hatton and Williamson 2002), we introduce this variable in quadratic form, expecting an inverted u-shape; that is, fewer remittances flowing to very poor and very rich municipalities. We control for informal labour markets using the percentage of the population without Social Security (INEGI). This variable is widely used in the Mexican context as a proxy for the size of the informal sector and to a lesser extent for unemployment, mainly because in Mexico Social Security is not universal and only individuals with a formal employer are covered by this system. If remittances correlate positively with this variable, we can interpret this coefficient as remittances being sent to these municipalities to minimise the income shocks associated with unemployment.

Demographic characteristics are controlled for using two variables. First, since in Mexico out-migrants are typically male, we include a variable that measures the percentage of *households that are headed by a woman* (INEGI). This characteristic changes little over time; however, the average increased roughly one percentage point during the period. Second, we include the percentage of the *population that is aged 60 years or older* (INEGI) since out-migrants are typically younger. Here as well, changes in the distribution are slight. These two demographic variables capture that municipalities in which most households are headed by women or older people will be more likely to receive remittances if remittances are mostly sent for altruistic reasons.

As noted earlier, scholars have suggested that the transition from one-party rule to multiparty democracy led to the breakdown of informal government protection networks. Osorio (2012) shows that in the post-2006 period, more competitive municipalities experienced more organised crime-related violence. In addition, Trejo and Ley (2016a) found that as a result of the intense confrontation between the right and the left prior to and during the Calderón administration, criminal violence was fiercer in municipalities ruled by opposition parties, and more so when governed by the left. Therefore, we control for political factors that may also have had an effect on the level of remittances received, largely due to greater competition and uncertainty in the local political environment. We do so by including a dummy equal to one if elections were held at the gubernatorial level (taken from CIDAC) and if there was party alternation in the municipal government in the two years under analysis as a proxy of enhanced electoral competition (Ríos 2015; Trejo and Ley 2016b; Urrusti Frenk 2012). Approximately half the municipalities experienced an alternation of the party in power.

4.2. Empirical strategy

Our empirical specification takes the following form:

$$\ln(\text{rem}_{it}) = \beta_0 + \alpha_i + \delta_t + \beta_1 \ln(\text{crime}_{it}) + \beta_2 X_{it} + \varepsilon_{it}, \quad (1)$$

for municipality i in year t . The dependent variable, rem_{it} , measures the percentage of households receiving remittances. We use the logarithmic transformation of this variable. The main independent variable, crime_{it} , is calculated as the natural logarithm of homicide rate per 100,000 inhabitants. X_{it} is a vector of economic, demographic, and political characteristics as described above, measured for each year at the municipality level. α_i and δ_t are municipality and year fixed effects respectively. ε_{it} is an error term.

A naïve approach to estimating this relationship would be to regress remittances on crime rates and the controls for a pooled cross-section of municipalities. However, this specification would clearly yield a biased estimate of the parameter β_1 due to two main sources of endogeneity. The first threat to validity stems from omitted factors that also affect remittances. Even when we are able to control for the main time-varying determinants of remitting behaviour at the local level, there still are unobservable factors that may also be determining remittance patterns across Mexican municipalities or may be correlated with crime. For instance, subregions located in south and central western states such as Michoacán, Guerrero, and Jalisco have historically been zones of high migration intensity (Burgess 2005). Unobservable factors could be long-term migrant networks abroad, predominantly agricultural economies, low wages, and low labour productivity.

Failing to account for these largely time-invariant factors is likely to introduce a bias into the coefficient of remittances. The direction of this inconsistency is hard to predict because it also depends on the correlation of these factors with crime. For instance, the aforementioned states, along with northern states such as Durango and Sinaloa, have also experienced escalating drug-related violence in recent years; possibly, socio-institutional and economic conditions have contributed to the development of drug-related activities, leading to higher crime. Hence, the estimate of β_1 is likely to have an upward bias if regions with higher remittances are also subject to a higher intensity of criminal activity.

To address this issue, we adopt a panel specification and include a set of municipal dummies to hold these time-invariant and region-specific differences constant. In addition, temporal macroeconomic or political shocks that affected the country as a whole might also be affecting the remittance flows. For instance, the economic recession of 2008–2009 that contracted economic activity in the United States and forced some migrants back to Mexico could have also reduced remittances overall. In order to account for this possibility, besides controlling for an indicator of net municipal migration, we include year fixed effects in our estimations.

The second source of bias is potential reverse causality. While we study the effect of crime on remittance patterns, there is the possibility that remittances have an effect on crime rates (Brito, Corbacho, and Osorio 2014). Inasmuch as remittances are an important source of household income, they can reduce poverty and hence discourage engagement in criminal activity. Furthermore, the income effect may be translated into greater investment in education and better job prospects, also resulting in a drop in the crime rate. We exploit an instrumental variable approach to further address this endogeneity problem. By isolating the endogenous variation between crime and remittances, we attempt to explain this relationship only through the exogenous variation of the instrument. The two instrumental variables we use are the number of drug cartels operating in the municipality and the number of convictions for drug-related crimes per 100,000 inhabitants (Coscia and Rios 2012, INEGI). Arguably, these two variables are strongly correlated with criminal activity, thus being relevant instruments. More drug cartels operating in a municipality may result in higher crime rates due to clashes and territorial disputes. Meanwhile, conviction rates will be, in principle, positively correlated with the number of drug-related crimes. However, in practice, there may be a negative association between these two variables if high conviction rates signal the presence of a strong rule of law and high levels of prosecution, which in turn deter crime.

As far as the exogeneity condition goes, it is plausible that observed crime rates at home change migrants' incentives to remit because, as we explained above, they threaten the financial security of migrants' families and/or the security of their investments back home. Migrants abroad are likely to learn about the security situation in their communities through the news media and through family communications. However, the number of operating drug cartels is less likely to be observed and often unclear. For this reason, we argue that this variable will affect remittances only through its effect on local criminal violence. Lastly, it is unlikely that the number of convictions for drug-related crimes would affect the decision to send money to relatives back home in a given year other than through the effect of convictions on crime rates.

In sum, our empirical strategy relies on the within-municipality variation in unobservable characteristics and the exogenous variation of the instruments to identify the effect

of crime on remittances. Because the error term is likely to be correlated within each municipality, we cluster standard errors at the municipal level.

5. Results

Table 2 reports the results of our main specification in Equation (1), where the dependent variable is logarithmic transformation of remittances and the main explanatory variable is the log of drug-related homicides per 100,000 inhabitants. In Column (1) the pooled-Ordinary Least Square (OLS) estimate of the effect of crime on remittances is positive and significant, suggesting that an increase in crime is associated with an increase in the expected percentage of households receiving remittances. However, as discussed above, this estimate is likely to be biased due to reverse causality and omitted variables. This is confirmed by the change in the sign of the coefficient on crime when municipality and year fixed effects are included in Columns (2)–(6).

A discernible pattern arises, and it suggests that increases in the number of drug-related homicides are associated with *decreases* in remittance flows. To test the significance of the variable of interest, we calculated different specifications and introduced control covariates progressively in Columns (2)–(6). The sequential inclusion of the various controls does not substantially change the size and significance of the parameter of interest, highlighting the strength of the association. Criminal violence seems to deter remitters from sending money home. Indeed, in line with self-interested accounts of remittance

Table 2. Pooled-OLS and fixed effects estimation of the effect of drug-related homicides on remittances.

Dependent variable: ln(Remittances)	(1) OLS	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
ln(Drug-related homicide rate)	0.092*** (0.010)	−0.059*** (0.007)	−0.052*** (0.007)	−0.053*** (0.007)	−0.045*** (0.007)	−0.038*** (0.007)
Net migration			0.032*** (0.002)	0.033*** (0.002)	0.032*** (0.002)	0.027*** (0.002)
Poverty index				0.055*** (0.013)	0.049*** (0.013)	0.046*** (0.014)
Poverty index squared				−0.0004*** (0.0001)	−0.0004*** (0.0001)	−0.0004*** (0.0001)
Population without social security					0.003*** (0.0003)	0.002*** (0.0004)
Households headed by women					−0.001 (0.006)	−0.010* (0.006)
Population aged 60 or older					0.054*** (0.016)	0.030* (0.018)
Party alternation in local government						−0.027* (0.016)
Elections held in state government						0.069*** (0.015)
Observations	4665	4665	4665	4665	4658	3926
R ²	0.015	0.038	0.172	0.178	0.214	0.160
Year effects	No	Yes	Yes	Yes	Yes	Yes
Municipality effects	No	Yes	Yes	Yes	Yes	Yes
F	78.29	43.21	114.0	70.82	52.69	34.38
Number of clusters (municipality)	–	2339	2339	2339	2339	1970

Note: Clustered standard errors in parentheses. FE: fixed effects.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

sending, the negative sign is suggestive of migrants' concerns about the safety of their remittances and associated investments back home.

In the full specification (6), a 10% increase in the drug-related crime rate is associated with a drop of 0.36% in the share of households receiving remittances.¹⁵ Arguably this is not a sizeable change. However, the consistency of the estimates across specifications points to a strong, very robust relationship. It is an important result that compels us to consider yet another broad effect of drug-related crime in the country.

It is not surprising that the rate of *net migration* is strongly and positively associated with incoming remittances, and holding it constant does not substantially affect the coefficient of crime and its significance. Recall that while our indicator of net migration reflected more exits than returns in 2006, in 2010 the indicator reflected that exits and returns had almost evened out. Thus, even if criminal violence has pushed considerable numbers to emigrate, return migration increased in this period due to the worsening of economic conditions and tightening of immigration policies in the United States, still justifying the sending of remittances back home. These two opposing migration forces have not resulted in a decrease in remittances, despite the decline in the rate of net migration. The size of the effect is relatively similar to that of crime but in a different direction.

As most of the literature on motives to send money home posits, the reasons to remit are a mix of self-interested and complex altruistic motivations (Carling 2014). This is confirmed by the fact that some municipal variables reflecting poor socio-economic conditions, such as *poverty* and *informality*, are positively associated with receiving more remittances. In line with theory, increases in the poverty index induce positive changes in the expected value of remittances. The level of poverty (or income) has a non-linear relationship with remittances. Poverty is positively associated with migration and hence remittances for the household, because persons from poorer households are more likely to leave their places of origin in search of better opportunities. Nonetheless, extremely poor households are typically immobile, as they do not have the minimum financial means to cover the costs of migration. Thus we find a negative coefficient on the square of poverty, confirming this inverted u-shape; although significant in our sample and period of study its magnitude is very small. As far as our proxy for informality goes, the estimated effect is positive and significant, but considerably smaller than that of poverty.

Regarding the demographic variables, the coefficients are not consistent across specifications. The variable of households headed by women is not significant in Column (5) and barely significant and negative in estimation (6), possibly suggesting that gender in the case of Mexico and during the period of study is not associated with being a migrant who is sending money back home. Nonetheless, the estimated effect of population aged 60+ years is positively correlated with remittances and significantly so in Column (5), where an increase of 10% in the share of population aged 60+ years is associated with a 0.52 increase in the expected share of recipient households. This hints at the fact that the younger population migrates and sends money back to support their families and elders, which reinforces the idea that altruistic motivations to remit persist even amidst high levels of drug-related violence. In other words, 'help', 'obligation', and 'investment' scripts seem to co-exist in times of crime (Carling 2014, S237, S241).

The coefficients on the political variables are significant and largely do not change the effect of crime. On average, and in line with Nyblade and O'Mahony (2014), the share of

remittance-receiving households was 0.66 percentage points higher in municipalities that held elections at the state level than in municipalities without elections. There is in fact a political remittance cycle by which elections stimulate migrants to send more money home. This remittance cycle is robust to the inclusion of municipal elections instead of state elections in Column (6). Conversely, expected remittances appear to be 0.26% lower in those municipalities whose municipal government experienced an alternation in power in the past two years, indicating that migrants may be put off by instability and the arrival of new incumbents at the local level.

To further reduce the possibility of endogeneity between crime and remittances, we adopt an instrumental variable approach to isolate the endogenous variation of crime. Because our instruments are time varying, we can estimate a two-stage least squares (2SLS) model with fixed effects. The first stage for different specifications is reported in Table 3. Column (1) estimates the reduced form with drug-related homicides as the dependent variable. We are able to reject the null hypothesis of jointly excluded instruments in favour of the alternative that the equation is not weakly identified in both the Cragg–Donald and Kleibergen–Paap tests. The sign on the instruments reveal that municipalities with a higher number of operating drug cartels have also a higher rate of drug-related crime rates. In contrast, municipalities with higher conviction rates have fewer reported crimes.

Table 3. First-stage fixed effects estimates of the impact of the instruments on different crime variables.

Dependent variables	(1) Drug homicides	(2) Homicides	(3) Disappearances
<i>Number of drug cartels</i>	0.348*** (0.036)	0.212*** (0.030)	0.157*** (0.021)
<i>Rate of drug-related crime convictions</i>	−0.004** (0.002)	−0.003* (0.002)	−0.002 (0.001)
Net migration	−0.028*** (0.006)	−0.033*** (0.006)	−0.012*** (0.002)
Poverty index	0.024 (0.060)	−0.006 (0.055)	−0.061** (0.028)
Poverty index squared	0.0003 (0.0006)	−0.00008 (0.0005)	0.0006** (0.0003)
Population without social security	0.001 (0.001)	−0.002* (0.001)	−0.0004 (0.0004)
Households headed by women	0.026 (0.020)	0.041* (0.022)	0.025*** (0.009)
Population aged 60 or older	0.241*** (0.058)	0.010 (0.057)	0.075** (0.032)
Party alternation in local government	0.023 (0.058)	−0.034 (0.060)	−0.001 (0.028)
Elections held in state government	0.052 (0.052)	0.234*** (0.055)	0.005 (0.028)
Observations	3926	4020	4018
R^2	0.186	0.070	0.125
Number of clusters (municipality)	1970	2017	2015
Year effects	Yes	Yes	Yes
Municipality effects	Yes	Yes	Yes
Kleibergen–Paap Wald F statistic	48.18	26.57	28.96
Cragg–Donald Wald F statistic	59.09	19.98	51.19

Note: Dependent variables are in logarithmic form. Clustered standard errors in parentheses.

*** $p < .01$.

** $p < .05$.

* $p < .1$.

Not only does the relevance of the instruments hold for drug-related homicides, but also for total homicides (Column 2) and disappearances (Column 3). In these specifications, we are also able to reject the null hypothesis that the equation is weakly identified. Moreover, the coefficients on the individual instruments are also statistically different from zero (except for drug-related crime convictions in Column 3, which is not surprising considering the measurement problems of the *disappearances* indicator). Altogether, we are confident that our instruments are relevant. Nonetheless, to meet the exclusion restriction, we need to establish that both the number of cartels and of convictions are not affecting the contemporaneous level of remittances. As reported in Table 4, the low values of the *J*-statistic for over-identification show that all instruments are jointly exogenous.¹⁶

Table 4 reports the 2SLS fixed effects estimates of crime on the percentage of households receiving remittances. We estimate Equation (1) using three different explanatory variables: *drug-related crime rates*, *overall rates of homicides*, and *disappearances*. When instrumenting for crime, the estimated effect is again negative and significant at the 1% level (Column 2). Similar results are obtained for total homicide rate in Column (4) and disappearances in Column (6). It should be noted that the size of the effect increases

Table 4. Second-stage and fixed effects estimates of the impact of crime on remittances.

Dependent variable: <i>ln(Remittances)</i>	(1) FE	(2) IVFE	(3) FE	(4) IVFE	(5) FE	(6) IVFE
<i>ln(Drug-related homicide rate)</i>	−0.038*** (0.007)	−0.111*** (0.026)				
<i>ln(Homicide rate)</i>			−0.019*** (0.006)	−0.164*** (0.047)		
<i>ln(Disappearance rate)</i>					−0.048*** (0.013)	−0.230*** (0.062)
Net migration	0.027*** (0.002)	0.021*** (0.002)	0.027*** (0.002)	0.019*** (0.003)	0.027*** (0.002)	0.021*** (0.002)
Poverty index	0.046*** (0.014)	0.045*** (0.015)	0.045*** (0.014)	0.042*** (0.016)	0.042*** (0.013)	0.029* (0.015)
Poverty index squared	−0.0004*** (0.0001)	−0.0003** (0.0001)	−0.0004*** (0.0001)	−0.0004** (0.0001)	−0.0004*** (0.0001)	−0.0002 (0.0001)
Population without social security	0.002*** (0.0004)	0.003*** (0.0003)	0.002*** (0.0004)	0.002*** (0.0004)	0.002*** (0.0004)	0.003*** (0.0003)
Households headed by women	−0.010* (0.006)	−0.001 (0.006)	−0.009* (0.005)	0.004 (0.007)	−0.009* (0.005)	0.003 (0.006)
Population aged 60 or older	0.030* (0.018)	0.076*** (0.019)	0.018 (0.018)	0.042** (0.019)	0.020 (0.018)	0.058*** (0.021)
Party alternation in local government	−0.027* (0.016)	−0.022 (0.016)	−0.028* (0.016)	−0.029 (0.018)	−0.028* (0.016)	−0.023 (0.017)
Elections held in state government	0.069*** (0.015)	0.083*** (0.016)	0.076*** (0.015)	0.119*** (0.020)	0.070*** (0.015)	0.081*** (0.016)
Observations	3926	3912	4020	4006	4018	4006
R-squared	0.160	0.094	0.149	−0.101	0.150	0.060
Number of clusters (municipality)	1970	1956	2017	2003	2015	2003
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipality effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>F</i>	34.38	33.51	31.92	27.90	32.44	33.08
Hansen <i>J</i> Statistic		0.044		0.056		0.003
Chi-square <i>P</i> -value for over-identification		0.8332		0.8129		0.9596

Note: Clustered standard errors in parentheses. FE: fixed effects, IVFE: instrumental variable fixed effects.

****p* < .01.

***p* < .05.

**p* < .1.

greatly for the three crime variables when we use the instrumental variables approach. For instance, a 10% increase in drug-related homicide rate is associated with a decrease of 1.05% in the expected percentage of households receiving remittances (Column 2). In the same vein, a 10% increase in the total homicide rate is associated with a drop of 1.54 in the expected value of the remittances variable (Column 4).

Overall, these results show that there is a *negative* association between the presence of criminal violence and remittances that is robust to different model specifications and to possible threats to validity. Crime deters migrants from sending money home; but migrants continue to send money to their elderly and to municipalities where informality predominates, indicating the endurance of altruistic motivations to remit amidst crime. Finally, municipal and state elections animate emigrants to remit back home. Therefore, political cycles should not be ignored in the exploration of the determinants to remit.

6. Conclusions

While research on the economic causes and economic consequences of remittances has been the object of a large body of research, much less attention has been paid to crime or to other non-economic motivations to remit. As a result, we have only quite thin and one-dimensional explanations of what drives the decision of migrants abroad to support their relatives back home. In this paper, we explore how the surge of crime associated with drug trafficking during the tenure of President Calderón in Mexico has affected the activities of remitters, taking into account factors such as changes in migration flows related to the Great Recession as well as changing political conditions following the transition to democracy in the 2000s. We of course control for standard economic explanations of the altruistic and self-interested type.

We find an unequivocal *negative* effect of crime on the percentage of households that receive remittances, which in this literature is interpreted as an indication of remitters' being concerned with the security of their money transfers and the security of the investments they have or plan to carry out in their communities of origin. Controlling for multiple alternative explanations and taking into account possible validity threats, we find that the percentage of households receiving remittances has declined during the most recent wave of drug-related crime and violence.

There are, however, other factors that point to an altruistic drive in the decision to remit and that continue to have leverage in explaining remitters' decisions. Controlling for levels of crime, there is an increase in the percentage of households that receive remittances in municipalities with higher levels of informality and higher poverty. Moreover, despite the abundant anecdotal and case study evidence that migrants frequently become involved in local politics using their resources, empirical work on the determinants of remittance sending has frequently overlooked political motivations to remit. Our findings corroborate the existence of political remittance cycles at the state and the municipal level and the importance of controlling for the political context when studying migrants' motivations to remit.

Further research on remitters' activities should theorise and test the interaction among these different factors. For instance, in recent research on the 2014 El Salvador presidential election, Paalberg (2015) describes how remittances entered into the electoral campaign: one of the contending parties appealed to migrants' concern about the security of their

transfers, presenting itself as the best guarantor of safer money transfers and making this a part of its campaign strategy. It could then be hypothesised that despite the existence of crime, remittances may still flow to municipalities where parties that embrace draconian security measures are in power. Testing this type of conditional hypothesis will no doubt improve our understanding of the relative explanatory power of economic and non-economic motivations to remit.

Notes

1. These types of studies also control for other factors that obviously may affect the propensity to remit, such as the legal status of migrants or their length of residence.
2. To be sure, there is abundant literature looking at the role that remittances play in contexts of conflict, yet conflict is rarely studied as a determinant of remittance sending. The emphasis is instead on the countercyclical role of remittances to help smooth the income of those left behind as well as the uses that remittances are given in conflict situations; for instance, to sustain insurgent movements or to support reconstruction efforts. See Carling, Bivand, and Horst 2012, 284–285 for a discussion.
3. In contrast, using survey data of different migrant groups and qualitative research among Somali and Pakistani communities in Norway, Carling, Bivand, and Horst (2012, 302) find that Somali migrants are ‘devoted remitters’, reacting to the ongoing climate of violence in an altruistic way, and increasing the amount of remittances that migrants send back home despite not being a particularly wealthy migrant group.
4. Alvarado and Massey (2010) find a heterogeneous response to violence in Mexico, Costa Rica, Guatemala, and Nicaragua. Only in Nicaragua were high homicide rates associated with greater emigration rates to the United States during the 1980s and 1990s.
5. Also, scholars are starting to pay closer attention to the role of remittances in helping autocracies to survive (Ahmed 2012) and to how remittances may facilitate democratisation processes (Pfitze 2013; Escribà-Folch, Meseguer, and Wright 2015).
6. Felipe Calderón won by a razor-thin margin of 0.6%. The opposing leftist candidate, Andrés Manuel López Obrador (Partido de la Revolución Democrática, PRD), did not concede defeat and contested the election in the courts and on the streets.
7. Database on deaths resulting from alleged criminal rivalry, Mexican Presidency.
8. There is unpublished evidence on the reverse relationship, namely, how remittances affect crime (Brito, Corbacho, and Osorio 2014). In Mexico, remittances seem to lower the incidence of crime at the municipal and state levels, possibly because remittances improve educational outcomes, which in turn reduces criminality.
9. The choice of years was made to match data from different sources across the longest time period possible, primarily because census data is available for 2005 and 2010.
10. For the logarithmic function to be defined we need to deal with the zeros, for which the natural logarithm is undefined. The log transformation is applied to the actual rate per thousand inhabitants plus one. Note that in 2006 only 6% of the municipalities report not having households receiving remittances while in 2010 the figure goes down to 2%.
11. The extent of return migration is controversial and sensitive to the source and the period under scrutiny. See Rendall, Brownell, and Kups’s research note (2011, 1050) for a discussion of methodologies and contradictory results regarding return migration.
12. ‘BBVA: Remittances Reduction: a factor in poverty rise.’ Available at <http://eleconomista.com.mx/finanzas/2009/07/27/reduccion-remesas-factor-aumento-pobreza-bbva>.
13. ‘Money Trickles North as Mexicans Help Relatives.’ Available at <http://www.nytimes.com/2009/11/16/world/americas/16mexico.html>.
14. Calculated by *Consejo Nacional de Población* (CONAPO) using census variables from INEGI.

15. In a log-log model, the estimated effect of a 10% increase in the crime variables is given by $e^{\beta_1 * \ln 1.1}$.
16. In other words, we can conclude that the instruments are uncorrelated with the error term and hence correctly excluded from the estimated equation.

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Appendix

Figure A1. Density distribution of municipality remittances by year.

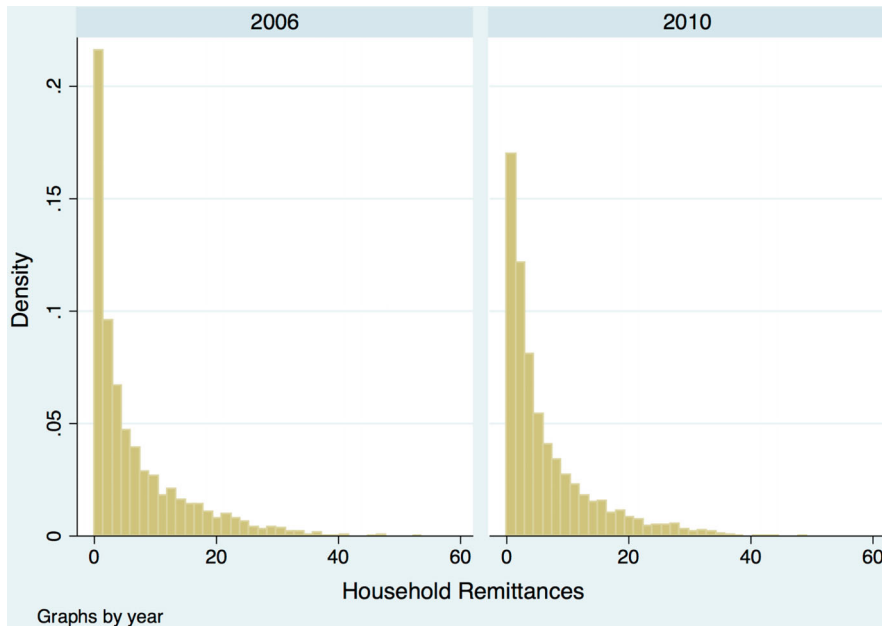


Figure A2. Total homicides per 100,000 inhabitants across municipalities, 2006. Source: Authors.

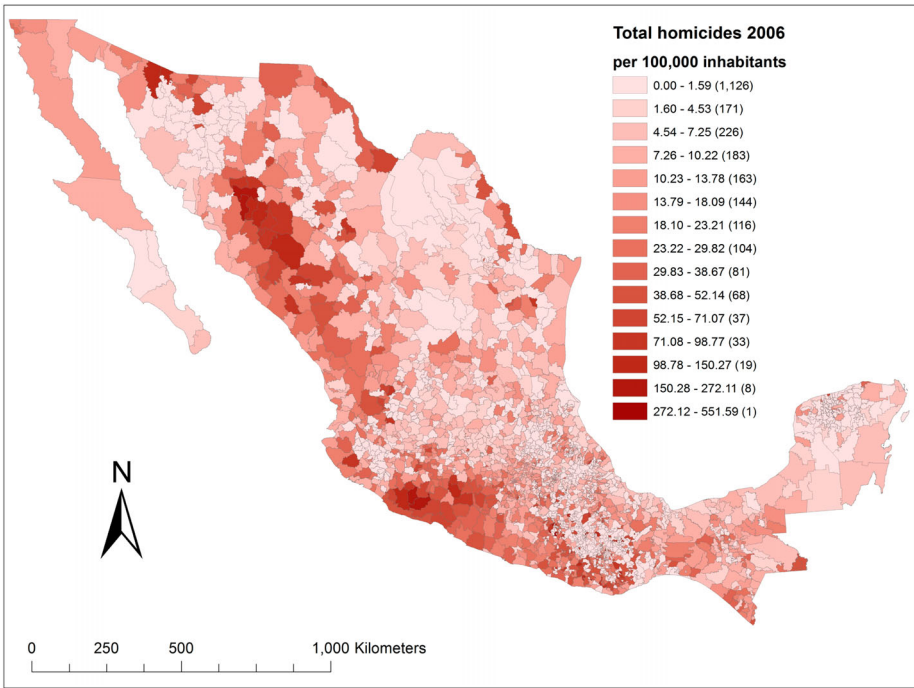


Figure A3. Total homicides per 100,000 inhabitants across municipalities, 2010. Source: Authors.

