Do Remittances Crowd-In or Crowd-Out Public Expenditure?

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Abstract

This paper estimates the effect of migrants' remittances on the size and composition of municipal finance in Mexico, by employing an instrumental strategy that exploits regional variation in labor market effects of the US subprime crisis as an exogenous determinant of remittances. Findings indicate that remittances are both a substitute and a complement of public finance. Although there is a crowding-in of public investment per capita, total revenue and expenditures decrease as a response to remittances. In relative terms, the crowding-out effect of remittances is most pronounced for transfers and subsidies. Two mechanisms seem to be at work. On the one hand, remittances function as a leverage for attracting additional public funds, a mechanism that has been institutionalized in the Three-For-One-Program, a co-financing scheme where public entities at the municipal, state and federal level match each dollar sent by migrants for public works in their home towns. On the other hand, governments respond to the inflow of resources by allocating funds away from municipalities with larger inflows of remittances. In particular, private self-insurance in the form of remittances substitutes public safety nets and crowds out public transfers and subsidies.

Keywords: remittances, public finance, governance

JEL classification: D72, D78, F24, H42, H72, H75

I. Introduction and Contribution to Literature

In parallel to the strong increase of monetary remittances transferred by migrants to their families back home, scholars have produced a wealth of literature on the impact of migration and remittances on countries of origin over the last two decades. Development micro-economists have mainly focused on remittances as a tool of risk-management and poverty-alleviation among transnational households that substitutes for absent or incomplete formal systems of social protection and insurance in the countries of origin (see for example Brown and Jimenez-Soto 2015; Page and Plaza 2006; de Haas 2010 for overviews of the literature). Development macroeconomists have emphasized the role that foreign currency inflows may have on the level (e.g. Amueda-Dorantes and Pozo 2004; Acosta, Lartey, and Mandelman 2009) as well as a the stability of exchange rates (e.g. A. Singer 2010; Buch and Kuckulenz 2010), among others. This paper joins a relatively new but growing literature on the broader political and institutional effects of out-migration and remittances. In concrete, it addresses the question how remittances affect public finance in the countries of origin. Although remittances are private incomes of transnational households that do not flow directly into governments' hands - and governments have rarely dared to tax remittances directly in order to avoid incentives of sending remittances outside formal channels - this paper argues that remittances have important indirect effects both on the amount as well as on the composition of government spending: While they crowd-in additional public investment, total revenue and expenditure decrease as a response to remittances. In relative terms, the crowding-out effect of remittances is most pronounced for transfers and subsidies. These findings underline the ability of migrants to influence economic policies at home on the one hand, and a substitution of public with private safety nets on the other hand.

Existing literature identifies several channels through which remittances may influence government finances. First, remittances potentially affect the size of government budgets via a wealth effect. Whereas remittances are usually not taxed directly, their spending and multiplier effects in the local economy (Durand, Parrado, and Massey 1996) increase overall taxable consumption. Value added taxes have become an important source of revenue in many developing countries and emerging markets since the 1980s. Singer

(2012) therefore argues that remittances expand the size of the state and identifies a positive association between the size of governments and the amount of remittances in a panel of 76 developing countries. Moreover, remittances may function as collateral and facilitate access to borrowing. Analogous to the household level (e.g. Demirgüç-Kunt et al. 2011; Ambrosius and Cuecuecha 2016), the "securitization" of remittances (using future flows of remittances as a security for lending in international capital markets) potentially facilitates access to credit by sovereign borrowers (Ratha, Mohapatra, and Plaza 2008). The latter effect may result particularly important during periods of economic downturn, due to the a-cyclical nature of remittances that may help countries to partly escape the policy constraints imposed by the anti-cyclical character of international financial cycles (D. A. Singer 2012).

A distinct strand of literature has emphasized that migrants are important non-state providers of public goods that reduce the pressure on governments to provide certain public services (cp. D. A. Singer 2012). For example, for the case of Yemen in the 1970s, Chaudhry (1989, 111) claims that remittances generated local resources that reduced the reliance of rural communities on the provision of public infrastructure, such as roads, electricity, water, clinics, and schools. Similarly, Kapur (2010, 119) argues that remittances to Kerala from Indian migrants reduced the pressures on government-provided facilities because remittances-receiving families use private health clinics and send their children to private schools. As an interesting contrast, an unpublished study on Moldova where schools are public finds that in the presence of remittances local governments shifted spending towards items that do not have private sector substitutes, such as education (Barsbai, Shweinitz, and Steinmayr 2015). Using data from Mexican municipalities, Adida and Girod (2011) show that remittances are partly used for the non-state provision of public goods such as drainage and water. There is also evidence from cross-country studies that remittances are channeled away from the delivery of certain government services, such as government transfers, public health care, and school enrollment (Ahmed 2013; Abdih et al. 2012) to fund patronage instead (Ahmed 2012). Doyle (2015) finds that Latin American countries with large remittance inflows reduced spending for social security, due to the compensation and insurance functions of remittances.

On the other hand, migrants might also exert pressure on governments to increase their spending, using remittances as a leverage. Mexico provides the prominent example of the

Three-for-One Program, of which variants have been implemented in other countries (e.g. El Salvador, Somalia, Ecuador, Colombia and Peru, see García Zamora 2007; cit. in Aparicio and Meseguer 2012). Under this matching-grant scheme, migrants use collective remittances by Home-Town-Associations (HTA) as leverage in order to obtain additional spending by municipal, state and federal governments for the financing of public works in their communities (Aparicio and Meseguer 2012; Meseguer and Aparicio 2012; Duquette-Rury 2014; Garcia Zamora 2005; Iskander 2015; Simpser et al. 2016). Several studies have diagnosed considerable political leeway in the manipulation of these funds. Meseguer and Aparicio (2012) provide qualitative evidence for the strategic use of the Program by elected officials. Municipalities that share partisanship with higher levels of government are more likely to benefit from the political bias of the Program (Aparicio and Meseguer 2012; Simpser et al. 2016).

Several open questions emerge from the literature. First, whether remittances increase the overall size of budgets - hence, whether remittances are a substitute or a complement of government finance - is not a priori clear. On the one hand, remittances might crowd-in additional public spending either via an increase of overall taxable consumption and a relaxing of financing and borrowing constraints; or because migrants and their families may pressure governments to increase public spending via co-financing schemes in the spirit of the Three-For-One Program. Taking the opposite view, the financing of public spending from remittances might also crowd-out public expenditure, because the self-provision of private goods from remittances reduces the pressure on governments to provide these goods from public resources. Second, irrespective of the total size of governments, remittances potentially affect the composition of public expenditure. On the one hand, governments might redirect spending towards areas for which no private substitute exists, as argued by Barsbai et al. (2015) and Kapur (2010), among others. On the other hand, even if governments increase expenditure in the context of co-financing schemes such as the Three-For-One Program, the increases of spending in one area might be cross-financed at the expense of other regions, by changes in the composition of spending, or by higher debts among participating municipalities as argued by Simpser et al. (2016).

This paper studies effects of private and collective remittances on municipal finance in the case of Mexico, a country with a long history of migration to the US. Today, an estimated

12 million Mexican-born immigrants live in the US (Pew Hispanic Center 2013), corresponding to roughly ten percent of the population of Mexico. The US-Mexican remittances corridor is the largest in the world and Mexico is the third-largest receiver of remittances in absolute terms, after China and India (World Bank 2014). Remittances contribute to 2% of GDP (ibid.) and up to 9% in the Mexican states with the highest out-migration rates (BANXICO 2016). Mexico constitutes an ideal laboratory for studying the impact of remittances on the size and composition of public expenditures, due to the availability of detailed panel data at the level of 2,456 Mexican municipalities and variations on key variables that can be exploited in the empirical strategy. For one, the fact that Mexican migration varies both in intensity as well as in destination across Mexican regions provides large variation on the independent variable. Traditionally, outmigration has been strongest in the Northern states with long-established migration networks, dating back to the 1920s when Mexican labor was recruited for the construction of railways in the North. More recently, the 1990s and 2000s saw strong waves of largely undocumented out-migration that led to a rising share of migrants from non-traditional migration states such as Oaxaca and Chiapas (see Durand, Massey, and Parrado 1999 for the different waves of Mexican migration to the US). The emergence of different migration corridors and a large variation of destination across US states is used for the construction of instruments using labor market indicators in the US.

Regarding the dependent variable, Mexico provides detailed yearly data on public revenue and expenditure across municipalities that will be crossed with data on migration and remittances. As a federal state, Mexican municipalities have a relative autonomy over spending that allows linking differences in size and composition of municipal finance to the prevalence of remittances. Finally, Mexico is a pioneer in co-financing projects: The existence of institutionalized matching funds schemes in Mexico allows investigating the effect of co-funding arrangements on the size and composition of municipal finance, one of the channels through which remittances potentially affect public expenditure. According to Duquette-Rury (2014), the Mexican Three-For-One Program budget had reached $1.7 billion in 2008, of which ¼ were financed by migrant clubs and ¾ by the three layers of government. Although the amount may appear relatively small compared to the annual 25

billion USD of private remittances to Mexico (World Bank 2014), its importance for municipal budgets is by no means negligible (Duquette-Rury 2014).

The remainder of the paper is organized as follows. The following section II explains the empirical strategy in more detail. Section III describes the data employed in this research. Section IV presents baseline correlations between changes in indicators of municipal finance and both private and collective remittances between the years 2000 and 2010. Section V estimates the causal impact of remittances as obtained from an instrumental regression. While remittances crowd-in additional public investments, they have a net negative impact on total per capita revenue and expenditure of municipalities. In relative terms, this crowding-out effect is most pronounced for transfers and subsidies. Two mechanisms seem to be at work here. On the one hand, remittances function as a leverage for attracting additional public finance towards communities with important remittance corridors, a mechanism that has been institutionalized in the Three-For-One-Program. On the other hand, governments also respond to the inflow of resources by reallocating funds away from municipalities with large inflows of remittances. In particular, private self-insurance in the form of remittances substitutes public safety nets and crowds out public transfers and subsidies. The final section concludes and highlights implications of these findings.

II. Identification Strategy: The US Subprime Crisis as a Natural Experiment for Remittances to Mexico

In order to estimate the effect of remittances on indicators of public finance, a two-period panel model with municipal fixed effects will be estimated using ordinary least squares. The baseline equation takes the following form:

$$(1)\ \mathrm{PubExp}_{i,t} = \beta_1 \mathrm{REM}_{i,t} + \beta_3 X_{i,t} + \nu_i + u_{i,t},$$

where PubExp stands for expenditure indicators of municipal governments. REM refers alternatively to the share of households in a municipality that received private remittances (REM_P) or whether the municipality received collective remittances (REM_CL) sent through the Three-for-One program]. In order to identify causal effects, REM will be replaced by an instrument Z of labor market conditions in the US, as explained below. X is a vector of control variables, collected either at the municipal or state level. The subset t refers to the years 2000 and 2010 for which census data is available. For the purpose of comparison, the regression analysis uses data for a subset of up to 1,962 out of a total of 2,456 Mexican municipalities i that reported data on municipal finance in both periods. This excludes mainly smaller municipalities that are not well covered by the data. u is the usual error term.

Studies on causal effects of migration and remittances are typically plagued by selection bias (i.e. the fact that migrants differ from non-migrants both on observable and unobservable characteristics) that pose empirical challenges to researchers. With respect to the effect of remittances on public expenditure, concerns lie in the fact that municipal budgets are affected by local economic conditions, but economic conditions in the regions of origin are also a main factor in explaining migration and remittances: Bleak economic outlooks provide an incentive to emigrate and they motivate support for family members back home. Inferences based on simple correlations between indicators of public finance and levels of remittances are therefore expected to be biased.

Following previous studies that have used economic conditions in the country of destination as an instrument for remittances (R. H. Adams and Cuecuecha 2013; R. Adams and Cuecuecha 2010; Ambrosius and Cuecuecha 2016; Anzoategui, Demirgüç-Kunt, and Martínez Pería 2014 among others), this paper uses a natural experiment for solving the endogeneity of both private and collective remittances. The US subprime crisis in 2007/2008 strongly affected remittances to Latin America and in particular to Mexico through a sudden decrease in labor demand in construction and other sectors that employ a large number of migrants. The employment effect of the US subprime crisis therefore translated to a decrease in incomes among the migrant population that provides a source of exogenous variation to be exploited in the instrumental strategy. Figure 1 plots remittances to Mexico over the period 1995 to 2016. After a continuous increase of remittances during

the 1990s, the US financial crisis led to a sharp drop in remittances to Mexico after 2007. The three-years-period from 2007 to 2010 – the year of the census in Mexico - saw a decline of remittances by more than 19%, compared to an increase of 34% during the reference period 1997-2000.

The instrumental strategy relies on two sources of exogenous variation: On the one hand, labor market conditions and the impacts of the financial crisis vary regionally across US states. At the same time, different remittance corridors have emerged across Mexico. Due to network effects that reduce costs of migration, these migration and remittances corridors present strong path-dependencies and change only slowly during time (McKenzie and Rapoport 2007). For example, migration networks in the Northern states date back to the recruitment of Mexican labor for railway construction in the 1920s, and later the 'bracero' program of labor recruitment in the 1950s and 1960s. In contrast, migration networks that emerged in the Central and Southern states have a more recent origin, registering strong outward movements in the 1990s and 2000s in the context of structural changes within the Mexican agricultural sector (cp. Durand, Massey, and Parrado 1999). Different migration corridors lead to variation in the exposures to US labor market conditions between Mexican states, depending on the distribution of the Mexican diaspora across US states. In order to capture regional exposure to US labor markets, an indicator on labor market conditions over the previous three years is constructed by subtracting the level of unemployment in US state k in year (t-3) from the level of unemployment in US state k in year (t). With the purpose of generating variation per Mexican state, job creation in US states is multiplied with the percentage of consular documents that were requested by individuals from Mexican state j who lived in US state k in 2008, available from IME (2008)[1]. Note that the IME (2008) data is left intentionally without variation so that all time variation in the created variable is due to the fluctuations in job creation. This variable is called DUSEMP[2].

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[1] The idea of using IME-data to construct instruments is owed to Alfredo Cuecuecha. See Ambrosius and Cuecuecha (2016) for an application to Mexican household data.

[2] The indicator of a change in unemployment rates over the previous three years proved to be empirically strongest, although other indicators (for example, employment creation over

Figure 2 plots variation on this indicator across the 32 Mexican states, with darker grey tones indicating higher exposure to the effects of the US financial crisis on remittances to Mexico.

[Figure 1: Remittances to Mexico]

[Figure 2: Exposure to US Labor Market Conditions in Mexican States]

In order to be a valid instrument, two conditions have to be satisfied: First, labor market conditions in the US have to be a strong predictor for remittances (instrument relevance) and, second, US labor market conditions have to be uncorrelated with unobserved components in eq (1) (instrument exogeneity) (Angrist and Krueger 2001). Regarding the first condition, employment creation is an important supply-side factor in explaining remittances to Mexico. As previous studies have shown, remittances are responsive to economic conditions in the host countries (for an assessment of the effects of the global financial crisis on remittances, see for example Inchauste and Stein 2013; Sirkeci, Cohen, and Ratha 2012). As illustrated in Figure 1 for the Mexican case, an improvement (or a deterioration) in labor market conditions in the US has a positive (negative) influence on the capacity of Mexican migrants to send remittances, everything else being equal. Regarding the second condition, regional variation in US labor market conditions does not have a (direct) effect on variation in indicators of municipal finance in Mexico, other than through remittances. Although overall business-cycles might be aligned between Mexico and the US, the instrument builds on regional variation in labor markets across US states, that should not be related to regional between-state variation in Mexico. Note that all

the previous four or five years that also covered the labor market effect of the financial crisis in 2007/2008) gave similar effects. See the annex for an evaluation of the strength of different instruments.

regressions maintain municipal and year fixed effects, so that all time-constant differences at the level of states and municipalities as well as overall time-trends are controlled for.

III. Data

This research uses data at the level of Mexican states and municipalities from several sources. Data on public revenue and expenditure at the level of municipalities comes from INEGI (2015c). The main aggregate items for revenue and expenditure in the years 2000 and 2010 are summarized in Table 1. Total municipal budgets per capita were, on average, 1730 Mexican pesos (MXP) in 2000 and 4120 MXP in 2010, measured in constant 2010 values (corresponding to roughly 140 USD and 330 USD at the 2010 exchange rate). The increase of municipal revenue over this ten years' period reflects processes of political and fiscal decentralization since the 1980s that went in hand with an increase of municipal budgets that provided municipal governments with considerable room for discretionary use of these public funds. According to Simpser et al. (2016: 69, based on INEGI data), municipal spending made up 7.5% of total public expenditure in Mexico in 2010.

Mexican municipalities receive revenue from three main sources (cp. SEGOB 2011). Federal transfers account for the largest component of municipal revenues, contributing to 82.3 % of total budgets. Federal Transfers are channeled towards municipalities via the respective state governments and can be distinguished between unconditional federal transfers or '*participaciones*' and conditional federal transfers or '*aportaciones*' that are tied to specific spending[3]. In principle, the channeling of funds towards municipalities follows pre-established formulas that consider geographic, historical, and distributional criteria, as defined in the Law of Fiscal Coordination (*Ley de Coordinación Fiscal)* (see SEGOB 2011, 26). Criteria for the distribution of federal transfers towards municipalities

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[3] On average, unconditional transfers made up 30.5 % of all municipal revenue in the year 2000 and 41.2 % of all municipal revenue in the year 2010. On average, conditional transfers amounted to 50.6% of municipal revenue in the year 2000, and 39.3% of municipal revenues in the year 2010.

differ between the 32 Mexican states. Transparence and accountability with respect to the distribution of these funds may vary at the subnational level (Gibson 2013; Snyder 2001; cp. Simpser et al. 2016, 65), providing public authorities with policy discretion in allocating funds towards municipalities[4]. In addition to federal transfers, municipalities may also receive own revenues in the form of local taxes on real estate, from the expedition of licenses (among others for construction, water usage and supply), service provisions (among others, for land and real estate registries, land division into lots, etc.), as well as from fines that can be charged by municipalities. Own revenues (INC_OWN) constituted around 11.2% (2000) and 10.5% (2010) of municipal revenues, whereas new loans accounted for 4.2 % of municipal revenue in 2000 and 5.1% in 2010, on average. Additional revenues that are not included in Table 1 may include other third-party finances, among others (INEGI 2009, 65f).

Municipal expenditure is reported for several main items. Current expenses (EXP_CUR) are composed of personal services, the acquisition of materials and supplies, and general services. Current expenses amounted to 52.4% of expenditures in 2000 and 46% of expenditure in 2010. Other main items are public investment (EXP_INV) including the acquisition of assets and real estate, as well as spending on public works and infrastructure. 22.4% of municipal spending fell into this category in 2000, and 36.2% of spending in 2010. A third spending category are subsidies and transfers (EXP_TRN) targeted towards the economically most vulnerable households, summing up to 14.6 % of all expenditure in 2000 and 9.3% in 2010. Remaining items include the payment of debt, the investment in

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[4] Policy discretion in the allocation of federal transfers towards municipalities is still an under-researched topic for the case of Mexico. Many municipalities are of small size. For these, reliable information on social and demographic data is only available for the census years, at best. For example, the state of Oaxaca counts 570 municipalities with a population size of several thousands and less in many cases. The lack of data needed for a formula-based distribution of federal funds together with variation in accountancy at the sub-national level provides public authorities with important discretion in allocating funds.

financial assets, and remaining dispositions at the end of the fiscal year, among others. By definition, total municipal revenue and expenditure are identical.

Since not all municipalities report data on all items, Table 1 and the subsequent analysis use between 662 municipalities (for debt) and 1692 municipalities (for total revenue and expenditure) for which data is provided in both years.[5] For the empirical exercise, all fiscal data refers to real values in 2010 Mexican pesos on a per capita basis, using population data from INEGI (2015a; 2015b). Missing values for population size at the municipal level in either 2000 or 2010 have been interpolated using historical population data.

[Table 1: Municipal Revenue and Expenditure, as % Shares and as Per Capita Values]

The share of households in a municipality that reported to have received private remittances has been constructed from microdata of an extended questionnaire that surveyed 10% of the population of the 2000 and 2010 census (INEGI 2015a; INEGI 2015b) and that was designed to be representative at the municipal level. In addition to the indicator of private remittances (REM_P), the paper also uses data for collective remittances (REM_CL) from the Three-For-One program, both as a control as well as an alternative explanatory variable. Three-For-One data originally comes from SEDESOL[6]. Because the program only started to operate in 2002, all municipalities had zero values in 2000. 38.6% out of the 1,692 municipalities considered in the paper had benefitted from the Thee-for-One Program in either 2009 or 2010 (REM_CL). Since federal contributions from the Three-For-One program do not appear in municipal budgets, estimates of remittances on indicators of municipal finance only show whether municipalities receive more (less) revenue other than

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[5] The main determinant of data availability is the size of the municipality. Under the assumption that the fact of lying below a given population threshold is a time-constant factor, truncation bias is controlled for via municipal fixed effects.

[6] Data on the Three-For-One Program has been generously shared by Lauren Duquette-Rury

through the Three-For One Program, and whether and in which way municipal governments adjusted expenditures as a response to remittances.

Data on the regional distribution of Mexicans in the US is available from the Institute for Mexicans Abroad IME (*Instituto de los Méxicanos en el Exterior)* (2008). Data on US employment at the level of states comes from the US Bureau of Labor Statistics (USBLS, 2014). These sources are used to construct an indicator for the exposure to labor market conditions in the US for each Mexican state, as described above.

In addition, the empirical model includes a number of control variables at the municipal and state level. Since all specifications employ municipal fixed effects, only time-varying indicators are included. At the level of states, several variables account for economic differences across states that could be related to the amount of revenues available to municipalities, as well as their spending priorities. Per capita GDP at the state level (in constant 2005 USD, GDPPC) captures the different levels of economic development across Mexican states. Data on state level GDP comes from INEGI (2015d). TRNST refers to the aggregate amount of per capita resources that were assigned by Mexican states to municipalities, according to the Law of Fiscal Coordination (*Ley de Coordinación Fiscal*), in constant 2010 values INEGI (2015c). The latter controls for differences in municipal income that is due to differences in the size of overall funds that are defined at the level of states.

At the municipal level, several indicators on aggregate demographic information are provided by INEGI (INEGI 2015a; INEGI 2015b). POP is population size of municipalities. MALE reports the share of households headed by men. INDIG is the number of inhabitants who speak an indigenous language as a proportion of the total population in each municipality. AGEHH reports the average age of the household head. EMPL gives the employed population as a share of total population, whereas ALFAB refers to the share of the adult population that knows how to write and read.

In addition to these, several other demographic and socioeconomic variables at the municipal level are controlled for. In order to identify a separate effect of remittances, while holding levels of international migration constant, MIGSH refers to an estimation for the percentage of dwellings that reported migrants to the US during the previous five years.

This indicator is provided by the National Council for Population and Housing (*Consejo Nacional de Poblacion y Vivienda,* CONAPO) (CONAPO 2002; 2012). The Mexico office of the United Nations Development Program (PNUD 2014) calculated the multidimensional Human Development Indicator (HDI) at the level of municipalities for the years 2000 and 2010, which allows to control for various measures of deprivation related to health, education and income at the same time.

Finally, because different expenditure patterns are potentially related to party preferences, binary indicators are included for each of the three main ruling parties (PRI, PAN, PRD) at the level of municipalities. Moreover, Simpser et al. (2016) and Aparicio and Meseguer (2012) have shown that the disbursement of funds from the Three-For-One Program of collective remittances is affected by shared partisanship at different levels of government. The same could be true for municipal revenue more generally. Regressions therefore include a binary indicator whether state and municipality are governed by the same party (PMTCH).

See Table 1 for a description of variables and summary statistics.

[Table 2: Data Description]

IV. Baseline Regressions

Tables 3a to 3d show OLS fixed effects regression results of private remittances (REM_P) and collective remittances (REM_CL) on various indicators of municipal finance. The dependent variables in Tables 3a and 3b refer to per capita levels of municipal revenue (Table 3a) and expenditure (Table 3b). Tables 3c and 3d regress remittances on the share of each item in overall revenue (Table 3c) and expenditure (Table 3d). Next to municipal and year fixed effects, all specifications also include the full set of time-varying demographic, political and socioeconomic controls as described in Table 1. Due to space constraints, all tables show results for the main variables of interest only, i.e. coefficients for the share of households receiving private remittances in a municipality (REM_P) and whether a

municipality received collective remittances (REM_CL) either in the ongoing or the previous year. In order to distinguish the correlation of remittances with municipal finance from the effects of migration, Tables 3a-d also show coefficients for the share of the migrant population in each municipality. For each set of regressions, indicators for private and collective remittances are included alternatively as well as jointly.

Regarding municipal revenue, total per capita budgets are significantly lower among municipalities that benefitted from the Three-For-One program but not for municipalities that received large amount of private remittances (Table 3a). Lower revenues among municipalities who benefitted from matching-grant schemes are mirrored in a reduction of federal transfers at the same magnitude. Private remittances are correlated with lower own revenue per capita, but not collective remittances. Neither private nor collective remittances are correlated with borrowing by municipalities.

By definition, total expenditure is identical to total revenue and therefore not reported separately. Private remittances only show a statistically significant and positive relationship with per capita investment. Municipalities who benefitted from collective remittances are not only characterized by lower total budgets, they also show lower per capita expenditure on each of the reported sub-items (current expenses, public investment as well as transfers and subsidies). In light of collective remittances being targeted towards public investments, the latter observation is surprising. However, due to the endogeneity of both private and collective remittances, coefficients should be taken as a sign of correlation, not of causation.

In order to highlight changes in the composition of government budgets and changes in the relative importance of different items, the dependent variables in Table 3c and Table 3d refer to percentage shares of each item in overall government budgets. Private remittances are associated with a relative increase of federal transfers per capita, compared to other revenues (Table 3c), but they do not exhibit any systematic relationship with the composition of expenditure (Table 3b). Municipalities who benefitted from collective remittances are characterized by relatively more revenue generated on their own (Table 3c). On the expenditure side, they dedicate a higher share of their municipal budgets to current

expenses, and lower shares of their revenue to public investment as well as to transfers and subsidies.

Coefficients for migration and for private or public remittances differ both in sign and significance in several specifications. In levels, neither revenue nor expenditure per capita show a clear relationship with the share of migrants in a municipality. In relative terms, municipalities with a larger shares of emigrants had lower own revenue generation. On the expenditure side, they are characterized by lower relative spending on current expenses and higher relative spending on public works.

Different coefficients for out-migration and private or collective remittances should not come as a surprise. MIGSH refers to households that reported out-migration during the previous five years and therefore refers to relatively recent migratory movements. In line with empirical findings on a U-shaped remittance-cycle over time (see Carling 2008, 592), migration may initially lead to an outflow of labor and financial resources, whereas the reception of remittances may lead to a reversal of this trend in later stages. The private insurance function of remittances, as well as the establishment of matching funds schemes for collective remittances would typically appear in later stages of the migration cycle. Hence, different signs for migration and remittances could be due to the fact that out-migration poses different incentives to municipal governments compared to remittances (e.g. municipalities responding to matching funds or the insurance mechanism of remittances only), or due to different selection biases for remittances compared to migration (for example, matching funds schemes favoring relatively wealthier municipalities). Here, the main interest lies on the effect of remittances, to be distinguished from the effect of migration.

[Table 3a-d: Baseline OLS, Remittances and Municipal Revenue and Expenditure, for Levels and % Shares of Total]

V. Solving the Endogeneity of Remittances: Results from the Instrumental Strategy

Despite municipality fixed effects and a large number of control variables, results in Tables 3a and 3b are expected to be biased, due to the endogeneity of remittances. The main source of concern lies in the fact that municipal budgets are affected by local social and economic conditions, but these conditions in the regions of origin are also a main factor in explaining both migration and remittances: Bad economic prospects in the regions of origin are a driving force of out-migration, while the economic situation of family members back home is also an important explanatory variable for the sending for remittances. The exact direction of the bias is difficult to determine a priori, and, depending on the progressivity of municipal revenues and expenditures, may differ for different items. For example, to the degree that private remittances respond to the economic situation back home, the coefficient for private remittances would be upward biased for the case of transfers and subsidies. On the other hand, to the degree that migrants and remittances self-select into richer municipalities – as diagnosed for example by Aparicio and Meseguer (2012) for the case of matching funds schemes - coefficients would be downward biased.

Table 5a to 5d repeat the previous exercise with the same dependent variables and controls, but using an instrumental variable for private and collective remittances instead. As explained above, the change in unemployment (DUSEMP) over the previous three years, weighted by the number of Mexican migrants from Mexican state j residing in US state k will be used as an exogenous instrument for remittances.

Results from the first step estimation are given in Table 4, where the instrument of labor market conditions in the US (DUSEMP) is regressed alternatively on private and on collective remittances, with and without the full set of control variables, and including municipality and year fixed effects in both specifications. The sign of DUSEMP is as expected for both private and collective remittances: Better labor market conditions in the US have a positive impact on the share of households receiving private remittances (REM_P), and on the probability of benefitting from collective remittances (REM_CL) in the ongoing or previous year. The instrument is strong: For the case of private remittances,

t-values for the DUSEMP are at 6.95, and at 8.94 for collective remittances, when including the full set of controls (spec. 2 and 4)[7].

In a second step, estimated values for private and collective remittances are used in the instrumental variable regressions as reported in Tables 5a – 5b. Analogous to the baseline regressions, dependent variables in Tables 5a and 5b are levels of municipal revenue (Table 5a) and expenditure (Table 5b). Dependent variables in Tables 5c and 5d are the share of different items of municipal revenue (Table 5c) and expenditure (Table 5d) in total budgets. As previously, all regressions use municipality and year fixed effects in addition to a large set of time-varying control variables at the municipal and state level. Instruments are used alternatively for private as well as for collective remittances. In the first case, collective remittances are also used as additional control variable, whereas private remittances are used as an additional control variable in the latter case.

Effects of remittances change both in magnitude and in significance in the instrumented regression, supporting the suspicion that coefficients in Tables 3a-d are biased. Municipalities with larger inflows of either private or collective remittances receive significantly less federal transfers (Table 5a). These lower federal transfers are mirrored in lower total municipal budgets and are not compensated by higher revenue generation from own sources. Also, in contrast to Simpser et al. 2016, countries who received more private or collective remittances did not borrow more. The negative effect of remittances on federal transfers (and total budgets) is large: A one percentage point increase in the share of households who receive private remittances decreases the expected amount of federal transfers per capita by more than 600 Mexican Pesos (MXP) or roughly 50 US dollars at the 2010 exchange rate (spec. 1 and 2 in Table 5a). This corresponds to ≈ 18% of the average amount of federal transfers (3400 MXP) in 2010. For collective remittances, the causal point estimate is – 2,000 MXP, corresponding to a more than 50% of the average per capita amount of federal transfers received by municipalities. Although funds from the Three-For-One program do not appear in municipal budgets, the average amount of yearly

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[7] The formal weak identification test shows no sign of a weak instrument. See test statistics provided in Tables 5a-5d below for each regression.

Three-For-One projects was between 250 and 300 MXP per capita in participating municipalities in 2009 and 2010 (own calculation based on SEDESOL data). Hence, the expected difference in federal transfers for those who benefitted from the program was much larger than the additional funds received. This observation together with the fact that federal transfers respond negatively to both private and collective remittances indicates a broader crowing-out effect of remittances on municipal budgets. Since municipal budgets had an overall upward trend between 2000 and 2010 (average per capita budgets more than doubled in the ten years' period), remittances did not necessarily lead to a decrease in transfers. Rather, the trend of increasing municipal budgets seemed to benefit municipalities with lower amounts of remittances at the expense of remittances-intensive municipalities. On the expenditure side, the lower total budget is reflected in both lower per capita spending on current expenses as well as lower spending on transfers and subsidies among municipalities that benefitted from private or collective remittances. In absolute terms, a one percentage point increase in the share of households receiving remittances translates to $\approx$ 450 MXP lower current expenses per capita, and $\approx$ 130 MXP lower transfers and subsidies compared to the control group. The effect of having received matching funds schemes is a $\approx$ 1200 MXP and $\approx$ 460 MXP difference respectively. Relative to mean values (i.e. 380 MXP for transfers and subsidies and less than 2000 MXP for current expenses in 2010, see Table 1), this corresponds to a more than 60% and a more than 100% difference between groups.

Public investment per capita is the only item that responds positively to the inflow of private or collective remittances, presumably due to matching-funds schemes targeted towards public works in migrants' home towns. Public investment was on average 230-280 MXP higher for a one percentage point increase in private remittances, and between 630 and 680 MXP for municipalities that benefitted from the Three-For-One Program. With respect to mean spending on public works of $\approx$ 1500 MXP per capita, this corresponds to a 15-17% and 42-45% higher municipal spending on public works, respectively.

The composition of revenues (share of each item in total revenue) does not change significantly in response to remittances (Table 5b). The composition of expenditure however does: Municipalities that receive larger amounts of remittances spend relatively

more on public investment: For each percentage point increase in households receiving private remittances, the share of expenditure for public works increases by ≈ five to eight percentage points and by ≈ 16 percentage points for municipalities that benefitted from collective remittances. Due to lower amounts of total expenditure, the share of revenue spent on current expenses increases in spite of a negative effect of remittances on levels of current expenses. Transfers and subsidies are negatively affected both in absolute and relative terms. The share of municipal budgets spent on transfers and subsidies is ≈ five percentage points lower for each percentage point increase in households receiving private remittances and ≈ 16% percentage points lower for municipalities that participated in the Three-For-One program. Considering that the average share spent on transfers and subsidies was only 15% of total municipal budgets in 2010, this difference among municipalities who received remittances is large. Figure 3 provides a graphical summary of these findings by plotting coefficients +/- 2 s.d. confidence intervals for the full specifications from the instrumented regressions 2,4,6 and 8 in Tables 5a-d.

The remarkably large effects of remittances on indicators of municipal finance are robust to alternative specifications and variable definitions. Estimates are robust to the inclusion/exclusion of a large number of controls at the municipal and state level additional to municipal and year fixed effects, as well as to the inclusion/exclusion of statistical outliers. They are also maintained when controlling for migration intensity, as well as for the presence of collective remittances when instrumenting for private remittances (and vice versa when instrumenting for collective remittances). Moreover, while the instrument is strongest for the three-year-period covering the global financial crisis, different ways to construct the instrument (using different time lags and labor market indicators, see Annex 1) lead to similar results. The fact that coefficients differ for the instrumented regression indicates that selection bias is a relevant concern for both private and collective remittances[8]. While scales and therefore the size of coefficients differ for private and collective remittances, a coherent pattern is revealed after cleaning the variable from

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[8] Wu-Hausman test statistics reported in Tables 5a-d indicate bias in the un-instrumented regression for almost all of the dependent variables.

endogeneity: Both private and collective remittances crowd-in public investment but they crowd-out total municipal budgets and transfers and subsidies in particular.

[Table 4: First Step Regression]

[Table 5a-d: Second Step Regression Results]

[Figure 3: Coefficient Plot]

VI. Conclusion

This research posed the question how remittances by international migrants affect public finance in the countries of origin. Two competing hypotheses were put forward: A "crowding-in-hypothesis" argues that remittances are complementary to public finance. Specifically, collective remittances may be sent for the co-financing of public works by migrants and governments, thereby crowding-in additional spending using remittances as a leverage. Moreover, additional spending from private remittances offers opportunities of taxing additional consumption and of relaxing financing constraints by governments. On the other side, a "crowding-out-hypothesis" claims that remittances compete with and eventually substitute public expenditure. Since remittances may partly be used for the provision of public goods (e.g. electricity, schooling, health) or for the purchase of such goods from private providers (e.g. private schools, private health clinics, etc.), remittances are expected to reduce the pressure on governments to provide certain public services.

Using labor market conditions in the US states were Mexican migrants reside as an instrument, this research finds a strong and robust causal impact of private and collective remittances on the size and composition of municipal finance in Mexico that is in line both with a complementarity view and a substitution view. On the one hand, municipalities that receive more private or public remittances report higher per capita expenditure on public works that can be attributed to leverage effects of the Three-For-One matching-funds scheme, where every dollar sent by migrants for public works in their communities is topped with an additional dollar from each of the three layers of government (municipal, state and federal). At the same time, private and collective remittances crowd-out total

municipal expenditure per capita due to a negative effect of remittances on federal transfers received by municipalities. This negative effect on federal transfers is not compensated by higher revenues generated within municipalities or by increased borrowing. In the face of lower overall budgets, municipalities respond to the inflow of remittances with comparatively lower transfers and subsidies per capita as well as with lower current expenses. In relative terms, remittances lead to a strong reduction of the share of budgets spent on transfers and subsidies compared to other items, and an increase of the share of total budgets spent on public works. These effects are revealed after cleaning explanatory variables from endogeneity and they are maintained in the presence of a large number of controls for socioeconomic conditions next to municipality and year effect.

Empirical findings from this research bear at least three broader messages. First, migration and remittances affect home countries not only via their direct effects at the household level. They also have important indirect effects as demonstrated for the case of municipal finance that have to be taken into account when assessing the overall impact of migration and remittances on the sending country. Second, the fact that remittances exert a strong negative effect in particular on transfers and subsides underlines a tendency of remittances to substitute public safety nets with private mechanisms of insurance. This finding contributes to recent literature by Abdih (2012), Ahmed (2013), Doyle (2015) and others who have found complementary evidence at the cross-country level. Third, evaluations of co-financing programs in the spirit of the Mexican Three-For-One program have to go beyond narrow evaluations and must consider their indirect effects on overall spending as well as its composition, and identify losers and winners both within and across municipalities. A closer examination of the Mexican case bears potentially important lessons for other countries where variations of matching-funds schemes have been implemented.

Some questions cannot be answered with the data at hand and are left for future research. For one, since consumption taxes are not generated at the municipal level, a possible increase of taxes via the consumption of remittances does not show up in municipal data. It could still be, in principle, that remittances have a positive effect on tax revenues (VAT) collected at the national level so that the effect of remittances on aggregate revenue and expenditure could be positive or neutral. Also, the negative effect of remittances on total

budgets could be the result either of lower federal transfers towards remittances-intensive municipalities, or of higher federal transfers towards remittances-poor municipalities. While the latter could be interpreted as compensating public action for municipalities that lack the benefits of remittances, the former would suggest that the state withdraws from the provision of public services when private substitutes exist.

VII. Literature

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VIII. Tables

Figure 1: Remittances to Mexico, in Billion USD, 1995-2016
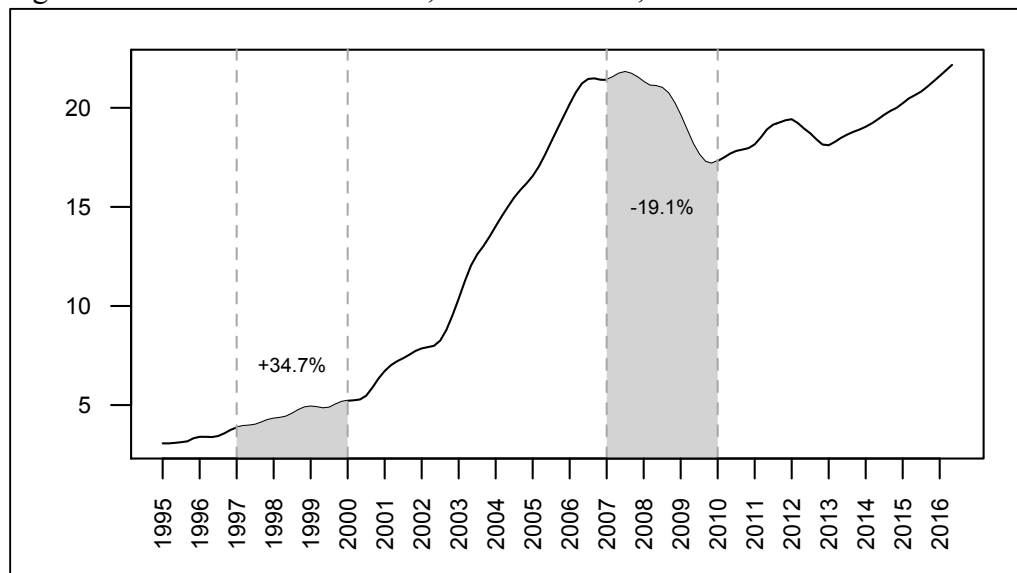
The figure shows monthly remittances to Mexico in current USD, from January 1995 to May 2016. Data is based on BANXICO (2016) and has been smoothed to take out seasonal effects. Variation in remittances flows for the period 2007-2010 compared to 1997-2000 (shaded areas) is used for the construction of the instrument.

Figure 2: State-Level Variation in the Exposure of Mexican States to Unemployment Increases in the US
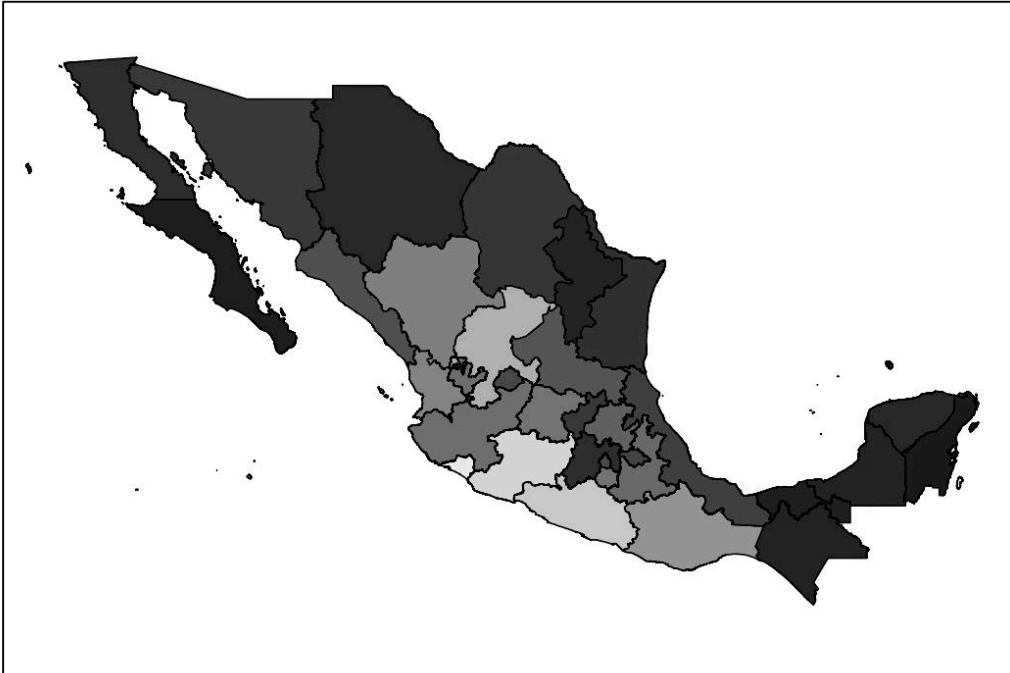
The figure illustrates regional variation in exposure to unemployment increases in the US over the period 2007-2010 compared to the period 1997 to 2000. The Northern states as well as the Yucatan peninsula are most affected, as is reflected in darker shades. More migrants from these areas settle in US states that were strongly affected by the US subprime crisis. Own elaboration based on IME (2008) and USBLS (2014).

Table 1: Municipal Revenue and Expenditure, as % Shares and as Per Capita Values

% Share of Total			Mean Values (const. 2010 per cap. val., MXP)		
Revenue					
	2000	*2010*	*2000*	*2010*	
INC_OWN #1267	11	10.6	199 [261]	420 [617]	Own Revenues
INC_TRNFD #1175	82.3	82.3	1700 [1260]	3390 [2400]	Federal Transfers
INC_DEBT #663	42.3	51	70 [185]	182 [212]	Debt
INC_TOT #1692	100	100	1730 [1360]	4130 [2790]	Total Revenue
Expenditure					
	2000	*2010*	*2000*	*2010*	
EXP_CUR #1525	52.4	46	889 [790]	1940 [1710]	Current Expenses
EXP_INV #1603	22.4	36.2	431 [516]	1470 [1260]	Investment
EXP_TRN #1664	14.6	9.3	254 [264]	382 [413]	Transfers and Subsidies
EXP_TOT #1692	100	100	1730 [1885]	4130 [1809]	Total Expenditure

Source: Own Calculations based on INEGI (2015c). The number of observations (#) refer to the number of municipalities that reported data on this category in both years. Standard deviations are given in squared brackets. Values refer to averages for each item across municipalities, not to aggregates.

Table 2: Data Description

Variable	Mean [standard deviation]		Description
	2000	2010	
REM_P	2.85 [3.45]	3.25 [3.89]	% share of households receiving remittances in the municipality [a]
REM_CL	0	0.386 [0.487]	Binary indicator taking the value 1 for municipalities that received collective remittances through the Three-For-One Program in the ongoing or previous year[)h]
DUSEMP	0.113 [0.374]	0.435 [0.212]	Indicator on the exposure to change in unemployment rates in US states where Mexican migrants reside, over the period t to t-3. In order to generate variation per Mexican state, unemployment levels are weighted based on the number of consular documents that were requested by individuals from Mexican state j who lived in US state k in 2008. Data normalized to [0,1] [b]
ALFAB	83.9 [10.5]	87.4 [8.16]	% share of the adult population in each municipality that knows how to read and write [a]
AGEHH	47.6 [3.35]	49.1 [3.54]	average age of household heads in each municipality [a]
EMPL	30.2 [5.75]	38.9 [10.00]	% share of the population that is employed in each municipality [a]
GDPPC	6,390 [2760]	7,090 [4600]	per capita GDP at the level of Mexican states, in 2005 USD [c]
HDI	0.743 [0.0685]	0.808 [0.051]	Multidimensional human development index at the municipality level [d]
INDIG	12.9 [25.9]	11.5 [23.9]	% share of persons in the municipality who speak an indigenous language [a]
MALE	81.3 [5.24]	78.6 [4.98]	% share of households in the municipality whose head is male [a]
MIGSH	6.71 [6.78]	3.38 [3.48]	% share of dwellings in the municipality who reported migrants to the US during the previous five years [e]
POP	70,000 [160000]	78,000 [190000]	Population size of municipality [a]
PRI	0.683 [0.465]	0.509 [0.500]	Binary indicator taking the value 1 for municipalities governed by PRI (alone or in coalition) [g]
PAN	0.181 [0.385]	0.348 [0.477]	Binary indicator taking the value 1 for municipalities governed by PAN (alone or in coalition) [g]
PRD	0.116 [0.321]	0.144 [0.351]	Binary indicator taking the value 1 for municipalities governed by PRD (alone or in coalition) [g]
PMTCH	61.9 [48.6]	388 [488]	Binary indicator taking the value 1 for shared partisanship at the municipal and state level [g]
TRNST	1,180 [191]	1,740 [261]	Amount transferred by states to municipalities, in Mexican Pesos, constant 2010 values [f]

The table reports mean values and standard deviations in squared brackets for a maximum of 1692 municipalities that reported data on indicators of municipal finance in both periods. Sources: a) INEGI (2015a; 2015b), b) USBLS (2014) and IME (2008), c) INEGI (2015d) d) PNUD (2014) e) CONAPO (2002; 2012) f) INEGI (2015c) g) CIDAC (2016) h) Lauren Duquette-Rury, based on SEDESOL

Table 3a: Baseline Regression. Correlations Between Remittances and Per Capita Municipal Revenue

	Total Budget			Federal Transfers			Own Revenue			Debt		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
REM_P	-2.3 [21]		3.2 [21]	-3.2 [22]		3.3 [22]	-13** [6.2]		-14** [6.2]	2.4 [5.1]		2.8 [5.2]
REM_CL		-300*** [100]	-300*** [100]		-300*** [110]	-300*** [110]		35 [30]	42 [30]		-7.8 [19]	-9.4 [19]
MIGSH	12 [10]	2.6 [11]	2.3 [11]	4.3 [11]	-5.5 [12]	-5.7 [12]	-3.9 [3.2]	-3.5 [3.3]	-2.3 [3.4]	0.35 [2.1]	0.26 [2.2]	-0.044 [2.3]
adj R^2	*0.29*	*0.29*	*0.29*	*0.22*	*0.22*	*0.22*	*0.09*	*0.09*	*0.09*	*0.08*	*0.08*	*0.08*
degrees of freedom	*1664*	*1664*	*1663*	*1147*	*1147*	*1146*	*1239*	*1239*	*1238*	*635*	*635*	*634*
F-stat	*179.08*	*180.6*	*169.88*	*97.1*	*98.17*	*92.32*	*21.54*	*21.32*	*20.41*	*14.72*	*14.72*	*13.85*

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). Dependent variables are in Mexican Pesos. See Tables 1 and 2 for a description of variables and text for details.

Table 3b: Baseline Regression. Correlations Between Remittances and Per Capita Municipal Expenditure

	Current Expenditure			Public Investment			Transfers and Subsidies		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
REM_P	-18 [14]		-16 [14]	24* [12]		27** [12]	-0.74 [4.8]		0.18 [4.8]
REM_CL		-110* [61]	-100* [61]		-180*** [61]	-190*** [61]		-52** [23]	-52** [24]
MIGSH	-7.2 [6.3]	-12* [6.4]	-10 [6.5]	6.2 [6.4]	2.1 [6.6]	0.15 [6.6]	4 [2.4]	2.4 [2.5]	2.4 [2.5]
adj R^2	*0.24*	*0.24*	*0.24*	*0.22*	*0.22*	*0.23*	*0.05*	*0.05*	*0.05*
degrees of freedom	*1497*	*1497*	*1496*	*1575*	*1575*	*1574*	*1636*	*1636*	*1635*
F-stat	*111.75*	*111.94*	*105.46*	*101.6*	*102.2*	*96.68*	*12.64*	*12.98*	*12.21*

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). Dependent variables are in Mexican Pesos. See Tables 1 and 2 for a description of variables and text for details.

Table 3c: Baseline Regression. Correlations Between Remittances and Municipal Revenue (% Share of Total Budgets)

	Federal Transfers			Own Revenue			Debt		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
REM_P	0.0036** [0.0015]		0.0034** [0.0015]	-0.00097 [0.001]		-0.0013 [0.001]	0.0015 [0.0016]		0.0015 [0.0016]
REM_CL		0.01 [0.0076]	0.0083 [0.0077]		0.014*** [0.005]	0.015*** [0.005]		0.00042 [0.0057]	-0.00044 [0.0057]
MIGSH	-0.0012 [0.00079]	-0.00068 [0.00082]	-0.00094 [0.00083]	-0.0017*** [0.00053]	-0.0013** [0.00055]	-0.0012** [0.00056]	-0.000085 [0.00064]	0.000067 [0.00066]	-0.0001 [0.00069]
adj R^2	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03
degrees of freedom	1147	1147	1146	1239	1239	1238	635	635	634
F-stat	3.14	2.88	3.03	3.63	4.11	3.97	3.81	3.74	3.58

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). See Tables 1 and 2 for a description of variables and text for details.

Table 3d: Baseline Regression. Correlations Between Remittances and Municipal Expenditure (% Share of Total Budgets)

	Current Expenditure			Public Investment			Transfers and Subsidies		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
REM_P	0.0035 [0.0028]		0.0017 [0.0028]	0.0016 [0.0025]		0.0029 [0.0025]	-0.001 [0.0014]		-0.00072 [0.0015]
REM_CL		0.098*** [0.012]	0.098*** [0.012]		-0.079*** [0.012]	-0.081*** [0.012]		-0.018** [0.0071]	-0.017** [0.0071]
MIGSH	-0.0083*** [0.0013]	-0.005*** [0.0013]	-0.0052*** [0.0013]	0.0064*** [0.0013]	0.004*** [0.0013]	0.0038*** [0.0013]	0.0015** [0.00073]	0.00085 [0.00075]	0.00091 [0.00076]
adj R^2	0.1	0.11	0.11	0.14	0.15	0.15	0.07	0.07	0.07
degrees of freedom	1497	1497	1496	1575	1575	1574	1636	1636	1635
F-stat	27.95	33.25	31.3	47.93	51.79	48.83	18.82	19.25	18.12

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). See Tables 1 and 2 for a description of variables and text for details.

Table 4: First Step Instrumental Regression

	REM_P		REM_CL	
	(1)	(2)	(3)	(4)
DUSEMP	1***	1.5***	0.6***	0.44***
t-value	[4.51]	[6.22]	[13.5]	[8.76]
time-varying controls	*yes*	*yes*	*yes*	*yes*
adj. R^2	*0.01*	*0.11*	*0.09*	*0.17*
F-stat	*20.86*	*13.36*	*173.5*	*22.56*
degrees of freedom	*1690*	*1663*	*1690*	*1663*

First step instrumental regression of unemployment rates in US states where migrants reside on private (REM_P) and collective remittances (REM_CL). Heteroscedasticity-robust t-values are given in squared brackets. All specifications include municipality and year fixed effects. Time-varying control variables refer to the full set of variables discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***).

Table 5a: Instrumented Regression (Second Step). Effect of Remittances on Municipal Revenue Per Capita

	Total Budget		Federal Transfers		Own Revenue		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
instrumenting private remittances								
REM_P	-570***	-550***	-610***	-630***	-40	-66	0.24	4.1
	[200]	[210]	[200]	[220]	[31]	[41]	[19]	[23]
REM_CL		-65		60		68*		-10
		[140]		[180]		[41]		[24]
degrees of freedom	*1664*	*1663*	*1147*	*1146*	*1239*	*1238*	*635*	*634*
weak instr. F-stat	*42.81*	*39.1*	*29.41*	*23.57*	*25.22*	*20.84*	*16.14*	*12.21*
Wu-Hausman (p-val)	*0*	*0.001*	*0*	*0*	*0.35*	*0.166*	*0.912*	*0.957*
instrumenting collective remittances								
REM_CL	-2000***	-2100***	-2000***	-2100***	-110	-78	0.62	-6.4
	[650]	[650]	[550]	[560]	[80]	[84]	[51]	[58]
REM_P		36		43		-11		2.7
		[26]		[26]		[5.8]		[6.2]
degrees of freedom	*1664*	*1663*	*1147*	*1146*	*1239*	*1238*	*635*	*634*
weak instr. F-stat	*86.7*	*77.47*	*77.51*	*68.62*	*93.13*	*83.54*	*49.03*	*41.33*
Wu-Hausman (p-val)	*0.002*	*0.001*	*0*	*0*	*0.081*	*0.166*	*0.861*	*0.957*

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). Dependent variables are in Mexican Pesos. See Tables 1 and 2 for a description of variables and text for details. Weak instrument test statistics >10 show no sign of weakness. Significance of the Wu-Hausman test (low p-values) indicates that remittances have to be treated as endogenous.

Table 5b: Instrumented Regression (Second Step). Effect of Remittances on Municipal Expenditure Per Capita

	Current Expenditure		Public Investment		Transfers and Subsidies	
	(1)	(2)	(3)	(4)	(5)	(6)
instrumenting private remittances						
REM_P	-430***	-450***	200**	280***	-130***	-130***
	[130]	[130]	[89]	[100]	[37]	[40]
REM_CL		49		-280***		5.8
		[87]		[83]		[33]
degrees of freedom	*1497*	*1496*	*1575*	*1574*	*1636*	*1635*
weak instr. F-stat	*35.52*	*33.39*	*38.18*	*35.92*	*41.03*	*37.4*
Wu-Hausman (p-val)	*0*	*0*	*0.046*	*0.008*	*0*	*0*
instrumenting collective remittances						
REM_CL	-1200***	-1200***	680**	630**	-460***	-490***
	[340]	[330]	[320]	[330]	[120]	[120]
REM_P		4.6		14		8
		[22]		[17]		[6.1]
degrees of freedom	*1497*	*1496*	*1575*	*1574*	*1636*	*1635*
weak instr. F-stat	*109.67*	*99.97*	*80.94*	*73.04*	*85.63*	*76.74*
Wu-Hausman (p-val)	*0*	*0*	*0.005*	*0.008*	*0*	*0*

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). Dependent variables are in Mexican Pesos. See Tables 1 and 2 for a description of variables and text for details. Weak instrument test statistics >10 show no sign of weakness. Significance of the Wu-Hausman test (low p-values) indicates that remittances have to be treated as endogenous.

Table 5c: Instrumented Regression (Second Step). Effect of Remittances on Municipal Revenue (% Share of Total Budgets)

|	Federal Transfers		Own Revenue		Debt	
	(1)	(2)	(3)	(4)	(5)	(6)
instrumenting private remittances						
REM_P	0.014	0.013	-0.0038	-0.011	-0.0004	-0.00071
	[0.0092]	[0.011]	[0.0064]	[0.0087]	[0.007]	[0.0095]
REM_CL		0.0025		0.02***		0.00081
		[0.0092]		[0.0078]		[0.0092]
degrees of freedom	*1147*	*1146*	*1239*	*1238*	*635*	*634*
weak instr. F-stat	*29.41*	*23.57*	*25.22*	*20.84*	*16.14*	*12.21*
Wu-Hausman (p-val)	*0.223*	*0.324*	*0.656*	*0.219*	*0.801*	*0.824*
instrumenting collective remittances						
REM_CL	0.046	0.037	-0.0099	-0.0078	-0.001	-0.0057
	[0.029]	[0.03]	[0.017]	[0.018]	[0.018]	[0.023]
REM_P		0.0028*		-0.0008		0.0018
		[0.0013]		[8e-04]		[0.0024]
degrees of freedom	*1147*	*1146*	*1239*	*1238*	*635*	*634*
weak instr. F-stat	*77.51*	*68.62*	*93.13*	*83.54*	*49.03*	*41.33*
Wu-Hausman (p-val)	*0.194*	*0.324*	*0.172*	*0.219*	*0.94*	*0.824*

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). See Tables 1 and 2 for a description of variables and text for details. Weak instrument test statistics >10 show no sign of weakness. Significance of the Wu-Hausman test (low p-values) indicates that remittances have to be treated as endogenous.

Table 5d: Instrumented Regression (Second Step). Effect of Remittances on Municipal Expenditure (% Share of Total Budgets)

	Current Expenditure		Public Investment		Transfers and Subsidies	
	(1)	(2)	(3)	(4)	(5)	(6)
instrumenting private remittances						
REM_P	0.11***	0.082***	0.046***	0.077***	-0.047***	-0.047***
	[0.021]	[0.019]	[0.017]	[0.021]	[0.012]	[0.013]
REM_CL		0.07***		-0.11***		0.0027
		[0.015]		[0.018]		[0.011]
degrees of freedom	*1497*	*1496*	*1575*	*1574*	*1636*	*1635*
weak instr. F-stat	*35.52*	*33.39*	*38.18*	*35.92*	*41.03*	*37.4*
Wu-Hausman (p-val)	*0*	*0*	*0.005*	*0*	*0*	*0*
instrumenting collective remittances						
REM_CL	0.3***	0.31***	0.16***	0.16**	-0.16***	-0.17***
	[0.043]	[0.045]	[0.061]	[0.064]	[0.038]	[0.04]
REM_P		-0.0023		-0.0011		0.002
		[0.003]		[0.0031]		[0.0018]
degrees of freedom	*1497*	*1496*	*1575*	*1574*	*1636*	*1635*
weak instr. F-stat	*109.67*	*99.97*	*80.94*	*73.04*	*85.63*	*76.74*
Wu-Hausman (p-val)	*0*	*0*	*0*	*0*	*0*	*0*

Heteroscedasticity robust standard errors are given in squared brackets. All regressions include municipality and year fixed effects, as well as the full set of time-varying control variables as discussed in section III. Stars denote statistical significance at 10% (*), 5% (**) and 1% (***). See Tables 1 and 2 for a description of variables and text for details. Weak instrument test statistics >10 show no sign of weakness. Significance of the Wu-Hausman test (low p-values) indicates that remittances have to be treated as endogenous.

Figure 3: Coefficient Plot. Instrumented Causal Effects of Private and Collective Remittances on Indicators of Municipal Finance
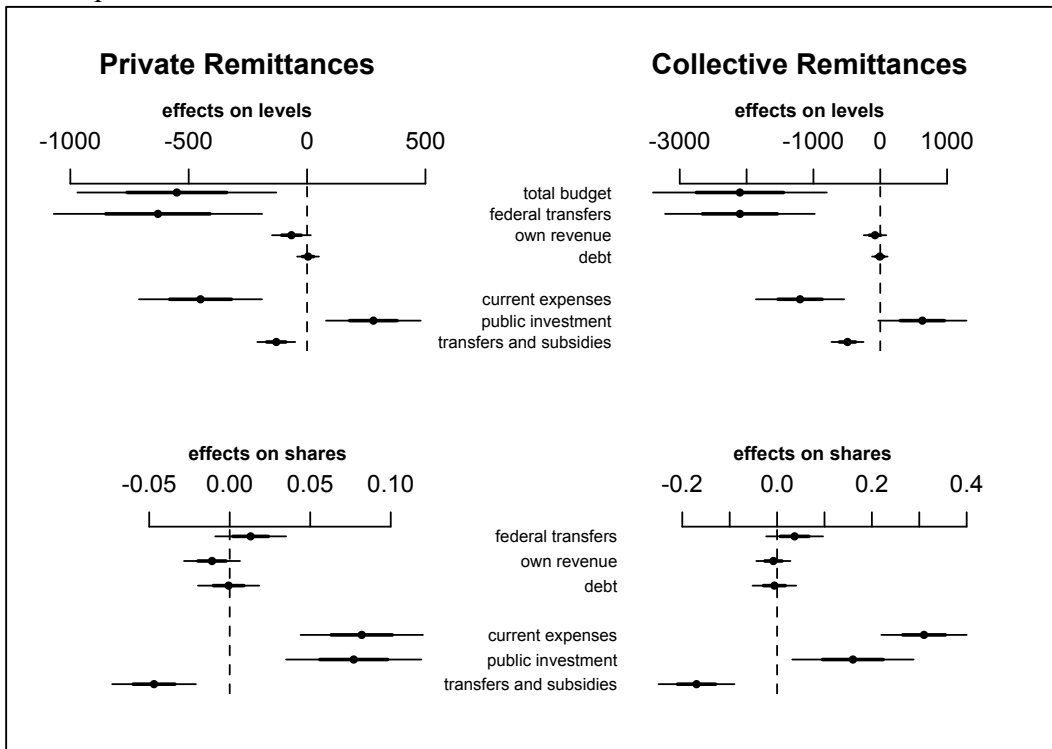

The figure plots instrumented coefficients with 95% confidence intervals for private and collective remittances, based on the full specifications 2,4,6 and 8 in Tables 5a-d. Effects refer to a one-unit increase in the explanatory variable (a one percentage point increase of households who receive private remittances, or a unit increase in the binary variable for whether a municipality benefitted from collective remittances)

IX. Annex

Annex 1: Evaluating Strength of Instruments (t-values)
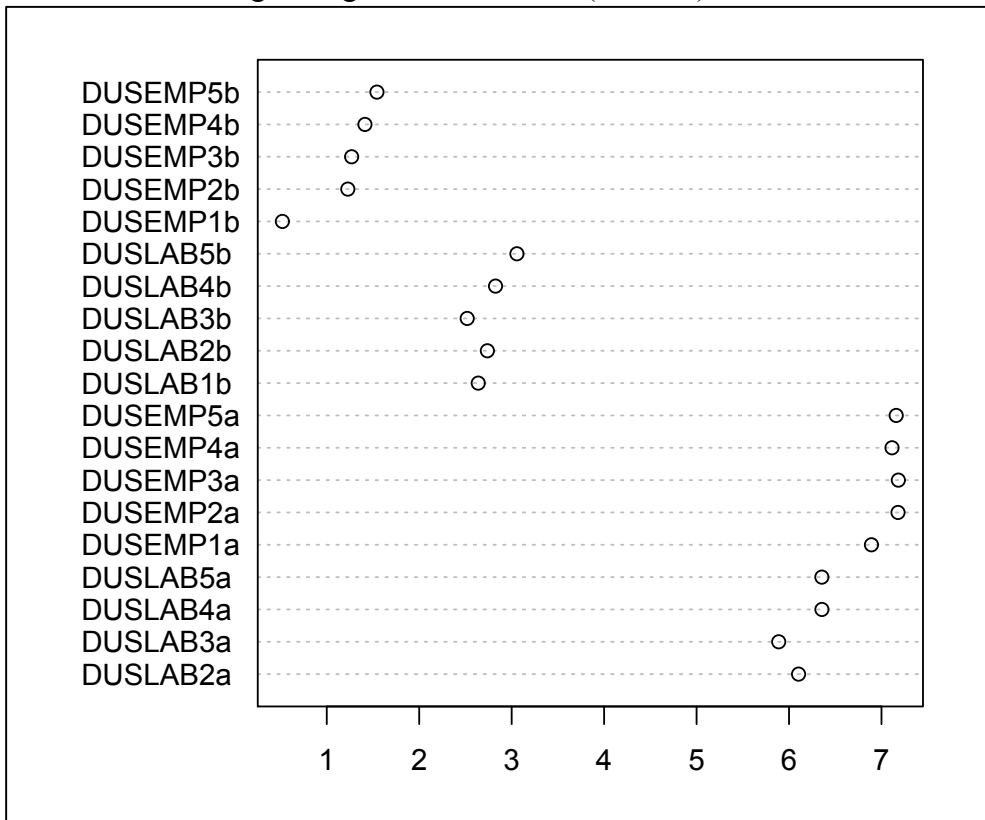
The figure plots absolute values of t-stats obtained for different instruments from the first-step regression on remittances (specification II in Table 4). DUSLAB refers to changes in the size of labor force, DUSEMPL refers to changes in unemployment rates. Different indicators use different lags and different weightings of the numbers of *matrículas consulares* as requested by Mexican migrants. The indicator that was finally used was DUSEMP3b (change in unemployment rates in US states where migrants reside, multiplied by the number of consular documents requested by migrants from Mexican state j in US state k).