Not by Land nor by Sea: The Rise of Formal Remittances during COVID-19*

Lelys Dinarte† David Jaume‡

Eduardo Medina-Cortina§ Hernan Winkler¶

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Abstract

Despite record unemployment in remittance-sending economies, formal (registered) remittances to several developing countries grew since the beginning of the pandemic. This article argues that such an increase in these economies likely reflects a shift from informal (unregistered) to formal channels to remit, rather than an increase in total remittances. This is because the mobility constraints that prevented travelers from carrying cash across borders made electronic wire transfers the only option to remit. Using a rich municipality-level data set of formal remittance inflows and location patterns of migrants to the United States for a developing country, Mexico, we find that the rise in formal remittances was largely driven by municipalities closer to a border crossing and mostly originated from US states along the border. This is consistent with migrants born in the Northern areas of Mexico living in US areas closer to their families, such that the cost of sending informal remittances is usually very low, but it largely increased after COVID-19. Along this line, we find a large and disproportionate increase in the number of new accounts at financial institutions among municipalities near a border crossing since the implementation of lockdown measures. Finally, we rule out alternative hypotheses, such as the role of the CARES Act and increasing remittance flows to municipalities worst hit by the crisis.

Keywords: COVID-19, remittances, financial inclusion, international migration, Mexico.

JEL Classification: F24, F22, I18, G50

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†The World Bank. Email: ldinartediaz@worldbank.org

‡Central Bank of Mexico. Email: djaumep@banxico.org.mx

§University of Illinois at Urbana-Champaign. Email: emm5@illinois.edu

¶The World Bank. Email: hwinkler@worldbank.org

1 Introduction

Following the implementation of lockdown policies worldwide in March 2020, governments and international organizations predicted a massive decline in remittances. By April 2020, remittance flows to developing countries were expected to fall by 20 percent during 2020, due to the unprecedented slowdown in economic activity in remittance-sending countries and the disproportionate increase in unemployment among migrants (World Bank 2020, Capps et al. 2020, Garrote Sanchez et al. 2020). Instead, registered remittances to several developing countries have been growing at unprecedented rates. As shown in Figure 1, monthly registered remittances for a group of selected countries grew between April and September 2020 after a temporary decline at the beginning of the crisis. With high unemployment rates in remittance-sending economies since the beginning of the crisis, these patterns are difficult to reconcile with the literature about the determinants of remittance flows (Ratha et al. 2007, Frankel 2011, Gupta 2006). In contrast, data from household surveys show that most remittance-recipient households in Latin America reported a drop in remittances during 2020 (Table 1).[1] Unlike official estimates, these data are more likely to capture the change in both formal and informal remittances, since they rely on actual individual responses and not on data from electronic transfers, and confirms that this pattern has been observed for several developing economies.

In this article, we argue that the increase in registered remittances is driven by a shift from informal to formal channels during the COVID-19 economic crisis. Estimating the size of informal remittances is challenging since they involve a substantial number of small-dollar transactions that are not registered in any system and go easily undetected.[2] However, scholars have argued that trends in formal

[1]Data available at https://www.worldbank.org/en/data/interactive/2020/11/11/covid-19-high-frequencymonitoring-dashboard

[2]Several articles have used indirect methods as an attempt to assess the magnitude of these flows.

remittances could be informative of changes in the informal channels. In particular, the long-term growth in formal remittances suggests that informal channels are sizable but weakening over time, and a slow shift from informal to formal channels has been taking place. This process has been driven by a reduction in the cost to send remittances through the formal channel as well as by a crackdown on informal remittance providers in several destination countries (Clemens & McKenzie 2018). This article argues that COVID-19 accelerated this process in a matter of days, by increasing the cost of sending and receiving informal remittances to prohibitive levels.

To test the hypothesis that a shift from informal to formal channels to remit helps explain the increase in remittances, we exploit the variation induced by the dramatic slowdown in geographic mobility caused by the pandemic, which made it impossible for travelers to transport cash or assets across the United States-Mexico border. As a consequence, the financial system became the only option to send and receive international transfers. Since informal remittances are mostly unobservable, we argue that if the increase in formal remittances is driven by a sudden shift from informal to formal channels to remit, the rise in formal remittances in 2020 should be disproportionately larger among municipalities closer to the border. This is because informal remittances were likely more prevalent in these areas before COVID-19, given that the cost of sending and receiving them (relative to the cost of sending and receiving formal remittances) is lower due to their proximity to the border.

We find strong evidence supporting the shift from informal to formal channels by examining the link between distance to a border crossing and the increase of formal remittances. We start by showing descriptive evidence that the growth

For example, Freund & Spatafora (2005) estimate that informal remittances amount to 35 to 75 percent of the value of formal remittances. In Latin America, Page & Plaza (2006) estimate that informal remittances represent 73 percent of total remittances.

in remittances was more substantial for municipalities closer to the nearest border crossing. We provide additional evidence that Mexican migrants born in the Northern areas of Mexico are more likely to live in US areas closer to the Mexican border than migrants born in Southern Mexico. Thus, households from Mexican municipalities near a US border crossing are also close to their diaspora in the United States. The relevance of distance to the border during COVID-19 is also confirmed by the evolution of remittances by US state of origin: the increase in remittances in 2020 was mostly driven by the states along the Mexican border, namely Texas, Arizona and New Mexico. This is the first article that documents these patterns during the COVID-19 pandemic.

Despite this descriptive evidence, it is possible that the relationship between the increase in remittances and distance is not driven by the informal to formal shift but, instead, affected by other economic variables related to both distance and remittances. In particular, other relevant determinants of the heterogeneous changes in remittances across Mexican municipalities could be a lower prevalence of unemployment in US states along the border, a higher exposure to local economic shocks in northern Mexican municipalities, and a larger exposure to the CARES Act in South-West US states. We show that, after controlling for all these plausible alternatives in a difference-in-difference research design, distance to the broader is still the leading economic factor explaining the increase in remittances across Mexican municipalities during COVID-19. Specifically, our empirical strategy consist on comparing changes in remittances during COVID-19 across municipalities according to their distance to the nearest border crossing, while controlling for potentially confounding factors. Using this identification strategy, we find that a 10 percent increase in travel time to the nearest border crossing reduces remittances by 0.39 percent during COVID-19. The same pattern holds when using other geographic distance measures, and the results are robust to several specifications, robustness

tests and placebo tests.

In addition, our research design also allow us to rule out several alternative hypothesis put forward to explain the rise in formal remittances. First, we do not find evidence that the large fiscal stimulus package implemented by the United States (the *CARES* act) contributed to the observed growth in remittances across Mexican municipalities. The idea that *CARES* fueled the increase in remittances to Mexico was based on historically strong negative relationship between remittances and the unemployment rate in the United States, but that this relationship changed in 2020. As seen in Figure 2, when the unemployment rate of Mexican workers in the US almost doubled during the 2008-2009 financial crisis, remittances fell dramatically. In contrast, when unemployment increased by even a larger magnitude in 2020, remittances kept growing. This has led to many news articles to speculate that the CARES-act implemented in 2020 may have alleviated the potential decline in remittances in a time of record-high unemployment.[3] Contrary to this hypothesis, other remittance-dependent countries without a large diaspora in the United States, such as Bangladesh, Pakistan, and Kosovo, also witnessed increases in remittances during this period (Figure 1). Additionally, recent evidence shows that despite suffering job losses disproportionately, Hispanics in the United States —a demographic group more prone to send remittances to Mexico—were significantly less likely to receive the stimulus payments, especially those without a US citizen in the household (Montenovo et al. 2020, Holtzblatt & Karpman 2020).

To study this link more rigorously, we evaluate the role of the increased generosity of the unemployment insurance (UI) system in 2020 by implementing the following difference-in-difference approach. First, we construct a measure of exposure to the unemployment of Mexicans living in the United States for each Mexican

[3]For example, https://expansion.mx/economia/2020/07/01/por-que-suben-remesas-hacia-mexico-plena-crisis-covid

municipality. Intuitively, a *CARES*-driven increase in remittances would be consistent with Mexican municipalities that witnessed the largest increases in remittances having migrants in US states that experienced the largest increases in unemployment rates in 2020. Using an administrative data set of migration flows (data from the *matricula consular ID*), we estimate the stock of Mexican migrants by municipality of birth in Mexico and by State of destination in the United States. We use these stocks to create a weighted average unemployment rate of Hispanics of Mexican origin by US state.[4] We find that from 2013 to 2019, a 10 percentage point increase in exposure to unemployment in the United States reduces remittances to Mexican municipalities by 3.6 percent, on average. We find that the relationship between US unemployment and remittances is weaker in 2020 —statistically not different from zero —but we do not find evidence of a positive effect. More importantly, the link between distance to the nearest border crossing and the rise of remittances during 2020 does not change when including this control.

Second, motivated by the fact that States' unemployment rates alone may not capture the full exposure to the CARES Act, we construct a measure of exposure to the increased UI wage replacement rates in 2020. We use data on the UI wage replacement rates by US state from Ganong et al. (2020) and the bilateral migrant stocks described above. We start by showing that US states that witnessed the largest increases in UI wage replacement rates are not the ones that drove the increase in remittances to Mexico during COVID-19. Then, we add the measure of exposure to increased UI generosity at the municipality level as a control variable to our difference in difference estimation and show that it is not significantly correlated with remittances at the municipality level and it does not affect their link with distance in 2020. These findings are robust to several specifications and support the

[4]Intuitively, if the unemployment rate is rising more rapidly in Arizona than in Chicago, Mexican municipalities with a larger share of migrants in Arizona would be more exposed to unemployment in the US, and thereby more likely to experience a rise in remittances during 2020.

claim that *CARES* was not a key driver of the rise in remittances at the municipal level.[5]

We also rule out altruism as another hypothesis that could explain the increase in remittances during the COVID-19 economic crisis. The altruistic channel would be consistent with remittances growing disproportionately in municipalities most affected by the crisis. We do not find evidence supporting this hypothesis. Specifically, our results show that changes in economic activity and COVID-19 infection rates at the municipality level in Mexico are not related to increases in remittances. Moreover, the link between distance and remittances during COVID-19 is not affected when controlling for these factors.

This article focuses on Mexico for three reasons. First, the United States and Mexico form the largest remittance corridor in the world (Ratha et al. 2016). Second, it has long been argued that the physical proximity between both countries facilities the use of informal remittances (Canales 2008, Amuedo-Dorantes & Pozo 2005). In fact, the convenience and lower cost for family members and friends to cross the Mexican-United States border with money in their pockets as already been documented by the literature (Beylier & Fortuné 2020, Orraca-Romano 2019). Third, the availability of rich data on sub-national remittances and location of Mexican migrants in the United States allows to control for a host of other confounding factors.

This article makes several contributions to the literature. First, it provides new evidence that the increase in *total* remittances during COVID-19 may not have been as high as initially thought. This is important for the design of policies to support

[5]It is important to note that the CARES Act may have contributed to boost economic activity along the United States and, thus, increased the level of remittances that Mexican migrants can send to their relatives. However, our research design does not allow us to capture this economy-wide effect of CARES on remittances common to all municipalities. Rather, our results point out that CARES exposure does not contribute to explain the change in remittances at municipal level.

remittance-dependent households during the crisis, which may be more vulnerable than suggested by trends in official remittances. While our findings imply that those living near a border crossing witnessed a disproportionate increase in official inflows, it is not clear if such increase fully compensated the decline in informal remittances. This is because of the dramatic increase in the unemployment rate of migrants and the fact that several households lack the financial literacy needed to use the formal mechanisms (Karakurum-Ozdemir et al. 2019, Ruiz-Durán 2016).

Second, this article contributes to a large literature that estimates the size of informal remittances. Our findings support the fact that these inflows are likely significantly larger than it may have been initially thought. For example, while cash and in-kind transfers are estimated to represent about 1 to 3 percent of reported remittances before 2020, reported remittances grew by more than 11 percent in 2020 compared to 2019. That is, between 4 to 11 times the size of the official estimates of informal remittances.

Finally, our article also contributes to the literature exploring the connection between remittances and financial development (Aggarwal et al. 2011, Demirgüç-Kunt et al. 2011). Consistent with this literature, we find that a 10 percent increase in remittances has been historically associated with an increase in transaction bank accounts in the receiving municipality of 0.6 percent. In addition, we find that the elasticity between remittances and transaction bank-accounts almost doubled during this period. This finding supports the hypothesis of the formalization of remittances during COVID-19 leading to an increase in demand for bank accounts to receive remittances via wire transfers. We also find that this increase was significantly lower for municipalities far away from the border, consistent with the larger increase in formal remittances in areas near a border crossing. Specifically, a 10 percent increase in the distance to the border reduces the increase in this elasticity by

0.14 percent.

The rest of this article is structured as follows. Section 2 discusses trends in remittances, their measurement and evolution during COVID-19. Section 3 describes the data, section 4 the empirical strategy, and section 5 presents the main results. Finally, section 6 explores the links with financial inclusion, and section 7 concludes.

2 Remittances, informal flows and COVID-19

2.1 Remittances: trends, impacts and drivers

Remittances are the largest source of external financing for developing countries and, as a result, they are an importance source of economic development. They are three times larger than Official Development Assistance (ODA) and they have surpassed Foreign Direct Investment in recent years (World Bank 2019). Most micro-level studies find that remittances are associated with poverty reduction and better health outcomes in developing countries, but that they reduce labor force participation by raising the reservation wage (Adams Jr 2011, Page & Plaza 2006). In contrast, cross-country studies that analyze the impacts on economic growth find mixed results. Clemens & McKenzie (2018) offer three explanations for this. First, the increase in remittances over time may be illusory and driven by changes in measurement. Second, cross-country studies may lack power to detect significant effects. And third, remittances are driven by out-migration, which at the same time reduces local GDP as long as the marginal product of labor is positive.

Remittance flows are driven by a host of factors, including the characteristics and preferences of the migrants, macroeconomic variables, and the costs of sending

and receiving remittances. In terms of migrants' preferences, Page & Plaza (2006) argue that there are three main reasons why migrants send remittances back to their countries: altruism, insurance (to protect the family left behind against shocks), and investment (asset accumulation as part of a migration life cycle plan). Remittances are also affected by macroeconomic factors, such as the economic situation both in host and sending countries. For example, economic crises in developing countries tend to trigger migration abroad which would tend to raise remittances. Accordingly, remittances are also influenced by the cost of living in the recipient country and by exchange rates movements (Page & Plaza 2006). Finally, the market structure of the remittance intermediaries also matters due to their impacts on sending and receiving costs. In particular, poor competition and remittance costs are important determinants of intermediary choice (Freund & Spatafora 2005). Since technology adoption and financial development have improved competition and lowered costs significantly in recent years, they may contribute to explain the sustained increase in remittance flows (Hernández-Coss 2005).

2.2 Remittances in Mexico

Data on formal remittances became available at the monthly level in 1995. Breakdowns by *Entidad Federativa*—i.e. Mexican State —were first reported in 2003. Ever since 2013, official figures report quarterly remittances received by each municipality and, separately, by country of origin. For remittances originating in the United States it also provides the remittance-sender state since 2013 (Banco de Mexico 2018).

In 2019, Mexico ranked third worldwide in terms of the amount of remittances received, reaching 38.7 billion US dollars (Ratha et al. 2019).[6] The vast majority of

[6]Outgrown only by India and China.

remittances to Mexico come from the United States (95 percent of all remittances according to official statistics), where most Mexican migrants live. Remittances to Mexico have grown dramatically since 1996 (see figure A1). In current US dollars, they grew at an average yearly rate of 9.8 percent. They declined only during the global financial crisis (2008-2010), as the rise in unemployment affected the ability of migrants to remit (Orozco 2009). They also fell in 2012 and 2013 when measured in dollars, but they actually increased in real pesos due to an appreciation of the peso against the US dollar (BBVA 2012).

The steady increase in remittances to Mexico over the last 20 years has been extensively documented. Hernández-Coss (2005) argues that the increase observed between 1996 and 2003 was driven by a shift from informal to formal channels to remit. Several factors contributed to that shift, including better financial access among undocumented migrants, due to the rapid adoption of the *Matricula Consular de Alta Seguridad*, which several financial institutions recognize as a valid identification to open an account.[7] Other factors were also important candidates to explain the secular increase in remittances, even after 2003. These include greater financial awareness among migrants, increased competition, technological change, product innovations and better distribution networks in remote areas of Mexico (Hernández-Coss 2005). Methodological improvements in remittances accounting were also important. For example, ever since late 2002, a new regulation was issued by Mexican authorities requiring all money transfer companies to report the value of their remittance transaction. Before then, only the remittance transfers from commercial banks were included in official figures (De Luna Martinez 2005). Estimated remit-

[7] While the *Matriculas* have existed for more than a century, two factors fostered their rapid adoption in the early 2000s (O'Neil 2003). First, anxiety over the terrorist attacks in September 11 2001 prompted several migrants to apply for the card. Second, the Mexican government implemented better security features of the card, improved the process to obtain it and launched information campaigns to encourage banks, government and the police to accept the card as a valid form of identification.

tance inflows showed a sharp increase after such reform.

Estimating the size of informal remittances constitutes a great endeavour due to data limitations. Despite the existence of data sources that aim to estimate informal remittances, they have some important measurement issues that limit their use for a rigorous analysis. First, official remittance figures do include estimates of informal remittances. These are calculated using the *Encuesta de Viajeros Internacionales*, which asks returning migrants direct questions about money and goods brought to relatives (Cañas et al. 2006). This survey is administered to visitors to Mexico at the time they are leaving the country to go back abroad, either by foot or car at the border or through an airport.[8] They represent between 1 to 3 percent of total remittances reported by official figures. Nevertheless, Cañas et al. (2007) argue that it is unlikely that informal remittances are captured with the same precision as formal ones. Specifically, in addition to typical misreporting issues that characterized individual surveys, it is questionable that an interview carried out in a public space in a country with high levels of insecurity and crime rates would capture financial measures accurately.[9]

Another alternative to estimate the size of informal remittances in Mexico is using traditional household surveys, such as the *Encuesta Nacional de Ingresos y Gastos de los Hogares* (ENIGH)— the largest household surveys in Mexico. In ENIGH, households are asked whether they receive remittances and the total amount. However, they capture less than 10 percent of the value of official remittances. This mismatch between the two sources can be explained by the fact that, as most house-

[8]Two sets of questions are used to estimate informal remittances. First, *Did you leave any money to your friends or relatives in Mexico during your visit?* and *How much?* Second, *Did you bring any gifts for your friends or family in Mexico?* and *What was the value of those gifts?*

[9]The *Colegio de la Frontera Norte*, a Mexican research center, also carries out a survey of returning migrants (*Encuesta sobre Migración en la Frontera Norte de México* (EMIF Norte)) that includes questions about remittances. However, it only asks about remittances sent in the past and the sample is biased toward migrants who are able to travel back to Mexico.

hold surveys, they tend to under-estimate income levels (Cervantes González 2019), which may be key in the case of Mexico due to security concerns of respondent households.

Case studies also support the hypothesis that informal remittances are sizable. For example, using data from a non-random sample of migrants from Zacatecas living in Los Angeles, Alarcón & Iñiguez (1999) shows that almost half of them use informal channels to remit, that is, through travelling friends and relatives. Similarly, Alarcón et al. (1998) and López et al. (2001) find that migrants living in Los Angeles from Jalisco and Oaxaca, respectively, send remittances in cash through relatives and friends, or send money orders and checks by mail.[10]

2.3 Remittances during COVID-19 and the role of distance

Ever since the implementation of lockdown measures in the United States, international and financial organizations predicted a significant decline in remittances to Mexico.[11] This was expected given that large declines in economic activity in the United States were strongly linked to a decline in remittances to Mexico in the past. For example, as seen in Figure 2, remittances fell by approximately 23 percent during the global financial crisis (2008Q1-2010Q1). Given that the decline in economic activity was faster and more severe in 2020, the fall in remittances was expected to be even larger than in 2008. In fact, household surveys conducted by phone in Latin America show that, on average, 64 percent of households that typically received re-

[10] Alarcón et al. (1998) also find that migrants often use creative ways to remit outside formal channels. For example, by leaving behind signed blank checks with their relatives in their hometowns. Others cross the border to Tijuana, and send their remittances to other parts of Mexico by telegram or using Mexican banks.

[11] World Bank (2020) predicted a 19.3 percent decline in remittances to Latin America and the Caribbean, where Mexico is the largest recipient. Private financial institutions also estimated significant declines. See, for example, El Financiero (2020), El Economista (2020), Reuters (2020).

mittances reported a decline in inflows from May through June 2020 (Table 1). In the case of Mexico, such figure is 36.5 percent, while 46 percent reported no changes and only 17 percent reported an increase.

Nevertheless, as mentioned above, official remittances to Mexico experienced record growth every month since March 2020. Several hypotheses, including the role of the United States' large fiscal stimulus package and the migrants' heightened incentives to help their relatives affected by the crisis in Mexico, were offered to explain this phenomenon. However, this article argues that such hypotheses are unlikely to explain the unprecedented increase in remittances to Mexico during 2020 and it is instead the result of a structural shift from informal to formal channels.

Without mobility restrictions, the cost of sending remittances informally would typically increase with the cost of travel and physical distance between senders and recipients. Thereby, it would be expected that Mexican municipalities closer to the US border have greater networks of migrants living in Southern US states and receive a higher share of remittances through informal channels. In fact, the migration pattern for Mexicans from northern states presented in Figure 3 shows that they are more likely to migrate to south US states.[12] However, geographic mobility declined dramatically in March 2020. As seen in Figure 4, the number of border crossings between Mexico and the United States declined by 70 percent in April 2020 when compared to April 2019, while the number of crossings increased since then. Even by August 2020, they were down by 52 percent with respect to the same month of 2019. As a comparison, border crossings between 2007 and 2008 fell by only about 5 percent. The decline in mobility since March 2020 —not only at the border but also within both the United States and Mexico —implied that informal channels to

[12]Migration patterns shown in figures A2 and A3 indicate that, in fact, Mexican migrants from northern states in Mexico have been more likely to emigrate to southern states in the United States between 2016-2019, whereas those coming from states in the South of Mexico do not show a clear pattern. More importantly, these patterns have not changed over time.

submit remittances were suddenly shut down. Thereby, municipalities closer to the US border that received remittances through informal networks would be disproportionately more likely to experience a shift from informal to formal channels to remit. As a result, officially recorded remittances would be more likely to increase among them.

Several articles have explored the role of geographic mobility and distance as important variables affecting the level of remittances. In general, when countries are farther away the amount of remittances is lower (Frankel 2011, Docquier et al. 2012, Lueth & Ruiz-Arranz 2008). This could reflect several issues, including the fact that there is less migration between these pairs of countries or that the costs of sending remittances increase with distance.

However, to disentangle the role of distance on the amount of remittances it is necessary to use subnational or individual level data, which allow to control for a host of unobservable factors that might affect cross-country regressions. Evidence using such type of data is scarce. An exception includes Ferriani & Oddo (2019), who use data on official remittances from institutions or other authorized intermediaries (MTOs, banks, and post offices) at the province level in Italy. They find a strong and positive correlation between the size of remittances outflows to other countries and the cost of travel to such countries, which is heavily driven by distance. The authors interpret this finding as evidence of the importance of informal remittances when the distance between recipients and senders is shorter.

Similarly, Simpson & Sparber (2020) use the Current Population Survey (CPS) from the United States to estimate the determinants of households' remittances abroad using household surveys.[13] They find that the physical distance between

[13]By using household survey instead of data on formal remittances, Simpson & Sparber (2020)'s model would capture the effects of distance on both formal and informal remittances.

the household's state of residence and the country of birth of its foreign residents is correlated with the decision to remit but not with the amount of remittances sent. More specifically, and in contrast to Ferriani & Oddo (2019), they find that a ten percent increase in distance reduces the probability to remit by 4.7 percentage points. In other words, these findings are consistent with distance increasing the costs of sending remittances, but reducing the cost of sending remittances through the formal channel relative to the informal one.

Descriptive patterns of remittance flows across municipalities since March 2020 are consistent with the shift towards formal channels to remit. Figure 5 shows that the share of remittances going to municipalities nearby the US border experienced a sudden increase when lockdown measures where implemented. The Figure shows that, in fact, the closer the distance between each Mexican municipality and the US border, the larger the increase in remittances during 2020. Accordingly, Figure 6 shows that the increase in remittance outflows from the US to Mexico during this period was driven mostly by US states at the Mexican border.[14]

We also explore additional explanations to the increase in formal remittances during COVID. Our analysis shows that it is unlikely that other factors played an important role in explaining the rise in formal remittances during 2020. For example, an alternative hypothesis for the rise in remittances has been the large fiscal stimulus package implemented in the United States. However, individual stimulus payments were not targeted at specific regions, which is inconsistent with the fact that US states at the southern border drove the increase in remittances. Accordingly, we show below that the increased generosity of the UI system does not seem to explain the rise in remittances either.

[14]The Figures described above show changes in the trend of remittances. For changes in levels, see Appendix Figures A4 and A5, which show annual changes in remittances for different years. A similar pattern arrives from both sets of figures.

Another potential explanation for the large increase in remittances has been a greater altruism among migrants to help relatives at home who were also experiencing economic distress. Cross-country studies show that, in fact, remittances tend to be counter-cyclical with respect to the country of birth of migrants (Frankel 2011, Hollifield et al. 2006). However, if this would be the main channel, we would expect an increase in remittances that is uniform across sender states in the United States or receiving municipalities in Mexico, which is not the case as most of the changes were experienced by areas along the border (Figures 5 and 6). At the same time, as we show in our estimations below, Mexican municipalities that experienced a larger economic shock during 2020 —and thereby more likely to receive remittances due to an altruistic motive —did not experience a disproportionate increase in remittances.

3 Data

3.1 Data sources

We combine multiple sources of administrative data to construct a panel of outcomes at the municipal level —including remittances and bank accounts data— and other measures that we use as explanatory variables —such as distance to the nearest border crossing, unemployment exposure in the US, and local economic activity.

A. Remittances: Data from remittances comes from quarterly reports produced by Mexican authorities, starting in 2013.[15] These reports contain information of remittances received by each municipality during each quarter since 2013. Additionally, the reports provide information on the origin of remittances by US state (but

[15]In particular, the data is produced and reported by Banco de Mexico

it does not report the municipality of destination in Mexico). Because quarterly remittances at the municipality level tend to be noisy, we aggregate the data at the semester level in our main analysis.[16] Panel A in Table 2 presents summary statistics for the remittances data at the municipal level for the sample period 2013-2020. Biannual remittance inflows at the municipal level vary from zero to about $300 thousand dollars. The average municipality receives more than $46 thousand dollars in biannual remittance inflows.

B. Registry of Mexican Immigrants —Matricula Consular: To provide a comprehensive measure of the bilateral connection between Mexico and the U.S., we use a confidential version of the Mexican government's *Matrícula Consular* database (MCAS). The *Matricula Consular* is a document (card) commonly accepted as proof of identity in the United States but issued by Mexican consulates to Mexican citizens living in the U.S.[17] To obtain the card, only proof of Mexican citizenship is required, but no verification of legal status in the U.S. Therefore, it is a popular method of identification for unauthorized immigrants. This data, however, provides robust measurement of Mexican immigration trends (both authorized and unauthorized) in the U.S. For example, Allen et al. (2018) conducts an accounting exercise comparing the MCAS and migrants' stocks estimates from the American Community Survey during the 2005-2016 period. Grouping migration at the core-based statistical area (CBSA) level,[18] they show that each *matricula* corresponds to somewhere

[16]By aggregating remittances at the semester level, we aim to alleviate the issue of the timing in which migrants sent money to their families. For example, mother's day in Mexico is on May and migrants tend increase transfers during that month, reducing transfers during the previous and posteriors months.

[17]This card can be used as a legal identification in the cities of Tucson, AZ., Los Angeles, CA., Dallas, TX., Houston, TX., Phoenix, AZ., Denver, CO., San Antonio, TX., and Chicago, IL. It can also be used, for example, to request a driver license, to register children at school, to apply for the birth certificate of a child born in the United States, to apply for business licenses, as identification in most banks and credit unions to open accounts, cash checks or send money abroad, etc.

[18]A CBSA is a U.S. geographic location defined by the Office of Management and Budget that consists of one or more counties anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting.

between 0.88 and 0.99 of a recent migrant in the MCAS and that a 10 percent increase in the number of cards is correlated with a 0.6 percent increase in the number of Mexican migrants in a CBSA.

We restrict our analysis to employed Mexicans living in the US, with ages ranging between 18 to 69 years. Thus, we observe around 3.1 million individuals over the period 2009–2013. For each individual, we observe their birth municipality in Mexico, the U.S. county where they live, as well as a few demographic characteristics such as age, gender, occupation, and education. The primary benefit of the MCAS is that we see the birthplace municipality in Mexico and the US state destination. The sub-national information allows us to exploit variation in labor market patterns over time as well as to control for state-level shocks and policies that may impact remittance flows. Panel B in Table 2 presents summary statistics for the registries data aggregated to the municipality level for the 2009-2013 period. We use this time period to control for any contemporaneous effect of the stock of immigrants and remittances. 7,089 Mexicans from the average municipality registered in the US during that period, ranging between 3 to 62,790 registries.

C. Unemployment of Mexicans in the United States: To test the relationship between remittances and unemployment in the United States, we use unemployment rates data from the Current Population Survey (CPS). It consists on a monthly sample survey of 60,000 eligible households conducted by the U.S. Census Bureau for the Bureau of Labor Statistics. We use quarterly (seasonally adjusted) unemployment rates of Hispanics of Mexican origin living in the U.S. at the county-level for the 2013-2020 period. Merging this dataset with MCAS allows us to estimate the exposure measure as we explain in the next section.

D. Municipality proximity to the nearest border or airport: To obtain a measure of closeness between each Mexican municipality and the United States, we implement

the following approach. First, we obtain the address of the 50 United States–Mexico border crossings and of the 60 international airports from the Ministry of Foreign Affairs. Second, we use the HERE geolocation API to calculate the driving distances (in kilometers) and the driving times (in minutes) from the center of every Mexican municipality to each access point.[19]

Panel B in Table 2 presents summary statistics for the distances data. Distances between the centroid of the Mexican municipalities and the nearest border crossing to the U.S. range between 0.85 to 2,358 Km. The average municipality is located at 917 Km from the border, which translates into an average travel time of 13.9 hours. Given that informal remittances are also carried out by air travel, we also used an alternative measure of distance of each municipality to the nearest international airport. However, such measure does not provide an accurate estimate of the cost of informal remittances for each municipality because it is difficult to know the exact itinerary of returning migrants or *encomenderos*.[20]

E. Economic activity: To control for the potential effect of an increase in remittances in places hit hardest by the pandemic (due to an increased altruism motive), we build a Bartik-style measure of local labor market shocks during COVID-19 at the municipality level. We use this measure instead of the actual change in economic activity because the latter could be endogenous to the remittance inflows, that is, remittances could foster local economic activity. Therefore, for each municipality we estimate shocks as the expected change in employment during COVID-19 by multiplying employment shares in January 2020 by sector at the municipality level with changes in employment in these sectors at the national level between January and

[19]See https://developer.here.com/ and Weber & Péclat (2017) for details on the methods used in here.

[20]For example, it is likely that several people travel to Mexico City first and then travel by land or through a domestic flight to the final destination. Unfortunately, we cannot accurately measure the average air travel time from each Mexican municipality to the United States.

June 2020. This index can be interpreted as the predicted changes in employment during COVID-19 at the municipality level due to the local industry composition in the local labor market and the industry-specific national employment changes during the pandemic.[21] On average, this measure of labor market shock during COVID-19 at the municipal level is around -4.42% (Table 2, Panel B).

F. Bank accounts data: Data from wage and transaction accounts at the municipality level comes from the financial regulator in Mexico. The *Portafolio de Informacion* of the Mexican National Banking and Securities Commission (CNBV), gathers financial information and data on the operation of all institutions regulated by the CNVB, including commercial banks. This public database provides monthly municipality-level data on the number of wage and transactions bank accounts. Transaction accounts are the most common bank accounts and can be open by any individual in Mexico with minimum requirements. On the opposite, wage accounts are usually open by the employer and require the holder to have a formal job with a company associated with the bank. This distinction is important for our analysis given that an increase in demand for bank accounts arising from a formalization of remittances during COVID-19 (electronic transfers) should be related to transaction accounts. However, controlling for the number of wage accounts at the municipality level helps mitigate the bias introduced by other potential confounding variables affecting the number of transaction accounts and remittances (e.g. local shocks). As Table 2 Panel C shows, the average municipality has an stock of around 27,615 transaction accounts and 15,438 wage accounts during our period of analysis.

G. Additional controls: To control for potential confounding elements, we collected data from two additional sources. First, measures of COVID incidence at the

[21] This Bartik-style instrument for labor demand shock at local labor market level has been widely used in the literature. For a recent article, see Notowidigdo (2020).

municipal level were obtained from the COVID-19 control panel.[22] We aggregate the number of cases at the quarter and municipal level. Then, we use population size at the municipal level, estimate municipal COVID incidence rates, and include this rate as control variable. We find that in our sample under analysis, the average COVID incidence rate was 10.8 deaths per 100.000 inhabitants, ranging from no cases to almost 1,200 at the municipal level (Table 2, Panel B). Second, to test the hypothesis of *CARES* act contributed to the observed growth in remittances across Mexican municipalities, we used data data on the UI wage replacement rates by US state from Ganong et al. (2020).

3.2 A measure of exposure to US unemployment

Given that we do not know the labor market status of Mexican migrants by municipality of birth and US state of residence, we create a Bartik-style measure of exposure of each municipality m to US state s unemployment of Hispanics of Mexican origin:

$$UExp_{mt} = \sum_{s=1}^{S} M_{ms} \times U_{st} \tag{1}$$

where M_{ms} corresponds to the share of migrants from municipality m in each state s (fixed over time), and U_{st} indicates the state-level unemployment rate at time t. To estimate U_{st}, we use the unemployment of Hispanics of Mexican origin living in the US. As we present in Table 2 in panel B, the biannual exposure rate at the municipality level ranges between 0.03 to 0.46.

[22] See https://www.coronavirus.gob.mx/datos/

Before 2020, the impact of this variable on remittances is expected to be negative, as higher exposure to unemployment in the United States implies that migrants would have lower levels of incomes and thereby capacity to remit. However, this link may have changed in 2020, as remittances continued to increase despite the dramatic rise in unemployment. It has been suggested that the large fiscal stimulus package implemented by the United States (the *CARES* act) may have spurred liquidity among migrants and thereby remittances. Thereby, it could be argued that areas that witnessed larger increases in the unemployment of migrants in 2020, also experienced larger unemployment insurance transfers. In other words, the impact of exposure to US unemployment on remittances could have become weaker or positive in 2020. We also carry out additional robustness checks to further examine the role of the *CARES* act on remittance flows in 2020.

4 Empirical strategy

We estimate the following equation:

$$R_{mt} = \alpha + \beta_0 UExp_{mt} + CV \times (\beta_1 UExp_{mt} + \beta_2 Dist_m + \beta_3 Eco_{mt}) + \lambda_t + \delta_m + \gamma_{mt} + \epsilon_{mt} \quad (2)$$

where R_{mt} is the log of remittances received by municipality m in quarter t; CV is a dummy that takes the value of 1 for every period during 2020. $Dist_m$ is a measure of distance from municipality m to the nearest border crossing, and Eco_{mt} is a measure of economic shocks in municipality m during COVID-19, which controls for the potential increase in remittances in municipalities hardest hit by the pandemic (altruism mechanism) that might also be closer to the northern border.

Additionally, λ_t and δ_m are time and municipality fixed effects that controls for shocks common to all municipalities and time-invariant characteristics of the municipalities, respectively. All models also include municipalities trends, γ_{mt}. This is important given the secular rise of formal remittances, which is likely different across municipalities with different degrees of dependence on informal inflows. Finally, to adjust our estimations by the importance of remittances at each municipality, all regressions are weighted using the average quarterly remittances at the municipality level.

Our main coefficient of interest is β_2, which captures the differential growth in remittances in 2020 by distance to the nearest border crossing. We expect this coefficient to be negative. The coefficient β_0 corresponds to the semi-elasticity of remittances to US employment rate exposure at the municipal level. Then, β_1 measures the change in this semi-elasticity with respect to the baseline β_0 in 2020. Finally, and β_3 measures the association between remittance inflows and local economic conditions in Mexico during COVID-19.

5 Results

5.1 Main results and robustness checks

Table 3 presents the main results to test the hypothesis that the increase in remittances has been driven by a shift from informal to formal channels to remit. We exploit the fact that municipalities closer to the nearest border crossing to the United States were more likely to receive remittances through informal methods. As measure of distance, we use the log of the number of hours needed to travel to the

nearest border crossing. We find that the elasticity between distance and biannual remittances in 2020 is around -0.041 (column 1). In other words, a 10 percent increase in distance is associated with a 0.41 percent decline in remittances in 2020.

These results are stable after including control variables that aim to account for alternative hypothesis. First, we find that there was a negative relationship between US unemployment and biannual remittances before the pandemic. According to column (2), a 10 percentage point increase in unemployment exposure was associated with a 3.6 to percent decrease in remittance inflows before the pandemic. This negative association became weaker in 2020, as shown by the interaction with the 2020 variable (C-19), which is positive but statistically insignificant. However, rather than a change in the sign of the relationship, the result shows no relationship between unemployment and remittances during COVID-19—We do not reject the hypothesis that the total effect of US unemployment exposure during 2020 is zero. This result is also found when we use an event-study design in which we compare the relationship between the log of annual changes in remittances and year dummies multiplied by the changes in the exposure to unemployment in the United States. As Figure 7 shows, there was a negative correlation between remittances and unemployment in the United States until March 2020.

Second, we also test the altruism channel and present the results in column (3). We find that the coefficient that measures the link between distance to the US border and remittances during the pandemic remains stable after controlling by a proxy for local economic activity. We also find that the impact of local economic activity on remittance inflows is not statistically different from zero. This result suggests that the altruism channel is unlikely to explain the rise of remittances during 2020.

Column (4) in table 3 present the estimated coefficients of our preferred model, which includes variables for all potential channels. Overall, estimated coefficients

are consistent with the hypothesis that the increase observed in official remittance flows to Mexico was driven mostly by municipalities that depended more heavily on informal channels before the pandemic, since municipalities further south experienced much lower growth rates.

Our main estimates are robust to using alternative specifications and controls. First, they are robust to using measures of physical distance (in hours, kilometers) instead of travel time or to a dummy defining northern municipalities (less than 350 km from the border). As shown in columns (1) - (4) in table 4, the sign and statistical significance of the estimated coefficients of the distance variable are similar to the ones in the main specification. Second, we also show that they are not driven by outliers. As shown in column (5) in table 4, most of the estimated associations from our preferred model remain stable when we use a sample restricted to non-extreme observations, except for the associations between unemployment exposure and remittances pre-COVID, which become marginally larger. Finally, the coefficient associated with distance in 2020 does not change when controlling for the spread of COVID-19 infections in Mexico. This is important since Mexicans living in the US that are from municipalities with high COVID incidence rates might send more remittances to support their families, compared to Mexicans from municipalities where infection rates are low. To address this concern, we control by COVID incidence rates (number of infections per 100,000 inhabitants) at the municipal level. As reported in table A1 in the appendix section, estimates are similar to those from our main model (Table 3) both in terms of magnitude and statistical significance.

In addition, we conduct three placebo test to confirm the link between distance to the US border and remittances in 2020. These results are presented in Table 5. First, among municipalities far enough from the border, the cost to send remittances through informal channels should not vary substantially by distance, as it would

be the case among municipalities closer to the border. Thereby, the role of distance is expected to become weaker or disappear for municipalities that are farther away from the nearest border crossing. To test this hypothesis, we restrict our sample to the municipalities that are at a travel distance longer than 500 minutes from the US-Mexico border. Then, we separate them into two groups and define the half closer to the border as the northern municipalities. As we show in column (1), the link between distance and remittances in 2020 becomes statistically insignificant.

As two additional placebo tests, we define the COVID-period as if it happened in 2019. If the role of distance remained significant, it would indicate that the effect found in 2020 is driven by pre-existing trends. This is plausible given the slow moving shift from informal to formal channels to remit. To test this hypothesis, we use this new COVID-period definition and estimate specification (2). Column 2 shows that the coefficient associated with distance is statistically insignificant, supporting the hypothesis that the role of distance in driving informal remittances changed in 2020.[23] Column (3) reports the same placebo test but excluding the year 2020 from the sample.

Finally, we also explore the hypothesis that rural areas were more likely to depend on informal remittances before the pandemic, due to their lower financial inclusion levels (Amuedo-Dorantes & Pozo 2005). Table A2 in the appendix reports the estimates of the main regression, splitting the sample between urban and rural municipalities. As expected, the role of distance is stronger among rural municipalities during COVID-19. In particular, a 10 percent increase in travel time lowers remittance inflows by almost 0.7 percent in rural areas, but only by 0.3 percent in urban ones.[24]

[23]The only statistically significant coefficient is the one on exposure index during COVID-19. However, the sign is the opposite to what we find in our main estimations, capturing part of the effect of exposure index pre-pandemic.

[24]We also show that the measure of proximity using the minimum distance or travel time to either

5.2 Does the CARES Act explain the rise in remittances?

A popular hypothesis has been that the large scale stimulus package implemented by the United States under the CARES Act contributed to the increase in remittances to Mexico. This channel is unlikely to have played a significant role for three reasons. First, if this hypothesis were true, it would be expected that the main remittance sender states —i.e. those along the Mexican border —would have been disproportionately benefited by the fiscal package. However, the two main direct transfers implemented by the United States since March 2020 do not seem to have benefited these areas more. This is because the direct payments to tax payers were universal, thereby the benefits would be expected to be proportional to the population of each state. At the same time, Hispanic families —particularly those without US citizens —were less likely to receive the stimulus payments (Holtzblatt & Karpman 2020). Accordingly, the uniform $600 Federal Pandemic Unemployment Compensation (FPUC) supplement implemented by the CARES Act did not benefit border states disproportionately. As Ganong et al. (2020) show, this supplement increased replacement rates significantly, with over 76 percent of eligible workers receiving benefits well above their lost wages. However, these replacement rates were not consistently higher among border States, as we also present in figure A6.

Second, our main specification includes exposure to unemployment in the United States as an explanatory variable. If an increase in unemployment led to higher liquidity due to the generosity of FPUC, it may have led to higher remittances. However, We find that the relationship between US unemployment and remittances is weaker in 2020 —statistically not different from zero —but we do not find evidence of a positive effect.. Third, official remittances have also increased

the border or international airport does not provide an accurate estimate of the cost of informal remittances for each municipality. As we present in Table A3 in the appendix section, the estimated coefficients of the effect of distance during COVID are negative but statistically insignificant.

in developing countries whose diasporas are concentrated in developed countries other than the United States. For example, as seen in Figure 1, Bangladesh, Pakistan and Kosovo also experienced large increases in official remittances while most of their emigrants live in the Middle East or Europe.

To further test the role of the CARES Act, we construct a variable of exposure to the increase in wage replacements rates due to FPUC and add it to the main regression:

$$CARES_{mt} = \sum_{s=1}^{S} M_{ms} \times RR_{st} \tag{3}$$

where RR_{st} is the wage replacement rate of the unemployment insurance scheme. As seen in Figure A6, the change in this parameter in 2020 exhibited substantial variation across states. If this had been an important factor, this exposure measure would predict an increase in remittances. Table 6 shows the results and indicates that, while exposure to FUPC is positively linked to remittances, the coefficients are not statistically significant. Moreover, the inclusion of this variable does not affect the coefficient associated with distance during COVID. In other words, the evidence does not support the claim that the CARES Act played a key role behind the rise in formal remittances at the local level in Mexico. As mentioned above, since our model only captures local effects, we cannot completely rule out the hypothesis of an economy-wide impact of CARES on remittances to Mexico.

6 Exploring the mechanisms: The Role of Financial Inclusion

The increase observed in formal remittances could be driven by a decline in informal transfers in favor of electronic transfers through the banking system. If this is the case, recipient families in Mexico have incentives to open transaction bank accounts so that relatives in the US can send these transfers. To explore this channel, we study the relationship between transaction bank accounts and remittances at the municipality level, how this relationship change during COVID-19, and if this change was different for municipalities closer to the north border.

Specifically, we estimate the following regression:

$$\begin{aligned} TransBankAcc_{mt} = \alpha + \beta_1 WageBankAacc_{mt} + \beta_2 CV \times Dist_m + \beta_3 CV \times Eco_m \\ + \beta_4 R_{mt} + \beta_5 CV \times R_{mt} + \beta_6 CV \times R_{mt} \times Dist_m \\ + \lambda_t + \delta_m + \epsilon_{mt} \end{aligned} \tag{4}$$

where $TransBankAcc_{mt}$ is the log of the stock of transaction bank accounts in municipality m in the last month of semester t; $WageBankAacc_{mt}$ is the log of wage bank accounts in municipality m in the last month of semester t; and the rest of the variables are defined as in equation (1). All models also include municipality fixed-effects, time fixed-effects and linear municipalities trends. The main coefficients of interest are β_4, β_5 and β_6. The first coefficient, β_4, captures the historic relationship between transaction bank accounts and remittances. The second coefficient, β_5, test if that relationship becomes stronger during COVID-19. Finally, β_6 measures if the increase in the relationship was mostly driven by municipalities closer to the border.

The results are shown in Table 7. We find that, historically, an increase in remit-

tances of 10 percent is associated with an increase in transaction bank accounts in the receiving municipality of 0.64 percent. During COVID-19 this elasticity almost doubled, reaching 1.15 percent. However, that increase was lower for municipalities far away from the border: an increase in 10 percent in the distance to the border reduces this increase by 0.14 percent. We also test if the effect was larger in municipalities where remittances tend to be more relevant. To this end, we split the sample in municipalities above and below the median of remittances per capita during our analyzed period. We find that the historical relationship between remittances and transaction accounts is stronger in municipalities where remittances tend to be more important. However, during COVID-19 we observe a similar increase in the relationship for both types of municipalities and we also find that this increase was concentrated in municipalities closer to the border.

Additionally, the data on transaction accounts are available at monthly level and it is less nosily than remittances (the total number of bank accounts is a stock variable, and is much more stable over time than remittances, which is a flow variable). This allows us to also run regressions using monthly level data in an event-study design, allowing us test exactly which month of 2020 distance to the border became a relevant factor to determine transaction bank accounts in Mexico. This exercise is shown in Figure 8, which displays the relationship between the log of transaction bank accounts and time dummies multiplied by the log travel time to the border. We find that there was no relationship of transaction bank accounts and distance to border until March 2020, precisely the month in which all the travel restrictions were imposed (see Figure 4).

7 Discussion

This article argues that the increase in official remittances observed in several developing countries during the COVID-19 crisis was driven by a shift from informal to formal channels to remit. This was caused by the sudden increase in the costs of sending informal remittances to prohibitive levels, due to the mobility restrictions imposed to control the pandemic. It uses sub-national data from one of these developing countries, Mexico, to show that the increase in remittances was driven by municipalities closer to a US border crossing, which were more likely to receive informal remittances before March 2020. Consistent with this hypothesis, these areas also experienced a disproportionate increase in bank accounts during this period.

This article makes several contributions to the literature. It is the first one to provide evidence on the drivers of the rise in remittances during COVID-19. Given the importance of remittances as a source of income for millions of households in developing countries, the findings of this article suggest that despite the rise of official remittances during 2020, total remittances may have actually declined. In other words, the decline in total incomes among remittance-dependent households is likely larger than suggested by available data on remittances. Second, it contributes to a large body of literature on the determinants of remittances. While it has long been argued that informal remittances to developing countries are substantial, this is the first article to document the link between a sudden increase in the cost of sending informal remittances and the rise of formal remittances. It also contributes to the literature exploring the impacts of remittances on financial development.

It is important to mention that while the evidence does not support the claim that the CARES Act or increased altruism drove the rise in remittances at the *local* level in Mexico, it cannot completely rule out that these channels impacted aggre-

gate remittance flows. Additional research that examines the importance of these various sources of changes in remittances at the national level should be encouraged.

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Tables and Figures

Table 1: **Remittance inflows in 2020: household surveys vs. official estimates**

	Remittances-receiving households				Official remittances (US$)	
	% did not receive or experience a decline		% received the usual amount		y-o-y change	
	May-June 2020	July-August 2020	May-June 2020	July-August 2020	Q2	Q3
Bolivia	79.6	48.4	15.9	8.7	-48.0	-5.7
Colombia	74.0	59.2	11.0	27.4	-22.4	6.1
Costa Rica	58.6	52.4	22.6	23.5	-8.5	
Dominican Republic	45.5	56.7	42.2	9.2	3.4	29.4
Ecuador	69.3	51.5	22.2	25.9	-16.3	
El Salvador	67.4	61.1	26.1	22.2	-16.4	17.7
Guatemala	74.1	30.6	22.6	23.4	-8.5	12.7
Honduras	61.2	52.8	29.8	39.5	-9.8	
Mexico	36.5	24.4	46.2	19.2	4.1	9.1
Paraguay	80.0	48.5	17.8	19.2	-35.2	-0.6
Peru	62.5	65.9	29.6	24.6	-33.5	
Average	**64.4**	**50.2**	**26.0**	**22.1**	**-17.4**	**9.8**

Source: World Bank High Frequency Surveys (https://www.worldbank.org/en/topic/poverty/brief/high-frequency-monitoring-surveys)
Note: The first and third columns report the share of remittance-receiving households that reported a decline or the same amount of remittances since the beginning of the lockdown measures, with respect to the last 12 months. The second and fourth column report the share of remittance-receiving households that reported a decline or the same amount of remittances in July-August 2020 with respect to May-June 2020. Remittance-receiving households are those who received remittances between May-June 2019 and May-June 2020.

Table 2: **Summary Statistics**

	Mean (1)	SD (2)	Min (3)	Max (4)
Panel A. Outcomes				
Remittances (in millions)	46.12	50.61	0.00	301.74
Panel B. Control variables				
Registries	7,089	9,153	3	62,790
Exposure index (biannual)	0.12	0.04	0.03	0.46
Distance to border				
In hours	13.86	6.19	0.07	36.04
In Km	916.65	407.11	0.85	2,358.19
Local economic activity	-4.42	2.50	-27.13	32.13
COVID incidence	10.83	57.26	0.00	1,198.94
Panel C. Mechanisms				
Transactions bank accounts	27,615	98,165	0.00	496,195
Wage accounts	15,438	72,053	0.00	346,926
Observations		24,213		

Table shows descriptive statistics of the main variables under analysis.

Table 3: **Remittances in times of COVID**
Dependent variable: Biannual remittances (log)

	(1)	(2)	(3)	(4)
C-19 × Distance (in log (hours))	-0.041***	-0.039***	-0.041***	-0.039***
	(0.009)	(0.011)	(0.009)	(0.011)
Exposure index		-0.358*		-0.358*
		(0.201)		(0.201)
C-19 × Exposure index		0.155		0.153
		(0.307)		(0.307)
C-19 × Local economic activity			0.030	0.041
			(0.215)	(0.213)
Constant	3.217***	3.258***	3.217***	3.258***
	(0.001)	(0.022)	(0.002)	(0.022)
Observations	24,213	24,213	24,213	24,213
p-value H0:				
Exposure index + C-19 × Exposure index = 0		0.428		0.424

Table shows the associations between remittances and three factors that can explain changes during the pandemic. Exposure index was estimated using unemployment of Mexicans adjusted by the share of Mexicans living in each state in the US. Estimation sample include all municipalities and all semesters. All models include municipality and time-quarter fixed-effects and municipalities trends. For the restricted sample, 1% of observations in both tails of the change in biannual remittances distribution were dropped. Standard errors are clustered at the municipal level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: **Robustness Checks**
Using alternative measures of distance
Dependent variable: Biannual remittances (log)

	All Observations				Restricted Sample
	(1)	(2)	(3)	(4)	(5)
C-19 × Distance (in hours)	-0.006***				
	(0.002)				
C-19 × Distance (in Km)		-0.008**			
		(0.003)			
C-19 × Distance (in log(Km))			-0.031***		
			(0.008)		
C-19 × Distance (<350Km)				0.081*	
				(0.045)	
C-19 × Distance (in log(hours))					-0.036***
					(0.010)
Exposure index	-0.382*	-0.390**	-0.361*	-0.380*	-0.524***
	(0.199)	(0.199)	(0.201)	(0.199)	(0.201)
C-19 × Exposure index	0.206	0.160	0.114	0.0110	0.340
	(0.351)	(0.349)	(0.303)	(0.311)	(0.306)
C-19 × Local economic activity	0.041	0.089	0.031	0.099	0.010
	(0.213)	(0.217)	(0.213)	(0.215)	(0.211)
Constant	3.258***	3.261***	3.267***	3.257***	3.317***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.020)
Observations	24,213	24,213	24,213	24,213	19,343

Table shows the associations between remittances and three factors that can explain changes during the pandemic. Exposure index was estimated using unemployment of Mexicans adjusted by the share of Mexicans living in each state in the US. Estimation sample include all municipalities and all semesters. All models include municipality and time-quarter fixed-effects and municipalities trends. Standard errors are clustered at the municipal level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: **Placebo tests**
Dependent variable: Biannual remittances (log)

	(1)	(2)	(3)
	Changing definitions of North-South	Defining COVID = 2019	
C-19 × Distance	0.027	-0.001	-0.0004
	(0.017)	(0.001)	(0.001)
Exposure index	-0.278*	-0.099	-0.230
	(0.161)	(0.201)	(0.198)
C-19 × Exposure index	-0.327	-0.658***	-0.802
	(0.281)	(0.236)	(0.495)
C-19 × Local economic activity	0.043	0.043	0.011
	(0.002)	(0.002)	(0.002)
Constant	3.191***	3.244***	3.227***
	(0.018)	(0.022)	(0.024)
Observations	21,185	24,213	22,185
Sample	All periods	All periods	2013-2019

Table shows placebo tests in the association between remittances and factors that can explain changes in remittances inflows during the pandemic. In column (1), we switch the North-South definitions and variable *Distance* is a northern municipality placebo indicator, that is, it takes the value of 1 if the municipality is in the south of Mexico and 0 otherwise. Columns (2) and (3) define the COVID indicator as if the pandemic would had occurred in 2019 and variable *Distance* consists on the log of travel time in hours. In (2) we use data from 2013-2020, whereas in (3) we use only data from the 2013-2019 period. Models include municipality and time-quarter fixed-effects and municipalities trends. Standard errors are clustered at the municipal level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: **CARES as an alternative explanation**
Dependent variable: Biannual remittances (log)

	All Observations		Restricted Sample	
	(1)	(2)	(3)	(4)
C-19 X Distance (log(hours))	-0.039***		-0.036***	
	(0.0105)		(0.0103)	
C-19 X CARES exposure	0.133	0.107	0.038	0.0109
	(0.149)	(0.148)	(0.153)	(0.150)
Exposure index	-0.365*	-0.388*	-0.527***	-0.540***
	(0.201)	(0.199)	(0.201)	(0.199)
C-19 X Exposure index	0.311	0.332	0.385	0.442
	(0.361)	(0.381)	(0.364)	(0.384)
C-19 X Local economic activity	0.038	0.092	0.009	0.058
	(0.213)	(0.216)	(0.211)	(0.213)
Constant	3.242***	3.245***	3.322***	3.315***
	(0.038)	(0.030)	(0.033)	(0.032)
Observations	24,213	24,213	19,343	19,343

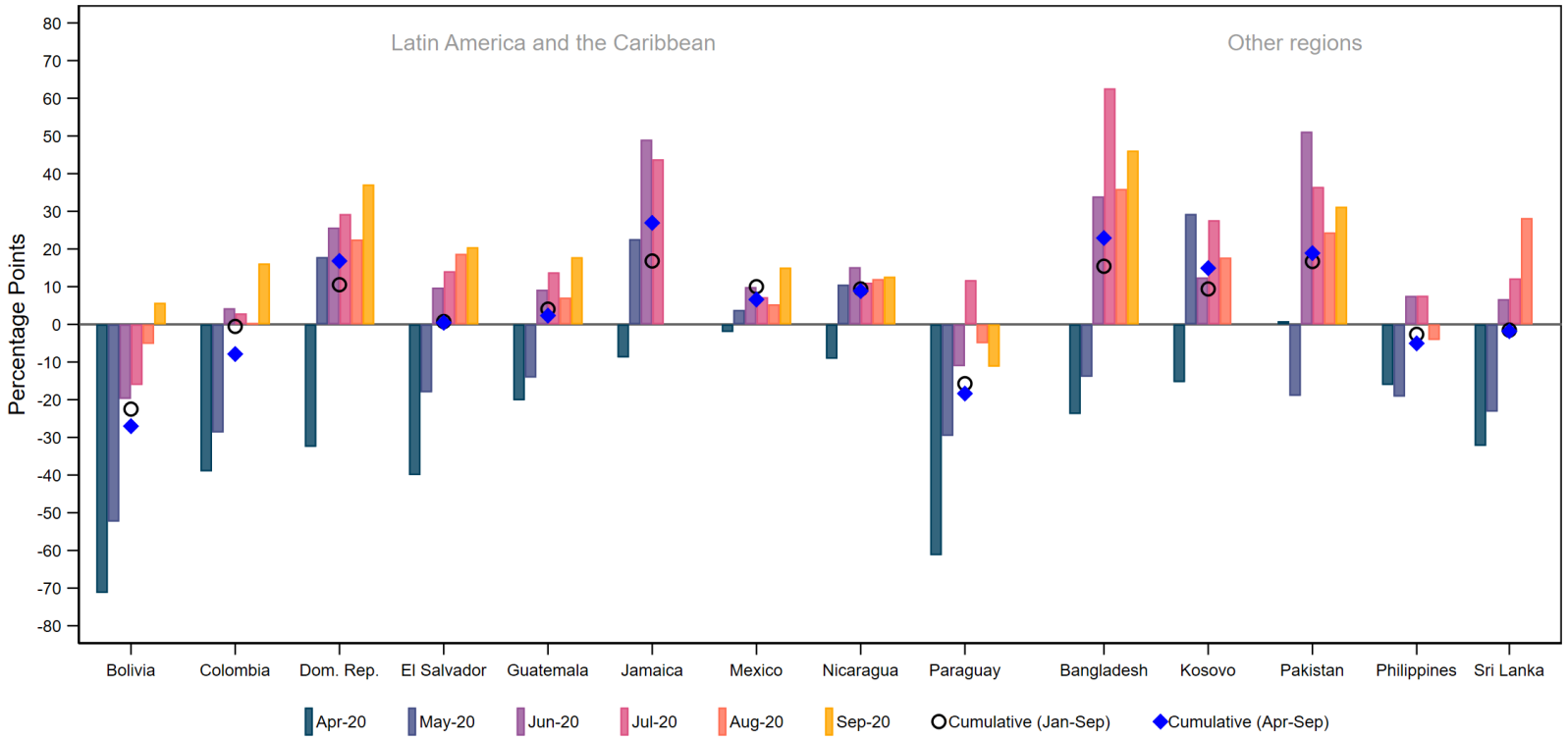
Table shows the associations between remittances and three factors that can explain changes during the pandemic. Exposure index was estimated using unemployment of Mexicans adjusted by the share of Mexicans living in each state in the US. Estimation sample include all municipalities and all semesters. All models include municipality and time-quarter fixed-effects and municipalities trends. For the restricted sample, 1% of observations in both tails of the change in biannual remittances distribution were dropped. Standard errors are clustered at the municipal level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: **Mechanism**
Dependent variable: transaction Bank Accounts (log)

	(1) All Observations	(2) Municipalities with low PC remmitances	(3) Municipalities with high PC remmitances
C-19 × Distance (log(hours))	0.064***	0.071**	0.068***
	(0.018)	(0.029)	(0.022)
C-19 × Remmitances (log)	0.051**	0.066*	0.055**
	(0.023)	(0.036)	(0.027)
C-19 × Remittances (log) x Distance (log(hours))	-0.014***	-0.015***	-0.016***
	(0.004)	(0.006)	(0.005)
C-19 × Labor demand shocks	0.002	0.009*	0.0002
	(0.004)	(0.005)	(0.004)
Remittances (log)	0.059**	0.024	0.078**
	(0.024)	(0.024)	(0.033)
Wage accounts (log)	0.109***	0.028***	0.131***
	(0.014)	(0.009)	(0.017)
Constant	10.05***	11.84***	9.604***
	(0.160)	(0.127)	(0.201)
Observations	24,213	12,075	12,138

Table shows placebo tests in the association between remittances and factors that can explain changes in remittances inflows during the pandemic. Models include municipality and time-quarter fixed-effects. Standard errors are clustered at the municipal level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

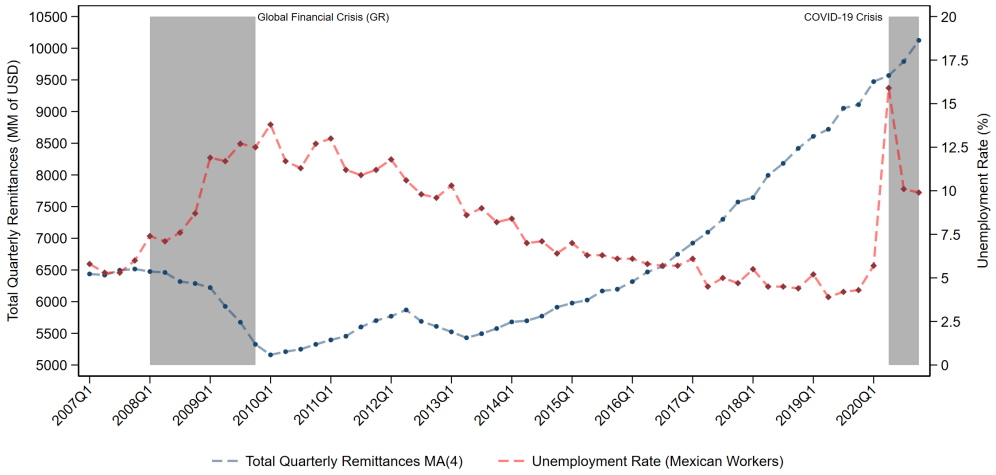
Figure 1: Remittance inflows, 2019-2020 growth



Source: Data reported by Central Banks of each country.

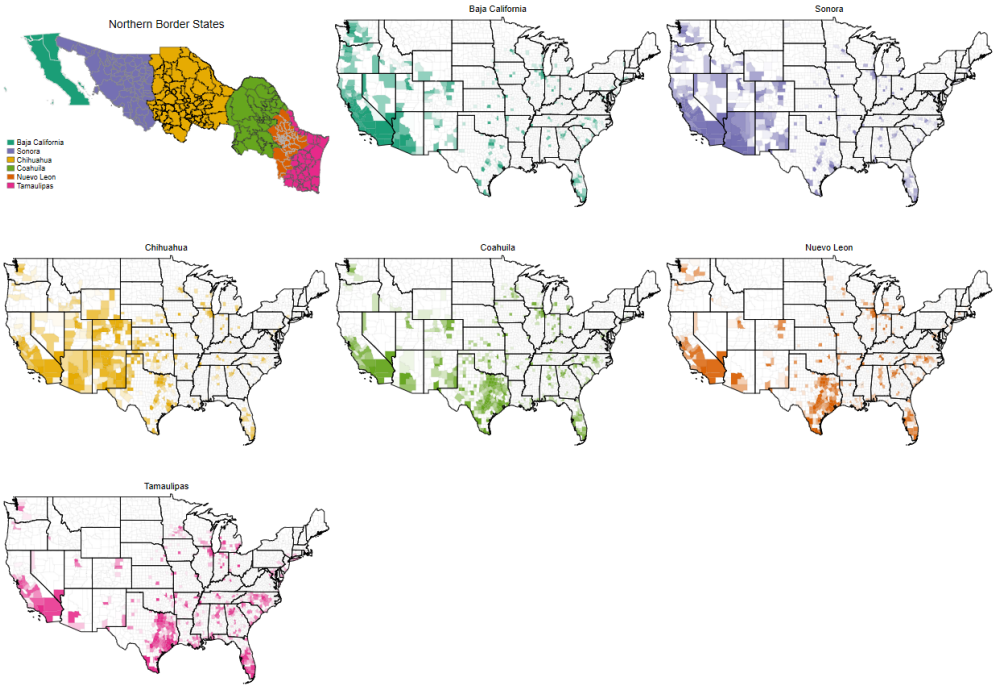
Note: Each bar shows the growth in the total remittance inflows each month of 2020, with respect to the same month of 2019. The dots show the growth in the total remittance inflows in January through September 2020 (April through September 2020), with respect to the same period of 2019.

Figure 2: Remittances to Mexico and Unemployment of Mexican Workers in the US



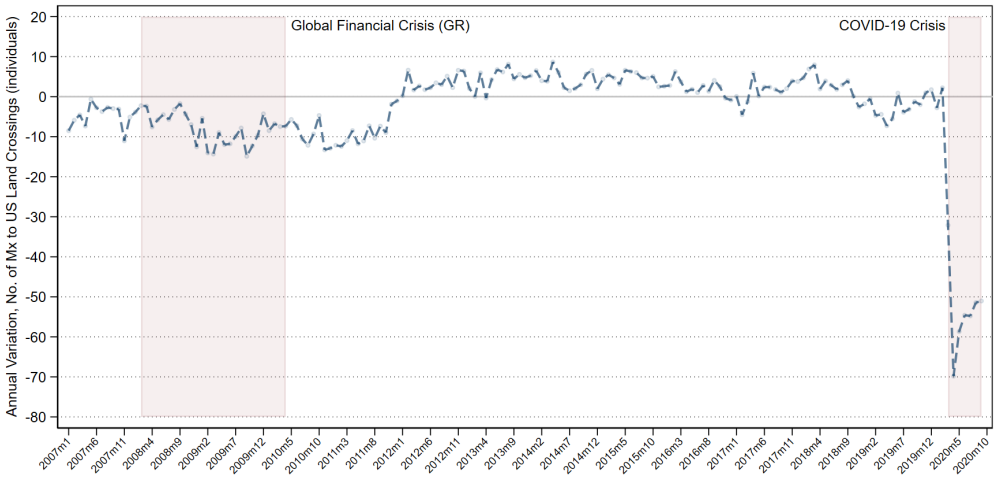
This figure shows the 4-period moving average (1 year) of quarterly remittances from the United States to Mexico in current dollars (axis 1) and the unemployment rate of Mexican workers 16 years and older living in the United States (axis 2). Data on unemployment comes from the Labor Force Statistics from the Current Population Survey.

Figure 3: Migration Patterns of Mexican Citizens from Northern States to the United States 2002-2020



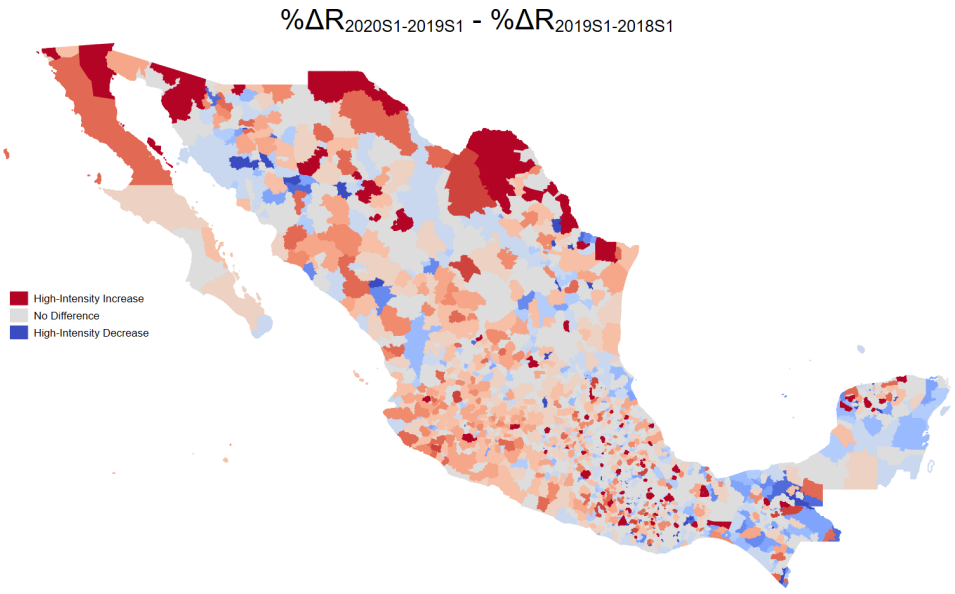
This figure shows the change of migration of Mexican citizens to the United States by state of origin (northern border) in Mexico. The northern border states in Mexico are Baja California, Chihuahua, Coahuila, Sonora, Nuevo Leon, and Tamaulipas. The data corresponds to all matricula consular registries from 2002 to 2020.

Figure 4: Annual Variation in Land Crossings from Mexico to the US



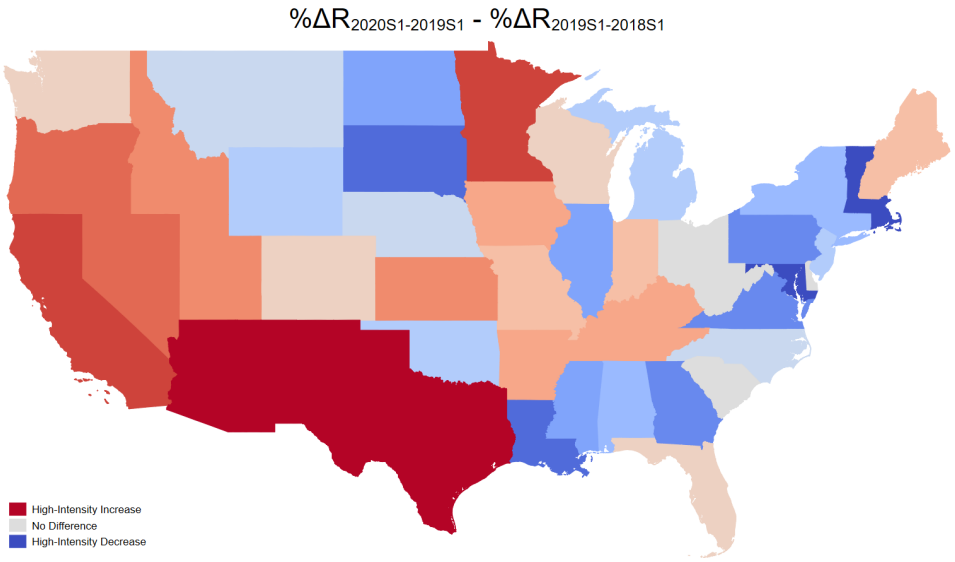
This figure shows the variation in land crossing from Mexico to the United States in comparison to the same month of the previous year. Data is provided by the Bureau of Transportation Statistics (BTS) Border Crossing Data.

Figure 5: Changes in Municipality Level Remittances Compared to the Previous Trend



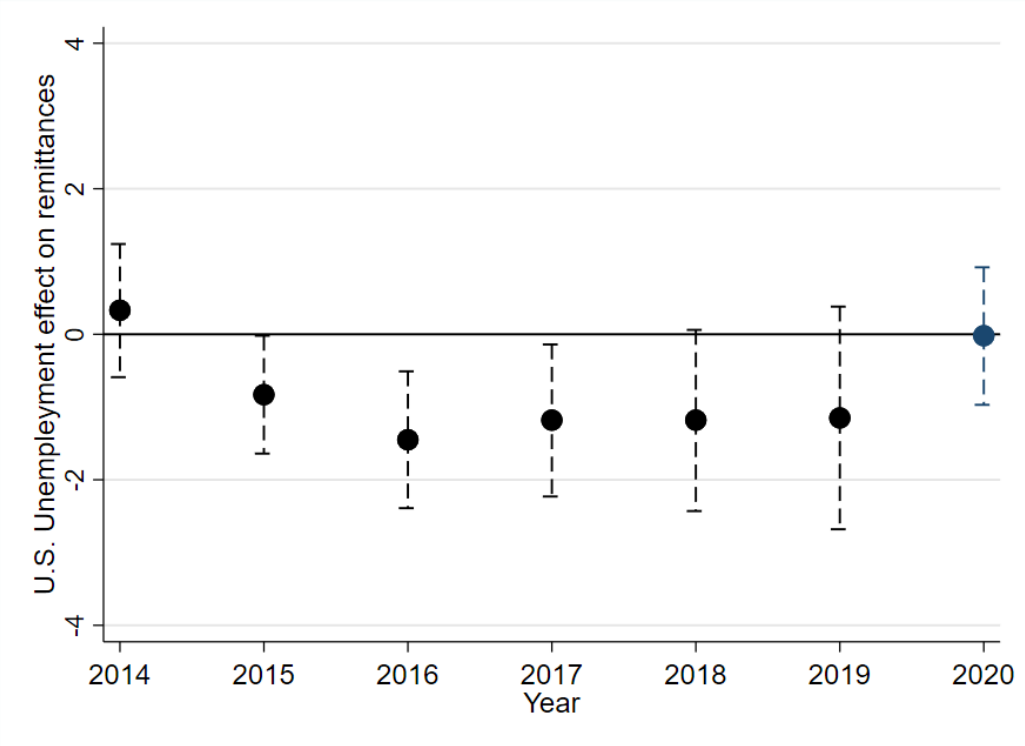
This figure shows the changes in remittances received by each municipality in Mexico during the first semester of 2020 relative to its previous trend. To do so, it subtracts the municipality-level percentage change in total remittances received during the first semester of 2018 and 2019 from the percentage change in total remittances received during the first semester of 2020 and 2019.

Figure 6: Changes in State Level Remittances Compared to the Previous Trend



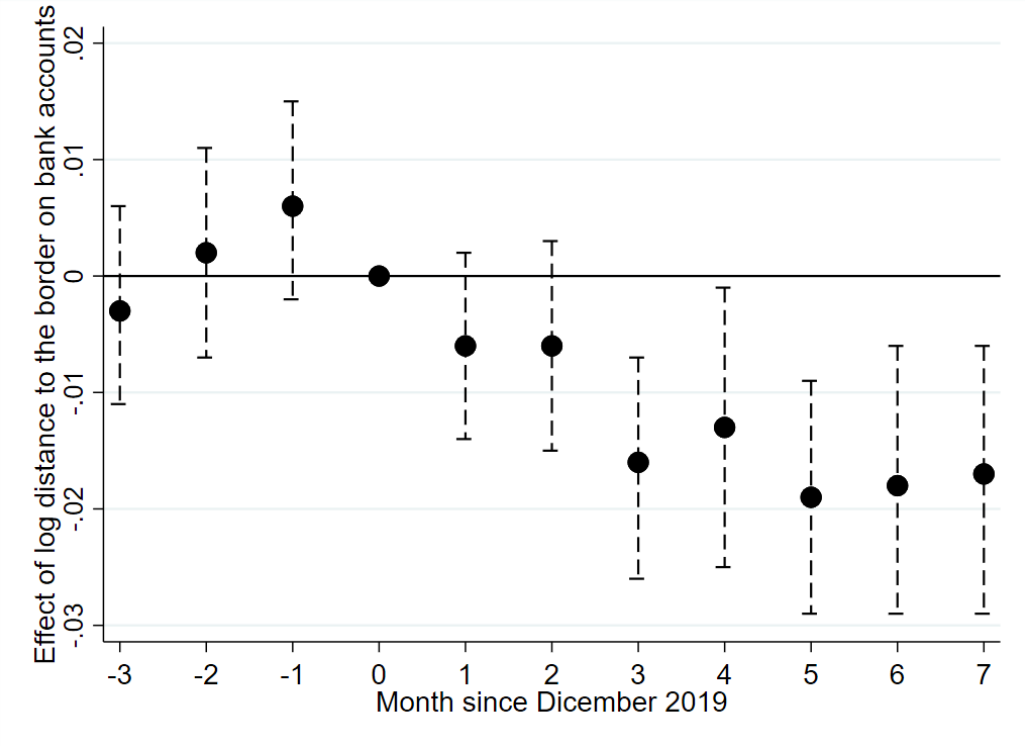
This figure shows the changes in remittances sent by each state in the United States to Mexico during the first semester of 2020 relative to its previous trend. To do so, it subtracts the state-level percentage change in total remittances sent during the first semester of 2018 and 2019 from the percentage change in total remittances sent during the first semester of 2020 and 2019.

Figure 7: Relationship between unemployment in the US and inflows of remittances in Mexico.



This figure shows the values for the correlation obtained from regressing annual changes in remittances at the municipality level to changes in exposure to US unemployment, year by year. Regressions include state and semester fixed effects. The lines extending from the point estimates show the 90% confidence intervals with robust standard errors.

Figure 8: Effects of distance to the border on transaction bank accounts



Notes:The figure shows the correlation between the log of transaction bank account and time dummies multiplied by log distance to the border. The point estimate is interpreted as the additional increase in transaction bank account for each increase in 100 percent from distance to the boarder in each month, with respect to December 2019. Regressions include municipality by calendar month fixed effects and municipality linear trends. The lines extending from the point estimates show the 90% confidence intervals with standard errors cluster at the municipality level.

Appendix

Tables

TABLE A1. Remittances in times of COVID
Including COVID incidence rate at the municipality level
Dependent variable: Biannual remittances (log)

	(1)	(2)
C-19 × Distance (in hours)	-0.00545***	
	(0.00209)	
C-19 × Distance (in log(hours))		-0.0388***
		(0.0104)
Exposure index	-0.379*	-0.362*
	(0.198)	(0.201)
C-19 × Exposure index	0.198	0.165
	(0.348)	(0.307)
C-19 × Local economic activity	0.0956	0.0394
	(0.217)	(0.214)
Constant	3.259***	3.269***
	(0.0222)	(0.0219)
Observations	24,213	24,213

Table shows the associations between remittances and three factors that can explain changes during the pandemic. Exposure index was estimated using unemployment of Mexicans adjusted by the share of Mexicans living in each state in the US. Estimation sample include all municipalities and all semesters. Models include municipality and time-quarter fixed-effects and municipalities trends. Standard errors are clustered at the municipal level. *** p<0.01, ** p<0.05, * p<0.1, + p=0.101

TABLE A2. Remittances in times of COVID
Separating by Urban-Rural using Population Density
Dependent variable: Biannual remittances (log)

	(1)	(2)
	Rural	**Urban**
C-19 X Distance (in log(hours))	-0.0696***	-0.0311**
	(0.0210)	(0.0124)
Exposure index	-0.431	-0.334
	(0.288)	(0.262)
C-19 X Exposure index	0.247	0.157
	(0.484)	(0.389)
C-19 X Local economic activity	0.00108	0.000170
	(0.00284)	(0.00329)
Constant	2.497***	3.565***
	(0.0300)	(0.0291)
Observations	12,112	12,101

Table shows the associations between remittances and three factors that can explain changes during the pandemic. Exposure index was estimated using unemployment of Mexicans adjusted by the share of Mexicans living in each state in the US. Estimation sample include all municipalities and all semesters. Models include municipality and time-quarter fixed-effects and municipalities trends. Standard errors are clustered at the municipal level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$, + $p=0.101$

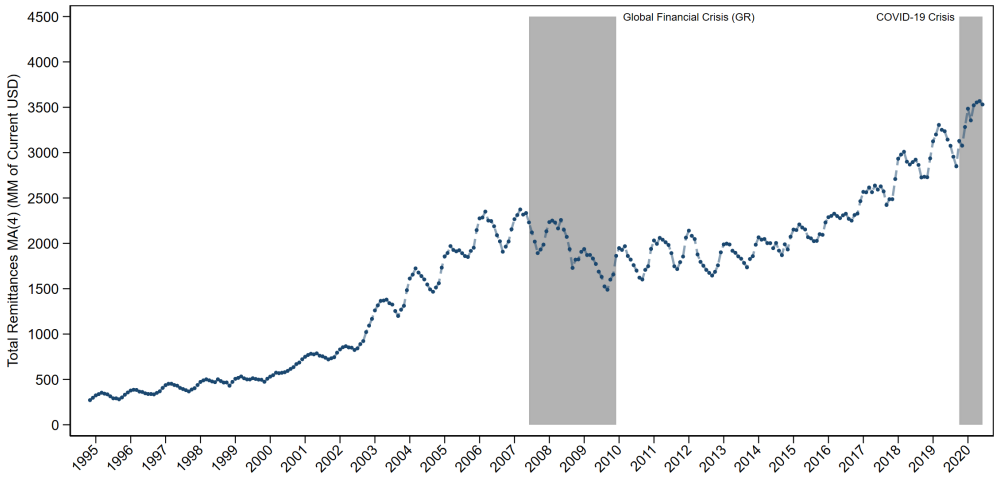
TABLE A3. Remittances in times of COVID
Using distance to min distance to border or airport
Dependent variable: Biannual remittances (log)

	(1)	(2)	(3)	(4)
C-19 × Distance (in hours)	-0.006			
	(0.007)			
C-19 × Distance (in log(hours))		-0.018		
		(0.013)		
C-19 × Distance (in Km)			-9.14e-05	
			(0.0001)	
C-19 × Distance (in log(km))				-0.016
				(0.010)
Exposure index	-0.407**	-0.391*	-0.411**	-0.390*
	(0.200)	(0.200)	(0.200)	(0.200)
C-19 × Exposure index	-0.208	-0.189	-0.210	-0.175
	(0.279)	(0.284)	(0.279)	(0.285)
C-19 × Local economic activity	0.156	0.170	0.148	0.159
	(0.232)	(0.227)	(0.230)	(0.224)
Constant	3.265***	3.262***	3.265***	3.266***
	(0.022)	(0.022)	(0.022)	(0.022)
Observations	24,213	24,213	24,213	24,213

Table shows the associations between remittances and three factors that can explain changes during the pandemic. Exposure index was estimated using unemployment of Mexicans adjusted by the share of Mexicans living in each state in the US. Estimation sample include all municipalities and all semesters. Models include municipality and time-quarter fixed-effects and municipalities trends. Standard errors are clustered at the municipal level. *** p<0.01, ** p<0.05, * p<0.1, + p=0.101

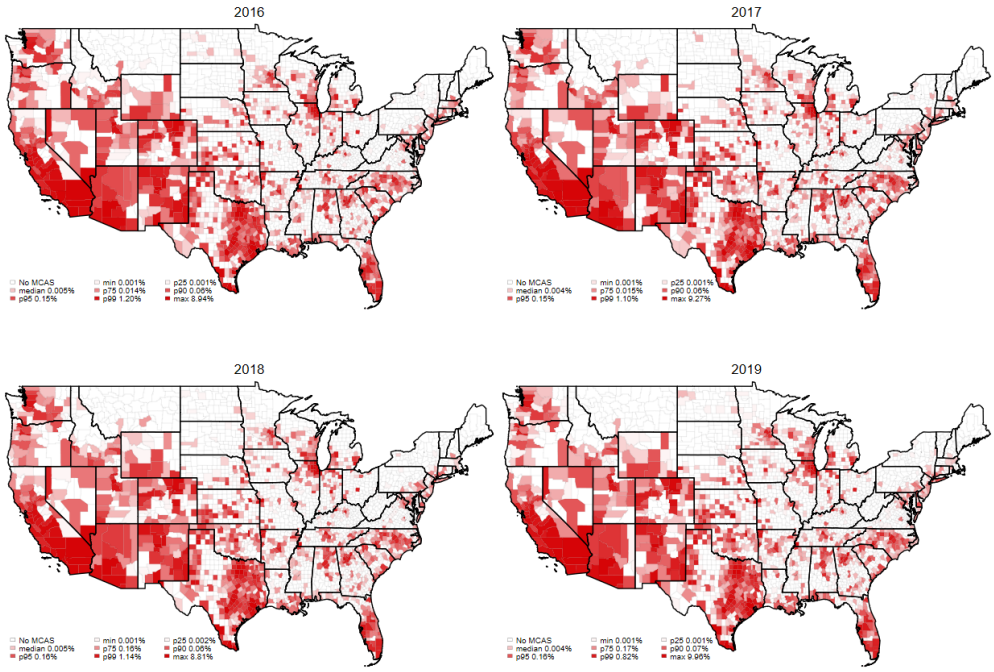
Figures

Figure A1: Trend of Total Remittances to Mexico



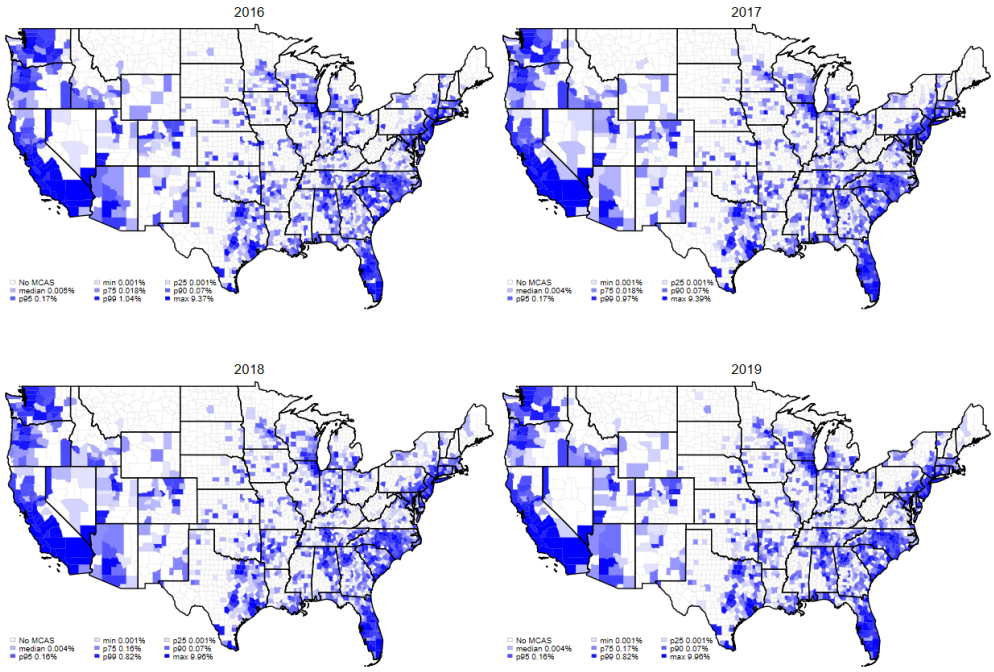
This figure shows the total unadjusted monthly remittances from the United States to Mexico in current dollars.

Figure A2: Migration Patterns of Mexican Citizens to the United States by Region of Origin (North) and Year



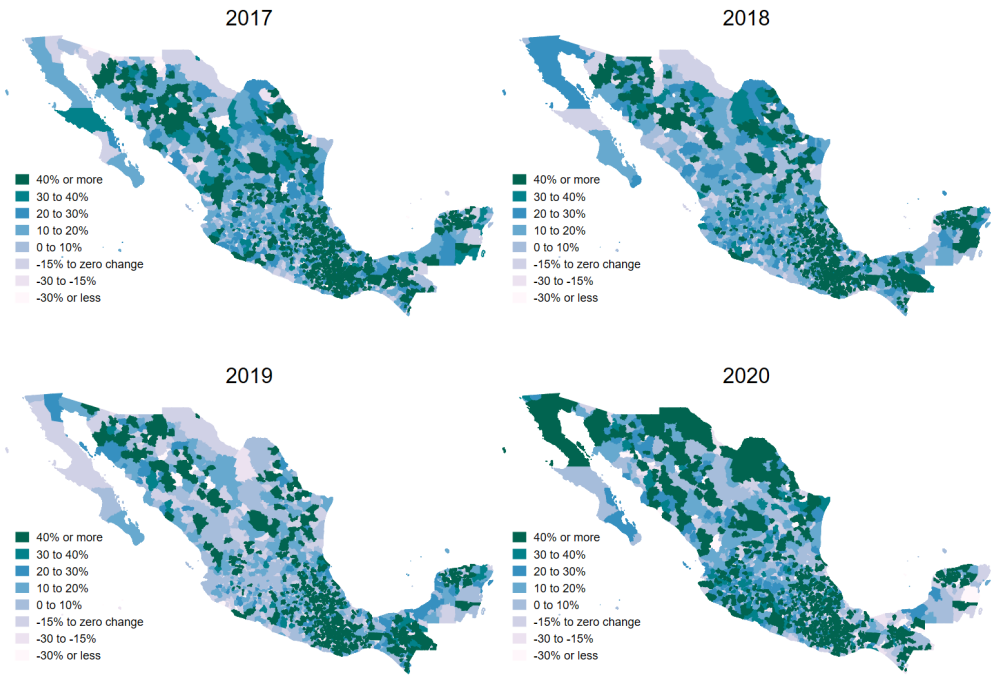
This figure shows the change of migration of Mexican citizens to the United States by region of origin (north) in Mexico. The northern states in Mexico are Baja California, Chihuahua, Coahuila, Sonora, Nuevo Leon, and Tamaulipas. The data corresponds to the stock of migrants with a valid matricula consular identification card by year.

Figure A3: Migration Patterns of Mexican Citizens to the United States by Region of Origin (South) and Year



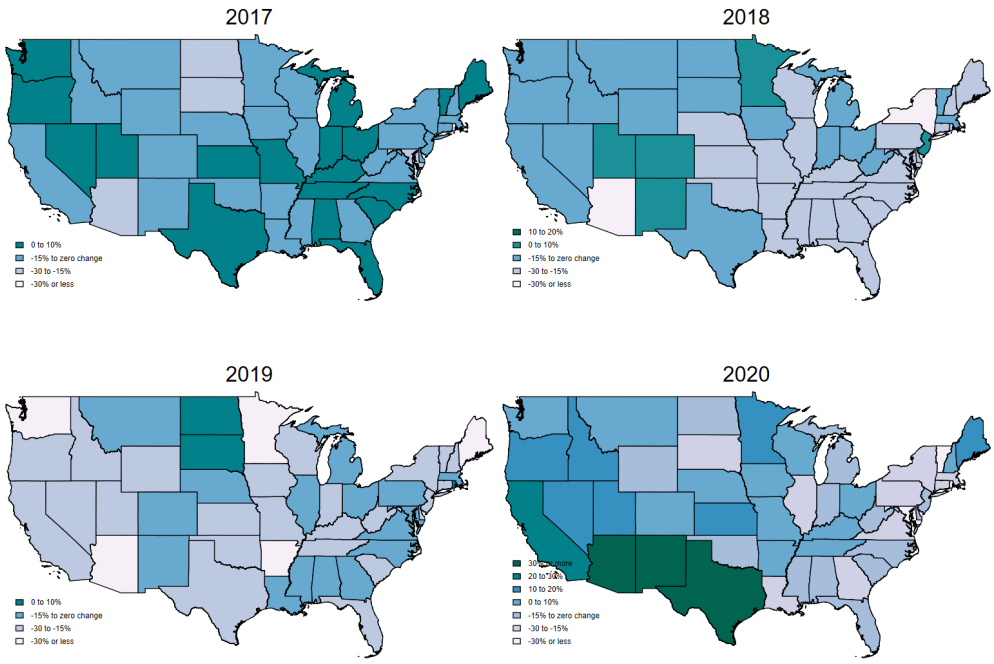
This figure shows the change of migration of Mexican citizens to the United States by region of origin (south) in Mexico. The southern states in Mexico are Quintana Roo, Yucatan, Chiapas , Oaxaca, Tabasco, and Campeche. The data corresponds to the stock of migrants with a valid matricula consular identification card by year.

Figure A4: Annual Changes in Municipality Level Remittances Received by Year



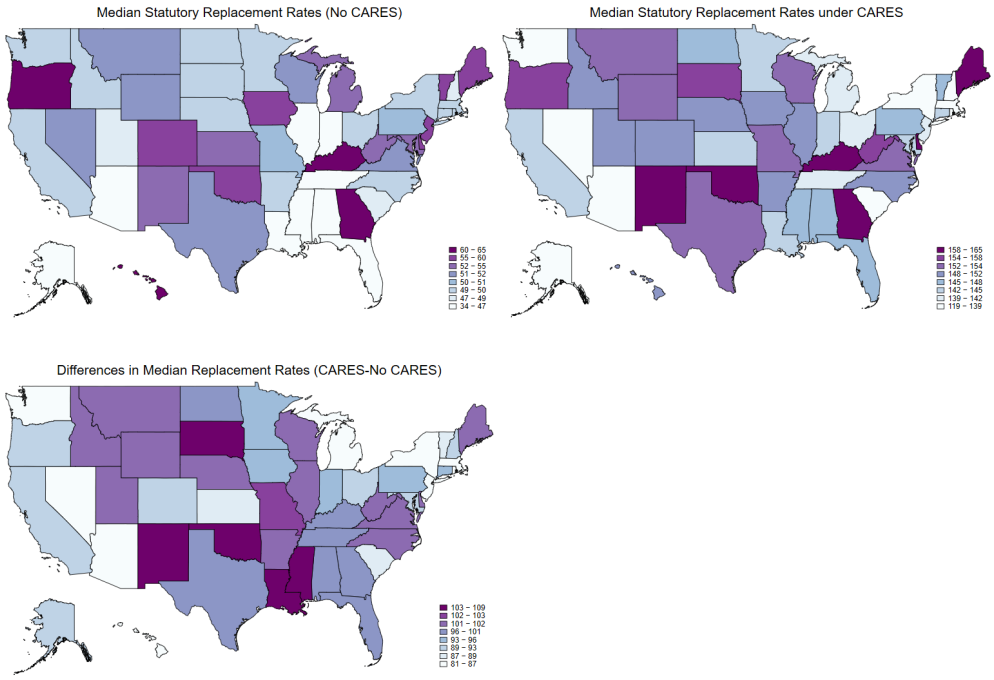
This figure shows the annual percentage change in remittances received for each municipality in Mexico, by year. For example, for 2020 we compare the total remittances received in each municipality during the first semester of 2019 and during the first semester of 2020.

Figure A5: Annual Changes in State Level Remittances Sent by Year



This figure shows the annual percentage change in remittances sent by each state in the United State, by year. For example, for 2020 we compare the total remittances sent by each state during the first semester of 2019 and during the first semester of 2020.

Figure A6: Median Statutory Unemployment Replacement Rates by State with and without CARES Act



This figure maps the median statutory replacement rate for April through July 2020 with and without Federal Pandemic Unemployment Compensation (FPUC) supplement implemented by the CARES Act. The data come from Ganong et al. (2020).