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RESEARCH ARTICLE

Remittances and Federal Government Spending: Evidence from Mexico

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ABSTRACT

We develop an empirical analysis of the effect of remittances on the size and composition of government spending. Using data from 28 years in Mexico, we show that remittances increase the provision of public goods and social security transfers. We also find evidence that the proportion of social spending in relation to programmable spending falls as remittances increase in Mexico. This evidence shows that remittances not only affect the size but also the composition of government spending changing who benefits the most from public spending in Mexico.

KEYWORDS

Remittances, government spending, social security transfers, public goods, taxation

ARTICLE INFORMATION

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I Introduction

Remittances to developing economies surged to $669 billion in 2023, with India, Mexico, China, the Philippines, and Egypt emerging as the top recipients. These monetary transfers, which constitute a significant portion of household income in many developing countries (30% to 40%), are typically allocated towards consumption expenditures (Adams, 2011). If remittances promote consumption, then these transfers might have spillover effects on government spending by affecting the government´s revenue from commodity taxation.

Although there has been some research studying the effect of private transfers, such as remittances, on the behavior of governments (see Kochi and Ponce 2010, Ponce and Ponce 2023, and others), to the best of our knowledge, the issue of spillover effects of remittances on the size and composition of government spending has not been studied adequately. In this paper, we are interested in studying whether remittances have spillover effects on the provision of public goods, social programs, and the composition of government spending. Such analysis would shed light on whether remittances have effects on the distribution of benefits in society from government spending.

Remittances might increase the demand for private and public goods, and the government might increase its supply of public goods to satisfy that demand. Hence, increases in remittances might lead to more public goods, but other types of government spending might react differently to remittances. In particular, the response of social security transfers to remittances might be positive or negative (see Ponce and Ponce 2023), since these private transfers increase the income of households receiving these cash transfers, which in turn might reduce the social marginal utility of a social program in which the government provides cash transfers that seek to reduce poverty or the inequality in the distribution of income. In this case, remittances cause a positive income effect in households and reduce the marginal utility for the society of a cash transfer program from the government (see Ponce and Ponce 2023).

In addition, remittances cause a price effect that increases the net return of social spending because the cash transfers from social programs have a lower net cost of production vis-à-vis that of public goods (this is the case because public transfers lead to more consumption and marginal increases in government tax revenue, reducing thus, the net cost of social security transfers). Hence, this price effect might create incentives for the government to increase its public cash transfers when households receive more remittances. The final effect of remittances on transfers from social programs depends on whether the income effect dominates (or it is dominated by) the price effect, and according to Ponce and Ponce (2023), this balance depends on the parametric values of the commodity tax rate, the subjective intertemporal rate of discount between present versus future consumption, and the interest rate.

In this paper, we test whether remittances affect the size and composition of government spending using data from Mexico on public goods, subsidies and transfers, and other different forms of government spending from the last 28 years. We find that remittances positively affect government spending on public goods and social spending. This latter outcome is somewhat surprising because we could have expected that remittances increase income from households and reduce the marginal utility of social spending (see Kochi and Ponce 2010). Hence a positive effect of remittances on subsidies and transfers might be explained through a price effect in which remittances change the net cost of providing public transfers vis-a-vis public goods.

Finally, we find evidence that remittances not only affect the size but also the composition of government spending because increases in remittances reduce the proportion of social spending in relation to programmable spending (which is spending devoted to goods and services) in Mexico. This evidence suggests that the marginal effect of remittances in different types of public spending from the government is heterogeneous, and remittances affect how different groups in society gain from government spending.

The rest of the paper is structured as follows: Section II provides a brief literature review of the economic effects of remittances. Section III shows the empirical analysis using data from Mexico. Section IV concludes.

II Literature Review

According to the Central Bank of Mexico, by the end of 2023, remittance inflows have reached an unprecedented amount of 5418 million dollars in Mexico. Worldwide, the World Bank estimates that remittances to developing countries reached $669 billion in 2023, and as a result, economists are becoming increasingly interested in studying the direct and indirect economic effects of remittances in developing economies.

Researchers have been interested in studying the effect of remittances on households' economic choices such as the demand for health services and education. Some studies find that remittances raise households' incomes and increase knowledge of mothers improve infant mortality and child health (see Duryea et al. 2005, and Hildebrandt and McKenzie 2005), and Alcaraz et al (2012) find that a negative shock on remittances is related with an increase in child labor and a significant reduction of school attendance.

Economists have also studied the economic effect of remittances on growth, development, poverty, and inequality in the distribution of income. Adams and Page (2005) and Acosta et al (2008) find that remittances have reduced (modestly) poverty in developing economies, while the evidence of the effect of these cash transfers on the inequality in the distribution of income is less clear. Stark *et al.* (1986, 1988) show evidence from different districts in Mexico in which inequality falls or increases depending on whether the predominant beneficiaries of remittances are high or low-income households. According to Adams (2011), these cash transfers are mostly spent on consumption goods with little growth effects of remittances on local economies.

In this paper, we are interested in studying the effect of remittances on government spending. With respect to the theoretical analysis, Ponce and Ponce (2023) develop a dynamic model in which public goods depend positively on income effects from remittances, but the response of social security transfers to increases in remittances might be positive or negative depending on whether the income effect of remittances dominates (or not) its price effects. Kochi and Ponce (2010) study the response of public redistribution in universal and focalized transfer programs to changes in remittances that affect the distribution of income. The size of public cash transfers can fall or increase depending on whether the government responds to electoral incentives or economic returns in designing policy, and whether remittances increase or reduce the inequality in the distribution of income.

Easton and Montinola (2017) find that the effect of remittances on government spending in the country receiving these transfers is contingent on its political regime. Remittances reduce public spending on education and health in autocratic regimes, but in democracies spending on education and health increases. Doyle (2015) finds that remittances reduce the perceived risk of vulnerability of income of the receiving households and reduce the social welfare transfers in eighteen countries in Latin America. Mina (2019) finds similar negative effects of remittances on social programs in high and middle-income countries and concludes that remittances substitute public cash transfers from the government.

However, to the best of our knowledge, the empirical analysis of spillover effects of remittances in several types of government spending, such as public goods and redistribution, has not been adequately studied in the literature. This analysis would clarify whether remittances influence how government spending benefits are distributed within society. To fill this gap, we develop an empirical analysis with data from Mexico for the last 28 years, showing remittances have a significant effect on spending on public goods and services, and the composition of the spending of the federal government in Mexico.

III Empirical Analysis

In this section we use an econometric model to test whether remittances (private transfers among individuals) have spillover effects on the size and composition of government spending. In particular, we are interested in testing the marginal effect of remittances on total spending, programmable spending, current spending, investment spending (physical infrastructure), and subsidies and transfers. Ponce and Ponce (2003) propose a dynamic model of two periods in which the government provides public goods and social security transfers. In their analysis, remittances increase the household's income and demand for private and public goods, while the government observes an expansion of commodity tax revenue which leads to an increase in the supply of public goods.

While remittances might lead to more public goods, the effect on social security transfers is less certain, and Ponce and Ponce (2023) identify an income and price effect of remittances on social security transfers. The income effect is related to the fact that remittances increase household income, potentially reducing the perceived need for government-provided cash transfers. This could lead to a decrease in social security spending. The price effect, however, emphasizes that remittances can also lower the net cost of social security transfers because public transfers lead to more consumption and marginal increases in government tax revenue, reducing thus, the net cost of social security transfers. Hence, the government may be incentivized by this price effect to increase these transfers. The ultimate impact of remittances on social security spending depends on the balance between these two effects. Factors such as tax rates, time preferences, and interest rates influence this balance.

To test these hypotheses, we use data on government spending in Mexico by considering programmable spending, which is spending on public goods and services to the population, and it is divided by spending on capital investment and current spending. Current spending is defined as spending on personal services, expenses related to the management of the government, and subsidies and transfers. [1]

In our econometric model, the dependent variable is defined as government spending on public goods (programmable spending) and spending on social security transfers. In addition, we analyze the composition of public spending by considering the proportion of spending on subsidies and transfers over programmable spending which is an indicator of public spending devoted to improving social outcomes such as poverty and the inequality of income. Our variable of interest is remittances, and the control variables include an index of economic activity, the inflation rate, the interest rate, a dummy variable for an economic crisis, and political variables defining the timing of elections, the year of the beginning of the administration, as well as the identity of the party on power to reveal their preferences over public spending in Mexico. Our econometric model is:

$$\Delta G_t = \beta\, \Delta Rem_t + \psi\, \Delta \mathbf{X_t} + \Delta \varepsilon_t \qquad (1)$$

In equation (1), $\Delta G_t = G_t - G_{t-1}$ is the first difference of our dependent variable of public outlays in Mexico at period t, the interest variable is the first difference of remittances, $\Delta Rem_t = Rem_t - Rem_{t-1}$, $\Delta \mathbf{X_t}$ is a set of control variables, and $\beta, \boldsymbol{\psi}$ are parameters measuring the marginal effects of the interest and control variables on government spending.

Our theoretical model says that remittances might have a positive income effect on expenditures on public goods since this type of spending might be a normal good and depends on a positive proportionality parameter of remittances. If we consider public goods as the dependent variable, the expected sign for β_1 is positive. However, increases in remittances might lead to a negative income effect as well as a price effect on social security transfers and the theoretical response of such transfers to remittances can be positive or negative depending on which effect dominates. If the negative income effect dominates then increases in remittances reduce social security transfers but if the price effect dominates then the marginal effect is positive. Hence, if we consider social security transfers as the dependent variable, the expected sign for β_1 can be negative or positive.

Following the literature (see Holsey, and Borcherding 1997, Mueller 2003 and Facchini 2018), we consider the indicator of global activity as an index for aggregate production, and we expect a positive sign if government spending is a normal good and a negative sign if public spending is an inferior good. We also include the inflation rate with a marginal expected effect on spending being positive or negative. Note that increases in the price level can increase the effective tax rates of households in the personal income tax by increasing nominally their incomes and the tax brackets they are in. In this case, the expected sign for the inflation rate is positive since increases in inflation lead to higher effective rates for some households, tax revenue and public

[1] Non-programmable spending in Mexico refers to expenses used to finance the payment of the government's obligations such as debts and other payments.

spending. However, an increase in prices can lead to lower private consumption, tax revenue and spending from the government. In this case the expected sign for inflation would be negative.

The interest rate has an expected negative sign on government spending since higher interest rates reduce the present discounted value of the household's income, consumption and tax revenue collection that might constrain government spending (see Ponce and Ponce 2023). Previous literature shows that political institutions of elections and the structure of the electoral system (see Hankla et al 2019) have a significant impact on government spending. In our analysis, we consider a dummy variable for the election year and a dummy for the first year of a new administration (since budgets need congressional approval in the previous year, new parties in power are likely to change policy positions in the first year of the administration). The literature has recognized that in election years, governments might increase government spending to increase their chances of electoral support (see Dubois 2016).

The literature has recognized that parties might have preferences over fiscal outcomes, which is to say, parties might represent groups of individuals with different socio-demographic characteristics and income and therefore parties select policies to benefit some influential activist-groups inside parties (see Wittman 1983). Parties who represent the interests of low-income households would spend more on redistribution (transfers and subsidies), and parties who represent high-income households might spend more on capital investment since it is likely that high-income households would benefit more from infrastructure such as highways, airports, and other public goods such as public safety, etc.

A close examination of our data on spending shows that there is a strong seasonal component of government outlays in Mexico. Public expenses increase steadily on a monthly basis and achieve their maximum level in December of each year to fall significantly in January of the next year. Every single year in our sample shows this seasonal behavior. To control this seasonal pattern, we develop an index variable that takes a value of one in January, two in February, and so on until December, which takes the value of 12 every year. With this variable, we control for the seasonal pater of government spending in Mexico.

In summary, in our basic econometric model, our dependent variable is defined by five different types of government spending: total government spending, programmable spending (spending on public goods and social transfers), current spending (spending on personal services, expenses related to the management of the government and subsidies and transfers), spending on capital (public goods), and spending on subsidies and transfers. In addition, we consider the composition of public outlays by computing the ratio between spending on subsidies and transfers over the total amount of programmable spending. And as we mentioned before, the variable of interest is remittances and for the control variables we consider an index of economic activity (which is a proxy of income), the inflation rate, the interest rate, and variables related to election years and the identity of the party in power as a proxy of preferences of politicians over public spending.

Data

For our analysis we use time series data for all the variables considered in our econometric model. Due to availability of data, our sample corresponds to monthly data for 28 years, which is between January of 1995 and October of 2023. Our sample is constituted by 343 observations. All the variables are real (we use the index of national prices for the consumer to remove the effect of inflation on nominal variables of public spending and remittances), our variables are defined as first difference of government spending at period t, $\Delta G_t = G_t - G_{t-1}$, the interest variable is the first difference in remittances, $\Delta Rem_t = Rem_t - Rem_{t-1}$, and $\Delta \mathbf{X_t}$ is a set of control variables, and $\beta, \boldsymbol{\psi}$ are parameters measuring the marginal effects of the interest and control variables on government spending.

The central bank of Mexico is the source of our data on government spending, remittances, economic activity, inflation, and interest rate. Data on remittances include money orders, personal checks, electronic transfers, cash, and in-kind transfers received by households in Mexico. The index for global economic activity (also known as IGAE) is a proxy index of gross domestic product and it is published monthly. In our analysis we use the index for global economic activity as a proxy for income in Mexico. The source of the data on election years and the party on government is the National Electoral Institute (also known as INE or "Instituto Nacional Electoral").

Elections take place every 6 years in Mexico in the years 2000, 2006, 2012 and 2018. Data also shows that the party called "Partido Revolucionario Institucional (PRI)" ruled the central government between December of 1995 and November of 2000 and again between December of 2012 and November of 2018. The party known as "Partido Accion Nacional (PAN)" ruled the central government between December of 2000 until November of 2012. Finally, the party "Movimiento de Regeneración Nacional" (kwnown as MORENA) has been ruling since December of 2018 to the end of our sample.

Econometric Results

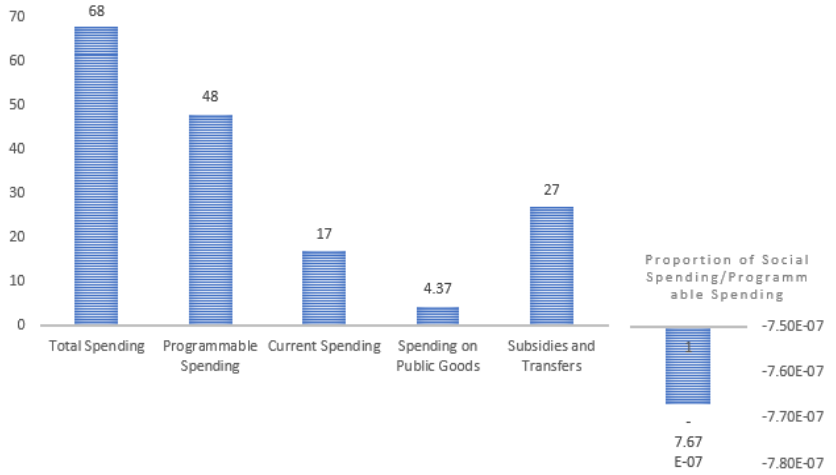
Table 1 shows the results of our regression analysis considering total government spending (model I), programmable spending (model II), current spending (model III), capital spending or spending on public goods (model IV), social security spending (model V), and the composition of social spending over programmable spending (model VI). We use ordinary least squares (OLS) in our first difference model and to avoid endogeneity in our estimates, we lag the index of economic activity. Models IV and VI show autocorrelation of the error term which implies that the estimates of the standard errors and test statistics are not valid even asymptotically. To solve this issue on model VI, we simply add the lagged variable of governments spending on capital to the model. ΔG_{t-1} to correct for autocorrelation.

In the case where the dependent variable is the composition of social spending over programmable spending (that is, model IV), the best way to deal with autocorrelation of the error terms was to consider that autocorrelation follows an autoregressive process of the error terms, implying $\Delta\varepsilon_t = \alpha + \rho\Delta\varepsilon_{t-1} + \mu_t$ where μ_t is not correlated over time. Hence, we use OLS regression of our dependent variable, ΔG_t, on its lagged value ΔG_{t-1} to estimate ρ and use the residuals as our new dependent variable of the first difference of government spending on capital. Then we run the OLS regression of equation (1).

With the estimate of $\hat{\rho}$ we transform the data by calculating the second order difference (that is, the difference of the first difference) of both the dependent and independent variables that is we calculate $\Delta_2 G_t^* = \Delta G_t - \hat{\rho}\Delta G_{t-1}$ and $\forall\, \Delta x_t \in \Delta\mathbf{X_t}: \Delta_2 x_t^* = \Delta x - \hat{\rho}\Delta x_{t-1}$. This allows us to estimate a second order-difference model, considering that it is well-established that the marginal effects of running the second order difference model, and the first-difference model are equivalent (see Enders, 2015). After confirming the stationarity of the transformed data $\Delta_2 G_t^*$ and $\Delta_2 x_t^*$ using augmented Dickey-Fuller tests, we estimate the second order -difference model using Ordinary Least Squares (OLS).

The estimation results show that changes in remittances are statistically significant at a significance level of 1% and positively correlated with changes in total government spending, programmable spending, current spending, expenditures on capital (public goods), and subsidies and transfers. This evidence could be explained as a positive income effect, that is, remittances induce higher consumption of households of private and public goods, higher commodity tax revenue, and government spending. However, the positive and significant sign of remittances on social security transfers could not be explained through an income effect but a price effect. In fact, increases in remittances increase the household's income and reduce the social marginal return of social security transfers leading to a negative income effect of remittances on social spending.

Graph 1. Effect of Remittances on Different Types of Government Spending in Mexico



In addition to the income effect, social security transfers lead to a price effect that could operate as follows: an increase in transfers from the government lead to more tax revenue which is explained by the fact that the government's cash transfers promote consumption and the government's revenue from commodity taxation. The effect of social security transfers in tax revenue changes the relative price of providing public goods vis-à-vis social security transfers because the net cost of providing social security transfers is lower than that of public goods. Hence, this price effect means that an increase in remittances leads to an increase in the size of social security transfers.

Our empirical analysis also shows that remittances are negatively correlated with the proportion of social government spending in relation to programmable spending. This effect is significant and shows that remittances might affect not only the size but the composition of public spending in Mexico (see model VI in table 1). Our econometric model also confirms that the index

on economic activity, our proxy of aggregate income in the economy, has a positive and significant effect on total, programmable, current, capital, and social spending. However, it has a negative marginal effect on the composition of social spending over programmable spending, suggesting that as the economy grows, the composition of government spending changes.

Table 1. Marginal Effects of Remittances on Government Spending in Mexico

	Model I $\Delta Total\ Spending_t$	Model II $\Delta Program\ Spending_t$	Model III $\Delta Current\ Spending_t$	Model IV $\Delta Capital\ Spending_t$	Model V $\Delta Subsidies\ and\ Transfers_t$	Model VI ΔSGP= *(Social / Programable Spending)*
$\Delta IGAE_{t-1}$	30447**	20371**	6771*	4060***	11403**	-0.0017***
	(2.1)	(1.98)	(1.73)	(4.12)	(2.06)	(-2.87)
ΔP_t	-852204***	-601198***	-232229***	-68352***	-301850***	-0.0014
	(-6.91)	(-6.89)	(-6.98)	(-8.13)	(-6.40)	(-0.28)
Δr_t	2163	376	-264	260	-477	0.00025
	(0.14)	(0.03)	(-0.06)	(0.26)	(-0.08)	(0.42)
ΔRem_t	68***	48***	17***	4.37***	27***	-7.67E-07**
	(8.01)	(8.02)	(7.51)	(7.56)	(8.18)	(-2.20)
$CRISIS$	-35350	-26203	-13421	-2524	-10089	-0.0003
	(-0.28)	(-0.3)	(-0.41)	(-0.30)	(-0.21)	(0.95)
ELE	-19964	-16629	-13421	-4669	-5850	0.0011
	(-0.17)	(-0.21)	(-0.41)	(-0.60)	(-0.14)	(0.23)
$1st\ Year$	-94374	-67861	-31466	-5226	-31473	0.0008
	(-0.93)	(-0.94)	(-1.15)	(-0.75)	(-0.81)	(0.84)
PRI	-353562***	-255426***	-98917***	-30861***	-129606***	0.001
	(-4.04)	(-4.13)	(-4.20)	(-5.18)	(-3.87)	(0.28)
PAN	-475446***	-337210***	-132406***	-40033***	-168661***	0.003
	(-5.59)	(-5.61)	(-5.78)	(-6.91)	(-5.19)	(0.97)
$SEASON$	106162***	75574***	29585***	8726***	37820***	-0.0003
	(10.26)	(10.31)	(10.6)	(12.37)	(9.55)	(-0.79)
ΔSGP_{t-1}						-0.1916***
						(-3.58)
R^2_{Adjust}	0.3740	0.3748	0.37	0.44	0.36	0.05
F	21.34***	21.41***	21.02***	27.85***	19.85***	2.44***
DW	2.17	2.14	2.12	1.95	2.10	2.05
N	343	343	343	343	343	343

t statistics in parenthesis and the significance level for p<0.01***, for p<0.05** and for p<0.1*

In addition, changes in prices, which is ΔP_t, are statistically significant and have a negative marginal effect on models I through V but not on model VI. That is, changes in prices have a significant effect on the size but not on the composition of government spending. This might show evidence that increases in inflation lead to lower real consumption, lower real tax revenue and real spending. The interest rate has a negative sign in models III and V as expected but it is not significant in any of the models estimated.

Our analysis shows evidence of partisan preferences over government spending. In other words, different parties in power lead to different choices of government spending as parties might seek to design public outlays to benefit minoritarian coalitions of voters in the electorate. Since these coalitions of voters are different for each party, then changes in the party ruling the government translate into changes in policy choices in government spending. Our regression analysis shows that changes in parties ruling the government have a negative and significant effect on the size but not on the composition of government spending.

That is, administrations of the government ruled by parties PRI and PAN lead to lower spending on public goods and subsidies and transfers relative to administrations of MORENA (the party identified as the left inclined party) but the preferences of parties are not statistically different for the case of the composition of government spending taken by the party MORENA. Our estimates also suggest that the party more closely identified as the "right" party, which is PAN, is the one with the largest negative marginal effect on total, programmable, current, capital, and social security spending during the administrations between 2000 and 2012.

The dummy variables trying to capture the effect of economic crisis in the period of 1995, 2000 and 2001, 2008 and 2009, and 2020 as well as the dummy variables for election years and the first year of each administration are negative but not significant in any of the models. The variable SEASON that seeks to capture the seasonal effect of government spending is positive and significant in all models except for the model of the composition of government spending model VI.

V Conclusion

Mexico is one of the top five countries receiving remittances in the world. According to the central bank of Mexico, in 2023, these cash inflows reached an unprecedented amount of 5418 million dollars. The literature has recognized that remittances have significant effects on economic development, poverty, and inequality in the distribution of income. More recently, scholars are paying attention to the possibility of spillover effects of remittances, and in this paper, we are interested in studying the effect of remittances on the size and composition of government spending in Mexico. This issue has not been studied adequately, and we seek to contribute to fill this gap by developing a theory and an empirical analysis of the effect of remittances on government spending using data from Mexico.

Remittances might affect differently the provision of public goods vis-a-vis social security transfers: remittances increase the demand of private and public goods, and the government responds accordingly because these inflows might also affect the government´s revenue from commodity taxation. In addition, remittances increase the household's income and reduce the social marginal utility of government's transfers, which is a negative income effect. Therefore, remittances might create incentives for the government to reduce the size of social security transfers.

Nonetheless, remittances also lead to a relative price effect on government spending that recognizes that the net cost of providing public transfers is lower than that of public goods (this is the case because the transfer program leads to more consumption and marginal increases in government tax revenue, reducing thus, its net cost). Through this price effect, remittances might increase social spending. Hence, the interaction of the negative income effect as well as the price effect imply that the response of social security transfers to remittances might be negative or positive depending on whether the income effect dominates (or is dominated by) the price effect.

We test these hypotheses from the theory for the case of Mexico using data on different definitions of government spending from the last 28 years. We find that remittances affect positively government spending on public goods as our theory predicts. In addition, our empirical analysis shows that remittances also increase social spending. This is a surprising outcome, suggesting that the price effect of remittances dominates its negative income effect. We also show that remittances not only affect the size but also the composition of government spending as we find evidence that increases in remittances reduce the proportion of social spending in relation to programmable spending in Mexico. This evidence shows that remittances have distributional effects by modifying who benefits the most from government spending in Mexico.

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