

## Economic Research note

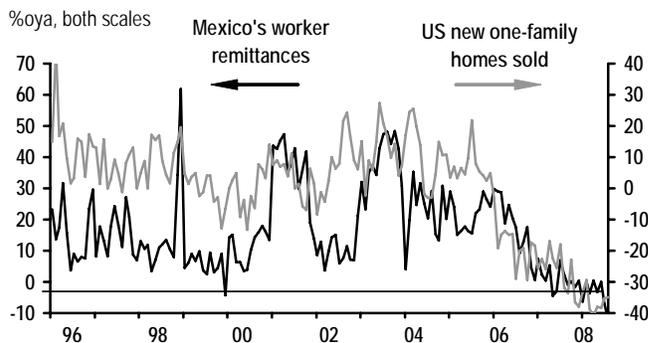
# Determinants of Mexico's remittances from the US

- Mexico's worker remittances plunged in August and the forecast anticipates an 11.5% oya fall in December
- This reveals Mexico's exposure to US housing, unemployment in construction, and the financial crisis
- The drop in US home sales and employment in US construction are the two most important determinants
- Tighter US migration policies and Mexico's higher productivity also induced workers to stay home
- Drop in consumption and increased unemployment among low income families to be the main side-effect

In August, Mexican workers' remittances from the US declined sharply, evidence of Mexico's exposure to the US housing sector and financial crisis. This is a potential source of balance of payments (BoP) vulnerability, as well as a mechanism that transmits the current US financial stress to Mexico. The meltdown of the US financial system could translate into an even sharper drop in remittances. August remittances fell 12.2% oya after averaging 3.4% oya in the previous three months. Moreover, on a sequential 3m/3m comparison, remittances fell 11.4% after dropping 9% in the three months ending in July. This contrasts with the rapid acceleration experienced in 2002-05 when remittances grew, on average, 26.2% 3m/3m. The tight correlation between US new single-family homes sold and workers' remittances is evidence of the link with the US housing crisis (chart). Illegal Mexican workers account for 13.8% of the total work force in the US construction sector (table).

While the US housing decline is behind a large portion of the remittance decline, other structural factors have also contributed. For example, there is the sharp drop in remittance costs since 2001 that may have distorted remittance trends. But migration trends have aggravated the decline. There has been a reduction in labor migration with tighter US-Mexico border control, and the wedge in workers' compensation between the US and Mexico has narrowed. The outlook anticipates remittances hitting bottom in October 2008, when the forecast anticipates a 31.3% 3m/3m (19.9% oya) fall. Then, they should recover and fall only 18.5% in December (or 11.5% oya). This should not translate into a major BoP shock, as the drop in remittance inflow is small relative to total BoP flows; the drop in remit-

Mexico's worker remittances and US new one-family homes sold



Mexican immigrants' share in US labor force by sector  
 % of total labor force

	Jul-Aug 2008
Agriculture	15.8
Industrial production	9.6
Construction	13.8
Manufacturing	7.3
Services	3.7
<i>Memo items: share of:</i>	
Total labor force	5.1
Total unemployment	5.5

Source: Banxico using US Current Population Survey.

tances has not had visible effects on the currency. More relevant has been the effect on private consumption. Although the effect on aggregate consumption would be small (a 10% drop in remittances cuts private sector consumption growth by only 0.3% point), this effect is larger for the low-income and low-skilled workers that typically make up most of the migrant population.

## Remittances: a fluke in the data?

A close inspection of the remittance time series indicates that some of the deceleration starting in late 2007 may have resulted from base effects. This is apparent when growth rates of workers' remittances, number of transactions, and the amount transferred per transaction are compared (first two charts, next page). Workers' remittance growth has been explained by growth in the number of transactions. By contrast, the amount of money per transaction has been surprisingly stable and only accelerated in 2000, a time when the number of transactions decelerated.

Most of the difference between growth rates in transactions and money sent per transaction is explained by cost. In 1996, only 53% of total workers' transfers were performed through electronic transfers (table, next page). At that time, it cost workers about \$30 per \$300 transaction and illegal workers could not open bank accounts. Beginning in 2001, banks allowed workers to open accounts and to use ATM networks to transfer money. By 2007, electronic transac-

tions surged to 95% of the total and the cost was cut to \$10 per \$300 transaction.<sup>1</sup> This explained the surge in the number of transfers and also in remittances. It is unclear, however, how many of these new transactions were performed by the same workers and how many by new ones.

More difficult to determine is the extent to which the reduced cost of transfers led to a substitution of nonfinancial for financial transfers. Workers may have opted for electronic transfers instead of other ways of sending money to their relatives. The high cost of transfers before 2001 encouraged workers to make transfers in kind (durable goods imported into Mexico) or using cash hand-delivered by relatives or friends, transactions that went unregistered. The post-2001 remittance surge may have been the result of a switch to using the financial system, and may not have reflected an increase in the amount transferred.

In fact, the increase in the 12-month sum of remittances since 1995 is striking. This increased from \$3.7 billion in the year ended December 1995 and peaked at \$24bn in July 2007, after the full substitution effect took place. It is difficult to explain the total increase in remittances by the substitution effect. But the substitution was correlated with the increase in the number of transactions. These increased from a total of 11 million in the year ended December 1995 to 68.5mn in July 2007. During that period, as will be shown below, Mexico's illegal population in the US increased from 5 to 7mn, which can hardly account for the boom in remittances. The average dollar amount per transfer only increased from \$304 in December 2005 to \$348 in July 2007. This casts doubt on the rapid growth in remittances. By contrast, the recent drop may have been more real and less influenced by exogenous factors. But in dollar terms the drop seems small: from a peak of \$24bn in the year ended July 2007 to only \$23.6bn in August 2008. Moreover, the number of transactions fell from 68.8mn to 67.6mn and the amount per transaction from \$348 to \$347.

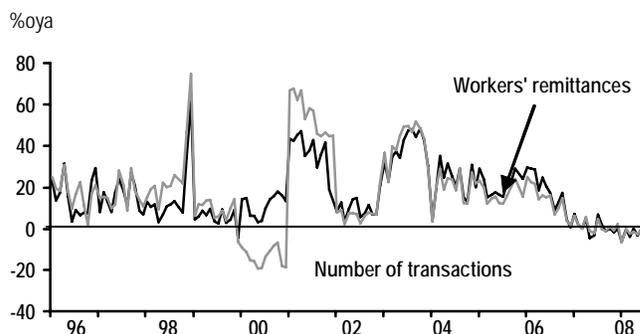
## Changes in migration incentives

Two structural factors contributed to the decline in workers' remittances.

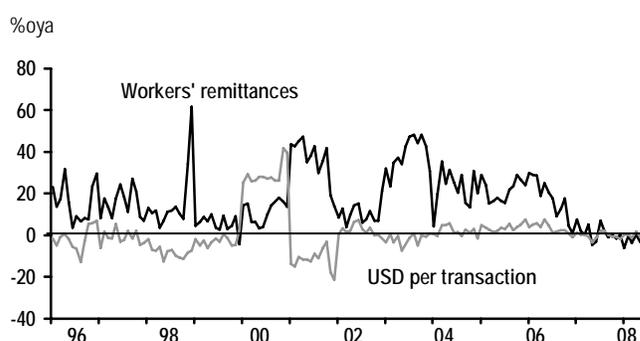
- **Tighter border security.** US authorities have clamped down on border security since end-2006, making migration more difficult. Studies conclude that workers' remittances are typically larger from workers who have recently migrated or who have lived in the US less than five years, compared to more established migrants.<sup>2</sup>

1. See Banxico, "Las remesas familiares en Mexico." Banxico, Feb 2, 2007. 2. See Banxico, *Op. Cit.*, February 2, 2007.

Workers' remittances and number of transactions



Workers' remittances and number of transactions



Workers' remittance indicators

%oya, unless indicated	1996	2004	2006	2007	2008
					Jan-Aug
Total remittances	15.0	22.6	17.1	1.0	-4.2
Remittance per transfer	-1.9	1.8	3.1	-0.3	-0.6
Number of transactions	17.3	20.3	13.6	1.3	-3.5
Money orders (% of total)	36.0	11.2	5.7	3.6	2.7
Electronic transfers (% of total)	52.6	87.4	92.8	94.8	95.5
US hourly wage per worker	3.3	2.6	1.5	2.7	2.7
MX hourly wage per worker	3.5	0.9	4.9	5.7	9.1
US-MX hourly wage differential <sup>1</sup>	9.5	6.4	5.8	5.7	5.5

1. Ratio of US and Mexico USD wage per hour in manufacturing.

Source: Banxico and INEGI.

The number of apprehensions at the US-Mexico border has increased, and estimates of Mexican-born migrants in the US have declined. Apprehensions peaked in 1999-01, then fell 2001-03, and increased again in 2003-05 (first chart, next page). Excluding 2001-03, when the US economy flirted with recession and joblessness increased, apprehensions did not reach the 1999-01 peak. This was particularly relevant for the period 2003-07 when incentives to migration were high as the US economy grew rapidly and the unemployment rate fell.

A similar conclusion emerges from estimates of the unauthorized immigrant population from Mexico, which has shown a steady increase since 2000. There were 4.8

million Mexican illegal immigrants in 2000 and 7.1mn in 2007. However, in 2008, the number fell to 7mn. Estimates of illegal workers may be subject to calculation errors. However, the fact that estimates of apprehensions and immigration offer the same conclusion may indicate that immigration leveled off starting in late 2007.

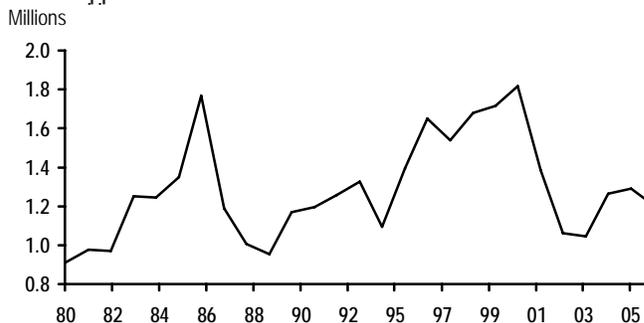
One possible explanation may be the difficulty of finding jobs in the US, particularly in the construction sector, where a large share of Mexico's workers are employed. In fact, estimates of employment in construction indicate a retracement. But they also indicate that most of the layoffs were of nonhispanics. Of 700,000 workers laid off, nonhispanics explained 460,000, hispanics 250,000, and Mexican-born workers 150,000. Proportionally, job reductions among nonhispanics were about 5% of the labor force, while Mexicans were about 9%. But it is an open question why employers did not fire most of the hispanic workers who were, after all, illegal.

US firms had an incentive to dismiss illegal workers, as is apparent in estimates of immigrant removals from the US, which increased in 2006 and 2007. After being about 240,000 per year in 2004 and 2005, removals jumped to 272,000 in 2006 and then to 300,000 in 2007. Tightened security may have induced employers to lay off immigrant workers instead of native workers as the construction recession progressed in 2007, even though native workers demanded higher compensation.

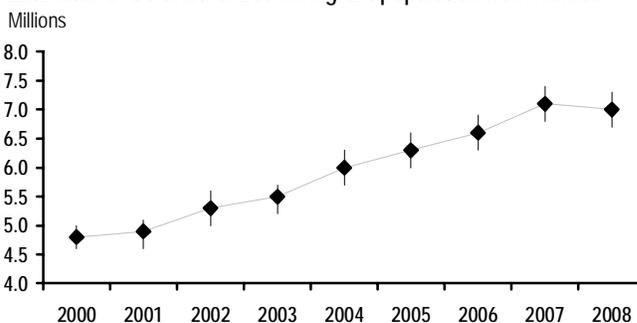
- Less attractive compensation.** The narrowing US-Mexico gap in labor compensation may have been another powerful incentive for workers to stay home. This was indicated by the ratio of US-Mexico hourly compensation and labor productivity in manufacturing.<sup>3</sup> The strong wave of Mexican migration to the US coincided with the period when workers' compensation and productivity in the US was much higher than in Mexico. One example of this is the ratio of the dollar hourly labor compensation paid in the US and Mexican manufacturing sectors. In early 1998 this ratio was 8.5 times, which means that the a manufacturing worker was paid 8.5 times more the US than a manufacturing worker in Mexico. This ratio fell to 6.0 in 2002, where it stabilized until 2006. But since then, it has continued to drop, reaching 5.5 in July 2008. US labor productivity is much higher than in Mexico, but the fact that the ratio of US-Mexico unit labor costs also fell indicates that the productivity differential did not fully account for the narrowing in labor compensation. In fact, US labor produc-

3. These data are only available for manufacturing and not for construction. However, they offer a good proxy as the correlation between labor data in these two sectors was very tight.

Annual apprehensions at US-Mexico border



Estimates of US unauthorized immigrant population from Mexico

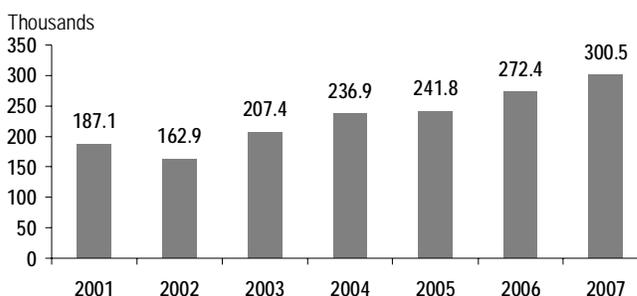


Employment in US construction industry

Millions, nsa	Annual change				
	1Q06	1Q07	1Q08	1Q07	1Q08
All workers	11.09	11.61	10.91	0.51	-0.70
Non-Hispanic	8.43	8.64	8.18	0.21	-0.46
Hispanics	2.67	2.97	2.72	0.30	-0.25
Native born	0.62	0.71	0.69	0.09	-0.03
Foreign born	2.06	2.26	2.04	0.20	-0.22
Mexican born	1.43	1.64	1.49	0.21	-0.15
Arrival: 2000 or later <sup>1</sup>	0.73	0.85	0.78	0.12	-0.07

Source: Pew Hispanic Center tabulation of Current Population Survey.

Migrant removals from the US



Note: A removal is "the compulsory and confirmed movement of an inadmissible or deportable alien out of the US based on an order of removal".

tivity growth outpaced that in Mexico and thus induced more migration until 2004. But since then, US productivity growth has slowed and Mexico's has accelerated, causing the ratio to move sideways. This was a clear incentive for Mexican workers to stay home.

Mexican workers migrated to the US while the compensation gap was attractive, particularly in the late 1990s and early 2000s when Mexico was coming out of the 1995 peso crisis. However, when the US-Mexico compensation differential narrowed, presumably as a result of stronger economic performance in Mexico, the incentives to migrate faded. This was particularly apparent in the ratio of US-Mexico productivity. The result may have been that job opportunities in Mexico improved, making migration less necessary.

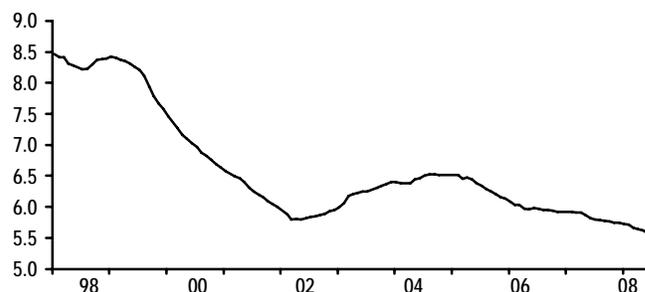
## Determinants of remittances

Quantifying the marginal contribution of all these factors influencing workers' remittances in a single framework is a challenge. We estimate a vector autoregressive econometric model using these determinants. The coefficients of the model capture the elasticity of the rate of growth of remittances to a 1% shock to each of the determinants (first chart, next page). An advantage of this framework is that it reflects the dynamic adjustment of workers' remittances to shocks in each of these variables (shown by impulse response; charts, next page). For simplification, the determinants were grouped in four subcategories: US housing, employment in construction, labor compensation and productivity, and transaction costs. The conclusions can be summarized as follows:

- **The fate of the US housing market has a modest impact on workers' remittances.** A 1% decline in the number of US houses sold translates into a 0.05% decline in remittances. However, since on an oya comparison US single-family home sales fell 14% oya in August 2008, this variable accounts for 0.7% point of the 12.2% oya total drop in remittances. Using the average sale prices of existing single-family homes sold and the S&P Case-Shiller price index, the former had better predictive power, but neither was statistically different from zero.
- **Employment in construction had a much more powerful effect.** A 1% drop in US employment in construction translated into a 2% drop in remittances. US employment fell 5.6% oya in August 2008, which means that this variable accounted for 11.2% points of the 12.2% oya drop in remittances. The strong role of US construction employment shouldn't come as a surprise. Since 2001, the US construction sector has absorbed most of

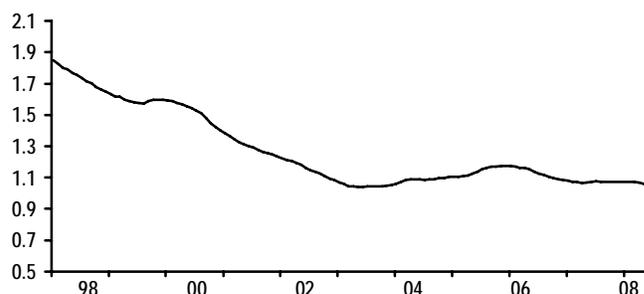
### US-Mexico wage per hour differential in manufacturing

Ratio of US and Mexico USD wage per hour, 12mma



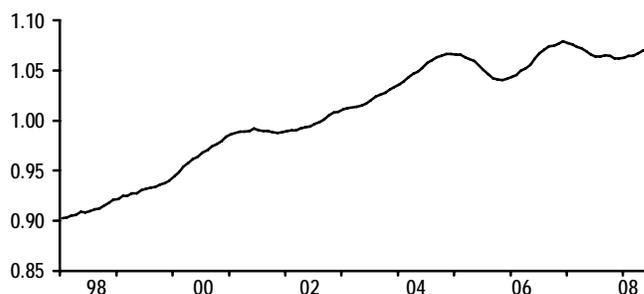
### US-Mexico productivity differential in manufacturing

Ratio of US and Mexico USD unit labor cost indices, 12mma



### US-MX productivity differential in manufacturing

Ratio of US and Mexico productivity indices, 12mma

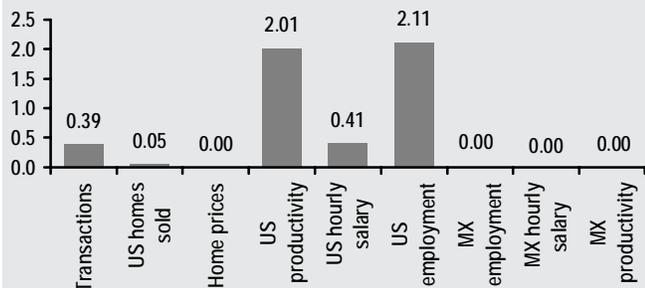


Mexico's migrant workers and is the second most important sector (after agriculture) for employing Mexican workers. To examine how many of these workers were pulled from the Mexican construction sector, employment in Mexico's construction was included. But the coefficient was not significantly different from zero. It indicated that Mexico's workers that end up in US construction did not necessarily come out of Mexico's construction sector; rather, they apparently switch from job to job within the US.

- **US and Mexican labor compensation and productivity rates also had a strong effect on remittances.** A 1% increase in US hourly wages resulted in a 0.4% increase in remittances; for labor productivity, the effect was larger than 2%. But these effects were offset by Mexico's

Remittances' sensitivity to US house and labor market variables

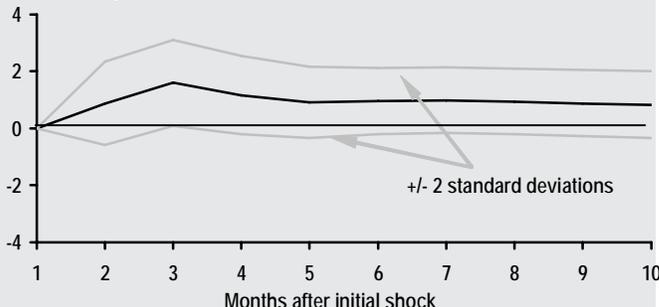
% point change



Note: These are the long-term coefficients of the regression and indicate the effect of a 1% change in each variable on the rate of growth of remittances. Coefficients shown with zero value were not statistically significant.

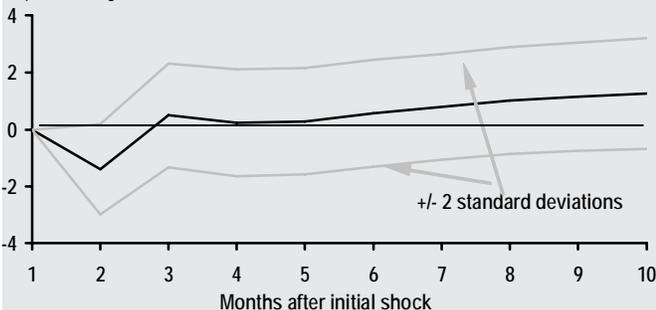
Impulse response from number of transactions shock

% point change



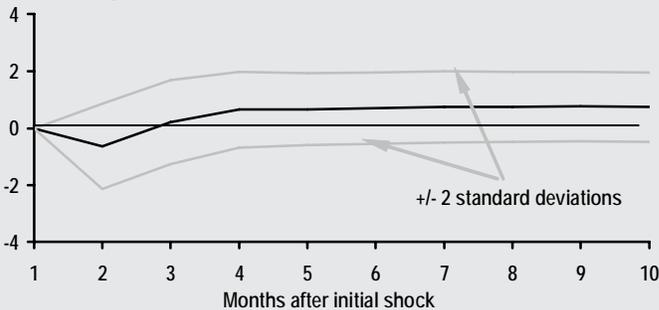
Impulse response from existing single family-homes sold shock

% point change



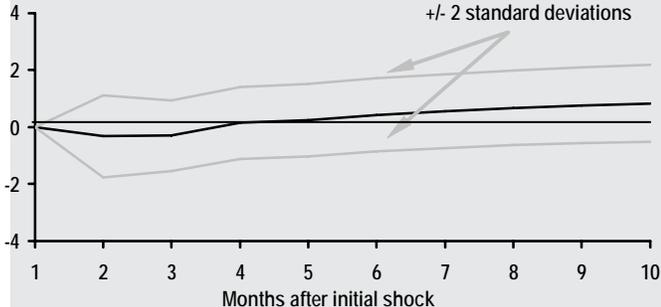
Impulse response from US salary per hour shock

% point change



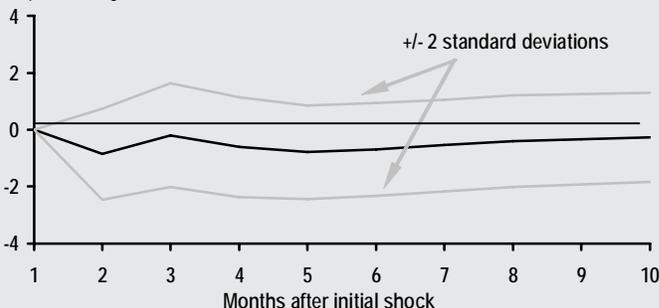
Impulse response from US productivity shock

% point change



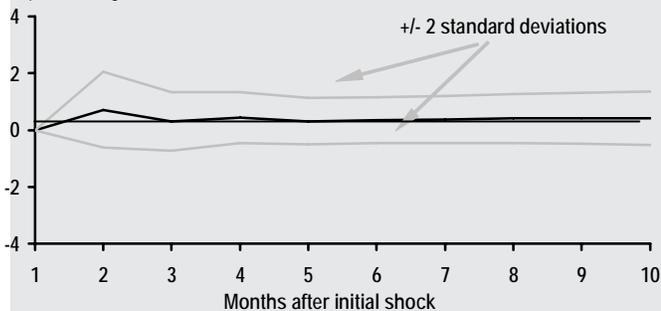
Impulse response from Mexico productivity shock

% point change



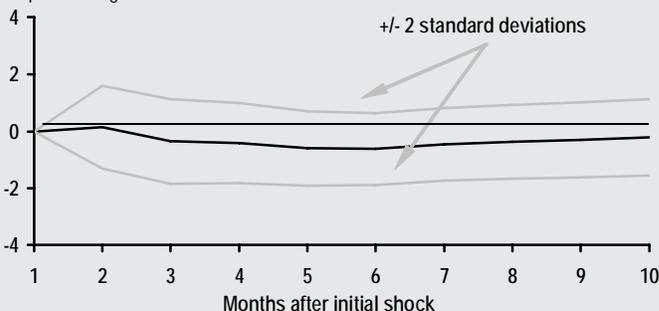
Impulse response from US employment in construction shock

% point change



Impulse response from Mexico salary per hour shock

% point change



productivity growth, which induced workers to stay home, as the coefficient was *minus* 0.9. Since US hourly wages increased 2.9% oya in July and productivity increased 2.8%, this may have resulted in a 6.8% oya increase in remittances. But since Mexican productivity increased 2.5% oya, this resulted in a 4.4% net increase in remittances and partly offset the effect of a drop in US construction employment.

- **Transaction costs also contributed to the decline in remittances.** We proxied this effect by the rate of growth in the number of transactions. Its effect was sizable: a 1% drop in the number of transactions leads to a 0.4% decline in remittances. This indicates that the volume of remittances is sensitive to transaction costs. Once again using the 12-month growth rates, transactions fell 6.7% oya in August 2008 and led to an additional 2.7% drop in remittances.

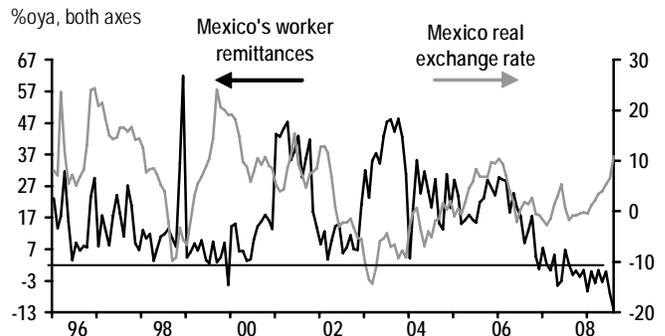
Adding the effect of the US home sales (which contributed 0.7% points to the decline), employment in US construction (-11.2%pt), labor compensation and productivity (4.4%pt) and transaction costs (-2.7%pt), it is apparent that the model predicts remittances to have fallen 10.2% oya in August 2008, which was very close to the 12.2% observed.

### Macroeconomic effects

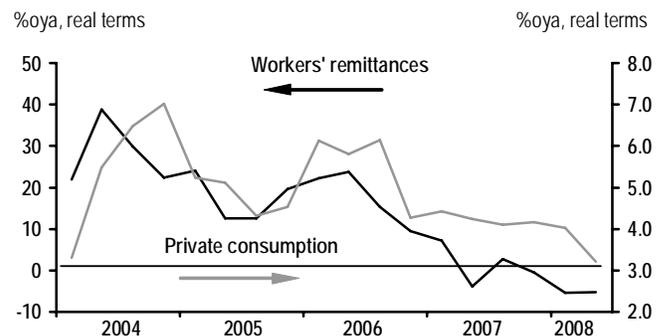
Two effects may have resulted from the decline in the flow of remittances: a financial one on the currency through a BoP shock, and a real one on private consumption.

- **BoP shock.** The evidence indicates that the decline in remittances had a minor effect on Mexico's overall balance of payments, and thus on the currency. In simple terms, this was apparent from the weak correlation between the change in remittances and MXN's real multi-lateral exchange rate. More sophisticated models of real exchange rate determinants offer the same conclusion. The straightforward explanation was that remittances had fallen only \$2 billion from their peak and account for a small proportion of trade and capital inflows in the BoP. Why did the boom in remittances appear to lead to currency appreciation in 2004-06? Remittances fell at a time when other trade flows had accelerated: real exports advanced on average 13%q/q, saar, in 2H07;
- **Private consumption shock.** Being a complement of consumers' disposable income, remittances may have hit consumption demand (second chart). At the aggregate level, the effect was small: a 10% drop in remittances

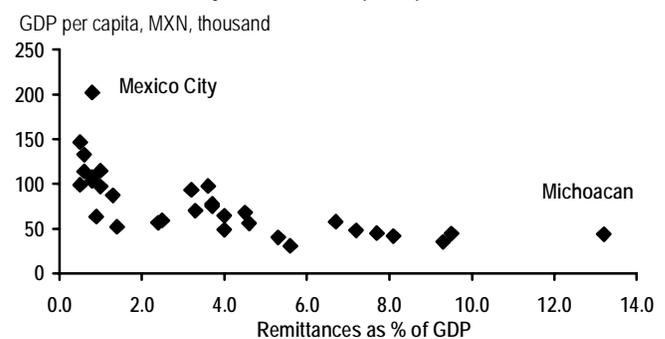
Mexico's worker remittances and real exchange rate



Workers' remittances and private consumption



Workers' remittances by states and GDP per capita



translates into a 0.3%-point cut in private consumption growth. In fact, remittances used by households to finance consumption accounted for 2.9% of total private consumption. However, the drop in remittances had a large effect on low-income households, which are highly dependent on this income. Indeed, states with lower real GDP per capita accounted for most of the remittance inflows (third chart).