

# **The Importance of Macroeconomic Conditions on Remittances: the Case of Mexico**

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## **Abstract**

In this document we evaluate how macroeconomic conditions influence the amount of remittances sent to Mexico from the United States. Specifically, we perform cointegration tests to determine the existence and magnitude of common trends between remittances and variables believed to influence their dynamics; including employment in the states of Arizona, California, Illinois and Texas, the real exchange rate, credit granted to the private sector and inflation in Mexico. In addition, common cycle tests are performed to identify common transitory movements among said variables. Our findings indicate that employment in the US, and credit and inflation in Mexico, affect significantly the amount of remittances sent in the long-run. In addition, the real exchange rate and remittances are found to be positively related in the long-run but negatively associated in the short-run. That is, a devaluation of the Mexican currency decreases the flows of remittances transitorily, but it increases them in longer horizons.

JEL classification: F2, F4

Key words: remittances, macroeconomic conditions, cointegration, common cycles.

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## Introduction

Migration is a phenomenon that has been amply studied in the social sciences. Its counterpart, the money sent by migrants back home, has received relatively less attention. This is interesting to note, since for some nations remittances represent their primary capital inflow. Countries such as India, China, Mexico, the Philippines and Pakistan depend significantly on them as a source of foreign reserves. According to the World Bank, in 2006 developing countries received 250 billion dollars from nationals working in foreign countries; and the amount increases by approximately 30 per cent every year.

By far, the most significant advances on the analysis of remittances are represented by studies evaluating their impact on the receiving country. For example, Durand, Parrado and Massey (1996) argue that remittances serve as an engine of economic growth. Glytsos (2005) compute the multiplier effects of remittances on the economy. The author finds that in some countries, Egypt for instance, they are significant. On a similar venue of analysis, Adelman, Taylor and Vogel (1988) estimate social accounting matrices to identify the indirect and direct effects of remittances on household income. They suggest that both effects are important in determining the economic conditions of a community. Lastly, we can mention Rapoport and Docquier (2005) who argue that remittances can influence investment in physical and human capital and hence promote development.<sup>1</sup>

Although studies such as those previously mentioned provide important insights to our understanding of the nature and importance of remittances, very little is known about

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<sup>1</sup> We refer the reader to Giuliano and Ruiz-Arranz (2006) for a nice discussion on remittances and growth.

the stochastic nature of this capital flow. What factors determine the dynamics of remittances? How do macroeconomic conditions affect their behavior? These are just a couple of questions that remain to be fully explored. The purpose of this document is to contribute to the literature by addressing the second. To that end, we present an econometric analysis of macroeconomic determinants of remittances in the short-run and in the long-run. Specifically, we perform cointegration tests to determine the existence and magnitude of common trends between remittances and variables believed to influence their dynamics. In addition, common cycle tests are performed to identify common transitory movements among said variables. The exercise considers data from Mexico, one of the primary recipients of remittances in the world.

It is worth mentioning that the modeling strategy does not follow a specific theoretical model, rather, an eclectic approach is undertaken considering factors that have traditionally been incorporated in the analysis of remittances. In general, these include economic conditions in the home and recipient countries.<sup>2</sup> For the case of Mexico, in addition to its gross domestic product (GDP), we identified in the existing literature that the GDP of the United States (US), real exchange rate, monetary aggregates and measures of unemployment and inflation have been utilized.<sup>3</sup> The argument for including the home domestic product is the following: suppose the economic cycle is going through a slowdown, nationals in the foreign country would tend to increase the amount of remittances sent to their families who face peril circumstances. Hence, the GDP of the recipient country and remittances would have a negative association. As for the host country's GDP, the reasoning is precisely the opposite. When the foreign

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<sup>2</sup> These types of determinants are formally proposed in Vargas-Silva and Huang (2006).

<sup>3</sup> See for example Castillo (2001).

economy is not doing well, like it is the case nowadays in the US, workers would find it more difficult to send money to their home country.

As such, variables that account for the economic conditions of the home and host countries would be appropriate explanatory variables. Nonetheless, we have to be particularly careful in selecting these variables, since the business cycles of the countries considered in this exercise are synchronized.<sup>4</sup> Thus, including GDP for both, Mexico and the US, may represent a potential econometric problem. To avoid this likely conflict, we decided to include two alternative variables to account for the economic environment: employment in the states of California, Texas, Illinois and Arizona for the host country, and the consumer price index (CPI) for Mexico.<sup>5</sup> We believe that the CPI is a reasonably accurate measure of the economic conditions Mexican nationals face at any given point in time. When prices are rising (decreasing), individuals would very likely sense more difficult (more amiable) economic circumstances. For example, they would notice the need for higher (lower) amounts of money to carry out their daily transactions and to be able to afford the basic consumer basket of goods and services. Hence, we would expect to see families relying on remittances demanding more (less) of them. If this argument holds, we should find a positive relationship between remittances and the price level.

As for the employment variable, we thought that the same is a fairly accurate indicator of the potential for sending remittances. Specifically, the ability of foreign residents to

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<sup>4</sup> The synchronization of the business cycles of Mexico and the US has been decisively established. See for example Herrera (2004) or Chiquiar and Ramos-Francia (2005).

<sup>5</sup> Although we do not estimate multivariate equations, and hence multicollinearity is not an issue, considering more than one of the GDPs would not have provided us with any additional insights. That is, since the dynamics of the Mexican GDP are similar to the dynamics of the US GDP, the results of analyzing one of them would not be much different to the results of analyzing the other.

send money to their home country depends strongly on the conditions of the labor market they participate in. These differ from state to state in the US, while some states may experience a rapid deterioration in labor market conditions, others may be doing fairly well. Thus, to properly characterize the likelihood of Mexican nationals remitting money, we would have to identify the states where the majority of them reside. This task is relatively easy: California, Texas, Illinois and Arizona.<sup>6</sup> Reasonably, when the labor markets in these states are robust, Mexican workers would have more opportunities to have better paying jobs and hence increase the amount of money they send home. The opposite would be true during an economic slowdown. This reasoning would apply to both time horizons considered in the analysis, in the short-run and in the long-run.<sup>7</sup>

We also incorporated two variables to measure the purchasing power of recipient families in Mexico; as a proxy for their “need” for external capital funds: the real exchange rate and the amount of credit granted to the private sector. In the case of the first variable, its association with remittances in the short-run and in the long-run is not entirely clear. On the one hand, when the peso depreciates, for example, a lower amount of dollars would be needed to continue purchasing a given basket of goods and services in Mexico, as such, a lower amount of remittances could be sent. Nonetheless, depreciation would also signify an opportunity to increase consumption, since a fixed amount of remittances can now buy more. In general, we believe that in the short-run the amount of remittances sent would tend to decrease, since consumption patterns in

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<sup>6</sup> See for example Bustamante et al. (1998) or Glick and Van Hook (1998) for a description of the Mexican population in the US.

<sup>7</sup> A more disaggregated measure of Mexicans employed in the US would have been employment by state and by industry or sector, since Mexican workers seem to be concentrated in certain activities (construction for example). However, we considered total employment to avoid excluding workers in non-traditional industries, such as professional services. Overall, we believe our measure of Mexicans employment provides a more precise account of the potential for sending remittances.

the receiving country would not necessarily change in response to the depreciation. In the long-run, however, as families in Mexico recognize the potential for acquiring more goods, and perhaps identify an investment opportunity, the amount of money sent by their relatives living in the US would increase. These are, of course, just two possibilities that may arise.

We acknowledge the fact that other factors in the dynamics of the exchange rate may not be fully captured by the previously mentioned scenarios. For example, it is well accepted that depreciations are associated with higher inflation rates in Mexico. Hence, a large or persistent depreciation may lead to an increase in the amount of remittances sent in the short-run and in the long-run.<sup>8</sup> To avoid speculation, we rely on the econometric exercise to help us identify the statistic association between remittances and the real exchange rate.

As for the credit granted to the private sector, we suppose that when credit becomes more available and families face less stringent liquidity restrictions, they will require lower amounts of remittances for consumption. If we think of remittances as the primary source of current income for receiving families, as is the case in Mexico for some households, we should then expect that improvements in the credit market would tend to diminish their reliance on them. Thus, we anticipate a negative association of remittances with the credit variable.

The formal exercise considers bivariate systems that include the remittances variable and each of the variables just mentioned. Our first estimation refers to testing for unit

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<sup>8</sup> As it was the case in October of 2008, according to Banco de Mexico in “Las Remesas Familiares en 2008”; [www.banxico.org.mx](http://www.banxico.org.mx)

roots. Conditioned on the results of this exercise, we perform the cointegration analysis according to the Johansen (1991) methodology. The short-run estimations are carried-out via the common cycles test suggested in Vahid and Engle (1993). Evidently, we could have employed alternative techniques for the cointegration and common cycles tests, however, it has been shown in the literature that in the presence of common trends this approach produces more efficient results.<sup>9</sup>

Needless to say, this is not the premier document on the topic; several works have preceded our effort. Using data from Brazil, Colombia, the Dominican Republic, El Salvador and Mexico, Vargas-Silva and Huang (2006) determine that remittances respond more strongly to macroeconomic conditions in the host country than in the receiving country. Similarly, El-Sakka and MaNabb (1999), find that the interest rate differential is an important determinant of remittances to Egypt. For the case of Mexico, Castillo (2001) estimates a cointegrating equation between remittances, the bilateral Mexico-US real exchange rate, and the GDPs of Mexico and the US. The author finds a negative association between economic conditions in Mexico and the flow of remittances; and a positive relationship with those in the US. Along this line, Salas-Alfaro and Pérez-Morales (2006) examine how remittances influence economic growth and income distribution in Mexico. They suggest that families who receive remittances are more likely to engage in consumption than families who do not.

In contrast to these studies, that evaluate long-run relationships, we go a step further by determining if remittances and the variables believed to affect their behavior respond in a similar manner to transitory shocks, that is, if the series share a common cycle. This

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<sup>9</sup> See for example Issler and Vahid (2001).

extension is interesting to the extent that we recognize that short-lived changes in remittances may have significant impacts on the receiving communities. Suppose a family in Mexico depends on a monthly amount of remittances for medical care, if the economic conditions in the US change unfavorably, for example, and remittances respond immediately to the change, then the receiving family will surely suffer, even though conditions may improve in the long run.

The rest of the document is organized as follows: section I presents a graphical description of the data, in section II the econometric exercise is conducted, section III concludes.

## Section I. Data Analysis

### I.1 Data

We consider remittances, the consumer price index (CPI) and credit granted to the private sector in Mexico, the real exchange rate, and the sum of employment in the states of California, Texas, Illinois and Arizona. The source for the Mexican variables was Banco de México and for the US variables we resorted to the Bureau of Labor Statistics. The real exchange rate was constructed by multiplying the price ratio between Mexico and the US by the nominal Mexico-US exchange rate. Remittances are expressed in real terms. In all cases the frequency of the data is quarterly and the sample period covers from the first quarter of 1980 to the last quarter of 2007.

## I.2 Graphical Description

Figure 1 shows the levels of the series of employment, CPI, real exchange rate and credit along with the series of remittances.<sup>10</sup> In the case of employment there appears to be a somewhat positive relationship with remittances. Notice the fall of the two series in 1982 and their expansion right before the 2001 economic slowdown. Overall these variables follow a similar trend. The credit variable, on the other hand, exhibits counter dynamics relative to remittances. The credit expansion of the late 1980's and early 1990's is associated with a flattening of the remittances trend. Interestingly, as the credit market in Mexico cooled off after the 1995 crisis, the trend experienced a moderate change in the upward direction. From this latter observation we may infer that the lack of access to financing led to an increase in the flows of remittances to access consumption goods; perhaps beyond basic necessities. As for the price level, we recognize a steep increase in the series from 1980 to 1988, consistent with high periods of inflation in Mexico. Beginning with the 1990's prices tended to stabilize and so did remittances, until about 2001 when they increased significantly. Based on the illustration, a relationship between the trends of the two variables is difficult to determine. Finally, there is no obvious association of remittances with the real exchange rate; their trends appear not to have a particular pattern.

### **Figure 1**

Figure 2 shows the series in annual growth rates. The positive association of remittances with the employment variable becomes evident. This is particularly striking in the

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<sup>10</sup> We decided to normalize the scale to have a clearer illustration of the joint behavior of the series.

period from 1980 to 1994; and again in from 2005 to 2007. Labor market conditions in those states where the majority of Mexican nationals reside appear to strongly influence the amount of remittances they send to their families. A positive relationship is also apparent in the case of the CPI. This is especially true for the period that goes from 1981 to about 2000. After that year inflation in Mexico follows a more or less constant trend, while the growth rate of remittances changes significantly. The joint behavior of remittances and the real exchange rate is quite interesting. In some periods, 1981 to 1986 for example, remittances seem to lag variations in the exchange rate. From about 1994 to 1997 they are clearly negatively related. But then, in the more recent period beginning in 2003, the variables follow a very similar pattern. In sum, it is challenging to establish a definite association between the variables from the graphical evidence. The econometric exercise should provide more definite conclusions. Lastly, the credit variable also exhibits a somewhat puzzling scenario. From 1981 to about 1986 the growth of credit seems counter to changes in remittances. Then, in 1987 there is a significant increase in both of them. However, after the 1995 crisis credit has remained relatively constant, while remittances show a very dynamic behavior.

## **Figure 2**

### Section II Econometric Exercise

As we mentioned in the introduction, the formal analysis consists of testing for the existence of common trends and common cycles. These two exercises require that the series of analysis be integrated of order 1. To identify the stochastic nature of the variables we implement the unit root test suggested by Kwiatkowski-Phillips-Schmidt-Shin (KPSS), we then perform the cointegration tests, and conditioned in the existence

of common trends we test for the presence of common cycles. Prior to the estimations we present a brief description of the methodology employed.

## II.1 Methodology

The narrative that follows is close to the technical discussion of the Vahid and Engle methodology found in Issler and Vahid (2001). Consider a  $n$ -vector of I(1) variables whose first difference is stationary and hence admits a Wold representation as follows:

$$\Delta y_t = C(L)u_t \quad (1)$$

Where  $C(L)$  is a polynomial matrix with  $\sum_{j=1}^{\infty} j|C_j| < \infty$ ,  $C(0) = I_n$  and  $u_t$  is white noise. Defining  $C^*(L)$  as  $C^*(L) = (1-L)^{-1}(C(L) - C(1))$  we can rewrite (1) as:

$$\Delta y_t = C(1)u_t + \Delta C^*(L)u_t \quad (2)$$

Integrating (2) we get

$$y_t = C(1)\sum_{s=0}^{\infty} u_{t-s} + C^*(L)u_t \quad (3)$$

The first term on the right of (3) represents the trend component, the second the cyclical stationary element. It is said that the variables in  $y_t$  share common trends if there exists  $r$  linearly independent vectors stacked in a  $r \times n$  matrix,  $\alpha'$ , with  $\alpha' = C(1) = 0$ .

Similarly, the variables in  $y_t$  share common cycles if there exist  $s$  linearly independent vectors,  $s \leq n - r$ , stacked in a  $s \times n$  matrix  $\tilde{\alpha}'$  with  $\tilde{\alpha}' = C * (L) = 0$ .

To identify  $r$  we implement the methodology suggested in Johansen (1991); for  $s$  we consider the common cycles test proposed in Vahid and Engle (1993). The same requires the estimation of the squared canonical correlations in the system,  $\lambda^2$ , and then a test to determine if the smallest correlations are zero,  $\lambda_i^2 = 0 \quad \forall i = 1 \dots s$ . The test statistic is given by  $C(p, s) = -(T - p - 1) \sum_{i=1}^s \log(1 - \lambda_i^2)$  and it is distributed  $\chi^2$  with  $s^2 + snp + sr - sn$  degrees of freedom. To carry out the common cycles test we used a program developed in GAUSS.

## II.2 Tests

Table 1 presents the results of the KPSS and Augmented Dickey Fuller (ADF) tests. Overall, we find evidence suggesting that the series are integrated of order 1. The results for remittances, real exchange rate (RER), consumer price index and credit are consistent with the findings of previous studies.<sup>11</sup> Judging from the graphical evidence, we believe that the result for the employment variable is reasonable. That is, the same seems to follow a trend and the mean does not appear to be constant over time.

**Table 1**

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<sup>11</sup> For results on remittances and the real exchange rate see Castillo (2001). Garces (1999) examines the stochastic nature of the CPI in detail. Castillo and Herrera (2005) evaluate the credit variable.

We now perform the cointegration tests. As we previously mentioned, we considered bivariate systems, containing remittances and each one of the variables thought to explain their behavior. The results are presented in Table 2.

## **Table 2**

In all cases we find evidence of the existence of a common trend. With respect to employment, its qualitative relation with remittances is positive. The same association is found with the CPI and the real exchange rate. These results are consistent with what we expected. As employment in the states of California, Texas, Illinois and Arizona rises, the amount of remittances to Mexico also increase. When the labor market in these states deteriorates remittances diminish. This latter result is empirically evident nowadays. As it is widely known, the unemployment rate in the US has reached levels not seen since the early 1980's, with a particularly significant deterioration in employment in California. At the same time, remittances to Mexico have fallen for the first time in many years. According to Banco de Mexico in 2008 income from remittances decreased 3.6%.<sup>12</sup>

Similarly, when it becomes more costly to buy goods and services in Mexico, immigrants in the US tend to remit higher amounts of money. The opposite applies when there are no inflationary pressures. The historical positive association between the price level and remittances is clearly observed during the 1980's, though the same is not so obvious in recent times, given that the price level has not experienced significant shifts in the last few years. It is interesting to note that the magnitude of the

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<sup>12</sup> "Las Remesas Familiares en 2008" Banco de México, [www.banxico.org.mx](http://www.banxico.org.mx)

coefficients for employment and the CPI are similar, hence, we may deduce that the conditions of the US economy and the Mexican economy influence remittances at a similar level, which is consistent with the finding that the two economies are highly integrated.

For the real exchange rate variable the result is quite interesting, in the long-run, a depreciating peso is associated with increasing levels of remittances. The intuition for this relationship follows closely what we indicated in the introduction. Specifically, the higher purchasing power of the US dollar would eventually translate into more remittances, perhaps with the intention to employ them in ventures beyond current consumption. The coefficient indicates that a one percent depreciation of the peso is associated with a 0.32 percentage change in the level of remittances. The only negative relationship identified is with respect to the credit variable, which is consistent with the argument posed in the introduction. When the conditions of the Mexican credit market improve, families who depend on receiving remittances may ask for lower quantities, since accessing goods and services through credit is less difficult; compared with instances when the credit market is tight.

The results of the common cycle tests are shown in Table 3. Interestingly, we find that, although each of the variables paired with remittances exhibits a statistically significant association, with the exception of the real exchange rate, none of them shares common transitory movements with remittances. Notice that the *p value* in all cases is 0, so that the null hypothesis of the existence of a common cycle is rejected. The qualitative relationships are worth mentioning. For the case of employment, credit and the consumer price index, the signs of the coefficients are identical to those obtained for the

cointegration tests: a transitory increase (decrease) in employment in California, Texas, Illinois and Arizona is associated with larger (smaller) amount of money remitted to Mexico. An improvement in the conditions of the credit market leads to a slowdown of remittances. Worsening of economic conditions, as proxy by the CPI, are countered by an increase in remittances. We should emphasize that, while the relationships are significant, we find no evidence that these dynamics occur consistently, that is, the variables do not always respond in this manner to transitory shocks.

### **Table 3**

Interestingly, the coefficient for the real exchange rate is negative, suggesting that a sudden depreciation of the peso is associated with a decrease in remittances. Given this result, we thought that it would be appropriate to further examine the relationship between remittances and the real exchange rate, since there was a structural change in the behavior of the latter in 1995, when Mexico adopted a flexible exchange rate. Hence, we decided to conduct the cointegration and common cycle tests for the sample period 1996-2007. The results are presented in Table 4.

### **Table 4**

Qualitatively, we find identical results for the short-run and for the long-run with respect to the 1980-2007 sample. Nonetheless, the cointegration coefficient for the shorter sample is significantly greater than the coefficient for the longer sample. This fact is consistent with the graphical evidence in Figure 2. Notice that in 2001 and 2003 peso depreciations were followed with large increases in remittances. With respect to

the short-run, we find that the coefficient is now significant and there is evidence of the existence of a common cycle. The *p-value* for the null hypothesis that there exists more than 0 common cycles indicates that the hypothesis cannot be rejected. The coefficient indicates a short-run elasticity of 0.08 which is relatively small. In words, a one percent depreciation of the peso is instantaneously accompanied with an 0.08 percent decrease in remittances.

### Section III Conclusion

Remittances are an important source of money for a large number of families in developing countries. In the case of Mexico, their importance not only rests on this, but also on the fact that they represent a fundamental source of foreign reserves for the country. Interestingly, while various studies have examined their impact on the economic well being of the receiving communities, little attention has been paid to their determinants at the macroeconomic level. In this document we attempted to fill this gap. We find that labor market conditions in the states where the largest Mexican communities reside, the real exchange rate, inflation and the conditions of the credit market in Mexico influence the behavior of this capital flow; both in the long-run and in the short-run. We believe that, beyond the interest that statistical and econometric results may produce, perhaps the most important contribution of our analysis is to show that remittances respond significantly to short-lived changes in the explanatory variables. This finding could be useful not only for those families who depend on a constant inflow of funds from abroad, but also for policy makers who may count on the flows of remittances to finance public spending. In the future, it would be interesting to

conduct exercises similar to these for other countries or regions within a country who may depend heavily on remittances.

## References

- Adelman, I., E. Taylor and S. Vogel (1988) "Life in a Mexican Village: a SAM Perspective" *Journal of Development Studies*, 25, pp. 5-24.
- Adams, R.H. and Page, J. (2005). Do International Migration and Remittances Reduce Poverty in Developing Countries? *World Bank*, 33, pp. 1645-1669.
- Bustamante, J., G. Jasso, E. Taylor and P. Trigueros (1998) "Characteristics of Migrants: Mexicans in the United States" in Binational Research Papers Volume 1, U.S. Commission on Immigration Reform, University of Texas, pp. 91-162.
- Castillo, R. (2001) "Remesas: Un Análisis de Cointegración para el Caso de México." *Frontera Norte*, 13, pp. 31-50.
- Castillo, R. and J. Herrera (2005) "Efecto del Gasto Público sobre el Gasto Privado en México." *Estudios Económicos*, 20, pp. 173-196.
- Chiquiar, D. and M. Ramos-Francia. (2005). "Trade and Business-Cycle Synchronization: evidence from Mexican and U.S. Manufacturing Industries" *North American Journal of Economics and Finance*, 16, pp. 187-216
- Durand, J., E. Parrado, and D. Massey (1996). "Migradollars and Development: A Reconsideration of the Mexican Case", *International Migration Review* 30, pp. 423-444.
- El-Sakka, M. and MaNabb, R. (1999) The Macroeconomic Determinants of Migrant Remittances, *World Development*, 27, pp. 1493-1502.
- Glick, J. and J. Van Hook (1998) "The Mexican-origin Population of the United States in the Twentieth Century" in Binational Research Papers Volume 2, U.S. Commission on Immigration Reform, University of Texas, pp. 571-585.
- Glytsos, N. (2005). "The Contribution of Remittances to Growth: A Dynamic Approach and Empirical Analysis" *The Journal of Economic Studies*. 32, pp. 468-496.
- Garcés D. (1999). Determinación del Nivel de Precios y la Dinámica Inflacionaria en México. *Documento de Investigación*, Banco de México.
- Giuliano, P. and Ruiz-Arranz, M. (2005). "Remittances, Financial Development and Growth" *International Monetary Fund*, Working Paper 234.
- Issler, J.V. and F. Vahid (2001), .Common Cycles and the Importance of Transitory Shocks to Macroeconomic Aggregates, *Journal of Monetary Economics*, 47, pp. 449-475.
- Herrera, J. (2004). "Business Cycles in Mexico and the United States: do They Share Common Movements?" *Journal of Applied Economics*, 7, pp. 303-323.
- Johansen, S. (1991) "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models" *Econometrica* 59, pp. 1551-1580.

Rapoport, H. and Docquier, F. (2005) The Economics of Migrants' Remittances in L.A. Gerard-Varet, S-C Kolm and J. Mercier (Eds) *Handbook of the Economics of Reciprocity, Giving and Altruism*, forthcoming (Amsterdam: North Holland).

Salas-Alfaro, R and Pérez-Morales, M. (2006), “Determinantes Macroeconómicos de las Remesas y su Efecto en la Distribución del Ingreso en México”, *Economía y Sociedad*, 11.

Straubhaar, T. (1986) “The Determinants of Workers' Remittances: The Case of Turkey”, *Weltwirtschaftliches Archiv*, 122, pp. 728-740.

Swamy, G. (1981) “International Migrant Workers’ Remittances: Issues and Prospects, *World Bank Staff Working Paper* 481.

Vargas-Silva C. and P Huang (2006), “Macroeconomic Determinants of Workers’ Remittances: Host vs. Home Country’s Economic Conditions”, *Journal of International Trade and Economic Development*, pp. 15, 81-99. .

Vahid, F. and R. Engle. (1993). “Common Trends and Common Cycles”. *Journal of Applied Econometrics*, 8, pp. 341-360

Figure 1  
Series in Levels

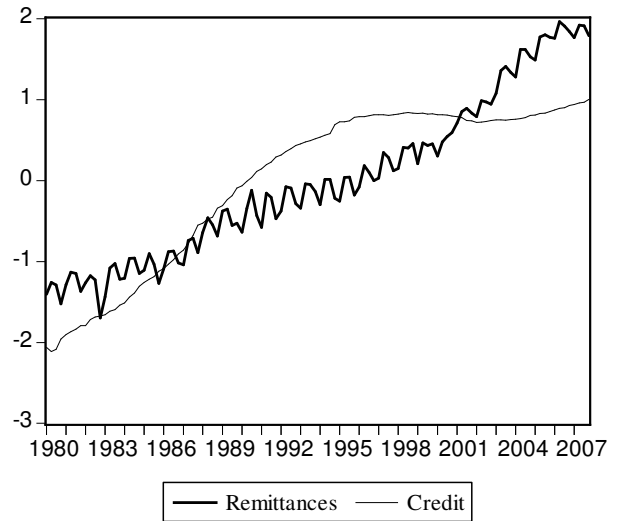
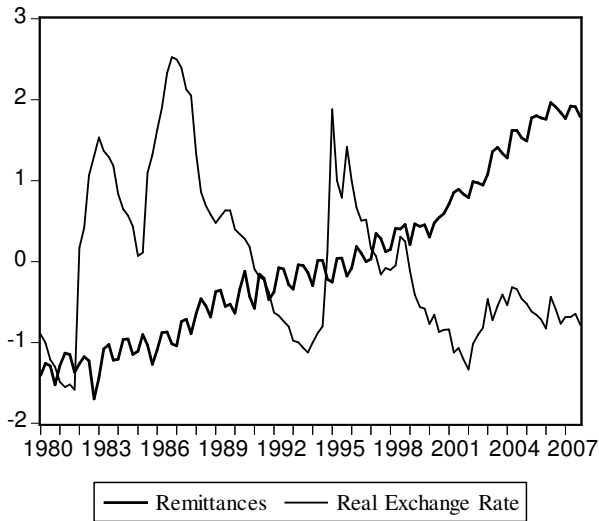
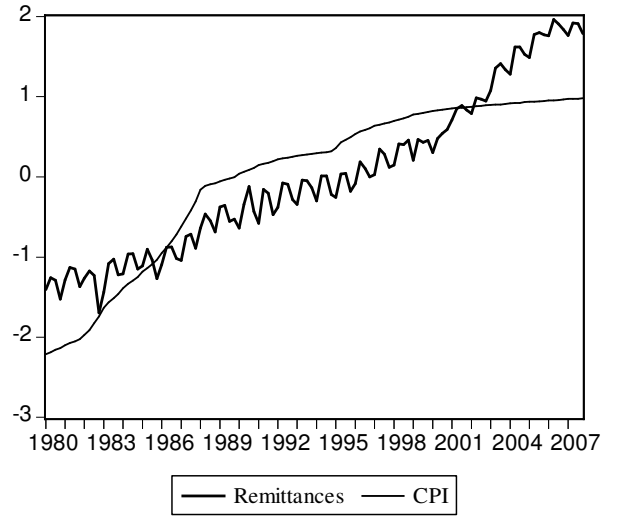
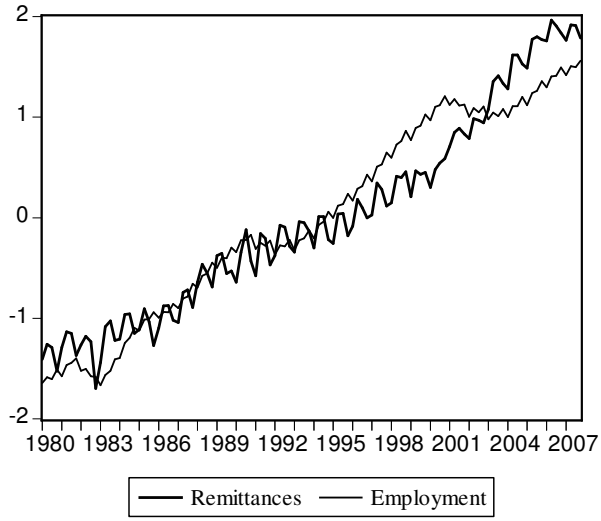
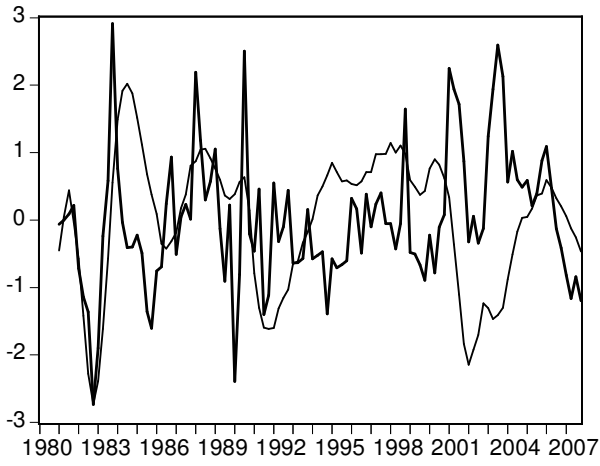
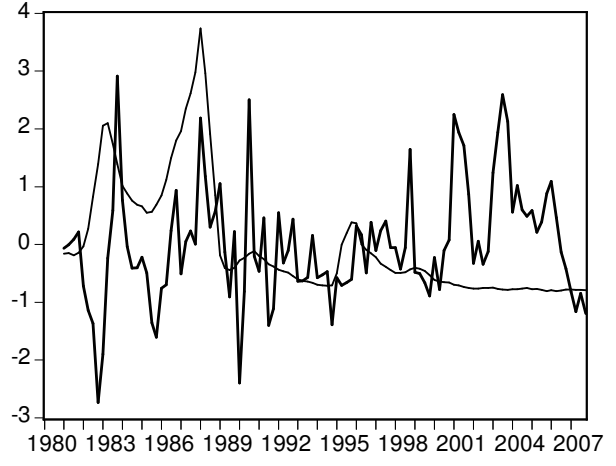


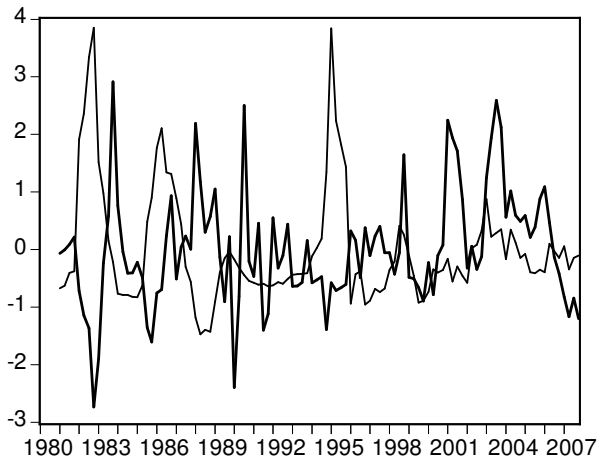
Figure 2  
Series in Growth Rates



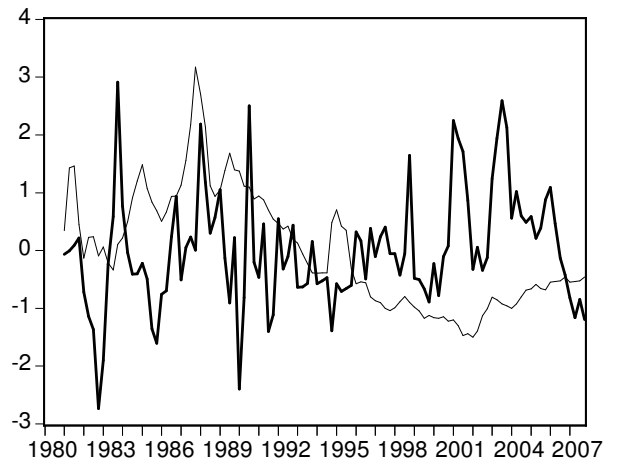
— Remittances — Employment



— Remittances — CPI



— Remittances — Real Exchange Rate



— Remittances — Credit

Table 1  
Unit Root Tests Results

Series	KPSS		ADF		Integration Order
	Level	First Difference	Level	First Difference	
Remittances	0.23*	0.09	-1.80 <sup>+</sup>	-5.91	I(1)
Employment	1.21*	0.05	-1.78 <sup>+</sup>	-5.42	I(1)
Credit	0.28*	0.15	-2.06 <sup>+</sup>	-2.33	I(1)
CPI	0.29*	0.08	-1.46 <sup>+</sup>	-3.98	I(1)
RER	0.41*	0.05	-0.08 <sup>+</sup>	-4.44	I(1)

Note: Different models were specified (intercept, trend and none).

\* Rejects the null hypothesis of stationarity at conventional levels.

+ Does not reject the null hypothesis of non-stationarity at conventional levels.

Table 2  
Cointegration Tests Results

Series	Hypothesis on $r$	Critical Value	Trace Statistic	Cointegrating Vector
Employment	$r = 0$	12.32	27.06	1 , 0.25
	$r \geq 1$	4.12	0.60	(0.11)
Credit	$r = 0$	20.26	36.11	1 , -0.71
	$r \geq 1$	9.16	6.33	(1.40)
CPI	$r = 0$	15.49	15.99	1 , 0.28
	$r \geq 1$	3.84	0.13	(0.09)
RER	$r = 0$	18.4	18.58	1 , 0.32
	$r \geq 1$	3.84	0.72	(0.08)

Table 3  
Common Cycle Tests Results

Series	Hypothesis on $s$	p-value	Coefficient	t-statistic	Cofeature Vector
Employment	$s > 0$	0.00	0.02	1.75	NA
	$s > 1$	0.00			
Credit	$s > 0$	0.00	-0.13	-1.94	NA
	$s > 1$	0.00			
CPI	$s > 0$	0.00	0.18	2.85	NA
	$s > 1$	0.00			
RER	$s > 0$	0.00	-0.06	-1.13	NA
	$s > 1$	0.00			

Table 4  
Cointegration and Common Cycle Tests Results for the Exchange Rate  
Sample Period 1996-2007

Serie	Hypothesis on $r$	Critical Value	Trace Statistic	Cointegrating Vector
RER	$r = 0$	25.88	30.31	1 , 0.81
	$r \geq 1$	12.52	6.84	(0.22)

Serie	Hypothesis on $s$	p-value	t-statistic	Cofeature Vector
RER	$s > 0$	0.48	-1.70	1 , -0.08
	$s > 1$	0.01		