

Macroeconomic Determinants of Remittances: the Case of El Salvador

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Abstract

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Abstract

Traditionally, remittances have been analyzed in the context of their socioeconomic impact on the receiving communities. As such, little is known about the macroeconomic factors that influence their behavior. In this document we evaluate the importance of some macroeconomic indicators on the flows of remittances from the United States to El Salvador. The analysis considers cointegration and common cycle tests. We include as explanatory variables employment in the US, El Salvador's GDP, interest rate differential in El Salvador, and M2 as a measure of the stance of US monetary policy. We find that all variables share a common trend and a common cycle with remittances. That is, remittances respond significantly to transitory and permanent changes of the explanatory variables. This exercise is particularly interesting considering that El Salvador is one of the few economies on the American Continent that have adopted the US dollar as its domestic currency.

Introduction

Remittances are a subject that has attracted significant attention in recent times. Policy makers, academicians and the general public pay close attention to the evolution of this capital flow. This fact is not surprising, since remittances represent one of the primary sources of foreign reserves for many economies; and in some cases the main source of income for families. According to the World Bank, in 2007 developing countries received an estimated 240 billion dollars from nationals working on foreign soil. This amount represents about 75% of world remittances.¹

Within the world regions that depend significantly on remittances to sustain economic activity, Latin America stands out as the one with the highest amounts collected. Acosta et al. (2008) indicates that Latin American countries received 50 billion dollars in 2005; Mexico alone accounted for half of this amount. Although this percentage is substantial, remittances in Mexico do not represent a significant portion of the gross domestic product (GDP), at about 2.8%. This share is much larger for countries such as Honduras, El Salvador, Haiti, and Jamaica, where remittances account anywhere from 16% to 25%.

The impact of remittances on the receiving countries has been addressed extensively in the literature. Durand et al. (1996), for example, argue that remittances function as an engine of economic growth. Similarly, Glytsos (2005) evaluates the multiplier effects of remittances on the economy. The author finds that in some countries, Egypt for instance, they are significant; the impact of remittances goes beyond the initial effect on

¹ Migration and Remittances Factbook 2008.

consumption. Along this avenue of analysis, Adelman et al. (1988) develop 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. Rapoport and Docquier (2005), on the other hand, argue that remittances can influence investment in physical and human capital and hence promote development. More recently, 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.²

Although the literature has made significant strides in evaluating the effect of remittances on the socioeconomic conditions of the home country, little is known about the macroeconomic determinants of this capital flow. Only a handful of studies have analyzed remittances and their association with macroeconomic variables. We can mention Vargas-Silva and Huang (2006), who use data from Brazil, Colombia, the Dominican Republic, El Salvador and Mexico to determine the relative effects of home and host country conditions on the flows of remittances. The authors conclude that macroeconomic conditions in the host country influence remittances more significantly than those of the receiving country. Similarly, El-Sakka and MaNabb (1999) find for the case of Egypt that the foreign-domestic interest rate differential is an important determinant of remittances. Along this line of analysis, Castillo (2001) estimates a cointegrating equation between remittances, the bilateral Mexico-United States (US) real exchange rate, and the GDPs of the two countries. The author identifies a negative

² We refer the reader to Giuliano and Ruiz-Arranz (2006) for a nice discussion on remittances and economic development.

association between remittances and economic conditions in Mexico; and a positive relationship with those in the US.

The purpose of the present analysis is to contribute to the previously noted stream of study by evaluating the macroeconomic determinants of remittances sent from the US to El Salvador. We believe this document contributes to the literature on at least two fronts. First, we choose to conduct the exercise for a country that depends heavily on remittances and operates as a dollarized economy. To our knowledge no study in the literature is similar to ours in this respect. Second, we estimate long-run and short-run associations between remittances and variables believed to influence their behavior. In general, previous studies have evaluated long-run relationships. Again, to our knowledge no other study has examined the transitory effects of macroeconomic conditions on remittances.

We should indicate that our analysis does not follow a particular theoretical model of the macroeconomic determinants of remittances. Rather, we adhere to an eclectic approach that considers variables that are likely to influence the flows of remittances. In order to identify such factors we refer to previous studies such as Vargas-Silva and Huang (2006) and Castillo (2001).³ In both documents the authors suggest considering macroeconomic conditions in the home and host countries. Thus, we decided on El Salvador's GDP and the interest rate differential in that country as measures of economic conditions in the home country. As for a measure of the conditions in the host country we include employment in the state of California; and the monetary aggregate M2 as a proxy for the stance of monetary policy in the US. It is worth mentioning a

³ It is worth noting that Vargas-Silva and Huang (2001) present a theoretical model to show how economic conditions in the home and host countries may influence the flows of remittances.

little more about the choice of employment in California, and not the US, to capture economic conditions in the host country. According to a study conducted by FUSADES (Salvadorian Foundation for Economic and Social Development) in 2004, California is home of the largest Salvadorian community in the US. Thus, we believe employment in this state is a more accurate measure of how labor market conditions in the US influence the ability of Salvadorians to sent money back home.⁴

Intuitively, we expect to find a positive relationship between remittances and each of the chosen variables, with perhaps the exception of El Salvador's GDP. The interest rate differential between what financial institutions pay for savings and what they receive for loans is used as an indicator of credit market conditions in El Salvador. It is argued that as the spread widens, credit tightens and hence it becomes more difficult for consumers to obtain credit. As such, they will require larger amounts of remittances to maintain their consumption patterns. The opposite is supposed to occur as the spread closes.⁵ With respect to employment in California, clearly, as conditions in the labor market worsens the ability of workers to send money back home deteriorates. M2 is considered in order to indicate the policy stand of monetary authorities in the US. A lax monetary policy is assumed to be associated with healthy economic conditions, which in turn imply more favorable circumstances for Salvadorians to send remittances. The opposite argument holds for a stringent monetary policy.

For the case of El Salvador's GDP the argument as to its relationship with remittances is not as clear as with the previous variables. On the one hand, it would be reasonable to

⁴ We thank Pedro Antonio Argumendo at FUSADES and Otto Boris Rodríguez at the Banco Central de Reserva de El Salvador for helpful guidance in collecting data.

⁵ This type of interest rates spread has been used extensively in the literature as a measure of credit market conditions, see for example Bacchetta and Gerlach (1997).

find a negative association between them, since strong (weak) economic conditions in the country would imply that consumers do not (do) rely heavily on income from abroad. On the other hand, since El Salvador is a dollarized economy, and according to theory its economy would tend to behave in synchronization with that of the country from which the currency was adopted, we may also find that when the country is doing well, so is the amount of remittances received. That is, when the US economy expands, the amount of money sent back home would increase, and the economy in El Salvador would be healthier. This possibility is especially true in this country given that remittances represent about 20% of its GDP. The argument would not be as strong for countries where remittances represent only a small share of the aggregate economy, Mexico for instance.

Notice then that an endogeneity issue between remittances and GDP may exist. In particular, since the economy of El Salvador depends so heavily on remittances, it could be the case that the causality goes from remittances to GDP and not from GDP to remittances. Evidently, determining the interaction between the performance of the US economy, remittances and El Salvador's GDP is not a trivial matter, and we do not intend to do it in this document. Rather, we center our attention on establishing how remittances and GDP are related in the short-run and in the long-run, an extension of our analysis could be very well go a step further and determine the precise interrelation between these variables.⁶

⁶ The choice of employment in the US, and not GDP, as a proxy of economic condition in the host country responds in part to having recognized the complex interrelation that may exist between the US economy, the economy of El Salvador, and remittances; given that El Salvador is a dollarized country and depends significantly on remittances. We believe that the employment captures reasonably well the ability of Salvadorians in the US to send money back home.

For each one of the exogenous variables we conduct tests to identify their stochastic association with remittances in the short-run and in the long-run. Our intent is to identify how macroeconomic conditions influence the behavior of this capital flow in the steady state and how they affect them transitorily. Although we believe the econometric exercise is interesting in and of itself, the results we derive should also be of relevance for policy makers in El Salvador, especially now that the US is experiencing a recession unlike any other in the last seven decades. In particular, determining how the conditions of the labor market in the US and the stance of monetary policy in that country affect the amount of money sent by Salvadorians to their home country, should help policy makers in the design of policies to confront the consequences of the economic crisis in the US in their own country, both in the immediate horizon and for the long-run; especially since a large share of the population relies on this capital flow for their every day consumption spending.

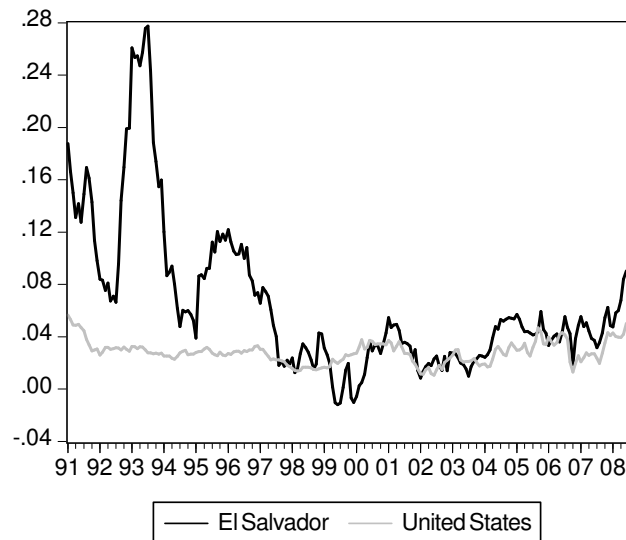
The remaining of the document is organized as follows: In section I we present a brief discussion of El Salvador as a subject of analysis. In Section II we describe the data and provide a graphical evaluation of the variables under study. Section III presents the econometric analysis and a discussion of the results. Section IV concludes.

Section I. El Salvador: a Dollarized Economy

In December of 2000 the Salvadorian government announced that beginning in 2001 the exchange rate between the Colón and the US dollar would remain fixed at 8.75 Colones per dollar; in other words, the economy was dollarized. Since then, El Salvador has experienced some interesting developments which are often attributed to dollarization.

For example, interest rates and inflation have remained more or less constant at levels similar to those seen in the US. Figure 1 shows inflation rates in both countries from 1991 to the second quarter of 2008. The rates were computed as the annual growth rate of the consumer price index. The data for El Salvador were obtained from the Banco Central de Reserva de El Salvador (BCRS) and from the Bureau of Labor Statistics in the case of the US. We notice a significant decrease of inflation in El Salvador at the end of the 1990's. Inflation rates in El Salvador and the US remained relatively close from 2000 to about the end of 2007. During the first half of 2008 there appears to be an upward drift in inflation in El Salvador, most likely the result of high oil and food prices. For the most part, however, the price level has remained at reasonable levels, much lower than those observed in the early 1990's.

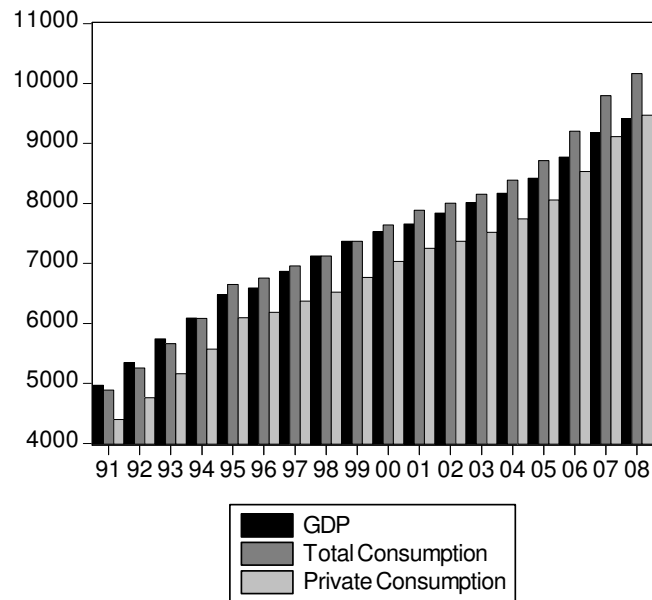
Figure 1
Inflation Rates



Although dollarization has been credited with the stabilization of the inflationary process, it has also been blamed for a large increase in consumption goods and the

slowdown of the economy since 2001. With respect to the consumption phenomenon, the issue is not so much that it has increased considerably, but that it has been financed with remittances, and not with domestic income. That is, consumption in El Salvador is greater than GDP, and the accounting identity is maintained only when the large negative amount of net exports is added. Figure 2 shows total consumption, private consumption and GDP. Data were obtained from BCRS and covers the periods 1990 to 2008 at annual frequency. Notice that beginning in 1995 total consumption has been for the most part greater than GDP. This difference is quite significant from 2005 to 2008. Also, private consumption in 2007 was almost equal to GDP and is actually greater in 2008. If the trends continue, it would not be surprising that in years to come private consumption supersedes GDP on a continuous basis.

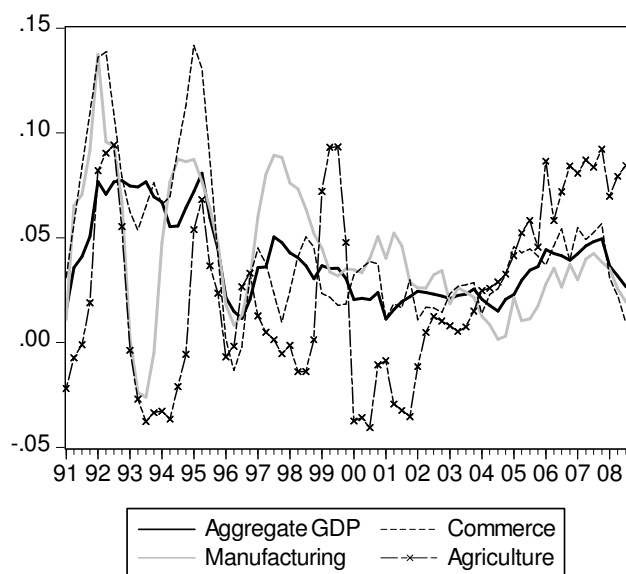
Figure 2
Consumption and GDP



Beyond the interesting situation between consumption, net exports and GDP in El Salvador, economic growth since dollarization is a topic that has particularly caught the

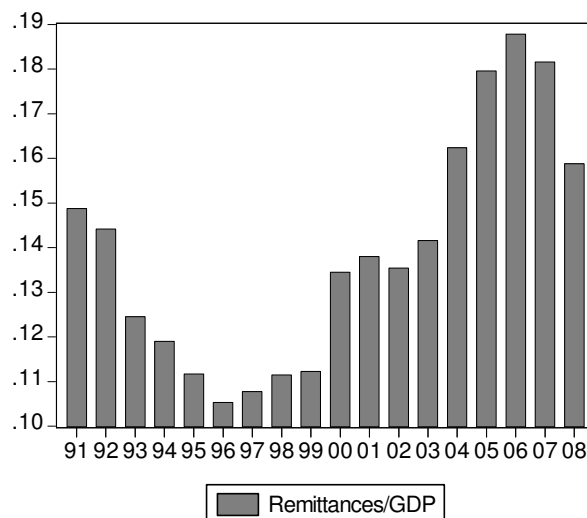
attention of policy makers in that Central American country. Figure 3 illustrates the annual growth rates of El Salvador's GDP and the GDPs of the manufacturing, commerce and agricultural sectors. Evidently, economic growth has been weak since the late 1990's at the aggregate level and within the most important economic sectors. Some attribute this development to the adoption of a relatively stronger currency. Gonzalez-Orellana (2008), for example, argues that dollarization led to the emergence of the so called Dutch Disease. In his opinion, it would be best for El Salvador to abandon the US dollar and go back to the Colón. We should note, however, that the slowdown of the economy did not begin in 2001, when the dollar was adopted, but initiated well before, around 1996. Hence, it is not entirely clear that dollarization caused the stall of economic activity. Notice also, that while GDP growth has been relatively low, the volatility of this indicator has decreased considerably, that is, the economy of the US is more stable now than it was back in the early 1990's.

Figure 3
GDP Growth Rates



As for remittances, their influence in the economy of El Salvador has increased significantly since dollarization. Figure 4 shows the share of remittances with respect to GDP. The data refers to accumulated balances at the end of the year, were obtained from the BCRS, and covers the period 1991-2008. In the early 1990's the share was around 15%, and then decreased sharply until reaching a minimum in 1996 to about 10%. Then, after the significant increase in 2000, the participation of remittances rose steadily until 2006, when is accounted for 19% of GDP. The impact on remittances of the economic slow-down in the US is evident in 2007 and 2008. To a good extent, the increase in the amount of remittances received in El Salvador is associated with the increase in consumption, to the extent that the same is larger than GDP, as it was illustrated previously. Of course, the association between this capital flow and consumption patterns needs to be analyzed formally, and at this point we present this evidence to highlight the importance of remittances in the economy of El Salvador.

Figure 4
Remittances as a Share of GDP



Evidently, El Salvador is a country that exhibits various economic phenomena that are intriguing, and that should be addressed carefully. For now, we confine our analysis to determine how remittances are associated with the various macroeconomic indicators we have selected.

Section II. Data

To conduct the econometric analysis we consider bivariate models that include the remittances variable and each one of those variables mentioned in the introductory section; and that are believed to influence their behavior: employment in the state of California, M2, interest rates differential and El Salvador's GDP. As it was indicated previously, data for remittances and El Salvador's GDP were obtained from the BCRS and are expressed in constant US dollars. The interest rate differential was computed by subtracting the "tasa pasiva" from the "tasa activa", that is, the interest rate commercial banks pay for savings deposits and the interest rate they charge for loans. Both interest rates were obtained from the BCRS. The source for the employment data was the Bureau of Labor Statistics. The monetary aggregate M2 was obtained from the Federal Reserve Board. In all cases the frequency is quarterly.

As a first approximation, we graph remittances together with the exogenous variables in levels and in growth rates. Figure 5 illustrates the former and Figure 6 the latter. To facilitate the visual recognition of the association between variables we considered their logarithmic transformation (except for the interest rate differential) and normalized the scale. There is really no intuition behind this other than making the graphical illustration more vivid.

Figure 5
Series in Levels

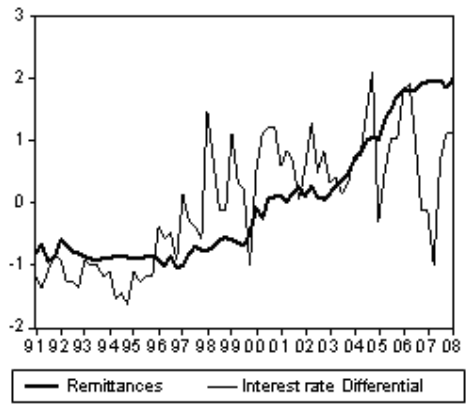
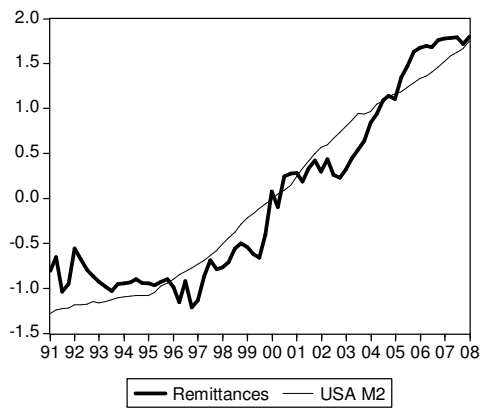
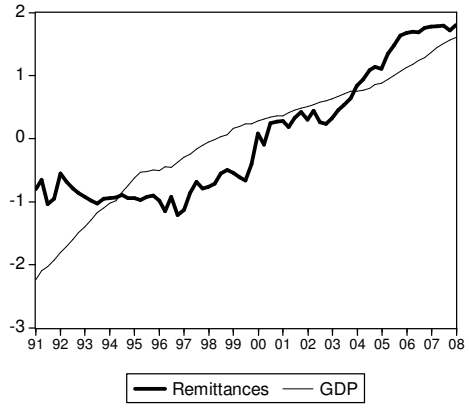
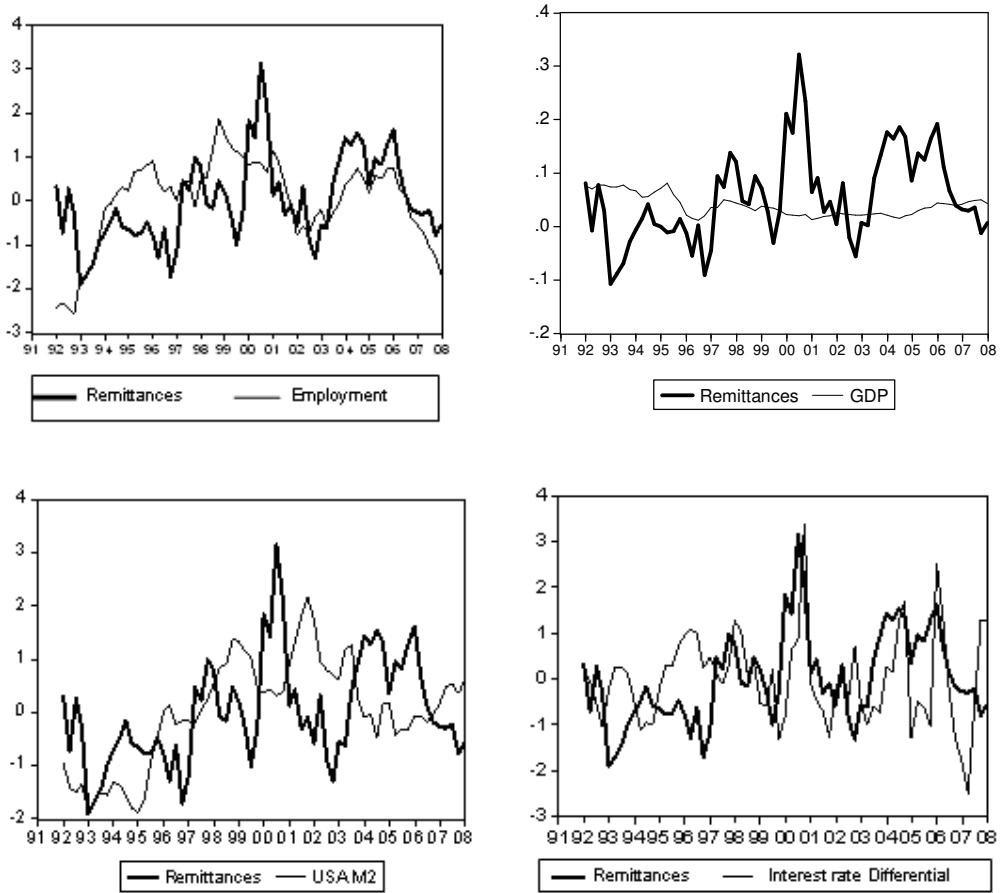


Figure 6
Series in Growth Rates



Section III. Econometric Exercise

Our estimating strategy requires the implementation of two methodologies: cointegration as suggested by Johansen (1991) and the common cycle tests proposed in Vahid and Engle (1993). We recognize that, while the cointegration technique is amply known, the Vahid and Engle (VE hereafter) methodology is not. Thus, we include a brief description of the same next.

III.1. Methodology

Following the description in Issler and Vahid (2001), we consider a n -variable vector integrated of order 1, y_t , and whose first difference is stationary and allows for a Wold representation as follows:

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

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

$$C^*(L) = (1-L)^{-1}(C(L) - C(1)) \quad (2)$$

Then, expression (1) can be rewritten as

$$\Delta y_t = C(1)u_t + \Delta C^*(L)u_t \quad (3)$$

Integrating (3) we obtain:

$$y_t = C(1)\sum_{s=0}^{\infty} u_{t-s} + C^*(L)u_t \quad (4)$$

This expression is the trend-cycle decomposition of a time series system as suggested by Stock and Watson (1988). The first term on the right side refers to the trend

component and the second to the stationary cyclical component. The variables in y_t share a common trend if there exists r linearly independent vectors stacked in an $r \times n$ matrix, α' , that satisfies the following property:

$$\alpha' = C(1) = 0$$

Similarly, the variables in y_t share a common cycle if there exists s linearly independent vectors, $s \leq n - r$, stacked in a $s \times n$, dimension matrix $\tilde{\alpha}'$ with:

$$\tilde{\alpha}' = C^*(L) = 0$$

To determine r we implement the Johansen (1991). For s we apply the common cycles methodology suggested in Vahid and Engle (1993). The same requires the estimation of squared canonical correlations λ^2 and then test the hypothesis that the smallest correlation is zero, that is $\lambda_i^2 = 0 \quad \forall i = 1 \dots s$. 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 χ^2 with $s^2 + snp + sr - sn$

degrees of freedom. To carry out this procedure we implement a GAUSS code originally developed in Issler and Vahid (2001).⁷

⁷ We thank Professor Issler for facilitating the original code. The same was modified to implement the current analysis.

III.2. Estimations

We begin by conducting unit root tests on each of the series of study. Table 1 reports the results from the Kwiatkowski-Phillips-Schmidt-Shin (KPPS) test. Notice that in all cases the test statistics are greater than the critical value for the series in levels, but lower for the series in first differences. Given that the null hypothesis of the test is stationarity, we conclude that all series are integrated of order one. The results are consistent with the graphical evidence analyzed in the previous section. That is, it is clear from the illustrations that the series do not evolve around a constant mean.

Table 1
Unit Root Tests Results

Critical Value	0.74	
Series	Levels	1st Differences
Remittances	0.98	0.33
GDP	1.07	0.62
Interest Rates Differential	0.90	0.09
Employment	1.05	0.23
M2	1.08	0.52

Our next exercise consists on estimating cointegration relations for the bivariate systems. Table 2 reports the results for the cointegration tests and the normalized cointegrating vectors. Notice that in all cases the null hypothesis of the non-existence of cointegration is rejected, while the null of at most one cointegration relation is not. That is, we find evidence of the existence of one common trend for each one of the sets considered. For the case of employment in California, we obtain a positive and significant relationship with remittances: an improvement (deterioration) in the labor market is associated with an increase (decrease) in the amount of remittances sent to El Salvador. The magnitude of the coefficient indicates a long-run elasticity of 2.2, that is,

a one percentage change in employment leads to a variation of two percentage points in the flows of remittances. The result is consistent with what we expected. The sign of the coefficient for El Salvador's GDP suggests a negative response of remittances to economic performance. In particular, in long horizons, upward shifts on the trend of GDP, for example, are related to an opposite change on the remittances trend. That is, when the economic performance is robust in El Salvador, Salvadorians in the US decrease the amount of remittances they send; the amount increases during economic contractions. This result is clearly consistent with the traditional view of remittances, as complements of income in the home country. The coefficient for the interest rates differential is positive, that means that when the credit market in El Salvador is dynamic, remittances decrease. Again, this seems consistent with standard intuition, as families in El Salvador find themselves with more favorable credit conditions, their need for money from abroad decreases. Finally, we find a positive relationship between remittances and M2. The result appears to be consistent with economic intuition. A lax monetary policy in the US will most likely reflect an economy in expansion, as low interest rates motivate consumption and investment. In turn, Salvadorians would be in the position to increase the amount of money they remit, not only because they will probably be doing well in terms of their income, but because their own access to credit in the US would be favorable.

Table 2
Cointegration Tests Results

Model	$r = 0$		$r \leq 1$		Normalized Cointegrating Vector
	Trace Statistic	Critical Value	Trace Statistic	Critical Value	
Remittances, GDP	45.49	19.38	8.90	12.51	1, 0.36 (0.02)
Remittances, Int. rate dif.	20.95	19.38	10.05	12.51	1, -0.12 (0.02)
Remittances, Employment	20.19	19.38	5.44	12.51	1, -2.20 (0.19)
Remittances, M2	25.77	19.38	6.42	12.51	1, -0.37 (0.03)

*Numbers in parenthesis refer to standard errors.

Finally, we proceed to estimate the test for common cycles. The results and normalized comovement vectors are presented in Table 3. We find that in all cases remittances share a common cycle with the exogenous variables. Notice that the null hypothesis of more than 0 common cycles cannot be rejected at conventional levels, while the null of more than 1 is. The coefficient for GDP indicates a negative relationship with remittances, result similar to that found for the long-run. That is, even in short horizons transitory improvements in the economic conditions of El Salvador are associated with a decrease in remittances. For the other three variables, employment, interest rates differential and M2 the sign is positive. These qualitative results are identical to those obtained for the long-run, and the intuitive explanation is very much the same.

It is worth noticing the relative magnitude between the short-run coefficients and the long-run ones. In the case of GDP, the long-run elasticity, 0.36, is greater than the short-run coefficient, that is, the response of remittances to transitory movements in GDP are less sensitive than in longer horizons. The result makes sense, since with time Salvadorians in the US find ways to accommodate their response. Interestingly, for the case of the interest rates differential, the contrary occurs. In the short run, the sensitivity

of remittances to changes in the conditions of the credit market, 1.70, is much larger than the same for the long-run, 0.12, though the coefficient for the short-run is not significant at conventional levels. We may then say that, although the transitory dynamics of both variables are similar, the remittances do not respond significantly to sudden and non-permanent changes in credit market conditions. A possible explanation for the non-responsiveness of remittances to this variable may be the fact that obtaining credit entails a process that takes time, and even when credit terms may be attractive, not everyone will be able to access the credit market, at least not instantaneously. In the case of employment and M2 the results are consistent with the time of adjustment argument. That is, in both cases the long-run elasticities are larger than the coefficients associated with transitory shocks.

Table 3
Common Cycle Tests Results

Series	Hypothesis on s	p value	Normalized Coefficients
GDP	$s > 0$	0.83	0.17
	$s > 1$	0.00	(0.07)
Int. Rate Dif.	$s > 0$	0.41	-1.70
	$s > 1$	0.03	(1.13)
Employment	$s > 0$	0.49	-0.15
	$s > 1$	0.00	(0.05)
M2	$s > 0$	0.08	-0.07
	$s > 1$	0.00	(0.04)

*Numbers in parenthesis refer to standard errors.

Section IV. Conclusions

Remittances have traditionally been studied in the context of their impact on the economic conditions of the home country. Little has been done, however, to understand the macroeconomic factors that influence their dynamics. In this document we conduct an analysis to establish the short-run and long-run association between remittances and some variables that are believed to influence their behavior. We choose to conduct the analysis for El Salvador, a country that operates as a dollarized economy. As such, its dependence on remittances is much more significant than countries that use their own domestic currencies. We find that in the long-run and in the short-run, remittances to El Salvador from the US share common movements with variables that are proxy for the macroeconomic conditions of the home and host country. For the first, we determine that remittances are associated with El Salvador's GDP and the credit market conditions. For the latter, we identify a significant relationship between remittances and employment in the state of California and M2. In general, the qualitative results are consistent with basic economic intuition. Remittances are negatively associated with domestic economic conditions, that is, improvements in domestic income or the conditions of the credit market entail lower amounts of remittances. On the contrary, remittances are positively associated with economic conditions in the host country: a more robust labor market in the US and a less restrictive monetary policy favor the amount of remittances sent to El Salvador. We should note, however, that some issues emerged in the process of conducting the analysis and, we believe, should be address in the future.

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