

# Working Paper

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## What Do Remittances Do? Analyzing the Private Remittance Transmission Mechanism in El Salvador

*Luis René Cáceres and Nolvía N. Saca*

## IMF Working Paper

Statistics Department

### What Do Remittances Do? Analyzing the Private Remittance Transmission Mechanism in El Salvador

Prepared by Luis René Cáceres and Nolvía N. Saca<sup>1</sup>

Authorized for distribution by Kimberly Zieschang

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#### Abstract

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Family remittances are important for El Salvador's economy. This paper analyzes the impact of remittances on El Salvador's economy and the spillover effects on the other Central American countries. A vector autoregression (VAR) model is formulated, consisting of real and monetary variables. The results suggest that in, El Salvador, remittances lead to decreases in economic activity, international reserves, and money supply and increases in the interest rate, imports, and consumer prices. This underscores the need for reorienting economic policy in El Salvador to promote the use of remittances in capital formation activities to maximize the benefit of remittances.

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## I. INTRODUCTION

As a result of emigration flows that El Salvador has experienced since the 1980s, remittances have grown rapidly in recent years. Reaching US\$2.5 billion in 2004, the remittances represent 16.6 percent of its GDP, 76% of its exports of goods, close to 60 percent of its exports of goods and services, and over 40 percent of its imports of goods. These inflows mainly originate from the 0.8–1.1 million Salvadorans residing in the United States, whose aggregate personal income sums to \$13.1 billion—an amount equal to El Salvador’s GDP.<sup>2</sup> These amounts in the urban areas are assigned to consumption (80 percent), education and health (15 percent), investment (3 percent), and savings (2 percent); in the rural areas, they are assigned to consumption (90 percent), education and health (7 percent), investment (2 percent), and savings (1 percent).<sup>3</sup>

This phenomenon is common to many Latin America countries, whose emigration flows reached 10 million persons in the 1990s, giving rise to remittances of US\$38 billion in 2003. The inflow was larger than the amount of foreign investment received by the region (see Table 1). Given the significance of these transfers, it should not be surprising that the study of remittances has received much attention in recent years.<sup>4</sup>

Table 1. Amounts of Remittances in 2003  
(In millions of U.S. dollars)

Country	Amount
Brazil	5,200
Colombia	3,067
Dominican Republic	2,217
Ecuador	1,656
El Salvador	1,935
Guatemala	2,106
Jamaica	1,425
México	13,266
Perú	1,295

Sources: Inter-American Development Bank, Multilateral Investment Fund, 2004, *Sending Money Home: Remittances to Latin America and the Caribbean* (Washington).

Remittance flows benefit the recipient countries because they allow higher human and capital development. But they also pose a challenge to these countries of channeling these external savings to productive projects and avoiding macroeconomic overheating. Certainly the

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<sup>2</sup> See Yang (2003).

<sup>3</sup> Taken from Castro (2004).

<sup>4</sup> A review of the literature on these matters is presented in Cáceres (2005a).

inflow of remittances has benefited El Salvador because, as discussed below, it assists in reducing poverty levels and school desertion rates.<sup>5</sup> The size of remittances and the fact that El Salvador is vulnerable to a remittance-flow reversal, however, raises concerns about El Salvador's economic performance. It also raises concerns about the effects of remittances on inflation, economic growth, and other macroeconomic variables.

The purpose of this paper is to analyze the transmission mechanism for El Salvador during a period of continuously increasing remittance inflows and poor economic growth (1995-2004). Using monthly data, we have formulated a model that includes real and financial sector variables of El Salvador and the other Central American countries. We seek to answer questions related to the macroeconomic effects of remittances on the economies of El Salvador and the other Central American countries.

After this introduction, the remainder of the paper is organized as follows. Section II presents a brief survey of the research on El Salvador's receipts of remittances. Section III presents some key facts on the magnitude of private remittances and their relation to other macroeconomic variables, as well as to the nature of economic growth in El Salvador in recent years. Also this section, briefly discusses the central bank policy and the role of the commercial banks played in financing consumption in El Salvador. Section IV presents the specification of the model and data issues as well as a description of the transmission mechanism (the way private remittances ultimately affect economic activity and the price level). Section V discusses the empirical results, while Section VI contains some conclusions and policy implications

## **II. BRIEF REVIEW OF RESEARCH ON EL SALVADOR'S RECEIPTS OF REMITTANCES**

Most of El Salvador's growing literature on remittances and their effects stresses the effects of remittances on the social sectors. Among the studies, the work by Rivera Campos and Lardé de Palomo (2002) on the effect of remittances on poverty is particularly important. The authors find that in 2000 the remittances helped reduce the national poverty rate by 4.2 percent, as well as reduced the Gini coefficient from 0.55 to 0.53.

The role of remittances in the education of children has been studied by Cox-Edwards and Ureta (2003). Their results show that in rural areas the probability that a child—from a household receiving a 100-dollar remittance per month—leaves primary school is 56 percent lower than that of a child from a household not receiving a remittance. In urban areas, the corresponding probability was 24 percent.

Lopez-Calix and Seligson (1990) conducted a survey in the San Salvador area to inquire into the role of remittances in financing small business. They found that on average 16 percent of

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<sup>5</sup> The average annual amount of remittance received by El Salvador's households was \$1,200 in 2002, which represented 51 percent of the income of households receiving remittances.

remittances were used for investment purposes.<sup>6</sup> Delgado and Siri (1996) proposed a series of financial mechanisms, such as investment funds and micro-enterprise credit lines, among others, to facilitate the use of remittances in starting up new business. In the same vein, Cáceres (2003) explored the role that remittances could play in developing the rural sector.

With respect to the economic effects of remittances, reference must be made to Rivera Campos's (1996) analysis of a scenario in which remittances gradually cease. He found that such a scenario would lead to an increasing deterioration of the external accounts, such that the deficit in the current account would reach a maximum of 12.5 percent of GDP. In a subsequent paper, Rivera Campos (1998) formulated a theoretical model to track the repercussions of remittances on the interest rate, postulating the existence of a "Dutch Disease" phenomenon that exerted contraction forces on the economy.

Cáceres (2005a) has also analyzed the effects of remittances on investment, interest, inflation rates, and the money supply. Using cointegration techniques applied to annual data for the 1980–2001 period, he found that contrary to theoretical expectations, remittances tend to exert upward pressure on the interest rate in El Salvador, which has negative effects on economic growth. In a subsequent paper (2005b), Cáceres used monthly data to study the effects of remittances on monetary variables. His results illustrated that the uncertainty associated with remittances, obtained by GARCH methods, was an important determinant of the money supply.

A recent paper by Cartagena (2004) estimated a cointegration relationship between remittances, U.S. GDP, and El Salvador GDP, using quarterly data for the period 1990:Q1 to 2003:Q4. The results indicated the existence of a long-term relationship: Coefficients showed that a 1 percent increase in the U.S. GDP leads to an increase in remittances of 2.4 percent, whereas an increase of 1 percent in El Salvador's GDP is associated with a reduction of remittances by 0.4 percent. This result was interpreted as evidence of a motive of risk aversion in determining migration flows.

This paper offers new insights into the importance of remittances in El Salvador's economy, presenting results of a VAR estimated with monthly data. The VAR permits tracking the impacts of remittances on a set of El Salvador's real and monetary variables as well as on other Central American countries' economic variables. The use of impulse response functions permits depiction of the effects on these variables of the inflows of remittances—both on national and regional dimensions.

### **III. STYLIZED FACTS OF EL SALVADOR'S ECONOMY, 1995–2004**

This section provides some important features of El Salvador's economy, which are key to understanding the transmission mechanism of private remittances. In this context, we present data on private remittances and other macroeconomic variables; discuss the monetary policy

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<sup>6</sup> Note how the remittances allocation has changed over time. In 2004, only an average of 3% of remittances were used for investment purposes (see Section I).



during the period; the role of the commercial banks in supporting remittances in financing consumption in El Salvador; and describe El Salvador's trade links, as main transmission channels of shocks to its main trade partners.

### **A. Private Remittances, Macroeconomic Balances, and Economic Growth**

El Salvador has undertaken a number of economic reforms since the early 1990s.<sup>7</sup> Macroeconomic stability has been achieved, private remittances have been growing rapidly, but economic growth rates since the mid-1990s have consistently been low. The main causes of this growth performance have been the low rate of investment and national savings, despite that the country has been the recipient of large boom in remittances from the US, a source of external savings, that could have facilitate the financing of domestic investment. Instead the increase in remittances has been accompanied by a sharp decline in domestic savings with not perceptible impact on the domestic investment. During the second half of the 1990s and the first years of the 2000s, the average rate of investment to GDP was lower than in the 1970s—19 percent in 1970–79 versus 16 percent in 1995–2003 (see Figure 1). National savings have declined even more than investment, and the current account has deteriorated, while consumption has grown steadily (see Figures 1, 2, and 3). This surge in consumption has been satisfied by increasing imports of consumption goods (see Figure 4) and has been particularly financed by remittances (see Table 2),<sup>8</sup> but also, in recent years, by an expansion of private sector credit, and by public external borrowing (see Figure 5).

The deterioration in macroeconomic balance and the poor economic growth may be symptoms of a Dutch Disease phenomenon. That is, increasing consumption puts upward pressure on prices and wages on the non-traded goods sector and on importable goods (see Figure 6),<sup>9</sup> which in turn contributes to the deterioration of the current account and external competitiveness and the poor growth of exports (see Figure 7).

The impressive number of reforms undertaken by El Salvador since the early 1990s and the important inflow of external savings could have facilitated the financing of domestic investment. Obviously, it has not had the expected positive impact on domestic investment and growth. In other words, the inflow of remittances has boosted consumption and imports but not investment and domestic production.

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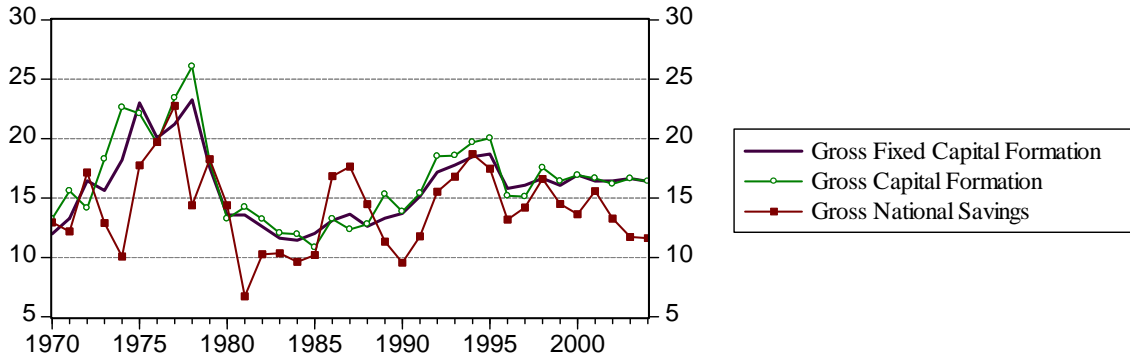
<sup>7</sup> El Salvador has undertaken a series of structural reforms, including trade and capital account liberalization, financial liberalization, privatization and deregulation of public enterprises, pension reform, tax reforms, free trade agreements, and dollarization.

<sup>8</sup> Table 2 shows that the amount of private remittances are similar to the trade deficit on goods and services in millions of U.S. dollars.

<sup>9</sup> Figure 6 presents the real exchange rate defined as the ratio of prices of traded (PT) to non-traded goods (PN), indicating the non-traded goods prices have increased faster than the prices of traded goods, and the real exchange has appreciated since 1990.

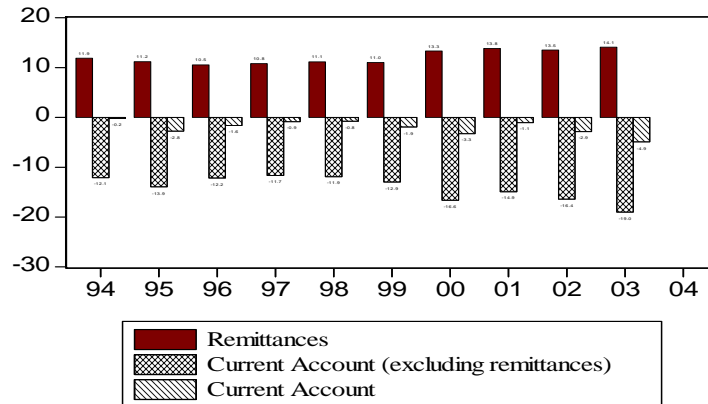
This has raised the concern as to what policy should be implemented to foment the use of remittances in capital formation activities. Another concern is the vulnerability of the Salvadoran economy in the event of a reduction of remittances. When that occurs, without other sources of foreign exchange, the liquidity crunch would be substantial, with severe repercussions on the commercial and banking sectors.

Figure 1. Investment and National Savings  
(In percent of GDP)



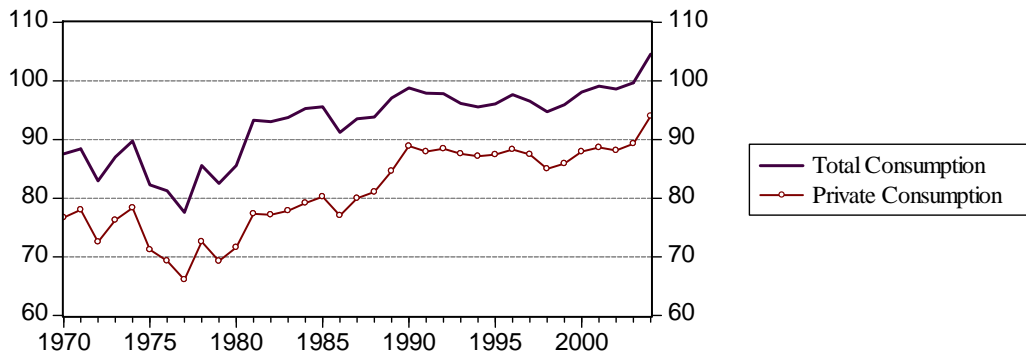
Source: Central Reserve Bank of El Salvador Database.

Figure 2. Remittances and Current Account Deficit  
(In percent of GDP)



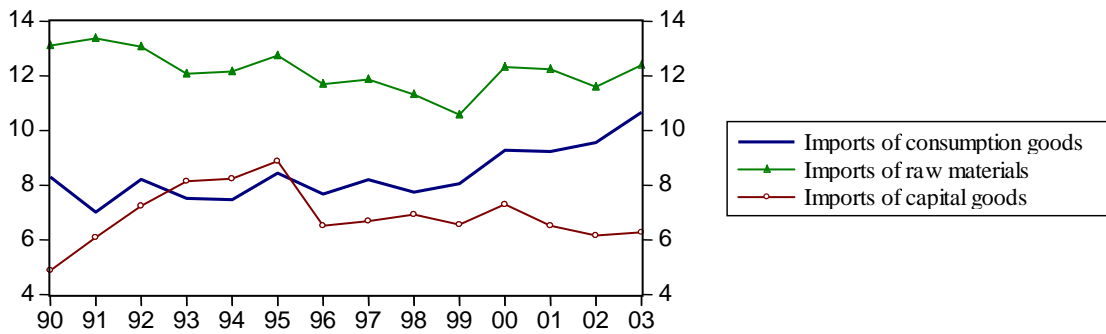
Source: Central Reserve Bank of El Salvador Database.

Figure 3. Consumption  
(In percent of GDP)



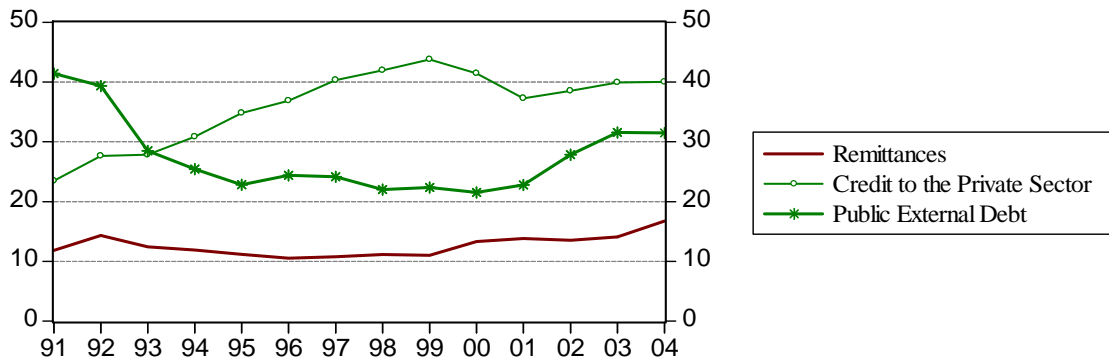
Source: Central Reserve Bank of El Salvador Database.

Figure 4. Structure of Imports of Goods  
(In percent of GDP)



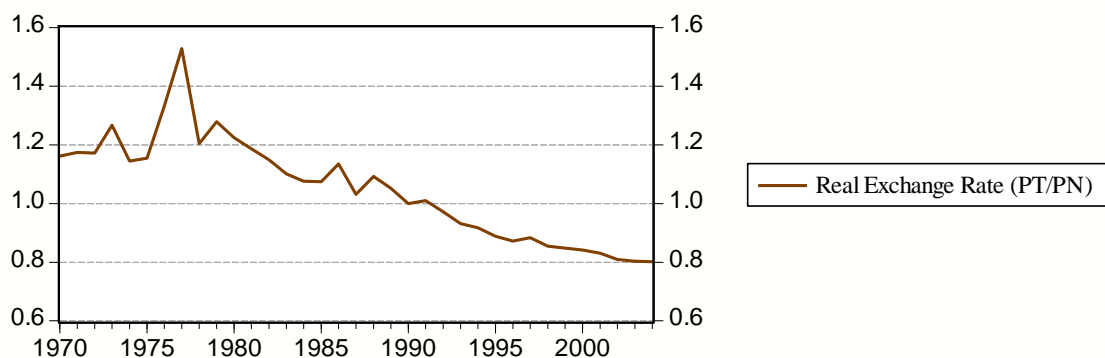
Source: Central Reserve Bank of El Salvador Database.

Figure 5. Financing Consumption  
(In percent of GDP)



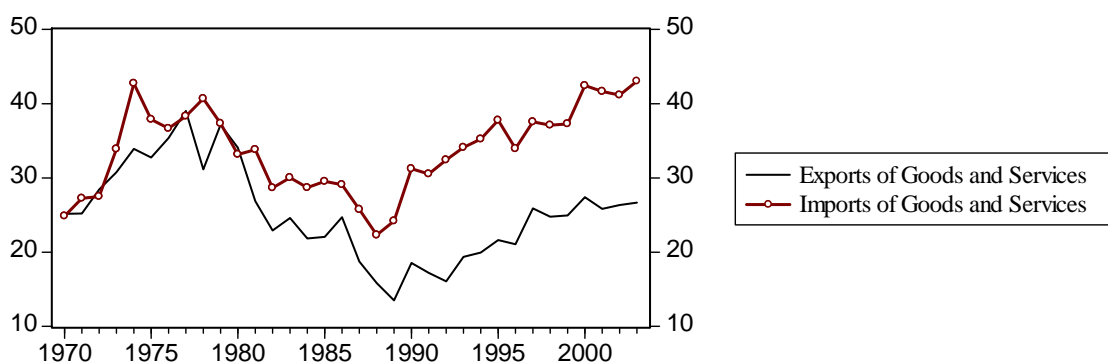
Source: Central Reserve Bank of El Salvador Database.

Figure 6. Real Exchange Rate



Source: Central Reserve Bank of El Salvador Database.

Figure 7. Exports and Imports of Goods and Services  
(In percent of GDP)



Source: Central Reserve Bank of El Salvador Database.

Table 2. Trade Balance on Goods and Services and Remittances  
(Annual data in millions of U.S. dollars)

Year	Trade Deficit on	
	Goods and Services	Remittances
1996	1,333	1,259
1997	1,295	1,364
1998	1,455	1,534
1999	1,539	1,566
2000	1,975	1,830
2001	2,182	2,022
2002	2,112	2,206
2003	2,393	2,316
2004	2,739	2,548

Source: International Monetary Fund, *International Financial Statistics*, September 2005, and the Central Reserve Bank of El Salvador's website

## **B. Monetary Policy**

### **De facto fixed exchange rate regime, 1995–2000**

After the unification of the foreign exchange markets in June 1990, El Salvador adopted a floating exchange rate regime. By law, the system was a market-determined exchange rate with central bank intervention limited to smoothing cyclical fluctuations. The system worked in this way for a short time. However, for the period of analysis, El Salvador had a *de facto fixed* exchange rate regime, in an attempt by the Central Reserve Bank of El Salvador (CRB) to prevent nominal exchange rate appreciation because of the inflow of capital, particularly of remittances.

The CRB's strategy in response to the inflow of remittances attempted to target both the nominal exchange rate and the money supply. On the one hand, the CRB intervened in the foreign exchange market by buying foreign exchange to avoid nominal appreciation. On the other hand, it sought to absorb liquidity stemming from remittances by issuing sterilization bonds, increasing reserve requirements, and requiring banks and financial institutions to hold part of their deposit in CRB bonds.

However, this policy failed to obtain its objectives (i.e., prevent real exchange rate appreciation) and was inconvenient for three reasons. First, sterilization intensified the conditions that attract capital inflow, increasing interest rates. Second, maintenance of high domestic interest rates and tight liquidity deprived the economy of the benefit of capital inflows (e.g., increasing investment and growth). Third, the sterilization in the form of open market operation was costly for the CRB and could have discouraged financial intermediation.<sup>10</sup>

### **Dollarization, 2001–2004**

On January 1, 2001, El Salvador adopted the U.S. dollar as legal tender, and all financial transactions were converted into dollars at the rate of 8.75 colones per U.S. dollar.

After adopting the dollarization regime, the CRB continued issuing its own paper—the certificates of liquidity (see Table 3). The purpose of these operations is to ensure that the level of international reserves exceeds liquidity requirements. These operations are not consistent with the dollarization regime, and they could explain in part the behavior of the interest rate after a shock of remittances and the apparent negative effect of remittances in El Salvador.

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<sup>10</sup> For details of El Salvador's monetary policy for this period, see Nolvía Saca and Orlando Martínez (1998).

## Commercial banking system

Table 4 presents a simplified version of the balance sheet of the commercial banking system (including commercial banks and other financial institutions) as of December 31, 2004. On the asset side, the system had US\$1,537.5 million in reserves at the CRB, but US\$737.7 million are held in the form of certificates issued by the CRB (certificados de liquidez and certificados de estabilizacion monetaria). Moreover, the credit of the banking system to the private sector is concentrated in a few sectors, especially in consumer credit, housing, and commerce sectors (see Table 5). Note that these sectors received 59 percent of the system loans, whereas industry and agricultural sectors received 14.7 percent. The implications of this are that significant risks and higher costs are associated with this type of lending for the banking sector. (For instance, these customers have limited credit histories and require more monitoring.)<sup>11</sup> This situation increases the vulnerability of the financial sector, especially under a scenario of a reduction of remittance inflows.

Table 3. Central Bank of El Salvador: Papers Issued  
Outstanding Stocks  
(In millions of U.S. dollars)

Year	Amount
1995	355.9
1996	462.5
1997	996.6
1998	1028.3
1999	1157.2
2000	1273.0
2001	1363.8
2002	1295.3
2003	1226.1
2004	1317.4

Source: Central Reserve Bank of El Salvador.

<sup>11</sup> For a detailed balance sheet analysis of El Salvador's commercial banking system, see Andres Velasco (2004).

Table 4. Balance Sheet of Commercial Financial System  
(In millions of U.S. dollars; as of December 2004)

Assets		Liabilities	
External assets	<b>1,029.8</b>	External liabilities	<b>1,733.0</b>
Domestic assets	<b>7,108.6</b>	Short term	909.1
Credit to private sector	6,112.3	Long term	823.9
Credit to non-MFI	319.7	Domestic liabilities	<b>7,129.8</b>
Credit to public sector	676.6	Deposits in checking and savings accounts	3,050.3
Reserves	<b>1,822.3</b>	Time deposits	3,036.9
BCR reserves	1,537.5	Investment certificates (3 to 5 years)	434.5
Stock market operations	283.8	Public sector deposits	608.1
Other assets	-242.2	Loans from Banco Multisectorial de Inversiones (BMI)	<b>138.8</b>
		BCR loans	...
		Liabilities with non-MFI	<b>198.0</b>
<b>Total assets</b>	<b>9,718.7</b>	<b>Total liabilities plus capital</b>	<b>9,718.7</b>

Source: Central Reserve Bank of El Salvador *Revista Trimestral*, October–December 2004.

Table 5. Banking System: Share of Total Credit by Economic Sectors  
(As of December 31, 2004)

Economic Sectors	Percent of Total Credit
Housing	23.7
Commerce	18.0
Consumer loans	17.3
Industry and manufacture	10.5
Other services	9.2
Construction	8.4
Agriculture	4.2
Other sectors	3.1
Financial institutions	2.7
Transportation and communications	1.6
Electricity, gas, water, and other services	1.2
Mines	0.0
<b>Total</b>	<b>100.0</b>

Source: Superintendencia del Sistema Financiero de El Salvador

### El Salvador's main trade partners

Trade links have been considered an important channel of transmission of a shock in one country to its trade partners. Thus, El Salvador has close economic ties, particularly trade, to the U.S. and the rest of Central America; they remain the largest markets for El Salvador's exports; over 80% of El Salvador's exports are to the U.S. and the Central American countries; and about 65% of its imports are from these countries during the sample period.

Among the Central American countries, Guatemala is the El Salvador's second biggest trade partner, after the U.S., accounting for over 20% of its exports and over 10% of its imports. More than 50% of El Salvador's regional trade is toward and from Guatemala, followed by Honduras, Costa Rica, and Nicaragua. Thus, a shock of remittances in El Salvador would be transmitted to these economies in particular, as El Salvador is also one of the top trade partners for the rest of the Central American countries.

These trade linkages are expected to be enhanced further after full implementation of the Central America and Dominican Republic Free Trade Agreement with the U.S. (CAFTA-DR).

#### **IV. MODEL SPECIFICATION AND DATA ISSUES**

##### **A. Model Specification**

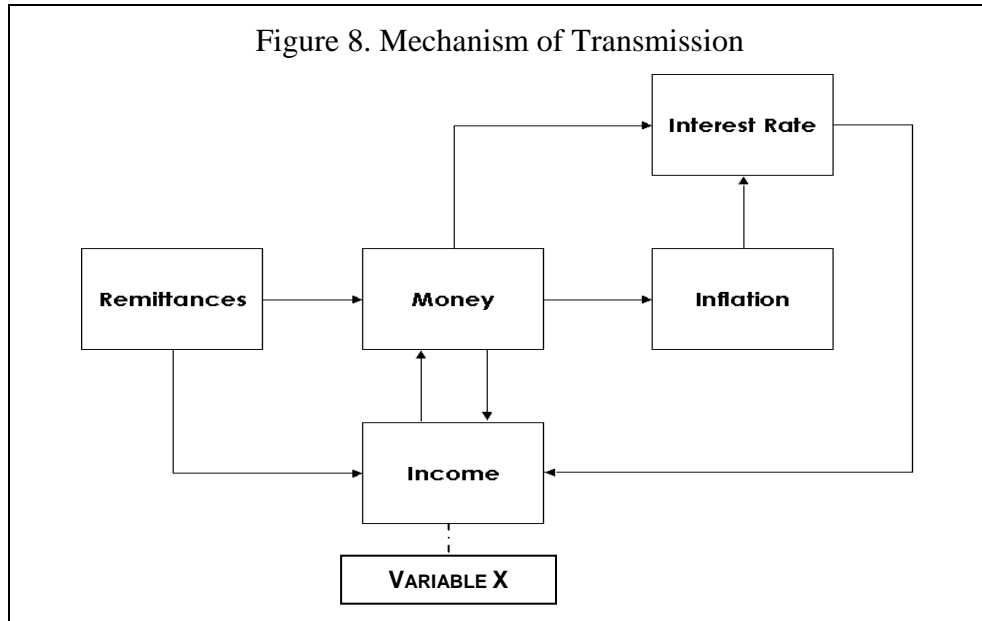
To describe the transmission mechanism of remittances, we employ a vector autoregression (VAR) model, which can be written as

$$Y = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + e_t \dots$$

where  $Y$  is a vector of variables observed at time  $t$ , and  $p$  is the maximum lag of the system. Conceptually,  $Y$  contains all variables of the system, the remittances (the beginning of the transmission process), all the variables that transmit the remittance shock (the transmission variables), and output and price level (the end of the process). The VAR error term vector  $e_t$  is assumed to be serially uncorrelated and homoskedastic.

It is postulated that the variables included in the VAR constitute the structure shown in Figure 8. It is assumed that remittances give rise to an expansion of the money supply, owing to their impact on international reserves. As remittances constitute an increase in personal income, this increases the demand for consumption goods, thus increasing economic activity and the demand for money. The change in the money supply would affect the interest rate, although such a change may be mitigated by the increase in money demand. Finally, it is assumed that the interest rate would affect the index of economic activity. Also, remittances and personal income would cause increasing demand for imports from and exports to the Central American countries, by virtue of the significant trade links between them, and thus would affect these countries' indices of economic activity.





## B. Econometric and Data Issues

The empirical application of the model will consist of estimating impulse response functions from the VAR model above, representing the response of several variables to a shock of remittances. Specifically, the estimated model analyzes the impact of remittances on El Salvador's economic activity, interest rate, consumer prices, and money supply. It also analyzes a set of variables, denoted by X, where X is the real exchange rate, other Central American countries' economic activity, and their exports to, and imports from El Salvador. Thus, the vector Y will contain six variables, including X.

Apart from the X variables, the model will always include the following five macroeconomic variables: the log of the consumer price index (IPCES), the log of the index of economic activity (IMAE), the log of remittances (REMESASES), the rate of interest rate on repos (REPOS), and the log of the money supply broadly defined (M2ES).

Conceptually, our VAR is made up of (1) the two variables that represent the end of the transmission process (IPCES and IMAE), (2) the variable that starts it (REMESASES), (3) the transmission variables—central bank reaction (REPOS and M2ES)—and (4) one of the X variables. The variable X represents national variables such as the El Salvador real exchange rate (REER), El Salvador's imports from the U.S. and the rest of the world, and El Salvador's international reserves (IRES). It also represents variables from other Central American countries, specifically their indices of economic activity and exports from and imports to El Salvador. In this way, it will be possible to assess the impact of remittances on neighboring countries and thus detect spillover effects.

Two exogenous variables were used: (1) the index of El Salvador's export prices and (2) a dummy variable that took the value of zero from January 1995 to December 2000 and thereafter a value of one to signify the period starting in January 2001, when the economy

was officially dollarized. The first exogenous variable was dropped when the REER entered into the system as an X variable.

It should be pointed out that the estimated model will differ from one estimation to another as the variables X change (Jansen [2003] used this methodology in his study of the mechanism of transmissions of capital inflows in Thailand).

The data used in the estimation of the unrestricted VAR models are monthly for the January 1995 to August 2004 period. All data for El Salvador were obtained from the CRB; data for other Central American countries were obtained from the Central American Monetary Council.

Most of the time series used in the estimation of the VARs are stationary, except the international reserves. Some of the stationary time series (e.g., imports, exports, and indices of economic activity) are stationary only when the Dickey-Fuller test includes a constant and a linear trend. This fact indicates that the series have a deterministic trend (see Table in Appendix I).

The unrestricted VARs are estimated using the logarithms of the variables, except in the case of the interest rate, in which case percentage values were used. The results are presented next.

## **V. EMPIRICAL EVIDENCE: TRANSMISSION MECHANISM**

This section describes the transmission process of private remittance inflows. We start by discussing the remittance inflow shock and its ultimate effects on real GDP and the price level, which represent the end of the transmission process. Then, we introduce the transmission variables, including first real variables and then financial variables, as indicated in Section IV.

In the traditional Cholesky Impulse Response Functions (IRF), the ordering of the variables in the VAR is important for determining the pattern of recursiveness.<sup>12</sup> Since financial variables react faster than real variables, real variables will be placed after the IPC and IMAE and then after financial variables. For example, the first VAR to be estimated has the following form: IPCES, IMAEES, REMESASES, REPOSES, M2ES, IRES.

The empirical evidence is presented below the IRF figures for each macroeconomic variable of the VAR model, after one-standard error shock to remittances.

### **A. Consumer Prices**

The response of El Salvador's consumer price index shows steep increases after two and four months. As can be seen in Figure 9a, it reaches a value that is sustained thereafter. Thus, the

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<sup>12</sup> See Christiano, Eichenbaum, and Evans (1998).

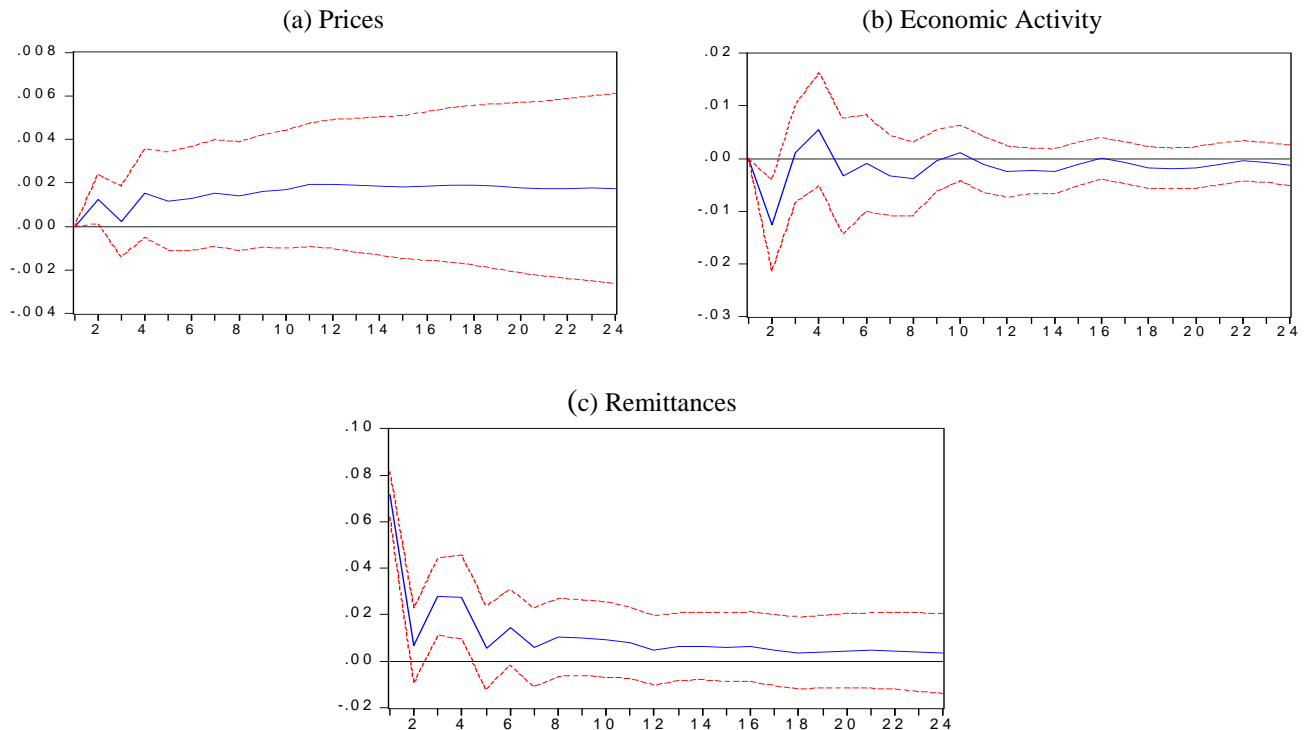
first notable point is that remittances impart an inflationary effect on El Salvador's economy. This effect may be explained by an increase in prices and wages on the non-traded goods and a slow supply response to the growing purchase power generated by remittances.

### B. Index of Economic Activity

Figure 9b shows that the index of economic activity decreases by 1.2 percent after two months. It recovers to 0.005 percent after four months and experiences negative growth rates from then on. In effect, the Appendix shows that the accumulated response of IMAEES to remittances is increasingly negative.

The reason economic activity declines in response to remittances could be partly explained by the loss in external competitiveness due to Dutch Disease effects (see section V.G). That is, the large remittances that are channeled mainly to consumption increase the prices and wages of non-traded goods, reduce exports growth, and lead to a rise in imports, displacing national production of importable goods. In other words, the additional demand generated by remittances is met by additional imports, which leave no room for national production to increase.

Figure 9. Effects of Remittances on Prices and Economic Activity



### C. Remittances

As expected, the remittances responded by immediately spiking, then dropping sharply after two months, and settling at a sustained growth rate soon thereafter (see Figure 9c). This would indicate that remittances have their own built-in force that drives their growth.

#### **D. Interest Rate**

Figure 10a shows the response of the repos interest rate. In this case, an initial small increase occurs, followed by a sharp drop after two months. The interest rate increases from then on to reach a positive value after seven months, showing an increasing trend thereafter. The initial decrease in the interest rate may be explained by the short-lived liquidity provided by remittances, soon dissipated through imports. Additionally, the CRB's intervention policy may have contributed to the interest rate's response of increase. The point to stress is the tendency for the interest rate to rise, despite the adoption of dollarization; the results indicate that dollarization decreased the interest rate. The coefficient of the interest rate with respect to the dollarization dummy variable used to indicate a change of exchange rate regime is significant and with a negative sign. This tendency toward an interest rate increase may strengthen the recessive forces discussed before.

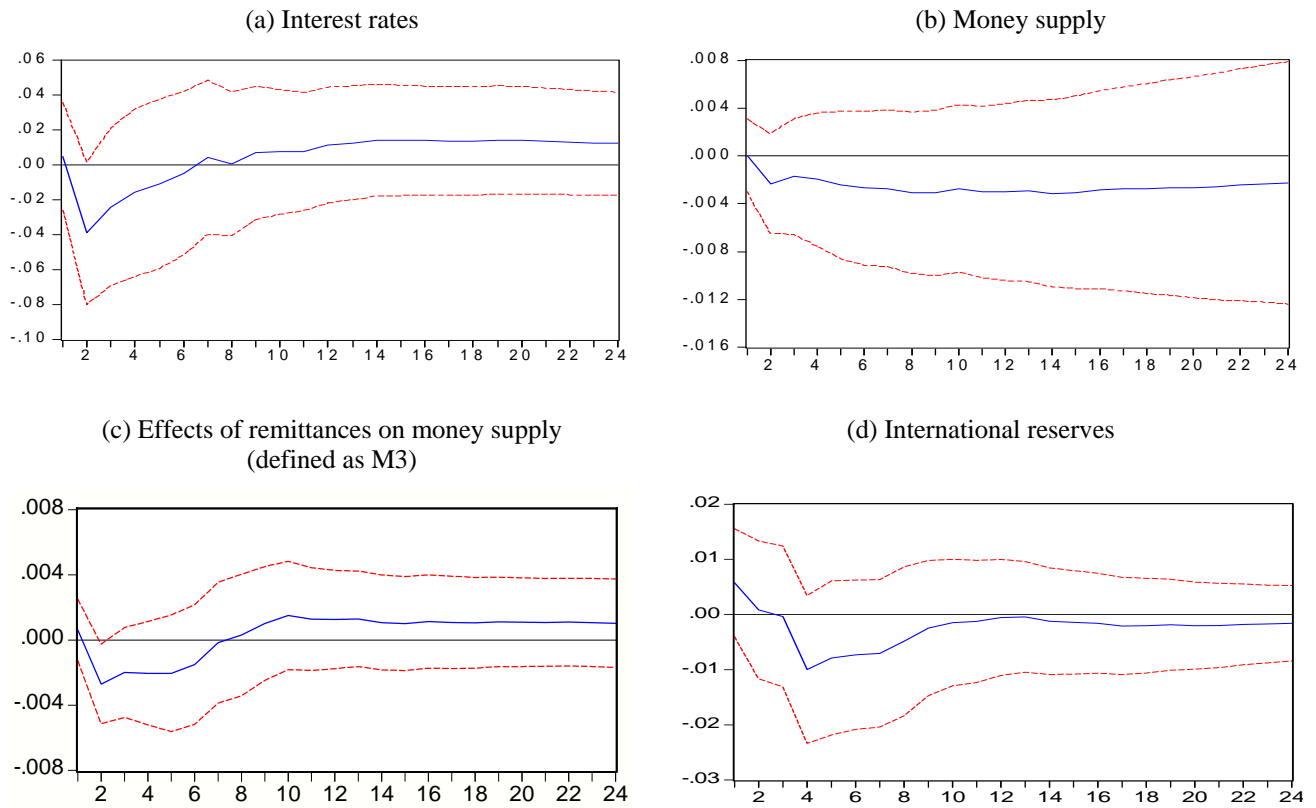
#### **E. Money Supply**

The response of the broadly defined money supply (M2) is presented in Figure 10b. Money supply shows a consistently negative trend with a shock of remittances. This result is unexpected and then the VAR was re-estimated using M3 instead of M2; in this case, the effect of a shock of remittances on money also was negative the first six months and stabilized to positive values thereafter, implying that after a shock of remittances, a substitution of money for less liquid assets takes place (see Figure 10c). This could be explained by the policy reaction of the central bank aimed at reducing the excess supply, given a lower demand for money during the first half of the sample period. The lower demand was induced by the reduction in the indices of economic activity and the increase of the price level—both act to reduce the demand for money. Or since the adoption of dollarization (second half of the sample period), the central bank aimed to maintain an adequate level of international reserves. This result also is consistent with the increase in the interest rate. Table 3 presents the operations of the central bank during the sample period (1995–2004).

#### **F. International Reserves**

Figure 10d shows the response from net international reserves to an inflow of remittances. A positive initial spike is noted, but after three months the responses become negative and continue negative thence after. This negative response is stabilized toward zero, which confirms the argument that remittances are used for imports of consumer goods. This implies that the central bank was unnecessarily restricting the money supply and increasing the interest rate with its policy.

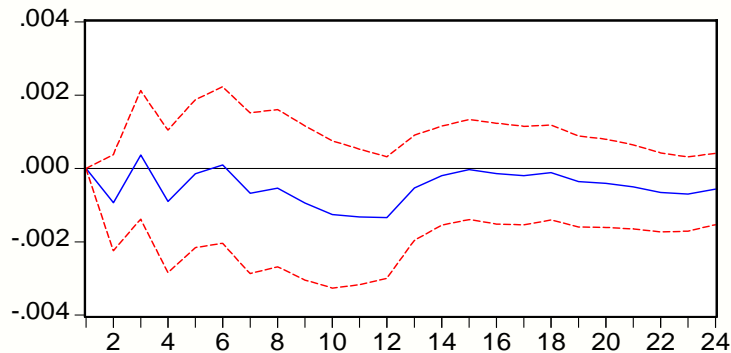
Figure 10. Effects on Monetary Variables



### G. Real Exchange Rate

Figure 11 represents the real exchange rate response to a shock of remittance inflow. It indicates generally an appreciation of the exchange rate—a real appreciation of the exchange rate in the first two months and then a slight recovery—but it shows after three months a steady appreciation of the real exchange rate. The exchange rate appreciation partly explains the negative response of economic activity to a shock of remittances.

Figure 11. Effects of Remittances on Real Exchange Rate



## **H. El Salvador's Imports from Central American Countries, the United States, and the Rest of the World**

With regard to imports from other Central American countries (Figures 12a–12d), there is a sharp drop after two months, as in the case of the index of economic activity. Thereafter, the responses acquire cyclical paths that reach zero after approximately eight months. The imports from Honduras differ from this pattern in that they increase sharply after three months, becoming sustained as negative after nine months. Imports from Nicaragua respond with negative values until 10 months, increasing thereafter to reach zero after 15 months. The response of imports from Costa Rica shows a negative value at two months, followed by a cyclical pattern that decays to zero after 12 months.

It is interesting to note that in the cases of both exports to and imports from Central America the responses are not sustained, both decaying to negative or zero values after nine or ten months. However, after examining the accumulated responses of exports and imports, shown in Appendix I, we can see that the accumulated responses of exports to Guatemala, Nicaragua, and Costa Rica are positive, as are the accumulated responses of imports from Guatemala, Honduras, and Costa Rica. The accumulated response of imports is consistent with data showed in section III.

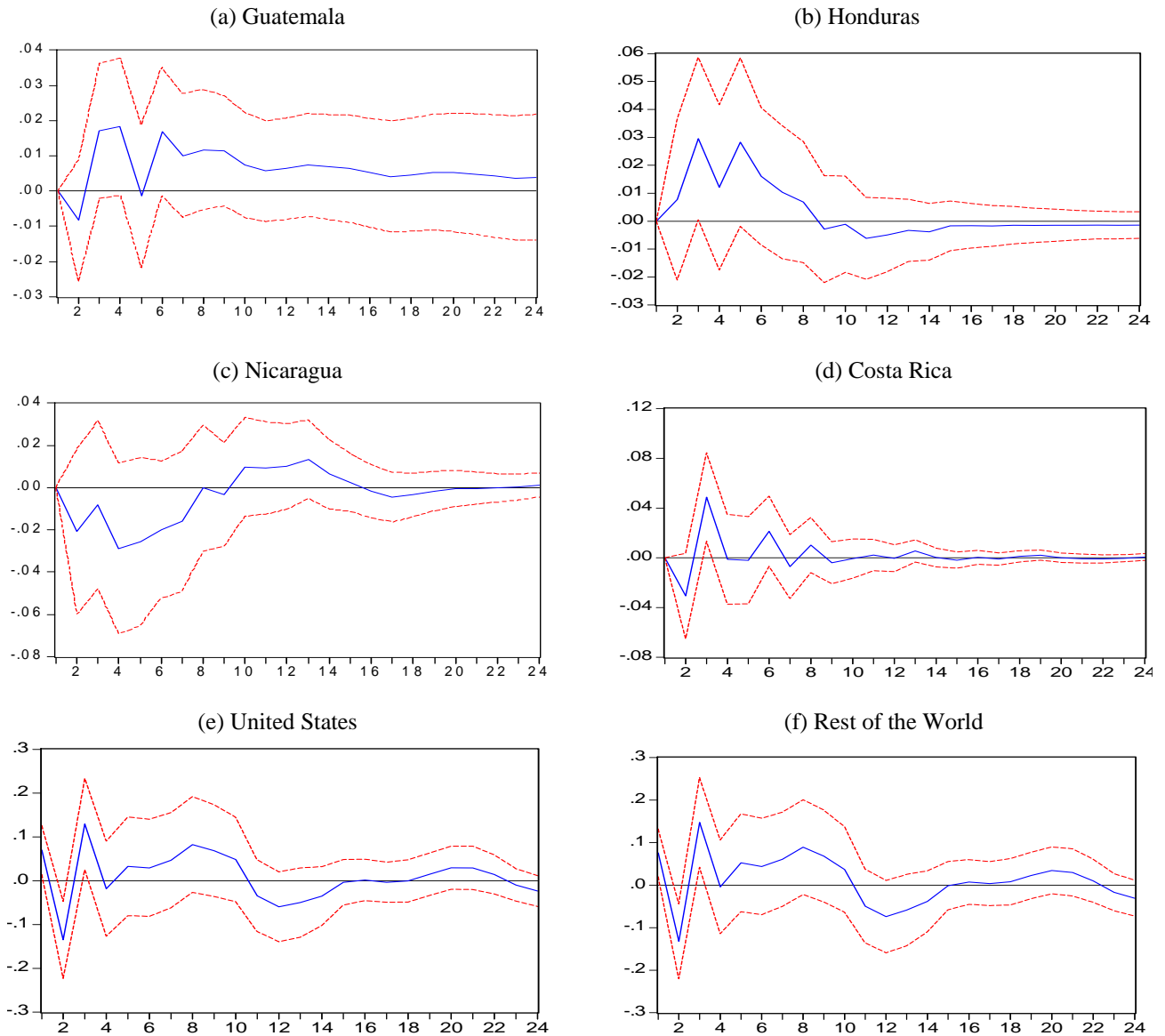
### **Imports from Guatemala**

The response of El Salvador's imports from Guatemala is shown in Figure 12a. It shows a small drop after two months, and a subsequent surge. The initial drop in imports from Guatemala may be explained by the concomitant drop occurring in the index of economic activity, shown in Figure 9b above. In effect, during the first five months, imports from Guatemala resemble the response shown by El Salvador's index of economic activity. However, from then on, the demand for imports, fueled by remittances, overcomes the drop in the index of economic activity. The net result is that import growth is sustained throughout the period, and thus, contrary to what occurs to the domestic economy, remittances positively stimulate Guatemala's economic activity (see Figure 12a).

### **Imports from United States and rest of the world**

Figures 12e and 12f show the responses of the imports from the U.S. and from the rest of the world. It can be seen that in both cases sharp initial spikes are followed by decreases and cyclical patterns with predominating positive values. Note that the initial positive spikes shown by these two responses differ from those of imports from the Central American countries, which showed initial drops in imports. The accumulated responses indicate large positive responses of these imports (see figures in the Appendix).

Figure 12. Effects of Remittances to Imports from Central American Countries, the United States, and the Rest of the World



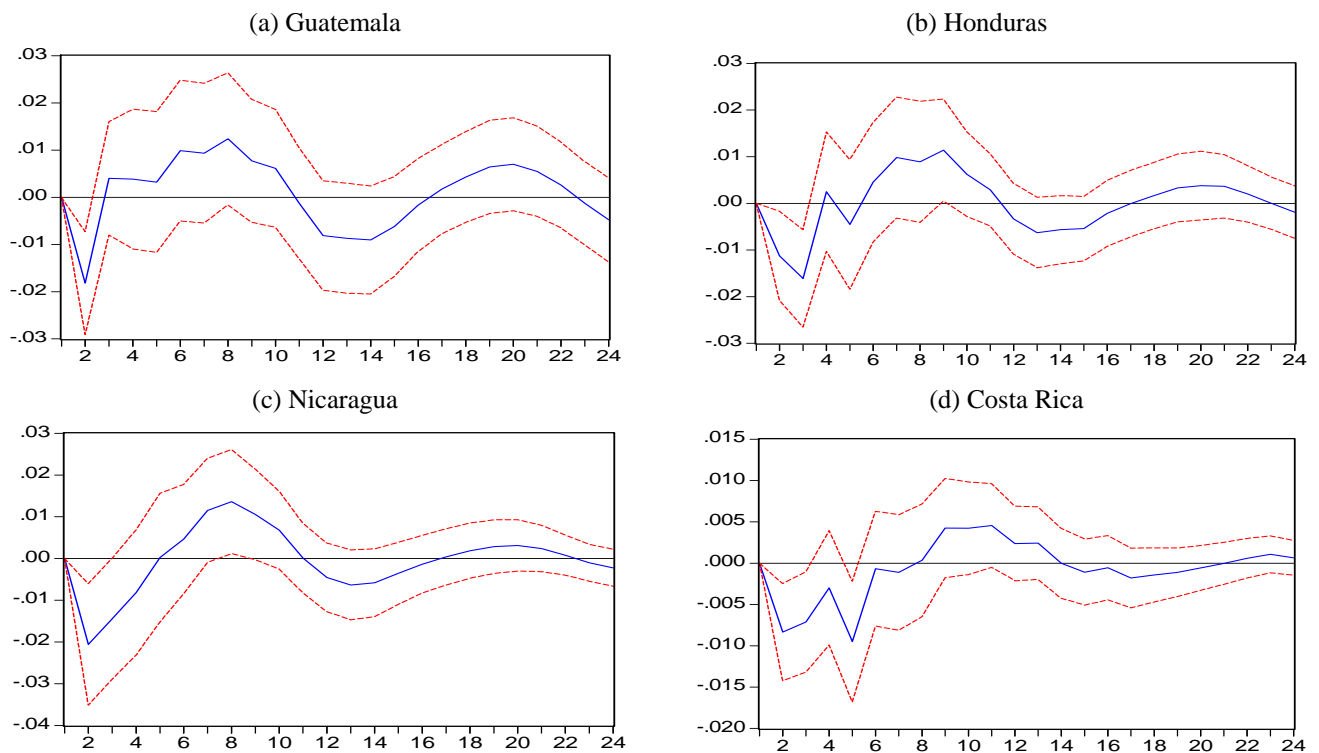
### I. Indices of Economic Activity of Other Central American Countries

The responses of the indices of economic activity of the other Central American countries (Figures 13a–13d) are similar in the sense they show an initial drop after two or three months. This is followed by a recovery that attains a maximum positive value after eight or nine months (or 11 months for Costa Rica). A cyclical pattern is noted with a decaying trend more pronounced for Nicaragua and Costa Rica, which may be explained by their longer distance from El Salvador. The amplitude of these cycles is larger than those of the exports to and imports from the rest of Central America, as will be seen below.

In effect, the indices of economic activity show a weaker tendency to decay to zero, especially for Guatemala, which represents 60 percent of El Salvador's Central American exports and 65 percent of its Central American imports. The accumulated responses show positive values at the end of the period, although small for Costa Rica. This contrasts with the negative accumulated value shown by El Salvador's index of economic activity. Thus, remittances promote economic growth in all Central American countries, except in El Salvador.

The differences in the magnitude and persistence of the country responses could be related to their trade links between El Salvador and the rest of the Central American countries (see Section III).

Figure 13. Effects of El Salvador's Remittances on Economic Activity of Other Central American Countries

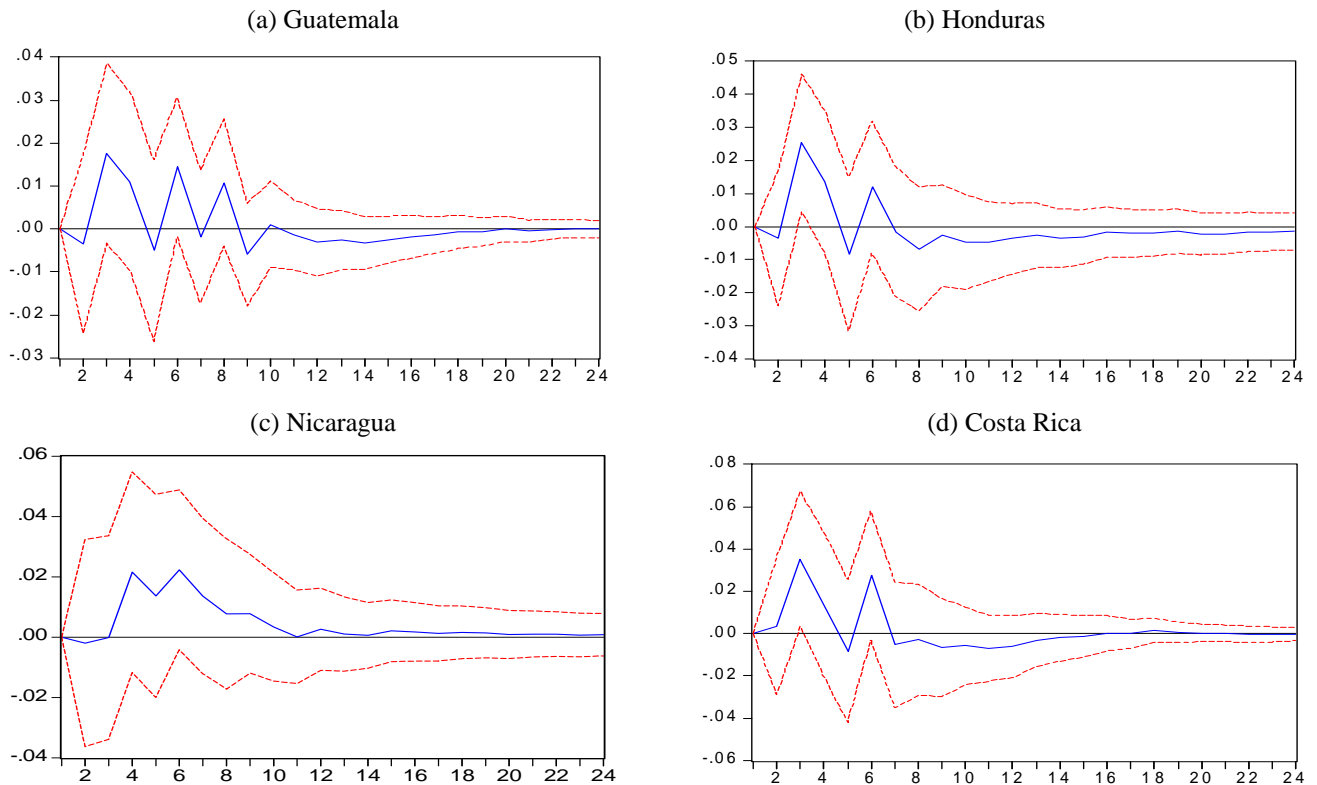


### J. El Salvador's Exports to Central America

El Salvador's exports to Central America show a similar pattern of responses although different magnitudes depending on the importing country (Figures 14a–14d). Those destined to Guatemala increase after an initial small drop, reaching a maximum value after three months. Thereafter, they start to decrease, showing negative values after eight months, and remaining negative for the rest of the period. All cases were characterized by two positive spikes—three in the case of Guatemala—followed by rapid decay to negative values that approach or reach zero at the end of the period. Thus, no definite inference can be made on the net effect of remittances on the balance of trade with other Central American countries.



Figure 14. Effects of El Salvador's Remittances on Exports to Central America



## VI. CONCLUSIONS AND ECONOMIC POLICY IMPLICATIONS

Certainly, remittances play an important role in Salvadoran economy. They support a high level of private consumption, financing imports of consumption goods and risky loan provision of the banking system. Moreover, the social benefits of remittances are important in terms of reducing poverty rates and increasing education rates. However, the results presented in this paper suggest that remittance inflows also have adverse macroeconomic effects in the short run, in the sense that such inflows lead to (1) an appreciation of the real exchange rate; (2) an increase in consumer prices, the interest rate, and imports; and (3) a decrease in economic activity, money supply, and international reserves. Initiated by a remittance inflow, these adverse effects are intensified by the policy reaction of the Central Reserve Bank (see Section III).

These results for El Salvador contrast with the beneficial impacts exerted on the other Central American countries, in terms of the increases in their indices of economic activity. Both exports to other Central American countries and imports from them are positively stimulated by remittances, with impulse response functions decaying rapidly in Nicaragua and Costa Rica—the countries with relatively fewer trade links to El Salvador.

The results obtained in this paper indicate important challenges for Salvadoran policymakers to avoid these undesired macroeconomic effects of remittances. To maximize the benefits of remittances, the macroeconomic policy should be redesigned to be consistent with the dollarization regime and to ensure that at least a proportion of remittances are channeled to productive projects in line with the Fund's recommendation.<sup>13</sup> Specifically, the results identify several issues with the present policy framework that need to be addressed:

- Redesign the central bank policy to avoid inconsistency with the dollarization regime and avoid reducing the benefits of remittances;
- Review the fiscal policy with a view to promoting national saving and investment;
- Strengthen regulation and supervision of the financial system with a view to limiting lending toward consumption and with higher risk and costs; and
- Continue with the structural reform agenda to improve competitiveness and consolidate a series of initiatives by a public-private strategy that supports new investments; and ideas to develop higher-productivity activities and nontraditional products that can be produced profitably at the local level as well as the development of new business opportunities.<sup>14</sup> In this way, the policy thrust should consist of promoting (1) private investment by diverse means, including policy intervention to direct remittances investment (e.g., public-private collaborative strategy to promote investment for new activities, as has been employed by Chile), (2) public investment in infrastructure and education, and (3) support for innovation in technology and for technical education, so as to generate the productive capacity that would satisfy the demand created by remittances. These policies are of paramount importance, given that remittances will eventually decrease. This has been the case in many other countries that have experienced strong migration outflows. If there is no additional productive capacity when remittances reduce or cease, the ensuing scenario in a dollarized economy could be characterized by a collapse of the economy and the banking system, and social instability.

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<sup>13</sup> See "El Salvador: 2004 Article IV Consultation."

<sup>14</sup> See Rodrik Dani and Ricardo Hausman (2003) and (2005), who conclude that market failures in the process of "self-discovering" El Salvador's productive potential is a main obstacle to investment and growth and the economic policies should tackle this constraint.

## APPENDIXES

**I. Augmented Dickey-Fuller Test  
(data dependent lag) 1/**

The log of the variables	Intercept	Trend and Intercept	None
Consumer price index	-2.54	-3.521**	5.25***
Index of economic activity	-2.039	-3.43*	-0.52
Remittances	-0.053	-8.40***	2.53**
Money	-2.08	-0.69	3.12***
Interest rate	-2.08	-3.72**	-1.84*
Real exchange rate	-4.58***	-3.97**	-1.86*
International reserves	-2.04	- 1.07	1.04
Imports from the United States	-5.17***	-7.06***	-1.98**
Imports from rest of world	-4.56***	-6.71***	-1.82*
Index of economic activity of Costa Rica	-2.29	-10.01***	0.32
Index of economic activity of Guatemala	-4.60***	-9.77***	-0.30
Index of economic activity of Honduras	-1.61	-3.32*	0.69
Index of economic activity of Nicaragua	-3.46	-6.49***	0.14
Imports from Costa Rica	-2.29	-10.01***	0.32
Imports from Guatemala	-1.66	-6.43***	0.60
Imports from Honduras	-1.61	-7.94***	1.05
Imports from Nicaragua	-1.97	-6.01***	0.134
El Salvador's exports to Costa Rica	-4.99***	-4.97***	-0.28
El Salvador 's exports to Guatemala	-0.70	-11.35***	1.24
El Salvador's exports to Honduras	-1.60	-3.34*	0.60
El Salvador's exports to Nicaragua	-1.34	-4.31***	0.60

1/ Number of lags = four

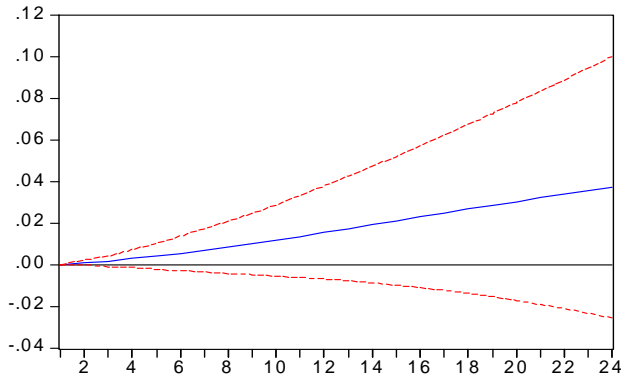
\*  $H_0$  of unit root is rejected at the 10 percent level

\*\*  $H_0$  of unit root is rejected at the 5 percent level

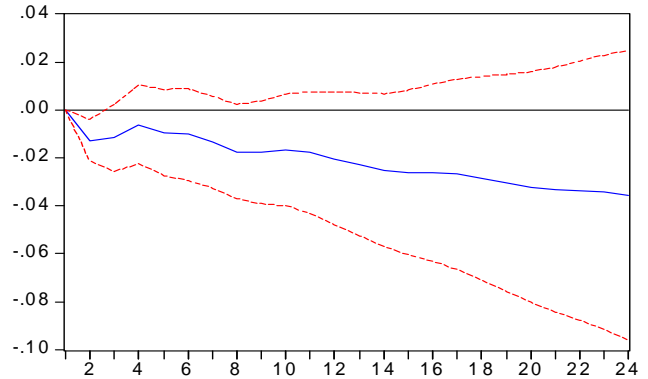
\*\*\*  $H_0$  of unit root is rejected at the 1 percent level

## II. Accumulated Response of Remittance to Various Dependent Variables

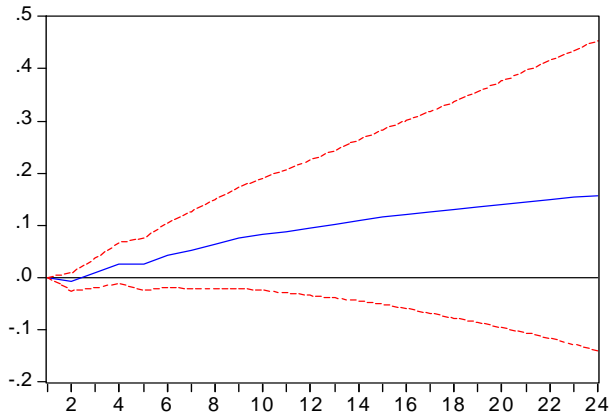
Accumulated Response of Consumer Prices to Cholesky  
One S.D. Remittances Innovation



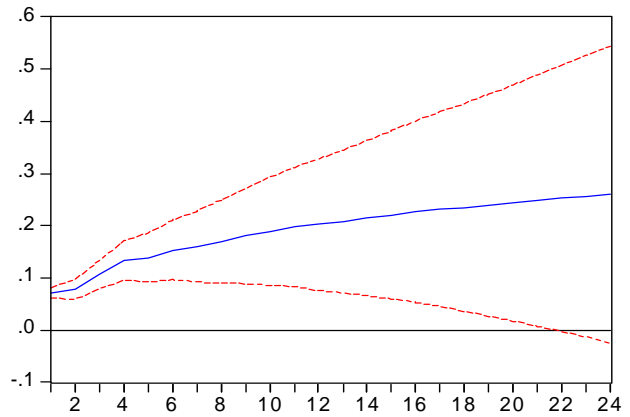
Accumulated Response of El Salvador's index of economic activity to Cholesky  
One S.D. Remittances Innovation



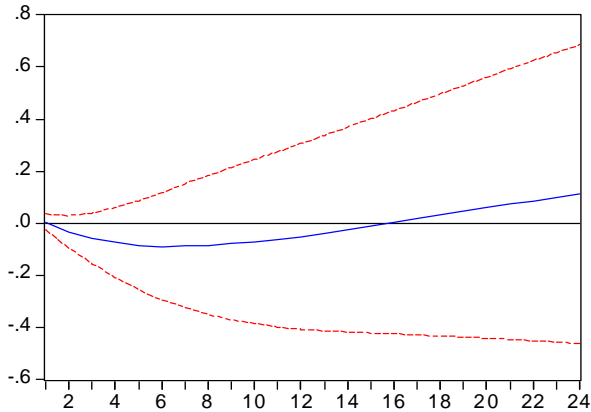
Accumulated Response of El Salvador's Imports from Guatemala to Cholesky  
One S.D. Remittances Innovation



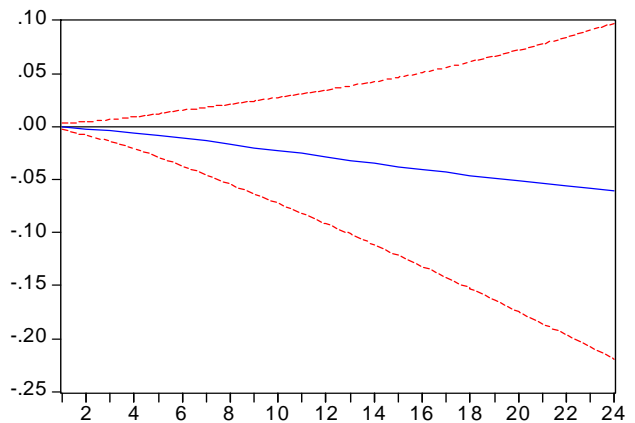
Accumulated Response of Remittances to Cholesky  
One S.D. Remittances Innovation



Accumulated Response of Interest rate to Cholesky  
One S.D. Remittances Innovation

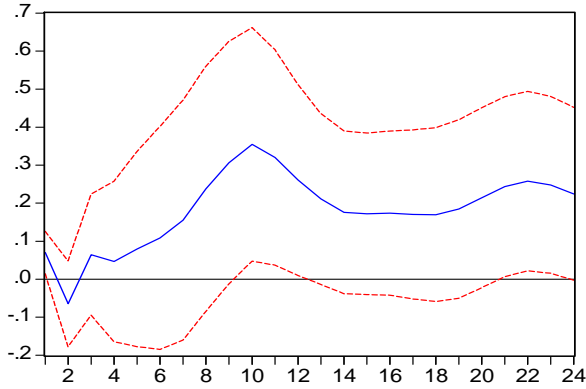


Accumulated Response of Money Supply to Cholesky  
One S.D. Remittances Innovation

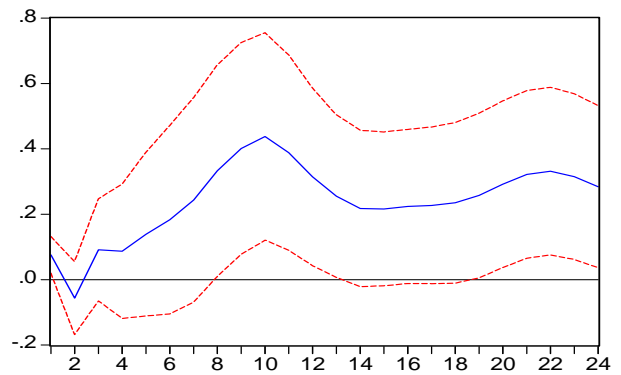


S.D. :Standard Deviation

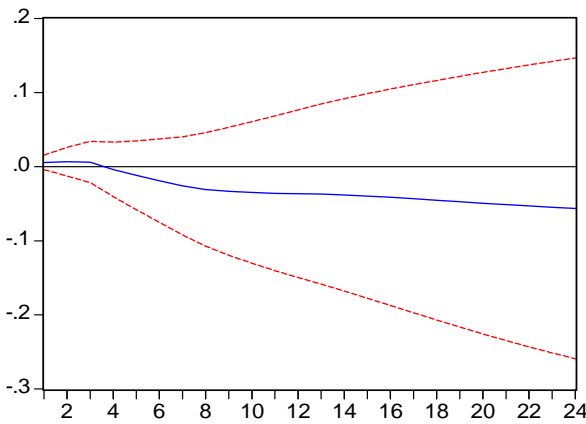
Accumulated Response of El Salvador's Imports from the U.S. to Cholesky  
One S.D. Log (REMESASELSA) Innovation



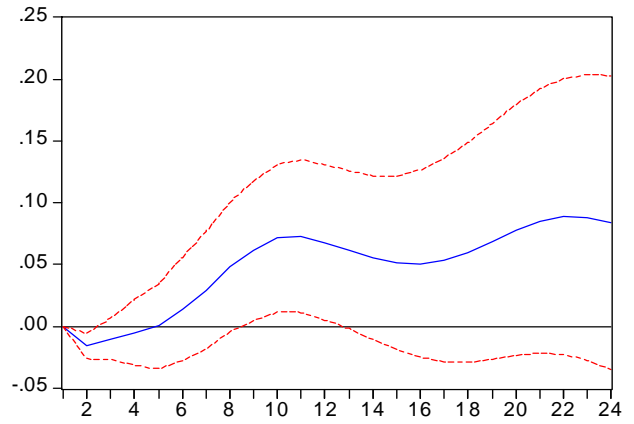
Accumulated Response of El Salvador's Imports from the Rest of the World to Cholesky  
One S.D. Remittances Innovation



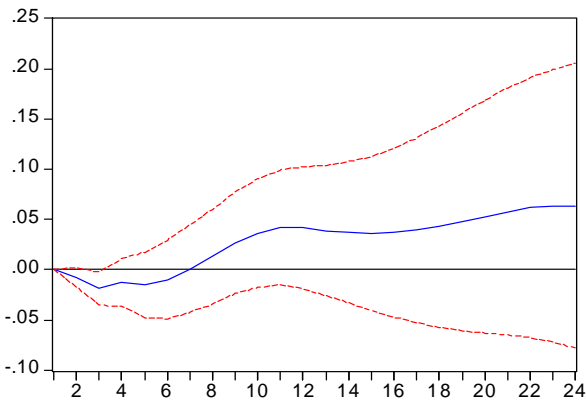
Accumulated Response of International Reserves to Cholesky  
One S.D. Remittances Innovation



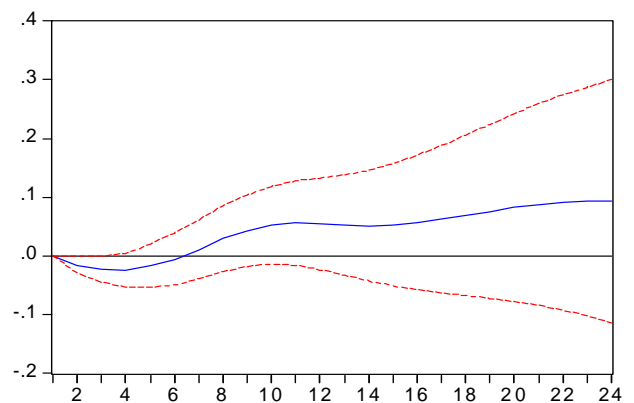
Accumulated Response of Guatemala's index of economic activity to Cholesky  
One S.D. Remittances Innovation



Accumulated Response of Honduras's index of economic activity to Cholesky  
One S.D. Remittances Innovation



Accumulated Response of Nicaragua's index of economic activity to Cholesky  
One S.D. Remittances Innovation



S.D.: Standard Deviation.

## References

- Cáceres, Luis René, 2000, "Integración Monetaria en las Regiones Centroamericana y Andina," *Comercio Exterior*, Vol. 50, No. 7 (July).
- , 2003, "Remesas y Desarrollo Rural en Centroamérica," *Estudios Centroamericanos*, October
- , 2005a, "Remesas y Macroeconomía en El Salvador" (forthcoming in *Comercio Exterior*).
- , 2005b, "Short Run Macroeconomic Effects of Remittances in El Salvador" (forthcoming in *Savings and Development*).
- Carlino, Gerald A., 1998, "Monetary Policy and the U.S. States and Regions: Some Implications for the European Monetary Union," Federal Reserve Bank of Philadelphia, Working Paper No. 98-17 (July).
- Cartagena, Edgar R., 2004, "Las Remesas Familiares y su Relación con los Ciclos y Shocks Económicos," Banco Central de Reserva de El Salvador, Documento Ocasional No. 2004/01 (San Salvador).
- Castro, Alvaro, 2004, "El Impacto de las Remesas en la Pobreza e Ingreso de los Hogares Salvadoreños," *Realidad*, San Salvador, Universidad Centroamericana José Simeón Canas, Vol. 97 (January/February), pp. 37–66.
- Central Reserve Bank of El Salvador, *Revista Trimestral*, October–December 2004.
- Christiano, Lawrence L., Martin Eichenbaum, and Charles L. Evans, 1998, "Monetary Policy Shocks: What Have We Learned and to What End?," NBER Working Paper No. 6400 (Cambridge, Massachusetts: National Bureau of Economic Research).
- Clements, Benedict, Zenon G. Kontolemis, and Joaquín Levy, 2001, "Monetary Policy Under EMU: Differences in the Transmission Mechanism?" IMF Working Paper 01/102 (Washington: International Monetary Fund).
- Cox-Edwards, Alejandra, and Manuelita Ureta, 2003, "Internacional Migration, Remittances and Schooling: Evidence from El Salvador," *Journal of Development Economics*, Vol. 72, No. 2 (December), pp. 429–61.
- Delgado, Pedro Abelardo, and Gabriel Siri, 1995, "Uso Productivo de las Remesas Familiares en El Salvador," Fundación Salvadoreña para el Desarrollo Económico y Social, San Salvador (January).

- Hausmann, Ricardo, and Dani Rodrik, 2002, "Economic Development as Self-Discovery," NBER Working Paper (March).
- Inter-American Development Bank (IADB), Multilateral Investment Fund, 2004, *Sending Money Home: Remittances to Latin America and the Caribbean* (Washington).
- Lopez-Calix, Jose Roberto, and Mitchell Seligson, 1990, "Small Business Development in El Salvador: The Impact of Remittances," Report of the Commission for the Study of International Migration and Cooperative Development (Washington: Government Printing Office).
- Jansen, Jos W., 2003, "What Do Capital Inflows Do? Dissecting the Transmission Mechanism for Thailand, 1980–1996," *Journal of Macroeconomics*, Vol. 25, No. 4 (December), pp. 457–80.
- Peersman, Pert, 2004, "The Transmission of Monetary Policy in the Euro Area: Are the Effects Different Across Countries?" *Oxford Bulletin of Economics and Statistics*, Vol. 66, No. 3, pp. 285–308.
- Rajan, Raghuram G., and Arvind Subramanian, 2005, "What Undermines Aid's Impact on Growth?," IMF Working Paper 05/126 (Washington: International Monetary Fund).
- Ramaswamy, Ramana, and Torsten Slök, 1977, "The Real Effects of Monetary Policy in the European Union: What Are the Differences?," IMF Working Paper 97/160 (Washington: International Monetary Fund).
- Rivera Campos, Roberto, 1996, "La Potencial Contracción de las Remesas y el Financiamiento de la Economía Salvadoreña," *Boletín del CEMLA*, (November–December).
- , 1998, "Mal Holandés, Esterilización Monetaria y Tasa de Interés Real en El Salvador," Instituto de Economía Aplicada, Serie Documentos de Investigación, No. 1, San Salvador (July).
- , and Anabella Lardé de Palomo, 2002, "Invirtamos en Educación para Desafiar el Crecimiento Económico y la Pobreza," Fundación Salvadoreña para el Desarrollo Económico y Social, San Salvador (May).
- Rodrik Dani and Ricardo Hausmann (2003), "Discovering El Salvador's Production Potential," part of a report on El Salvador's economic strategy, Fundación Salvadoreña para el Desarrollo Económico y Social, San Salvador, (September).
- Rodrik Dani and Ricardo Hausmann (2005), "Self Discovering in a Development Strategy for El Salvador," Harvard University, (September).
- Saca, Nolvía N., 1990, "Exchange Controls, Transfers and Export Competitiveness: Theory and Some Evidence from El Salvador," Kiel Institute of World Economy (May).

- , 1997, *Black Market Exchange Rate, Unification of the Foreign Exchange Markets and Monetary Policy: The Case of El Salvador* (Bern, Switzerland: Peter Lang, Europaischer Verlag der Wissenschaften).
- , and Orlando Martinez, 1998, “Fiscal and Monetary Policies and its Impact in El Salvador’s Economy and Financial System,” study prepared for the Banking Association in El Salvador (ABANSA), San Salvador (December).
- Velasco, Andrés, 2004, “Finance in El Salvador: Avoiding Crises, Nurturing Growth,” study prepared for Fundación Salvadoreña para el Desarrollo Económico y Social (FUSADES), San Salvador, El Salvador.
- Yang, Dean, 2003, “Risk, Migration, and Rural Financial Markets: Evidence from Earthquakes in El Salvador” (unpublished; Ann Arbor, Michigan: Gerald R. Ford School of Public Policy, Department of Economics, University of Michigan).