BANCO DE GUATEMALA

Documentos de Trabajo

CENTRAL BANK OF GUATEMALA

Working Papers

No. 69

THE ROLE OF MONETARY POLICY IN AN OPTIMAL CURRENCY AREA (CENTRAL AMERICAN CASE)

Año 2002

Autor:
Luis F. Granados Ambrosy*

*Departamento de Investigaciones Económicas
Banco de Guatemala

BANCO DE GUATEMALA

La serie de Documentos de Trabajo del Banco de Guatemala es una publicación que divulga los trabajos de investigación económica realizados por el personal del Banco Central o por personas ajenas a la institución, bajo encargo de la misma. El propósito de esta serie de documentos es aportar investigación técnica sobre temas relevantes, tratando de presentar nuevos puntos de vista que sirvan de análisis y discusión. Los Documentos de Trabajo contienen conclusiones de carácter preliminar, las cuales están sujetas a modificación, de conformidad con el intercambio de ideas y de la retroalimentación que reciban los autores.

La publicación de Documentos de Trabajo no está sujeta a la aprobación previa de los miembros de la Junta Monetaria del Banco de Guatemala. Por lo tanto, la metodología, el análisis y las conclusiones que dichos documentos contengan son de exclusiva responsabilidad de sus autores y no necesariamente representan la opinión del Banco de Guatemala o de las autoridades de la institución.

**********©**********

The Central Bank of Guatemala Working Papers Series is a publication that contains economic research documents produced by the Central Bank staff or by external researchers, upon the Bank's request. The publication's purpose is to provide technical economic research about relevant topics, trying to present new points of view that can be used for analysis and discussion. Such working papers contain preliminary conclusions, which are subject to being modified according to the exchange of ideas, and to feedback provided to the authors.

The Central Bank of Guatemala Working Papers Series is not subject to previous approval by the Central Bank Board. Therefore, their methodologies, analysis and conclusions are of exclusive responsibility of their authors, and do not necessarily represent the opinion of either the Central Bank or its authorities.

The Role of Monetary Policy in an Optimal Currency Area (Central American Case)

By Luis F. Granados Ambrosy [1]

July 2002

[1] Economic Research Department
Central Bank of Guatemala
The views and opinions expressed are those of the author only.

Abstract

The paper includes three sections. The first one, based on the Optimal Currency Area Theory, explores the criteria and contrasts opinions about the economic integration degree between a country and a fixed-exchange-rate area allows that country to reap a monetary efficiency gain or losses when it fixes its exchange rate against the area´s currencies. Then, in the second and third part, the idea is to measure symmetry among Central American countries through different methodologies, in order to determine what the probability is to get monetary policy efficiency in an Optimum Currency Area and to determine what the role of the monetary policy should be. To identify shocks and to study symmetry between countries, measurements based on business cycle, asymmetries from variance decomposition and estimation of a VAR model are used. Those methods provide evidence about the evolution of convergence between the five member countries of the Central American Common Market. Finally, the paper includes an approach about how the future of the Central American Monetary System could be under an optimum currency area and the new role for the Central American Monetary Council which was established to improve monetary policy coordination in Central America.

JEL Classification Numbers: C13, C32, C53, E32, E52 and F33.
Keywords: Monetary Policy, Optimal Currency Areas, Foreign Exchange Regimes, Business Cycle, VAR´s.

Introduction

The first part of the paper, monetary policy in an optimal currency area: a theoretical dilemma, consists of theoretical generalities and history about optimum currency areas, including discussions about macroeconomic, institutional and political factors to understand costs and benefits from a currency area in an economic integration field. In this chapter it is possible to infer how difficult is to get institutional, macroeconomic and political convergence to obtain benefits from the currency area and contrast different points of view regarding how to determine the difference between the monetary efficiency gain from joining and the potential economic stability loss from joining. Also, the chapter includes a description of the most known results from the past, the European Monetary System. In the second part, the econometric methodology, includes a description about the measuring asymmetries and the identification criteria. Also, it is described some notes about business cycle, Vector Autoregresive model –VAR-, the impulse response function and Variance decomposition. In the third part, the empirical results show F-test and significances, VAR results, Impulse Responses and Variance Decomposition.

Finally, the paper includes an approximation about how the future of the Central American Monetary System would be under a monetary union and common currency, and the new role of the Central American Monetary Council, which was established to improve the monetary policy coordination in Central America.

I. Monetary Policy in an Optimal Currency Area[2]: a theoretical dilemma

1. Generalities

In a very general view maintaining the value of the currency and providing liquidity to the economy could be two important issues of monetary policy to promote the most significant objective, price stability. But, how to do it? is the key question, taking into account institutional and structural conditions and instrumental techniques which influence the behavior of monetary policy.

With respect to institutional and structural conditions, for instance, the characteristics of export products and the size of domestic financial markets relative to the international market will drive changes or shocks in the management of monetary policy. For example, changes in the international prices, interest rates, and capital flows, could induce changes in the behavior of the monetary aggregates. Whether those changes are temporary or permanent should be taken into analysis to design the reaction of monetary policy. Also, along the highway of monetary decisions, monetary policy

[2] Grubel (1970) A currency area is defined as a territory with one or several currencies whose relative values are fixed permanently but whose common external value is determined in markets free from official intervention. The relative internal exchange rates can be kept fixed through a variety of arrangements. Mundell argued that currency area formation results in deeper foreign exchange markets, which make it more difficult for any one speculator to affect the market price.

should include constraints like independence, accountability, openness and transparency to explain and justify the actions adopted.

Modeling the monetary policy, the theoretical framework says that money supply in the country and in the region should be manageable by the monetary authority, the central bank. With respect to the money demand, according to the empirical evidence, should be stable at least in the long-run. However, this condition is difficult to observe when macroeconomical and political shocks occur and affect the stability of the macroeconomic fundamentals. How is the behavior of the money demand, and which is the pertinent monetary aggregate, are two of the most important matters to be defined by the monetary policy in the country and within the region. Taking into account the sensitivity of money demand to internal and external shocks, then discretionary faculties should be given to central banks, in order to avoid strong and erratic fluctuations in macroeconomic variables; also, to direct a coordination between the means of payment and macroeconomic prices, foreign exchange rate, wages and international interest rate, integration between domestic credit with public budget and the balance of payment; and, finally, to get short term monetary programming with demand of liquidity and projection of gross domestic product

Giavazzi and Pagano (1988) say that when the monetary authority has an incentive to raise output and to reduce the value of the public debt via unanticipated inflation, the public will rationally discount such incentive in forming their inflation forecast, so that the equilibrium has the two following features: a) the policy-maker does not succeed in surprising the public systematically (and thereby permanently increase employment and government revenue); b) the expected, and actual inflation rate is higher than the one that would prevail if the policy-maker could credibly precommit. That could be true if the response of output and employment to unanticipated inflation is large, and when the government has a high outstanding stock of nominal liabilities and when money demand is inelastic and the revenues from the inflation tax are high. Therefore, the credibility and ability of the monetary authorities to reduce their incentives to produce inflation surprises, could induce the public to expect lower inflation or could be a source of inefficiency, which the optimum currency area is supposed to correct, coordinating and promoting the monetary stability in the region.

Applying in each country the monetary policy as we analyzed before, facilitates a regional adjustment process looking to an optimum currency area. Therefore, the monetary policy of each central bank has to play an integrated role with the rest of economic policies, specially monetary, fiscal, foreign exchange and macroeconomic policy.

According to Kenen (2000) the Mundell's story has three special features: the model used allows each member of a currency union to pursue an independent monetary policy, expenditure-changing shocks play no role in defining an optimum currency area, although they may be asymmetric in origin and impact. When high capital mobility prevents the members of a union from adopting independent monetary policies, those shocks become important; Mundell dealt with a two-country union, the expenditure-switching shock that he studied exhibit a unique mirror-image asymmetry, it raises output in one country and reduces output in the other. That would not be true of an expenditure-switching shock involving a member of the union and a third, outside country; and, because of that same mirror-image asymmetry, a unified, union-wide

fiscal system can cushion the impact of an expenditure-switching shock with little effect on the stance of the unified system.

Under a currency union, countries adopt the same currency and the transaction costs disappear, the net benefits from participating in a currency union increase with the following: the correlation of real shocks between countries; the degree of adjustment provided by fiscal policy instruments and by international labour mobility, as substitute adjustment mechanisms for the exchange rate; the difference between the inflationary bias of the domestic authority from that of the currency union; the variability of domestic monetary shocks, as part of these shocks are transmitted to other countries within the currency union; and, the size of the deadweight and efficiency losses eliminated through the adoption of a single currency. However, other factors will tend to diminish the net benefits of a currency union, including: the variability of real shocks, as these shocks generate adjustment costs in the currency union; the variability of foreign monetary shocks; and, the correlation of monetary shocks between countries, as this decreases the probability that the monetary shocks neutralize each other in a currency union. But, Corsetty and Pesenti (2002) say that the modern applications and revisions stress that asymmetric country-specific shocks represent a key element in the choice of exchange rate regime. Shocks weaken the common currency because countries in a monetary union lose their ability to use domestic exchange rate and interest rate policies for stabilization purposes. In contrast, business cycle synchronization and macroeconomic convergence make a currency area an optimal monetary arrangement when foreign exchange transaction costs are reduced and trade integration across countries is promoted.

Demertzis et al.(1996) formalise the notion that the costs of monetary union are directly related to the degree of asymmetry between national shocks and transmission mechanisms. Hence, to test whether Central America, or some countries, could function well enough as a single currency area, demand firstly evaluate symmetry of shocks issues.

2. The History

As Krugman (1994), says: " a high degree of economic integration between a country and a fixed exchange rate area magnifies the monetary efficiency gain the country reaps when it fixes its exchange rate against the areas currencies". As a result, if countries apply macroeconomical, institutional and political convergence they will get monetary and economic efficiency in an optimum currency area. Then, to implement a currency area it is necessary to know how experiences have been in the past, for instance the European Monetary System.

Flying and looking over the world it is possible to see different kind of experiences about optimal monetary currency approaches. In Europe, for instance, Buiter (1999) considers that monetary policy in the Euro Area has been conjuncturally appropriate after one year of life of the European Central Bank[3] . However, people say

[3] The ECB's monetary strategy has two pillars. A prominent role for money, as signalled by the announcement of a reference value for the growth of a broad monetary aggregate and a broadly based assessment of the outlook for future price developments and the risks to price stability in the euro area as a whole.

that the existence of considerable cyclical divergence between the various national economies in the Euro Area continues, then there are arguments that autonomous national monetary policies and the associated flexibility of nominal exchange rates do not provide a perfect mechanism for responding to asymmetric fundamental shocks. In this issue, Buiter brings to the debate the weaknesses of OCA in the original literature, when failed to distinguish in a consistent way between short term nominal rigidities and long term real rigidities. Then, the monetary policy, whether it works through nominal interest rates, through the credit channel or through the nominal exchange rate, only has real effects at cyclical frequencies, therefore the monetary policy can not be used to eliminate the business cycle. Also, argues Buiter, the second fatal flaw in the OCA literature is its failure to allow for the international mobility of financial capital and for the frequent social inefficiency of the foreign exchange markets. A flexible exchange rate, often driven more by asset market than by fundamentals, can not be manipulated effectively to serve the needs of the real economy. Finally, openness and accountability, including procedural transparency, are important political public goods in a democratic society. They also are indispensable instruments of quality control for the monetary policy process of the Eurosystem. Therefore, Buiter proposes favouring of nominal exchange rate flexibility

Designing the macroeconomic policy as a condition to get an optimum currency area requires, in a stabilization program, to take into account, the optimal combination of three of the most important policies: controlling aggregate demand, correcting distortion in the relative prices system and managing of expectations. First of all, the control of aggregate demand works when inflation is explained by an excess of demand, and it is known which will be the effects on real economic activity. Second, relative prices without distortions lead a real equilibrium of the economy. Therefore, this policy will be relevant to converge in a an optimum currency area. With regard to the management of expectations, these will be a guide of the changes in the critical variables, wages, foreign exchange rate, interest rate, and prices of the most important goods (coffee, oil, etc.).

The efficiency of macroeconomical policy requires of the institutional and coordination support. In this particular sense, a central bank with institutional independence is crucial, at least to get efficiency and coordination of monetary and fiscal policy.

A high degree of economic integration between a country and a fixed-exchange-rate area allows that country to reap a monetary efficiency gain when it fixes its exchange rate against the area´s currencies.

II. The econometric methodology

1. Measuring Asymmetries

Assessing criteria for optimal currency areas mean two relevant dimensions, measuring asymmetry and assessing compensating adjustment mechanisms. First of all, among the most common approaches to test asymmetry have been measures of shocks and business-cycle asymmetry with Vector Autoregressions –VAR- , volatility of real exchange rates test, in an optimal currency area, the basic idea is that less volatility

means more symmetric shocks, make cluster analysis and principal components to identify similarity between countries and take a look about regional/industrial disaggregation to know the real economic vulnerability. On the other hand, estimate a compensating adjustment mechanism require for instance, to perceive the differences of labour mobility and wages flexibility, fiscal sustainability and market mechanisms in smoothing consumption. In our particular study, we place emphasis in the first criteria to measure asymmetries.

Therefore, when governments smooth exchange rates, do they merely transfer the volatility elsewhere in the economy or do they simply reduce the volatility of the nominal exchange rate.

2. Identification criteria

Enders (1996) sets that tools employed by VAR analysis-granger causality, impulse response analysis and variance decomposition can be helpful in understanding the interrelationships among economic variables and in the formulation of a more structured economic model.

The goal of a VAR analysis is to determine the interrelationships among the variables, not to determine the parameter estimates. The main argument against differencing is that it throws away information concerning the comovements in the data. Similarly, it is argued that the data need not be detrended. In a VAR, a trending variable still be well approximated by a unit root plus drift. However, the view of the majority is that the form of the variables in the VAR should mimic the true data generating process. This is particularly true if the aim is to estimate a structural model. Enders (1996).

Using a 5-variable VAR framework to examine the relationship between the monetary aggregate and other variables, we are going to include the following: foreign exchange rate, money, output, inflation rate and interest rate.

2.1 Business Cycle[4]

Between the most common methods to measure business cycle, we find static and dynamic methods. First, the measure of the aggregate variability of the business cycle can be determined by simply computing the variance of any variable for the countries in the region measuring business cycle. While the dynamic analysis has been working through the Hodrick-Prescott filter decomposing a variable into cyclical and trend components. The results series of cyclical components are studied for static relationships using correlation and graph analysis; long run relationships, using autoregressive distributed lag models; and, short run relationships, using error correction models as the most common methods to test the cyclical behaviour.

[4] A cycle is a stationary process, which explicitly takes the cyclical behaviour of this component into account.

The formulation of cycles gives a formal representation of the impulse-propagation dynamics. Bentoglio and Fayolle (2002) say that the cyclical componentes extracted from a series are the result of a time series of random impulses, called innovations by a statistician and shocks by an economist, characterised by a given variance, that is applied to a mechanism of cyclical propagation, characterized by a virtual periodicity and a damping factor, as a result, the cyclical component is basically a succession of expansions and recessions which can incorporate actual variations in the length, magnitude and profile of the successive cycles. Then, the series of shocks are revealed by the actual history.

2.2 Vector autoregressive model

In the last years empirical studies about monetary policy and real economic activity have been using some basic tools like vector time series processes. For instance, the Vector Autoregressive Model due to Sims (1980) to study the dynamic economic system in multiequation time series models. The most commom approaches are bivariate, trivariate and larger systems. Enders (1995) describes, when we are not confident that a variable is actually exogenous, a natural extension of transfer function analysis is to treat each variable symmetrically. For example, in a two variable case, letting the time path of $\{y_t\}$ be affected by current and past realizations fo the $\{z_t\}$ and let the time path of the $\{z_t\}$ sequence be affected by current and past realization of the f$\{y_t\}$ sequence. In a simple bivariate system:

$$y_t = b_{10} - b_{12} z_t + \gamma_{11} y_{t-1} + \gamma_{12} z_{t-1} + \varepsilon_{yt} \qquad (1)$$

$$z_t = b_{20} - b_{21} y_t + \gamma_{21} y_{t-1} + \gamma_{22} z_{t-1} + \varepsilon_{zt} \qquad (2)$$

ε_{yt} z_t It is necessary to assume that both y_t and z_t are stationary, ε_{yt} and ε_{zt} are white noise disturbances with standard deviations of σ_y and σ_z, respectively; and $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ are uncorrelated white-noise disturbances. Those equations constitute a first-order vector autoregression VAR since the longest lag length is unity. Transforming the system of equations into a more usable form, using matrix algebra, the system in compact will be:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

or

$$Bx_t = \Gamma_0 + \Gamma_1 x_{t-1} + \varepsilon_t$$

Where

$$\varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} B = \begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix}, \quad x_t = \begin{bmatrix} y_t \\ z_t \end{bmatrix}, \quad \Gamma \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix}, \quad \Gamma_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix}, \quad \varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

previously to be multiplied by B^{-1} allows to obtain the vector autoregressive (VAR) model in standard form"

$$x_t = A_0 + A_1 x_{t-1} + e_t \tag{3}$$

Where $A_0 = B^{-1}\Gamma_0$

$A_1 = B^{-1}\Gamma_1$

$e_t = B^{-1}\varepsilon_t$

Then a VAR in estandar form could be:

$$y_t = a_{10} + a_{11} y_{t-1} + a_{12} z_{t-1} + e_{1t} \tag{4}$$

$$z_t = a_{20} + a_{21} y_{t-1} + a_{22} z_{t-1} + e_{2t} \tag{5}$$

The VAR models allow shocks to be distinguished from responses and allow for a disggregation of the shocks to identify their origins (monetary, supply or demand). The most common methodology followed has been that from Blanchard and Quah (1989). The estimation of a VAR model leads to the estimation of residuals as a by-product. Then, econometric theory will help to decompose these residuals into several structural components. The transmission of these shocks can be analyzed through the construction of impulse response functions.

Although VAR methods, as Spencer (1989) says, have also generated some controversial empirical results. For instance, sometimes the results implied that money supply shocks do not help in explaining future movements in real economic activity. Those results challenge the empirical relevance of a broad range of traditional macroeconomic models and have given fundamental support to the development and credibility of real business cycle theories since the evidence is interpreted to require a nonmonetary explanation of business cycle fluctuations.

In the practice we are interested in the effects of policy on several dimensions of an economy's macroeconomic performance. For instance, to see how interest rate and exchange rate respond in short term to changes of policy actions.

In our particular case of study, the utility of the VAR model investigated is using monthly data of foreign exchange rate, money, output, prices and interest rates.

2.3 The impulse response function

Enders(1995) indicates that an autoregression has a moving average representation, then a vector autoregression can be written as a vector moving average (VMA) , essential feature of the methodology of Sims (1980) in that it allows to trace out the time path of the various shocks on the variables contained in the VAR system. With our same bivariate model we get:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \qquad (6)$$

taking into account the stability condition:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} e_{1t-i} \\ e_{2t-i} \end{bmatrix} \qquad (7)$$

which expresses $\{y_t\}$ and $\{z_t\}$ in terms of the $\{e_{1t}\}$ and $\{e_{2t}\}$ sequences. In terms of the $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ sequences the vector of errors can be written:

$$\begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} = [1/(1-b_{12}b21)] \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \qquad (8)$$

Combining the last two equations

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + [1/(1-b_{12}b_{21})] \sum_{i=0}^{\infty} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}^i \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \qquad (9)$$

Defining 2 x 2 matrix Φ_i with elements Φ_{jk}:

$$\Phi_i = [A_1^i/(1-b_{12}b_{21})] \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix}$$

Writting in a moving average representation equations 4 and 5 in terms of $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ sequences:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} \Phi_{11}(i) & \Phi_{12}(i) \\ \Phi_{21}(i) & \Phi_{22}(i) \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{zt-i} \end{bmatrix}$$

The four sets of coefficients $\Phi_{11}(i)$, $\Phi_{12}(i)$, $\Phi_{21}(i)$ and $\Phi_{22}(i)$ are called the impulse response functions. Plotting those functions is a practical way to see the behavior of the $\{y_t\}$ and $\{z_t\}$ series in response to the various shocks.

2.4 Variance Decomposition

In the most classical VAR´s methodology, the relationships among macroeconomic time series use a procedure known as "variance decomposition". Each variable is expressed as a linear combination of its own current innovation (error) and lagged innovations of all the variables in the system. If there is no contemporaneous correlation among the innovations, it is possible to uniquely decompose the variance of each variable into componentes accounted for by each innovation.

Since unrestricted VAR´s are overparameterized, they are not particularly useful for short term forecasts. Then, variance decomposition tells us the proportion of the movements in a sequence due to its own shoks versus shocks to the other variable. If e_{zt} shocks explain none of the error variance of $\{y_t\}$ at all values, it is possible to say that the $\{y_t\}$ sequence is exogenous. In such circumstance, says Enders (1995), the $\{y_t\}$sequence would evolve independently of the ε_{zt} shocks and $\{z_t\}$ sequence. At the other extreme would evolve independently of the ε_{zt} shocks could explain all the error variance in the $\{y_t\}$ sequence at all values, so that $\{y_t\}$ would be entirely endogenous. In applied research, it is typical for a variable to explain almost all its forecast error variance at short term.

Then, impulse response analysis and variance decomposition can be useful tools to examine the relationships among economic variables to determine how is the symmetry responding to shocks. And also to determine which shocks are the primary causes of variability in the endogenous variables.

III. Empirical results

Beginning to make our testing, in this particular case of study, the utility of equation VAR model investigated is to use a measure of foreign exchange rate, money, real output, prices and interest rates, our n-equation VAR could be portraited by

$$\begin{bmatrix} E_{1t} \\ M_{2t} \\ Y_{3t} \\ INF_{4t} \\ INT_{5t} \end{bmatrix} = \begin{bmatrix} I_{10} \\ I_{20} \\ I_{30} \\ I_{40} \\ I_{50} \end{bmatrix} + \begin{bmatrix} E_{11}(L) & E_{12}(L) & . & E_{1n}(L) \\ M_{21}(L) & M_{22}(L) & . & M_{2n}(L) \\ . & . & . & . \\ INT_{N1}(l) & INT_{n2}(L) & . & INT_{nn}(L) \end{bmatrix} \begin{bmatrix} E_{1t-1} \\ M_{2t-1} \\ . \\ INT_{nt-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ . \\ e_{nt} \end{bmatrix} \quad (10)$$

We include variables, the parameters representing intercept terms, polynomials in the lag operator, lags and shocks.

Unquestionably, we do not live in a world with linear countries, the behaviour of the fundamentals in the Central American Countries evidence interesting results in the last seven years, as follows:

Central America F-test and Significance

1995-2001

	Guatemala		El Salvador		Honduras		Costa Rica		Nicaragua	
	F-Statistic	Signif	F-Statistic	Signif	F-Statistic	Signif	F-Statistic	Signif	F-Statistic	Signif
Money										
Inflation	1,1511	0,4113	1,5922	0,2247	5,0392	0,0058	0,6716	0,748	0,9717	0,5224
Echange rate	0,8543	0,6063	1,3167	0,3279	2,4219	0,07686	1,5728	0,2307	0,4977	0,8768
Interest rate	0,3493	0,9579	1,5867	0,2264	5,0392	0,00584	0,815	0,6361	0,4817	0,8874
Growth	0,3896	0,5104	1,0885	0,447	4,0359	0,01385	0,7039	0,72264	40.6	0
Foreign Exchange										
Inflation	1,2096	0,378	0,6694	0,7497	0,9087	0,5664	2,1024	0,1144	0,7464	0,6892
Money	0,2931	0,9773	0,7781	0,6645	0,6725	0,7473	3,7803	0,0176		
Interest rate	0,3878	0,9408	0,2629	0,9549	1,0502	0,4711	1,9523	0,1371	0,5485	0,8416
Growth	0,9896	0,5104	0,3805	0,8443	1,039	0,4782	1,1519	0,4053	1,634	0,2122
Interest Rate										
Inflation	0,9877	0,5116	1,2671	0,351	0,9805	0,5165	0,4146	0,9271	0,3203	0,9687
Echange rate	0,688	0,7351	1,3558	0,3108	1,4093	0,2867	0,5127	0,8668	1,4372	0,2778
Money	1,4457	0,2746	1,5388	0,2418	2,199	0,1012	0,4069	0,9312		
Growth	1,479	0,2623	1,7212	0,1886	0,9442	0,5414	0,586	0,814	0,553	0,8384
Inflation										
Money	0,824	0,7851	0,6883	0,7348	1,0102	0,4967	1,9398	0,1412		
Echange rate	0,2814	0,9805	0,6043	0,8002	1,6698	0,2022	2,9745	0,0405	0,9748	0,5203
Interest rate	0,3938	0,9378	1,2612	0,3538	1,9471	0,1398	2,5668	0,0646	0,7191	0,7106
Growth	1,075	0,4556	1,3139	0,3291	0,8015	0,6464	2,0295	0,1256	0,9162	0,5611

The F-test indicates that, at conventional significance level, in Central America money Granger-causes more inflation, exchange rate and interest rate than economic growth. Foreign Exchange rate Granger-causes more inflation than changes in interest rates, except in Costa Rica where foreign exchange Granger-causes inflation, money, interest rate and economic growth. Interest rate Granger-causes all variables in the system in El Salvador and the other countries interest rate Granger-causes more money, economic growth and foreign exchange rate. Finally, inflation Granger-causes more changes in exchange rate than the other variables, except in El Salvador.

With respect to impulse responses, in Central American countries, a one-standard-deviation-shock in money in Guatemala (0.0000001) induces consistent contemporaneous increases in inflation (0.00274) units and a contemporaneous decrease in output of –0.00521 units. In El Salvador, a one-standard-deviation-shock in money (0.06956) induces consistent contemporaneous increases in inflation (0.05169) units and after one step a contemporaneous decrease in interest rate of –0.03023 units. In Honduras, a one-standard-deviation-shock in money induces consistent contemporaneous increases in inflation after one step (0.03144) units and a contemporaneous decrease in output after one step (-0.70367). In Costa Rica, a one-standard-deviation-shock in money induces consistent contemporaneous increases in inflation (0.05759) units and a permanent contemporaneous decrease in output (-0.04638).

Central America Responses to Shock in Money

	Foreign Exchange Rate	Money	Economic Growth	Inflation	Interest Rate
Guatemala					
1	0	0,06956	-0,0052	0,00274	0,00239
2	-0,00219	-0,02509	-0,00812	0,00004	0,00027
3	-0,00069	-0,01001	-0,01176	0,04998	-0,00538
4	-0,00023	-0,0088	-0,01385	-0,02267	0,00877
El Salvador					
1	0	1	0,00861	0,05169	-0,03023
2	0,00029	-0,39279	0,037	0,09705	-0,0016
3	0,00026	-0,29095	0,07988	0,06374	0,02234
4	-0,00044	-0,07873	0,0817	-0,02705	0,00958
Honduras					
1	0	1	0,0111	-0,00025	0,02179
2	0,00546	-0,70367	-0,01447	0,03144	0,00832
3	-0,00118	-0,03179	-0,02892	0,03057	0,03845
4	0,0044	-0,29021	-0,01972	-0,0296	-0,009228
Costa Rica					
1	0	3	-0,04638	0,05759	0,05785
2	0,00576	-1,61933	-0,17995	-0,18491	0,10869
3	0,0248	0,18304	-0,18386	0,04627	-0,07339
4	0,07425	-0,58548	-0,10895	0,19799	-0,08463

With respect to responses to shocks in output, in Central American countries, a one-standard-deviation-shock in output in Guatemala (0.0000001) induces smooth contemporaneous increases in inflation (0.01809) units and a smooth contemporaneous increase in interest rate of 0.00275 units. In El Salvador, a one-standard-deviation-shock in output because of the multiplier effects and the economic behaviour in the last five year induces consistent contemporaneous and strong increases in output (0.003834) units. In Honduras, a one-standard-deviation-shock in output induces consistent contemporaneous increases in inflation (0.12216) units and a smooth increase interest rate (0.04973). In Costa Rica, a one-standard-deviation-shock in output induces consistent contemporaneous increases in interest rate (0.03177) units and a smooth increase in output and inflation (0.07977 and 0.05698), respectively.

Central America Responses to Shock in Output

	Foreign Exchange Rate	Money	Economic Growth	Inflation	Interest Rate
Guatemala					
1	0	0	0,00641	0,18255	0,00275
2	0,00567	0,07372	0,01418	0,01809	0,00439
3	-0,00011	0,00293	0,02018	-0,13104	0,01474
4	-0,0066	-0,0985	0,02397	-0,03236	-0,00097
El Salvador					
1	0	0	0,03834	-0,13612	-0,03439
2	0,00021	-0,35225	0,08311	-0,00629	0,00045
3	-0,00003	0,00299	0,08325	-0,06827	0,01783
4	0,00004	-0,034	0,06019	0,06311	-0,03079
Honduras					
1	0	0	0,09932	0,12216	0,04973
2	0,00703	0,24595	0,16358	0,056737	0,012433
3	0,00356	0,33759	0,13489	0,05441	-0,00351
4	0,00876	-0,49584	0,09133	-0,00469	0,08234
Costa Rica					
1	0	0	0,07977	0,05698	0,03177
2	0,00795	-0,37017	0,09051	0,03711	0,09533
3	-0,00173	-0,109966	0,03442	0,00382	0,05508
4	0,00411	-0,29765	0,02311	-0,04173	0,06966
Nicaragua					
1	0	0,06871	0,20932	0,00871	-0,62883
2	0,0042	0,17197	-0,05605	0,04263	0,11105
3	0,00017	0,22769	0,05783	0,01609	-0,03506
4	0,00133	0,23685	-0,08972	-0,030496	-0,0672

About the responses to shock in foreign exchange rate, in Central American countries, a one-standard-deviation-shock in foreign exchange rate in Guatemala (0.03302) induces consistent contemporaneous increases in inflation (0.11236) units and a smooth decrease in interest rate of 0.0533 units. In El Salvador, a one-standard-deviation-shock in foreign exchange rate induces consistent contemporaneous increases in inflation (0.18515) units. In Honduras, a one-standard-deviation-shock in foreign exchange rate induces consistent contemporaneous increases in inflation (0.08724) units and a decrease in interest rate (-0.05192). In Costa Rica, a one-standard-deviation-shock in foregin exchange rate induces consistent contemporaneous increases in inflation rate (0.0189) units.

Central America Responses to Shock in Foreign Exchange Rate

	Foreign Exchange Rate	Money	Economic Growth	Inflation	Interest Rate
Guatemala					
1	0,03302	0,51302	0,00196	0,11236	-0,0533
2	-0,00409	-0,04362	0,00561	-0,01309	-0,04561
3	0,00104	0,01726	0,01099	-0,07269	0,00508
4	-0,00198	0,02901	0,01626	-0,10121	-0,00738
El Salvador					
1	0,00168	0,79575	0,01339	0,18515	-0,00241
2	-0,00047	-0,04433	0,01854	-0,01123	0,01327
3	-0,00028	0,10658	-0,00504	0,03856	0,01305
4	-0,00032	-0,06691	-0,02501	0,12225	0,02526
Honduras					
1	0,02833	-0,16565	-0,00425	0,08724	-0,05192
2	0,01033	-0,05669	-0,00016	0,12804	0,02738
3	0,00091	-0,20815	0,03196	-0,00681	-0,02272
4	-0,005	0,12649	0,04952	0,03842	-0,0572
Costa Rica					
1	0,03902	0,54595	0,0172	0,0189	0,1244
2	0,01479	-1,54063	0,0304	0,0835	0,08462
3	0,04562	0,14975	0,02607	0,03036	0,1136
4	0,04511	0,29193	0,00675	-0,057	-0,00247
Nicaragua					
1	0,00591		0,02361	-0,00697	0,02532
2	-0,00191		0,05756	-0,0133	0,00637
3	0,00053		0,0785	0,19056	-0,01926
4	0,00039		0,089925	-0,00278	-0,04096

Responding to shocks over interest rate, a one-standard-deviation-shock in interest rate in Guatemala (0.05371) induces smooth changes in economic variables but they are not contemporaneous. In El Salvador, after structural changes on interest rate during the last seven years, one-standard-deviation-shock over interest rate induces consistent contemporaneous decreases in output (-0.00957) units. In Honduras, a one-standard-deviation-shock over interest rate induces consistent contemporaneous decreases in output rate and foreign exchange rate (-0.01866 and -0.0072) units. In Costa Rica, there are smooth responses in the variables. In Nicaragua, a one-standard-deviation-shock in interest rate induces smooth decreases in output (0.00235) units.

Central America Responses to Shock in Interest Rate

	Foreign Exchange Rate	Money	Economic Growth	Inflation	Interest Rate
Guatemala					
1	0	0	0	0	0,05371
2	0,00384	0,05057	0,00165	0,01032	0,00283
3	0,00148	-0,00325	0,00406	0,05205	-0,017254
4	0,00474	0,08487	0,00341	-0,04613	-0,00661
El Salvador					
1	0	0	0	0	0,069
2	-0,00024	-0,04563	-0,00957	-0,041688	0,01138
3	-0,00004	0,28983	-0,04832	0,011977	0,0071
4	-0,00021	-0,12445	-0,07574	0,08033	0,01408
Honduras					
1	0	0	0	0	0,09683
2	-0,0072	-0,25528	-0,01866	0,04693	0,020668
3	-0,00975	0,23367	-0,04275	-0,03503	0,01305
4	-0,00066	-0,23246	-0,04969	-0,07404	-0,006147
Costa Rica					
1	0	0	0	0	0,22546
2	0,01443	0,27717	0,019489	0,08845	0,077241
3	0,02591	-0,25841	-0,01928	0,08981	0,02547
4	0,02457	-0,71661	-0,00092	-0,03157	0,04121
Nicaragua					
1	0		0	0	0,08056
2	-0,00059		0,00182	-0,12345	-0,01463
3	0,000159		-0,00235	-0,0667	-0,01446
4	-0,00091		-0,01742	-0,021	-0,0151

As unrestricted VAR's would be overparameterized, they are not particularly useful for shor-term forecast, but, using the properties of the forecast errors it could be useful in uncovering interrelationships among the variables in the system. Then, with Variance Decomposition, abreviating only the 1-step, 8-step, 12-step and 24-step ahead forecast error variances are reported, we can examine the relationships among economic variables if the correlations among the various innovations are small. We find the following results:

In Central American countries, decomposition of variance for the series of the foreign exchange rate (E)[5], tells us the proportion of the movements in a sequence due to the own shock of the countries explains all the behaviour in one step. At an 12-step ahead horizon, in Guatemala foreign exchange rate, inflation rate and interest rate

[5] In Costa Rica, there are small programmed devaluations every year, El Salvador has a dollarized economy, Guatemala has a flexible regimen, Honduras has a managed regimen and Nicaragua has small devaluations daily.

explains 49.2%, 23.9% and 16.5%. In El Salvador, foreign exchange rate, output and inflation explains 52.0%, 17.5% and 7.4%. In Honduras, foreign exchange rate, output and inflation explains 55.0%, 25.4% and 7.0%. In Costa Rica, with an 8 step ahead, foreign exchange rate and money explains 18.7% and 74%. In Nicaragua, foreign exchange rate and output explains 42.3% and 31.0%.

Decomposition of Variance for Series Foreign Exchange Rate (E)

Step	Std Error	E	M	Y	INF	INT
Guatemala						
1	0,03302	100	0	0	0	0
8	0,04462	58,56966	0,99877	9,39975	17,26612	13,7657
12	0,05475	49,24583	1,45384	8,82173	23,90806	16,57054
24	0,06678	45,59248	2,37936	12,6702	20,70046	18,65751
Salvador						
1	0,00168	100	0	0	0	0
8	0,00249	54,69553	13,82682	17,90317	6,83105	6,74343
12	0,002568	51,99687	15,19844	17,54453	7,40706	7,85309
24	0,00497	61,72491	12,85063	11,35848	9,12582	4,94015
Honduras						
1	0,028333	100	0	0	0	0
8	0,04284	70,39851	3,54061	9,63065	7,35673	9,0735
12	0,05439	55,35314	4,39306	25,41411	6,97983	7,85985
24	0,081651	32,99685	8,01882	49,23258	4,20965	5,5421
Costa Rica						
1	0,03901	100	0	0	0	0
8	0,23956	18,68995	73,98961	1,21882	0,74473	5,35688
12	0,403841	7,5408	83,43009	3,17739	3,61496	2,23676
24	0,86463	10,792	56,27964	9,19349	9,65447	14,08039
Nicaragua			PP			
1	0,00591	100	0	0	0	0
8	0,0109	42,30797	4,77424	30,99955	16,45141	5,46683
12	0,014007	28,57012	11,40888	36,19968	16,112	7,70932
24	0,02134	24,41922	13,70976	34,62152	16,04522	11,20428

E= Foreign Exchange Rate
M= Money
Y= Output
INF= Inflation
INT= Interest Rate
PP= OILprices

The decomposition of variance for series money (M)[6], tells us the proportion of the movements in a sequence due to its own shock of the countries explains all the behaviour in one step. At an 12-step ahead horizon, in Guatemala foreign exchange rate, inflation and interest rate explain 49.2%, 25.4 and 14.9%. In El Salvador, money,

[6] Monetary policy in the countries has been prudent with discretionary elements. Money supply behaviour is consistent with inflation and economic growth.

inflation and foreign exchange rate explain 34.5%, 32.3% and 19.7%. In Honduras, output and money explain 66.8% and 16.8%. And in Costa Rica, money and foreign exchange explain 53.0% and 23.8%.

Decomposition of Variance for Series MONEY (M)

Step	Std Error	E	M	Y	INF	INT
Guatemala						
1	0,51771	98,19471	1,80529	0	0	0
8	0,68729	58,30826	1,82041	9,10061	18,9518	11,81893
12	0,83365	49,23146	1,92551	8,60891	25,3783	14,85581
24	1,13014	41,70821	3,10761	14,033265	28,10507	13,04645
Salvador						
1	1,47659	29,04243	70,95757	0	0	0
8	2,89679	9,99329	38,55648	5,00458	37,09412	9,35153
12	3,17405	19,67163	34,52271	5,45084	32,26525	8,08957
24	9,42494	42,3338	13,46759	29,67368	6,40037	8,12457
Honduras						
1	0,98603	2,82233	97,17767	0	0	0
8	3,25032	8,21024	25,02487	60,39791	3,47552	2,89146
12	4,82182	10,24646	16,8426	66,76479	3,65237	2,49379
24	7,20277	14,36039	12,34461	60,47664	7,15645	5,66192
Costa Rica						
1	3,39187	2,59081	97,40919	0	0	0
8	5,45437	16,2188	61,69594	2,351741	8,1345	11,59906
12	6,1493	23,78901	52,95276	2,75553	8,24049	12,26221
24	9,37345	22,71114	44,84431	4,20376	9,15931	19,08147
Nicaragua						
1	0,072658	10,55459		89,44541	0	0
8	0,56308394	12,49366		66,23557	15,75229	4,81939
12	0,67219	12,68596		68,00091	12,36755	4,14473
24	0,83869	12,63406		64,49632	15,70916	3,62684

E= Foreign Exchange Rate
M= Money
Y= Output
INF= Inflation
INT= Interest Rate

The decomposition of variance for series output (Y)[7], tells us the proportion of the movements in a sequence due to its own shock of the countries explains in the first step the behaviour, 57.0 % in Guatemala, 85.3% in El Salvador, 98.6% in Honduras, 72.2% in Costa Rica and 89.4% in Nicaragua. After 12 steps ahead forecast error variance, in Guatemala, output and foreign exchange explain 44.5% and 40.2%. In El Salvador, output, interest rate and and money explain 30.6%, 22.5% and 23.1%. In Honduras, output and foreign exchange rate explain 55.8% and 26.3%. In Costa Rica, money explains 72.1%. And, Nicaragua, output, inflation and foreign exchange explain 68.0%, 12.4% and 12.7%.

[7] In Nicaragua and Honduras, economic growth trend decreased in the last two years. El Salvador evidence stability and Guatemala and Costa Rica showed low economic growth.

Decomposition of Variance for Series OUTPUT (Y)

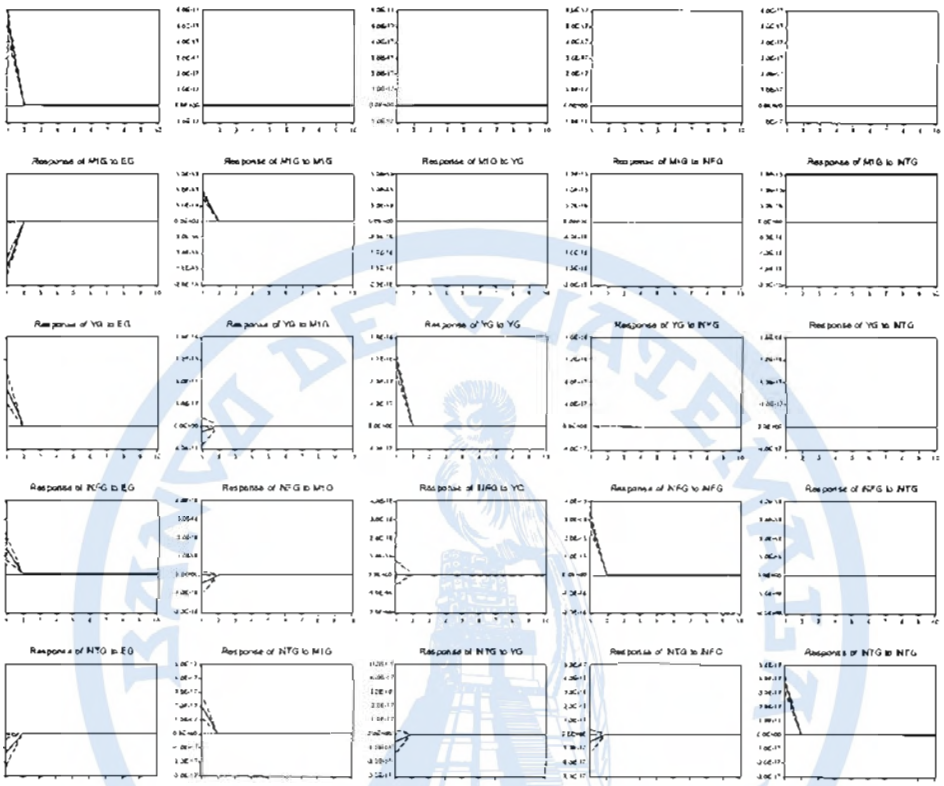
Step	Std Error	E	M	Y	INF	INT
Guatemala						
1	0,00848	5,3443	37,60832	57,04737	0	0
8	0,09357	39,40308	13,91178	44,43964	1,44867	0,79683
12	0,11087	40,23481	12,05901	44,5224	1,38373	1,80005
24	0,17931	61,42821	9,64195	21,76329	5,60918	1,55737
Salvador						
1	0,04152	10,39899	4,30783	85,29318	0	0
8	0,25517	8,83834	25,85115	34,53227	8,22702	22,55122
12	0,27733	15,98364	23,06114	30,64838	7,76332	22,54352
24	0,50153	24,06293	17,46265	17,48162	22,27501	18,71779
Honduras						
1	0,100025	0,18103	1,23284	98,58613	0	0
8	0,29754	5,66737	2,70394	76,1653	1,68146	13,78192
12	0,36724	26,30059	2,74127	55,80097	1,58544	13,57173
24	0,49141	31,57771	2,23716	41,71715	5,66141	18,80658
Costa Rica						
1	0,09386	3,35949	24,41669	72,22383	0	0
8	0,3594	5,89844	73,1328	13,33662	6,5193	1,11284
12	0,40574	5,44334	72,12725	12,11057	7,56595	2,75288
24	0,86177	8,9518	56,5905	11,71508	11,37561	11,36701
Nicaragua			PP			
1	0,07266	10,55459	0	89,44541	0	0
8	0,56308	12,49366	0,69909	66,23557	15,75229	4,81939
12	0,67219	12,68596	2,800085	68,00091	12,36755	4,14473
24	0,8387	12,63406	3,53362	64,49632	15,70916	3,62684

E= Foreign Exchange Rate
M= Money
Y= Output
INF= Inflation
INT= Interest Rate
PP= OILprices

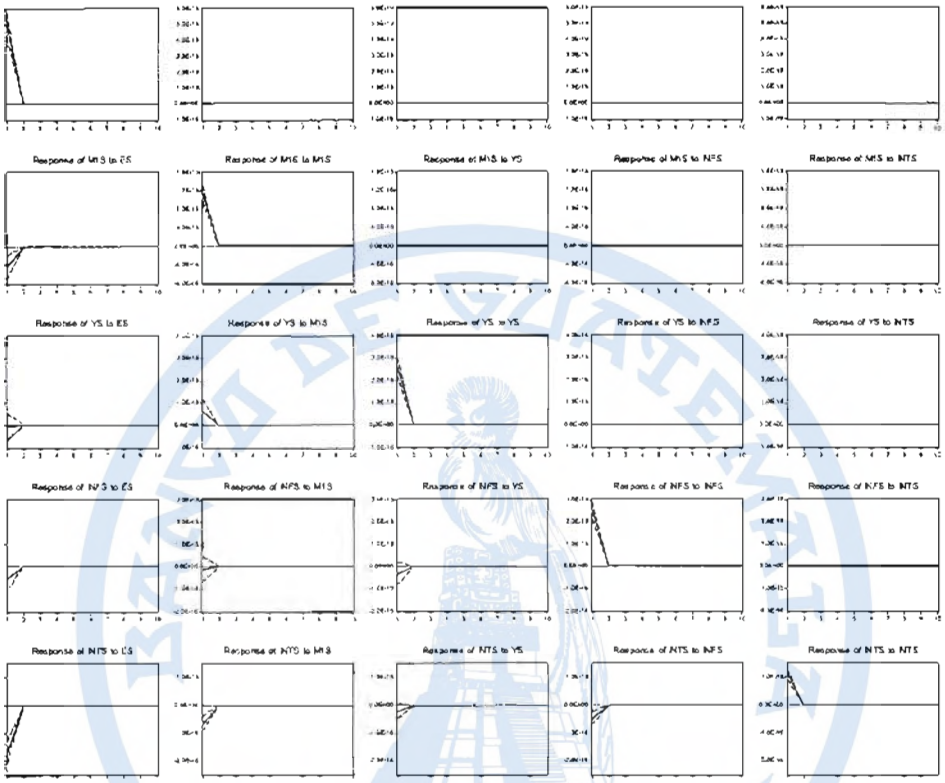
The decomposition of variance for series inflation (INFY) in the first step, forecast errors variance is explained fundamentally by inflation, output and foreign exchange rate in all countries, but Costa Rica evidences inflation and money elements. The decomposition of variance for series interest rate (INT), in the first step, forecast errors variance es explained basically by interest rates, inflation and foreign exchange rate.

The following tables include responses to Cholesky One S.D. innovations plus/minus 2 S.E.

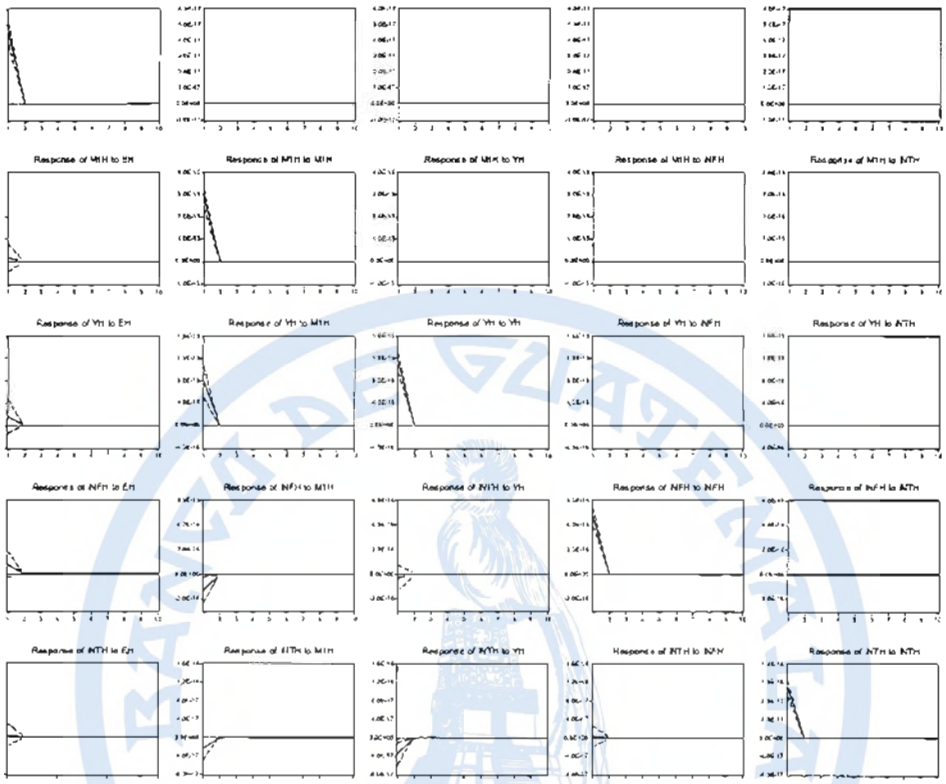
Guatemala


Response of MG to EG
Response of MG to MG
Response of MG to YG
Response of MG to NFG
Response of MG to NTG
Response of YG to EG
Response of YG to MG
Response of YG to YG
Response of YG to NFG
Response of YG to NTG
Response of NFG to EG
Response of NFG to MG
Response of NFG to YG
Response of NFG to NFG
Response of NFG to NTG
Response of NTG to EG
Response of NTG to MG
Response of NTG to YG
Response of NTG to NFG
Response of NTG to NTG

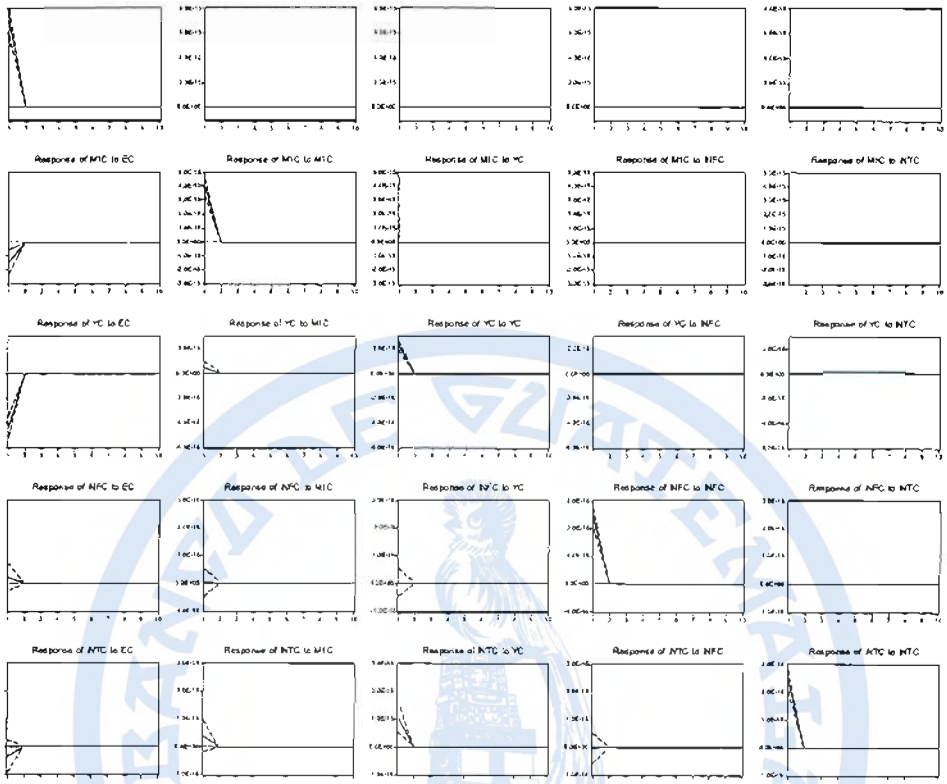
El Salvador


Response of M1 to ES
Response of M1 to M1
Response of M1 to YS
Response of M1 to NFS
Response of M1 to NTS
Response of YS to ES
Response of YS to M1
Response of YS to YS
Response of YS to NFS
Response of YS to NTS
Response of NFS to ES
Response of NFS to M1
Response of NFS to YS
Response of NFS to NFS
Response of NFS to NTS
Response of NTS to ES
Response of NTS to M1
Response of NTS to YS
Response of NTS to NFS
Response of NTS to NTS

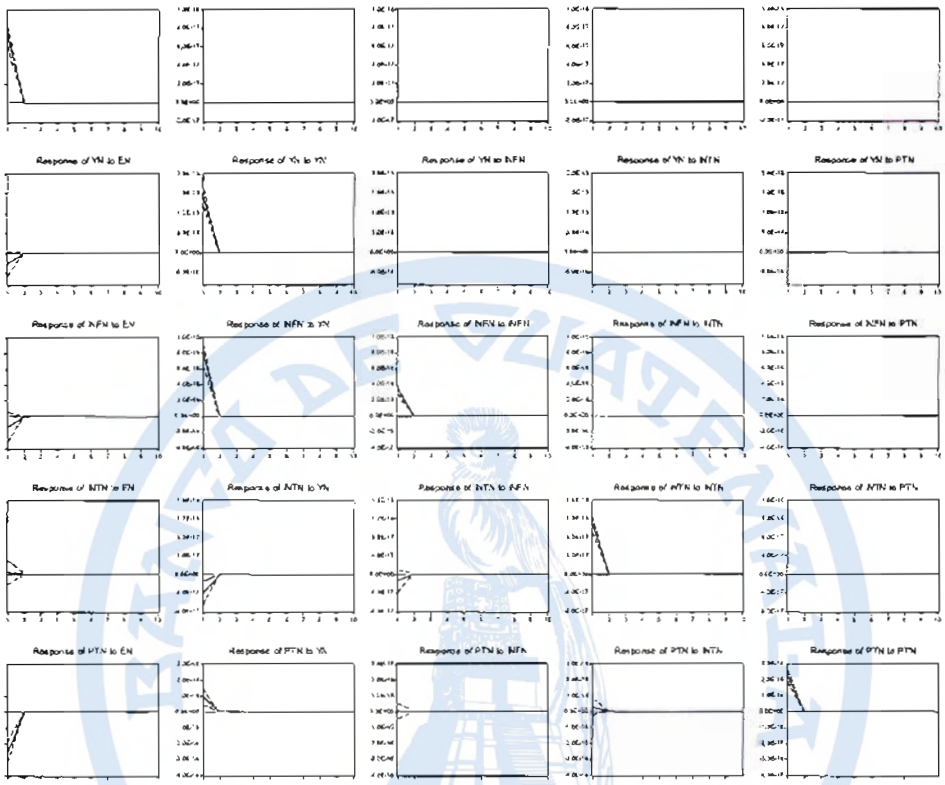
Honduras


Response of MtH to Em
Response of MtH to MtH
Response of MtH to Yh
Response of MtH to NFH
Response of MtH to NTH
Response of Yh to Em
Response of Yh to MtH
Response of Yh to Yh
Response of Yh to NFH
Response of Yh to NTH
Response of NFH to Em
Response of NFH to MtH
Response of NFH to Yh
Response of NFH to NFH
Response of NFH to NTH
Response of NTH to Em
Response of NTH to MtH
Response of NTH to Yh
Response of NTH to NFH
Response of NTH to NTH

Costa Rica


Response of MTC to EC
Response of MTC to MTC
Response of MTC to YC
Response of MTC to INFC
Response of MTC to INTC
Response of YC to EC
Response of YC to MTC
Response of YC to YC
Response of YC to INFC
Response of YC to INTC
Response of INFC to EC
Response of INFC to MTC
Response of INFC to YC
Response of INFC to INFC
Response of INFC to INTC
Response of INTC to EC
Response of INTC to MTC
Response of INTC to YC
Response of INTC to INFC
Response of INTC to INTC

Nicaragua



IV. Central American Monetary Council in an Optimal Currency Area

When there are asymmetric shocks, Persson and Tabellini (1995) stress that a cooperative optimum under commitment is infeasible, facing a second-best institution design problem, namely a choice between different suboptimal alternatives, then the most difficult question would be how does the design of the common central bank or another institution solve conflicting interests among countries and shape the union´s monetary policy? Bernheim and Whinston (1986) formulated a general model of a simple common agency considering that given the right to make certain decisions upon a single is quite complex, but, common agent facilitates plans for collusion; collusion arises from strategic interaction and compensation facilitates collusion.[8] Then, there is a

[8] Arestis and Sawyer (2001) describe that the institucional policy framework within wich the euro has been introduced and will operate has four key elements. First, the ECB is the only effective federal economic institution. The ECB has the one policy instrument of interest (repo) rate to pursue the main

problematic nature with the institutional policy framework, given asymmetric shocks and channels of monetary policy which could require different macroeconomic policies. The degree to which countries evidence asymmetric shocks are at different stages of the economic cycle and raises significant questions for economic policy. When the monetary policy operates through interest rates that could affect foreign exchange rate and would increase financial fragility.

As a result, our proposal is to plan and implement a global integration system. The future of the Central American Monetary system under the new Central American Integration System (SICA) would include three ex ante stages of development. The first embryonic stage would be dated since 1991, when the presidents of Central America agreed in the Tuxtla, Mexico by 1996 a free trade zone will be established between Central America and Mexico. However, it was noy possible to reach that goal, therefore it is imperative to support the original proposal, to emphasize the consolidation of optimal tariff in the region in the short term; to consolidate the maximum tariff negotiated under the World Trade Organization –WTO; to support and coordinate the trade policy through the Central American Group - GRUCA.; to design an homogeneous trade policy; to reduce structural asymetries and facilitate international future negotiation; and take into account the direction of trade, to set the most important economic areas for Central America.

The second stage (2002-2003) fixed the new role of the Central American Monetary Council (CAMC), as Scholz (1991) recommends, as an autonomous body of policy makers. They must be in charge of coordinate the monetary, financial, foreign exchange and fiscal policy, working together with the Central American Economic Cabinet, taking preconditions or criteria of convergence to make ex ante precondition looking for an optimal currency area. The region requires at least a monetary cooperation fund of US$ 5,0 billion to adjust costs of the new integration program and to facilitate stability in members among countries. The fund should be managed by the Central American Economic Stabilization Monetary Fund. With respect to the interest rate, in order to facilitate and coordinate the financial policy and to maintain permanence in capital mobility with internal and external macroeconomic equilibrium, interest parity condition should be considered as well as the nominal interest of equilibrium of each country, because of the particular characteristics of each financial market. This criterion avoid speculative capital movements in the short run. The rate of growth of government debt should be at least zero in 1999. The fiscal deficit should be maintained limited. The inflation targeting zone should be the monetary framework. The Central American Check in Central American Pesos approved in July 1963 would be an embryo to get in the future a common currency.

Regarding to the institutional structure, there is already the necessary institutions, for instance the Balance of Payment, Monetary, Foreign Exchange and Public Finance Commissions, to support the new economic integration and the future monetary area.

The last stage (2003-2010), should be considered the superior stage of an economic and monetary union, with economic growth and almost full employment.

In our case, Central American Monetary Council could begin to work in three programmed stages. First of all, plan an inflation targeting zone, determine how

objective of low inflation. The Governing Council of the ECB agreed on the main features of their stability-oriented policy strategy. The single monetary policy has an euro area-wide perspective.

efficient is the interest rate as an instrument of demand management policy and how to reduce the asymmetric shocks. Second, coordinate convergence in the region: and, harmonize an Stability Pact.

V. Conclusion

The role of monetary policy in an optimal currency area could be the best possisble optimal if there is a perfect macroeconomical, institutional and political convergence, without asymmetries in the monetary policy as well as the behaviour of the fundamentals. Then, working in coordination and convergence requirements could facilitate the economic and monetary union. There is no free lunch in commom monetary policy, in the particular case when the pricing strategy is going to change and when we have a dollarized economy with different mechanism of transmission.

Although in the Central American region there are commom factors as language, size and complementary of the economies and markets, in the present, there are no conditions in the short run for an optimum currency area or peg the foreign exchange rate within specific countries. In fact, more important than currency area would be to reduce the structural problems of the balance of payments, to support the production sectors. Taking into account that small open economies, small total population and small markets with less diversified industry implies large imports relative to GDP. Some countries require priority solution with high costs.

In the particular case of El Salvador, after the analysis of the econometric results in the past seven years, the fundamentals, could evidence a cooperative zero-sum game between national policy makers and private sectors when choosing pricing strategies like looking for an optimal monetary area. Although, in time higher import prices and lower purchasing power of the country could afect price stability.

In a very basic econometric methodology, Business Cycle, Vector Autoregresive Model, Impulse Response Function and Variance Decomposition, it is found significant results coming from economic variables from Central American countries. For instance, there are differences in the causality test among countries and variables, exchange rate, interest rate and economic growth causes inflation. In El Salvador exchange rate does not causes inflation, this country moved to dollarization regime, therefore, decreases interest rates and inflation rates have been some consequences that affect the results of our empirical methodology. On the other hand, with impulse responses, in Central America, shocks in money induces contemporaneous increases in inflation. Shocks in output induces contemporaneous effect in inflation and in Guatemala (smooth) Honduras and Costa Rica induces comtemporaneous effects on interest rates. Shocks in foreign exchange rate induces contemporaneous effects on inflation, except El Salvador. Then there is no precisely symetry responses coming from shocks in diferent variables. So the models are useful to test the asymmetric policy and asymmetric shocks, also to see that there is no efficient convergence in economic policy decisions in the Central American region. After estimating unrestricted VAR model, the preliminary evidence is limited because of monthly data available have a disadvantage of noise and structural changes in the behaviour of the variables; then, the next step should be trying with Structural and Bayesian Vector Aurorregresive analysis,

SVAR´s and BVAR´s to provide instruments of analysis and forecast useful to take the most adecuated monetary policy reaction.

Finally, there is no stable relationship between monetary aggregates and the price level over the last seven years. Monetary Union should be flexible to get synchronization of the business cycle across the countries participating in a monetay union as analysts say.

VI. Bibliography

Arestis, P. and Malcolm Sawyer. (2001). **Will the Euro Bring Economic Crisis to Europe**. Working Paper No. 322 Levy Economics Institute.

Bentoglio G. And J. Fayolle. (2002). **Unity and Plurality of European Cycle**.

Boone, L. (1997). **Symmetry and Asymmetry of Supply and Demand Shocks in the European Union: A Dynamic Analysis.**

Buiter, W. H.(1999). **Six Months in the Life of the Euro What Have We learnt ?.**

Carrera, J. ( ). **Dollarization as an asymmetric Monetary Union..The case of Argentina**.

Corsety, G. and Paolo Pesenti. (2002). **Self Validating Optimum Currency Areas**. NBER.

Demertzis, M . (1996). **Is a 2 speed system in europe the answer to the Conflict between the German and the anclo-Saxon Models of Monetary Control.**

Enders, W. (1995). **Applied Econometric Time Series.**

Enders, W. (1996). **RATS Handbook for Econometric Time Series**

Grossman, G. M. And Kenneth Rogoff (1995). **Handbook of International Economics**. Volume 3. North Holland.

Grubel, H. G. (1970). **The Theory of Optimum Currency Areas.** Revue canadienne d´Economique III, No. 2. May.

Hamilton, J. D. (1994). **Time Series Analysis**. Princeton University Press.

Kenen, P. B. (2000). **Currency Unions and Policy Domains**. Princeton University

Krugman P. R. and Maurice Obstfeld. (1994). **International Economics Theory and Policy**.

Lafrance, R. And Pierre St-Amant. (1999). **Optimal Currency Areas: A Review of the Recent Literature**. Working Papers 99-16 Bank of Canada .

Mills, T. C. (1990). **Time Series Techniques for Economists.**

Mundell, R. A. (1997). **Optimum Currency Areas**. Conference at Tel Aviv University.

Persson, T. And Guido Tabellini. (1995). **Double-Edged Incentives: Institutions and Policy Coordination.**

Scholz, S. (1991). **Welfare Analysis of Guatemala in the Central American Commom Market: An application of the New International trade Theory**. (Thesis P.h.d.) University of Illinois at Urbana-Champaign

Sims, C. (1980). **Macroeconomics and Reality**. Econometrica 48. 1-48.

Sims, C. (1996). **Comment on Glenn Rudebusch´s Do Measures of Monetary Policy in a VAR Make Sense**. Yale University

Spencer, D. E. (1989). **Does Money Matter? The Robustness of Evidence from Vector Autoregressions**. Journal of Money, Credit, and Banking, Vol. 21, No. 4 (November).

Walsh, C. (1998). **Monetary theory and Policy**. The MIT Press, Cambridge, Massachusetts.