Economic integration in Latin America

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Abstract

This study investigates the feasibility of economic integration in Latin America by considering the seven largest economies in the region i.e. Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. We hypothesize that if the seven largest economies in the region are integrated then the smaller economies will follow the suit. Towards this goal we analyze the long-term and short-term relationship among key macro variables—real GDP, intra-regional trade, private investment and consumption in these seven countries. We observe that all variables in these countries are driven by more than one common trends and these variables also share common cycles. The common trend-common cycle decomposition of real GDP, private investment and consumption reveal that the economic fluctuations in these countries follow a similar pattern in terms of duration, intensity and timing both in the long and the short run. Since these countries demonstrate a high degree of co-movement among key macro variables these seven largest countries in Latin America can lead the path of integration process in the region and reap the benefits of economic integration.

Key words: common trends, common cycles, economic integration, common currency.

JEL Classification: E2, E3, E6.

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1. Introduction

Various countries over time realize that the socio-economic problems they are facing cannot simply be coped with by individual efforts. As a result they begin to team up with neighboring countries in the region, and this process is deepening now. The most obvious and successful example is the European Union (EU)[1] which has teamed up a number of isolated countries to become a fully integrated economic unit. Regional integration is considered growth enhancing. Integration necessarily implies free mobility of factors such capital, labor, entrepreneurship, etc. among member countries. It will create a greater market in the region, demolish the constraint of factor mobility and increase bargaining power in the global economy.

Many countries around the world are trying to follow the integrationist footsteps of Europe. The core lesson learned from European success is that despite many differences with respect to goals, objectives and policies among countries in a region, economic integration among those countries can take place and become successful. A greater degree of macroeconomic synchronization or business cycles co-movements is regarded the key to successful integration. A complete regional integration is materialized by having monetary union with a single (optimum) currency in the region such as the European monetary union with the Euro. Optimum currency areas are groups of regions with economies closely linked by trade in goods and services and by factor mobility. A single currency will best serve the economic interest of each of its members if the degree of output and factor trade among the included economies is high (Krugman and Obsfeld, 2008). Rose and Wincoop(2001) note that

[1] The EU was established by the Treaty of Maastricht on 1 November 1993 upon the foundations of the European Economic Community. It consists of 27 member countries. They have had a common currency called Euro since 1999.

national money seems to be a significant barrier to international trade. Currency unions lower these monetary barriers to trade and are thus associated with higher trade and welfare.

With the inception of World Trade Organization (WTO) many countries opened up their economies and liberalized the trade policies. At the mean time, countries in different regions began to form free trade agreements (FTAs)[2] or preferential trade agreements (PTAs). As a matter of fact, the first level of economic integration begins with such agreements. In light of this new world order, Strydom (1995) writes a single country regardless of its economic, military and cultural power or influence cannot stand alone in dealing with the many challenges they face or might face. Individual countries have thus no choice but to adopt or implement outward-oriented policies. Additionally, empirical evidence suggests that countries under economic union or FTAs tend to trade three times more with each other than with non-member countries (see Rose and Wincoop, 2001)

The existence of similar business fluctuations or business cycle synchronization is considered a necessary condition for the harmonization of economic policies and institutions among countries involved in an economic integration process (Christodoulakis, Dimelis and Kollintzas, 1995; Fiorito and Kollintzas, 1994). The concept of interdependence of economies is also known in the literature as macroeconomic interdependence which gives rise to economic integration in any region. Macroeconomic interdependence is referred to as comovement between real and monetary sectors between or among countries. If business cycle fluctuations are synchronized, harmonized policies to cope with the cycles across countries can be effective (Sato and Zhang 2006). Additionally, macroeconomic interdependence has been crucial for the integration of financial markets as well (see Sharma and Wongbangpo, 2002).

[2] FTAs eliminate import tariffs as well as import quotas between signatory countries.

The presence of strong macroeconomic synchronization is regarded as a rationale for creation of Regional Trade Agreements (RTAs). The concept of RTAs in Latin American context dates back to 1960 when the Latin American Free Trade Association (LAFTA)[3] was created. The goal of LAFTA was to create a common market in Latin America and it was perceived as a first step to economic integration in Latin America. Many Latin American economists took it as a promising vehicle for enhancing economic and social development in their respective countries (Rosenthal, 1985). But, the initial enthusiasm gradually faded away and a general air of pessimism regarding integration spread. Over the course of the past three and half decades, the process of economic integration has suffered numerous setbacks. Frequent abrupt political changes have been a deterrent to economic cooperation. During the 1960s, LAFTA was disrupted by military coups in Argentina and Brazil (Ffrench-Davis,1989). Due to this, we believe, integration movement could not make any progress and obviously could not reap the benefits of greater extension in the region. In addition to that the Latin American countries were left out of this line of research mainly for lack of stability and lack of data (Fullerton and Araki, 1996, Mena, 1995). However, the movement toward Latin American economic integration is gaining momentum. The formulation of the Common Market of the south or MERCOSUR—a largest regional trade area signed in 1991 between Argentina, Brazil, Paraguay, Uruguay (and more recently Venezuela), with Bolivia, Chili, Peru, Colombia, and Ecuador as associates—is taken as momentum gain. As a matter of fact, more than 14 agreements—free trade areas or custom unions—since 1990 have been made in the region. Hence, with this renewed interest this is of extraordinary relevance to investigate macroeconomic interdependence for Latin American countries.

[3] The initial signatories in LAFTA charter were Argentine, Brazil, Chile, Mexico, Paraguay, Peru, and Uruguay. By 1970, LAFTA expanded to include four more Latin American nations—Bolivia, Colombia, Ecuador and Venezuela. In 1980, LAFTA reorganized into the Latin American Integration Association (ALADI). There are currently at least seven active RTAs in Latin America. i) the southern common market (Mercosur) ii) Andean community of nations iii) Central American integration system (CA4), iv) The Caribbean Free Trade Association (CARIFTA), v) Union of South American Nations, vi) Free trade area of the Americas (FTAA), and vii) G3

The decade of the 1990s was characterized by an intense parley of regional trade agreement in Latin America. More than 14 agreements[4]--free trade areas or custom unions—since 1990 have been made in the region. However, Latin America seems to be far behind in its endeavor to formulate regional integration and enjoy the benefits of greater integration. What are the main hurdles that have suppressed all the initiatives that have emerged so far? Or how feasible it is to imitate the European style integration model in Latin America? This study analyzes the feasibility of economic integration in Latin America. According to conventional literature a set of countries involved in integration should meet certain preconditions such as business cycle synchronization, a strong similarity in the adjustment process and the convergence of policy responses. The aim of this research is twofold: to explore the degree of macroeconomic synchronization of Latin American economies and hence the feasibility of economic integration. We aim to achieve this goal by analyzing the intra-Latin America trade and business cycle synchronization (common cycle/trend) among key macroeconomic variables. The macro-variables chosen are: gross domestic product, trade flows, private consumption and investment. According to Mundell (1961) the overall degree of economic integration can be judged by looking at the integration of product markets, that is the extent of trade between the joining country and the currency area, and at the integration of factor markets, that is, the ease with which labor and capital can migrate between the joining country and the currency area. In this study, real GDP and intra-regional trade captures the integration of product markets and private investment represents the factor market (i.e. capital). Additionally, we further investigate the short-run and long run behavior of consumption in these countries. Hence, selection of our variables for this study is relevant and justifiable.

We have chosen the seven largest economies (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela) from Latin America. Together, these seven countries out of 21

[4] For details see: Allegret and Sand-Zantman (2009)

Latin American countries account for more than 90 percent of the continent's GDP and about 93 Percent of its population in 2008. More importantly, these seven countries' real GDP always maintain more than 89% of their five year averages in the region from 1980-2008 (see table 1). Similarly, their trade share in the region is also significant and growing (see table 2). Argentina has a higher trade share in the region during 1980-2008. On five years average its exports plus imports for the region almost doubled the last decade from its eighties share. Mexico, being the second largest economy after Brazil, has the smallest regional trade share (see table 2). Obviously, Mexico trades more with its northern partners—USA and Canada. The rest of the countries in this study have an average of about one fourth of the trade share in the region. Therefore, these countries are leading economies in the region and we believe that the possible integration of these leading seven countries would bring the other countries in. Our rationale for this choice is that if macro variables in the leading economies are synchronized then the smaller economies will catch up with them, which will result in a complete integration in the entire continent.

Unlike the case of European integration, sufficient amount of empirical studies have not been devoted for the case of Latin America, only marginal attention has been paid to in this regard. Hence, this study will have great policy implication in context of economic integration in Latin America. Past studies have examined economic integration based on the observed similarities of the economies and the correlation analysis of the business cycles. The problem with these methodologies is that the degree of correlation between shocks does not accurately follow short-run output co-movements. Hence, we complement our analysis by both testing cointegration (to assess the existence of long-run movements in real output among countries) and for the existence of common short-run cycles as suggested by Vahid and Engle (1993). Sharing similar short and long run macro trends necessitates few or no country-specific policies that may hinder the stability of the union (Abu-Aarn and Abu-Bader, 2008). For an integration

process to be viable, it is essential to have both long-run synchronous real output co-movements and short-run common business cycles to minimize the need for country-specific policies that may hinder the stability of the union. To the best of our knowledge, very few studies, most notably Engle and Issler (1993), have investigated the common trends and common cycles in three Latin American economies. We contribute to these efforts by exploring long run trends and short run cycles among key macro variables of the seven largest Latin American economies.

The chief policy implication of this research is concerning monetary union for Latin American countries. Monetary union is the final stage of economic integration. The preconditions for economic integration are also applicable to monetary union. More simply, if these countries follow the long term trends and also the short term business cycles then they can implement a single monetary policy and currency for the integrated region. Therefore, the study Macroeconomic synchronization is crucial for the success of integration. The argument behind this logic is that if the impact of a shock across countries is not symmetric then harmonized monetary and fiscal policies could be detrimental.

The rest of the paper is organized as follows. The next section presents a review of past studies that deal with the topic of common movement between macroeconomic time series and economic integration. Section 3 describes the methodology used to analyze business cycle synchronization and integration. In section 4, the empirical results are reported and commented on. Finally, we state concluding remarks.

2. Literature Review

The business cycles co-movements between the economies of Latin American countries have been examined from a variety of perspectives. For instance, Engle and Issler (1993) investigated the degree of short and long run comovement in GDP-per capita of three Latin

American countries (Argentina, Brazil and Mexico) using common trends and common cycles methodology and document that while Argentine and Brazil share both long and short run co-movement, Mexico does not have similar trend and cyclical behavior with any of those countries. Similarly, Arnaudo and Jacobo (1997) considered the four Latin American countries—Argentina, Brazil, Paraguay and Uruguay—and noted that there is significant synchronization only between Argentina and Brazil. Jacobo (2002) studied macroeconomic behavior of five Latin American countries for period the 1970-1997 and finds that the group of these countries did not have a strong economic linkage. More interestingly, in a study of 8 Latin American countries and the United States Mejia-Reyes (1999) also found no evidence of a Latin American Common cycle but the author found significant synchronization between several countries[5] in bivariate context. Fiess (2007) measured the degree of business cycle synchronization between Central America[6] and the United States observed that business cycle synchronization within Central American countries is quite low. This finding does not support any macroeconomic coordination within Central America. In a recently published paper Allegret and Sand-Zantman (2009) studied the feasibility of a Monetary Union between five Latin American Countries—Argentina, Brazil, Chile, Mexico and Uruguay. In doing so, they have investigated whether this set of countries is characterized by business cycle synchronization. Based on results obtained from the Vector Auto Regression (VAR) model these authors do not support monetary union in Latin American even though Uruguayan economic activity depends mainly on Argentina and Brazilian business cycles.

[5] Argentina – Brazil, Argentina – Peru, Bolivia – Venezuela, Brazil- Peru, Chile- United States, Argentina-Bolivia, Mexico- Venezuela and Brazil-United States).

[6] Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama.

After inception of NAFTA[7] several studies have examined the business cycle synchronization particularly between US and Mexican economies and found the existence of statistically significant common movements between two economies since then (Hernandez, 2004). This result is consistent with studies that examine economic interactions in a wide sample of counties. For example, Anderson and Kwark (1999) reported a significant relationship between trade openness and the synchronization of economic cycles in a set of 37 countries across the world.

Many have examined to what extent business cycles of the different countries are similar[8]. In a recent paper, Adom, Sharma and Morshed (2010) examine the feasibility of African economic integration by applying common trends and common cycles methodologies. They find the presence of macroeconomic interdependence among eight largest African economies and hence their results suggest that some preconditions for a successful integration of Africa are currently in place. Haan and Montoya (2008) investigate regional business cycle synchronization in the Euro area and found the Euro area has become more synchronized since integration. This result, according to the authors has been able to dismiss the well-known critique that a common monetary policy may not be good for all countries or regions in the union (i.e. one size does not fit all).

In the race of regional integration, the Gulf Cooperation Council (GCC) is ahead of any other region in the world. The GCC member countries have adopted the EU convergence criteria[9] and fulfillment of most of the convergence criteria has been achieved. Given the

[7] North American Free Trade Area (NAFTA) which consists of US, Canada and Mexico.

[8] e.g. Capannelli, Lee and Petri (2010), Rana (2007), McAdam (2007), Anderson and Moazzami (2003), Sharma and Horvath(1997).

[9] According to the article 121(1) of the European community treaty, the applicant countries should not exceed on average 1.5% of inflation and 2% of nominal interest rates. Similarly, budget deficit and public debt to GDP ratio should exceed more than 3% and 60% respectively. The last criterion is that applicant countries should not have devalued its currency at least 2 years prior to joining EU.

preparation Abu-Aarn and Abu-Bader(2008) examine whether GCC countries are ready to form a viable monetary union in the region. By studying long run trends and short run cycles on their macro variables their findings do support for the readiness of the GCC countries to establish a viable currency union. In contrary to this, Darrat and Al-Shamsi(2005) find supportive evidence for the economic integration in the Gulf region. Selover (1999) studies co-movements of business cycles between Indonesia, Malaysia, Philippines, Singapore, and Thailand and their major trading partners the United States, Australia, Japan, and the European Union and found the evidence of strong co-movement in these countries.

On multivariate trend-cycle decomposition, Vasta and Sharma (2010) investigate the financial integration in ASEAN- 4 countries (Malaysian, Philippine, Singapore and Thailand) by looking at the short-run and long-run behavior of exchange rate series of these countries. The authors conclude that the exchange rates of share long term trends and short term cycles.

3. Data and Methodology

We use yearly data on Real gross domestic product (RGDP), Intra-regional trade (TRADE), Investment (INVEST) and Consumption (CONS) for the seven largest Latin American countries—Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. Data is obtained from the World Development Indicators (WDI-2009) and various issues of the Direction of Trade Statistics year book. Since we are investigating the feasibility of economic integration in Latin America it makes a lot sense to investigate trade intensity among the sample countries within the region. So we decided to use intra-regional trade data rather than just trade flows measured by the sum of imports and exports. The intra-regional trade only covers the sum of exports plus imports from countries under consideration into the Latin American region. The time span for intra-trade ranges from 1978 to 2008 whereas for the rest of the variables it ranges from 1960 to 2008. All data are in constant 2000 US dollar. In

accordance with the literature, all the series are transformed into their logarithmic forms. During the time span used in this study, some unusual behaviors in Argentine Real GDP are noticed. The Real GDP of Argentina plummeted sharply from 8.11% in 1997 to -10.98% in 2003. Thus, we smoothed out the real GDP data for 2001, 2002 and 2003[10] by the average of number. By doing so, we believe it restores the normal behavior of the series. The same smoothing out procedure is applied to consumption also. For the rest of the countries, none of the variables have been smoothed out. The analysis is done both with and without smoothing real GDP and consumption series.

3.1 Methodology:

First, all the variables are tested for stationarity and their order of integration is determined. Next the Johansen cointegration test is used to test for the long-run relationship among the variables. Given the series of these countries are cointegrated, the short term cycles and the long term trend components of the series are recovered by using Vahid and Engle (1993) methodology.

3.2 Unit root tests:

We employ the Dickey-Fuller, Augment Dickey-Fuller test, the Phillips-Perron (PP) tests, and KPSS [(Kwiatkowski, Phillips, Schmidt and Shin (1992)] test to test for unit roots in each of the series considered. All the tests used here (except KPSS test) are tests for testing a null hypothesis of a unit root (i.e. a series is non-stationary) against the alternative hypothesis of a stationary series. The KPSS test, however, tests the null hypothesis of a stationary series against the alternative hypothesis of a non-stationary series.

The ADF tests are based on the following equations, which account for the presence of a non-zero mean in equation (1.1) and a non-zero mean with linear trend in equation (1.2).

[10] The 2001, 2002 and 2003 data is replaced by the average of 2000 and 2004 data.

$$\Delta Y_t = \mu^* + \alpha^* Y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta Y_{t-i+1} + \varepsilon_t \qquad (1.1)$$

$$\Delta Y_t = \mu + \beta t + \alpha^{\sim} Y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta Y_{t-i+1} + \varepsilon_t \qquad (1.2)$$

where Y_t is the series being tested, α is a constant, t represents a time trend and k is the lag length, and μ and β are non-zero mean and linear trend terms respectively. The unit root process is tested under the null hypothesis of H_o: $\alpha^*=0$ by using t_μ test statistics in (1.1) and H_0: $\alpha^{\sim}=0$ by using t_τ test statistics in (1.2). The critical values can be obtained from Fuller (1976, pp 371 and 373).

The PP tests are based on the following equations;

$$Y_t = \mu^* + \alpha^* Y_{t-1} + \varepsilon_t^* \qquad (1.3)$$

$$Y_t = \tilde{\mu} + \tilde{\beta}(t - T/2)_t + \tilde{\alpha} Y_{t-1} + \varepsilon_t^{\sim} \qquad (1.4)$$

Where Y_t is a time series at time t, T is the number of observations, μ and β are non-zero mean and linear trend terms respectively. We follow the hypothesis testing strategy proposed by Perron (1988, pp 316/17).

The KPSS tests, as mentioned above, have the null of stationarity against the alternative hypothesis of a unit root. Hence, this test is employed as a complementary to the ADF and the PP. The KPSS considers the model

$$Y_t = \beta_t t + \mu_t + \varepsilon_t \qquad (1.5)$$

where ε_t is a stationary process, and μ_t is a random walk given by

$$\mu_t = \mu_{t-1} + \psi_t \qquad (1.6)$$

Their null hypothesis of stationarity is given by H_0: $\sigma^2 = 0$ or ψ_t is a constant. This test is based on the principle of a Lagrange Multiplier score test and the test statistics and the critical values are provided by Kwaiatkowski et.al (1992).

3.3 Common Trend and Common Cycle analyses

3.3.1 Cointegration test:

We employ the maximum likelihood cointegration approach introduced by Johansen (1988). The cointegration test begins by expressing series in *(nx1)* vector form.

Let $\left(y_t^{Arg}, y_t^{Brl}, y_t^{Chl}, y_t^{Col}, y_t^{Mex}, y_t^{Per}, y_t^{Ven}\right)'$ be a *(7x1)* vector of either GDPs or intra-regional trade or investment or consumption of the seven countries under investigation. Thus, the unrestricted Vector Auto regression (VAR) can be written as follows:

$$y_t = A_1 y_{t-1} + ... + A_n y_{t-p} + \varepsilon_t \qquad (1.7)$$

where ε_t is a vector of white noise residuals and *p* is the lag length. Following Johansen (1988) and Johansen and Juselius (1990) the vector error correction model of the above equation (1) can be rewritten in its first difference form:

$$\Delta y_t = \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + ... + \Gamma_{p-1} \Delta y_{t-p+1} + \Pi y_{t-1} + \varepsilon_t \qquad (1.8)$$

where $\Delta y_t = y_t - y_{t-1}$

$$\Gamma_i = -\left[\mathrm{I} - \sum_{i=1}^{p-1} A_i\right],\ \Pi = -\left[\mathrm{I} - \sum_{i=1}^{p} A_i\right]$$

where I is a *(7x7)* identity matrix and the term Πy_{t-1} contains information concerning long-run relationship between the variables. Johansen (1988) notes that the number of cointegrating vectors can be determined by the rank of Π matrix, *r*. If the matrix Π is of rank *0<r<7*, then it

can be decomposed into $\Pi = \alpha\beta'$, where $\beta_{(rx7)}$ is the matrix of the cointegration coefficients and $\alpha_{(rx7)}$ is the adjustment coefficients to the long run equilibrium. Given a *(7 x1)* vector y_t if there exists $r < 7$ linearly independent cointegrating vectors then it implies that there are *(7-r)* common trends. The maximum likelihood based λ_{trace} and λ_{max} test statistics are used to identify the number of independent cointegrating vectors. To test the null hypothesis $r = 0$ against the alternative hypothesis $r = 1,2,3 \ldots 7$, λ_{trace} is used whereas λ_{max} tests the null $r = 0$ against the alternative hypothesis that there are *(r +1)* cointegrating vectors.

3.3.2 Common cycles:

To test common cycles in the presence of common trends, we employ the methodology purposed by Vahid and Engle (1993). According to Vahid and Engle (1993), this methodology tests the significance of the connonical correlations between Δy_t and $W = (\beta' y_{t-1}, \Delta y_{t-1}, \Delta y_{t-2}, \ldots, \Delta y_{t-p+1})$. They point out that given *r* linearly independent cointegrating vectors, if a series y_t has common cycles there can, at most exist $s = (n - r)$ cofeature vectors that eliminate common cycles (see Vahid and Engle 1993, pp. 345). With *s* number of cofeature vectors there exists *(n-s)* number of common cycles in a series. The test statistic proposed by Vahid and Engle (1993) is

$$C(p^*, s) = -(T-p^*-1)\sum \ln(1-\lambda_i^2) \sim \chi^2 \qquad (1.9)$$

with $(np^*s + rs - ns + s^2)$ degree of freedom, where λ_i^2 are the *s* smallest squared canonical correlations between Δy_t and *W*, *T* is the number of observations, p^* is the lag length of VAR system in difference, and *r* represents the number of cointegrating vectors. Note that the test statistic is for the null hypothesis that the dimension of the cofeature space is at least *s.* If there exist *s* independent cofeature vectors then there are *(n-s)* common cycles. A dimension of *(nxs)*

matrix $\tilde{\gamma}$ and of *(nxr)* matrix γ are referred to as the cofeature and cointegrating vectors respectively. In a case when *r+s = n*, Vahid and Engle (1993) decompose the permanent (trend) and the transitory (cycle) components of each series. In this case (i.e *r+s = n*) there will be an *(nxn)* matrix A=$\begin{pmatrix} \tilde{\gamma}' \\ \gamma' \end{pmatrix}$ with full rank and hence it will have A^{-1}. We can proceed trend and cycle decomposition by partioning the columns of A^{-1} such as $A^{-1} = (\tilde{\gamma}^{-} \mid \gamma^{-})$. Finally we recover the trend and cyclical components in the following way:

$$y_t = (A^{-1}A)y_t = \tilde{\gamma}^{-}\tilde{\gamma}'y_t + \gamma^{-}\gamma'y_t \qquad (1.10)$$

= Trend components + Cycle components

Equation (1.10) is used to decompose a trend-cycle in a series. The first term represents only the trend part since $\tilde{\gamma}'y_t$ is a random walk and is free from any cycles. The second part is characterized by cyclical components as $\gamma'y_t$ is serially correlated and I(0).

4. Empirical Results:

The results of the unit root tests are reported in table 3 and 4. The test statistics show that a null hypothesis of unit roots cannot be rejected in their levels whereas the unit roots of the first difference reject the null at 5% significance level. These results suggest that series are first-difference stationary. The sequential likelihood ratio tests suggest the optimal lag length for the cointegration test to be one for real GDP and intra-trade and two for investment and consumption.

4.1 Common Trend Analysis

We consider the following model for each of the series investigated i.e.

$$y_t = \left(y_t^{Arg}, y_t^{Brl}, y_t^{Chl}, y_t^{Col}, y_t^{Mex}, y_t^{Per}, y_t^{Ven}\right)'$$

where, y_t is a *(7 x1)* vector of real GDP or intra-regional trade or investment or consumption of seven Latin American countries. The results for the cointegration tests are presented in table 5 Both λ_{trade} and λ_{max} ensure the presence of two cointegrating vectors (i.e. r =2) in real GDP. This means that there exists 5 common trends in the real GDP of these seven countries. The existence of common trends indicates that the real GDP of these countries move together in the long run. Similarly, we cannot reject the null of at most three cointegrating vectors, and conclude that there exists 3 cointegrating vectors (i.e. r=3). This implies the existence of 4 common stochastic trends in trade variables. In fact, the existence of at least one cointegrating vector is required to establish a long run relationship among a set of variables. Thus, this result suggests that trade among these countries cannot swing for long time, they eventually move together. This can be clearly viewed from the five years average data on intra-regional trade of these countries. Table 2 tabulates data on export plus import of these countries in the region. Mexico's trade share is very low vis- à –vis the rest of the countries. Its close tie with North American Free Trade Agreement (NAFTA) members (USA and Canada) can be attributed to the low share. Cointegration results reveal that both investment and consumption also share 6 and 5 common trends in the long-run respectively. We also check whether the residuals of the four variables are serially correlated. The Lagrange Multiplier Autocorrelation test reported in table 6 reveal that we accept the null hypothesis of no serial correlation at 5% significance level in each cointegrating model.

While the presence of one or more cointegrating vectors necessitates the long relationship among them, each variable in the model may not be statistically significant to

move the system towards long run equilibrium(s) (Vasta and Sharma, 2010). Hence, in order to establish the individual significance of each variable we conduct likelihood ratio (LR) test for the restrictions that each variables in the cointegrating vector is zero, i.e. H_0: $\beta_k = 0$ where k =1,2,…7. This process repeats for all four variables. The LR test statistics are reported in table 7. The results for the individual significance are a bit mixed. For instance, real GDP of Peru is not significant at 5% level. This implies that Peru is not making a significant contribution in driving long run equilibrium in real GDP. This result is consistent with Peru's share in the real GDP in the region. It has less than 3% share in the region during the time period considered here (see table 1). Brazil is the largest economy in the region and its share of real GDP is very high. This is confirmed in the cointegrating relation since the GDP of Brazil is highly significant.

For investment Brazil turns out to be insignificant at conventional level. In establishing long-run relationship in the consumption pattern of these countries Colombia is insignificant at 5% level. Based on the test for the properties of individual series the rest of the countries are equally important. None of these countries are consistently insignificant in all four models. Therefore, we opted to proceed our analysis with all 7 countries.

4.2 Common Cycle Analysis

The next step is to examine whether the series have common cycles by testing for the significance of the canonical correlation described in section 3.3.2. Towards this goal, test statistics given in equation (1.9) are computed and reported in table 8. This table presents both the results of the χ^2 and F-statistics to determine the number of common cycles in a series. Note that the cofeature rank s is the number of statistically zero canonical correlations. The results indicate that the cofeature rank for real GDP is 5 (i.e. s=5). Thus, output in seven Latin American countries shares two independent cycles and do have similar short-run fluctuations.

In this case we have r+s=n (i.e. 2+5=7) which allows us to do a special trend-cycle decomposition.

The null hypothesis that the cofeature space has a dimension of seven is rejected for the rest of three variables—trade, investment and consumption. The cofeature rank for trade is 5 (i.e. s = 5). This implies that these seven countries share two common cycles in their trade pattern. We further note that for investment *s* = 6, suggesting at least one common cycle. Finally, at conventional significance level both χ^2 and F-test confirm that for consumption *s=5*. This suggests that the system of seven Latin American consumption series possesses two common cycles. In this study the special condition i.e. r+s =n is not satisfied for trade variable. However, for investment and consumption the number of cointegrating vectors (r) and cofeature vectors (s) add up to the number of the total variable (n). Therefore, we can decompose three out of four variables into their trend and cyclical components.

GDP: A plot of the trends and cycles of real GDP is given in figures 1 and 2. From the figures, it is so apparent that the long term trends and short term cycles are synchronized. The long-run co-movement of real GDP in seven Latin American economies suggests that these countries are reacting to the shocks in a similar way. We can also observe two noticeable characteristics in their trend components. First, Argentine and Venezuelan trend components are highly synchronized throughout the sample period. Second, the economic prosperity in Brazil is coincided by economic slump in Chile and vice versa during 1981 to 1992. The existence of no independent trend can also be viewed by the band these countries are holding. The constant gap in their long run co-movement further implies that although these economies might have policy differences (monetary and fiscal) they are not creating any substantial output differences. Furthermore, the divergence from the long run equilibrium is short-lived and real GDP of these economies adjusts to the long run common trend.

From figure 2, we observe that not only are these economies following long run trends in GDP but short-run cycles also. One striking point of the cyclical components is that Argentina, Brazil, Colombia, Peru, Venezuela move together during the entire sample period. Moreover, their cyclical components display similar and comparable turning points. The evidence indicates that the recession and expansion in these economies start and end at the same time. The duration, intensity and persistence of recession and expansion are the most visible characteristics of the cyclical components. While Mexican cycle is quite stable during entire sample period, Chile is inversely related with the rest of the economies. One possible reason of this inverse relationship could be that the shocks might be transmitted to Chile differently than that of the other countries. The smoothness of Mexican cyclical components shed some lights on its macroeconomic fundamentals. First, it clearly indicates that transmission of shocks from rest of the countries in this study to Mexican economy is negligible and second, the strong macroeconomic interdependence with more stable economies i.e. US and Canada. The intra-regional trade share of Mexico has always remained on average around 5% whereas the rest of the countries account for up to 42% on average (see table 2.2). Mexico has stronger trade tie with its NAFTA members. The cyclical component of Chile is below zero, suggesting that its output performance always stays below its trends.

In figures 3 through 9 we plot the actual series against its own trend and cyclical components for seven Latin American countries. In other words, we are measuring the variations in the original series. Such graphical presentation sheds light on the significance of innovations stemming from trend and cycle components. We observe that the variation in real GDP series is largely explained by trend components. The real GDP series can be classified either trend-dominated or the cycle dominated. In light of graphical evidence, we can classify real GDP series of all seven countries are trend-dominated. The transitory shocks are not playing a major role in the deviation of actual series from the trends. This is more so for the

case of Chile and Mexico since their trend components are moving very close to the actual ones. As a matter of fact Chile's real GDP seems to be unaffected by short-term fluctuation resulting from monetary and fiscal interventions. The actual real GDP series in Chile is underperforming vis a vis its long term trends.

We also note that the trend components of real GDP in these countries share a strong positive relationship i.e. they follow the same direction. The cyclical components seem to be producing the same rhythm except for Brazil which seems relatively more volatile. This can partly be explained by the series of financial crises that took place in Brazil. One interesting point to make in this trend-cycle decomposition is that both Mexico and Argentina suffer from financial crisis in 1994 and 2001 respectively but these crises did create a noticeable short-term volatility on their output. This shows a good macroeconomic fundamental in these economies.

Investment: the trend-cycle decomposition of investment is plotted in figure 10 and 11 respectively. Our empirical evidence indicates that there is at least one cointegrating vector in investment series of seven Latin American economies. This result suggests that there is not a single source of common long run movements to generate a synchronized movement in these economies. More importantly, investment in these economies is driven by more than one common trends. Figure 10 displays the permanent components of investment in seven Latin American economies. The volatility in trend components is distinct and apparent. The long-run dynamics are captured by the upward and downward movement of trend components. This indicates that permanent shocks have played a key role in determining investment decisions. This is also justified by the stylized fact that investment is the trend. It means that investment is less likely to react cyclical. The long-run behavior of investment reflects the good and bad times these countries have gone through over time. Latin America has a well established history of crises and on top of that financial instability appears to have become the norm, rather the exception (Edwards, 2003). From the trend figure we can see two notable instances among

the trend components during the entire sampling period. First, the volatility in trend components is pronounced for all countries between 1979 and 1983. Second, three countries—Argentina, Chile and Colombia—have more synchronized investment trend since late 1980s.

In figure 11, we plot the short-run fluctuation in investment series. Transitory movements in investment have one cycle in common (see table 8). The cyclical components of these series exhibit strong co-movement. Indeed, the co-movement of five countries—Argentina, Brazil, Chile, Colombia and Mexico—is smooth and persistent implying that these economies do not require frequent adjustments resulting from cyclical fluctuations. In contrast, the cyclical behavior of Peru and Venezuela does not resemble to those five countries. In that sense, we can divide these seven countries into two groups—a group of five and two. The cyclical movement of Peru and Venezuela demonstrates a positive relationship and such relationship further indicates that shocks to these two economies are transmitted through the same channels which are different from the other five countries. Therefore, this result suggests that these two countries require different policy tools to stabilize short-run fluctuations.

Figures 12 through 18, we plot the actual series against its trend and cyclical components. The trend components of a group of five countries mentioned above are following closely to its actual series. The implication of the behavior is that transitory shocks are not playing important role in the deviation of actual series from the trends. For the group of two, while transitory shocks are more pronounced compare to the other group, trends have still dominant role. Therefore, we can claim that the series of all seven countries are trend dominated.

Consumption*:* The trend components are plotted in figure 19. The trend innovations in consumption series are stable and synchronized for all seven countries. The co-movement in the series is strong and persistent. The volatility of Mexico, Peru and Venezuela trends clearly

stand out from other countries. The trend components of Mexico, Venezuela and Peru are below zero suggesting that consumption is not trended, it is a cyclical phenomenon. In other words, private consumption of these countries follow the short-run cycles—consume more at the time of economic boom and vice versa. The trend for these three economies peak around 1989-1990 followed by down turn in their consumption. Nonetheless, the co-movement is strong the entire sampling period. Similarly, we can also observe a strong co-movement in cyclical components of consumption. Figure 20 displays the effect of transitory innovations to consumption. One striking characteristic of the cyclical components of consumption is that economic prosperity (during period of 1984-1990) is accompanied by higher level of consumption. This behavior is consistent with economic theory that asserts that consumption depends on income.

We plot the actual series of consumption against its trend and cyclical component in figures 21 through 27. Out of seven countries, the transitory shocks seem to play a vital role in determining consumption in the short-run for Brazil, Mexico, Peru and Venezuela since the cyclical components are closely following or are above the actual consumption. So the consumption of these four countries is cycle dominated. However, the cyclical components are not a decisive factor for Chile and Colombia. The actual-trend relationship assures that the consumption pattern of these two countries is trend dominated. The graphical evidence shows that Argentine consumption is neither trend nor cycle dominated. Both the trends and cycles are moving together staying away from the actual series. Together, five common trends and two common cycles govern the stochastic behavior of the consumption behavior of these seven countries.

5. Conclusion

By analyzing the long-term and short-term relationship among key macro variables—real GDP, intra-regional trade, private investment and consumption—of seven largest Latin American countries—Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela, we find the existence of robust long-run economic relationship among these countries. The Johansen cointegration results show that real output, trade, private investment and consumption among these seven countries are driven by more one common trends. The existence of cointegration implies that these countries share synchronous long-run movement in their macro economies that give rise to greater economic integration in the region. The long-run synchronous behavior of macro economy is necessary but not the sufficient condition in the integration process (Abu-Aarn and Abu-Bader, 2008). The existence of short-run cycles suffices the condition. Hence, we also compute the number of common cycles by using the methodology proposed by Vahid and Engle (1993). The results produced from the multivariate model indicate that these seven countries share common cycles in their macro variables. This further reflects that these countries have shared the coordinated and common fiscal and monetary policies over the study period.

The trend-cycle decomposition results display a number of interesting facts. We observe that the transitory shocks to real GDP are not playing a major role, the major variation in the actual series of real GDP is largely explained by the trend components. So the real GDP series of all seven countries are trend-dominated. While empirical results indicate that these countries share at least one common cycle in their investment series, the cyclical movement of Peru and Venezuela is displaying an asynchronous behavior compared to the rest of the countries. In light of this empirical evidence we conclude that these two countries require different policy options to stabilize short-run disturbance in investment. The actual against trend-cycle plot indicates that investments of all seven countries are trend dominated. In contrast, the

consumption pattern in these countries has produced some mixed results. The cyclical influence is robust and decisive for consumption. Consumption for Brazil, Mexico, Peru, and Venezuela seems to be cycle dominated whereas it is trend dominated for Chile and Colombia. Argentine consumption is neither trend nor cycle dominated. The key finding from our trend-cycle decomposition is that the economic fluctuation in these countries both in the long-run and short-run follow a similar pattern in terms of their duration, intensity and timing.

Finally, the overwhelming evidences indicate among others mainly two policy implications. First, since their macro economies are synchronized these countries can benefit from harmonized monetary and fiscal policies. Second, the co-movement among macro variables helps significantly in improving forecasting. Hence, we conclude that integration in Latin American context is economically feasible.

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Table-1: Percentage of real GDP in the Latin American region

Year	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela
1980-1984	15.07	31.24	2.05	4.03	27.43	2.98	6.43
1985-1989	13.49	34.09	2.29	4.38	25.93	2.90	6.21
1990-1994	13.60	31.71	2.93	4.78	27.01	2.33	6.45
1995-1999	14.34	31.42	3.55	4.80	25.77	2.59	6.00
2000-2004	12.84	32.02	3.85	4.75	28.15	2.69	5.44
2005-2008	14.17	31.71	3.94	5.01	26.90	2.97	6.04

Source: World Development Indicators (2009).

Table 2: Intra-regional trade (% of the region)

Year	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela
1980-1984	22.29	13.76	21.34	19.19	6.24	13.95	27.52
1985-1989	26.36	12.49	19.96	18.40	5.44	18.63	18.19
1990-1994	33.68	19.28	20.67	24.39	5.76	26.72	29.28
1995-1999	38.49	23.29	24.22	26.56	4.10	25.13	27.65
2000-2004	41.04	20.79	27.22	29.73	4.13	25.82	32.00
2005-2008	41.69	22.68	23.31	32.73	5.84	28.18	29.09

Source: Direction of trade statistics year book.

Table 3: Unit Roots Test

Log levels

Variable	Country	ADF Test		DF Test		Phillips-Perron Test					KPSS Test
		t_{μ}	t_{τ}	t_{α^*}	t_{α}~	$Z(\Phi_1)$	$Z(\Phi_2)$	$Z(\Phi_3)$	$Z(\tau_{\alpha^*})$	$Z(\tau_{\alpha\sim})$	
	Argentina	-0.230	-1.858	-0.38	-1.94	6.777	5.461	2.065	-0.375	-2.149	0.88
	Brazil	-3.062	-1.233	-3.46	-1.29	21.221	14.165	3.603	-2.628	-1.421	0.86
RGDP	*Chile*	0.332	-1.750	0.36	-1.41	13.877	10.058	1.479	0.238	-1.697	0.90
	Colombia	-1.580	-1.721	-3.07	-1.50	62.045	42.122	3.720	-2.441	-1.616	0.91
	Mexico	-3.572	-1.731	-4.12	-1.85	48.330	33.018	8.184	-3.922	-1.887	0.89
	Peru	-0.427	-2.279	-0.96	-1.96	8.285	6.962	2.415	-0.995	-2.251	0.88
	Venezuela	-1.130	-2.947	-1.34	-2.50	7.812	7.232	3.486	-1.351	-2.668	0.90
	Argentina	0.127	-2.534	-0.16	-1.55	3.080	3.308	1.763	-0.356	-1.982	0.69
	Brazil	0.338	-1.398	-0.06	-1.67	3.761	3.858	2.067	-0.22	-2.15	0.71
	Chile	1.126	-3.183	0.65	-1.64	5.088	5.576	2.140	0.43	-1.87	0.70
TRADE	*Colombia*	0.573	-3.987	0.08	-2.00	6.570	5.563	2.374	0.10	-2.31	0.72
	Mexico	-0.116	-5.023	-0.67	-2.17	5.004	5.18	3.07	-0.74	-2.65	0.72
	Peru	0.006	-3.238	-0.57	-2.49	4.25	4.75	3.61	-0.55	-2.89	0.72
	Venezuela	-0.039	-1.349	-6.89	-7.06	0.97	1.75	1.58	-0.39	-1.70	0.58
	Argentina	-1.523	-2.622	-1.08	-1.92	1.33	2.00	2.39	-1.26	-2.25	0.56
	Brazil	-1.379	-2.025	-1.55	-1.76	5.48	3.97	2.05	-1.57	-1.91	0.83
	Chile	-0.215	-2.253	-0.39	-2.37	1.04	2.66	2.85	-0.04	-2.26	0.79
INVEST	*Colombia*	-0.389	-2.849	-0.57	-2.16	3.24	4.05	3.14	-0.67	-2.62	0.83
	Mexico	-1.698	-2.651	-1.84	-2.64	5.17	4.54	3.68	-1.92	-2.67	0.84
	Peru	-0.275	-3.411	-0.87	-2.36	0.81	2.43	3.06	-0.81	-2.45	0.77
	Venezuela	-1.524	-2.585	-1.66	-2.69	1.48	2.66	3.31	-1.42	-2.73	0.64
	Argentina	-0.911	-3.43	-1.00	-2.77	5.83	5.72	3.83	-1.00	-2.89	0.90
	Brazil	-2.426	-1.024	-2.79	-1.03	27.19	17.83	2.99	-2.41	-1.19	0.88
	Chile	-0.475	-2.042	-0.67	-2.21	5.68	4.79	2.54	-0.65	-2.38	0.88
CONS.	*Colombia*	-0.927	3.011	-1.74	-2.17	33.28	22.88	3.52	-1.73	-2.33	0.92
	Mexico	-2.353	-2.125	-3.48	-1.77	45.15	31.01	6.29	-3.37	-1.82	0.90
	Peru	-1.592	-2.853	-3.82	-4.06	14.31	13.62	8.94	-3.18	-3.73	0.84
	Venezuela	-0.600	-1.877	-1.04	-1.36	9.45	7.00	1.48	-0.98	-1.71	0.87

Table 4: Unit Roots Test

Log first difference

Variable	Country	ADF Test		DF Test		Phillips-Perron Test					KPSS Test
		t_{μ}	t_{τ}	t_{α^*}	t_{α}~	$Z(\Phi_1)$	$Z(\Phi_2)$	$Z(\Phi_3)$	$Z(\tau_{\alpha^*})$	$Z(\tau_{\alpha\sim})$	
	Argentina	-5.716	-5.670	-5.78	-5.72	16.14	9.74	14.61	-5.85	-5.86	0.10
	Brazil	-4.033	-4.227	-3.93	-4.17	9.48	6.16	9.21	-4.15	-4.46	0.40
RGDP	*Chile*	-4.966	-4.992	-5.06	-5.04	8970.20	8.02	12.02	-5.11	-5.14	0.17
	Colombia	-4.415	-4.651	-4.23	-4.69	9.32	7.40	11.07	-4.44	-4.92	0.28
	Mexico	-4.564	-5.326	-4.38	-5.27	9.54	8.97	13.44	-4.50	-5.42	0.53
	Peru	-4.261	-4.191	-4.29	-4.22	8.28	6.96	2.41	-4.21	-4.16	0.23
	Venezuela	-5.596	-5.552	-5.61	-5.58	15.42	10.10	15.15	-5.71	-5.74	0.16
	Argentina	-4.240	-4.399	-4.51	-4.58	12.42	7.44	11.12	-4.75	-4.87	0.10
	Brazil	-4.829	-5.043	-5.20	-5.29	16.88	9.67	14.48	-5.39	-5.56	0.11
	Chile	-3.655	-4.202	-3.81	-4.17	15.14	6.06	9.07	-4.06	-4.43	0.22
TRADE	*Colombia*	-5.035	-5.239	-5.41	-5.46	14.66	10.06	15.07	-5.60	5.77	0.14
	Mexico	-4.173	-4.286	-4.05	-3.97	1796.14	4.85	7.23	-4.12	-4.12	0.07
	Peru	-6.108	-6.516	-6.88	-7.05	46.61	18.97	28.17	-6.94	-7.59	0.10
	Venezuela	-4.837	-5.062	-4.90	-5.06	12.00	8.73	13.08	-5.07	-5.46	0.18
	Argentina	-5.425	-5.425	-5.50	-5.49	15.56	9.52	14.28	-5.53	-5.59	0.09
	Brazil	-5.816	-5.788	-5.81	-5.80	16.69	10.89	16.35	-5.91	-5.96	0.12
	Chile	-7.268	-7.331	-7.44	-7.47	97.09	20.96	31.45	-7.89	-8.23	0.30
INVEST	*Colombia*	-5.529	-5.484	-5.71	-5.65	16.26	10.57	15.86	-5.85	-5.86	0.05
	Mexico	-6.478	-6.481	-6.43	-6.46	53.49	13.91	20.86	-6.59	6.73	0.15
	Peru	-5.800	-5.888	-5.45	-5.48	14.09	9.28	13.91	-5.45	-5.56	0.29
	Venezuela	-7.055	-6.993	-7.14	-7.07	32.84	18.38	27.58	-7.71	-7.73	0.19
	Argentina	-5.785	-5.722	-5.82	-5.76	16.37	10.54	15.77	-5.89	-5.90	0.31
	Brazil	-5.290	-5.541	-5.21	-5.56	14.96	10.82	16.22	-5.54	-5.89	0.38
	Chile	-7.164	-7.095	-7.24	-7.16	27.71	17.21	25.79	-7.42	-7.42	0.06
CONS.	*Colombia*	-4.936	-4.951	-4.73	-4.82	12.49	6.85	10.21	-4.64	-4.78	0.12
	Mexico	-4.390	-4.894	-4.20	-4.86	9.38	7.25	10.87	-4.24	-4.90	0.49
	Peru	-3.992	-3.912	-4.00	-3.92	7.92	4.76	7.12	-3.92	3.88	0.35
	Venezuela	-4.122	-4.068	-4.14	-4.11	8.36	5.41	8.11	-4.23	-4.23	0.14

Table 5: Johansen's Cointegration tests

Variables	Eigenvalues	H_0	λ-trace	λ-max	95% quantiles CV	
					λ-trace	λ-max
RGDP	0.686	$r \leq 0$	160.46*	54.43*	125.61	46.23
	0.651	$r \leq 1$	106.03*	49.50*	95.75	40.07
	0.454	$r \leq 2$	56.53	28.46	69.82	33.87
	0.224	$r \leq 3$	28.06	11.94	47.85	27.58
	0.170	$r \leq 4$	16.12	8.81	29.79	21.13
	0.122	$r \leq 5$	7.30	6.12	15.49	14.26
	0.025	$r \leq 6$	1.19	1.19	3.84	3.84
TRADE	0.889	$r \leq 0$	186.48*	63.95*	125.61	46.23
	0.792	$r \leq 1$	122.53*	45.50*	95.75	40.07
	0.734	$r \leq 2$	77.03*	38.38*	69.82	33.87
	0.542	$r \leq 3$	38.65	22.65	47.85	27.58
	0.284	$r \leq 4$	16.01	9.69	29.79	21.13
	0.184	$r \leq 5$	6.31	5.89	15.49	14.26
	0.014	$r \leq 6$	0.42	0.42	3.84	3.84
INVEST	0.705	$r \leq 0$	147.32*	56.13*	125.61	46.23
	0.495	$r \leq 1$	91.18	31.41	95.75	40.07
	0.429	$r \leq 2$	59.78	25.82	69.82	33.87
	0.325	$r \leq 3$	33.95	18.12	47.85	27.58
	0.196	$r \leq 4$	15.84	10.03	29.79	21.13
	0.117	$r \leq 5$	5.81	5.75	15.49	14.26
	0.001	$r \leq 6$	0.06	0.06	3.84	3.84
CONS.	0.682	$r \leq 0$	159.67*	52.78*	125.61	46.23
	0.592	$r \leq 1$	106.89*	41.31*	95.75	40.07
	0.463	$r \leq 2$	65.57	28.65	69.82	33.87
	0.346	$r \leq 3$	36.92	19.55	47.85	27.58
	0.194	$r \leq 4$	17.36	9.95	29.79	21.13
	0.141	$r \leq 5$	7.41	7.02	15.49	14.26
	0.008	$r \leq 6$	0.38	0.38	3.84	3.84

* indicates rejection of the null hypothesis at 5% significance level.

Table 6: Lagrange Multiplier test for serial correlation

Variables	*Lags*	$\chi^2_{(49)}$	*P- value*
RGDP	1	58.39	0.16
TRADE	1	66.58	0.05
INVEST	2	48.56	0.49
CONS.	2	40.25	0.81

* the null hypothesis is that there is no serial correlation

Table 7: Likelihood Ratio test for Individual significance

Variable	*Country*	$\chi^2_{(2)}$	*p-value*
RGDP	*Argentina*	23.18	0.00
	Brazil	18.52	0.00
	Chile	20.36	0.00
	Colombia	13.06	0.00
	Mexico	11.57	0.00
	Peru	4.66	0.09
	Venezuela	20.40	0.00
TRADE	*Argentina*	26.17	0.00
	Brazil	28.22	0.00
	Chile	29.02	0.00
	Colombia	16.58	0.00
	Mexico	25.03	0.00
	Peru	36.30	0.00
	Venezuela	13.22	0.00
		$\chi^2_{(1)}$	
INVEST.	*Argentina*	15.63	0.00
	Brazil	1.81	0.17
	Chile	17.52	0.00
	Colombia	8.73	0.00
	Mexico	13.65	0.00
	Peru	23.13	0.00
	Venezuela	8.38	0.00
CONS.	*Argentina*	17.31	0.00
	Brazil	12.63	0.00
	Chile	8.12	0.01
	Colombia	5.88	0.05
	Mexico	6.73	0.03
	Peru	22.60	0.00
	Venezuela	9.46	0.00

Table 8: Test for the number of common cycles

Null	ρ_i^2	*C(p*,s)*	*df*	*F-stat*
Real GDP				
s = 1	0.03	1.43	3	0.59
s = 2	0.10	6.36	8	0.91
s = 3	0.16	14.55	15	1.02
s = 4	0.23	26.83	24	1.13
s = 5	0.29	42.93	35	1.20
s = 6	0.40	66.94	48	1.36*
s = 7	0.74	130.25	63	2.17*
TRADE				
s =1	0.02	0.59	4	0.23
s = 1	0.04	1.77	10	0.22
s = 2	0.21	8.61	18	0.50
s = 3	0.30	18.95	28	0.64
s = 4	0.62	47.01	40	1.13
s = 5	0.73	84.98	54	1.57*
s = 6	0.92	158.23	70	2.60*
INVEST				
s =0	0.06	2.91	9	0.25
s =1	0.11	8.39	20	0.28
s =2	0.15	16.02	33	0.31
s =3	0.25	29.54	48	0.40
s = 4	0.36	50.52	65	0.51
s =5	0.67	102.63	85	0.84
s =6	0.80	178.27	105	1.27*
CONS.				
s =1	0.00	0.00	2	0.09
s =2	0.01	0.47	8	0.11
s =3	0.05	2.88	15	0.22
s =4	0.27	17.67	24	0.74
s =5	0.38	40.14	35	1.12
s =6	0.51	73.67	48	1.51*
s= 7	0.71	131.85	63	2.19*

**indicates rejection of the null hypothesis at 10% significance level.*

Figure 1. Real GDP: Trend components

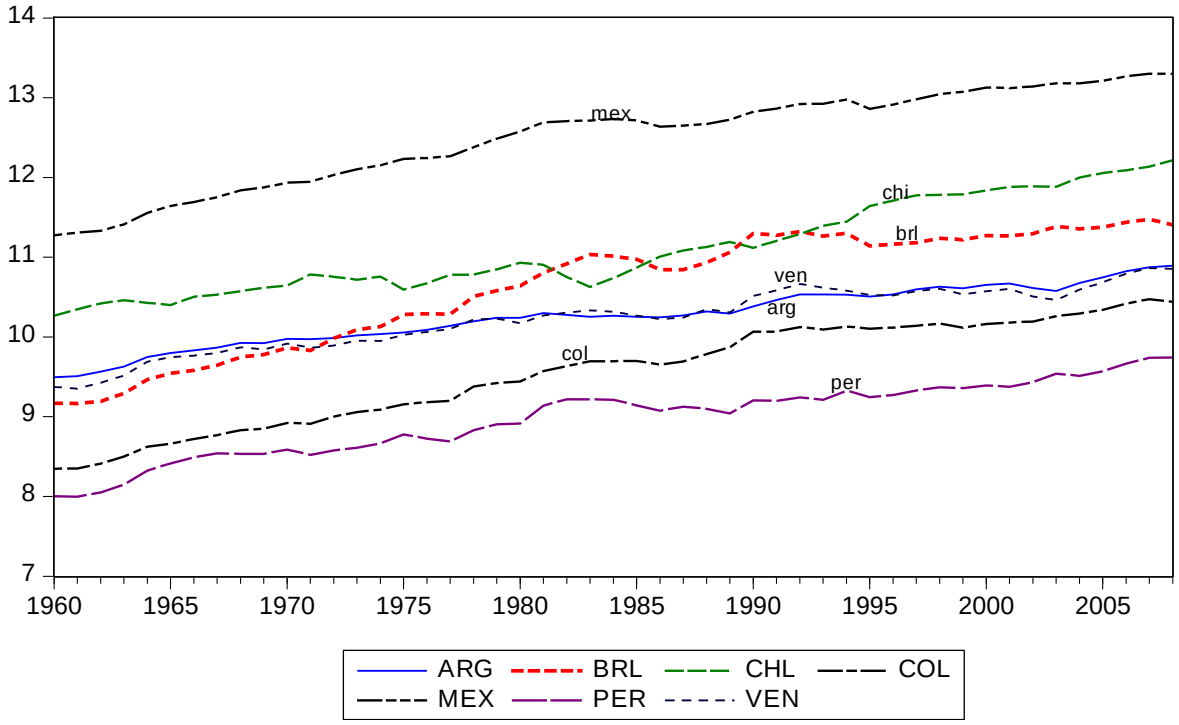

Figure 2. Real GDP: cyclical components

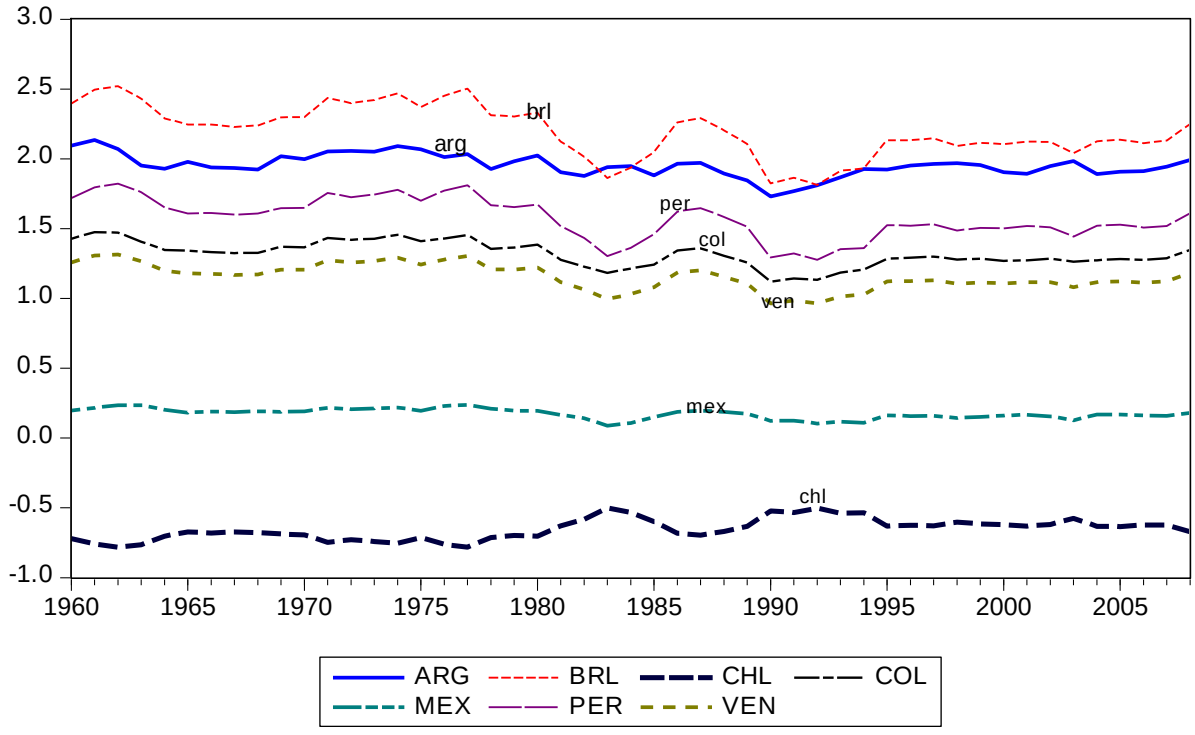

Figure 3. Trend-cycle decomposition of Argentina's Real GDP

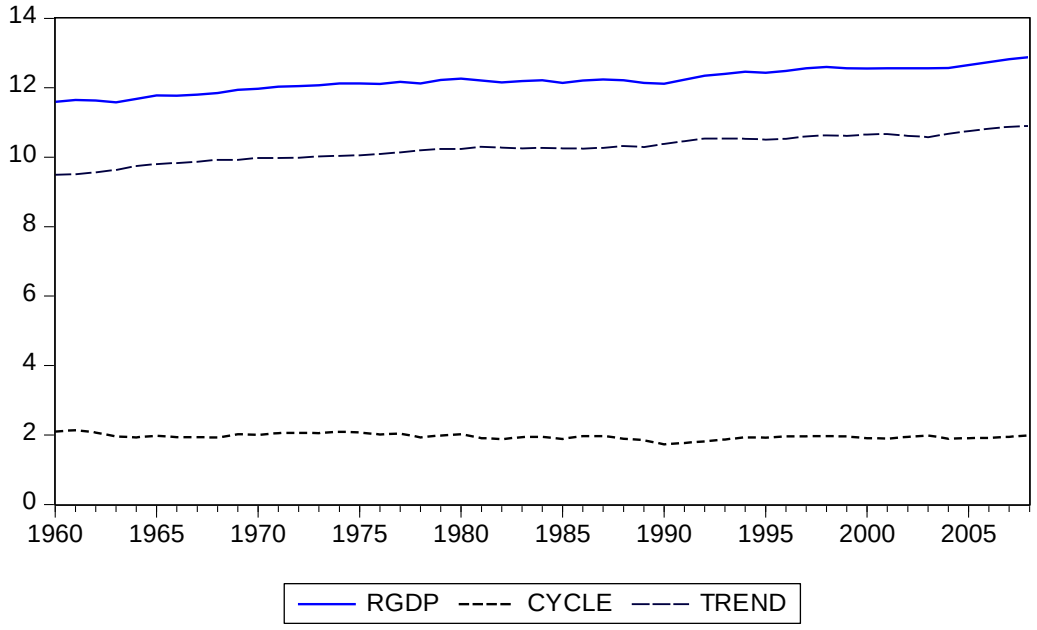

Figure 4. Trend-Cycle decomposition of Brazilian Real GDP

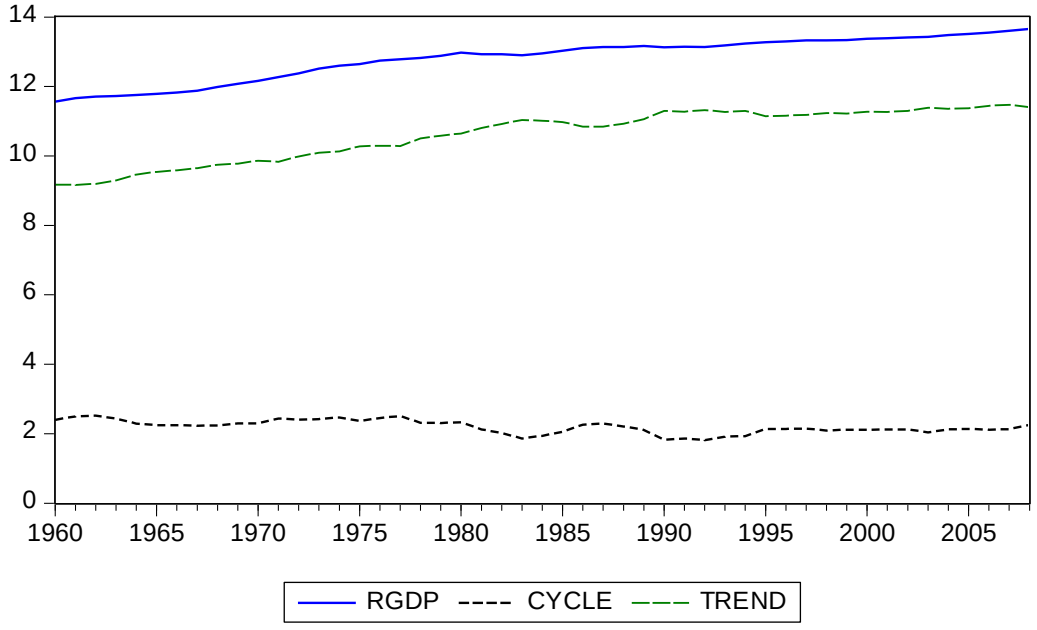

Figure 5. Trend-Cycle decomposition of Chilian Real GDP

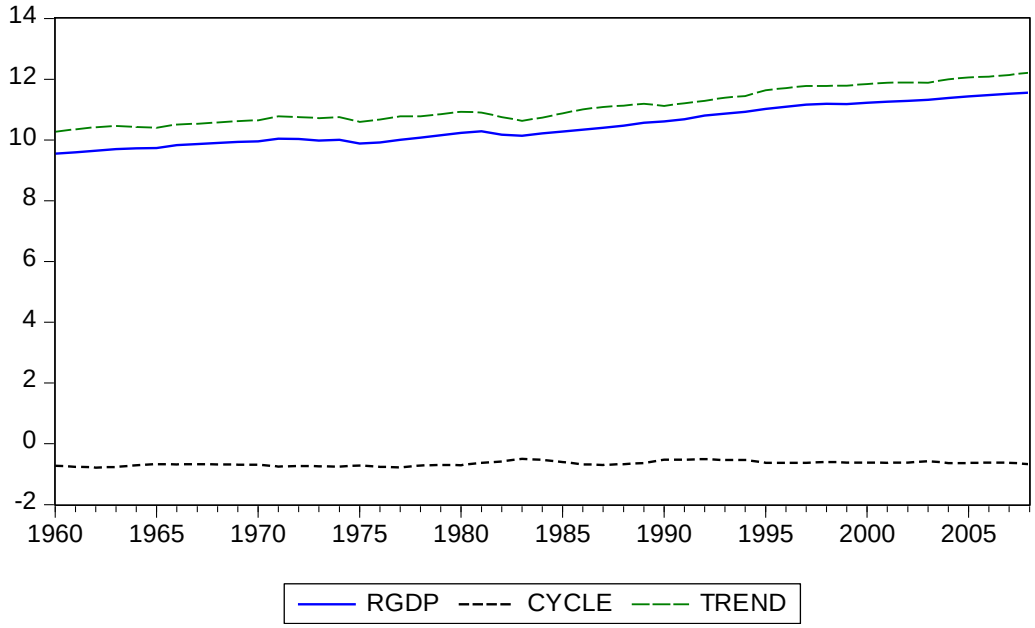

Figure 6.Trend-Cycle decomposition of Colombian Real GDP

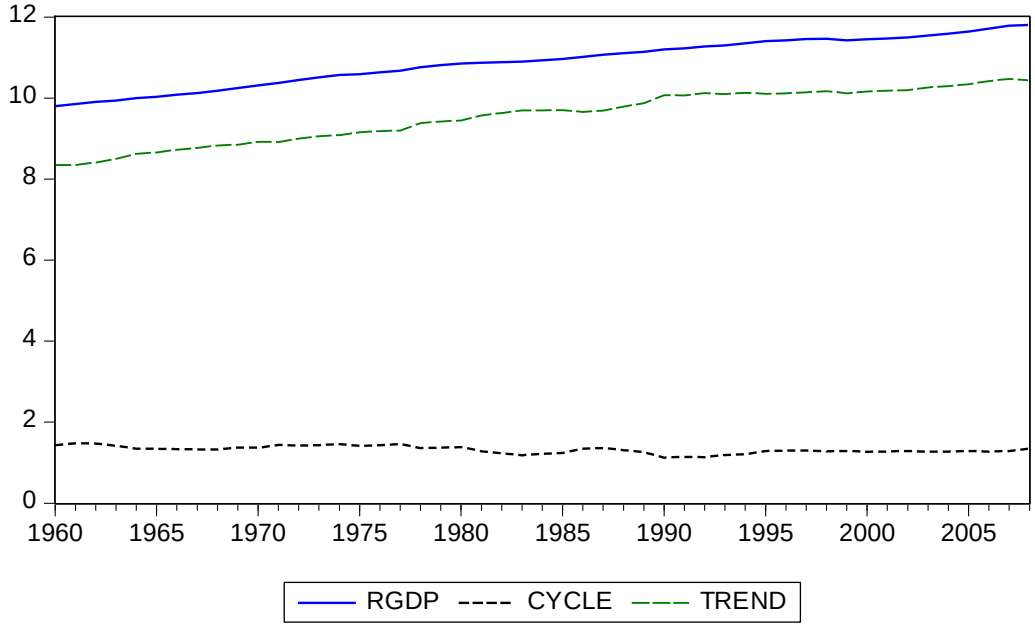

Figure 7. Trend-Cycle decomposition of Mexican Real GDP

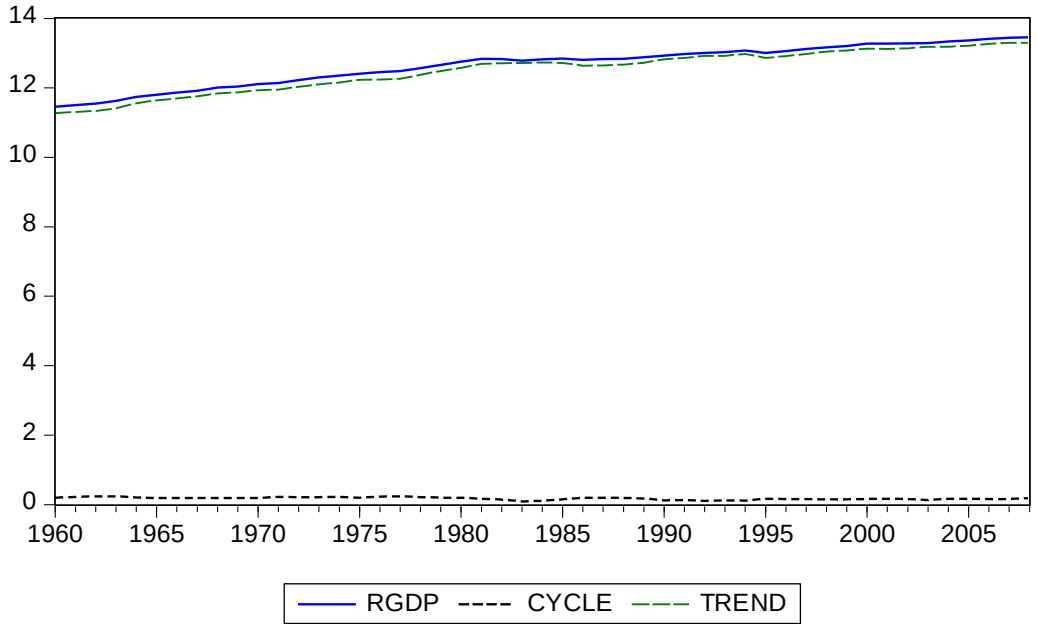

Figure 8. Trend-Cycle decomposition of Peruvian Real GDP

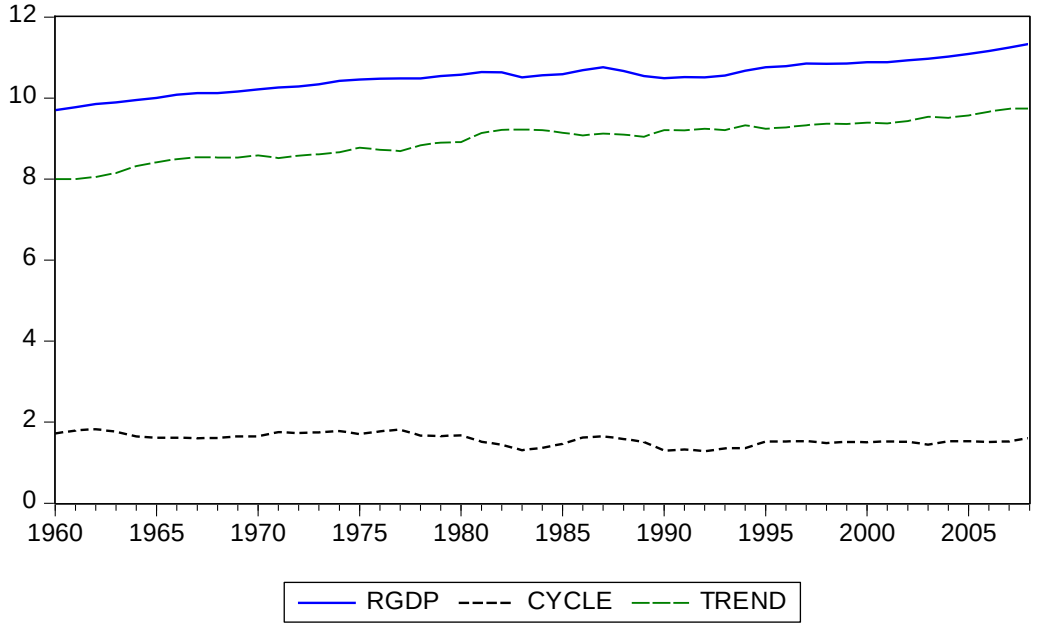

Figure 9. Trend-Cycle decomposition of Venezuelan Real GDP

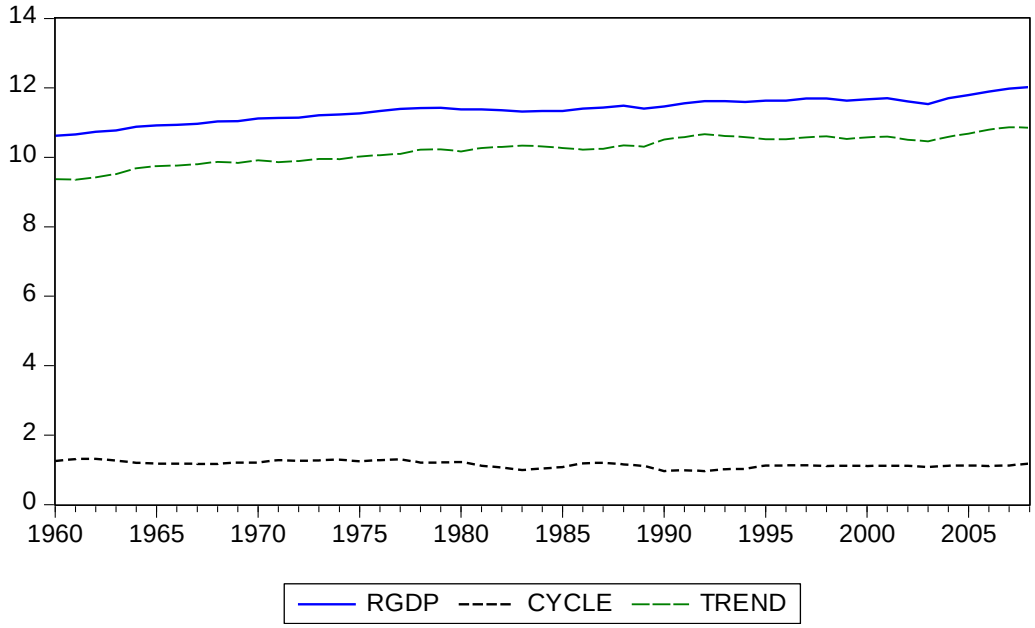

Figure 10. Investment: Trend Components

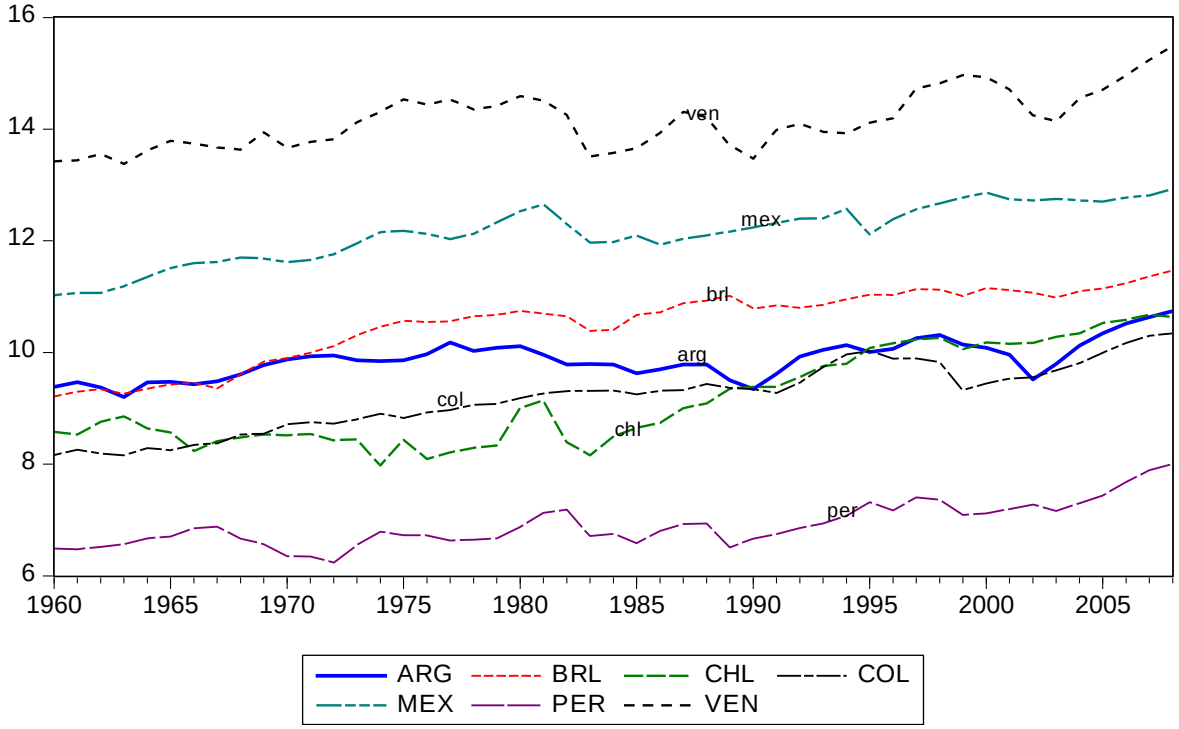

Figure 11. Investment: Cyclical Components

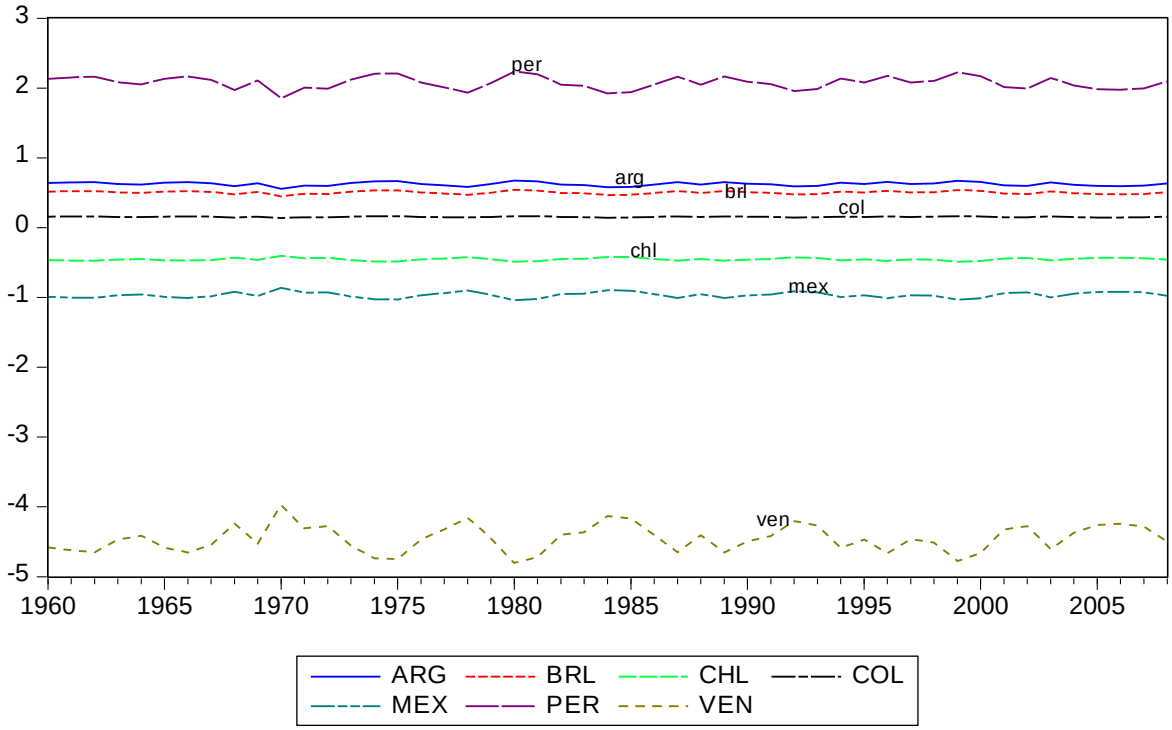

Figure 12. Trend-Cycle decomposition of Argentine Investment

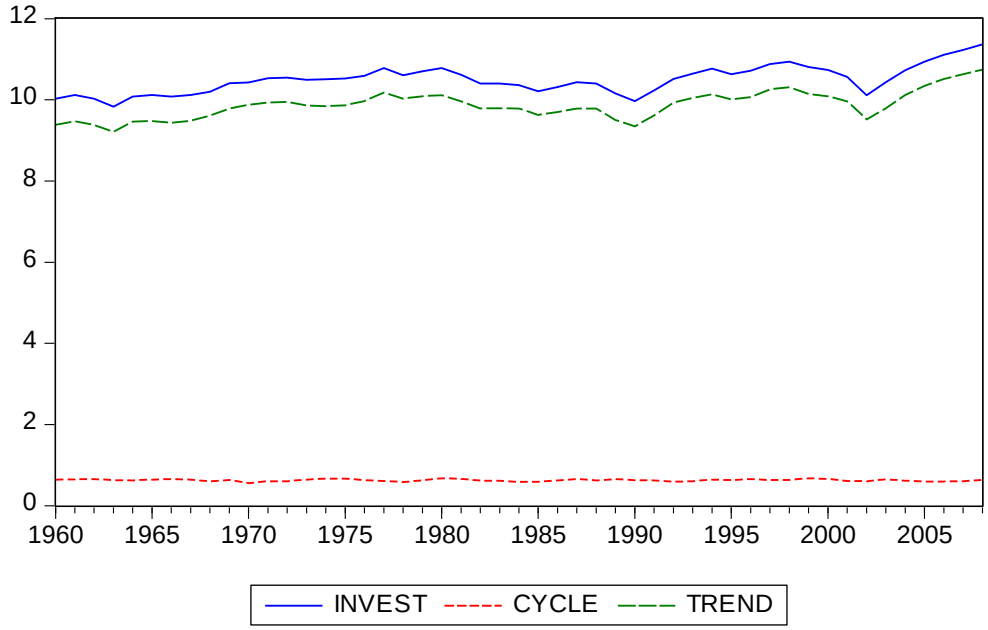

Figure 13. Trend-Cycle decomposition of Brazilian Investment

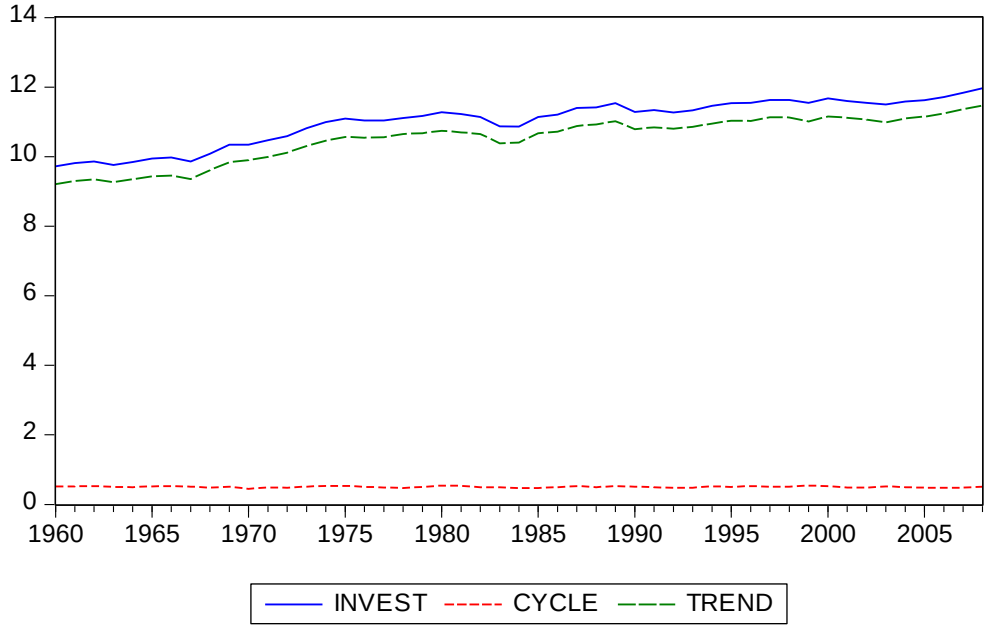

Figure 14. Trend-Cycle decomposition of Chilean Investment

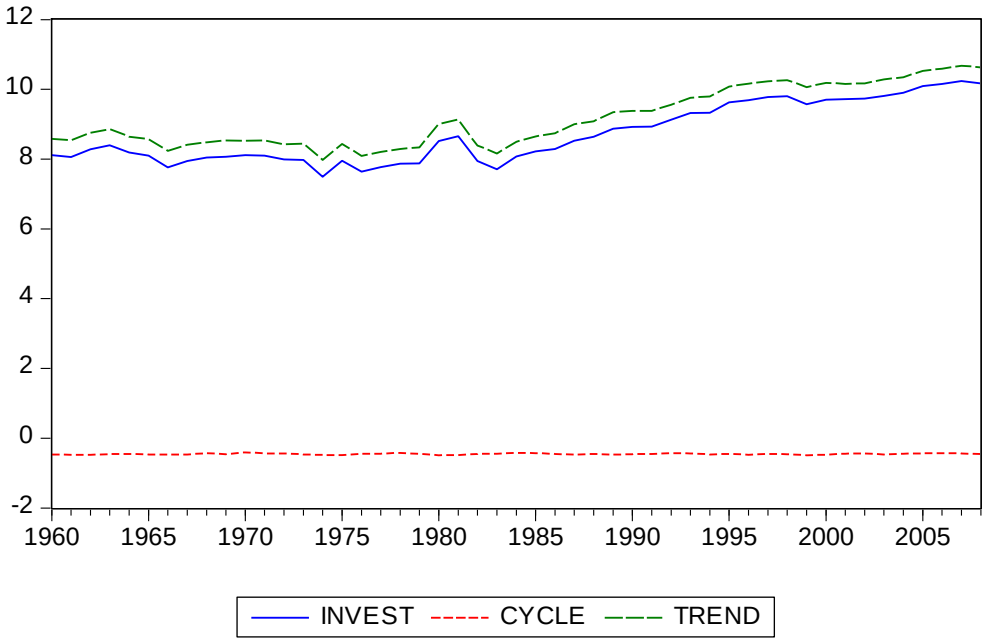

Figure 15. Trend-Cycle decomposition of Colombian Investment

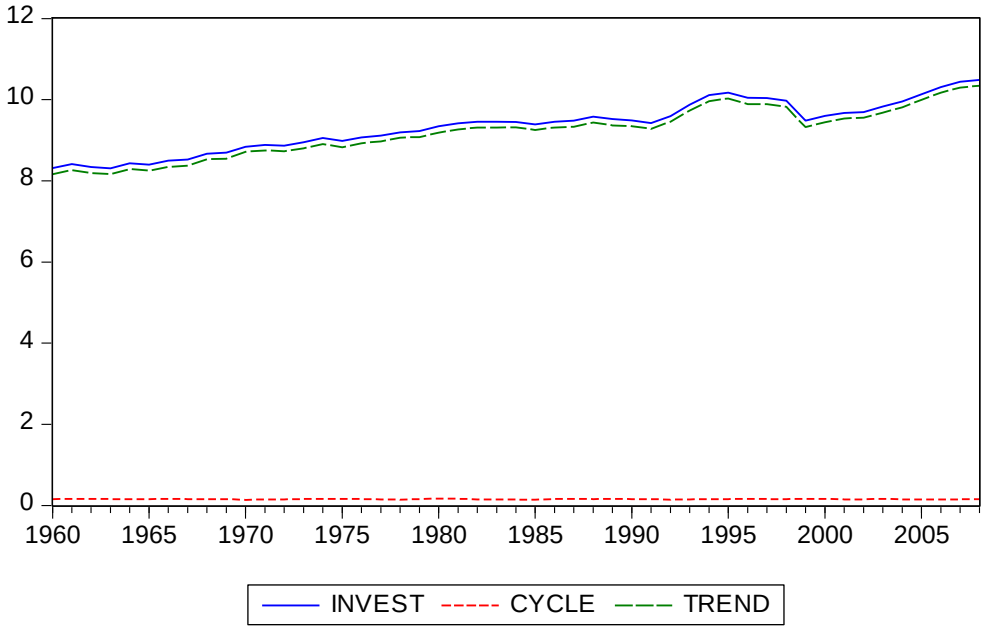

Figure 16. Trend-Cycle decomposition of Mexican Investment

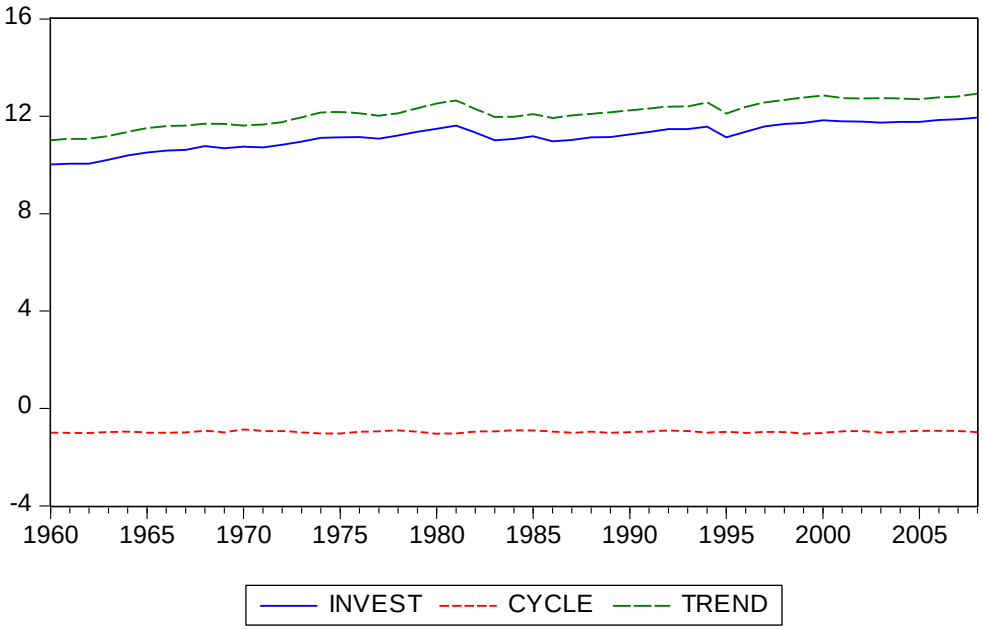

Figure 17. Trend-Cycle decomposition of Peruvian Investment

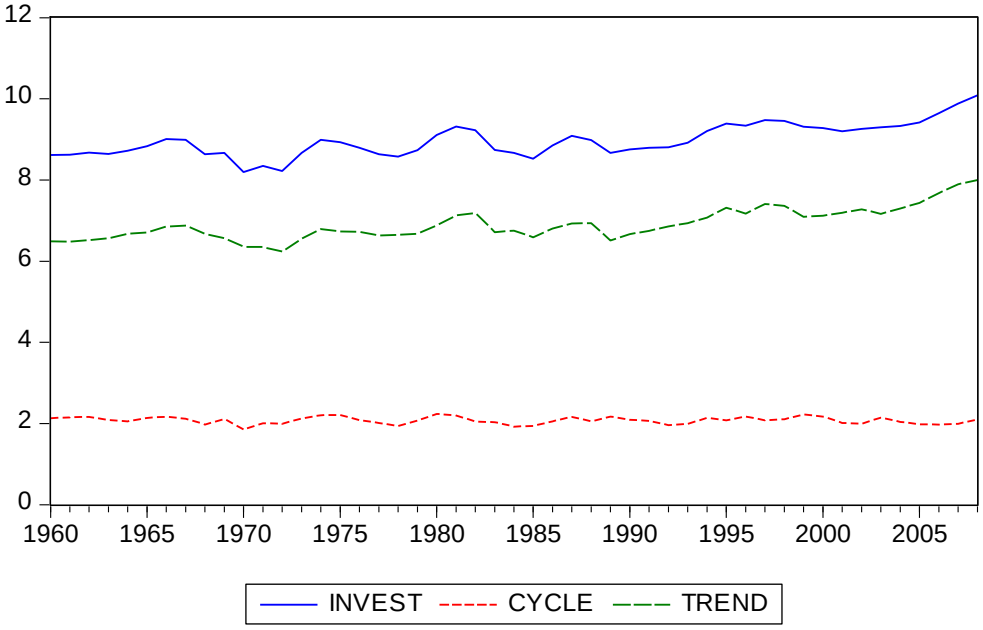

Figure 18. Trend-Cycle decomposition of Venezuelan Investment

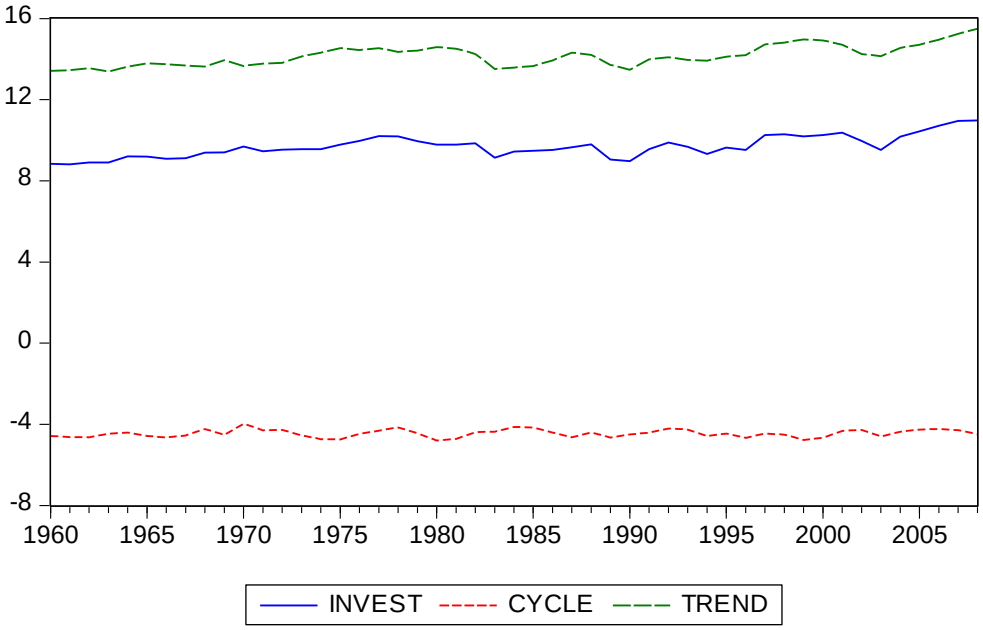

Figure 19. Consumption: Trend Components

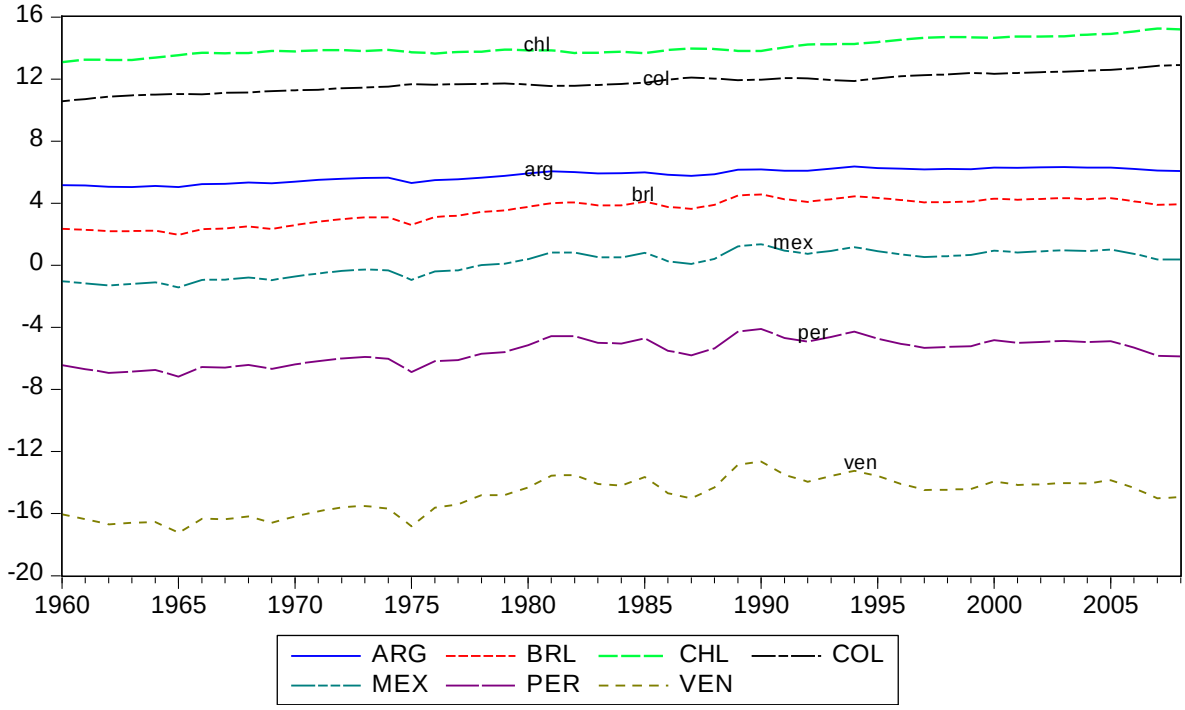

Figure 20. Consumption: Cyclical Components

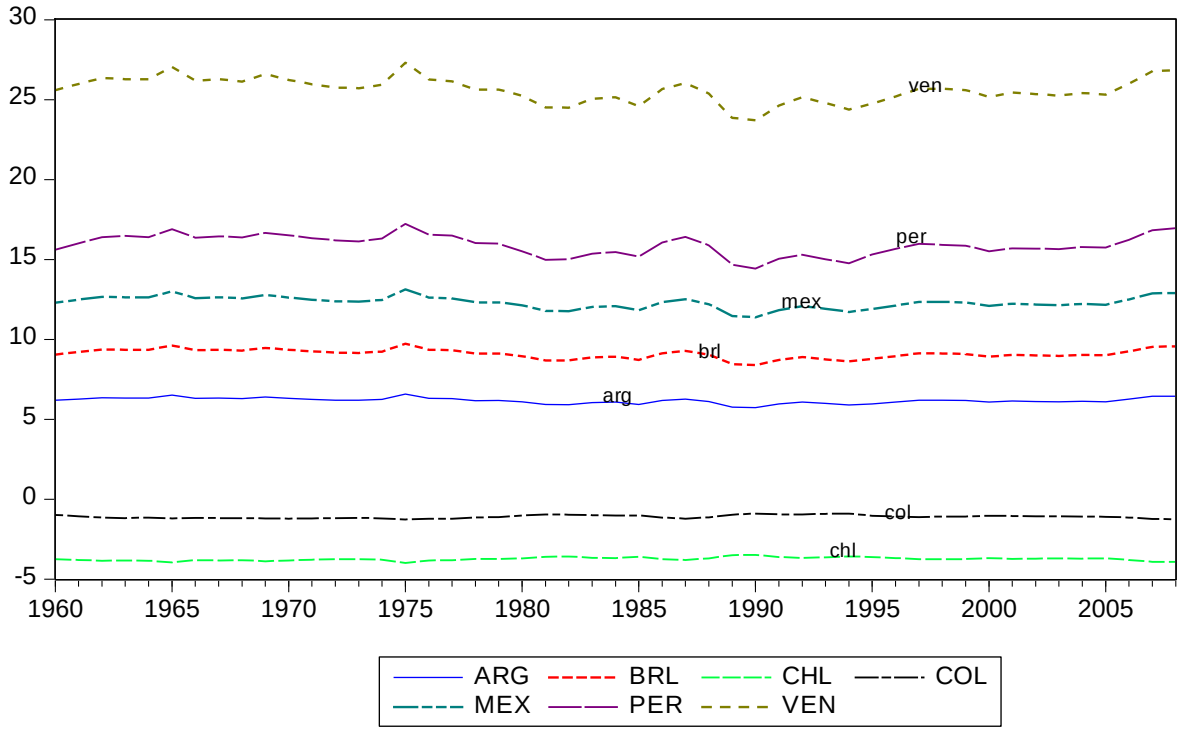

Figure 21. Trend-Cycle decomposition of Argentine Consumption

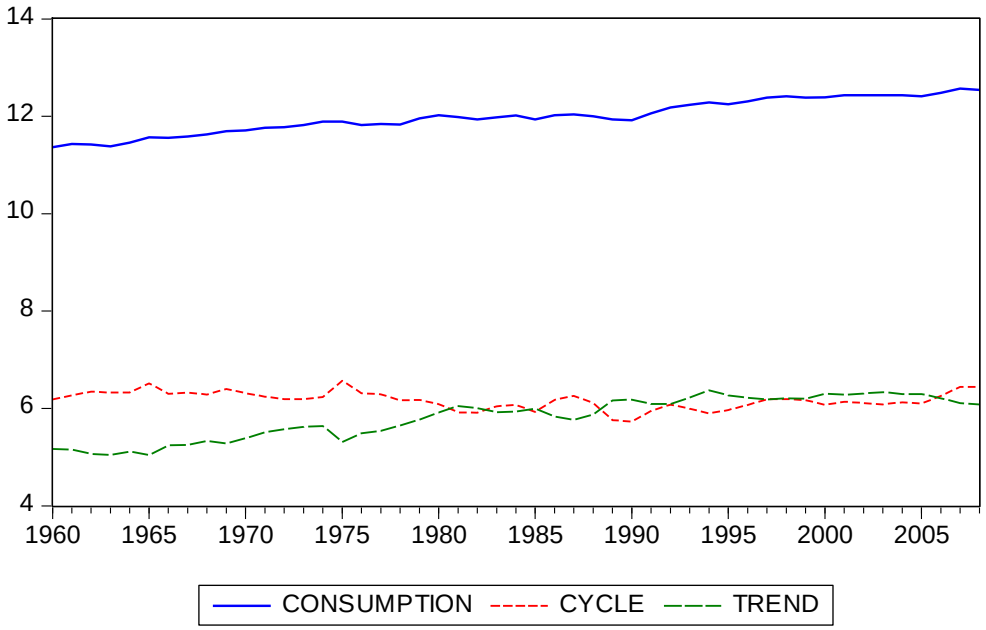

Figure 22. Trend-Cycle decomposition of Brazilian Consumption

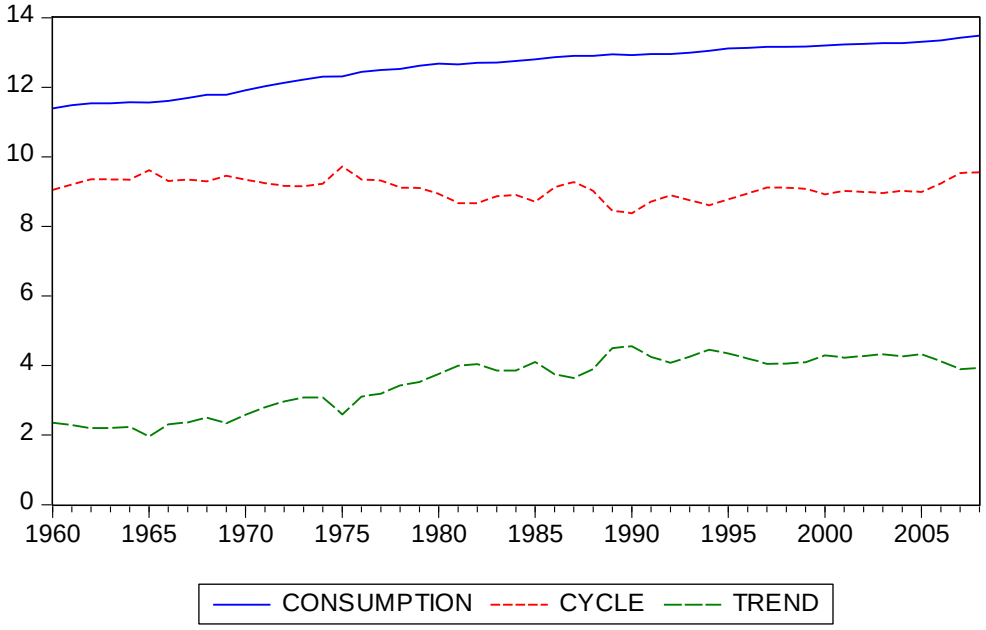

Figure 23. Trend-Cycle decomposition of Chilean Consumption

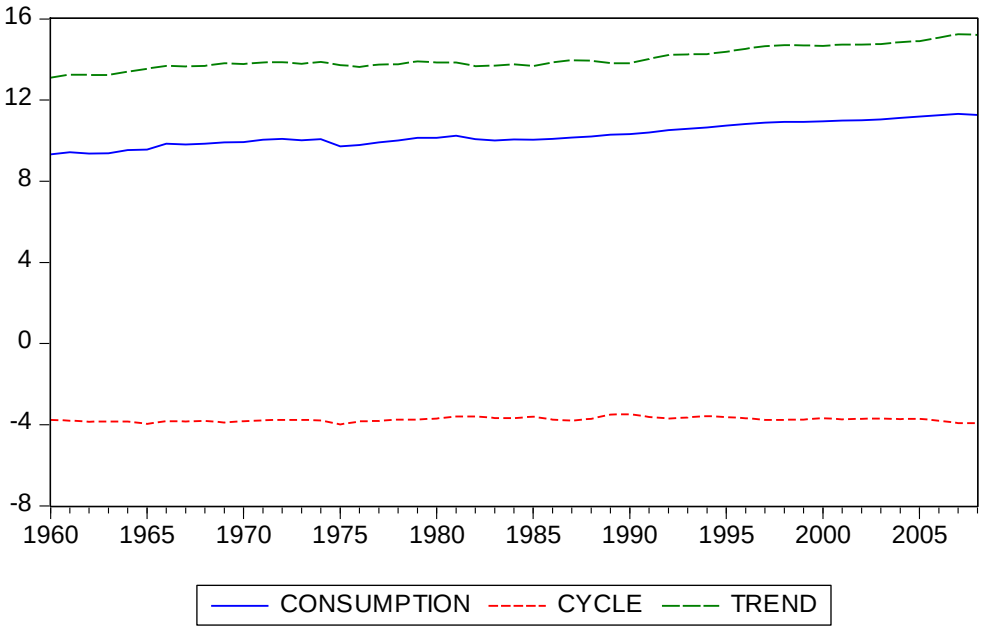

Figure 24. Trend-Cycle decomposition of Colombian Consumption

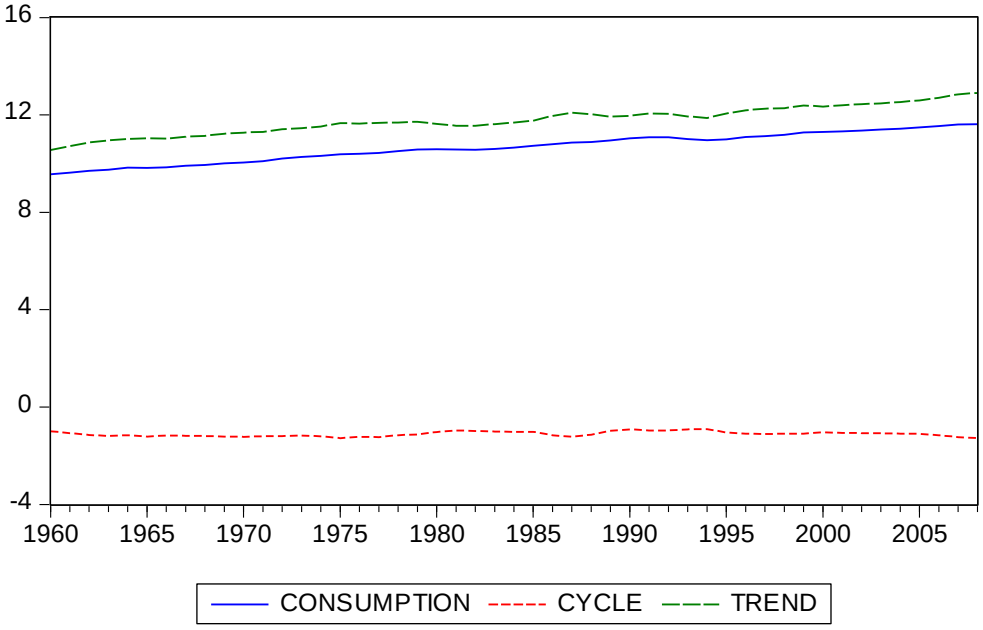

Figure 25. Trend-Cycle decomposition of Mexican Consumption

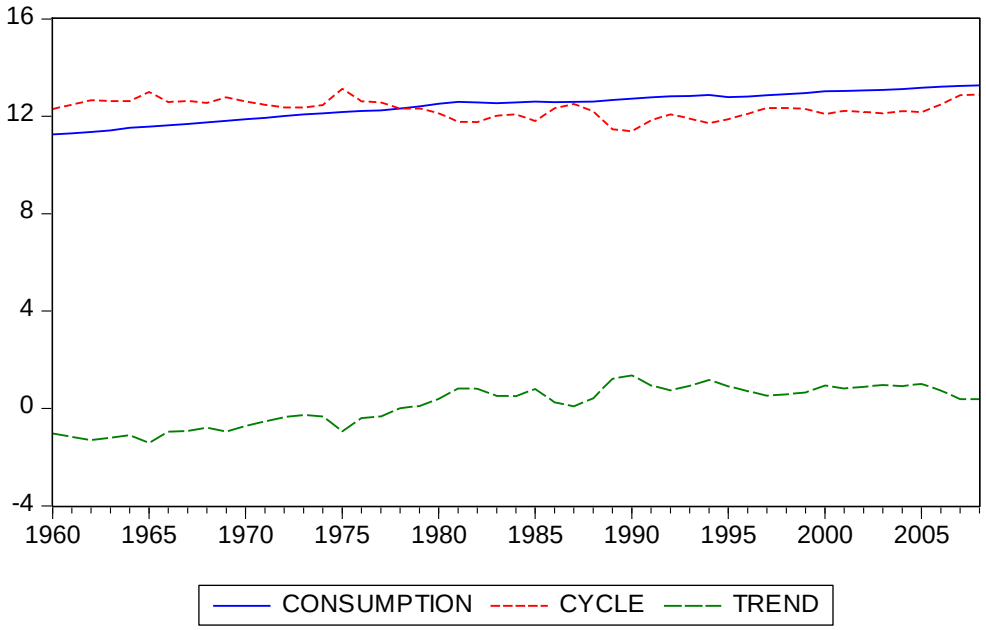

Figure 26. Trend-Cycle decomposition of Peruvian Consumption

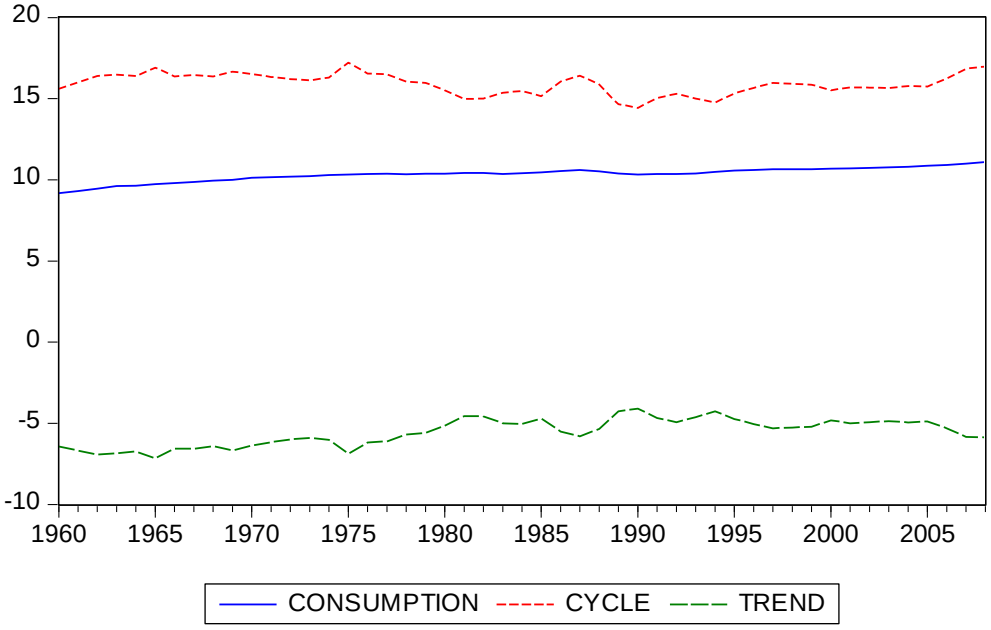

Figure 27. Trend-Cycle decomposition of Venezuelan Consumption