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Abstract

This paper studies the economic sources underlying the co-movement of real stock returns in Latin America. Following the literature on Structural Vector Autoregressive Models (SVARs) using long-run restrictions, three structural shocks are identified: demand, supply and portfolio shocks. First, I document the pervasive co-movement of real stock returns in Latin America by means of simple correlations. Second, for each country, I asses the importance of each structural shock in explaining real stock return dynamics. Third, I identify which shocks are driving the observed co-movement in Latin American real stock returns. Results show that, for the majority of countries, portfolio shocks are the main driving force behind real stock returns. Furthermore, that shock is also extremely important in explaining co-movement patterns in Latin American stock markets. In addition, macroeconomic shocks (supply and demand) are unimportant and weakly correlated across countries, suggesting financial integration without economic integration in Latin America.

Keywords: real stock returns, structural shocks, co-movement
JEL Classification: E 44, G12, C32

1. Introduction

The interaction between macroeconomic forces and the stock market ia a wildly studied topic in Macroeconomics. A basic question is assessing the importance of macroeconomic disturbances in explaining fluctuations in stock markets. In the context of open economies, there is another interesting issue, namely, the role of macroeconomic disturbances in the international co-movement of stock markets. In Macroeconomics, vector autoregressive models (VARs) have been used to address both the importance of particular macroeconomic shocks as well as the role of different propagation mechanisms. International linkages have also been studied using the VAR framework. Based upon economic theory or institutional considerations, it is possible to impose additional restrictions on VARs in order to be able to give economic interpretation to particular classes of disturbances.

In this paper, I use long-run restrictions, following the methodology developed by Blanchard & Quah (1989) and extended to the case of financial variables by Hess & Lee (1999), Rapach (2001) and Fraser & Groenewold (2006). In fact, I adopt the identification scheme suggested by Fraser & Groenewold (2006) in which three structural shocks are identified: demand, supply and portfolio shocks. This identification strategy generalizes Hess & Lee (1999) approach of identifying supply and demand disturbances using real stock prices instead of only macroeconomic variables as is traditionally done in the spirit of Blanchard & Quah (1989). The use of long-run restriction can be seen also in Rapach (2001) and Gallagher & Taylor (2002) mainly to analyze the stock-return inflation relationship in the US as well as how important are macroeconomic shocks for real stock returns.

One of my goals is to asses the importance of each structural shock in explaining real stock return variations as in Rapach (2001) and Gallagher & Taylor (2002). In addition, I introduce an international flavor by asking, additionally, which shocks are driving the observed co-movement in Latin American real stock returns.

The idea of studying stock market behavior in different countries and connecting it to specific shocks has been explored by Canova & De Nicoló (2000) and Gallagher (1999). The first paper is an empirical analysis of the relationship of asset returns, real activity and inflation from an international perspective, comparing different countries and studying how shocks propagate from one country to the others. In spite of it explicit international focus, this paper does not identify structural shocks and concentrates only on reduced forms VARs. Gallagher (1999) manages to identify permanent and transitory shocks, which could also be labeled supply and demand, using Blanchard & Quah (1989) identification strategy for a sample of 16 countries and concludes that stock prices contain a significant mean-reverting component due to the importance of transitory shocks in variance decomposition analysis. Though it identifies structural shocks, this paper does not address the pattern of co-movement in stock markets located in different countries.

In spite of being cross-country studies, so far, the papers reviewed do not include Latin American countries in their sample. There are, though, some papers addressing stock market linkages specifically related to Latin America. In Choudrhry (2001), the relationship between inflation and stock returns for a sample of high inflation countries, including some

Latin American nations, is explored. In contrast to Hess & Lee (1999), in which a structural interpretation to the correlation between inflation and stock returns is given, this paper concentrates on reduced form regressions and does not use VARs. The VAR approach is represented by Pagán & Soydemir (2000) and Chen et al. (2002). In both papers, however, there is no attempt to suggest any structural interpretation to the underlying forces behind stock market linkages in Latin America.

The purpose of this study is to identify underlying structural shocks and gauge their importance for real stock returns movements in each country as well as for the observed co-movement pattern across countries. Therefore, I use a VAR approach with a structural interpretation to understand stock market linkages in Latin America and the role played by macroeconomic sources of fluctuations.

The remainder of this paper is organized as follows. First, I describe the data set and document stylized facts related to real stock returns co-movement in Latin America. In section 3, I present the identification of structural shocks and briefly discuss the reduced form VAR specification. Section 4 provides the empirical findings and reports measures of the relative importance of each shock in explaining variations in stock returns and co-movement patterns. In addition, the main results are discussed and interpreted. Finally, the last section offers some conclusions.

2. Data and Co-movement Patterns

2.1. The Data Set

In this section, I describe my data set and discuss the co-movement patterns for real stock returns in Latin America by means of a simple correlation matrix.

I need the following economic variables in order to identify demand, supply and portfolio shocks: stock market indices, inflation and measures of economic activity for each country considered. The sample consists of monthly observations from January 1995 to December 2005.

I collect data for the US, as a benchmark for comparison and for the following countries in Latin America: Argentina, Brazil, Chile, Colombia, Mexico, Venezuela and

Peru. The stock market indices, in nominal terms, are: S&P 5000 (US), IBOVESPA (Brazil), IGPA (Chile), IBB (Colombia), IPC (Mexico), IBVC (Venezuela) and IGBVL (Peru). I also collect consumer price indices for each country to construct inflation and also to deflate nominal stock market indices. Finally, I employ industrial production indices a measure of economic activity for almost all countries. The only exception is Venezuela. For this country, I use crude oil production, since I do not have an industrial production index for the entire sample. Furthermore, oil is a very important sector for Venezuela. Therefore, I believe that oil production is capturing important movements in real economic activity.

I decide to work in monthly frequency to have enough data to run VARs in a reliable way since I would like to consider a period, on average, of stable macroeconomic conditions and low inflation.

The following tables present mean and standard deviation for inflation, the growth rate in industrial production and real stock returns for each country. These variables are used in the reduced form VAR specification for each country in the sample. Figures presented in the following tables are monthly growth rates, not annualized, for consumer price indices, industrial production indices and real stock prices.

Table 1: Inflation

Country	Mean (%)	Standard Deviation (%)
Argentina	0.3975	1.1824
Brazil	0.6961	0.5919
Chile	0.3421	0.3604
Colombia	0.8938	0.7931
Mexico	1.0686	1.1459
Peru	0.3738	0.4484
Venezuela	2.2811	1.7545
US	0.2198	0.2658

Table 2: Industrial Production Growth

Country	Mean (%)	Standard Deviation (%)
Argentina	0.1252	1.7307
Brazil	0.2247	6.3869
Chile	0.2748	1.9667
Colombia	0.1171	6.8491
Mexico	0.2572	3.9829
Peru	0.2926	6.1095
Venezuela	-0.0194	13.5910
US	0.2371	0.5535

Table 3: Real Stock Returns

Country	Mean (%)	Standard Deviation (%)
Argentina	0.5648	11.9534
Brazil	0.7935	10.6134
Chile	0.1115	4.8097
Colombia	0.6191	8.1078
Mexico	0.3869	8.3997
Peru	0.5601	7.5840
Venezuela	-0.2204	11.2258
US	0.5235	4.4351

Looking at the data, it is evident how much volatile are Latin American economies and stock markets compared to the US. The only exception seems to be Chile. Venezuela is the only country with very poor economic and financial performances, since all variables are very volatile and have a very low mean.

2.2. Stock Returns Co-movement

I summarize the co-movement by the cross-county correlation matrix. I do not attempt to model how the correlation pattern may be changing over time. I consider the pervasive high and positive correlation coefficients as a stylized fact concerning Latin. American stock markets and I aim at interpreting this fact in terms of structural shocks (supply, demand and portfolio shocks). The correlation matrix is displayed bellow.

Table 4: Real Stock Returns Correlation Matrix

Country	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	US
Argentina	1							
Brazil	0.4857 (p<0.0001)	1						
Chile	0.4482 (p<0.0001)	0.6039 (p<0.0001)	1					
Colombia	0.3672 (p<0.0001)	0.1164 (p=0.1871)	0.3519 (p<0.0001)	1				
Mexico	0.6436 (p<0.0001)	0.6440 (p<0.0001)	0.4305 (p<0.0001)	0.2061 (p=0.0186)	1			
Peru	0.5232 (p<0.0001)	0.5951 (p<0.0001)	0.6050 (p<0.0001)	0.3562 (p<0.0001)	0.4596 (p<0.0001)	1		
Venezuela	0.3674 (p<0.0001)	0.2947 (p=0.0007)	0.3259 (p=0.0002)	0.2788 (p=0.0013)	0.3534 (p<0.0001)	0.2888 (p=0.0009)	1	
US	0.3703 (p<0.0001)	0.6025 (p<0.0001)	0.4150 (p<0.0001)	0.0755 (p=0.3934)	0.5478 (p<0.0001)	0.2691 (p=0.0020)	0.2523 (p=0.0038)	1

In parenthesis, I show the p-value associated with the null hypothesis that the correlation coefficient is equal to zero. In all cases, except for the pairs Brazil-Colombia and US-Colombia, all the correlation coefficients are statistically different from zero. The correlations between US-Brazil, US-Chile and US-Mexico are high. This is probably a consequence of more financial integration between these markets, since Brazil, Chile and Mexico have developed and sophisticated financial markets. Argentina, Brazil, Chile and Mexico co-move very strongly, indicating some common component in real stock returns for Latin America. Peru, Venezuela and Colombia are not strongly correlated with the US. Argentina is correlated with US financial market, though not as strongly as Brazil, Chile and Mexico. There seems to be a substantial degree of co-movement in Latin America based on the pattern for the correlation coefficients. The pattern is not uniform, since some country pairs are more correlated than others. Brazil, Chile and Mexico tend to form a core with vary correlated real stock returns. In addition, these countries display strong co-movement with the US.

3. The SVAR Model

In this section, I introduce the basic ideas related to Structural Vector Autoregressive modeling. First, I describe how to use long-run restrictions to identify a set of economic shocks. Second, I discuss how to specify a reduced form VAR and present the specifications chosen for each country in my data set.

3.1. Identification of Structural Shocks

Consider the following SVAR, displaying contemporary relationships between the endogenous variables grouped in the vector X_t.

$$B(0)X_t = b_0 + B(L)X_{t-1} + \varepsilon_t \qquad (1)$$

The matrix $B(0)$ summarizes any contemporary relationship between the variables in the system and ε_t denotes a set of structural shocks that can be interpreted in economic terms. In the equation above the letter L represents the lag operator and B(L) is a matrix polynomial in the lag operator given by: $B(L) = B(1) + B(2)L + B(3)L^2 + ... + B(k)L^{k-1}$.

The goal is to use restrictions coming from economic theory to identify the matrix $B(0)$. One basic input for identification is some information on estimated residuals from a reduced form VAR. The reduced form obtains multiplying equation (1) by the inverse of $B(0)$.

$$X_t = a_0 + A(L)X_{t-1} + e_t \qquad (2)$$

The reduced form parameters and the residuals are related to the structural form parameters and to the shocks, according to the following expressions:

$$a_0 = B(0)^{-1}b_0,\ A(L) = B(0)^{-1}B(L) \text{ and } e_t = B(0)^{-1}\varepsilon_t.$$

I can derive a moving-average representation associated with (2):

$$X_t = c_0 + C(L)\varepsilon_t$$

The moving average representation parameters are related to the structural form parameters according to:

$$c_0 = C(L)b_0 \ C(L) = (B(0) - B(L)L)^{-1}$$

The matrix of long-run multipliers is defined as follows:

$$\lim_{k \to \infty} \frac{\partial X_{t+k}}{\partial \varepsilon_t^{'}} = C(1)\varepsilon_t$$

One way to identify the matrix $B(0)$ is to impose long-run restrictions on the matrix of long-run multipliers $C(1)$. In addition, it is assumed that structural shocks represent distinct sources of fluctuations and, therefore, are not correlated. In other words, the variance-covariance matrix for ε_t is diagonal. By normalizing the main diagonal of the variance-covariance matrix, I have $E(\varepsilon_t \varepsilon_t^{'}) = I_n$, where I_n represents the identity matrix. That assumption creates another set of restrictions involving $B(0)$ and the variance-covariance matrix of the reduced form residuals (Ω) given by $B(0)B(0)^{'} = \Omega$.

In fact, the set of long-run restrictions and the set of restrictions $B(0)B(0)^{'} = \Omega$ should be enough to recover $B(0)$ and, therefore, construct measures of structural disturbances from estimated reduce-form residuals, using the equation $\varepsilon_t = B(0)e_t$.

In this paper the vector X_t contains three variables: inflation (π_t), growth rate of real output measure (Δy_t), which is the industrial production index, and real stock returns (Δq_t). Just explaining notation, y_t and q_t denote real output (industrial production) and real stock prices respectively.

Following Fraser & Groenewold (2006), I use the following long-run restrictions:

- Demand shocks have no long-run effect on real output
- Demand shocks have no long-run effect on real stock prices
- Portfolio Shocks have no long-run effect on real output

Supply shocks have permanent effects in both real stock prices and real output. In contrast, demand shocks affect real output and real stock prices just temporarily. Finally, a portfolio shock has no permanent effect on economic activity, though it is able to impact permanently real stock prices.

Supply shocks can be associated with technology shocks, which can affect real stock prices through dividends, and demand shocks with monetary policy shocks or fiscal policy shocks. A clear economic interpretation for portfolio shocks is not straightforward. It is a disturbance that impact stock market permanently but cannot have any long-memory effect on the real economy. These shocks can be thought as shifts in the market perception towards risky alternatives or changes in preferences for different types of assets.

3.2. Reduced Form Specification

After the identification strategy can be applied, reduced form VARs need to be specified for each country analyzed. I follow standard practices in the VAR literature and look at information criteria and autocorrelation tests for estimated residuals. The idea is to have a parsimonious specification with a good fit to the data and

Besides, I also specify a set of seasonal dummies since I am using monthly data. To save space, I am not reporting results of all statistical tests but only the number of lags for each country VAR.

For each country, a different VAR was estimated using the following vector of economic variables: $X_t = [\pi_t \quad \Delta y_t \quad \Delta q_t]'$ in this particular order. Additionally, for all countries, I include a constant and a set of seasonal dummies.

Table 5: VAR Specification

Country	Number of Lags
Argentina	7
Brazil	6
Chile	6
Colombia	7
Mexico	10
Peru	11
Venezuela	4
US	5

4. Results

Demand, supply and portfolio shocks are identified for each country according to the strategy discussed in section 3. Appendix I show time series for each structural shock in each country analyzed. The objective of this section is to gauge the relative importance of the three shocks in each country and to compute cross-country correlations for each structural shock in order to identify which shock, if any, is capable of displaying the pervasive co-movement associated with real stock returns.

4.1. The Relative Importance of Structural Shocks

The first method used to evaluate the relative importance of each structural shock is to run simple regressions employing real stock returns as dependent variable and the component of real stock returns originated from each structural shock. These last quantities can be generated by simulation, assuming that there is only one source of fluctuation associated with a particular structural shock.

Regressions of real stock returns on the component of real stock returns due to a structural shock s can be written as $R_t^i = \alpha + \beta RS_t^i + \eta_t$, where R_t^i represents the time series of real stock returns on country *i* and RS_t^i stands for the component of real stock returns due to the structural shock *S*.

The following tables summarize the results by reporting the estimated coefficients with t ratios in parenthesis and the Adjusted R^2.

Table 6 : Demand Shock Component

Country	$\hat{\alpha}$	$\hat{\beta}$	Adjusted R^2
Argentina	0.0046 (0.4595)	0.2817 (3.5530)	0.0832
Brazil	0.0074 (0.8018)	0.1697 (1.7584)	0.0169
Chile	0.0008 (0.2073)	0.3264 (4.4769)	0.1295
Colombia	0.0013 (0.3071)	0.7633 (14.1389)	0.6084
Mexico	0.0038 (0.5430)	0.3025 (3.5946)	0.0852
Peru	0.0055 (0.8953)	0.3050 (3.9156)	0.1077
Venezuela	-0.0011 (-0.1188)	0.2413 (2.8252)	0.0517
US	0.0031 (0.8481)	0.3870 (4.5137)	0.1314

Table 7 : Supply Shock Component

Country	$\hat{\alpha}$	$\hat{\beta}$	Adjusted R^2
Argentina	0.0016 (0.2494)	0.7451 (14.001)	0.6037
Brazil	0.0034 (0.4616)	0.6580 (8.8885)	0.3786
Chile	0.000656 (0.1690)	0.3914 (5.1632)	0.1669
Colombia	0.0041 (0.6004)	0.2872 (3.6013)	0.0855
Mexico	0.003873 (0.5530)	0.2961 (3.5804)	0.0845
Peru	0.005 (0.8217)	0.3506 (4.4894)	0.1301
Venezuela	-0.0010 (-0.1104)	0.2675 (3.1092)	0.0634
US	0.0039 (1.0256)	0.2150 (2.1758)	0.028

Table 8 : Portfolio Shock Component

Country	$\hat{\alpha}$	$\hat{\beta}$	Adjusted R^2
Argentina	0.0035 (0.3895)	0.4757 (6.4561)	0.2411
Brazil	0.0034 (0.4307)	0.5779 (7.2331)	0.2861
Chile	0.0001 (0.0543)	0.8260 (17.9858)	0.7158
Colombia	0.0031 (0.4849)	0.4405 (5.9765)	0.2133
Mexico	0.00001 (0.0784)	0.9905 (71.3520)	0.9754
Peru	0.0019 (0.5698)	0.7927 (17.7402)	0.7102
Venezuela	-0.0002 (-0.0607)	0.8880 (23.6353)	0.8133
US	0.0009 (0.4012)	0.7900 (14.5293)	0.6214

All shocks seem to have a role in explaining real stock returns based on the significance of $\hat{\beta}$ in the regressions. Looking at the Adjusted R^2, demand shocks are important for real stock returns in Colombia and supply shocks are important for real stock returns in Argentina. In Brazil supply shocks seem to be slightly more important than portfolio shocks. The other countries show that portfolio shocks are relatively more important than macroeconomic shocks (supply and demand) in explaining real stock returns dynamics in Latin America.

The relative importance of portfolio shocks for the US is one of the main results in Fraser & Groenewold (2006). My results show that this is not something specific to the US economy and may indicate something about the way developed financial markets work and disseminate information.

The second way to analyze the relative importance of each shock is to compute standard forecast error variance decompositions based on structural shocks for different horizons to understand which shock contributes the most in each horizon.

Results for the variance decomposition exercise are shown in Appendix II.

Again, the results support the importance of portfolio shocks for real stock returns, especially in long horizons (36 months).

4.2. The sources of Co-movement

The following tables display the co-movement pattern for the three structural shocks (demand, supply and portfolio). In parenthesis, I show the p-value associated with the null hypothesis that the correlation coefficient is equal to zero.

Table 9 : Demand Shocks Cross-Country Correlation Matrix

Country	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	US
Argentina	1							
Brazil	0.0152 (p=0.8634)	1						
Chile	-0.1095 (p=2149))	-0.0331 (p=0.7081)	1					
Colombia	0.0808 (p=3606)	-0.0110 (p=9008)	0.1319 (p=0.1348)	1				
Mexico	-0.0101 (p=9090)	-0.0145 (p=8702)	-0.0787 (p=3733)	0.0634 (p=0.4739)	1			
Peru	-0.0526 (p=5520)	0.0364 (p=6813)	-0.0413 (p6410))	-0.0964 (p=0.2751)	-0.0192 (p=8287)	1		
Venezuela	-0.1398 (p=0.1127)	-0.0634 (p=4739)	-0.0211 (p=0.8113)	0.0807 (p=3614)	0.0686 (p=4378)	-0.0416 (p=6384)	1	
US	-0.0800 (p=0.3657)	-0.0436 (p=0.6227)	0.3681 (p<0.0001)	0.1099 (p=2133)	-0.0967 (p=2736)	0.1421 (p=1069)	0.1012 (p=0.2521)	1

Table 10 : Supply Shocks Cross-Country Correlation Matrix

Country	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	US
Argentina	1							
Brazil	0.4687 (p<0.0001)	1						
Chile	-0.0896 (p=0.3109)	-0.1127 (p=0.2019)	1					
Colombia	-0.0974 (p=2704)	-0.0486 (p=0.5829)	0.0594 (p=0.5023)	1				
Mexico	0.0274 (p=7571)	0.1871 (p=0.0331)	-0.0290 (p=0.7431)	-0.0911 (p=0.3026)	1			
Peru	0.0957 (p=2788)	0.2083 (p=0.0174)	-0.0484 (p=0.5842)	0.0785 (p=0.3745)	0.0017 (p=0.9850)	1		
Venezuela	0.0589 (p=5058)	0.1232 (p=0.1626)	-0.0272 (p=0.7586)	0.0914 (p=0.3010)	0.0643 (p=0.4670)	0.0539 (p=0.5426)	1	
US	0.0246 (p=7811)	0.0552 (p=0.5331)	0.0148 (p=0.8671)	0.0185 (p=0.8346)	0.1883 (p=0.0319)	-0.2886 (p=0.0009)	-0.1264 (p=0.1518)	1

Table 11 : Portfolio Shocks Cross-Country Correlation Matrix

Country	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	US
Argentina	1							
Brazil	0.1151 (p=0.1922)	1						
Chile	0.1546 (p=0.0791)	0.2950 (p=0.0007)	1					
Colombia	0.2181 (p=0.0127)	0.1053 (p=0.2333)	0.0076 (p=0.9320)	1				
Mexico	0.1858 (p=0.0343)	0.3449 (p=0.0001)	0.4272 (p<0.0001)	-0.0415 (p=0.6392)	1			
Peru	0.2379 (p=0.0064)	0.2749 (p=0.0015)	0.4194 (p<0.0001)	0.1599 (p=0.0692)	0.3732 (p<0.0001)	1		
Venezuela	0.2066 (p=0.0184)	0.0941 (p=0.2871)	0.3070 (p=0.0004)	0.0391 (p=0.6585)	0.3847 (p<0.0001)	0.1304 (p=1393)	1	
US	0.1340 (p=0.1284)	0.3656 (p<0.0001)	0.5379 (p<0.0001)	-0.1142 (p=1958)	0.4889 (p<0.0001)	0.3994 (p<0.0001)	0.2279 (p=0.0091)	1

For demand shocks just the correlation between Chilean the US is statistically different from zero. The remaining correlations, positive or negative, have very magnitudes and are statistically zero. Demand shocks are weakly correlated across Latin American countries. For supply shocks, there are four pairs of country displaying correlations statistically different from zero. Three out of four are positive and all have small magnitudes. Again, supply shocks do not show a positive co-movement pattern.

For portfolio shocks, 17 out 28 correlation pairs are statistically different from zero. Only two pairs of countries show negative correlations. Moreover, the remaining 26 positive correlations display magnitudes that are higher than the ones observed for demand and supply shocks. The positive co-movement pattern does exist for portfolio shocks, though not as strong as in the data for real stock returns. Portfolio shocks in Colombia are not correlated to any other country portfolio shocks, except Argentina. The negative magnitudes for portfolio shocks are always related to Colombia. Portfolio shocks from Brazil, Chile and Mexico co-move strongly with the US portfolio shocks. They also co-move positively among themselves.

4.2. Discussion

Portfolio shocks seem to be the driving forces behind movements in real stock returns, except for Argentina, Colombia and Brazil. In Brazil, portfolio shocks do have a significant role, contrary to Argentina and Colombia, where supply and demand shocks are extremely important. In Chile and Mexico, portfolio shocks are extremely important as they are for the US economy. It seems that stock market returns on Chile and Mexico have the same qualitatively pattern of fluctuation as the US and are almost insulate from macroeconomic shocks, indicating possibly a degree of financial development that is coming close to the US.

According to the results, the plausible explanation for the pervasive co-movement in real stock returns is highly correlated portfolio shocks. Macroeconomic shocks are weakly correlated across countries. This result gives support to a process of financial integration much more strong than any process of economic integration in the region. It is worth noticing that

5. Conclusion

This paper sheds light on the economic forces underlying the co-movement of real stock returns in Latin America, following the literature on Structural Vector Autoregressive Models (SVARs) using long-run restrictions. After showing that a high degree of co-movement in real stock returns between Latin American countries, three structural shocks are identified: demand, supply and portfolio shocks. For each country, I asses the importance of each structural shock in explaining real stock return dynamics, using regressions employing real stock returns and the component of real stock returns due to demand, supply and portfolio shocks. I address the same question by means of a variance decomposition of forecast errors exercise.

To understand the co-movement pattern emerging from the data, I identify which shocks are driving the observed co-movement in real stock returns. Results show that, for the majority of countries, portfolio shocks are the main driving force behind real stock returns. Furthermore, that shock is also extremely important in explaining co-movement patterns in Latin American stock markets. In addition, macroeconomic shocks (supply and demand) are unimportant and weakly correlated across countries, suggesting financial integration without economic integration in Latin America.

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Appendix I

Figure 1: Demand Shocks

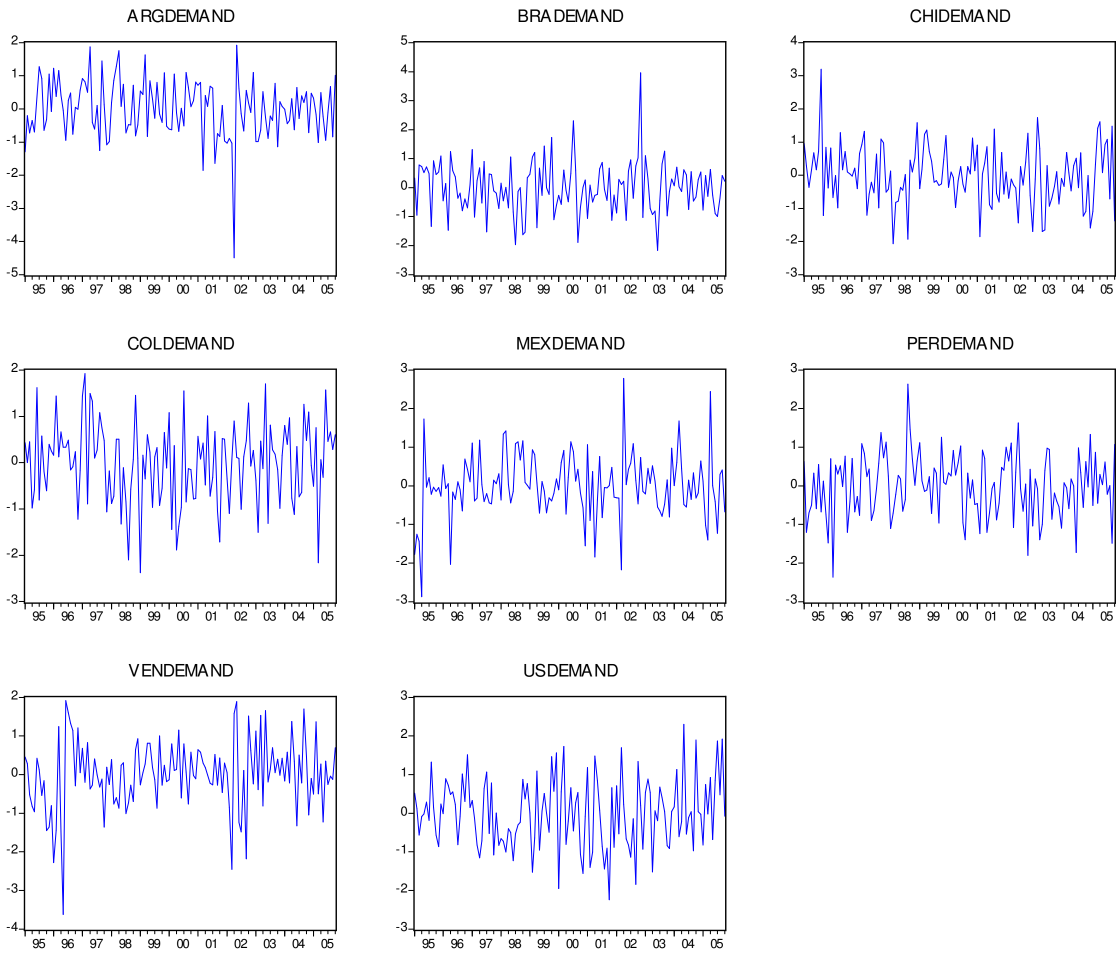


Figure 2: Supply Shocks

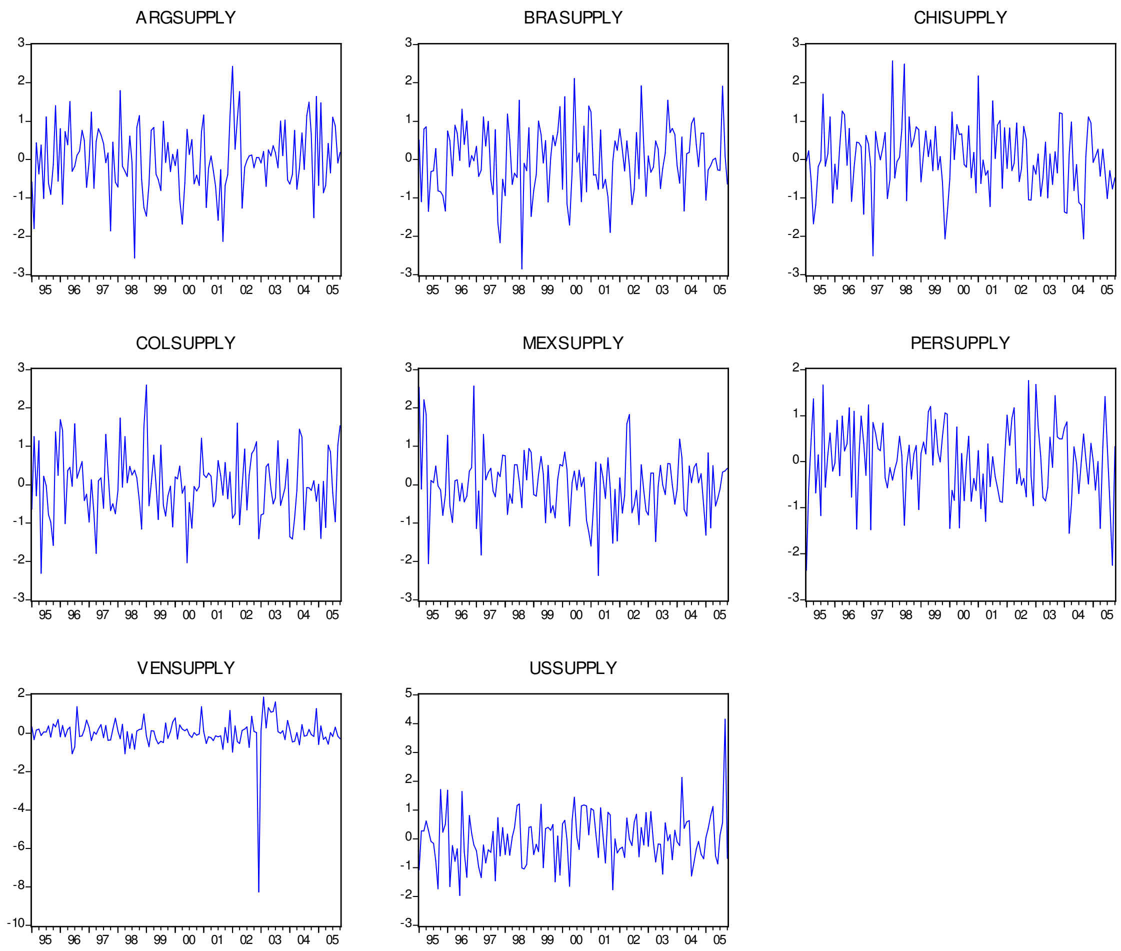
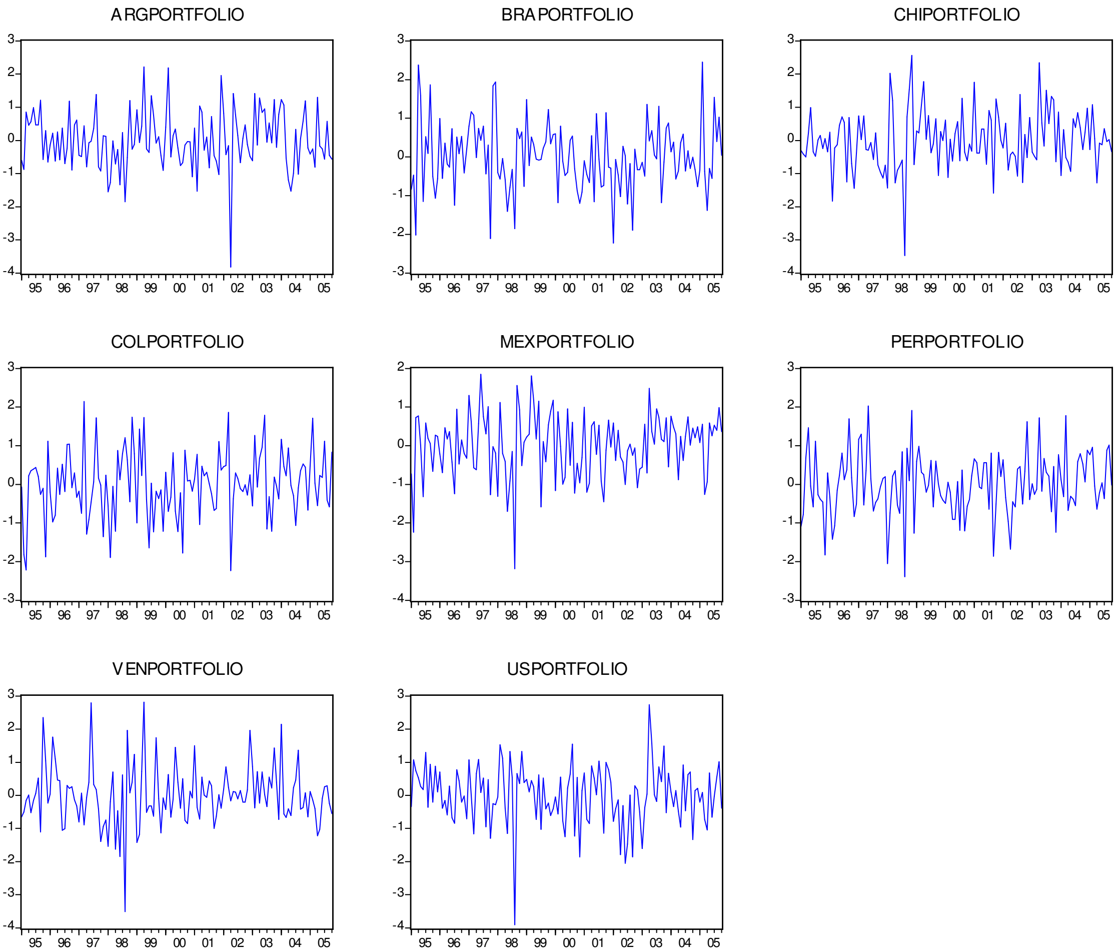


Figure 3: Portfolio Shocks



Appendix II

Figure 4: Variance Decomposition for Real Stock Returns in Argentina

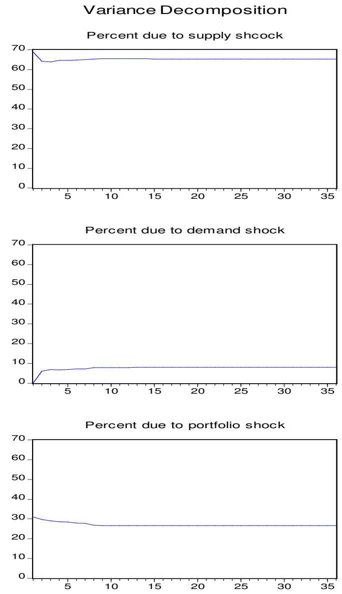


Figure 5: Variance Decomposition for Real Stock Returns in Brazil

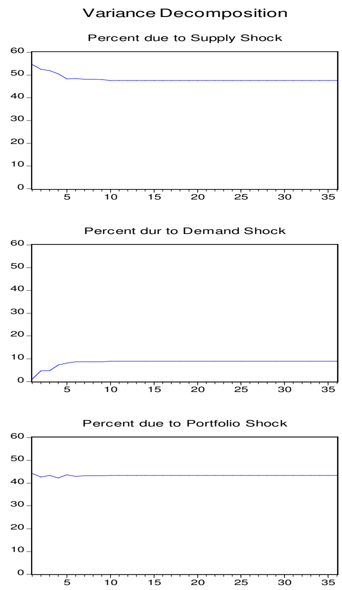


Figure 6: Variance Decomposition for Real Stock Returns in Chile

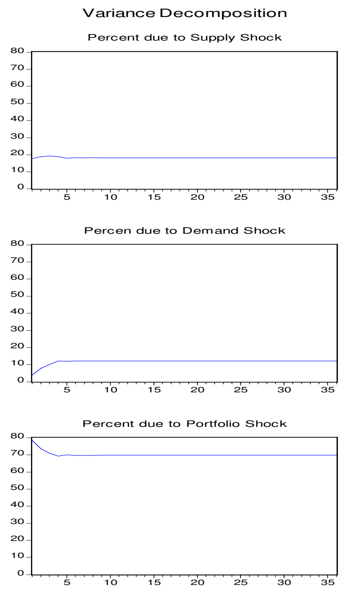


Figure 7: Variance Decomposition for Real Stock Returns in Colombia

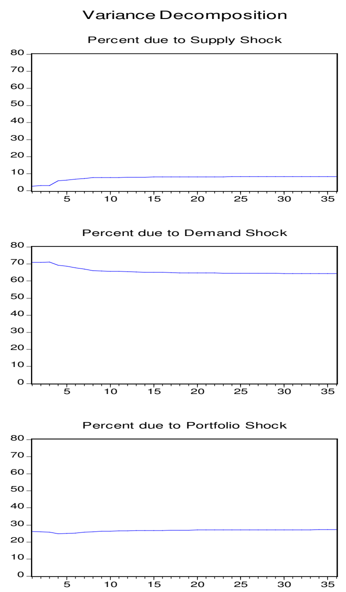


Figure 8: Variance Decomposition for Real Stock Returns in Mexico

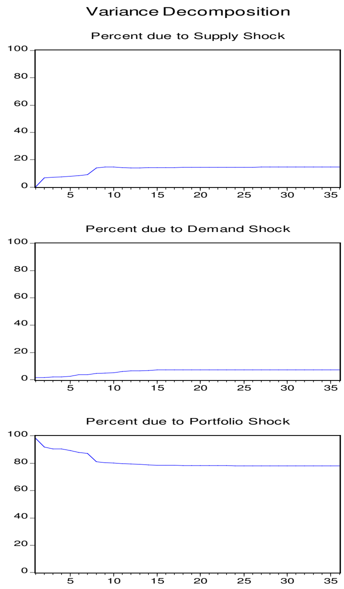


Figure 9: Variance Decomposition for Real Stock Returns in Peru

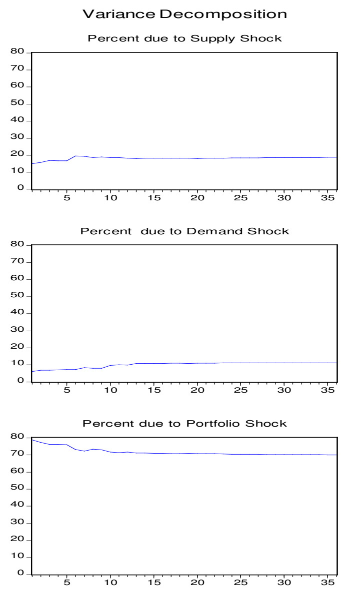


Figure 10: Variance Decomposition for Real Stock Returns in Venezuela

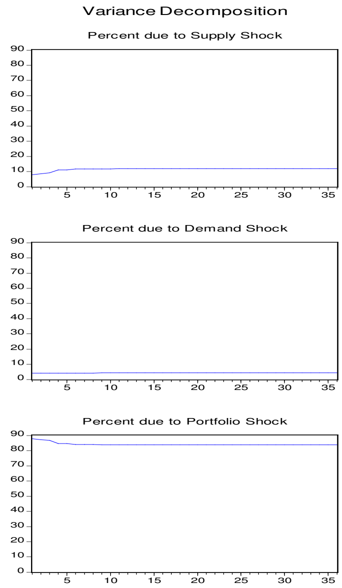


Figure 11: Variance Decomposition for Real Stock Returns in the US