Do European Stock Markets Affect Latin American Stock Markets?

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Abstract

In this study, we examine the response of Latin American stock markets to movements in European stock markets using VAR models. Our results vary depending on the openness of the country in terms of international trade. We find evidence that Latin American stock markets are responsive to changes in the stock market from Spain. Additionally, during the second and third subperiods, Spain has much stronger ties with Brazil, and this might explain why Brazil responds more to the shocks originating from Spain than from France. In conclusion, this study uncovers two important findings. First, Spain influences Latin American markets but these responses are not homogeneous across markets. Second, the influence of Spain has different magnitude in the three subperiods.

JEL classification codes: F30, G15, O54, C22

Keywords: Emerging Markets, Latin America, Stock Markets Interdependence, VAR

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1. Introduction

Previous studies on Latin American stock markets have examined the following issues: (i) effect of the US market (Soydemir, 2000; Meric et al., 2001a,b; Ratanapakorn and Sharma, 2002); (ii) interdependence (Ratner and Leal, 1996; Choudhry, 1997; Meric et al., 1998; Christofi and Pericli, 1999; Pagan and Soydemir, 2000; Chen et al., 2000; Pretorius, 2002; Johnson and Soenen, 2003); (iii) effect of macroeconomic variables (Bailey and Chung, 1995; Bilson et al., 2001; Adrangi et al., 2001; Verma and Ozuna, 2003); (iv) asymmetric responses (Pagan and Soydemir, 2001); (v) effect of the US Treasury Bill (Soydemir, 2002); (vi) volatility (Ortiz and Arjona, 2001); (vii) contagion (Calvo and Reinhart, 1996; Bazdresch and Werner, 2000); (viii) interrelationship among regional stock indexes (Ratanapakorn and Sharma, 2002) and (ix) global and regional indices integration (Barari 2004).

These studies have consistently supported the argument that Latin American equity markets are driven by both global and local risk factors. Specifically, the US market and the local macroeconomic variables are the most significant global and local factors respectively. However, an area of research that has drawn little attention is whether Latin American markets have any significant relationship with the European markets. One can expect such relationship due to the developments in some of the following areas: first, there is significant growth in the bilateral trade between Europe and Latin America in the past few years (Yeyati and Sturzenegger, 2000; Europa, 2005); second, following the privatization policies pursued by Latin America, there is significant increase in the foreign direct investments in the region by European countries (Hawkins and Mihaljek, 2000; Bubel and Skelton, 2002); third, during the recent years, the capital

flows into Latin America from Europe have been steadily increasing due to low European interest rates (Verner, 1999; Yeyati and Sturzenegger, 2000). Since trade links, foreign direct investments, and international capital flows are important determinants of the international stock market linkages, one can expect significant comovements between Latin American and European stock prices.

Our study contributes the literature as follows. first, unlike previous studies that have examined the role of the US market, we investigate the impact of the European stock markets; second, we examine how this relationship (if any) changes during the three periods of the study; and third, we analyze whether Latin America markets respond homogeneously to European markets. For example, does Mexico respond similarly to Brazil and Chile to shocks originating from Europe?

The impulse response functions generated from vector autoregression (VAR) models suggest that Latin American stock markets are responsive, with varying degrees of magnitude, to movements in the stock market of Spain. In addition, there are significant differences in the response of these markets during different subsample periods.

The balance of the paper is organized as follows: section 2 provides the linkages between Latin America and Europe. Section 3 describes the theories of stock market interdependence. Section 4 presents the empirical results of the estimated model and a discussion of these results. Lastly, section 5 concludes the study and draws implications.

2. Linkages between Latin America and Europe

Economic fundamentals might play an important role regarding the degree of stock market interconnectedness. Dornbusch et al. (2000) argue that trade links have been

identified as one of the major channels through which a crisis in one economy can affect the economic fundamentals of other countries. A frequent measure of market interconnectedness includes the contemporaneous movement of output growth between countries, which is based on the theory that substantial trade transmits economic activity from one country to another. If two countries experience comovements in their output, then their cash flow will move together and so will their stock markets (Phylaktis and Ravazzolo, 2002). Empirical studies have confirmed the long-run positive relationship between economic activity and stock prices (Schwert, 1990 and Rol, 1992 for the US, and Canaova and DeNicole, 1995, for European countries). The importance of Europe and, in particular, of some EU members as a source of capital inflows to Latin America has been steadily increasing during recent years (Yeyati and Sturzenegger 2000). According to the European Commission-External Relations (Europa, 2005), trade between the European Union and Latin American countries is becoming increasingly important.

Table 1 reports the direction of trade flows between Brazil, Chile and Mexico and European countries (UK, Spain, France, Italy Germany) and the US. Mexico has the highest trade links with the US among the Latin American countries. Overall, the volume of exports and imports of Brazil, Chile, and Mexico to European countries increased from 1990 to 1998, suffered a small declined in 1998 and increased again from 1999 up to date. The imports of Mexico, Brazil and Chile from Spain have increased 170%, 325%, and 183% respectively, as compare to the exports to Spain (2%, 120%, and 76% respectively). Even though the European countries have developed stronger trade links with Mexico, they are roughly around one tenth of the Mexico-US trade. In addition, the

volume of exports and imports of Brazil and Chile with respect to the US is much smaller than that of Mexico. Overall, in the year 2002, EU imports from Latin America and the Caribbean accounted for EUR 53.7 billion, and exports to the region amounted to 57.5 billion (Europa, 2005).

[Table 1 about here]

There is an agreement in the literature that the recent increase in the supply of foreign direct investment and capital have been driven by the success of some Western Hemispheric countries in implementing sound macroeconomic policies and structural reforms. For instance, European foreign direct investment in Latin America has increased dramatically over the past decade. Foreign Direct Investment (FDI) in Latin America rose from US$ 31,179 million to US$73,915 million between 1996 and 1999. This was largely a result of the privatization programs undertaken by most countries in the region, focusing initially on industrial sectors and subsequently on service sectors (Europa, 2005). International companies have invested a total of US$136.9 billion in Latin America since 1995, with 45% of this coming from Spanish companies, followed by US (32%), French, Portuguese, UK, Canadian and Italian firms (Thomson Financial Services). The banking industry, for example, represents the most impacted industry due to liberalization. The market share of foreign banks in the region rose from 7% in 1990 to 40% in 2000 (Hawkins and Mihaljek, 2000). Foreign banks represented 78.8% of the Mexican market while they controlled 24.4% of the market in Brazil, and 47% of the market in Chile (Bubel and Skelton, 2002).

Table 2 reports the European and US foreign direct investment from 1990 to 2002 to Brazil, Chile and Mexico. From 1990 to 1997 US has the highest FDI with Brazil.

After 1998, the situation changed, Spain had the highest FDI in Brazil. UK and France also have a very representative share of FDI in Brazil. In the case of Chile, the behavior is very similar. Spain has the highest FDI after 1998 until about the year 2001. UK also plays an important role. For the case of Mexico, the US remains the highest FDI contributor. During the period 1990 to 1998, the European Union became the largest source of investment in Latin America, and Latin America became the EU's principal destination of FDI to emerging markets. European foreign direct investment inflows peaked in 2000 and reduced afterwards (Europa, 2005).

[Table 2 about here]

The capital flows to Latin America from Europe have been increasing during the last few years (Yeyati and Sturzenegger, 2000; Europa, 2005). The growing significance of Europe as a source of foreign funds in Latin America is the result of a general trend towards international portfolio diversification common to most European banks. European investors see Latin American markets as another choice in which to place their investments. The managers of the growing pools of savings in European countries with aging populations seek for higher returns by increasing their investments in fast-growing developing countries. Private institutions such as pension funds and insurance companies have shifted a large share of their portfolios into Latin American countries in order to diversify their portfolio (Verner 1999). The stock of European investment in Latin America and the Caribbean continues to increase and, in 2002, accounted for more than EUR 200 billion (Europa, 2005).

In addition to the success of some Latin American countries in implementing sound economic policies, studies have found that the increase in the supply of capital to

Latin American economies emerges from the relatively low interest rates that followed the recent recessionary period in Europe, and from the decrease of attractions for investors trying to diversify their portfolio within European markets in consequence of the common interest rates and the correlation among EMU members Soydemir, 2000; Yeyati and Sturzenegger 2000).

European countries have become important suppliers of foreign investment flows to Latin America, perhaps competing with the US as the main source of international capital (Verner 1999; Yeyati and Sturzenegger 2000). Furthermore, capital flows to emerging markets such as those in Latin America are predominantly driven by liquidity and performance considerations, rather those long-term banking relationships (Soydemir, 2000). Therefore, one could expect to see changes in the relationships between Latin American and European stock markets during the last 15 years.

This study extends the literature by examining the influence of European stock markets on Latin American stock markets. We will assume that that the European markets exogenously affect the Latin American markets.

3. Data and econometric methodology

Since we want to measure the effect of the EU stock markets in Latin America, in this study we use the weekly closing equity price indices of Brazil, Chile, and Mexico, for Latin American countries and Spain, Italy, Germany, France, and UK for European countries. We also included US stock market data to test for response heterogeneity across Latin American markets to shocks originating in the largest world equity market.

Our measurements include the Bovespa price index for Brazil, the general price index (IGPA) for Chile, the IPC price index (BOLSA) for Mexico, Madrid SE price

index for Spain, the Milan MIB Storico price index for Italy, the DAX Industrial price index for Germany, the CAC 40 price index for France, the FTSE100 for United Kingdom, and the S&P500 composite price index for the US.

We included the three Latin America stock markets in our study because they have exhibited phenomenal growth in the past two decades. Brazil, Mexico, and Chile are placed among the top 30 developed and emerging markets in the world and are ranked 18^{th}, 25^{th}, and 30^{th} respectively (IFC, 1999). We also included these five European countries because they were among the first to form the European Monetary Union, and have stronger economic ties with these Latin American countries (International Monetary Fund, 1999).

The data set spans from January 4, 1988, to December 8, 2004, and contains 778 observations. We transform our data into weekly percentage returns as $(\log P_t - \log P_{t-1})$, where P_t is the value of the index at time *t* in terms of the local currency, in this way we are able to obtain continuously compounded returns (Tsay, 2002). This transformation facilitates our econometric estimation. To examine the stability of the results we run A VAR model for the whole sample period (January 4, 1988, to December 8, 2004) and for three sub-sample periods based on the dates of major events in the period. The sub-sample periods are January 1988 to December 1994, January 1995 to December 1999, and January 2000 to December 2004.

There are two major reasons for dividing the data in three sub-samples. First, because of the changes in the levels of trade, foreign direct investment and capital flows among the countries during the whole sample period. For instance, the volume of exports and imports of Brazil, Chile, and Mexico to European countries increased from 1990 to

1994, however, they suffered a small declined in 1998, and increased again from 1999 up to date.

Second, during the last 20 years these financial markets have faced financial crises and contagion among international markets. Kaminsky and Reinhart (1998), Edwards (2000), and UN (1998) have documented spillover effect from Asian financial crises to financial markets in Latin America. Likewise, Edwards (2000) and Gelos and Sahay (2000) report that Russian financial crises had a significant impact on Latin America financial markets. These studies found that these financial crises weakened domestic economies, affecting other countries with which they had trade links, propagating the shocks. Therefore, it is important to consider in our study these major events, to evaluate whether external financial crises had an influence on the linkages among European and Latin American stock markets.

During the sub-sample period of January 1988 to December 1994, we saw currency and banking crises unfold in Mexico followed by the so called "tequila effect." This was also a period of hyperinflation in Brazil. Then, during the sub-sample period of January 1995 to December 1999, we saw a financial crises starting in Thailand (1997) spreading across Malaysia, Indonesia, Korea and other Asian countries. During the same period, we saw the Russian crises (1998), which impacted Latin American countries. During the sub-sample period of January 2000 to December 2004 (European Monetary Union), we saw the enactment of the euro currency for the European Monetary Union members.

Table 3 reports the descriptive statistics of the continuously compounded returns for the data used in this study. Not surprisingly, Latin American markets exhibit higher

risk (as measured by standard deviation) compared to those in Europe and in the US. Brazil and Mexico's stock markets returns have high standard deviations suggesting that these emerging markets are the most volatile. In contrast, Chile exhibits low volatility. When comparing the standard deviation and the mean, higher average return for most countries are associated with higher levels of volatility. For example, Brazil and Mexico market returns exhibit both the highest means and standard deviations suggesting that investors are compensated for bearing higher risk. The skewness statistics suggest lack of normality in the distribution of the returns series. The US and all the European markets have returns distributions that are negatively skewed, however, for Latin American countries, Brazil and Chile are positively skewed whereas Mexico stock return distribution exhibits a negative skewness The values of kurtosis indicate that the returns of all countries are leptokurtic compared to the normal distribution (i.e., they are more peaked than normal distribution).

[Table 3 about here]

Table 4 provides the correlation matrix of stock market returns of the three countries in Latin America, the five countries in Europe, and the US, in both local currency (panel a) and US$ (panel b). The pairwise correlations amongst the Latin American countries are low compared to those amongst the European and US market returns. For Example, Chile/Mexico exhibits the highest correlation for Latin America (0.295) while the correlation for the pair of Germany/France is the highest (0.805). However, when comparing Latin American stock market returns with the US, the highest correlation is the one between US and Mexico (0.513 in local currency and 0.416 in US$). Latin American markets do not seem to exhibit much correlation with any

European country. Mexico shows a correlation above 0.400 with all the European markets except for Italy, which is 0.376. However, in average, the correlation of Brazil with European markets is about 0.16, and the correlation of Chile with European markets is approximately 0.22.

[Table 4 about here]

Standard correlation measures can offer misleading results when they fail to take in account relations that take place over longer time horizons. A long-run correlation estimator, such as the block estimator presented in Bartlett (1950), can be used to calculate the relationship between permanent stock market innovations, eliminating this problem. The use of a block estimator involves the choice of interval and alignment parameters, what can be done optimally using the approach presented in Albuquerque (2001). The results are presented in Table 5.

[Table 5 about here]

As expected, long-run correlation estimates are typically greater than standard correlation estimates. The conclusions however do not change: Latin American long-run correlations are typically lower than the ones among European countries and the US. Mexico has the highest long-run correlation levels with the US, as expected. Chile appears to have the lowest long-run correlation levels when measured in foreign currency, while Brazil appears to have the lowest long-run correlation levels when measured in local currency.

Darrat and Zhong (2002) argue that such relative low correlation with more mature markets appears to be consistent with international diversification. However, the study of Cooper and Kaplanis (1994) shows that US investors hold nearly all (more than

95%) of their portfolios in domestic assets. This means that portfolios held by investors are typically different from the optimal ones given weak correlations. Additionally, Kasa (1992) argues that correlations do not convey real information about relationships across national markets. Therefore, these portfolio patterns make us think on whether simple correlations provide sufficient justification to reveal the linkage of Latin American markets with those more mature markets of Europe.

To make sure that the next procedures are robust, we conduct unit root tests to analyze the time series properties of the data. Table 6 reports the results of the unit root tests for the variables using Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979, 1981; Enders, 2003). For the ADF test, we reject the null hypothesis of nonstationarity for each series of stock market return. Given that the log of first differences of all the series is stationary, we estimate the model in log of first differences. This procedure will ensure that the series will not have unit roots and this avoids running into spurious relationships.

[Table 6 about here]

We use a VAR model to test for the presence or absence of stock market response to European stock markets (Sims, 1980). The VAR model is appropriate when estimating unrestricted reduced-form equations with a uniform set of dependent variables as regressors. This model is useful for analyzing possible linkages that might exist between Latin American markets and European markets, since it does not impose a priori restrictions on the structure of the system and can be viewed as a flexible approximation to the reduced-form of the correctly specified but unknown structural model.

The VAR model can be expressed as:

$$z(t) = C + \sum_{s=1}^{m} A(s) Z(t-s) + e(t) \qquad 1$$

where Z(t) is a column vector of stock market returns for the three periods of the study, C is the deterministic component comprised of a constant, A(s) is a matrix of coefficients, m is the lag length and e(t) is a vector of random error terms.[1]

Sims (1980) suggests that autoregressive systems like these are difficult to describe concisely. It is difficult to explain them only by examining the coefficients in the regression equations. Additionally, Enders (2003) argues that the t-tests on individual coefficients are not reliable and do not uncover the most important relationships among the variables. In that sense, Sims (1980) recommends the analysis of the system's response to random innovations, i.e., IRFs. Thus, we construct IRFs for the VAR models to investigate the response of one variable to a one standard deviation innovation in another variable in the system, what can be thought as a dynamic multiplier representation. The effects of these innovations can then be orthogonalized using Cholesky decomposition (Runkle, 1987). Since, impulse responses are non-linear functions of the estimated parameters, we construct confidence bands around the mean response. Responses are considered statistically significant at the 95% confidence level when the upper and lower bands carry the same sign.

4. Estimation results

Subperiod January 1988 to December 1994

[1] After conducting lag-length tests based on the Akaike information criteria and the Schwartz Bayesian criteria and taking into consideration the number of data points and the loss of degrees of freedom, the appropriate number of lags to be included in the model was found to be equal to two.

Figures 1-3 contain the impulse response functions of the Latin American stock market returns in dollars to shocks from European and US stock markets for the sub-sample period of January 1988 to December 1994.[2] Figure 1 contains the response of Mexico's stock market to shocks from European stock markets. The graphs in Figure 1 suggest that during this first subperiod of the study, movement in Mexican stock market seems to be affected by US and Spain stock markets (see Figure 1 a, b). Consistent with the finding of Soydemir (2000), we find that there is a positive and significant effect of US on Mexican's stock markets. The response is significant during the first week and becomes insignificant from the second week onward. Unlike Soydemir (2000), we are considering the effect of other European Markets on Latin America, which he did not consider in his research. Our results show that Spain has a positive effect on Mexican stock markets and UK is insignificant. The effect of Spain on the Mexican stock markets is positive and significant the first week and becomes insignificant on the second week. However, during the third week becomes significant and then insignificant. Additionally, the graph in figure 1 suggests that movements in France's stock market have a significant effect the second week and becomes insignificant immediately. Lastly, we do not find that stock markets of UK, Germany and Italy affect the stock market of Mexico (see Figure 1 c, d, e). The response of Mexican stock markets to US stock market is a little bit higher than those of Spain, but much higher than those of France. These findings are consistent with the trade links observed between these economies. The US-Mexico trade links are stronger than the Spain-Mexico and France-Mexico trade links.

[Figure 1 about here]

[2] The Cholesky decomposition ordering is: US, Spain, UK, Germany, Italy and France.

Figure 2 and 3 contain the impulse response functions of Brazil and Chile's stock market to shocks from European and US stock markets for the sub-sample period of January 1988 to December 1994. The graph in Figure 2b shows the Brazilian stock market is affected by shock from Spain stock market. However, this positive effect of Spain's stock market on Brazil's stock market is significant the third week. Additionally, figure 2e suggests that movements in Italy's stock markets affect Brazil negatively the second week. Figure 3a shows that Chile's stock market is affected by shock from US stock market. During this period, the shocks from other European countries of the study do not affect Brazil and Chile's stock market.

[Figure 2 and 3 about here]

Subperiod January 1995 to December 1998

Figures 4-6 contain the response of Mexico, Brazil and Chile's stock market to shocks in European and US stock markets during the Subperiod January 1995 to December 1998. The graphs in Figure 4 suggest that movements in US, Spain and France's stock markets affect Mexican stock market (see Figure 4 a, b, e). US and Spain's stock market effects on Mexican stock market are significant the first week and then become insignificant. However, the response of Mexican stock markets to France stock market is positive and significant the second week. Note that for this second period both US and Spain's stock market have higher effects on Mexican stock market.

Figure 5 shows the response of the Brazilian stock market to US and European stock markets shock. The initial response is significant for US and Spain's on Brazilian market the first week and dies after the first week. However, for Spain it becomes significant again the third week and then dies gradually. Additionally, the dispersion

around the mean response of Brazil to a shock to a US and Spain shocks is smaller during this period of 1995-1998. The US-Brazil and Spain-Brazil trade links and the foreign direct investment links increased importantly during this period, which may partially explain differences in response patterns between the two periods for the countries.

Figure 6 shows the response of Chile to a shock to US and European stock markets. Shocks in the US and Spain's stock markets have a significant and positive effect on Chile. This response last for two weeks and dies afterward. The trade links and foreign direct investment of Chile with Spain are greater than those with the US. This might partially explain differences in response patterns and the importance of Spain on Chilean stock market during this period.

[Figures 4-6 about here]

Subperiod January 1999 to December 2004

Figures 7–9 contain the impulse response functions of the stock market returns in dollars to innovations from European and US stock markets in the subperiod January 1999 to December 2004. Figure 7 contains the response of Mexico's stock market to shocks from European and US's stock markets. Similarly to the previous subperiod, the graphs in Figure 7 suggest that after the implementation of the Euro, movements in Mexican stock market seems to be affected by the stock markets of US, and Spain (see Figure 6 a, b). The effect of US on Mexican stock markets is higher than that of Spain and this may be due to the increase on trade between the two countries. However, an interesting finding for this subperiod is that, despite the fact that the impact of Spain is lower than in the previous subperiod, the dispersion around the mean response of Mexico to an innovation from Spain is also lower (the effects are statistically more significant).

Lastly, we do not find that stock markets of the other European stock markets of the study UK, Germany, Italy and France have additional effects on the stock market of Mexico (see Figure 3 c-f) during the subperiod.

Figure 8 contains the impulse response functions of Brazil's stock market to shocks from European and US's stock markets. The positive effect of US and Spain's stock market on Brazil's stock market is significant in the first week and then becomes insignificant. The magnitude of the effects of the US on the Brazilian stock market is a little bit higher and the dispersion around the mean response in this subperiod is smaller. This response is consistent with the fact that the magnitude of the trade links between Brazil and US have increased. Note also that the magnitude of the effect of Spain's stock market is higher than in the previous subperiod and that the effect is statistically more significant. This might be attributed to the fact that both the Spain- Brazil trade link and the FDIs of Spain in Brazil have become stronger during this subperiod. Furthermore, the graphs in Figure 8 suggest that movements in UK, Germany, Italy, and France's stock markets do not have additional effects on Brazil's stock market (see Figure 4 c–f).

Figure 9 contains the response of Chile's stock market to shocks in European and American stock markets. The graphs in Figure 8 suggest that movements in Spain and US's stock markets affect Chile's stock market (see Figure 9 a, b). US and Spain stock market effects on Chilean stock market are positive and significant the first week and then become insignificant the second week. This might be accredited to the fact that the trade links with Spain are stronger than during the previous subperiods.

[Figure 7-9 about here]

5. Conclusion

In this study a VAR model is estimated to examine whether the stock markets of Latin American countries (Brazil, Chile, and Mexico) are affected by European stock markets during the three subperiods. During the first subperiod (January 1988 to December 1994), we find significant response of Mexico to the US, Spain, and France. Meanwhile, during the second subperiod (January 1995 to December 1998), Spain and France seem to have stronger effects on Mexico than those in the first subperiod and the effects dispersion seems to be smaller. However, during the third subperiod (January 1999 to December 2004), we find a significant decreasing role of Spain on the Mexican stock market.

In the case of Brazil, we find that in the first and second subperiod of our study innovations in Spain have an effect in Brazil in the third week. However, during the third subperiod we find a significant effect of Spain with a higher magnitude and statistically more significant.

In the case of Chile, only the US seems to have an effect on the stock market during the first subperiod of the study. None of the European countries has an effect on Chile's stock market. During the second and third subperiod Spain has a significant impact on Chile's stock market. Consistent with the previous studies we find that the US stock market strongly influences the Latin American stock markets in the three subperiods of the study.

These findings are consistent with the view that trade links and differences in institutional structures cause emerging markets to respond differently to shocks originating from European stock markets. For example, Mexico, Brazil and Chile are

more responsive to the US stock markets movements than to the European stock markets but the magnitude is higher in case of Mexico. This can be attributed to the fact that these economies, and especially Mexico, are geared toward the US economy. Additionally, during the second and third subperiods Spain has much stronger ties with Brazil and this might explain why Brazil responds more to the innovations originating from Spain than Chile.

In conclusion, this study uncovers two important findings. First, European stock markets, particularly Spain, influence Latin American markets but these responses are not homogeneous across markets. Second, the influence of European stock markets (Spain) has different magnitude in the three subperiods. These results imply that foreign investors, Latin American policy makers and researchers should closely monitor movements of European stock markets, especially those with which they have strong trade links since they impact Latin American stock markets and can lead to important spillovers effects.

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Table 1. Directions of trade flows

Panel a: Mexico

Partner	US		UK		Spain		France		Italy		Germany	
Period	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
1990	18,494	19,848	182	590	1,440	504	546	716	208	447		
1991	18,738	24,652	225	496	1,184	572	607	980	170	621	558	2,328
1992	37,284	45,721	242	590	1,234	822	594	1,260	146	955	489	2,318
1993	42,935	48,321	220	544	876	1,172	444	1,012	76	735	426	2,652
1994	51,198	54,813	276	706	870	1,338	426	1,527	99	1,021	401	3,100
1995	66,339	53,973	488	531	789	694	484	980	197	771	515	2,686
1996	79,771	67,615	434	679	953	629	375	1,020	183	999	596	3,174
1997	93,019	83,214	556	943	947	1,056	367	1,230	344	1,531	624	3,997
1998	101,927	93,307	621	1,055	719	1,256	379	1,430	195	1,580	1,112	4,542
1999	120,455	105,376	746	1,135	822	1,321	294	1,394	170	1,649	2,088	5,031
2000	147,186	127,789	859	1,091	1,527	1,430	376	1,469	224	1,850	1,459	5,728
2001	140,465	114,060	673	1,325	1,254	1,827	376	1,578	239	2,100	1,504	6,079
2002	143,151	106,901	625	1,350	1,433	2,224	351	1,808	174	2,171	1,237	6,066
2003	147,027	106,082	561	1,242	1,465	2,288	324	2,019	267	2,475	1,753	6,275

Table 1 continued: Directions of trade flows

Panel b: Brazil

Partner	US		UK		Spain		France		Germany		Italy	
Period	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
1990	7,733	4,505	945	460	705	240	902	635	0	0	1,615	732
1991	6,387	5,395	1,057	489	706	243	864	652	2,158	2,030	1,353	845
1992	7,081	5,379	1,287	435	739	171	844	631	2,074	2,018	1,597	876
1993	8,030	6,270	1,140	565	676	258	791	736	1,824	2,422	1,312	1,005
1994	8,969	8,203	1,229	781	709	326	901	933	2,049	3,614	1,647	2,066
1995	8,799	12,752	1,326	988	877	818	1,038	1,412	2,158	5,423	1,713	3,159
1996	9,312	12,632	1,324	1,328	937	968	959	1,421	2,083	5,031	1,531	3,071
1997	9,408	15,244	1,259	1,560	1,057	1,199	1,151	1,732	2,608	5,349	1,709	3,626
1998	9,889	14,319	1,339	1,561	1,055	1,251	1,256	2,068	3,006	5,463	1,931	3,324
1999	10,868	12,414	1,437	1,273	1,171	1,224	1,227	2,070	2,544	4,901	1,845	2,704
2000	13,549	13,647	1,498	1,297	1,010	1,179	1,791	1,977	2,526	4,591	2,146	2,274
2001	14,379	13,596	1,705	1,287	1,030	1,286	1,675	2,184	2,502	4,950	1,809	2,279
2002	15,535	10,881	1,769	1,397	1,105	1,029	1,554	1,832	2,537	4,594	1,817	1,840
2003	16,901	10,166	1,899	1,251	1,552	1,019	1,752	1,844	3,136	4,375	2,208	1,828

Table 1 continued: Directions of trade flows
Panel c: Chile

Partner	US		U.K.		Spain		Germany		Italy		France	
Period	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
1990	1,428	1,372	557	180	272	159			407	193	398	297
1991	1,388	1,582	559	163	348	148	716	499	339	177	388	241
1992	1,582	1,984	619	188	361	223	609	631	377	273	381	282
1993	1,526	2,477	552	215	243	278	493	620	331	335	376	346
1994	1,861	2,638	505	243	221	341	548	507	352	350	394	362
1995	2,138	3,793	1,044	247	304	445	808	790	596	509	501	446
1996	2,373	4,109	917	282	275	530	758	730	490	551	404	582
1997	2,439	4,332	1,040	320	334	621	750	844	498	700	450	502
1998	2,360	4,025	1,157	256	280	656	570	812	675	680	450	680
1999	2,811	2,986	1,063	181	313	409	563	615	639	513	492	411
2000	3,008	3,273	1,065	176	377	426	459	600	823	418	632	442
2001	3,484	2,976	1,243	193	354	464	547	684	830	435	621	573
2002	3,483	2,549	797	183	389	416	426	718	856	352	631	619
2003	3,570	2,531	694	180	480	451	578	696	924	386	743	593

Table 2: Foreign direct investment (in millions of US dollars)

Region/economy	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Brazil													
France	77.6	87.1	44.7	37.4	104.3	na	969.9	1235.3	1805.4	1982.1	1909.7	1912.8	1815
Germany	103.4	35.2	53.1	16.2	130.1	na	212	195.9	412.8	480.8	374.6	1047.5	628.3
Italy	3.3	10.1	-93.5	81.6	30.1	na	12.3	57.4	646.6	408.5	488	281.3	472.5
Spain	12.9	8.3	20.7	16.8	-3.4	na	586.6	545.8	5120.2	5702.2	9592.9	2766.6	586.9
United Kingdom	90.2	-14.8	214.4	153.2	384.2	na	91.5	182.5	127.9	1268.8	393.7	416.2	474.4
United States	144.5	461.5	1008.8	472.5	1476.7	na	1975.4	4382.3	4692.5	8087.6	5398.7	4464.9	2614.6
Chile													
France	na	na	40.2	12.3	27.2	26.6	65.8	62.6	150.2	608	43	57.5	20.2
Germany	na	na	16.1	10	8.7	56.3	-6.6	25.8	146.9	69.1	10.6	30.9	7.9
Italy	na	na	3.3	2.5	7.9	5.2	324.9	18.5	5.6	51.2	96.1	920	29.7
Spain	na	na	7.1	103.4	17.6	55.4	487.8	1497.7	896.1	4582.8	723.4	388.5	241.6
United Kingdom	na	na	17	17.8	36	90.3	231.7	200.6	411.6	310.9	180.3	423.6	1499.2
United States	na	na	300.1	624	1001.2	1550.4	2263.8	934.6	1358.1	1909.1	750.9	1759.8	529.9
Mexico													
France	na	na	na	na	90.5	125.9	124	59.8	127.8	167	-2565.9	354.8	150
Germany	na	na	na	na	307.5	548.6	201.4	481.1	136.9	742.6	342.8	-195.5	476
Italy	na	na	na	na	2.7	10.5	18.3	29.1	17.2	35.8	31.6	15.2	9.5
Spain	na	na	na	na	144.3	49.6	73.5	326.9	307.8	995.4	1890.3	585.3	239.8
United Kingdom	na	na	na	na	593.4	218.7	82.7	1829.8	182.9	-193.5	237.3	91.1	69.3
United States	na	na	na	na	4961.5	5480.7	5180.6	7432	5288.6	6904.6	11363.9	19812.1	7071.4

Source: UNCTAD

Table 3

Descriptive Statistics of Returns (in local currency)

Local Currency	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
R_BR	0.0189	0.0101	0.6931	-0.6931	0.1118	0.1179	19.9254
R_CH	0.0031	0.0024	0.1325	-0.1218	0.0234	0.1195	7.0056
R_MX	0.0043	0.0058	0.1730	-0.1676	0.0385	-0.1793	4.2786
R_SPA	0.0014	0.0036	0.0960	-0.1414	0.0271	-0.4277	5.0613
R_ITL	0.0009	0.0031	0.1058	-0.1153	0.0298	-0.1669	3.8493
R_GER	0.0011	0.0023	0.1490	-0.1526	0.0311	-0.4847	5.8852
R_FR	0.0008	0.0009	0.1432	-0.1094	0.0287	-0.1066	5.0601
R_UK	0.0009	0.0010	0.0991	-0.0815	0.0216	-0.1294	4.7257
R_US	0.0016	0.0023	0.0895	-0.1041	0.0213	-0.3559	4.7441

Brazilian stock market return (R_BR); Chilean stock market return (R_CH); Mexican stock market return (R_MX); Spain market return (R_SPA); Italian market return (R_ITL); German stock market return (R_GER); French stock market return (R_FR); UK stock market return (R_UK); and US stock market return (R_US). All the variables are in the form of continuously compounded rate of change.

Table 4 (Panel a)

Correlation Coefficients (in local currency)

	R_BR	R_CH	R_MX	R_SPA	R_ITL	R_GER	R_FR	R_UK	R_US
R_BR	1								
R_CH	0.261	1							
R_MX	0.262	0.295	1						
R_SPA	**0.174**	**0.262**	**0.483**	1					
R_ITL	0.113	0.161	0.376	0.629	1				
R_GER	0.186	0.206	0.464	0.708	0.673	1			
R_FR	0.176	0.231	0.465	0.732	0.647	0.805	1		
R_UK	0.147	0.252	0.438	0.649	0.562	0.717	0.744	1	
R_US	**0.196**	**0.274**	**0.513**	0.548	0.468	0.655	0.652	0.654	1

Brazilian stock market return (R_BR); Chilean stock market return (R_CH); Mexican stock market return (R_MX); Spain market return (R_SPA); Italian market return (R_ITL); German stock market return (R_GER); French stock market return (R_FR); UK stock market return (R_UK); and US stock market return (R_US). All the variables are in the form of continuously compounded rate of change.

Table 4 (Panel b)

Correlation Coefficients (in US$)

US$	R_BR	R_CH	R_MX	R_SPA	R_ITL	R_GER	R_FR	R_UK	R_US
R_BR	1								
R_CH	0.261	1							
R_MX	0.337	0.337	1						
R_SPA	**0.256**	**0.227**	**0.396**	1					
R_ITL	0.150	0.139	0.260	0.610	1				
R_GER	0.231	0.202	0.340	0.665	0.604	1			
R_FR	0.235	0.212	0.331	0.685	0.587	0.785	1		
R_UK	0.171	0.217	0.293	0.593	0.497	0.653	0.659	1	
R_US	**0.246**	**0.260**	**0.416**	0.455	0.397	0.580	0.574	0.566	1

Brazilian stock market return (R_BR); Chilean stock market return (R_CH); Mexican stock market return (R_MX); Spain market return (R_SPA); Italian market return (R_ITL); German stock market return (R_GER); French stock market return (R_FR); UK stock market return (R_UK); and US stock market return (R_US). All the variables are in the form of continuously compounded rate of change.

Table 5 (Panel a)

Long-Run Correlation Coefficients (in local currency)

	R_BR	R_CH	R_MX	R_SPA	R_ITL	R_GER	R_FR	R_UK	R_US
R_BR	1								
R_CH	0.461	1							
R_MX	0.363	0.472	1						
R_SPA	**0.311**	**0.313**	**0.498**	1					
R_ITL	0.207	0.185	0.378	0.793	1				
R_GER	0.281	0.263	0.455	0.761	0.730	1			
R_FR	0.221	0.297	0.470	0.818	0.751	0.850	1		
R_UK	**0.293**	**0.350**	**0.508**	0.768	0.611	0.714	0.763	1	
R_US	**0.212**	**0.307**	**0.506**	0.740	0.593	0.696	0.745	0.799	1

Long-run correlation estimator from Albuquerque (2001), with optimal time interval and alignment selection. Brazilian stock market return (R_BR); Chilean stock market return (R_CH); Mexican stock market return (R_MX); Spain market return (R_SPA); Italian market return (R_ITL); German stock market return (R_GER); French stock market return (R_FR); UK stock market return (R_UK); and US stock market return (R_US). All the variables are in the form of continuously compounded rate of change.

Table 5 (Panel b)

Long-Run Correlation Coefficients (in US$)

US$	R_BR	R_CH	R_MX	R_SPA	R_ITL	R_GER	R_FR	R_UK	R_US
R_BR	1								
R_CH	0.430	1							
R_MX	0.368	0.416	1						
R_SPA	**0.438**	**0.260**	**0.386**	1					
R_ITL	0.262	0.146	0.260	0.689	1				
R_GER	0.331	0.264	0.340	0.662	0.640	1			
R_FR	0.295	0.268	0.331	0.737	0.614	0.806	1		
R_UK	0.379	0.266	0.288	0.713	0.518	0.648	0.680	1	
R_US	**0.366**	**0.329**	**0.416**	0.642	0.492	0.629	0.658	0.682	1

Long-run correlation estimator from Albuquerque (2001), with optimal time interval and alignment selection. Brazilian stock market return (R_BR); Chilean stock market return (R_CH); Mexican stock market return (R_MX); Spain market return (R_SPA); Italian market return (R_ITL); German stock market return (R_GER); French stock market return (R_FR); UK stock market return (R_UK); and US stock market return (R_US). All the variables are in the form of continuously compounded rate of change.

Table 6

Augmented Dickey-Fuller test results

	Augmented Dickey-Fuller test statistic
Brazil	-8.942
Chile	-15.316
Mexico	-25.623
Spain	-17.744
Italy	-27.097
Germany	-28.598
France	-30.151
UK	-29.742
US	-29.325
Critical level: 0.01	-2.568
Critical level: 0.05	-1.941
Critical level: 0.10	-1.616

The variables in the Augmented Dickey Fuller test are: Brazilian stock market return (R_BR); Chilean stock market return (R_CH); Mexican stock market return (R_MX); Spain market return (R_SPA); Italian market return (R_ITL); German stock market return (R_GER); French stock market return (R_FR); UK stock market return (R_UK); and US stock market return (R_US). All the variables are in the form of continuously compounded rate of change.

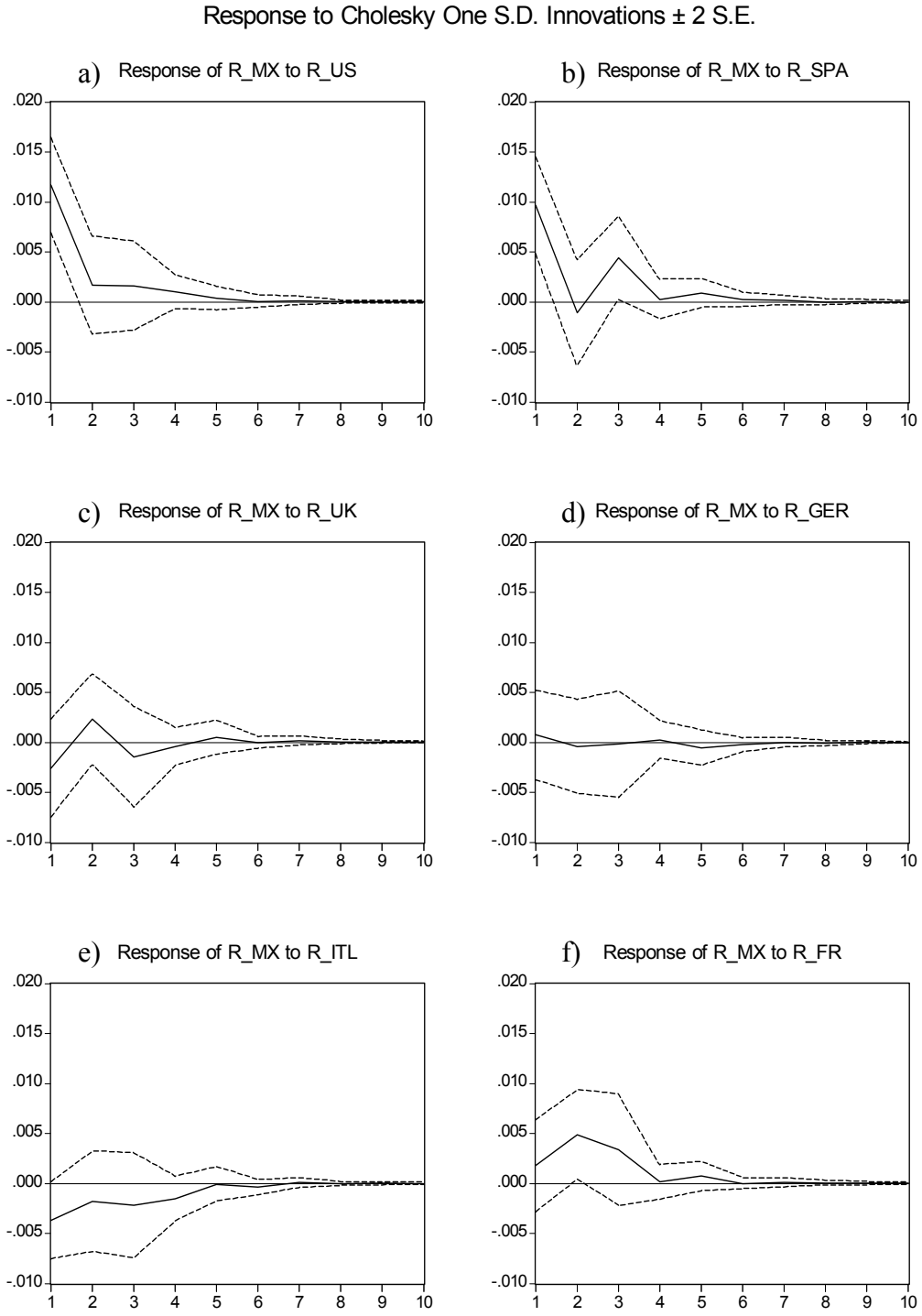

Figure 1. Response of Mexico to European stock market innovations during 1988-1994

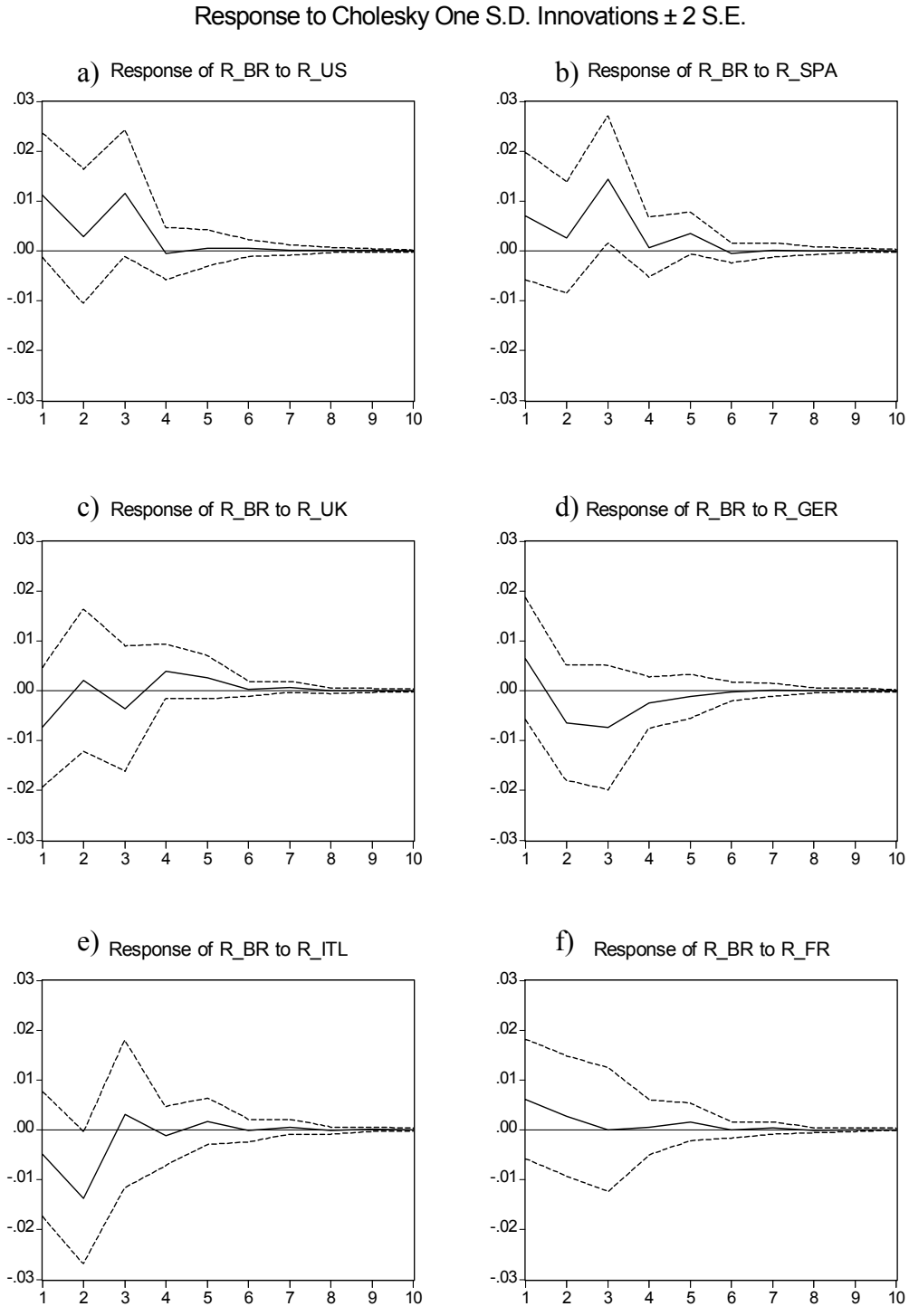

Figure 2. Response of Brazil to European stock market innovations during 1988-1994

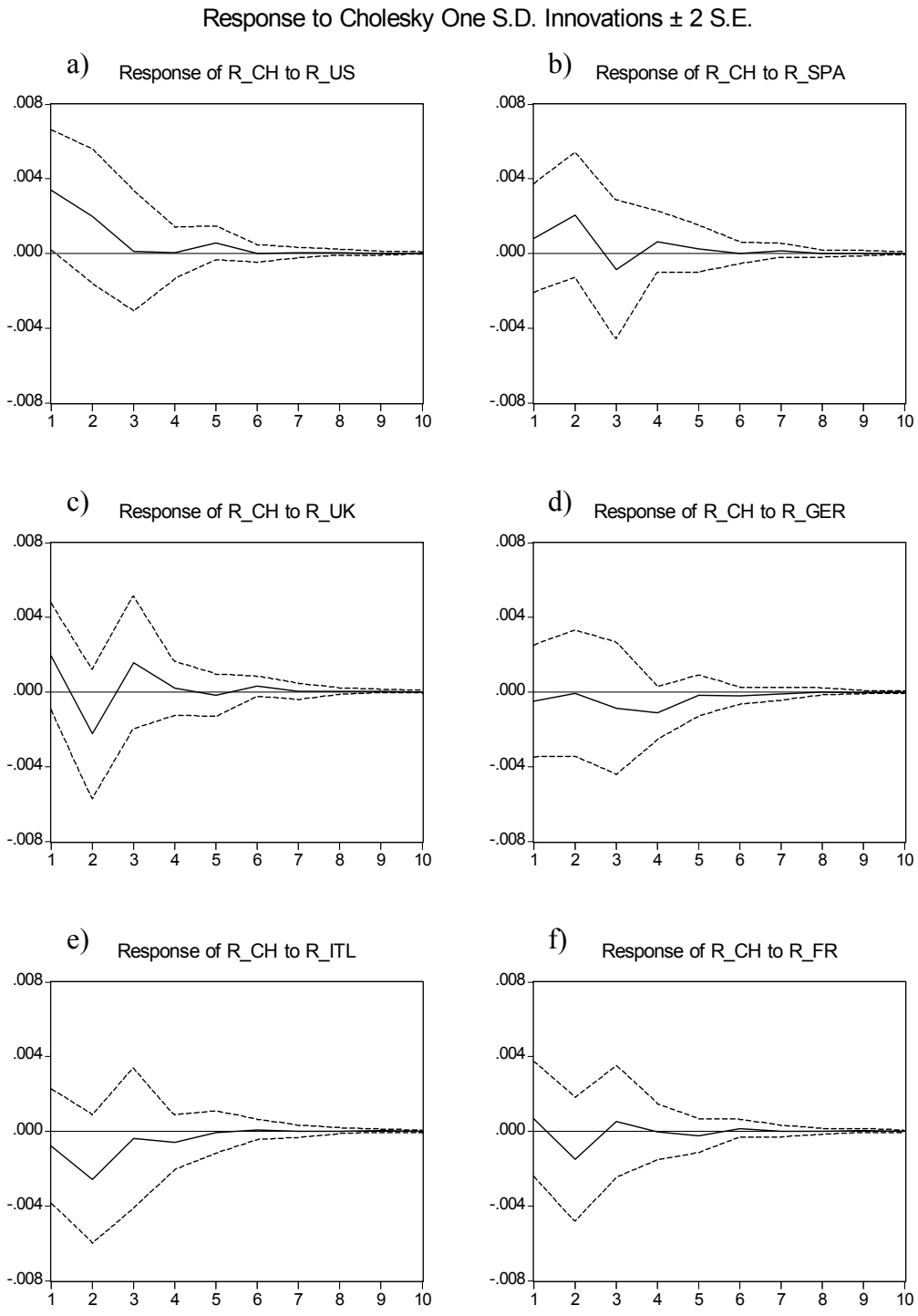

Figure 3. Response of Chile to European stock market innovations during 1988-1994

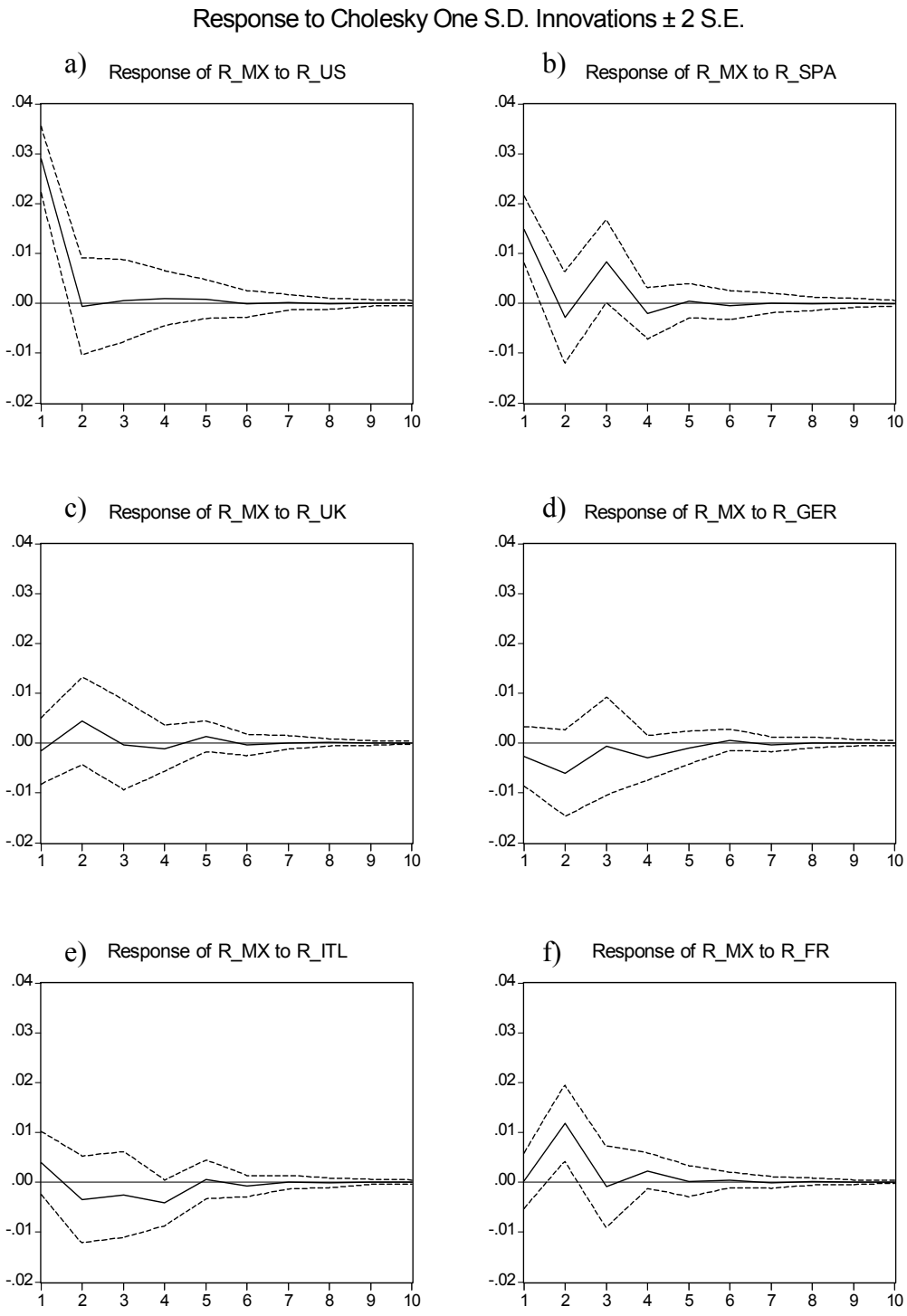

Figure 4. Response of Mexico to European stock market innovations during 1995-1998

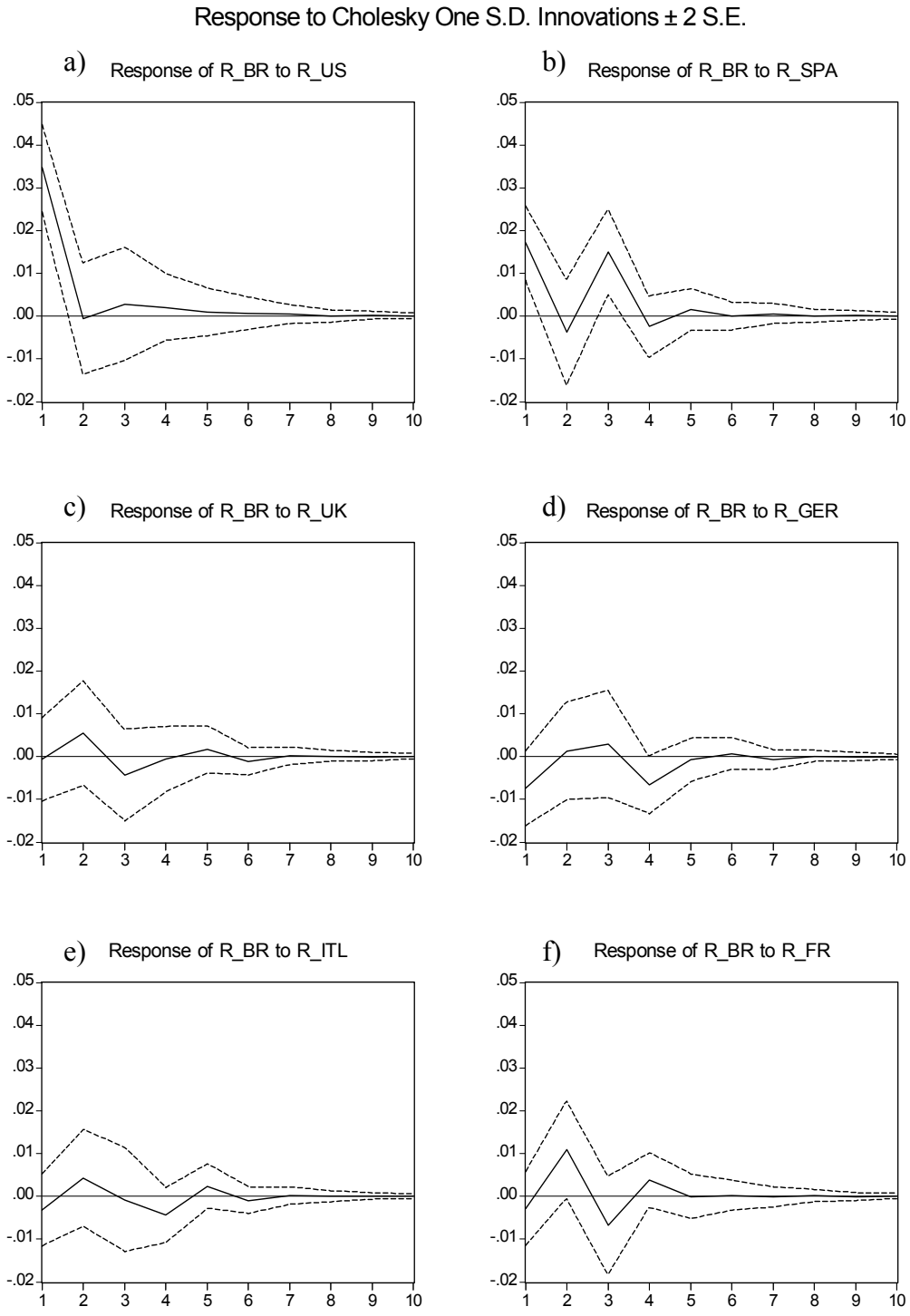

Figure 5. Response of Brazil to European stock market innovations during 1995-1998.

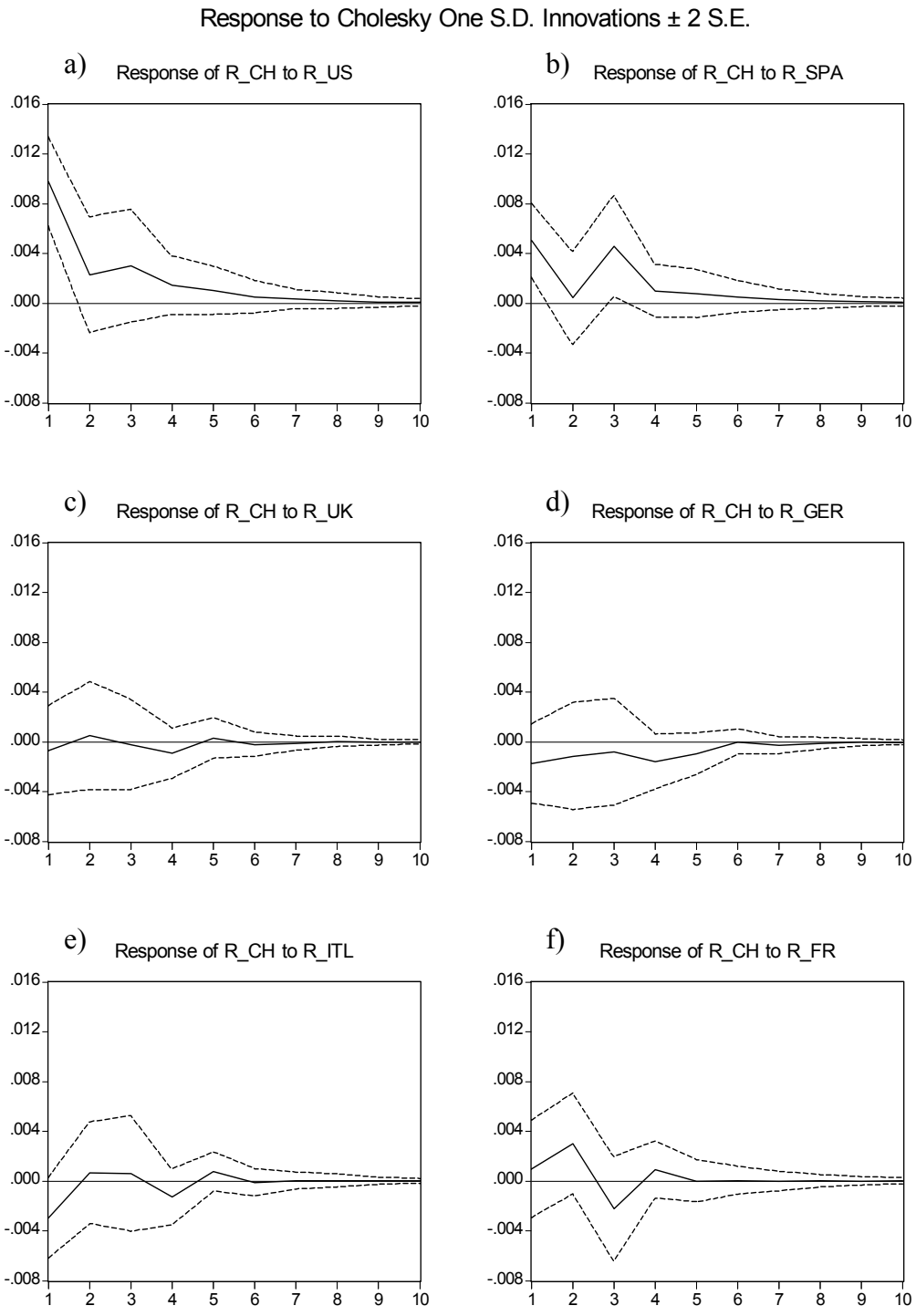

Figure 6. Response of Chile to European stock market innovations during 1995-1998

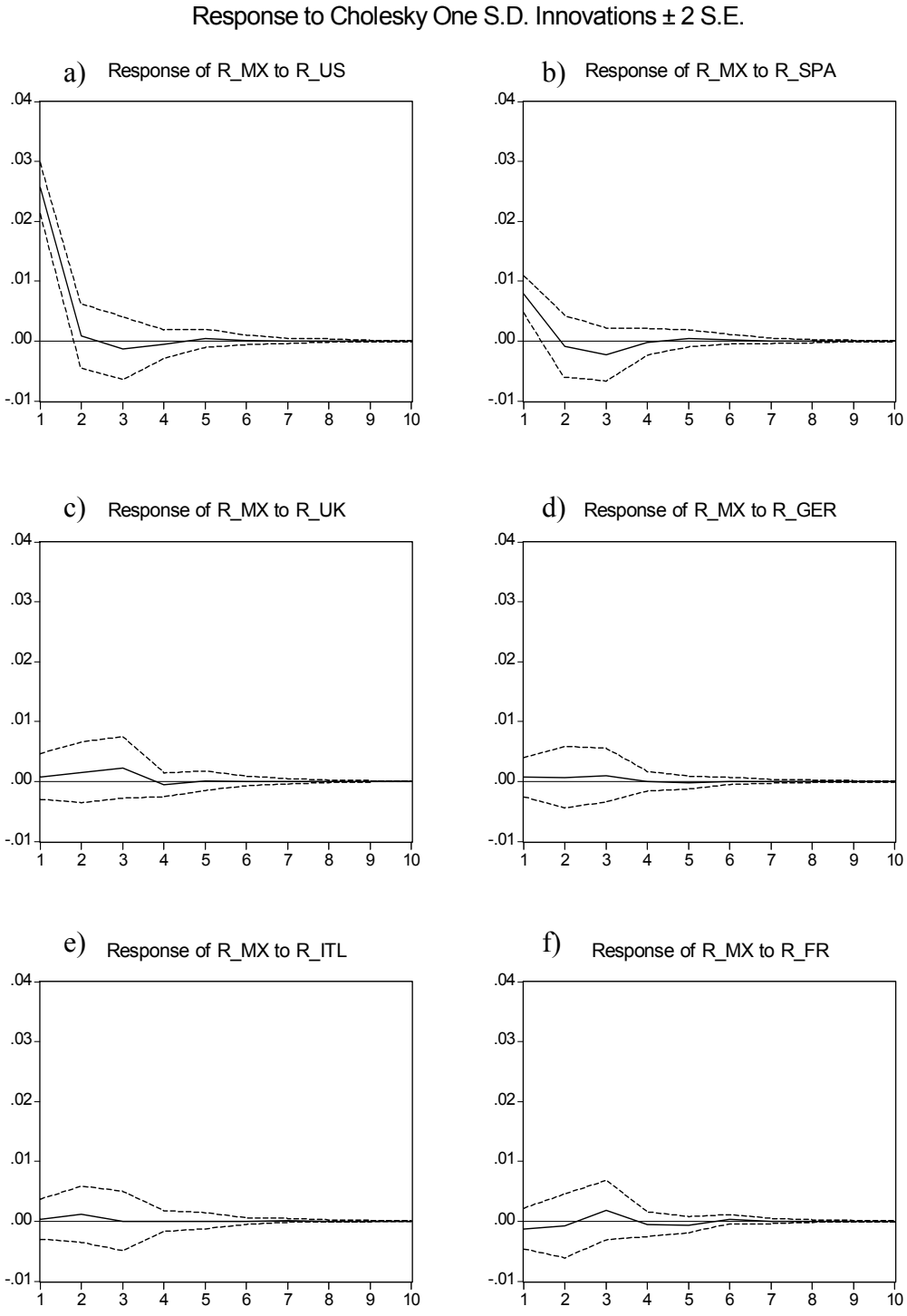

Figure 7. Response of Mexico to European stock market innovations during 1999-2004

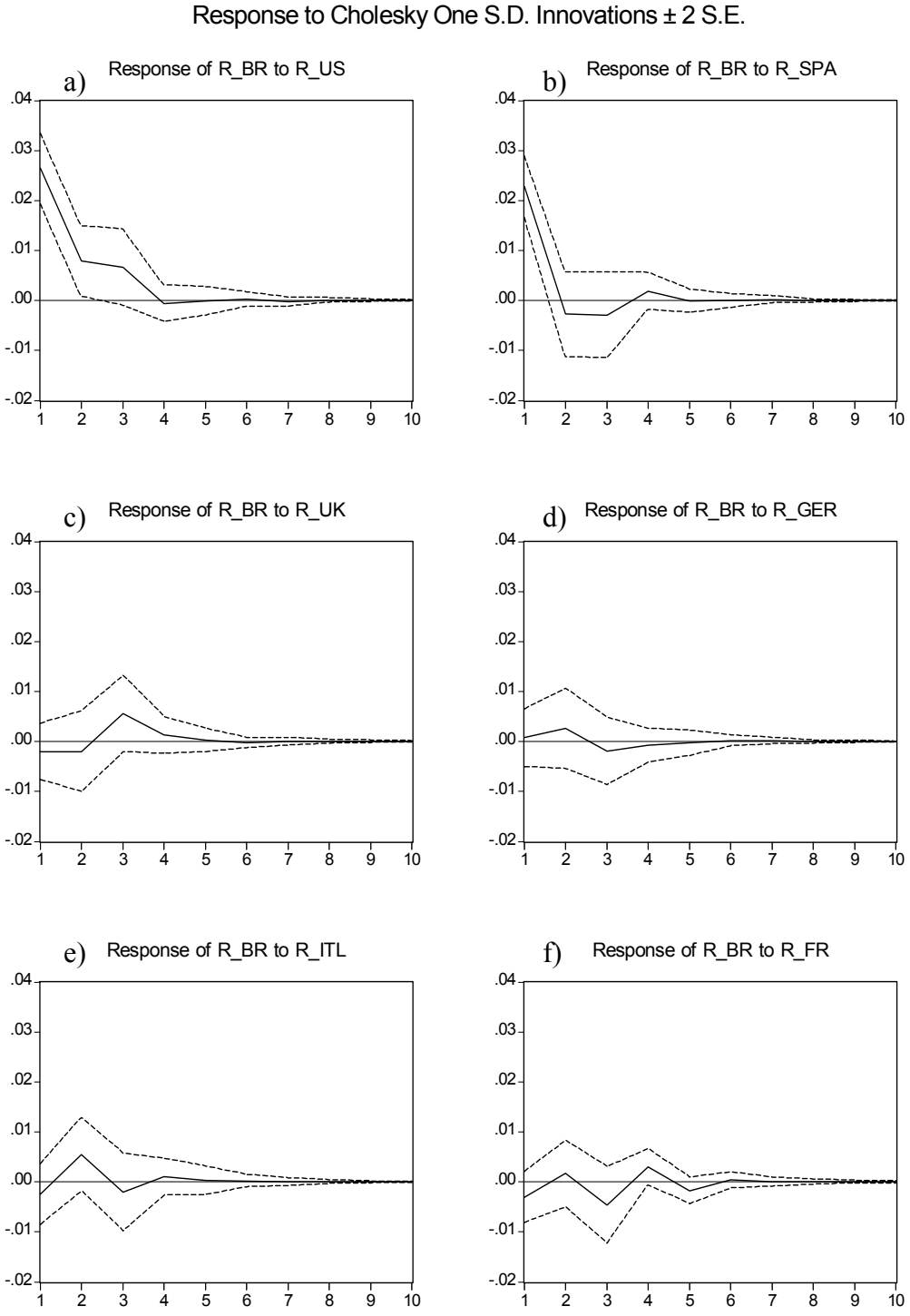

Figure 8. Response of Brazil to European stock market innovations during 1999-2004

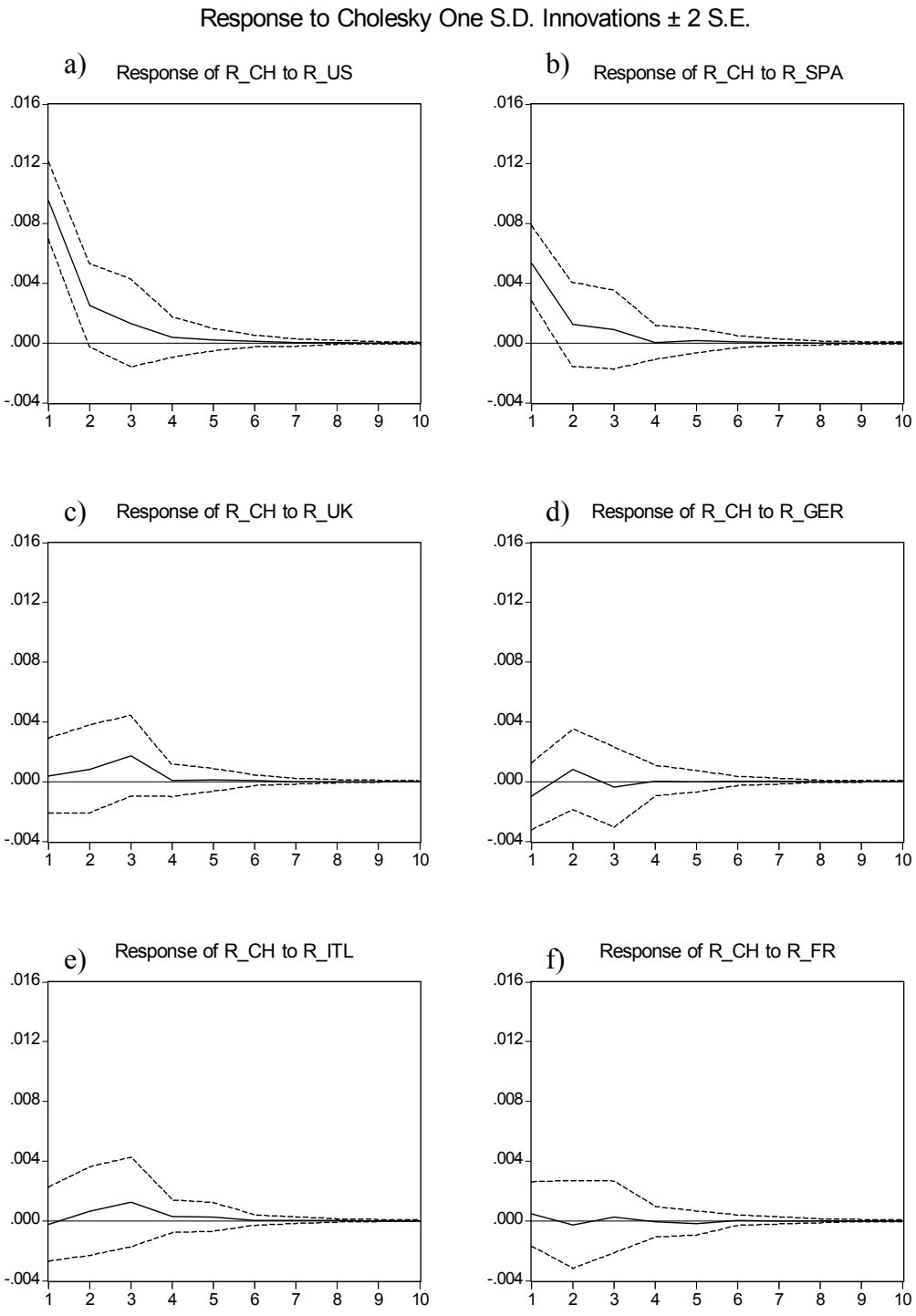

Figure 9. Response of Chile to European stock market innovations during 1999-2004