Are the Returns of the Spanish Real Estate Market Converging with the Rest of Europe?

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Abstract

This paper assesses whether the returns of the Spanish securitised real estate market are converging with those of the other countries in Europe relative to the returns in the US. Using time-varying parameter modelling techniques with monthly data over the period 1990 to 2008 we show that Spain has shown evidence of a convergence with some countries within Europe, especially since the introduction of the single currency, but little evidence of convergence with others. This implies that real estate diversification across Europe is still a viable option for Spanish investors but the choice of country is crucial.

Keywords: *Spanish Real Estate Convergence, Kalman Filter*

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Introduction

A number of authors have examined the diversification benefits across international real estate security markets with mixed results (see Wilson and Zurbruegg, 2003 and Sirmans and Worzala, 2003 for comprehensive reviews). In particular, a fair amount of research on integration and convergence in European real estate markets has been undertaken and suggest that those European countries that are part of the European Monetary Union (EMU) show greater levels of convergence in their real estate markets than the countries which are not part of the EMU (see for example, Lizeri et al., 2003, Yang et al., 2005, McAllister and Lizieri, 2006, and Lee, 2009). Additionally, recent studies show that the extent of convergence depends on the time period examined, i.e. convergence is time-varying (see for example, Brounen and Huisman, 2007; Andrews and Lee, 2008 and Lee, 2009). Therefore, this paper studies the time-varying convergence of the Spanish securitised real estate market shows with countries within Europe relative to that with the US utilising a model estimated using a Kalman Filter.

The use of the Kalman filter to test for convergence between capital markets has been used extensively since, Haldane and Hall (1991) first proposed a methodology for testing the time-varying relationship of the Pound Sterling/Deutschmark exchange rate relative to the US dollar (see for example, Frazer et al., 1994, Bekaert and Campbell, 1995, Serletis and King, 1997, Fraser and Oyefeso, 2001, Manning, 2002, Lee 2009 among others). However, no one as used the Kalman filter methodology to examine time-varying convergence of Spanish real estate markets returns with its neighbours in Europe. Thus, we add to the convergence literature in the European real estate market by examining the extent to which movements in the bilateral returns of the Spanish securitised real estate market are associated with movements in other European real estate markets relative to those in the US.

The Spanish-European bilateral return relationship is of interest as Europe is the preferred destination for real estate investors in their pursuit of portfolio diversification (see McAllister, 1999 and Hobbs et al., 2007). Hence, if the Spanish securitised real estate market is converging with its neighbours in the region the potential gains from European diversification will be eroded. However, if Spain shows greater convergence with the US, diversification across Europe will still be a viable investment strategy.

The rest of the paper is structured as follows. Section 2 reviews the previous literature on real estate market convergence within Europe. The empirical framework for this study is set out in section 3 and we go on to discuss the data used and the preliminary statistics in section 4. In section 5 we report and interpret the estimation results and present conclusions on the dynamic bilateral US-Spanish-European relationships in section 6.

Previous Studies

The first paper to examine convergence in real estate within Europe was by Eichholtz et al. (1998), which used monthly data from Global Property Research (GPR) over the period 1984 to 1996 and found that there is a significant 'continental' factor in European securitised real estate markets, which appears to have increased in strength from the early 1990s with the completion of the Single European Market and the move towards Monetary Union. However, in a follow up study Brounen and Huisman (2007) using monthly data from 1997 to 2007 find that six countries have become less related to the European factor, namely Austria, Belgium, the Netherlands, Spain, Switzerland and the UK. In contrast, France, Germany, Italy and Sweden have become more dependent on the European factor. In other words, the extent of convergence across the European real estate markets is time-varying.

Lizieri et al. (2003) examined whether the introduction of the Euro in 1999 led to greater convergence in European stock and real estate markets. Using a range of statistical tests on monthly data for eight Eurozone countries (Austria, Belgium, France, Germany, Ireland, Italy, the Netherlands and Spain) the authors find that, relative to the wider stock markets, real estate security markets showed a greater dispersion of performance, lower correlations, a lower contemporaneous factor, and stronger lead-lag relationships. In other words, real estate security markets across the Eurozone showed less and slower integration than that for the wider stock markets in general, which the authors attribute to the small size of the real estate security markets and the local nature of the holdings in the property company portfolios.

Using monthly data from 1993 to 2001 McAllister and Lizieri (2006) examined the impact the introduction of a single currency and monetary integration has had on different types of stock market returns in Europe: all equities, small cap stocks and real estate securities. For the wider stock market the authors find some evidence of convergence in returns, which they attributed to a global rather than European effect. Within the real estate securities market McAllister and Lizieri (2006) find there is a difference in 'core' (Belgium, France, Finland, Germany, and the Netherlands) and 'non-core' countries (Denmark, Italy, Ireland, Portugal, Spain, Sweden, and the UK). Core European countries exhibiting clear evidence of convergence, while non-core countries showed little evidence of common trends or movements, which the authors attribute to differences in macro-economic drivers between the 'core' and 'non-core' countries.

Yang et al. (2005) studied the integration of European real estate security markets before and after the establishment of the EMU using daily data for nine European countries and variance decomposition methodology. The authors find that the larger EMU countries (Germany, France and the Netherlands) showed greater integration than the smaller EMU countries (Belgium, Italy, and Spain). By contrast, the results for the three non-EMU economies (Denmark, Switzerland, and the UK) were mixed.

Andrews and Lee (2008) used the time-varying integration score approach of Akdogan

(1996, 1997), as extended by Barari (2004), and monthly data over the period 1990:1 to 2007:12 to examine the extent of global and regional integration for nine European countries, by regressing the returns of each country on a global and regional index. The results' indicating that both the level of global and regional integration for real estate securitised markets in Europe has on average increased since 1990, although the effect varied from country to country.

Using time-varying parameter modelling techniques with monthly data over the period 1990 to 2007 Lee (2009) finds that from 1990 to 1998 the returns of the UK securitised real estate were more influenced by the US market than the other countries in Europe. However, from autumn 1998 to 2004 the short-run movements in the return of the UK securitised real estate market became increasingly associated with movements in the other countries in Europe market rather than the US. But since 2004 the returns in the UK real estate have once again started to diverge from those of most countries in Europe.

In summary, the previous studies show a number of features of interest. First, convergence of the European securitised real estate markets very much depends on the time period covered, i.e. convergence is time-varying. Secondly, the extent of convergence is greater for countries that are more economically integrated and are also part of the EMU. In the following section therefore we employ a time-varying methodology to specifically test whether the Spanish securitised real estate market is converging with the US or with the other countries in Europe.

Methodology

Previous research has indicated that correlations between securitised markets are not constant over time. Frazer et al. (2008) therefore argue that convergence between country X and Y relative to country Z should be estimated by an extension of the time-varying estimation procedure of Haldane and Hall (1991) and Hall et al. (1992), which allows for a gradual adjustment path for the temporal correlation coefficients between the pairs of bilateral spreads using the following equations;

$$(R_Y - R_X)_t = \alpha_1 + \beta_1 (R_Z - R_Y)_t + \varepsilon_{1t} \quad (1a)$$

$$\alpha_{1t} = \alpha_{1t-1} + \eta_{1t} \quad (1b)$$

$$\beta_{1t} = \beta_{1t-1} + \nu_{1t} \quad (1c)$$

$$(R_Z - R_X)_t = \alpha_2 + \beta_2 (R_Z - R_Y)_t + \varepsilon_{2t} \quad (2a)$$

$$\alpha_{2t} = \alpha_{2t-1} + \eta_{2t} \quad (2b)$$

$$\beta_{2t} = \beta_{2t-1} + \nu_{2t} \quad (2c)$$

where R_X is the continuously compounded returns of country X; R_Y is the continuously compounded return of country Y, R_Z is the continuously compounded returns of country Z; ε_t is a random error term; and α and β are the parameters of interest.

The profiles of α and β are allowed to evolve over time according to the following laws of motion as in equations 3a and 3b, following the contention of Hall et al. (1992) that

convergence is a process and not a state:

$$\alpha_t = \alpha_{t-1} + \eta_t \quad (3a)$$

$$\beta_t = \beta_{t-1} + \nu_t \quad (3b)$$

where η_t and υ_t are white noise processes with variances σ_η^2 and σ_υ^2.

Thus, by reformulating the system of equations in a 'state space' form equation (1) is categorized as the measurement equation and equations 3a and 3b describe the dynamic evolution of the state parameters. Hence α_t and β_t are not constrained to having a fixed mean but allowed to vary over time according to a random walk, with the two hyperparameters σ_η^2 and σ_υ^2 determining the extent to which α_t and β_t evolve with their values estimated by the Kalman filter (see, Harvey, 1990 for more details)[1].

Frazer et al. (2008) point out that the following identity between the bi-lateral return spreads:

$$(R_Y - R_X) = (R_Z - R_Y) - (R_Z - R_X) \quad (5)$$

implies that changes in the bi-lateral return spread are associated with changes in one or other of the remaining bi-lateral return spreads in the stylized three country system. Thus an adding up constraint of the form $\beta_{2t} - \beta_{1t} = 1$ exists, which provides an opportunity to assess the robustness of the results.

Further, as Frazer et al. (2008) note that the stochastic constants α_{1t} and α_{2t} partial out all the systematic influences upon the X-Y and the Z-X relationships other than those resulting from the movements in the Z-Y. Hence, the procedure will offset any potential model misspecification problems although it will not infer causal linkages, nor will it proffer any economic explanation of what determines return spreads (Haldane and Hall, 1991). Additionally, since the same systematic influences are being removed in both equations, the result that $\alpha_{1t} = \alpha_{2t}$ gives another check on robustness of the results.

Data

In order to have consistency in terms of index calculations and composition across international countries the indices employed in this study are taken from the EPRA/NAREIT database. The EPRA/NAREIT indices ranked among the best indices for global real estate stocks in terms of coverage, investability, liquidity, float adjustment, published rules, accuracy and institutional acceptance (Frost et al., 2005) and can be viewed as representative of the real estate market of a country (Bond et al., 2003 and

[1] The use of the Kalman filter in estimating time-varying betas in preference to the alternatives, such as GARCH models and the approach of Schwert and Seguin (1990), can be justified from previous studies in the stock market which find that while all the methodologies are successful at characterising time-varying betas the Kalman filter is more efficient (see Brookes et al., 1998 and Faff et al., 2000, among others).

Yang et al., 2005).

Given that the focus of this paper is on convergence of the Spanish securitized real estate market with its neighbours in Europe, we use the country indices for to nine European countries namely; Belgium, France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland and the UK, which have complete price data over the study period 1990:1 to 2008:12, which gives 228 monthly returns for each country.

As is conventional in the literature we proxy the performance of non-European real estate markets with the returns of the US. US dollar prices are therefore used in this study. The returns however only comprise of the capital gain component of market returns. Nonetheless, Vassalou (2000) shows that correlation estimates are insensitive to whether total or capital gains are used so the omission of dividends should not seriously affect the results. In addition, recent studies (e.g., Bessler and Yang, 2003) have found that international stock market linkage patterns are not substantially affected by using USD versus local currencies to measure returns. Furthermore, by using USD returns, cross-country comparability of results is facilitated.

Table 1: Summary Statistics: Monthly data 1990:1 to 2008:12

Countries	Mean	SD	Skew	Kurt	JB	Prob
Belgium	-0.001	0.049	-1.34	9.94	521.28	0.00
France	0.003	0.056	-1.04	8.50	325.68	0.00
Germany	-0.001	0.083	-0.13	10.23	492.95	0.00
Italy	-0.002	0.084	-0.36	8.16	255.97	0.00
Netherlands	-0.001	0.047	-1.15	8.78	364.55	0.00
Spain	-0.004	0.102	-1.64	8.28	364.30	0.00
Sweden	-0.005	0.097	-0.12	6.95	147.14	0.00
Switzerland	0.003	0.051	-0.29	5.76	74.89	0.00
UK	-0.002	0.061	-1.12	7.53	240.51	0.00
US	0.003	0.054	-2.39	17.41	2168.67	0.00

The summary statistics in Table 1 show that the European real estate market with the highest mean return over the sampled period was France, while Sweden had the lowest average return. The European country with the lowest risk was the Netherlands, with Spain showing the highest risk. The European countries also show the unattractive feature of negative skewness, and significantly positive kurtosis (fat tails), which suggests that the returns are non-normal. Rejection of normality is also clearly indicated by the Jarque-Bera (JB) test for all European real estate markets.

Table 1 also shows that the US had a level of return greater than all European countries, except France, and a level of risk lower than all but three European real estate markets (Netherlands, Belgium and Switzerland). Nonetheless, the US also shows the largest negative skewness and positive excess Kurtosis and consequently displays the greatest level of non-normality.

Table 2 provides the contemporaneous correlations between the monthly returns of Spain with the other eight European countries and the US for the overall sample period (1990:1 to 2008:12) and for the period before and after the introduction of the single currency in January 1999. Table 2 shows that on average the correlation of Spain with the rest of

Europe was 0.360 and only 0.211 with the US over the full sample period. In addition, before and after the introduction of the single currency the average correlation of Spain with the rest of Europe increased from 0.331 to 0.392, while Spain's correlation decreased from 0.244 to 0.192 with the US.

Interestingly, Table 2 shows that prior to the introduction of the single currency Spain was more correlated with non-Eurozone countries (0.336) than with the Eurozone countries (0.328). However, after the introduction of the single currency in January 1999 Spain became more correlated with the Eurozone than the Non-Eurozone countries, 0.401 compared with 0.376. This suggests that now Spain is more influenced by Europe, especially the Eurozone countries than with the US.

Table 2: Correlation between Spain, Europe and the US:

Spain with	1990:1 to 2008:12	1990:1 to 1998:12	1999:1 to 2008:12
European Average	**0.360**	**0.331**	**0.392**
Eurozone Average	**0.371**	**0.328**	**0.401**
Non-Eurozone Average	**0.343**	**0.336**	**0.376**
Belgium	**0.418**	**0.390**	**0.447**
France	**0.436**	**0.443**	**0.444**
Germany	**0.232**	**0.156**	**0.264**
Italy	**0.400**	**0.333**	**0.446**
Netherlands	**0.370**	**0.317**	**0.406**
Sweden	**0.246**	**0.225**	**0.332**
Switzerland	**0.317**	**0.375**	**0.289**
UK	**0.466**	**0.406**	**0.506**
US	**0.211**	**0.244**	**0.192**

Nonetheless, Table 2 shows that there were substantial changes within the individual country correlations. For instance, over the full sample period Spain showed the highest correlation was with the UK (0.466) and the lowest with Germany (0.232). However in the period before the introduction of the single currency the highest correlation was with the France (0.443) and the lowest with Germany (0.156), while after the introduction of the single currency in January 1999 the highest correlation was with the UK (0.506) and the lowest with Germany (0.264). These changes in correlation suggest that focusing only on the simple correlations of international securitised real estate returns as opposed to their adjustment path, relative to some outside country, can be misleading.

Results

Recall we are using equations (1) and (2) to test whether the Spanish securitised real estate market is converging with its neighbours within the region relative to the US. The parameters β_{1t} and β_{2t} indicating the extent of convergence.

Frazer et al. (2008) point out that the parameters β_{1t} and β_{2t} are only relative and not absolute measures of convergence. So for instance, from the above framework one might assume that if $\beta_{2t} \approx 0.5$ would signify that Spain is independent of its neighbouring country Y and responds only to domestic factors. However, the correct interpretation of this scenario is that Spain is no more or no less converged with its neighbouring country Y, relative to the US. On the other hand, the closer that β_{1t} is to 0, or β_{2t} is to 1, the

greater the confidence we can have that Spain is converging with its neighbour, while the closer that β_{1t} is to 1, or β_{2t} is to 0, the greater the confidence we can have that Spain is not converging with its neighbour.

The results for the Kalman filter values β_{2t} are shown in Table 3 and Figures 1 to 3, since the β_{1t} values give essentially the same information but the β_{2t} values are easier to interpret, i.e. if Spain is converging with one of its' neighbours within the region $\beta_{2t} \rightarrow 1$, however, if Spain is not converging with its neighbour $\beta_{2t} \rightarrow 0$.

In the analysis the adding-up constraint $\beta_{2t} - \beta_{1t} = 1$ is satisfied by the data, with deviations typically less than 0.0001. Moreover, the constraint $\alpha_{1t} = \alpha_{2t}$ is also satisfied. Thus the estimation procedure would appear to be robust to the weighting between the state equations.

Table 3: Summary Statistics of the Kalman Filter Coefficients

Country/Period	1990:1 to 2008:12		1990:1 to 1998:12		1999:1 to 2008:12	
Country/Statistic	Av	SD	Av	SD	Av	SD
European Average	0.623	0.275	0.552	0.277	0.686	0.224
Eurozone Average	0.650	0.264	0.609	0.268	0.685	0.232
Non-Eurozone Average	0.580	0.293	0.456	0.292	0.688	0.212
Belgium	0.681	0.304	0.568	0.318	0.780	0.254
France	0.803	0.193	0.732	0.184	0.865	0.179
Germany	0.501	0.281	0.550	0.335	0.457	0.213
Italy	0.522	0.270	0.581	0.271	0.470	0.260
Netherlands	0.742	0.272	0.614	0.234	0.854	0.254
Sweden	0.443	0.304	0.218	0.215	0.641	0.221
Switzerland	0.650	0.291	0.516	0.342	0.769	0.163
UK	0.646	0.284	0.635	0.319	0.656	0.251

Table 3 shows a number of features of interest. First, the time-varying beta coefficients for Spain with the other countries with Europe is above 0.6 on average, which suggests that the returns in Spain are more affected by those of the it's neighbouring countries in the Europe than the perturbations in the US real estate market. However, prior to the introduction of the single currency the average Kalman filter coefficient (0.552) indicates that the returns in Spain were as equally influence by the US as the other countries in Europe. After January 1999 the Kalman filter results suggests that the Spanish real estate market has converged with Europe. Nonetheless, Table 3 also shows that while it is the Eurozone countries that have had the greatest influence on the Spanish real estate market, prior to January 1999, now the non-euroland countries have an equally strong influence. Nonetheless, the standard deviation values in Table 3 show that the Kalman filter coefficients are subject to considerable variation over time. This is more easily seen in Figure 1.

Figure 1 represents an attempt to capture the broad trend of regional convergence of Spain with its neighbours since December 1990[2]. It is apparent from Figure 1 that Spain's relationship with the rest of Europe declined substantially relative to the influence of the US until the introduction of the single currency. However, since January 1999 Spain has

[2] Since the Kalman filtering procedure takes sometime to settle down the values in Figures 1 to 3 start in 1990:12 rather than 1990:1.

moved ever closer to the rest of Europe. The Kalman filter values typically rising to and staying above 0.8 after December 2002, only dipping slightly in 2005/6 before rising dramatically above one in 2007. In other words, Figure 1 shows that the returns in Spain shows considerable evidence of convergence with its European neighbours, especially after the introduction of the Euro, confirming the results in Table 3.

If we now consider the individual country results in Table 3 and Figures 2 and 3 we see a number of interesting features. First, the Figure 2 shows that the Eurozone countries with the greatest influence on the returns in Spain are Belgium, France and the Netherlands, while Italy and Germany show little impact on the Spanish market. Indeed, since December 2002, the perturbations in the US market have had greater influence over Spanish market than the returns in Italy and Germany. Second, Figure 3 shows that of the Non-Eurozone countries the UK had the strongest influence over Spain prior to the introduction of the single currency, but more recently Switzerland has come to dominate the movements in the Spanish market, whereas, the returns in Sweden had little impact on the Spanish real estate market until December 2007.

In summary, the time-varying results in Table 3 and Figures 1 to 3 show that the convergence of the Spanish securitised real estate market with the rest of Europe is not a simple process with Spain sometimes converging with the countries in Europe and at other times showing greater convergence with the US. Secondly, the finding of strong convergence with some markets (e.g. Belgium, France, the Netherlands, Switzerland and the UK) and little or no convergence with others (e.g. Germany, Italy and Sweden) suggests that convergence between European real estate markets is not driven simply by the capital market and economic convergence, supportive of the results of Lizieri et al. (2003), Yang et al. (2005) and McAllister and Lizieri (2006) and may be due to other institutional differences

Conclusion

The aim of this paper is to consider the short-run bilateral linkages between the returns of the securitised real estate in Spain with its neighbours in Europe relative to the US. Using monthly data over the period 1990:1 to 2008:12 our results can be simply stated. First, the correlation between Spanish securitised real estate market and the other countries within Europe has not been constant over time, i.e. returns are time-varying. Second, the results indicate that Spain has shown evidence of a convergence with some countries within Europe, especially since the introduction of the single currency, but little evidence of convergence with others. This implies that real estate diversification across Europe is still a viable option for Spanish investors but the choice of country is crucial.

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Figure 1: Time-varying Beta Coefficients Europe: December 1990 to December 2008

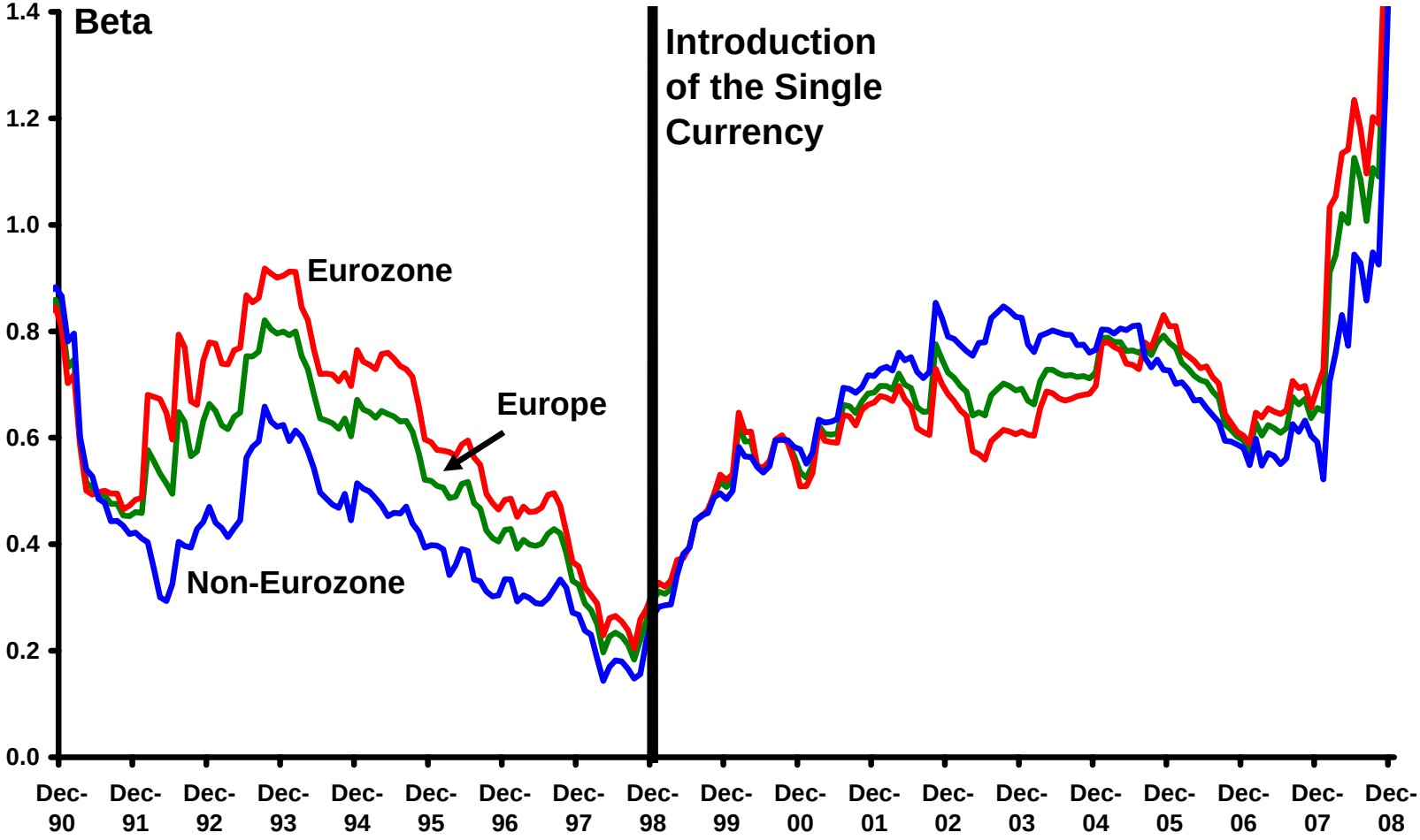

Figure 2: Time-varying Beta Coefficients Eurozone Countries: December 1990 to December 2008

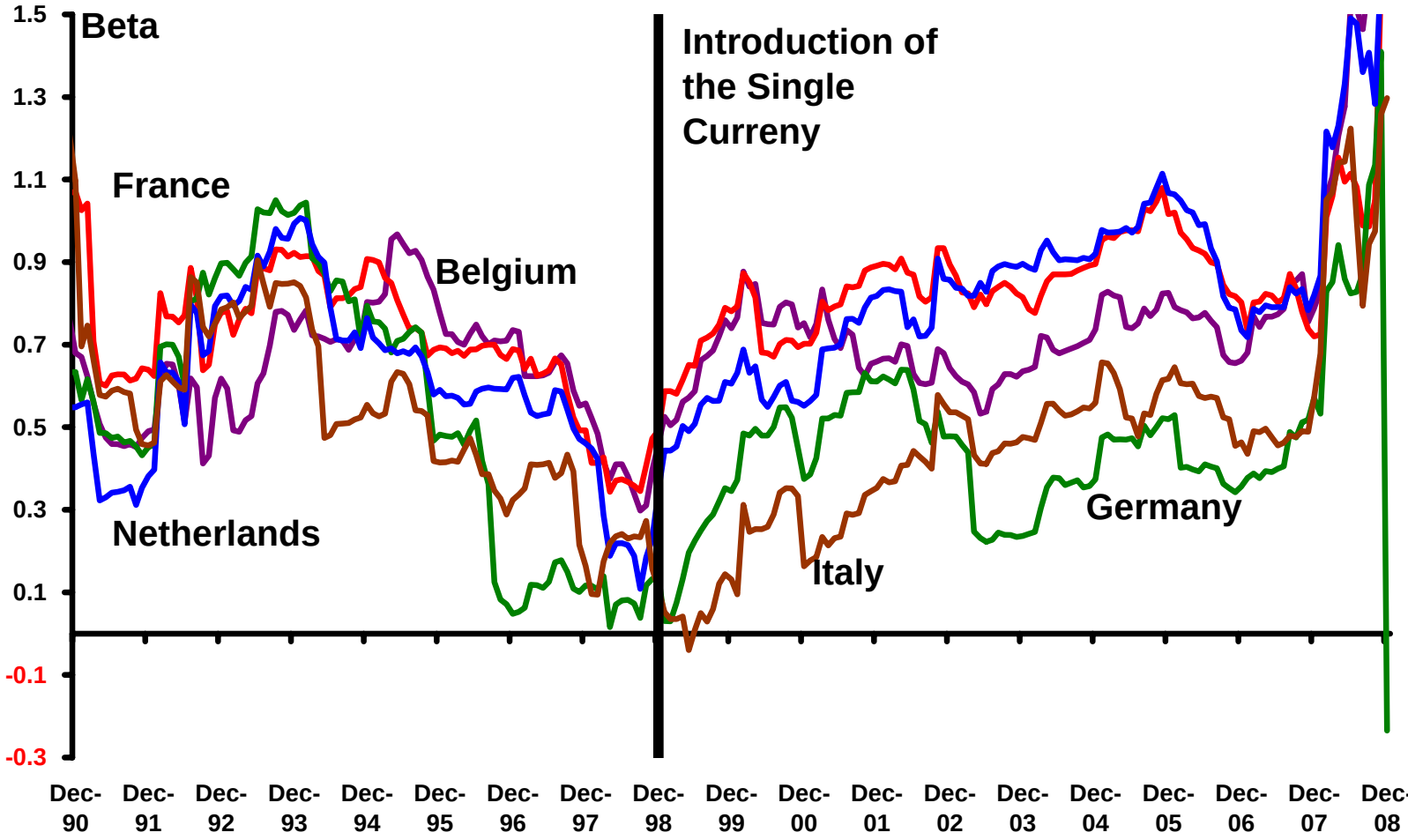

Figure 3: Time-varying Beta Coefficients Non-Eurozone Countries: December 1990 to December 2008