

---

# **An investigation into the incorporation of EU Accession information into the domestic stock markets of accession countries**

University ID: 0309093

*Department of Economics, University of Warwick  
Coventry, UK, CV4 7AL*

**April 2006**

---

## **ABSTRACT**

The accession of ten new member states in 2004 represented a bold and risky step forward for the European Union in its effort to create a 'single market'. An EU Accession is anticipated to provide many economic benefits to a country and hence its accession is associated with a sharp rise in the domestic stock index. This paper seeks to investigate whether this price rise is included in the market in advance of the EU Accession, as the theory of semi-strong form efficiency would suggest. The paper adapts the methodology of Fama, Fisher, Jensen and Roll's study of the efficiency of stock splits to try and map the process of the inclusion of EU Accession information in the market. The 2004 accession results are contrasted with the entry of three more economically developed countries in the 1995 accession to determine whether a countries' economic development is a key factor in determining the efficiency of its stock market. The paper concludes that market liquidity and factors influencing the volumes of trade are the key drivers behind the efficiency of this information incorporation process.

---

**Contents**

<b>1. Introduction</b>	<b>3</b>
<b>2. Literature Review</b>	<b>4</b>
<b>3. Data</b>	<b>10</b>
<b>4. Methodology</b>	<b>13</b>
<b>5. Results</b>	
<b>a. 1995 EU Accession</b>	<b>18</b>
<b>b 2004 EU Accession</b>	<b>22</b>
<b>bi. Czech Republic, Hungary, Poland and Slovakia</b>	<b>24</b>
<b>bii. Estonia, Latvia, Lithuania, Slovenia</b>	<b>25</b>
<b>c. Investor Confidence Effect</b>	<b>28</b>
<b>6. Conclusion</b>	<b>29</b>
<b>a. 1995 EU Accession</b>	<b>30</b>
<b>b. 2004 EU Accession</b>	<b>30</b>
<b>c. Evaluation of Methodology</b>	<b>31</b>
<b>d. Potential Extensions to the Analysis</b>	<b>32</b>
<b>Appendix 1 – Results with Different Time Periods</b>	<b>34</b>
<b>Appendix 2 – More Regression Results</b>	<b>39</b>
<b>Appendix 3 – Results with Three Market Indices</b>	<b>42</b>
<b>Appendix 4 – Results with a non-log Specification</b>	<b>47</b>
<b>References</b>	<b>49</b>

## 1. Introduction

The market efficiency theory in financial economics is principally a study of the dynamics of information and its incorporation into the market in the form of prices. This paper will focus on mapping out this informational process for the EU accession in the stock markets of the accession countries. These results will then be used to draw more general conclusions about the existence of semi-strong form efficiency in these markets.

The accession of ten new member states in 2004 represented a bold and risky step forward for the European Union in its effort to create a 'single market'. The accession was, and still is, envisaged to provide huge benefits to those member states in terms of economic growth and development. However the accession has a potentially negative side because of its size, structure and timing.

The most direct way to assess these two contrasting effects is through the stock markets. Economic theory and past evidence suggest positive economic growth effects will occur. Hence the accession should have a positive impact in the stock markets of the accession countries. Furthermore if semi-strong form efficiency holds then the positive price effect should be incorporated in the stock market before the date of accession.

The underlying theoretical base of the study is the concept of efficiency developed by Fama and subsequently tested with event studies. These event studies are predominantly company-specific and while efficiency studies have been conducted on country stock indices, including the study of four Central and Eastern European countries by Hanousek and Filer (2000)<sup>1</sup>, I have not found any event studies on EU accessions.

My study utilises a residual-based form of analysis that is adapted from the company-focused event study of stock-splits by Fama, Fisher, Jensen and Roll (FFJR) in 1969<sup>2</sup>. The methodology runs a regression on a simple market model and represents the effect of the EU

---

<sup>1</sup> Hanousek, J and Filer, R.K. "The Relationship between Economic Factors and Equity Markets in Central Europe", *Economics of Transition*, Volume 8 (3) 2000

<sup>2</sup> Fama, E.F, Fisher, L, Jensen, M. and Roll, R, "The Adjustment of Stock Prices to New Information", *International Economic Review*. Vol.10, No.1 (Feb. 1969), 1-21

accession information as a residual. The methodology has been applied to both the 2004 EU accession and the 1995 EU accession where three relatively developed countries, Austria, Finland and Sweden, joined the EU. This is designed to contrast the potentially inefficient stock markets of the 2004 accession countries with the anticipated efficient stock markets of the 1995 accession countries.

The results generally support this hypothesis. However the results were driven by micro-level issues rather than the differing structures of the two accessions. The key driver behind the results was market liquidity and the occurrence of events that boosted the volumes of shares traded, such as IPO's or takeovers. Therefore some of the 2004 accession countries contradicted the hypothesis, as in the case of Slovenia.

---

## 2. Literature Review

An efficient market is defined as a market in which prices “fully reflect” available information. Fama (1970)<sup>3</sup> developed this definition further by classifying types of efficiency based on the relevant information subsets. Weak form efficiency incorporates the subset of historical prices, semi-strong form efficiency involves the subset of all publicly available information and strong form efficiency involves the subset of all information and hence incorporates insider knowledge.

The theory of semi-strong form efficiency has empirically been tested using an event study to test if stock prices fully incorporate information from a given type of information-generating event. The majority of these studies are focussed on micro-level events, including stock splits and financial results announcements. FFJR's analysis of stock splits in 1969<sup>4</sup> will be my initial focus, before offering an overview of other studies.

---

<sup>3</sup> Fama,E.F, “Efficient Capital Markets: A Review of Theory and Empirical Work”, *The Journal of Finance*, Vol.25, No.2 (May 1970), 383-417

<sup>4</sup> Fama,E.F, Fisher.L, Jensen,M.Cand Roll,R, “The Adjustment of Stock Prices to New Information”, *International Economic Review*. Vol.10, No.1 (Feb. 1969), 1-21

Stock splits do not directly generate information; their only direct effect is to increase the number of shares per shareholder. FFJR, however, deduced that splits were associated with the appearance of important information. Empirical evidence showed that in periods before a stock split the rate of return is unusually high due to large increases in expected earnings and dividends. Past evidence shows that dividend increases usually follow stock splits and hence the highest returns usually occur close to the stock split because rumours of a stock split cause the market to anticipate a rise in dividends.

Most events studied, such as annual earnings announcement and for my study an EU accession, directly generate information at a given announcement date. However these types of events will be affected by rumours and hence if rumours result in a slow release of information before the announcement date, then these events will mimic the process of the stock split.

FFJR's methodology utilises Markowitz's market model (equation 1). The stock's returns are regressed against a market index and hence the residuals isolate the effects of event-specific information. The cumulative residuals are then plotted against time, with time 0 being the month in which the split occurs, for firms whose dividends increased by more than the NYSE average, firms whose change in dividends was less than the average and the sample as a whole. The dynamics of the new information is graphically illustrated through the residual plots. A flattening out of the plot after point 0 indicates that no more new information has entered; hence this is the 'efficient' result. The methodology can be applied to any event study and hence offers the simplest and most effective way to test, illustrate the results and provide implications for market efficiency.

$$\check{r}_{j,t+1} = \alpha_j + \beta_j \check{r}_{M,t+1} + \check{u}_{j,t+1}$$

**Equation 1**

The cumulative residual plots in FFJR's study (figures 1a, 1b and 1c)<sup>5</sup> shows a slight initial positive drift in the 'increased' dividend group and a fall for the 'decreased' dividend group. These results are consistent with the efficient markets hypothesis however this result is not a necessary and sufficient condition for semi-strong form efficiency.

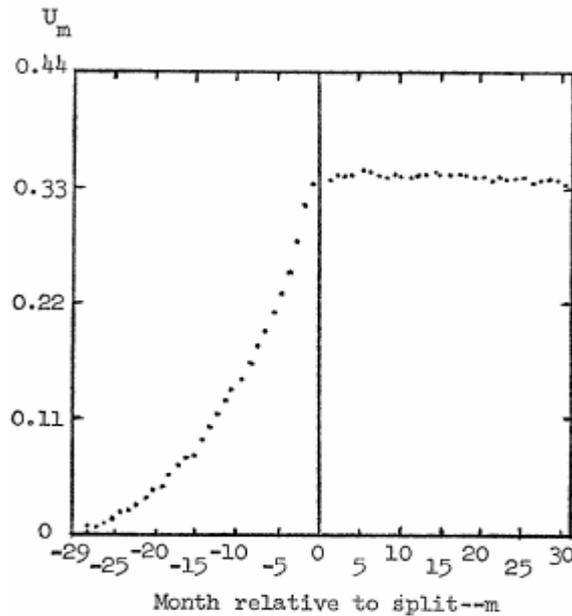


Figure 1a - Cumulative average residuals – all splits

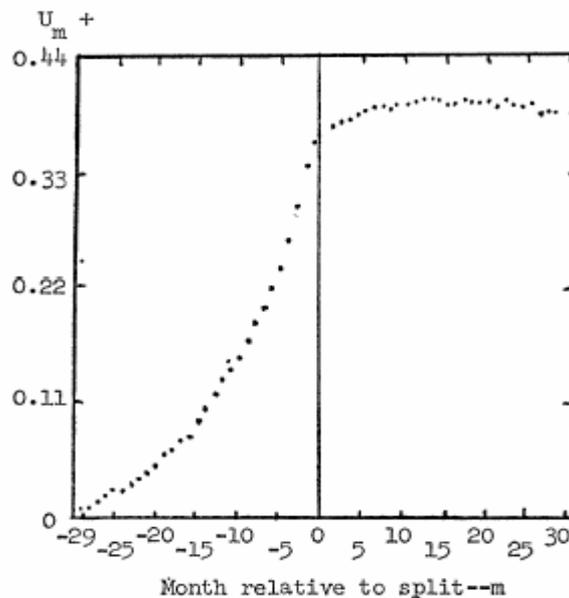


Figure 1b - Cumulative average residuals for dividend "increases"

<sup>5</sup> Fama, E.F, Fisher, L, Jensen, M. and Roll, R, "The Adjustment of Stock Prices to New Information", *International Economic Review*. Vol.10, No.1 (Feb. 1969), 13,15

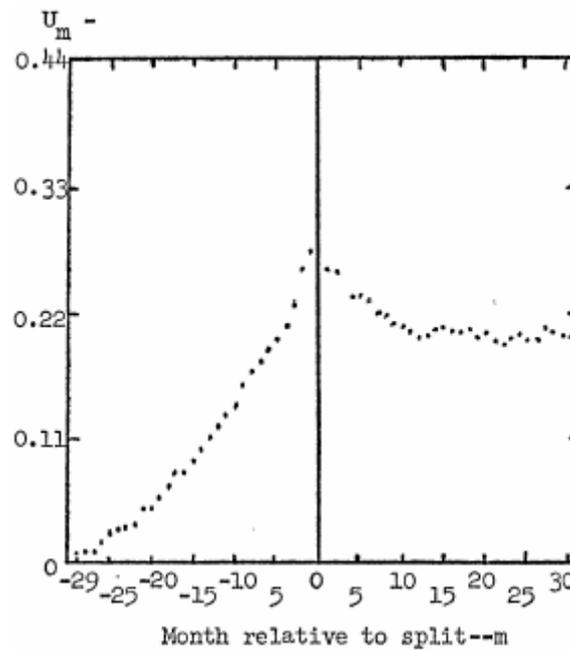


Figure 1c – Cumulative average residuals for dividend “decreases”

The use of monthly data in this study and the majority of event studies is a potential weakness in the methodology. Fama (1991)<sup>6</sup> states that daily data allows ‘precise measurement of the speed of the stock-price response’ and helps ‘eliminate the joint-hypothesis problem’<sup>7</sup>. The joint hypothesis problem occurs from having to jointly test market efficiency with the asset-pricing model used. However high frequency data runs the risk of being contaminated by shocks which less frequent data will average out. Therefore this trade-off suggests that the ideal data frequency for an event study is weekly data, which I will use in my study.

Many other event studies utilised the residual analysis methodology. Ball and Brown (1968)<sup>8</sup> studied the effect of companies’ earnings announcements on their stock price by using monthly stock data for 261 firms for the period 1946-66. The market efficiency implications are a by-product of demonstrating the accounting value of earnings data and therefore these conclusions must be treated with caution. The study concluded that no more than 10-15% of the

<sup>6</sup> Fama, E.F., “Efficient Capital Markets: II”, *The Journal of Finance*, Vol.46, No.5 (Dec. 1991), 1575-1617

<sup>7</sup> Fama, E.F., “Efficient Capital Markets: II”, *The Journal of Finance*, Vol.46, No.5 (Dec. 1991), 1601

<sup>8</sup> Ball, R and Brown, P., “An empirical evaluation of accounting income numbers,” *Journal of Accounting Research* 6, 1978, 159-178

information in the earnings announcement had not been anticipated by the month of the report<sup>9</sup>. However despite this support for market efficiency there is a post-announcement drift for six months, which contradicts this. However the cyclical nature of annual earnings announcements may mean that this post-announcement drift is being contaminated with pre-announcement drift data for next year's earnings announcement.

Waud (1970)<sup>10</sup> utilised this methodology on a macro level by examining the effects of announcements of discount rate changes by Federal Reserve Banks. The study finds a significant "announcement effect" on stock returns for the 1<sup>st</sup> day's trading following an announcement however this is at most a 0.5% change. Waud concludes that the market anticipates the announcements and hence the implication is that information may be leaked to the market via rumours. This supports my earlier proposition that rumours may influence my event study and hence mirror the stock split process.

These studies follow the majority of event studies in supporting semi-strong form market efficiency; however this is not certain. Asquith (1983)<sup>11</sup> found that in mergers the stock prices of the acquiring firms show little reaction to a merger announcement but then exhibit a steady downwards drift. Roll (1986)<sup>12</sup> suggests that acquiring firms pay too much and the market only realises this slowly hence exhibiting inefficiency. Alternative reasoning suggests that the drift is due to bias in measured abnormal returns (Franks, Harris and Titman (1991))<sup>13</sup> or that the drift may be sample specific<sup>14</sup> (Mitchell and Lehn (1990))<sup>15</sup>. Despite these possible

---

<sup>9</sup> Ball,R and Brown,P, "An empirical evaluation of accounting income numbers," *Journal of Accounting Research* 6, 1978, 175

<sup>10</sup> Waud,R.N, "Public Interpretation of Discount Rate Changes: Evidence on the 'Announcement Effect' ", *Econometrica*, Vol.38, No.2 (March 1970), 231-250

<sup>11</sup> Asquith,P, "Merger bids, uncertainty and stock holder returns", *Journal of Financial Economics* 11, 1983, 51-83

<sup>12</sup> Roll,R, "The hubris hypothesis of corporate takeovers," *Journal of Business* 59, 1986, 197-216

<sup>13</sup> Franks,J, Harris.R.S and Titman.S, "The postmerger share price performance of acquiring firms," *Journal of Financial Economics* 29,1991, 81-96

<sup>14</sup> Fama,E.F, "Efficient Capital Markets: II ",*The Journal of Finance*, Vol.46, No.5 (Dec. 1991), 1602

<sup>15</sup> Mitchell,M.L and Lehn.K, "Do bad bidders become good targets?," *Journal of Political Economy* 98, 1990, 372-398

weaknesses the majority empirical studies support the hypothesis of semi-strong form market efficiency<sup>16</sup>.

The existing literature largely neglects European transition countries. Hanousek and Filer (2000)<sup>17</sup> seek to test for semi-strong form efficiency, in relation to stock prices' reaction to economic variables, for four Central European transition countries: Czech Republic, Hungary, Poland, and Slovakia. These countries have subsequently joined the EU in the 2004 accession and hence this study offers a useful parallel.

The study focuses on economic variables and whether lagged variables have any economic predicting ability, which would contradict semi-strong form efficiency. Hence the study is not an event study and therefore uses a Granger causality test rather than the residual methodology. Granger causality tests are conducted for each selected economic variable to test whether the contemporaneous variable has added explanatory power and if the lagged variable has added explanatory power.

This methodology is not relevant for an event study because the information-generating event cannot be represented as a variable. The methodology needs to be able to illustrate the process of information incorporation around a given event and hence a time dimension is needed that the Granger causality test fails to incorporate.

The study, however, helps explain country efficiency differentials by evaluating the process of capital market development in these countries. All countries are shown to be inefficient; however Poland and Hungary are closer to efficiency than the Czech Republic and Slovakia. The Czech Republic and Slovakia adopted a 'big-bang' approach to establishing capital markets by trading large numbers of firms and hoping that the institutional framework would evolve around this. Poland and Hungary, however opted for a more gradual approach and hence have developed markets that are closer to efficiency.

---

<sup>16</sup> Fama, E.F, "Efficient Capital Markets: II", *The Journal of Finance*, Vol.46, No.5 (Dec. 1991), 1602

<sup>17</sup> Hanousek, J and Filer, R.K. "The Relationship between Economic Factors and Equity Markets in Central Europe", *Economics of Transition*, Volume 8 (3) 2000

These results suggest that a similar efficiency conclusion may be drawn from an event study of the EU accession. Similar country differentials may also occur within the study due to both the approach to developing capital markets and the country's individual approach to EU accession.

### 3. Data

The stock market data used in this study is from Thompson Financial DataStream. The 1995 EU accession data includes weekly data from the domestic indices of the three accession countries (figure 4a). The data was obtained for the period 14th December 1992 to 5<sup>th</sup> February 1996.

<b>Country</b>	<b>Index</b>
<b>Austria</b>	Austria ATX
<b>Finland</b>	OMX Helsinki
<b>Sweden</b>	OMX Stockholm

**Figure 2a**

The 2004 EU accession data includes weekly data from the domestic indices of eight of the ten accession countries (figure 4b). Cyprus and Malta have been excluded because they are not classified in the same group as the other eight countries, viewed as Central and Eastern European economies, by investors. The data was obtained for the period 7th October 2002 to 28<sup>th</sup> November 2005.

<b>Country</b>	<b>Index</b>
<b>Czech Republic</b>	Prague PX 50
<b>Estonia</b>	OMX Tallinn
<b>Hungary</b>	Budapest BUX
<b>Latvia</b>	OMX Riga
<b>Lithuania</b>	OMX Vilnius
<b>Poland</b>	Warsaw WIG 20
<b>Slovakia</b>	SAX 16
<b>Slovenia</b>	Slovenia SBI

**Figure 2b**

The selection of a time period for the analysis of the 1995 and 2004 EU accessions is a key issue in the study. The uncertainty over the timing of the incorporation of information within the stock markets could result in the time period selection becoming arbitrary and potentially causing a bias on the results.

The time period selected for the 1995 accession is designed to encompass the key dates of the accession (figure 3a) and allow sufficient scope for information to be incorporated. The 2004 accession time period was based on a start date selected through the analysis of when the price rise relative to the market index starts (figure 6). This fails to incorporate all of the key accession dates (figure 3b); however the period includes all the appropriate information. In addition my results have been tested with different time periods and there is little effect on the pattern of cumulative residual movements around the EU accession (appendix 1).

<b>Date</b>	<b>Event</b>
<b>1 February 1993</b>	Accession negotiations opened in Brussels
<b>24-25 June 1994</b>	Acts of Accession signed
<b>1 January 1995</b>	Accession of Austria, Finland and Sweden into the EU

**Figure 3a**

<b>Date</b>	<b>Event</b>
<b>10 November 1997</b>	Accession negotiations with Cyprus, Poland, Estonia, the Czech Republic, Hungary and Slovenia.
<b>10-11 December 1999</b>	Accession negotiations with Slovakia, Latvia, Lithuania and Malta.
<b>16 April 2003</b>	Acts of Accession signed
<b>1 May 2004</b>	Accession of the ten candidate countries into the EU

**Figure 3b**

The individual country data for both EU accessions was also aggregated into indices (figure 4) to obtain an overall view and to soften the effect of any potential individual country anomalies in the data.

The market capitalisation weighting relies on an assumption the weighting should be proportional to market capitalisation. An optimal weighting would be on the relative importance investors had attached to the country's stock market during the accession. This however is an impossible measure to determine and hence it is realistic to make the above assumption to allow the formation of a weighted index. The weighting for each index is taken at the beginning of the year in which the accession process begins.

The results, discussed later, show that the individual country effects are important. Therefore these combined indices should be viewed as a start-point in the analysis, which principally illustrates the broad differences between the 1995 and 2004 accession (figures 5, 6). The simple graphs below suggest that the EU accession effect is incorporated before the accession, the origin, and stagnates afterwards for the 1995 accession. In contrast there is no obvious pre-accession price effect for the 2004 accession but there is a post-accession effect.

Index	Year of Accession	Types of Weighting	Description
<b>Three Country Index</b>	1995	1) Equally weighted 2) Weighted by market capitalisation on 01/01/1993	The index includes all the countries in the 1995 accession.
<b>Four Country Index</b>	2004	1) Equally weighted 2) Weighted by market capitalisation on 01/01/1997	The index includes the countries analysed by Hanousek and Filer (2000) <sup>18</sup> : Czech Republic, Hungary, Poland and Slovakia.
<b>Eight Country Index</b>	2004	1) Equally weighted 2) Weighted by market capitalisation on 01/01/1997	The index includes all the countries in the 2004 accession, except Cyprus and Malta.

**Figure 4**

<sup>18</sup> Hanousek, J and Filer, R.K. "The Relationship between Economic Factors and Equity Markets in Central Europe", *Economics of Transition*, Volume 8 (3) 2000

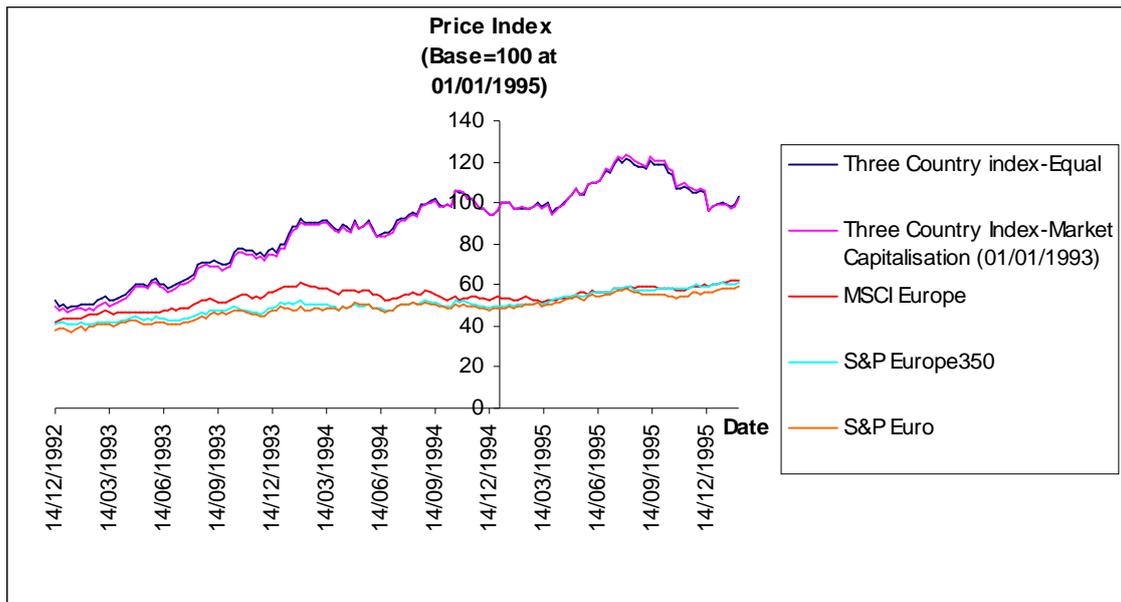


Figure 5

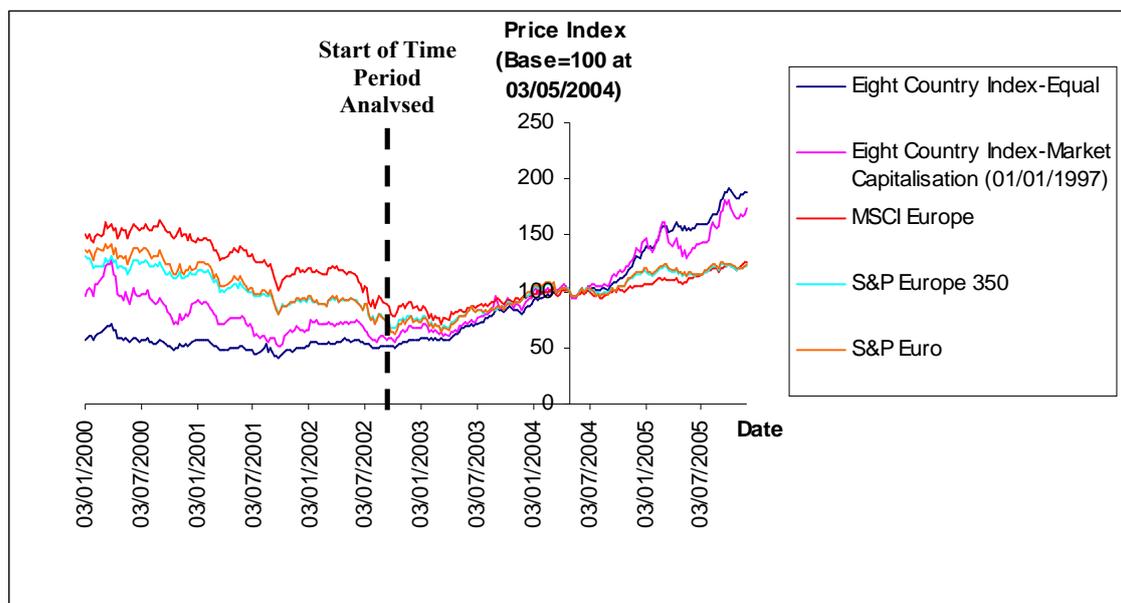


Figure 6

#### 4. Methodology

The analysis will closely follow the methodology utilised in FFJR (1969)<sup>19</sup>. Initially a relationship must be developed between stock returns and general market returns. FFJR utilised

<sup>19</sup> Fama,E.F, Fisher.L, Jensen,M.Cand Roll,R, “The Adjustment of Stock Prices to New Information”, *International Economic Review*. Vol.10, No.1 (Feb. 1969), 1-21

a simple logarithmic form of Markowitz's market model to illustrate the relationship (equation 2).

$$\log_e R_{j,t} = \alpha_j + \beta_j \log_e R_{M,t} + u_{j,t}$$

**Equation 2**

$P_{j,t}$  = Price of stock index j at the time t (weekly data)

$$R_{j,t} = P_{j,t} / P_{j,t-1}$$

$P_{M,t}$  = Price of the market index at time t (weekly data)

$$R_{M,t} = P_{M,t} / P_{M,t-1}$$

The original definitions from FFJR (1969) accounted for dividends and capital changes<sup>20</sup>. Due to my limited resources I have excluded this. This is plausible because of the national focus of my study and the lack of a link with dividends, unlike stock splits which are anticipated to signal a future rise in dividends.

The effect of market conditions in the study is proxied by a market index. The selection of this could potentially bias the results. However there is no 'best' result to test the relative success of the market indices against. Therefore I decided to test the robustness of the results with a variety of market indices (figure 7).

---

<sup>20</sup> Fama, E.F, Fisher, L., Jensen, M. and Roll, R., "The Adjustment of Stock Prices to New Information", *International Economic Review*. Vol.10, No.1 (Feb. 1969), 3

Index	Description
MSCI Europe	A free float-adjusted market capitalisation index of equities in 16 European developed market country indices: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. <sup>21</sup>
S&P Europe 350	A free float market capitalised weighted index of equities in 17 Pan-European markets, covering approximately 70% of the total market capitalisation. <sup>22</sup>
S&P Euro	“The S&P Euro Index is a free float market capitalisation weighted index that measures the performance of equities in the Euro Bloc markets, covering approximately 70% of the total market capitalisation.” <sup>23</sup>

**Figure 7**

The key output of the regression is not the standard regression coefficients. These coefficients show the degree to which the EU accession countries' stock markets are driven by general market conditions. However this study is focussed on the “extraordinary effects”<sup>24</sup> of the EU accession, which are measured by the residuals.

The raw residual values illustrate the price effect of information generated by the EU accession on a given day. However a dynamic view is needed to allow the process of information incorporation to be compared to the timing of the event, in this case the EU accession. Therefore the residuals are used to produce cumulative residuals which are graphed and form the main output of the analysis.

The market model first needs to be tested to ensure it is well specified (figures 8a, 8b and appendix 2). The indices for the 1995 accession pass all tests (figure 8a) however the intercept is not significant. Intuitively this shows that there is no fixed difference between the returns of these countries and the market index. Hence there is no risk premium for these countries, as would be expected given their developed economies.

<sup>21</sup> <http://www.msci.com/equity/indexdesc.html#EUROPE>

<sup>22</sup> [http://www.bloomberg.com/markets/stocks/wei\\_region2.html](http://www.bloomberg.com/markets/stocks/wei_region2.html)

<sup>23</sup> [http://www.bloomberg.com/markets/stocks/wei\\_region2.html](http://www.bloomberg.com/markets/stocks/wei_region2.html)

<sup>24</sup> Fama, E.F, Fisher, L., Jensen, M. and Roll, R., “The Adjustment of Stock Prices to New Information”, *International Economic Review*. Vol.10, No.1 (Feb. 1969), 3

The 2004 accession also appears to be well specified (figure 8b); however there are some minor problems. Four of the indices tested pass the ARCH heteroscedasticity test but fail White's heteroscedasticity test. These tests use different proxies for the true  $z$  variables and hence this may lead to the problem. The tests for heteroscedasticity also have low power and hence the problem will not bias the results.

The market model for Poland also suffers from heteroscedasticity problems and fails both tests. This will not affect the results because OLS is still unbiased and heteroscedasticity only alters the  $t$ -ratios. However the close parallels between Poland and some of the other countries, explored later in the results, suggest that the variables should still be significant.

Slovakia and Slovenia may also have incorrect  $t$ -ratios, because of serial correlation. However the OLS is still unbiased and the  $t$ -ratios will not affect the results of the residual analysis. The graphs for the stock indices of these countries also appear to show a relationship with the market index and hence the market index should still be significant.

The significance of the market index is another issue to address. Estonia, Slovakia and Slovenia have equations where the MSCI market index is not significant. However the pattern of results does not differ with alternative market indices (appendix 3), hence this specification problem does not affect the results.

A related case is the Latvian equation where all the market indices tested were not significant. However this is not due to misspecification, rather it is caused by a genuine lack of responsiveness of the Latvian stock market to any type of information due to low volumes of trading, as will be explored later. The market indices are also not significant for the Lithuanian equation but they are only just above the 10% significance level. This is because the Lithuanian market was still considered undervalued by investors, as explained later, and hence it was less responsive to the market index.

Therefore these tests suggest that the market model used is appropriate and will produce accurate results. However the nature of the study means that the expected value of the

disturbance term is likely to not be zero, hence violating one of the Gauss-Markov conditions. FFJR (1969)<sup>25</sup> sought to remove the disturbance terms that violated this assumption by the imposition of an exclusion criterion. However due to the country rather than company focus of my study I am unable to use an exclusion criterion without losing too many observations.

This violation of the Gauss-Markov conditions is minor, however, as the expected value of the residuals is very close to zero and hence this violation is unlikely to affect the results. This hypothesis is supported by FFJR (1969)<sup>26</sup> who noted that without the exclusion criteria the results were very similar.

Therefore the logarithmic form of the equation is well specified, as in FFJR (1969)<sup>27</sup>, and hence this will be used. The non-logarithmic form of the equation was also tested and the final results were very similar (appendix 4).

	<b>Serial Correlation</b>	<b>ARCH</b>	<b>White</b>	<b>Additional Comments</b>
<b>Three Country Index-Equal</b>	Passed	Passed	Passed	Intercept is not significant.
<b>Three Country Index- Weighted</b>	Passed	Passed	Passed	Intercept is not significant.
<b>Austria</b>	Passed	Passed	Passed	Intercept is not significant.
<b>Finland</b>	Passed	Passed	Passed	Intercept is not significant.
<b>Sweden</b>	Passed	Passed	Passed	Intercept is not significant.

**Figure 8a**

<sup>25</sup> Fama,E.F, Fisher.L, Jensen,M.Cand Roll,R, “The Adjustment of Stock Prices to New Information”, *International Economic Review*. Vol.10, No.1 (Feb. 1969), 5

<sup>26</sup> Fama,E.F, Fisher.L, Jensen,M.Cand Roll,R, “The Adjustment of Stock Prices to New Information”, *International Economic Review*. Vol.10, No.1 (Feb. 1969), 5

<sup>27</sup> Fama,E.F, Fisher.L, Jensen,M.Cand Roll,R, “The Adjustment of Stock Prices to New Information”, *International Economic Review*. Vol.10, No.1 (Feb. 1969), 4

	<b>Serial Correlation</b>	<b>ARCH</b>	<b>White</b>	<b>Additional Comments</b>
<b>Four Country Index-Equal</b>	Passed	Passed	<i>Failed</i>	
<b>Four Country Index- Weighted</b>	Passed	Passed	<i>Failed</i>	
<b>Eight Country Index-Equal</b>	Passed	Passed	<i>Failed</i>	
<b>Eight Country Index-Weighted</b>	Passed	Passed	<i>Failed</i>	
<b>Czech Republic</b>	Passed	Passed	Passed	
<b>Estonia</b>	Passed	Passed	Passed	MSCI index is not significant.
<b>Hungary</b>	Passed	Passed	Passed	
<b>Latvia</b>	Passed	Passed	Passed	All market indices are not significant.
<b>Lithuania</b>	Passed	Passed	Passed	All market indices are not significant. Virtually significant at 10% level for MSCI index.
<b>Poland</b>	Passed	<i>Failed</i>	<i>Failed</i>	
<b>Slovakia</b>	<i>Failed</i>	<i>Failed</i>	Passed	MSCI index is not significant.
<b>Slovenia</b>	<i>Failed</i>	Passed	Passed	MSCI index is not significant.

Figure 8b

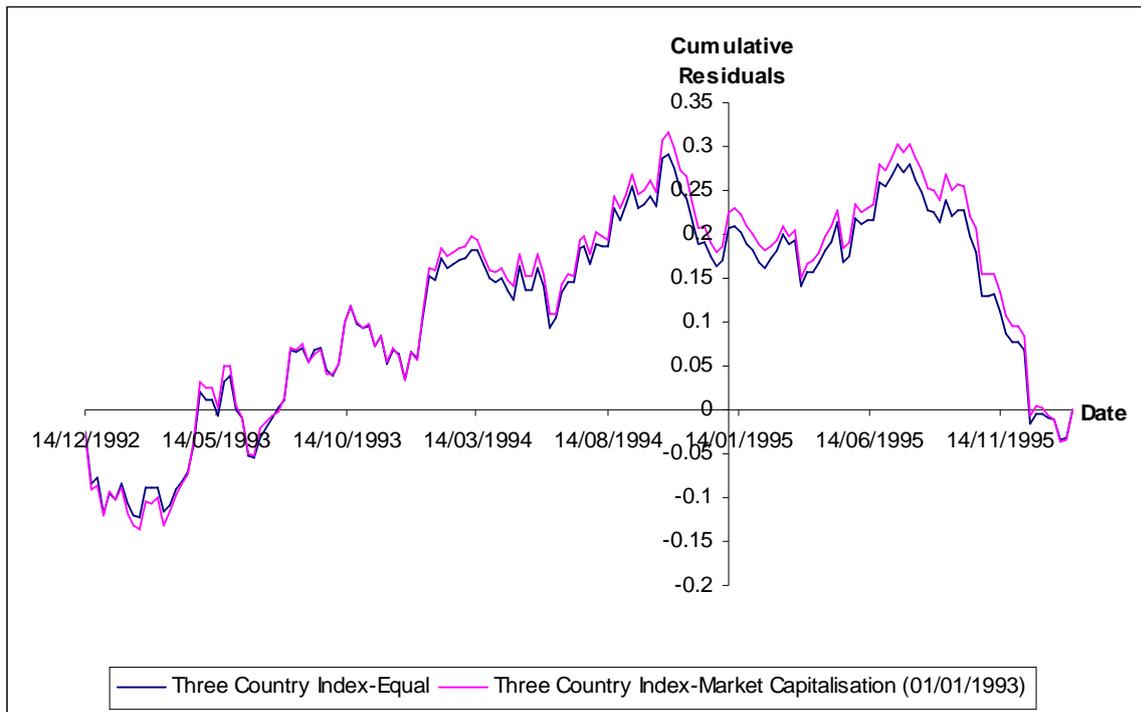
---

## 5. Results

The methodology detailed above has been applied to the 2004 and 1995 EU accessions for both the individual countries and the combined indices.

### *5a. 1995 EU Accession*

The equally weighted and market capitalisation indices (figure 9) display the hypothesised pattern of results.



**Figure 9**

The testing of the three market indices affects only the magnitude of the movements. Hence the results are robust and not influenced by the choice of market index. The graphs shown use the MSCI Europe index (for other market indices see appendix 3).

In the 1995 EU accession (figure 10) Finland appears to be the only country that exhibits the hypothesised 'efficient' effect (figure 11). Hence the negative effect in stage four is a specific shock unrelated to the EU accession.

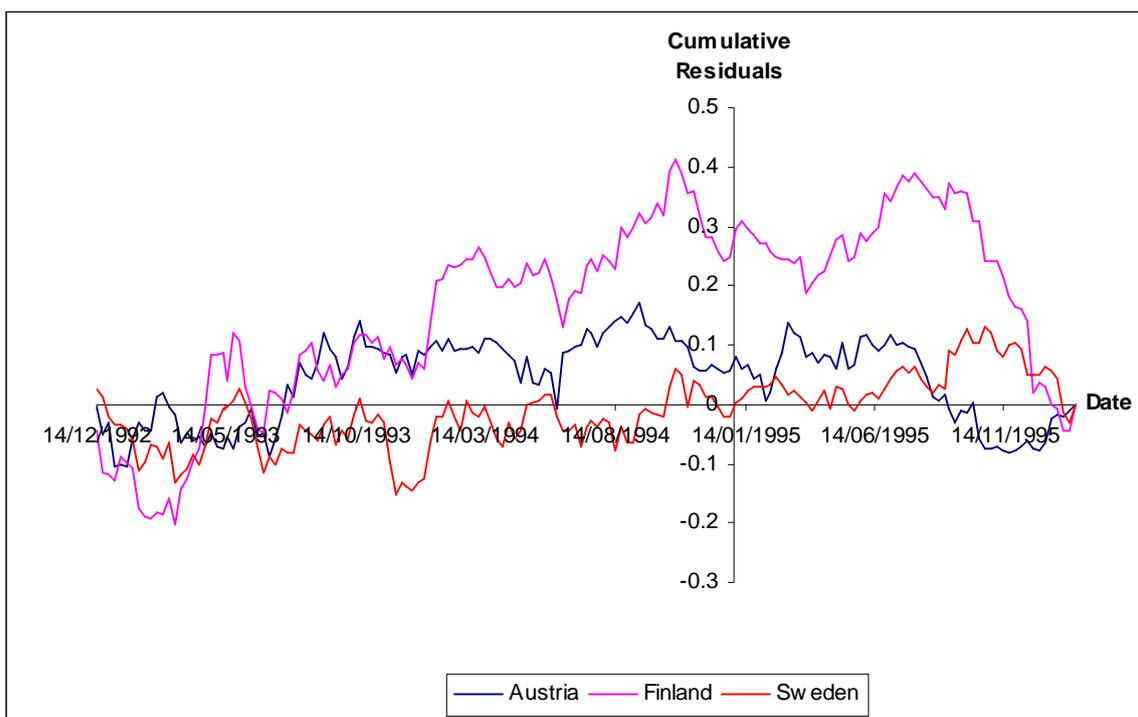


Figure 10

Stage	Effect	Reason
1	Initial rise in cumulative residuals from March 1993.	Information generated from the EU accession is incorporated in the market. This occurs after the start of accession negotiations on 1 <sup>st</sup> February.
2	Decrease in cumulative residuals before the accession.	Cautious investor sentiment due to ongoing wage negotiations in labour markets <sup>28</sup> and investor uncertainty over the result of the Swedish EU referendum on 13 <sup>th</sup> November 1994 <sup>29</sup> .  Subsequently the investor response to the successful referendum result was passive.
3	Cumulative residuals stagnate for six months after the accession.	All the information from the EU accession has been included in the market.
4	Cumulative residuals fall from 2 <sup>nd</sup> October 1995	The negative shock was initiated by the announcement of a poor financial performance in the third quarter by Nokia, which dominates the Finnish stock market, causing its share value to fall 14.5% in the week of this announcement <sup>30</sup> .  The negative impact on cumulative residuals was continued by Nokia's continuing poor performance in this period, including a profit warning on 15 <sup>th</sup> December, and negative investor sentiment towards Nordic forestry companies <sup>31</sup> .

Figure 11

<sup>28</sup> "Finnish shares decline on pay talk uncertainty", *Reuters News*, 29<sup>th</sup> November 1994 (www.factiva.com)

<sup>29</sup> "Finnish shares lower ahead of Swedish referendum", *Reuters News*, 8<sup>th</sup> November 1994 (www.factiva.com)

<sup>30</sup> "World Stock Markets (Europe) - Traders take cover in Italian Political Crisis", *Financial Times*, 21<sup>st</sup> October 1995 (www.factiva.com)

<sup>31</sup> "World Stock Markets – Nordic Forestry at Turning Point" *Financial Times*, 2<sup>nd</sup> November 1995 (www.factiva.com)

Austria's initial market gains from the EU accession were suppressed by the poor reputation of the Vienna stock exchange due to low regulations and the lack of an electronic trading system. Austria also lost favour amongst investors, who viewed it as an Eastern European play, because of the emergence of the Polish and Czech stock exchanges<sup>32</sup>. Subsequently a political crisis caused the fall in cumulative residuals from August 1995.

Sweden's results show that the anticipated rise in cumulative residuals before the accession is stifled by three large country-specific shocks (figure 12). When a dummy is added for the period these shocks effect, the dummy is significant and the cumulative residuals exhibit the hypothesised pre-accession rise (figure 13). Hence the EU accession information was quickly incorporated into the market. After the rise the cumulative residuals are volatile. This reflects a series of country specific effects, such as falling interest rates causing a boost and fears about a strong currency causing slumps, which are unrelated to the EU accession and hence do not affect the hypothesis.

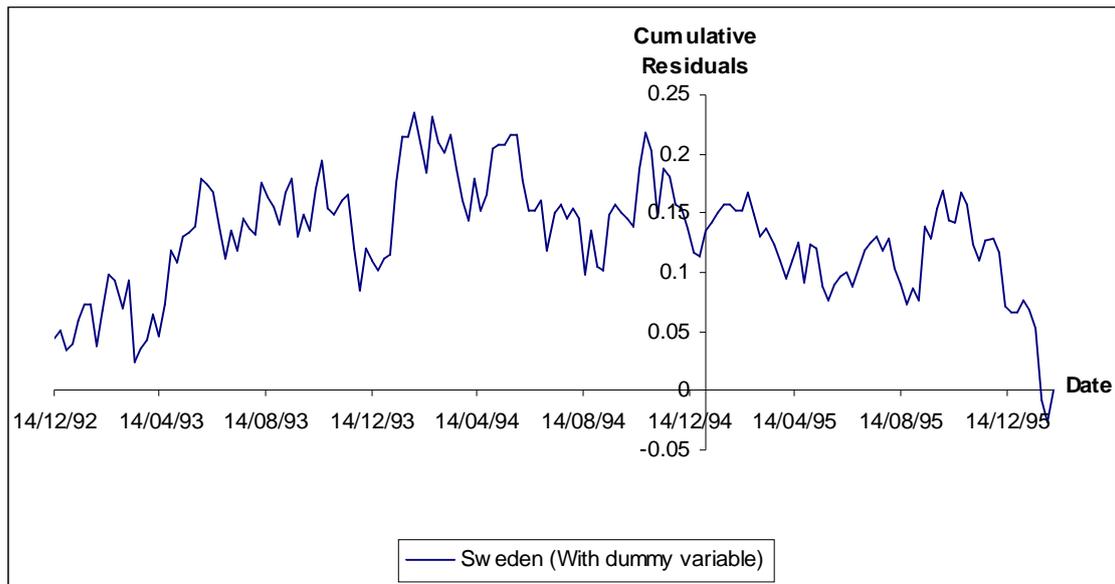
Date	Description of Shock
14/12/1992- 8/02/1993	The shock was stimulated by a disappointing analysts meeting for Astra, the pharmaceutical company <sup>33</sup> . The effect was accentuated by rising money market rates and expectations of disappointing results announcements.
31/05/1993- 28/06/1993	Trelleborg AG's announcement of a \$58.9 million loss up to April <sup>34</sup> stimulated a period of investor boredom and lead many investors to sell and cash-in on their shares.
08/11/1993- 29/11/1993	Ericsson, which has a heavy weighting in the Swedish stock market, announced disappointing nine-month results.

**Figure 12**

<sup>32</sup> "Austria seen as low-risk play on Eastern Europe", *Reuters News*, 3<sup>rd</sup> February 1994 (www.factiva.com)

<sup>33</sup> "Astra pulls Swedish bourse to a lower close", *Reuters News*, 15<sup>th</sup> December 1992 (www.factiva.com)

<sup>34</sup> "European Brief: Trelleborg AG", *The Asian Wall Street Journal*, 1<sup>st</sup> June 1993 (www.factiva.com)

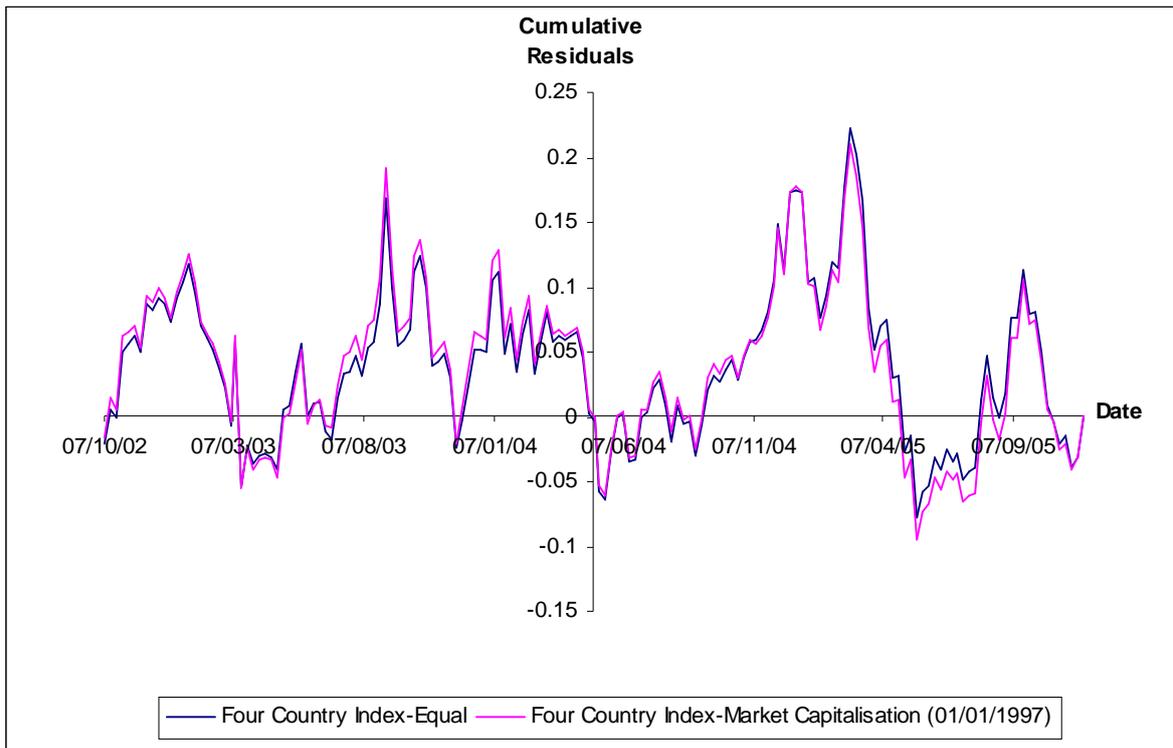


**Figure 13**

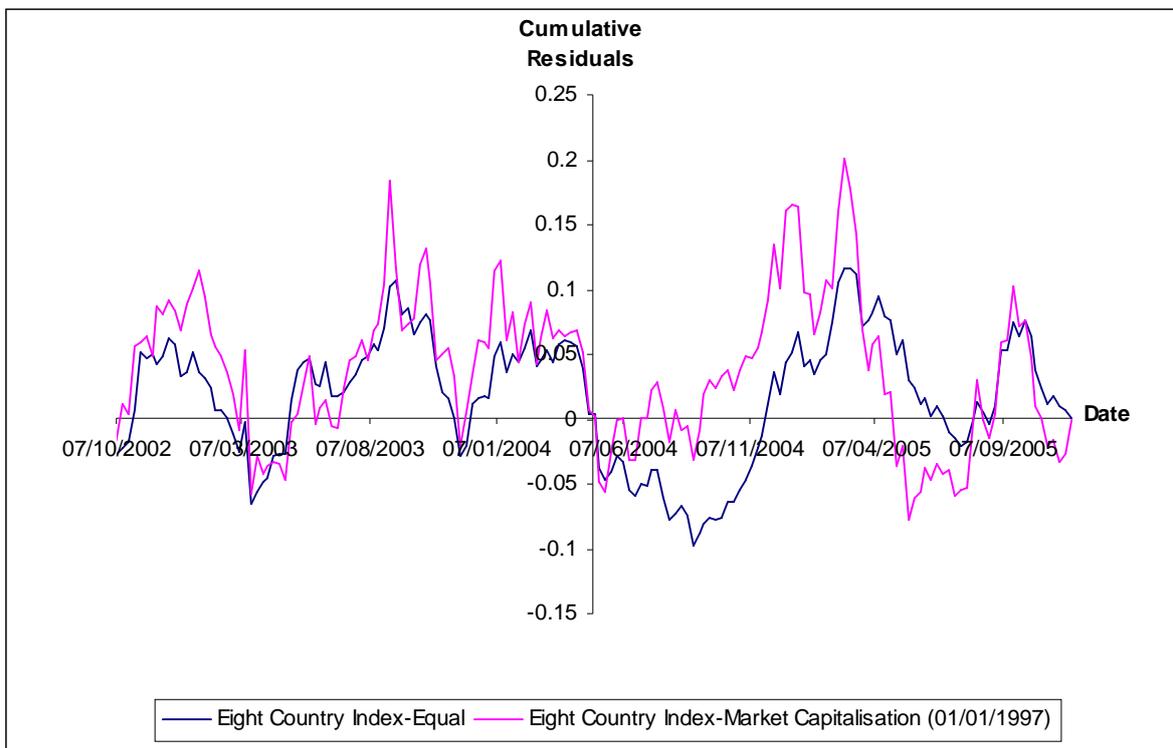
### ***5b.2004 EU Accession***

The 2004 accession generally contradicts the ‘efficient’ pattern of results. The four country and eight country indices both appear to encompass the positive price effect after the EU accession, however the effect varies between countries.

The four country index (figure 14) has a similar pattern of results for the equally and market capitalisation weighted index. This is because, as noted later, these countries have a very similar response to the EU accession. However the eight country index (figure 15) incorporates countries with differing responses to the EU accession. Therefore the market capitalisation index gives a more volatile set of results.



**Figure 14**



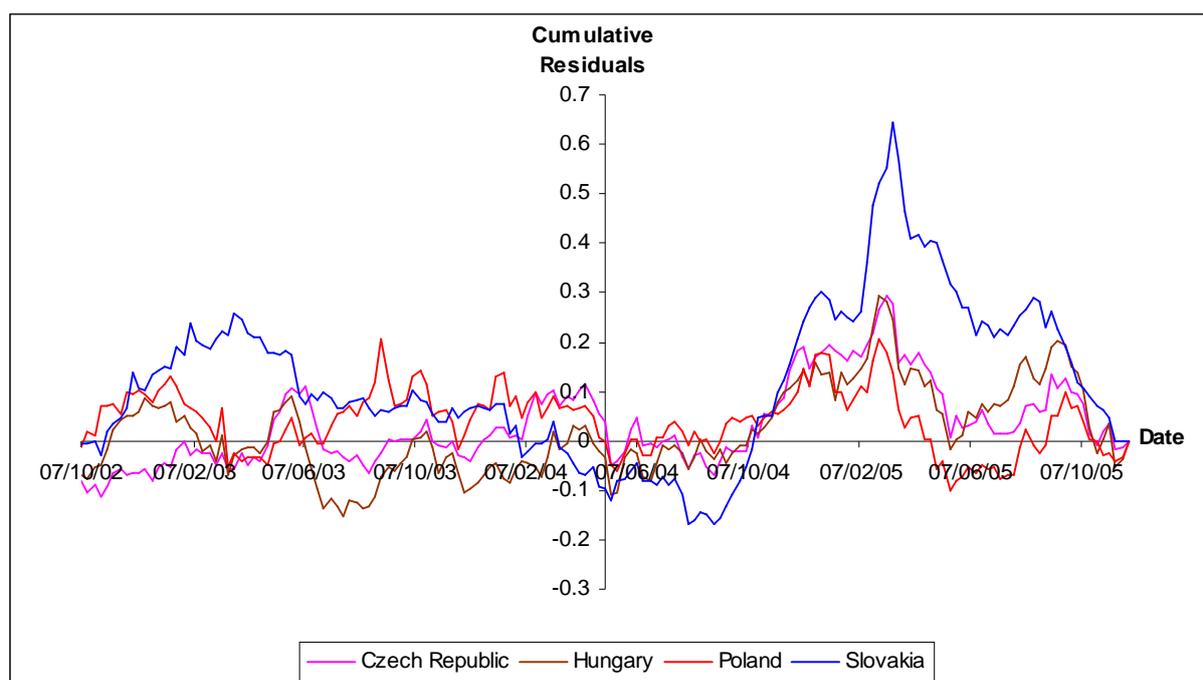
**Figure 15**

All indices again show no major differences in the results for the three market indices used in the 2004 EU accession analysis. Therefore the results are robust to the selection of the market index. The graphs shown use the MSCI Europe index (for other market indices see appendix 3).

The countries have been split into a first group which violated the conditions of the Stability and Growth Pact at the date of accession and a second group that didn't violate these conditions.

**5bi. Czech Republic, Hungary, Poland and Slovakia**

These countries follow a similar path, particularly after the accession, which is driven by market liquidity and contradicts the 'efficient' effects (figure 16, 17).



**Figure 16**

Stage	Effect	Reason
1	No clear pattern of increased cumulative residuals before the accession.  The pattern of these volatile movements differs between the countries.	Investor confidence in these relatively risky markets was suppressed by global market volatility <sup>35</sup> . This is an asymmetric effect that is not incorporated in the market index.  The effects were worst for Hungary and Poland because of fears over Hungary's budget deficit <sup>36</sup> and the poor reputation of regulation enforcement on the Warsaw stock exchange <sup>37</sup> .
2	Decrease in cumulative residuals from just before the accession date until just after.	The volume of trading was low due to uncertainty amongst investors.
3	Cumulative residuals stagnate for six months after the accession.	Investors waited for some reforms of the stock exchanges to increase the market liquidity.
4	Rise in cumulative residuals from August 2004 to March 2005.	The rise was driven by the EU accession information being fully incorporated into the market.  This was stimulated by measures that increased liquidity and attracted new investors, including: <ul style="list-style-type: none"> <li>1) The privatisation of the Warsaw stock exchange</li> <li>2) The November IPO of PKO BP, Poland's largest bank</li> <li>3) The June IPO of Zentiva the Czech pharmaceuticals company</li> </ul>
5	Decline in cumulative residuals from March 2005	The decline is due to the sell-off of US Treasuries on 16 <sup>th</sup> March 2005 which weakened the currencies of Central and Eastern European countries <sup>38</sup> .

**Figure 17**

These results contrast with the finding of an inter-country efficiency differential, explored earlier, by Hanousek and Filer (2000). After the accession the path of cumulative residuals in these countries almost perfectly mirrors each other, hence suggesting that the inter-country differentials in efficiency may not exist. This is caused by the drive for stock market reforms that have tried to standardise these markets and hence reduce the differentials.

#### ***5bii. Estonia, Latvia, Lithuania and Slovenia***

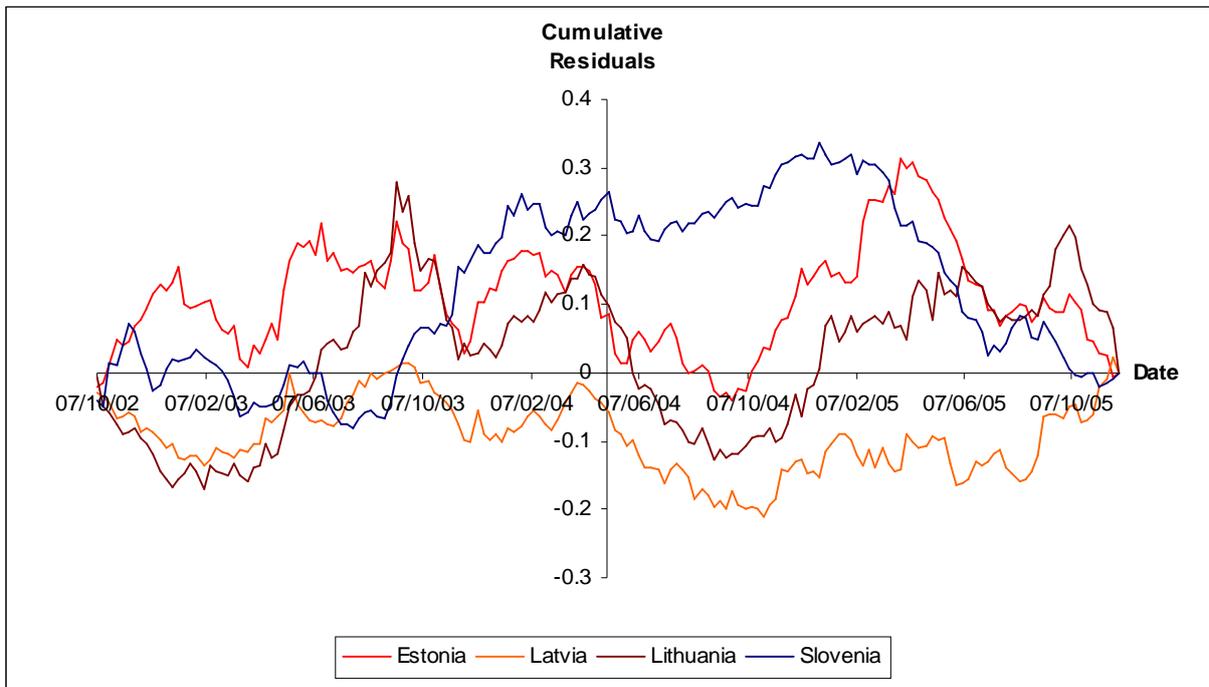
Latvia and Slovenia are situated at either end of the efficiency spectrum while Estonia and Latvia lie in the middle (figure 18).

<sup>35</sup> "Prague bourse bucks trend as E.Europe markets slump", *Reuters News*, 5<sup>th</sup> February 2003 (www.factiva.com)

<sup>36</sup> "Market Insight: Hungarian stocks tough out crisis", *Financial Times*, 26<sup>th</sup> August 2004 (www.factiva.com)

<sup>37</sup> "Poland's troubled bourse regulator seeks more bite", *Reuters News*, 24<sup>th</sup> February 2003 (www.factiva.com)

<sup>38</sup> "US Treasuries sell-off hits C.European currencies", *Reuters News*, 16<sup>th</sup> March 2005 (www.factiva.com)



**Figure 18**

Latvia has a low responsiveness to the EU accession due to a low trading volume with turnover down 26% in 2003 from 2002<sup>39</sup>. This is due to political problems in the country, particularly the delay in the privatisation process and arguments over the implementation of this process.

Slovenia, on the other hand, conforms to the efficient pattern apart from the slump from March 2005, as explained in stage five of figure 17. The price rise from the EU accession information was stimulated by the takeover of the pharmaceutical firm LEK by the Swiss firm Novartis and the subsequent takeover rumours this caused<sup>40</sup>. The effect was subsequently driven by investors' beliefs that many of Slovenia's blue chips would be taken over<sup>41</sup> and a period of sustained privatisation in Slovenia including the privatisation of Zavarovalnica Triglav, the country's largest insurer. These events all occurred on a solid base of investor

<sup>39</sup> "RSE Market turnover fell 26% last year", *Latvian News Agency*, 20<sup>th</sup> January 2004 ([www.factiva.com](http://www.factiva.com))

<sup>40</sup> "Focus - Sunny Ljubljana overshadows Zagreb", *Financial Times*, 7<sup>th</sup> November 2002 ([www.factiva.com](http://www.factiva.com))

<sup>41</sup> "Finance on Euphoria Reigning in Ljubljana Stock Exchange", *STA*, 25<sup>th</sup> September 2003 ([www.factiva.com](http://www.factiva.com))

confidence caused by Slovenia's domestic per capita GDP reaching 70% of the union average in Purchasing Power Parity terms, the most converged of all the accession countries<sup>42</sup>.

Estonia and Lithuania follow a similar pattern to Poland and Hungary. The Estonian results again show no clear trend due to specific country effects (figure 19) and the timing of the incorporation of the EU accession information in the market for both countries is again liquidity driven (figure 20).

The Lithuanian results slightly differ because the EU accession information is partly incorporated in the market from March to September 2003. The catalyst for this effect was investors' appetite for privatizations including the Vodka producer Stumbras and the power distributor Rytu Skirstomieji Tinklai, and the plans to privatize the Lithuanian stock exchange. However a lack of liquidity in the market and disappointing third quarter results, including a 32% drop in profit for Stumbras<sup>43</sup>, resulted in a sharp decline in cumulative residuals from September to November 2003. The Lithuanian results also appear to be insulated from the U.S. Treasuries sell-off from March 2005 because of investors' beliefs that the stocks were still under priced<sup>44</sup>.

Date	Description of Shock
06/01/2003-24/03/2003	There was a long period of investor uncertainty, due to economic and political uncertainty, which resulted in low volumes of trading <sup>45</sup> .
20/10/2003-24/11/2003	The market was affected by the Russian market where shares in Yukos and the whole market plummeted after the Yukos CEO was arrested.

**Figure 19**

<sup>42</sup> "Slovenia-Market Strategy-EMU On The Horizon", *Emerging Markets Daily News*, 11<sup>th</sup> June 2003 (www.factiva.com)

<sup>43</sup> "Stumbras distillery reports 32 pct drop in profit", *BNS Baltic Business News*, 2<sup>nd</sup> November 2003 (www.factiva.com)

<sup>44</sup> "Lithuania: Stock market well undervalued – analysts", *Baltic Business Weekly*, 31<sup>st</sup> January 2005 (www.factiva.com)

<sup>45</sup> "Markets still dragging along", *The Baltic Times*, 6<sup>th</sup> February 2003 (www.factiva.com)

Country	Effect
<b>Estonia</b>	1) Two Swedish companies entered onto the exchange 2) There was strong investor sentiment on Estonia's blue-chip stocks including Hansabank and Eesti Telekom.
<b>Lithuania</b>	1) Stocks were viewed as under priced by analysts <sup>46</sup> 2) Market reforms were introduced to improve liquidity after OMHEX acquired 54.47% in the National Stock Exchange of Lithuania in May.

Figure 20

### ***5c. Does a general investor confidence effect on Central and Eastern European stock markets exist?***

The results suggest that the 'extraordinary effect'<sup>47</sup> of the EU accession occurs under certain conditions:

- 1) Sufficient market liquidity
- 2) Sufficient volumes of trading
- 3) No shocks to investors' confidence

Therefore the EU accession may have caused a general positive impact on Central and Eastern European stock markets. In order to investigate this, the residual analysis was conducted on the next EU accession candidates, Romania and Bulgaria, who are scheduled to join in 2007 (figure 21).

Romania's results offer a very close parallel to Slovenia. The positive effect on residuals before the accession was stimulated by increased confidence in Romania's government, the introduction of legislation to increase the regulation in capital markets and a privatization drive in 2003 including the oil and gas company SNP Petrom.

<sup>46</sup> "Market Insight: Small Baltic tigers leap into action", *Financial Times*, 19<sup>th</sup> October 2004 (www.factiva.com)

<sup>47</sup> Fama,E.F, Fisher.L, Jensen,M.Cand Roll,R, "The Adjustment of Stock Prices to New Information", *International Economic Review*. Vol.10, No.1 (Feb. 1969), 3

Bulgaria, on the other hand, offers a parallel to Poland or Hungary. The initial lack of any positive pattern is caused principally by a lack of investor confidence in the Bulgarian government. The subsequent positive price effect from the EU accession is again stimulated by moves to increase the markets liquidity through IPO's and privatizations such as the IPO of Bulgarian Telecommunications Company in January 2005.

These results support the proposition but the effect may be due to investors anticipating the EU accession in 2007. However the close parallels with the 2004 accession countries contradicts this argument.

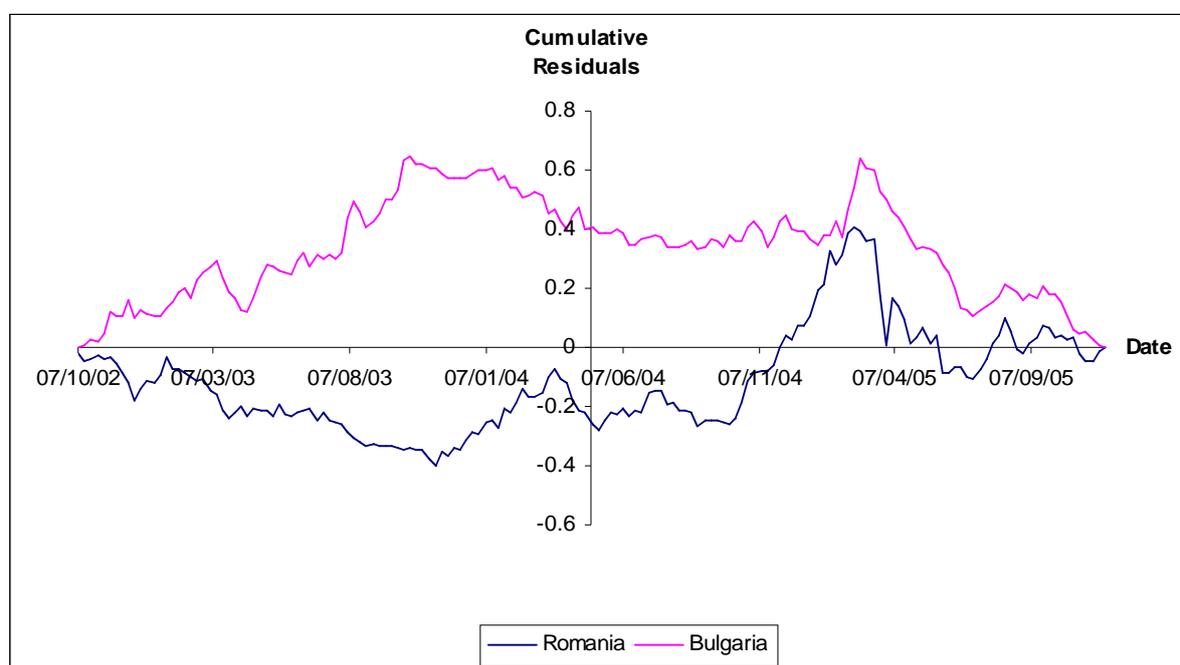


Figure 21

## 6. Conclusion

The results show a clear differentiation between the 1995 and the 2004 accession countries, though not all the countries conform to this. Therefore the main driver behind the efficient incorporation of information appears to be market liquidity and factors affecting the volumes of trading, such as the quality of stock market regulation, rather than simply the level of economic development in each country.

### ***6a. 1995 EU Accession***

The 1995 accession countries were predicted to have semi-strong form efficient capital markets due to their relatively developed economies increasing investor confidence. However the results suggest that only Finland fully supported this prediction and Sweden supports the prediction when a shock dummy is added.

The results for Austria suggest that further gains may have been possible if the reputation problem was cured through measures including electronic trading. Hence it could be concluded that the stock market is inefficient, however an analysis of a longer time period shows no evidence of further gains.

Therefore investors are seen to be acting efficiently if they anticipate the low regulations and decided to trade less on the EU accession information because of this extra information about the stock markets reputation.

### ***6b. 2004 EU Accession***

The 2004 accession countries showed a mixed pattern of results. The key determinants of the results were the level of market liquidity and the prevalence of events that could boost trading volumes such as takeovers and privatisations.

The Czech Republic, Estonia, Hungary, Poland and Slovakia exhibited an initial lack of liquidity. Subsequently the information from the EU accession was incorporated after the accession when the initiatives to develop the domestic markets allowed investors to undertake their investment plans with less liquidity restrictions. The implication of this is that the lack of liquidity may cause inefficiency in the stock markets of these countries.

Lithuania also experiences this liquidity effect after the EU accession; however it also experiences a similar IPO and privatisation fuelled rise in cumulative residuals before the EU accession. The subsequent slump, in part due to a lack of liquidity, shows that IPO's and privatisation are not necessary and sufficient for success and that market reforms are also needed to insure market liquidity and hence efficiency.

The impact of liquidity and the volume of trading are further demonstrated by the contrasting fortunes of Latvia and Slovenia. Latvia exhibited no apparent response to the EU accession due to a low volume of trading. Therefore this is resounding evidence that the Latvian market is inefficient. In contrast Slovenia is the main efficiency ‘success story’ in the EU accession countries. This success is based on investor confidence, built on Slovenia’s economic performance and potential takeover rumours, causing a large volume of trade and a high level of market liquidity caused by privatisations.

### ***6c. Evaluation of Methodology***

The main weakness of the methodology is the effectiveness of the market index. My results are robust for the selection of market indices. However these fail to factor out individual country effects, which were not a problem in the stock-split study because of the company-focus and shorter time period. These effects are unrelated to the EU accession and hence distort the results. However these shocks may be connected if they stimulate investor uncertainty, as in stage one in figure 17. Therefore the context of the situation must be considered.

Initially, if more time was available, I would undertake more research on specific country effects. I would judge the context of these and add dummies for cases where there was a direct effect that was stifling the impact of the EU accession information in the results. This would improve the results but it runs the risk of becoming arbitrary and potentially biased.

A more comprehensive approach could be used to identify company-specific shocks, with more time and data, by applying the same methodology at a company level for the indices studied. A positive by-product of this company-specific approach is that the analysis would now allow an exclusion criterion to be introduced to improve the specification of the model, as discussed earlier.

The impact of asymmetric effects, as mentioned in figure 17, may also not be fully incorporated in the market index. Therefore further research needs to be conducted on shocks

and a measure for the degree of vulnerability of given countries to economic shocks could be included. However it must be noted that the asymmetric effects occur due to investor uncertainty about the prospects of these relatively risky markets. Hence this confidence effect may affect the timing of the information inclusion in the market and therefore should still be considered.

#### ***6d. Potential Extensions to the Analysis***

There are three obvious extensions to this study. The first extension would extend my basic analysis to provide more insights into the effects of liquidity and volumes of trading on efficiency. The simplest way to achieve this would be to obtain comprehensive data for trading volumes and market liquidity and plot these against the residual plots. The key issue is that it is difficult to find a direct measure of liquidity so the accuracy of any proxy will affect the results.

The second is an event study of the potential second bull-run when the 2004 accession countries enter the Euro, using the same methodology with the modifications suggested above. Comparisons could be drawn with other EU countries that have entered the Euro, including Spain, Italy and Portugal whose stock markets rose by up to 300% in the three years leading to the introduction of the Euro. These results may then offer some insights into whether Euro entrance had been incorporated into markets as part of the EU accession. The main flaw is that the study will also encounter the problem of assessing the start of the effect because the Euro effect may be closely entwined with the EU accession effect.

The third potential extension is to conduct the analysis on potential EU candidate countries. The study could initially focus on Bulgaria and Romania as they near EU entry in 2007, utilising the modified methodology. The study could then look at the price effects on stock markets in countries that are being proposed as potential candidates. The same process could be utilised, however the focus will be whether investors are 'betting' on the next

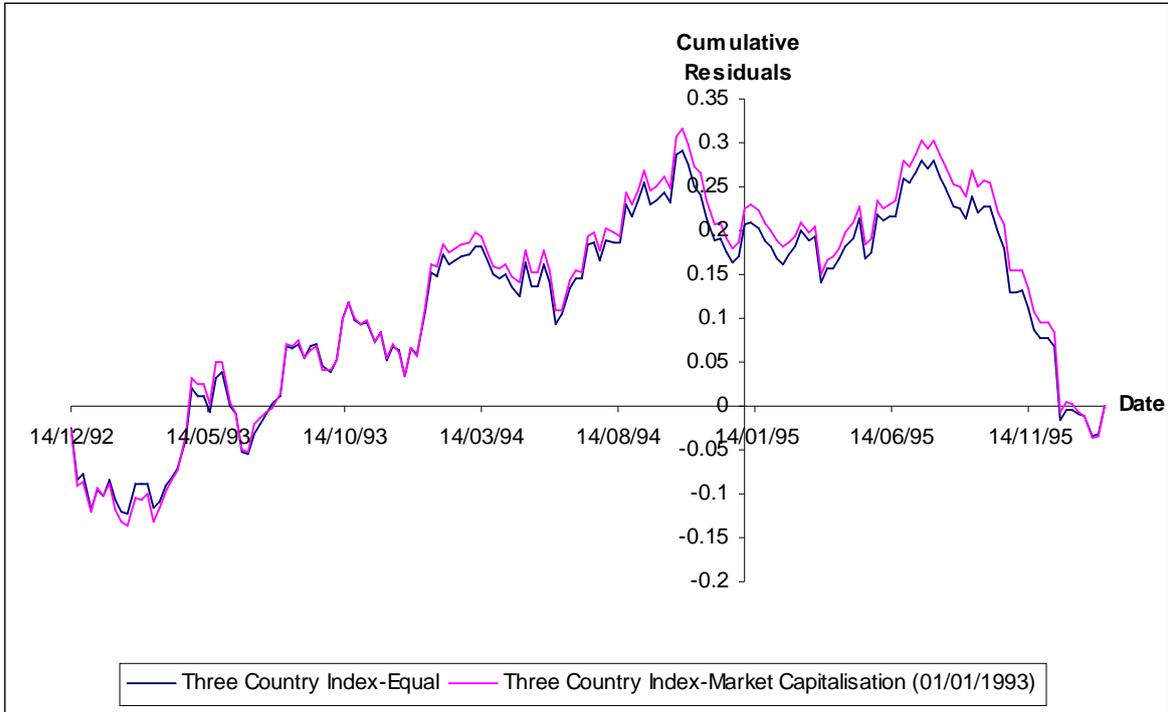
candidates for EU accession and how this is affected by the information being fed into the market.

*Word Count: 5,272(excluding tables, figures and appendices)*

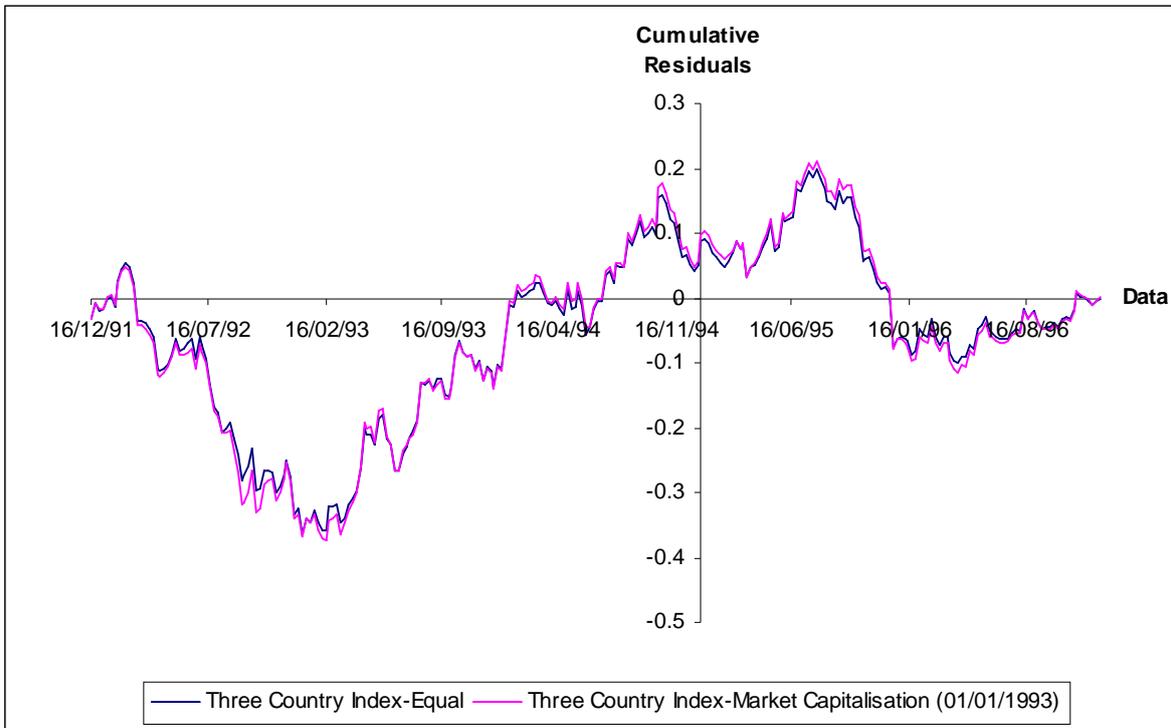
**Appendix 1- Results with different time periods**

*a. 1995 Accession (with MSCI market index)*

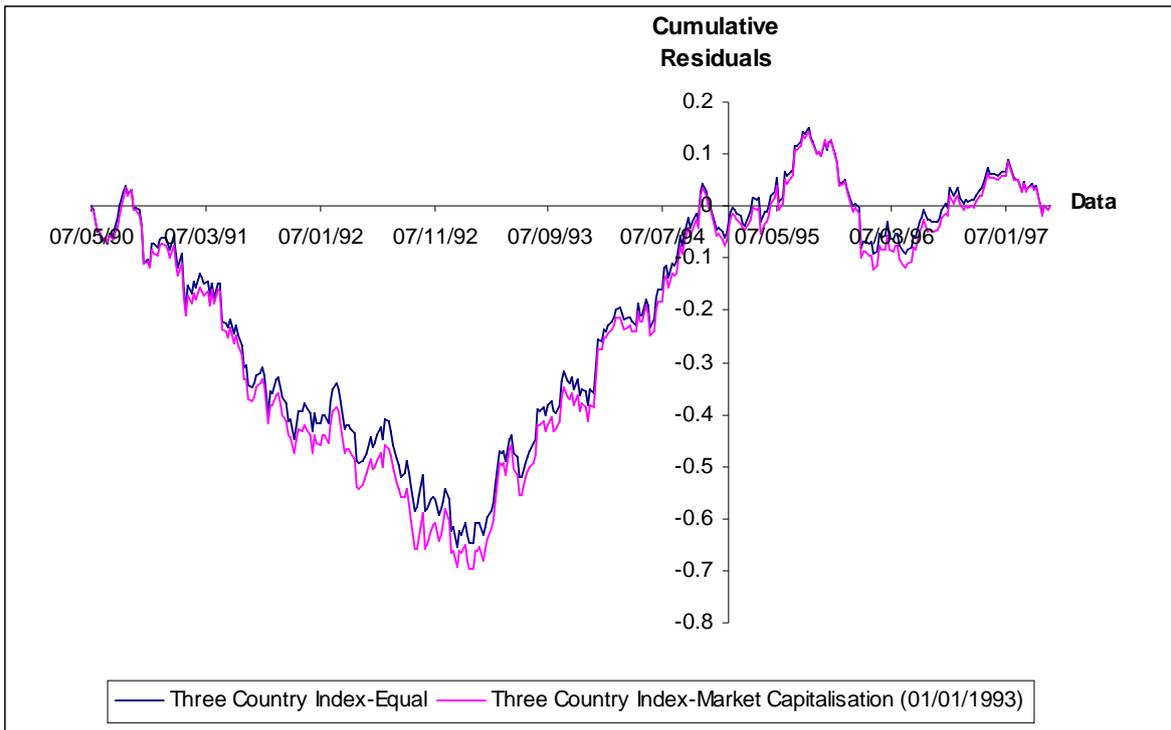
**i) 14/12/1992 – 05/02/1996 (Original Time Period)**



**ii) 16/12/1991 – 30/12/1996**

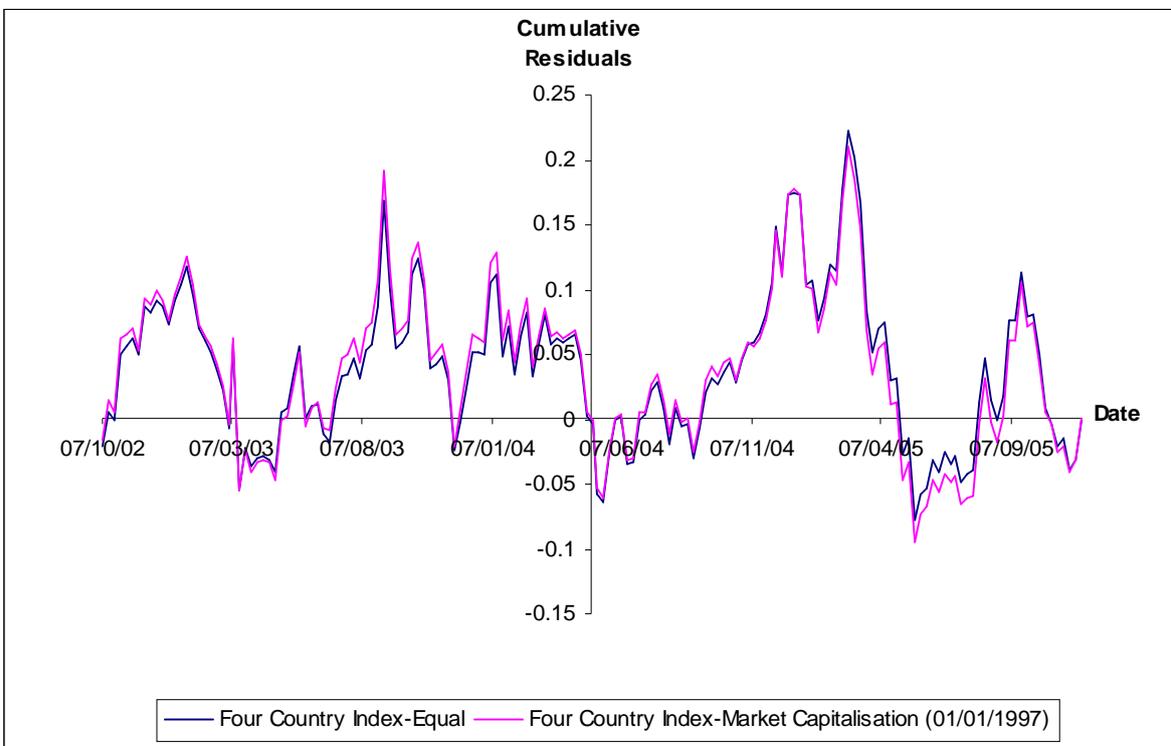


**iii) 07/05/1990 – 05/05/1997**

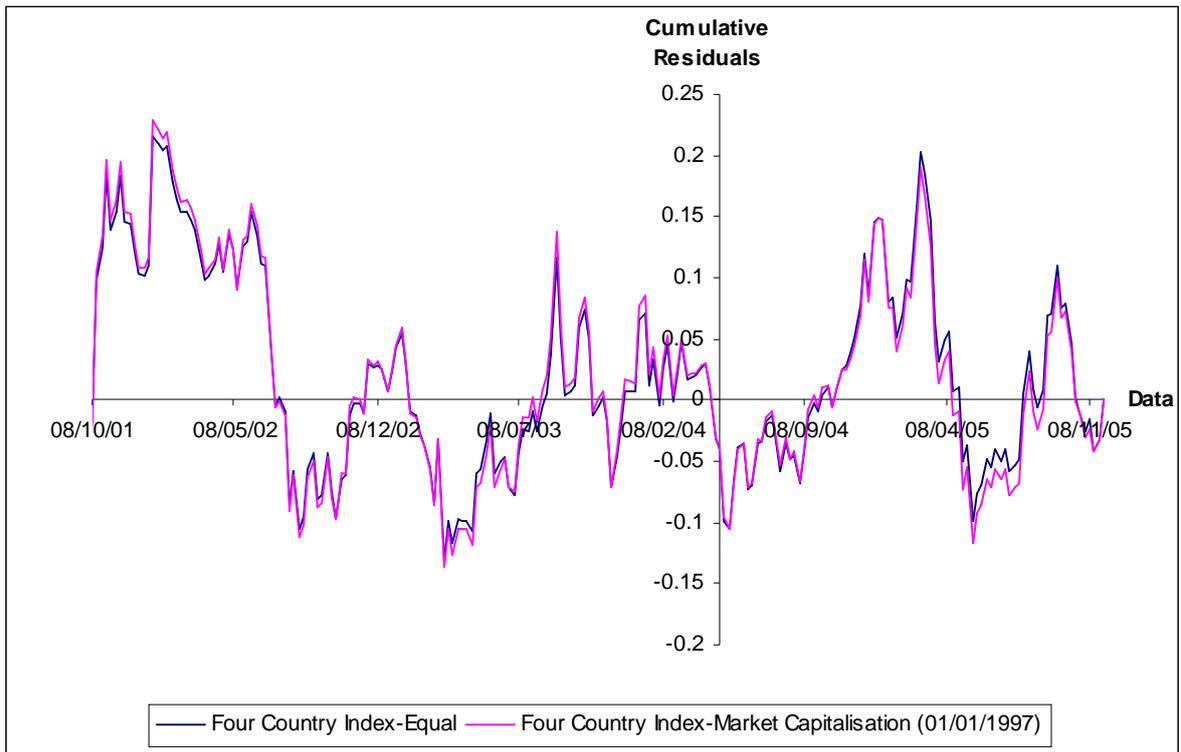


**b. 2004 Accession- Four Country Index (with MSCI market index)**

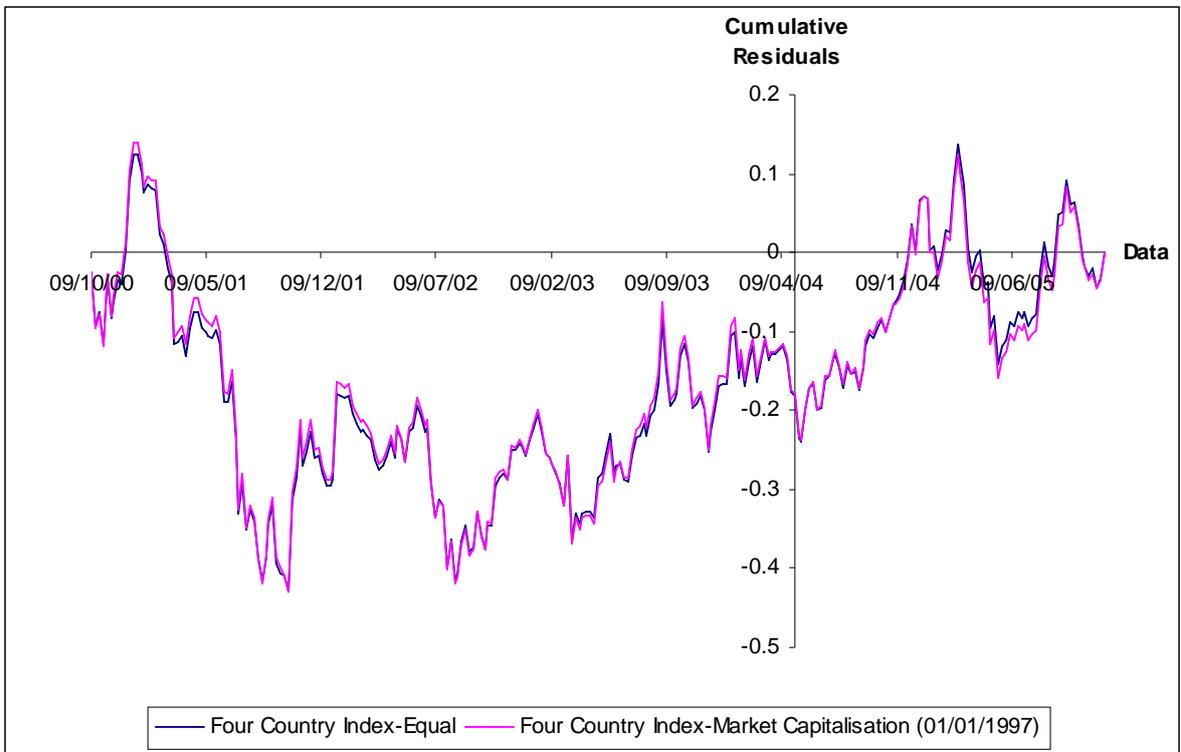
**i) 07/10/2002 – 28/11/2005 (Original Time Period)**



**ii) 08/10/2001 – 28/11/2005**

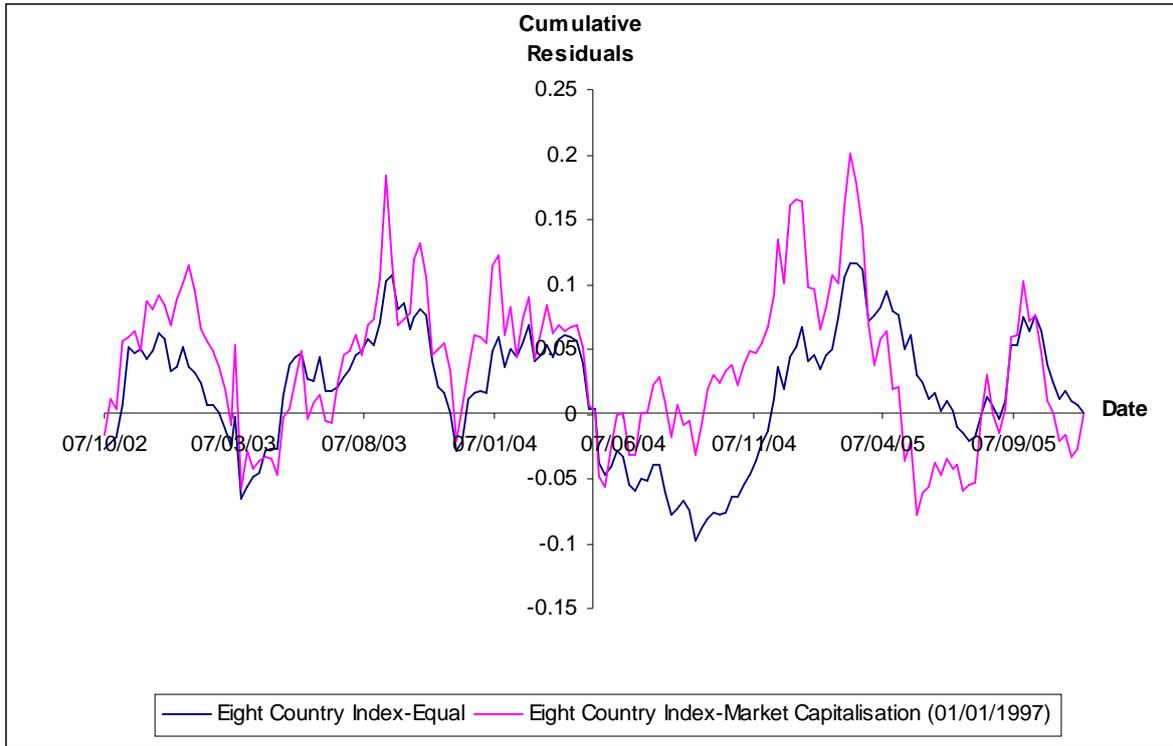


**iii) 09/10/2000 – 28/11/2005**

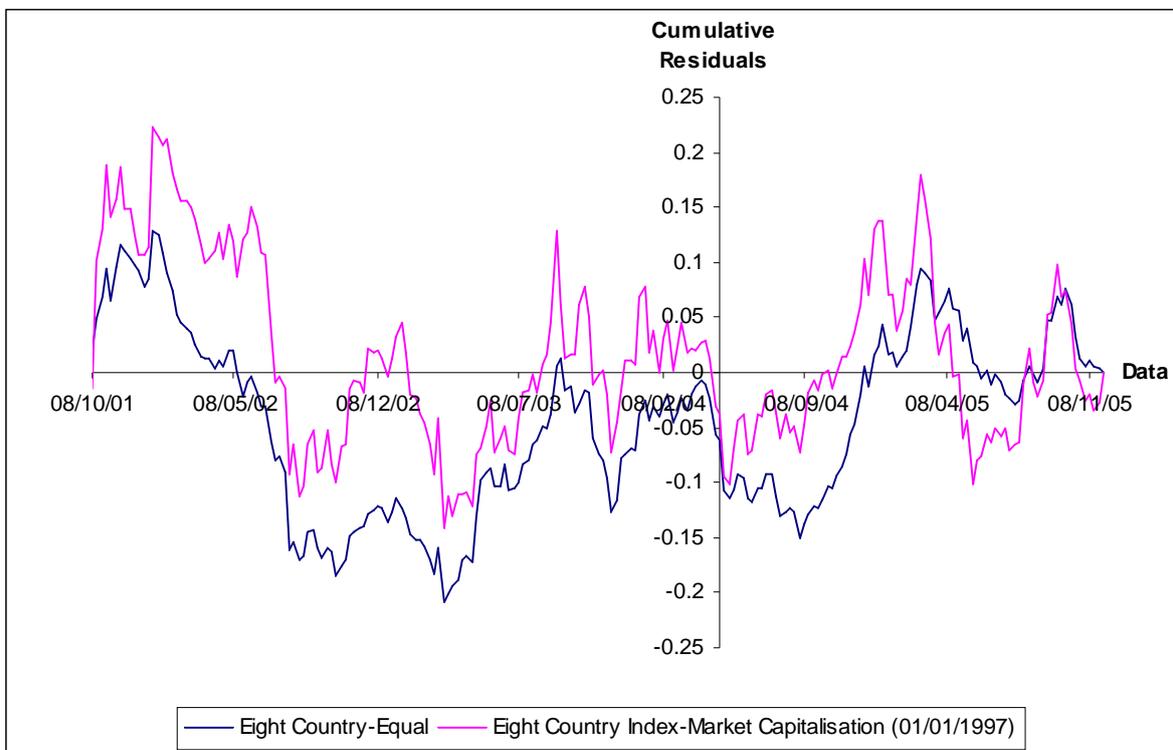


*c. 2004 Accession- Eight Country Index (with MSCI market index)*

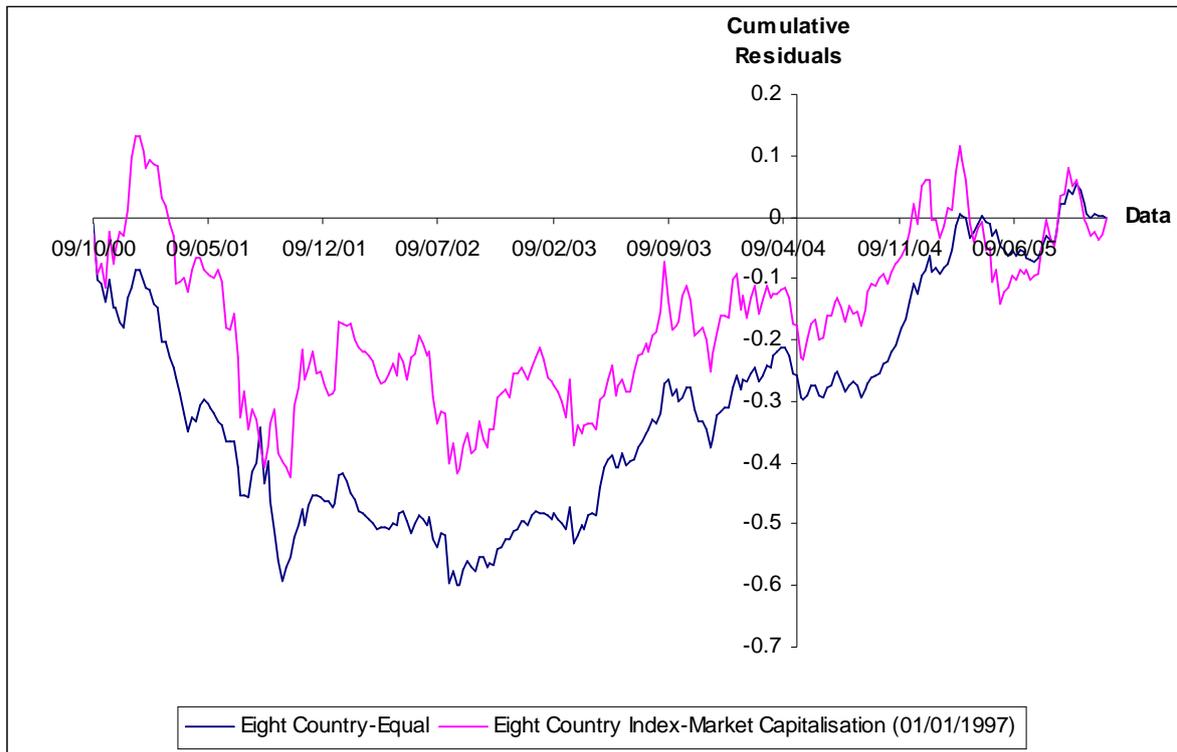
**i) 07/10/2002 – 28/11/2005 (Original Time Period)**



**ii) 08/10/2001 – 28/11/2005**



iii) 09/10/2000 – 28/11/2005



## Appendix 2- More regression results

### *a. MSCI Index*

	<b>Intercept Value</b>	<b>Market Index Coefficient</b>	<b>P-Value for Intercept</b>	<b>P-Value for Market Index Coefficient</b>	<b>R<sup>2</sup></b>
<b>Austria</b>	0.001428	0.479474	0.4814	0.0007	0.068638
<b>Finland</b>	0.003551	0.622359	0.1658	0.0005	0.072496
<b>Sweden</b>	0.002105	0.849180	0.2908	0.0000	0.193589
<b>Three Country Index-Equal</b>	0.002575	0.591952	0.1563	0.0000	0.123381
<b>Three Country Index-Weighted</b>	0.002760	0.600881	0.1510	0.0000	0.114733
<b>Czech Republic</b>	0.007559	0.281781	0.0008	0.0032	0.052227
<b>Estonia</b>	0.009214	0.020385	0.0000	0.8005	0.000393
<b>Hungary</b>	0.006571	0.392161	0.0101	0.0003	0.076504
<b>Latvia</b>	0.006985	0.044066	0.0000	0.4547	0.003433
<b>Lithuania</b>	0.009673	0.139098	0.0000	0.1007	0.016440
<b>Poland</b>	0.005056	0.572914	0.0482	0.0000	0.148575
<b>Slovakia</b>	0.010108	-0.110253	0.0001	0.2906	0.006849
<b>Slovenia</b>	0.003074	-0.097050	0.0359	0.1162	0.015070
<b>Four Country Index-Equal</b>	0.005401	0.532646	0.0235	0.0000	0.148466
<b>Four Country Index-Weighted</b>	0.005179	0.559064	0.0377	0.0000	0.149322
<b>Eight Country Index-Equal</b>	0.007277	0.230907	0.0000	0.0000	0.098370
<b>Eight Country Index-Weighted</b>	0.005388	0.524962	0.0213	0.0000	0.149795

*b. S&P Euro Index*

	<b>Intercept Value</b>	<b>Market Index Coefficient</b>	<b>P-Value for Intercept</b>	<b>P-Value for Market Index Coefficient</b>	<b>R<sup>2</sup></b>
<b>Austria</b>	0.000613	0.752221	0.7324	0.0000	0.267136
<b>Finland</b>	0.003360	0.638159	0.1767	0.0000	0.120532
<b>Sweden</b>	0.002194	0.734664	0.2589	0.0000	0.229123
<b>Three Country Index-Equal</b>	0.002174	0.692889	0.1891	0.0000	0.267309
<b>Three Country Index-Weighted</b>	0.002405	0.682780	0.1771	0.0000	0.234252
<b>Czech Republic</b>	0.006356	0.493999	0.0025	0.0000	0.187793
<b>Estonia</b>	0.008198	0.266251	0.0000	0.0003	0.078443
<b>Hungary</b>	0.005581	0.517874	0.0227	0.0000	0.156082
<b>Latvia</b>	0.006942	0.041066	0.0000	0.4511	0.003488
<b>Lithuania</b>	0.009563	0.123866	0.0000	0.1140	0.015251
<b>Poland</b>	0.003754	0.720518	0.1131	0.0000	0.274921
<b>Slovakia</b>	0.009031	0.190523	0.0003	0.0473	0.023929
<b>Slovenia</b>	0.002296	0.125641	0.1153	0.0273	0.029549
<b>Four Country Index-Equal</b>	0.004133	0.684174	0.0591	0.0000	0.286573
<b>Four Country Index-Weighted</b>	0.003889	0.707938	0.0908	0.0000	0.280120
<b>Eight Country Index-Equal</b>	0.006506	0.351532	0.0000	0.0000	0.266729
<b>Eight Country Index-Weighted</b>	0.004159	0.669104	0.0533	0.0000	0.284695

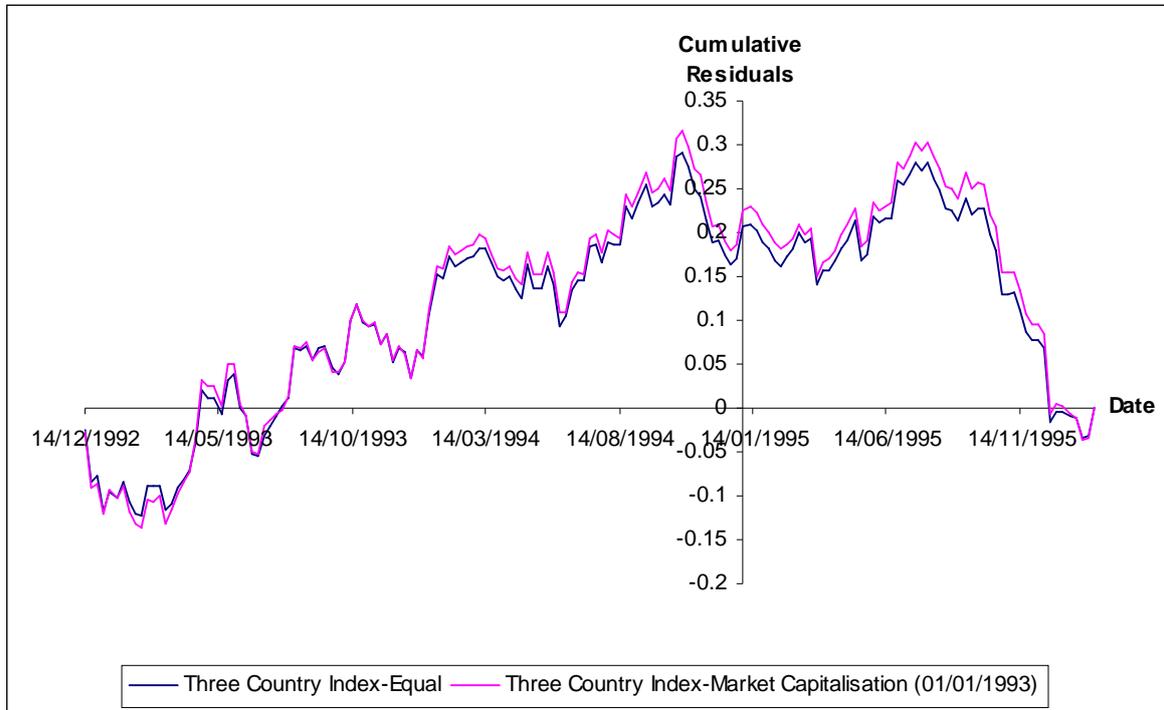
*c. S&P Europe 350 Index*

	<b>Intercept Value</b>	<b>Market Index Coefficient</b>	<b>P-Value for Intercept</b>	<b>P-Value for Market Index Coefficient</b>	<b>R<sup>2</sup></b>
<b>Austria</b>	0.000845	0.730929	0.6532	0.0000	0.195659
<b>Finland</b>	0.003110	0.812237	0.2031	0.0000	0.151466
<b>Sweden</b>	0.001919	0.929210	0.3053	0.0000	0.284332
<b>Three Country Index-Equal</b>	0.002144	0.777964	0.1972	0.0000	0.261404
<b>Three Country Index-Weighted</b>	0.002334	0.784416	0.1887	0.0000	0.239840
<b>Czech Republic</b>	0.006236	0.586910	0.0028	0.0000	0.202835
<b>Estonia</b>	0.008252	0.283352	0.0000	0.0007	0.067983
<b>Hungary</b>	0.005453	0.615884	0.0249	0.0000	0.168918
<b>Latvia</b>	0.006939	0.047000	0.0000	0.4506	0.003496
<b>Lithuania</b>	0.009534	0.146883	0.0000	0.1011	0.016411
<b>Poland</b>	0.003719	0.817430	0.1178	0.0000	0.270766
<b>Slovakia</b>	0.008920	0.244569	0.0004	0.0257	0.030171
<b>Slovenia</b>	0.002267	0.148859	0.1197	0.0221	0.031740
<b>Four Country Index-Equal</b>	0.004085	0.780264	0.0624	0.0000	0.285206
<b>Four Country Index-Weighted</b>	0.003849	0.804652	0.0951	0.0000	0.276913
<b>Eight Country Index-Equal</b>	0.006501	0.395399	0.0000	0.0000	0.258216
<b>Eight Country Index-Weighted</b>	0.004123	0.759942	0.0561	0.0000	0.281014

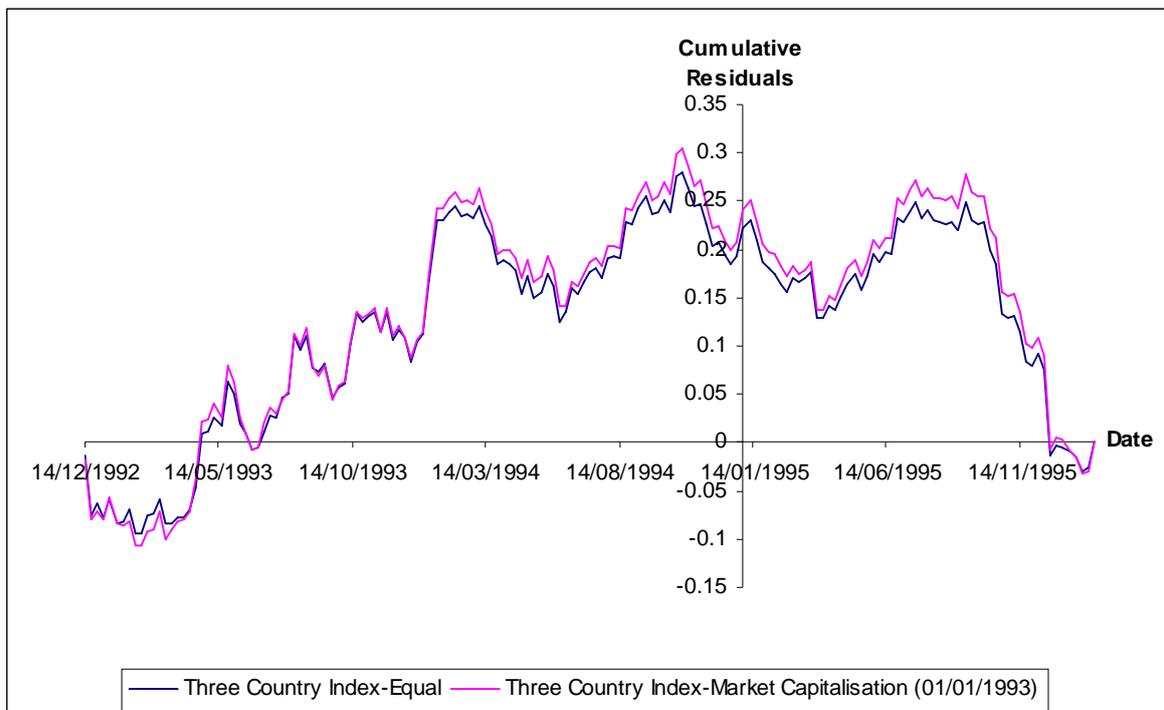
### Appendix 3- Results with the Three Market Indices

#### a. 1995 Accession

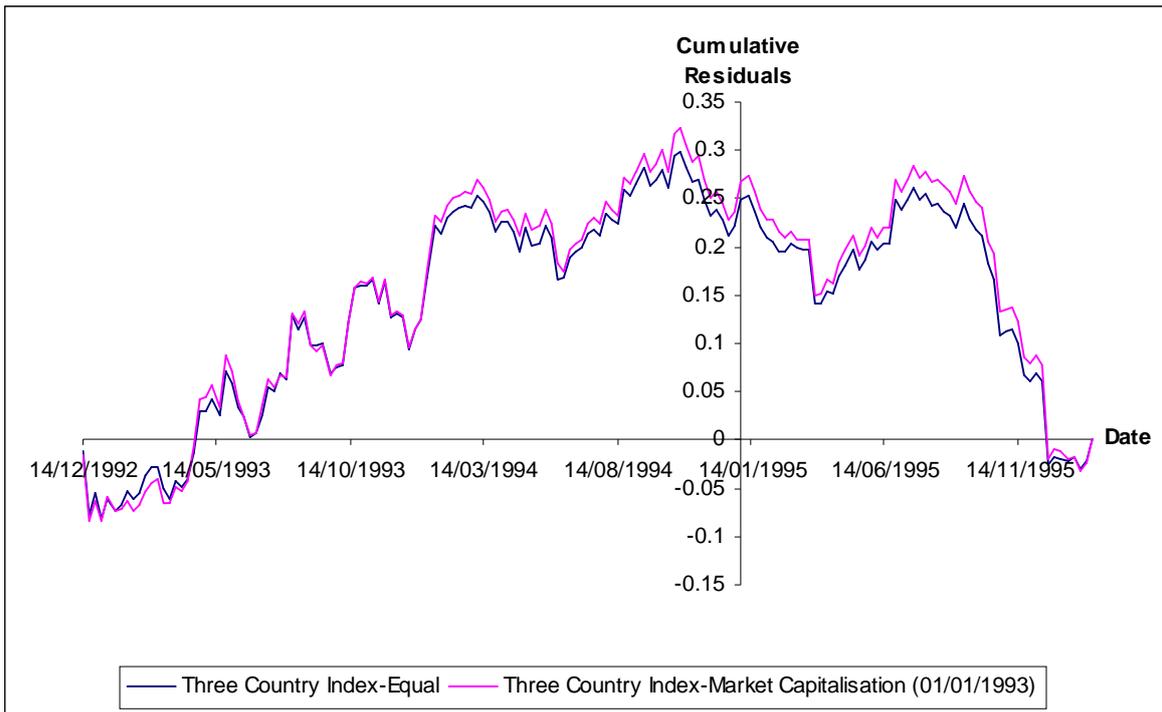
##### i) MSCI Index



##### ii) S&P Euro Index

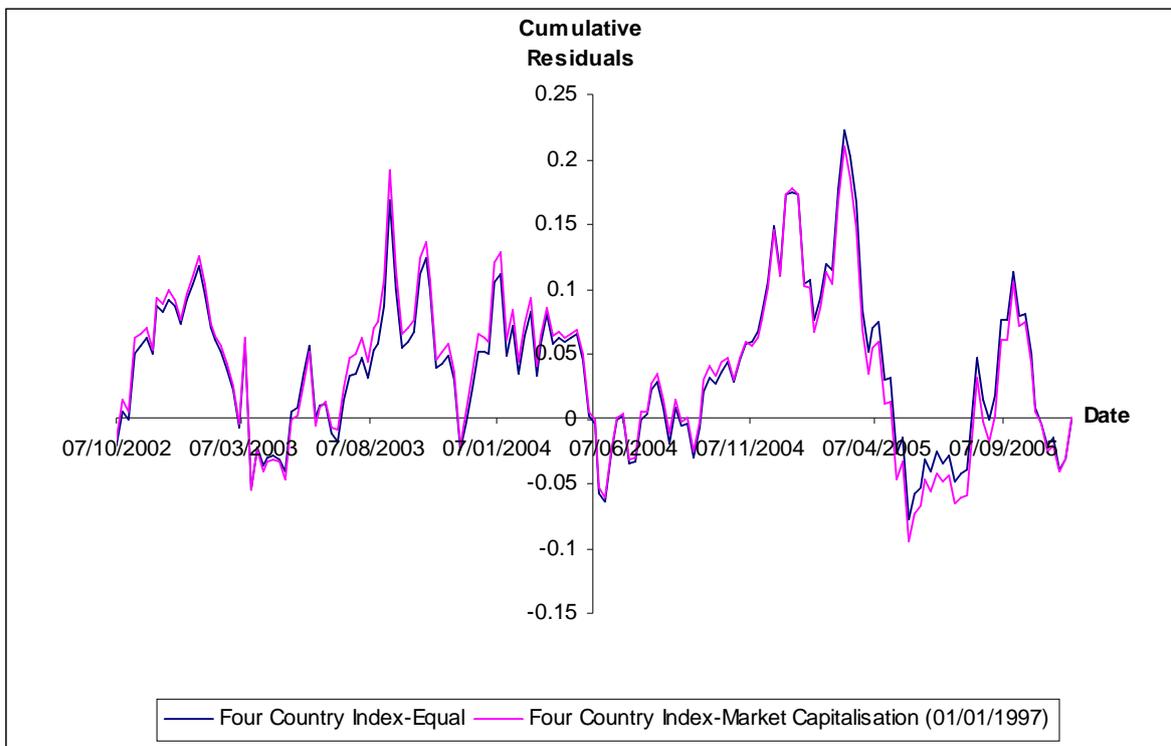


**iii) S&P Europe 350 Index**

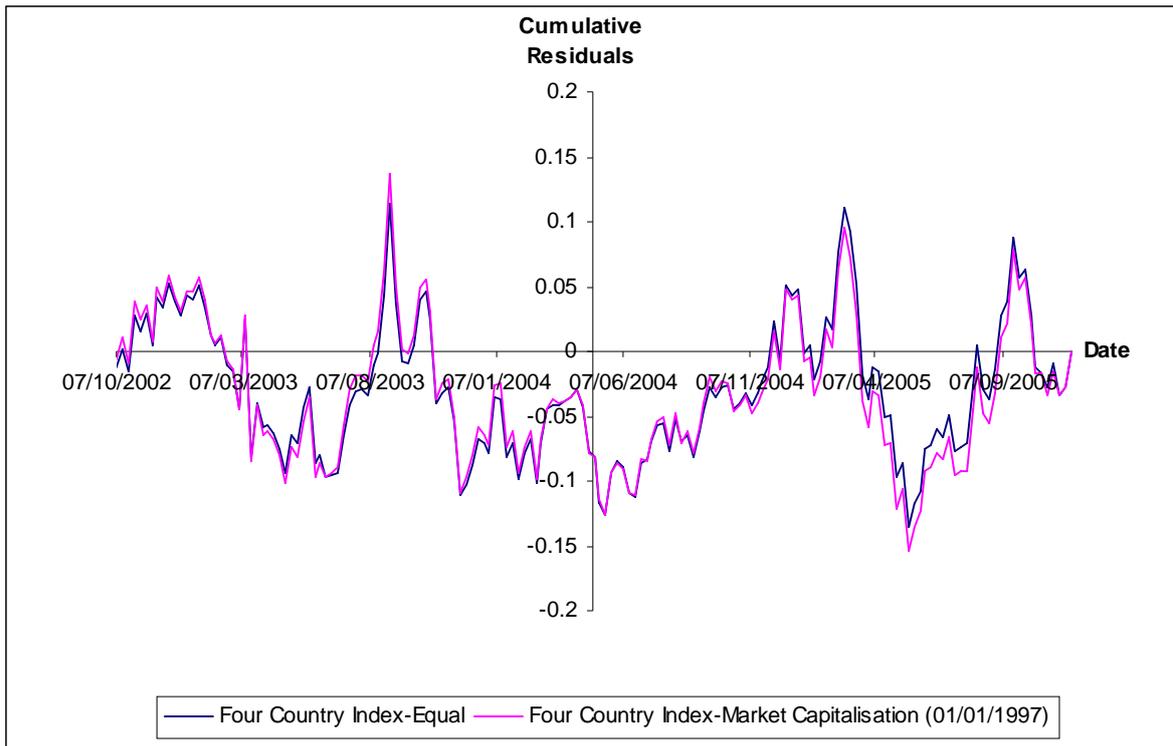


**b. 2004 Accession- Four Country Index**

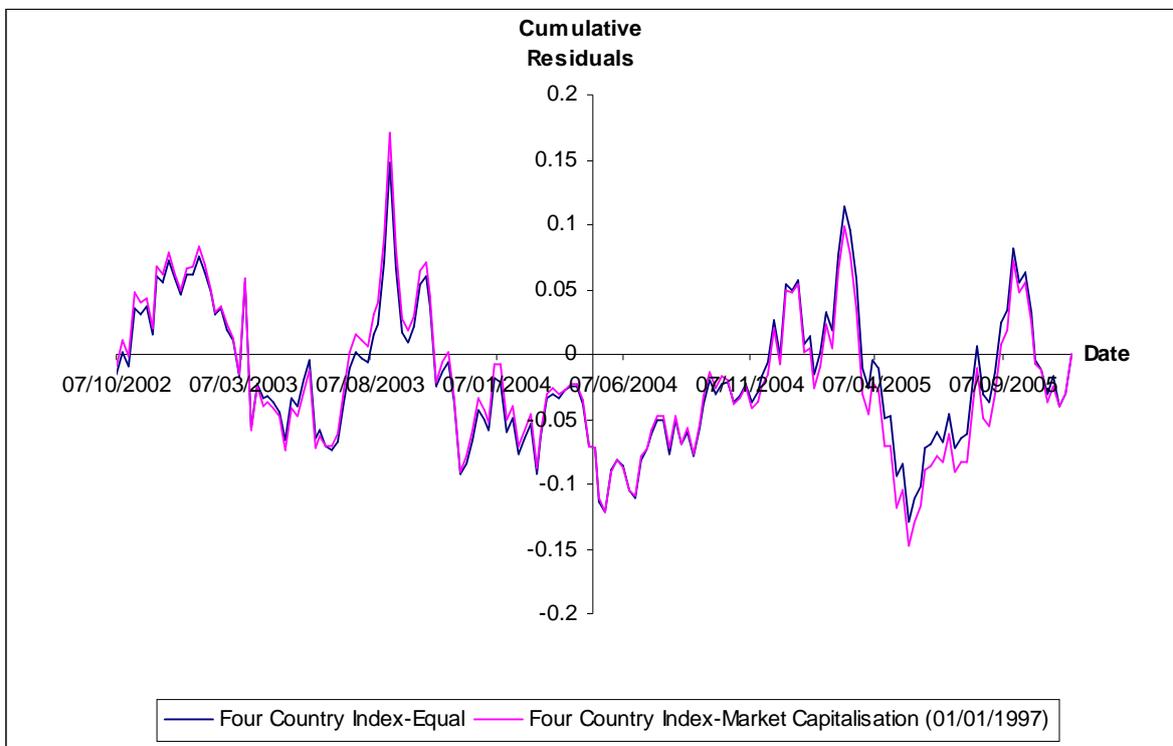
**i) MSCI Index**



**ii) S&P Euro Index**

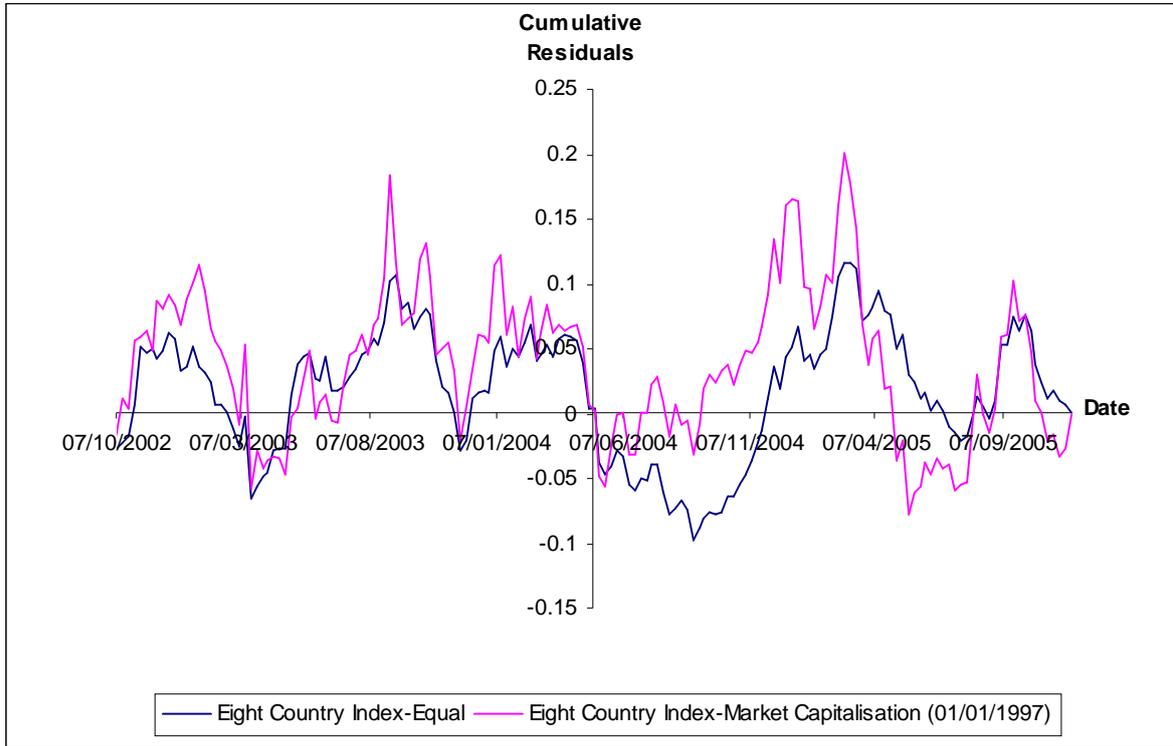


**iii) S&P Europe 350 Index**

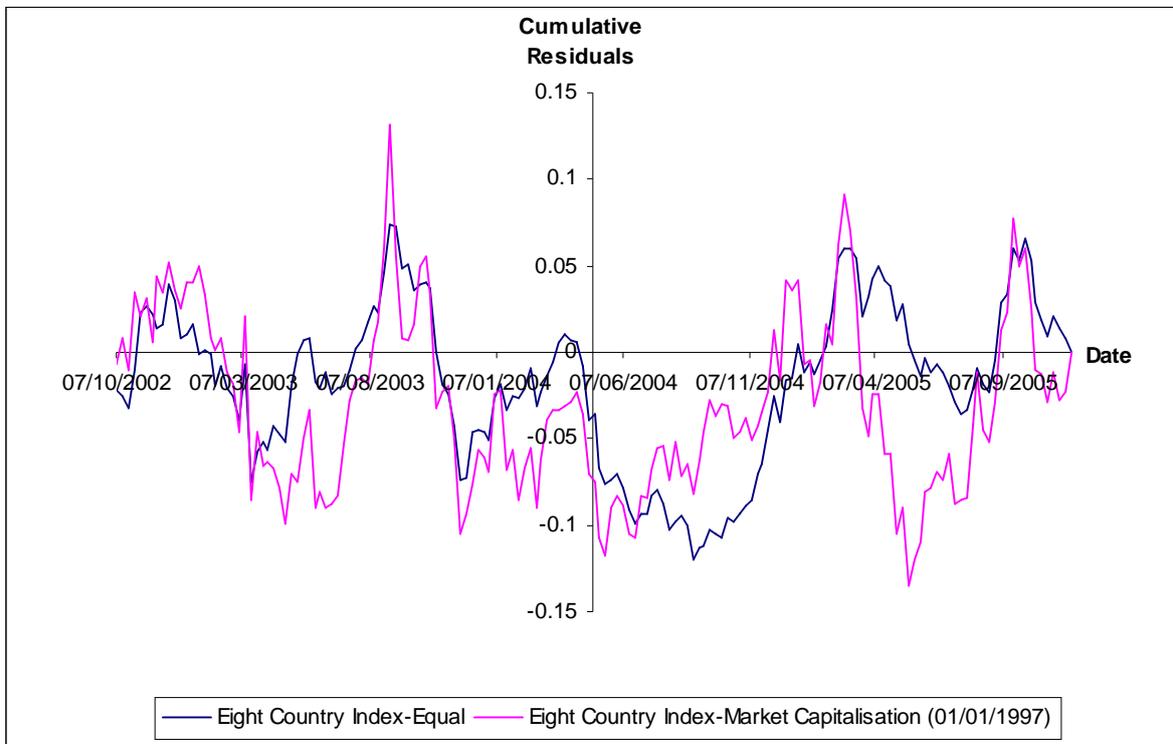


*c. 2004 Accession- Eight Country Index*

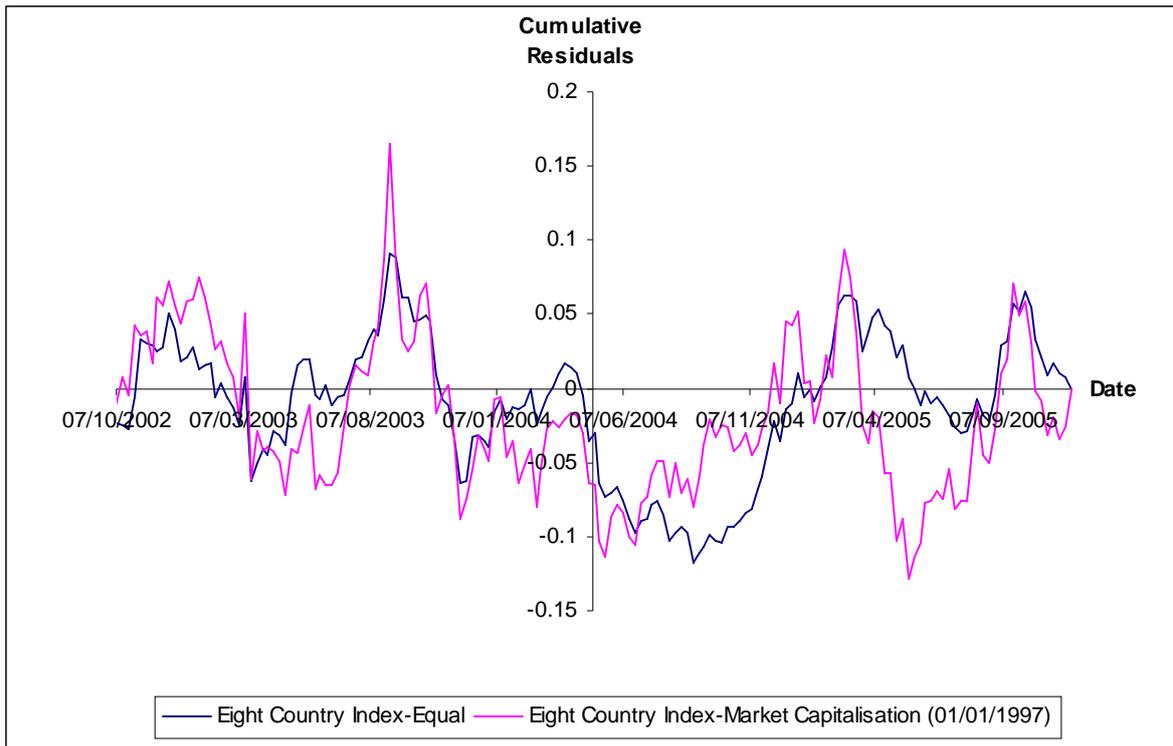
**i) MSCI Index**



**ii) S&P Euro Index**

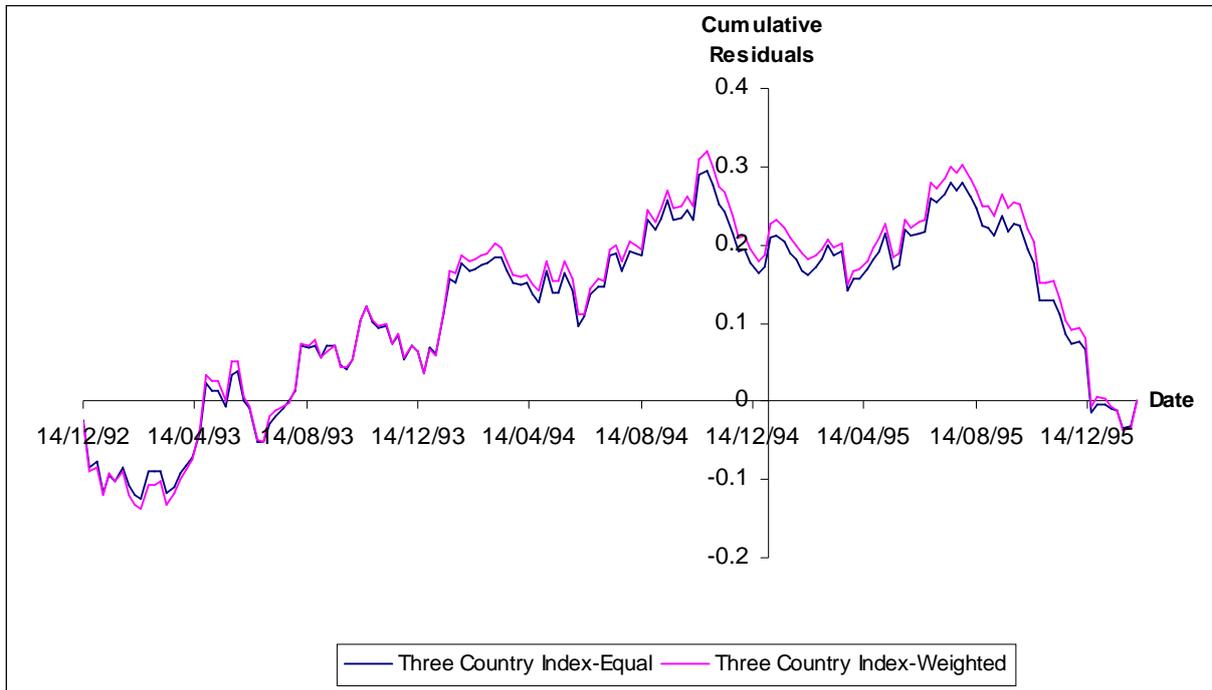


iii) S&P Europe 350 Index

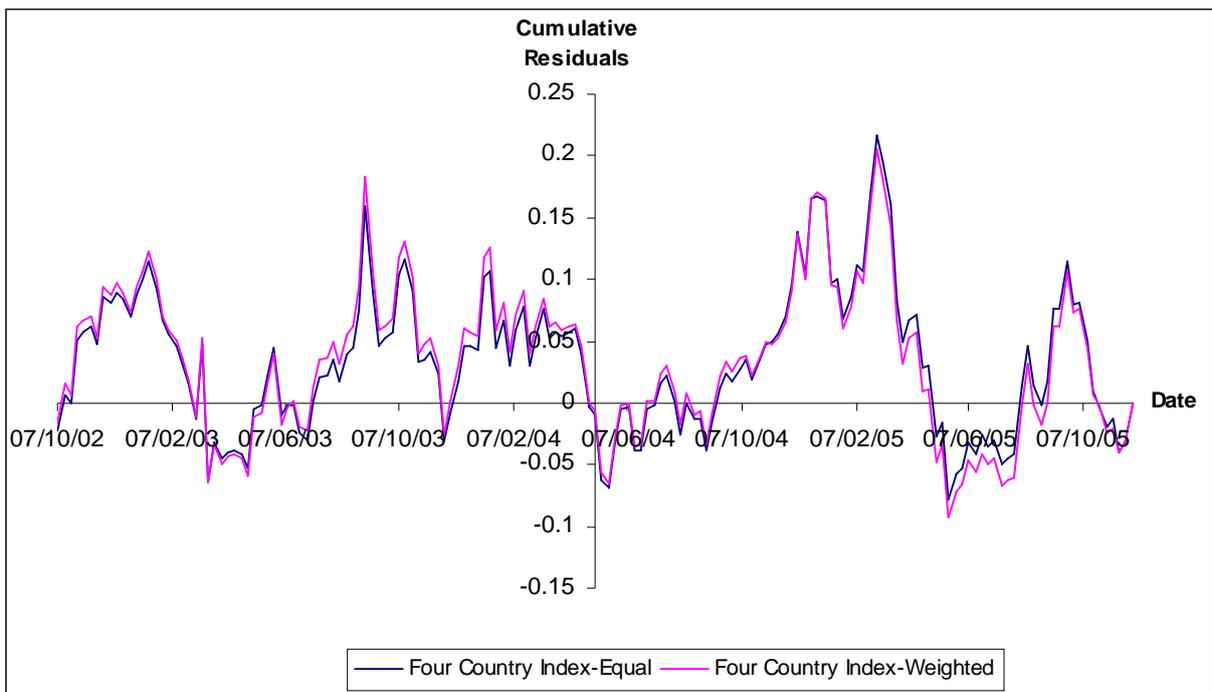


**Appendix 4- Results with a non-log specification**

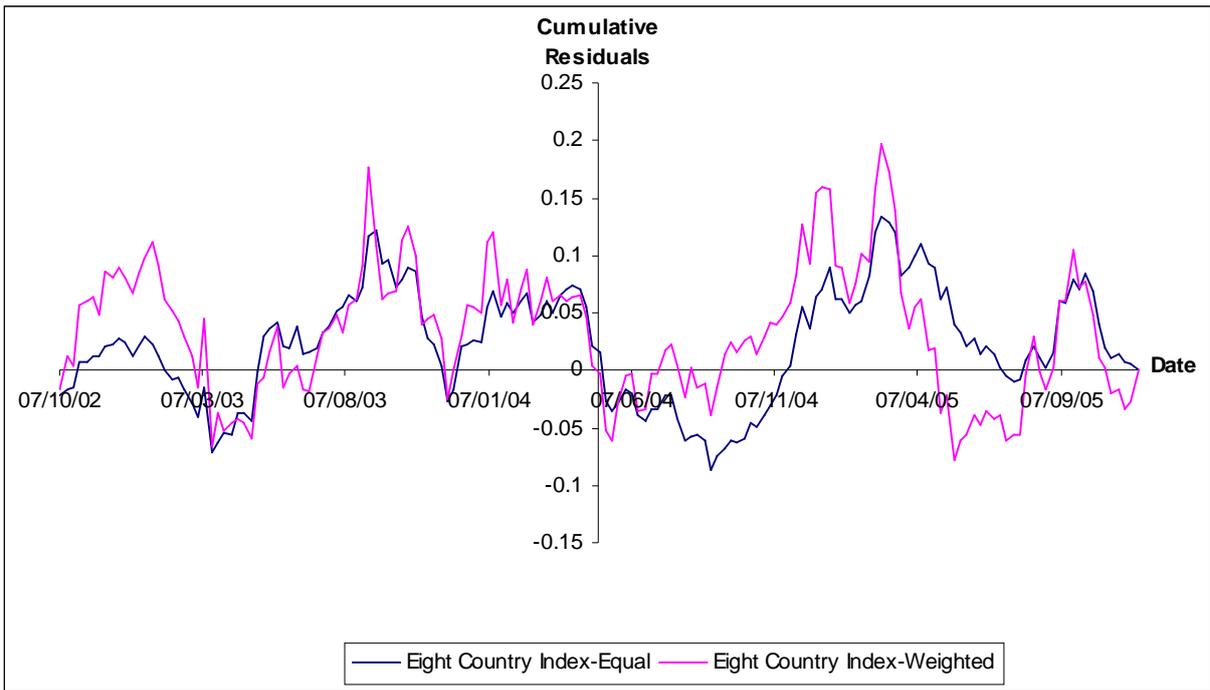
*a. 1995 Accession*



*b. 2004 Accession- Four Country Index*



*c. 2004 Accession- Eight Country Index*



## References

1. Asquith,P, “Merger bids, uncertainty and stock holder returns”, *Journal of Financial Economics* 11, 1983, 51-83
2. “Astra pulls Swedish bourse to a lower close”, *Reuters News*, 15<sup>th</sup> December 1992
3. “Austria seen as low-risk play on Eastern Europe”, *Reuters News*, 3<sup>rd</sup> February 1994
4. Ball,R and Brown,P, “An empirical evaluation of accounting income numbers,” *Journal of Accounting Research* 6, 1978, 159-178
5. “European Brief: Trelleborg AG”, *The Asian Wall Street Journal*, 1<sup>st</sup> June 1993
6. Fama,E.F, “Efficient Capital Markets: A Review of Theory and Empirical Work”, *The Journal of Finance*, Vol.25, No.2 (May 1970), 383-417
7. Fama,E.F, “Efficient Capital Markets: II ”,*The Journal of Finance*, Vol.46, No.5 (Dec. 1991), 1575-1617
8. Fama,E.F, Fisher.L, Jensen,M.Cand Roll,R, “The Adjustment of Stock Prices to New Information”, *International Economic Review*. Vol.10, No.1 (Feb. 1969), 1-21
9. “Finance on Euphoria Reigning in Ljubljana Stock Exchange”, *STA*, 25<sup>th</sup> September 2003
10. “Finnish shares decline on pay talk uncertainty”, *Reuters News*, 29<sup>th</sup> November 1994
11. “Finnish shares lower ahead of Swedish referendum”, *Reuters News*, 8<sup>th</sup> November 1994
12. “Focus - Sunny Ljublyana overshadows Zagreb”, *Financial Times*, 7<sup>th</sup> November 2002
13. Franks,J, Harris.R.S and Titman.S, “The postmerger share price performance of acquiring firms,” *Journal of Financial Economics* 29,1991, 81-96
14. Hanousek,J and Filer,R.K. “The Relationship between Economic Factors and Equity Markets in Central Europe”, *Economics of Transition*, Volume 8 (3) 2000
15. “Lithuania: Stock market well undervalued – analysts”, *Baltic Business Weekly*, 31<sup>st</sup> January 2005
16. “Market Insight: Hungarian stocks tough out crisis”, *Financial Times*, 26<sup>th</sup> August 2004
17. “Market Insight: Small Baltic tigers leap into action”, *Financial Times*, 19<sup>th</sup> October 2004
18. “Markets still dragging along”, *The Baltic Times*, 6<sup>th</sup> February 2003
19. Mitchell,M.L and Lehn.K, “Do bad bidders become good targets?,” *Journal of Political Economy* 98, 1990, 372-398
20. “Poland's troubled bourse regulator seeks more bite”,*Reuters News*, 24<sup>th</sup> February 2003
21. “Prague bourse bucks trend as E.Europe markets slump”, *Reuters News*, 5<sup>th</sup> February 2003
22. Roll,R, “The hubris hypothesis of corporate takeovers,” *Journal of Business* 59, 1986, 197-216
23. “RSE Market turnover fell 26% last year”, *Latvian News Agency*, 20<sup>th</sup> January 2004
24. “Slovenia-Market Strategy-EMU On The Horizon”, *Emerging Markets Daily News*, 11<sup>th</sup> June 2003
25. “Stumbras distillery reports 32 pct drop in profit”, *BNS Baltic Business News*, 2<sup>nd</sup> November 2003
26. “US Treasuries sell-off hits C.European currencies”, *Reuters News*, 16<sup>th</sup> March 2005

27. Waud,R.N, “Public Interpretation of Discount Rate Changes: Evidence on the ‘Announcement Effect’ ”, *Econometrica*, Vol.38, No.2 (March 1970), 231-250
28. “World Stock Markets (Europe) - Traders take cover in Italian Political Crisis”, *Financial Times*, 21<sup>st</sup> October 1995
29. “World Stock Markets – Nordic Forestry at Turning Point” *Financial Times*, 2<sup>nd</sup> November 1995
30. [www.bloomberg.com/markets/stocks/wei\\_region2.html](http://www.bloomberg.com/markets/stocks/wei_region2.html)
31. [www.factiva.com](http://www.factiva.com)
32. [www.msci.com/equity/indexdesc.html#EUROPE](http://www.msci.com/equity/indexdesc.html#EUROPE)