# Impact of the Global Financial Crisis on the Level of Capital Mobility in EU Members

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**Abstract**

This study investigates the level of capital mobility in European Union members and the impact of the global financial crisis on the capital mobility indicators. The capital mobility is examined by testing the Feldstein-Horioka puzzle. This study estimates quarterly data for 27 European countries for the period of 1995-2013 and employs the standard and dynamic generalized method of moments (GMM) estimation techniques. The results of the standard GMM estimations did not provide the evidence to support the Feldstein-Horioka puzzle, where the saving retention coefficient demonstrates the high capital mobility in European Union countries. However the results of the dynamic GMM estimations indicate that inclusion of historical values of investment and savings in the regression decreases the level of capital mobility in European countries. The consideration of the global financial crisis in the model revealed insignificant changes in capital mobility indicators, which means that the inclusion of the global financial crisis does not have an impact on the capital mobility analysis in European countries.

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## Küresel Finansal Krizin AB Üyelerinde Sermaye Hareketliliğine Olan Etkisi

**Öz**

Bu çalışmada, Avrupa Birliği üyeleri arasında sermaye hareketliliğinin seviyesi ile küresel finansal krizin sermaye hareketlilik değişkenleri üzerine olan etkisi incelenmektedir. Sermaye hareketliliği Feldstein-Horioka bulmacası test edilerek sınanabilir. Çalışmada, 27 Avrupa ülkesinin 1995-2013 dönemi üçer aylık veri seti ile standart ve dinamik Genelleştirilmiş Momentler Metodu (GMM) tahmin teknikleri kullanılmıştır. Standart GMM tahminlerinin sonuçları, Feldstein-Horika bulmacasının tasarruf tutma katsayısının Avrupa Birliği ülkelerinde yüksek sermaye hareketliliğini gösterdiği durumda destekleyen kanıtlar sunmamıştır. Bununla birlikte, dinamik GMM tahminlerinin sonuçları, regresyonda tarihsel yatırım değerlerinin ve tasarrufların dahil edilmesinin Avrupa ülkelerinde sermaye hareketliliği düzeyini azalttığını göstermektedir. Küresel finansal krizin modelde dikkate alınması sermaye hareketliliği göstergelerinde önemsiz bir değişiklik olduğunu ortaya koymuştur; bu küresel finansal krizin dahil edilmesinin Avrupa ülkelerinde sermaye hareketliliği analizi üzerinde bir etkisi olmadığı anlamına gelmektedir.

**Anahtar Kelimeler:** Sermaye hareketliliği, Feldstein-Horioka problemi, tasarruf-yatırım ilişkisi, Genelleştirilmiş Momentler Metodu (GMM), AB.

## 1. Introduction

The Feldstein Horioka puzzle took its origin from the investigation of capital mobility level in OECD countries where results came controversial to expected ones. High level of estimated saving and investment correlation contradicts to expected high level of capital mobility in developed countries. Feldstein and Horioka refer to the high correlation coefficient in developed countries as an indication of impediments for long-term capital flow between countries. Since then numerous studies in the literature have attempted to interpret such controversial results employing various econometric techniques.

The interpretation of Feldstein and Horioka has been supported by numerous studies (e.g., Argimón & Roldán, 1994; Chen & Shen, 2015; Holmes & Otero, 2015; Jansen, 1996; Sinn, 1992; Telatar, Telatar, & Bolatoglu, 2007; Younas & Chakraborty, 2011). However, it is not the only interpretation of investment-saving correlation; alternative explanations were offered in the literature rejecting the existence of the puzzle. Thus, Coakley et al. (1996) proposed that the high value of the saving coefficient indicates existence of the solvency constraint regardless of the level of capital mobility and this cannot be demonstrated as a puzzle. Numerous researchers continued this discussion (e.g., Chortareas, George, & Uctum, 2004; Jansen, 1997; Murthy, 2007; Nell & Santos, 2008) Ma and Li (2016). Another widespread interpretation of the investment saving correlation value is related to the size of a country. A country with a larger size has a higher level of correlation between investments and savings due to sufficient domestic savings. However, a smaller country is highly dependent on foreign investments, demonstrating low correlation between domestic savings and investments (see Bahmani-Oskooee & Chakrabarti, 2005; Baxter & Crucini, 1993; Fouquau, Hurlin, & Rabaud, 2008; T. Ho & Chiu, 2001; T.-W. Ho, 2003).



The aim of this study is to estimate the capital mobility in 27 European countries for the period 1995-2013 by testing the Feldstein-

Horioka hypothesis[1]. 27 European countries were chosen for this study as an example of developed countries with high capital mobility. Numerous studies were conducted to test the Feldstein-Horioka puzzle for different countries employing various methodologies. The novelty of this study is the consideration of the early impact of the global financial crisis of 2008 as the possible factor of capital mobility measure. A lot of researchers found the confirmation of the Feldstein-Horioka puzzle existence in their studies and therefore focused on explanation of low mobility indicators in developed countries. The first goal of this study is to test the Feldstein-Horioka puzzle employing the Generalized Method of Moments methodology and to compare the results with the OLS and FMOLS results. The Generalized Method of Moments technique includes instrumental variables and eliminates the problem of serial correlation and heteroscedasticity. The second purpose is to examine capital mobility taking into account the first impact of the global financial crisis.



The remainder of the paper is organized as follows: the literature review is presented in section 2. Section 3 outlines the empirical methodology adopted in the paper. Finally, empirical results are reported in section 4, and section 5 concludes.

## 1. Literature Review

The issue of capital mobility in developed countries has been widely investigated since the seminal work of Feldstein and Horioka (1980), which employed the following equation:

$$(I)_{it} = \alpha_0 + \beta(S)_{it} + \varepsilon_{it} \quad (1)$$

where the dependent variable $I_{it}$ and independent variable $S_{it}$ represent gross domestic investments and gross domestic savings, respectively. Both variables are expressed as ratio to gross domestic product of estimated country $i$ at period $t$. The coefficient of independent variable, $\beta$, measures the level of international capital mobility and is

1 Greece is not included in this study for the data problems.

known as the saving-retention coefficient. Low value of the saving-retention coefficient is explained by low correlation between savings and investments and is justified by high level of international capital mobility. However, high interdependence of domestic savings and investments is expressed by the high value of the saving-retention coefficient $\beta$ and indicates a low level of capital mobility. Values of the saving-retention coefficient $\beta$ may vary between 0 and 1. It is expected that the degree of capital mobility in developed countries is relatively high; however, Feldstein and Horioka (1980) estimated the saving-retention coefficient for advanced countries at a level close to 1 indicating a low degree of capital mobility.

Most of OECD countries represent a group of developed economies; however, the results attained by researchers vary with different groups of developed countries and with the econometric technique employed. Investigating the saving-retention coefficient for developed countries, researchers employ panel estimation methods (see Adedeji & Thornton, 2008; Chakrabarti, 2006; Christopoulos, 2007; Corbin, 2001; Di Iorio & Fachin, 2014; Fouquau et al., 2008; Georgopoulos & Hejazi, 2009; T. Ho, 2002; Ketenci, 2013; Kollias, Mylonidis, & Paleologou, 2008; Telatar et al., 2007) as well as time-series techniques (Abbott & Vita, 2003; Bodman, 1995; Caporale, Panopoulou, & Pittis, 2005; Dritsaki, 2015; Fidrmuc, 2003; Kejriwal, 2008; Levy, 2000; Özmen & Parmaksiz, 2003).



For example, Kollias et al. (2008) employed the panel of the EU15 countries using the ARDL procedure. Authors found high level of capital mobility, contradicting the results of Feldstein and Horioka (1980). Di Iorio and Fachin (2014) tested for panel cointegration with breaks in a panel of the OECD countries. The evidence of long run cointegration relationships between investments and savings was not found in this study, rejecting the Feldstein Horioka puzzle. Results of econometric estimations that employ time-series and panel series may significantly vary. Thus Ketenci (2012) employing the structural breaks methodology found that saving retention coefficient for individual countries is higher compared to the saving retention coefficient of

panel estimations, indicating higher capital mobility in estimations for individual countries.

Estimation results may provide different results if the dynamic nature of capital flows in developed countries is not taken into account; however, only few studies have employed econometric techniques that allow for the dynamic nature of variables (see Hassan & Mohamed, 2013; Ketenci, 2015; Rao, Tamazian, & Kumar, 2010; Younas, 2011; Younas & Nandwa, 2010). Rao et al (2010) took into account the dynamic nature of series by employing a systems GMM estimation method to test for the Feldstein Horioka puzzle in a panel of 12 OECD countries. International capital mobility was found at low level in the pre-Bretton Woods period, supporting the Feldstein Horioka puzzle, while significant changes were observed in the post-Bretton Woods period.



## 2. Methodology

### 2.1. Unit root tests

Only stationary data are allowed in the GMM estimation framework; therefore, in order to make a strong point about the order of integration it is necessary to perform several tests before deciding on the order of integration. Thus, integration of employed time series is tested by two alternative unit root tests. These are the Phillips and Perron (1988) PP test and Kwiatkowski, Phillips, Schmidt, & Shin (1992) KPSS test. The PP test is based on a nonparametric correction of the test statistics to account for the correlation in the residuals. The KPSS and the PP tests differ in the tested null hypothesis. The null hypothesis of the KPSS test is stationarity of series, while the PP tests for non-stationarity.

### 2.2. Generalized Method of Moments

This study examines the level of capital mobility in EU countries in the GMM framework. The GMM methodology was initially proposed by Hansen (1982) and is referred to as an instrumental variables technique where alternative estimators and instrumental variables can be applied as special cases. The problem of serial correlation and heteroskedasticity

is solved in the GMM by employing orthogonality conditions that allow a weighting matrix to account for them. The GMM approach is often applied to panel data; however, originally Hansen (1982) developed the GMM for time series applications. Therefore, the main advantage of the GMM approach belongs to time series data (Wooldridge, 2001). The complete information on the probability distribution of data is not required in the GMM that makes it superior to other methodologies. This study estimates equation 1 employing the GMM standard methodology.

The dynamic model, where the dynamic parameter is presented by lagged investment in the list of explanatory variables, is estimated employing the following dynamic regression:

$$(I)_{it} = \alpha_0 + \alpha_1 (I)_{it-1} + \beta\,(S)_{it} + e_{it} \qquad (2)$$



where the dependent variable $I_{it}$ and independent variable $S_{it}$ represent gross domestic investments and gross domestic savings, respectively, as ratios to gross domestic product of estimated country $i$ at period $t$. The coefficient, $\beta$, is the saving-retention coefficient and measures the level of international capital mobility. Interest rate is the main determinant of the investors' decisions in open economies. However, the experience of previous decades has significant impact on decisions as well. Therefore, the dynamic nature of capital flows is estimated by the past value of investment in the model, $I_{it\text{-}1}$.

High level of capital mobility has its advantages as well as disadvantages. Opportunities of high return on investments are combined with high risk of influence of domestic crises. Thus, the high degree of capital mobility is debated in the literature as one of the main causes of the spread of the global financial crisis of 2008.

The early impact of the global financial crisis on the level of capital mobility of the EU countries is examined by introduction of dummy variables to estimated models. Thus, the standard model (1) can be expressed as follows:

$$(I)_{it} = \alpha_0 + \beta\,(S)_{it} + \alpha_2 D_j + v_{it} \qquad (3)$$

The dynamic model (2) can be expressed as follows:

$$(I)_{it} = \alpha_0 + \alpha_1 (I)_{it-1} + \beta (S)_{it} + \alpha_2 D_j + u_{it} \quad (4)$$

where $I_{it}$ and $S_{it}$ represent gross domestic investment and gross domestic savings, respectively as ratio to gross domestic product for country $i$ at period $t$, and $I_{it-1}$ is the past value of investments. The global financial crisis is represented by the dummy variable, $D_j$, where $j$ is varying from 1 to 4 and indicates four different quarters of the year 2008. Four different regressions are run for every country. The aim of this study is to analyze the level of capital mobility by estimating the saving-retention coefficient $\beta$ in the GMM framework. The value of the saving-retention coefficient is expected to be close to 0 in advanced countries.



## 3. Empirical Results

### 3.1. Results of unit root tests

Integration order of variables is examined by two alternative unit root tests: the PP and KPSS tests. The null hypothesis of the first test is non-stationarity of variables and the null of the KPSS test is stationarity. Table 1 reports results of the unit root tests. Results of the test provide sufficient evidence to state that saving and investment variables of the selected countries are stationary in their levels. In most cases, the results of both tests illustrated the stationarity of series, with the exception of the Portugal case where the investment variable was found non-stationary. Based on the unit root test results, it can be concluded that investment and savings series are generated by the stationary stochastic process in levels. The GMM test is designed for strictly stationary data; therefore, all countries except Portugal proceed for further estimations of equations (1) - (4), where all series are estimated in their levels.

***Table 1.*** Unit Root Tests

| Country | PP[a] | KPSS[b] | PP[a] | KPSS[b] |
|---|---|---|---|---|
| | ***Investments*** | | ***Savings*** | |
| Austria | -6.67** | 1.27** | -2.74** | 0.42 |
| Belgium | -10.29* | 0.37 | -5.88** | 0.53* |
| Bulgaria | -3.16* | 0.38 | -12.79** | 0.40 |
| Cyprus | -0.36 | 0.11 | -7.90** | 0.70* |
| Czech Republic | -5.36** | 0.56* | -3.01* | 0.41 |
| Denmark | -3.62** | 0.18 | -1.62 | 0.26 |
| Estonia | -3.01* | 0.32 | -4.79** | 0.45 |
| Finland | -7.04** | 0.43 | -3.61** | 0.17 |
| France | -2.90* | 0.26 | -2.66’ | 0.31 |
| Germany | -7.67** | 1.30** | -3.89** | 0.85** |
| Hungary | -10.49** | 0.39 | -7.42** | 0.42 |
| Italy | -3.91** | 0.22 | -5.75** | 0.59* |
| Latvia | -3.92** | 0.30 | -5.02** | 0.33 |
| Lithuania | -4.92** | 0.32 | -5.77** | 0.53* |
| Luxemburg | -7.80** | 0.84** | -1.80 | 0.29 |
| Netherland | -5.21** | 0.49* | -5.44** | 0.55* |
| Poland | -10.48** | 0.42 | -9.66** | 1.57** |
| Portugal | 0.38 | 0.68* | -5.01** | 0.55* |
| Slovenia | -2.21 | 0.23 | -3.15* | 0.28 |
| Slovakia | -5.92** | 0.64* | -5.11** | 0.76** |
| Spain | -4.33** | 0.28 | -9.59** | 0.87** |
| Sweden | -5.66** | 0.93 | -2.01 | 0.32 |
| UK | -2.37 | 0.16 | -4.14** | 0.58* |

*Notes*: Estimation results are provided for series’ levels. The PP tests critical values are used from MacKinnon (1996) one-sided p-values. In the KPSS test, critical values are used from Kwiatkowski et al, (1992). (a) Null of non-stationarity (unit root), (b) Null of stationarity. * and ** denote the rejection of the null hypothesis at the 5% and 1% respectively.



### 3.2. Results of the GMM estimations

Table 2 presents the results of time series estimations of equations 1 and 2, where standard and dynamic GMM frameworks are employed, respectively. Additionally, the table presents results of estimations of equation 1 employing the ordinary least squares (OLS) and the fully modified ordinary least square (FMOLS) methods. Both models of

the GMM and the dynamic GMM methods for all estimated countries pass the Sargan test, where the *p* values vary between 0.20 and 0.30. Estimated saving retention coefficient is statistically significant at a 5% level in almost all estimated countries. In most considered countries, the GMM estimated saving retention coefficients are consistent with the OLS and FMOLS estimates. In cases of Belgium, Italy, Latvia, Spain and the UK, values of the GMM estimated saving-retention coefficient appeared higher compared to the OLS estimates. For example, in the case of Belgium the coefficient of 0.6 in the GMM estimations declines to 0.4 in the FMOLS estimations. The coefficient in Spain declines from 0.6 to 0.3, while in the UK the saving retention coefficient declines from 0.4 to 0.2. Results indicate that in these countries the level of capital mobility is lower when past values of variables are considered as instrumental variables, where relationships are estimated taking into account not just relations between absolute values but historical values as well.

***Table 2.*** GMM Estimations

| Country | GMM | | Dynamic GMM | | | OLS | | FMOLS | |
|---|---|---|---|---|---|---|---|---|---|
| | $\alpha_0$ | β | $\alpha_0$ | $\alpha_1$ | β | $\alpha_0$ | β | $\alpha_0$ | β |
| Austria | 30.592** (1.615) | **-0.292** (0.057)** | 28.108** (2.495) | 0.016 (0.057) | **-0.219** (0.065)** | 29.923** (2.715) | **-0.267** (0.097)** | 35.034** (2.674) | **-0.452** (0.095)** |
| Belgium | 2.535* (1.141) | **0.695** (0.044)** | 6.325** (1.988) | -0.177** (0.044) | **0.691** (0.050)** | 5.269** (2.109) | **0.596** (0.080)** | 9.377** (2.006) | **0.441** (0.076)** |
| Bulgaria | 23.885** (0.078) | **-0.173** (0.042)** | 6.553** (1.204) | 0.763** (0.046) | **-0.087** (0.029)** | 23.465** (1.737) | **-0.170 (0.094)** | 25.305** (4.358) | **-0.275 (0.265)** |
| Cyprus | 18.996** (0.318) | **-0.048** (0.009)** | 2.154** (0.803) | 0.964** (0.043) | **-0.085** (0.007)** | 19.086** (0.575) | **-0.046 (0.029)** | 18.963** (1.055) | **-0.039 (0.054)** |
| Czech Republic | 34.655** (1.289) | **-0.221** (0.045)** | 32.631** (3.884) | 0.054 (0.112) | **-0.203** (0.046)** | 34.239** (1.316) | **-0.202** (0.044)** | 33.937** (1.858) | **-0.191** (0.062)** |
| Denmark | 15.441** (1.722) | **0.166** (0.067)** | 4.672** (1.071) | 0.669** (0.064) | **0.075** (0.028)** | 15.617** (1.875 | **0.164** (0.076)** | 15.693** (3.116) | **0.162 (0.127)** |
| Estonia | 15.457** (1.814) | **0.572** (0.075)** | -7.619** (3.106) | 0.799** (0.057) | **0.537** (0.077)** | 12.472** (3.239) | **0.677** (0.127)** | 10.903** (4.488) | **0.760** (0.176)** |
| Finland | 7.978** (9.308) | **0.367** (0.028)** | 10.371** (1.671) | -0.129* (0.062) | **0.368** (0.034)** | 8.581** (1.450) | **0.345** (0.048)** | 10.375** (1.208) | **0.286** (0.040)** |
| France | 15.876** (0.918) | **0.157** (0.045)** | 3.871** (1.041) | 0.688** (0.102) | **0.102** (0.016)** | 15.159** (1.731) | **0.188** (0.084)** | 14.697** (3.087) | **0.312 (0149)** |
| Germany | 27.209** (0.875) | **-0.295** (0.034)** | 27.237** (1.299) | -0.014 (0.036) | **-0.288** (0.039)** | 26.162** (1.825) | **-0.254** (0.073)** | 26.027** (2.080) | **-0.248** (0.083)** |
| Hungary | 2.809* (1.249) | **0.746** (0.048)** | -13.473** (3.574) | 0.284** (0.045) | **1.118** (0.105)** | 3.167 (3.877) | **0.722** (0.148)** | 13.841** (4.902) | **0.322* (0.186)** |
| Italy | 14.698** (0.789) | **0.247** (0.038)** | 2.663 (1.943) | 0.603** (0.063) | **0.248** (0.051)** | 16.683** (2.349) | **0.147 (0.110)** | 15.803 (3.754) | **0.189 (0.176)** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Latvia | 3.808 (3.710) | **1.349** (0.224) | -3.729 (3.289) | 0.458** (0.073) | **1.100** (0.175) | 9.942** (3.607) | **0.976** (0.220) | 6.719 (5.427) | **1.199** (0.329) |
| Lithuania | 22.292** (0.914) | **-0.032 (0.054)** | 12.881** (1.849) | 0.379** (0.084) | **0.048 (0.051)** | 20.293** (1.657) | **0.067 (0.107)** | 20.982** (2.521) | **0.033 (0.163)** |
| Luxemburg | 12.259** (3.091) | **0.224** (0.067) | 11.243* (4.464) | -0.192 (0.123) | **0.336** (0.086) | 9.802** (3.051) | **0.274** (0.066) | 11.354** (3.122) | **0243** (0.068) |
| Netherland | 17.019** (1.760) | **0.118' (0.066)** | -6.221** (2.225) | 0.726** (0.050) | **0.416** (0.053) | 15.498** (3.658) | **0.165 (0.130)** | 19.665** (6.104) | **0.020 (0.217)** |
| Poland | 1.127 (0.849) | **1.019** (0.031) | 0.412 (1.087) | 0.031 (0.022) | **1.025** (0.032) | 2.105* (1.065) | **0.972** (0.052) | 3.687* (1.753) | **0.900** (0.085) |
| Slovenia | 10.814** (2.543) | **0.549** (0.092) | 1.184 (1.142) | 0.934** (0.022) | **0.017 (0.041)** | 10.164** (2.979) | **0.543** (0.116) | 7.492 (5.188) | **0.649** (0.201) |
| Slovakia | 40.457** (2.856) | **-0.517** (0.094) | 34.066** (2.957) | 0.189** (0.069) | **-0.464** (0.069) | 38.327** (2.737) | **-0.434** (0.098) | 40.365** (3.702) | **-0.504** (0.132) |
| Spain | 14.071** (0.974) | **0.497** (0.046) | -9.891** (1.746) | 0.799** (0.042) | **0.668** (0.049) | 16.342** (3.318) | **0.378** (0.147) | 17.082** (5.923) | **0.343 (0.263)** |
| Sweden | 7.410** (1.008) | **0.379** (0.037) | 7.296** (1.117) | -0.036 (0.063) | **0.405** (0.058) | 7.768** (1.350) | **0.365** (0.049) | 7.951** (1.396) | **0.362** (0.051) |
| UK | 9.648** (1.265) | **0.405** (0.074) | 0.316 (0.767) | 0.797** (0.041) | **0.176** (0.031) | 12.142** (1.729) | **0.249** (0.099) | 13.433** (2.268) | **0.176 (0.189)** |

** and * denote statistical significance at 1 and 5% levels, respectively. $\alpha$ and $\beta$ coefficients are from equation 1. Number of instruments varies between 3 and 8, values of Sargan test for GMM estimations vary between 0.20 and 0.30 indicating efficiency of chosen models.

Only in the case of Estonia, the GMM saving retention coefficient appeared lower, 0.5, compared to the OLS and FMOLS estimates, 0.7, illustrating higher capital mobility when past values of variables are considered. Even though most of estimated GMM coefficients are consistent with the OLS and FMOLS estimates, they appear slightly higher except the cases of France and Luxemburg. In cases of Austria, Bulgaria, Cyprus, Czech Republic, Germany and Slovakia, the saving retention coefficient was found negative. The negative value of the saving-retention coefficient implies that any increase in the saving rate would reduce the investment rate or a decrease in the saving rate would imply increase in the investment rate. In cases of Austria and Germany, the negative saving retention coefficient would imply a high level of saving flight abroad, while in cases of Bulgaria, Cyprus, Czech Republic and Slovakia the negative saving retention coefficient would imply that the desired level of investments is financed by foreign savings.



Results of estimations of the dynamic equation 2 are slightly different with estimations of equation 1. The saving retention coefficients estimated by the dynamic GMM are higher in most considered countries. In cases of Belgium, Hungary, Italy, Latvia, Luxemburg, Netherlands and Spain, values of the saving retention coefficient are substantially higher than the OLS estimates. In cases of Cyprus, Czech Republic, Finland, Germany, Poland, Slovakia and Sweden, values of the saving retention coefficient are only slightly higher compared to the OLS estimates, indicating lower level of capital mobility when past value of investments is added as an explanatory variable. Besides, only in cases of Bulgaria, Denmark, Estonia, France and the UK, values of the saving retention coefficient are lower compared to the OLS estimates. In all cases except Austria, Czech Republic, Germany, Luxemburg, Poland and Sweden, investments are significantly affected by past values of investments. The inclusion of the first lagged dependent variable in the list of explanatory variables resulted in a highly significant large positive coefficient intercept in most cases. Investment volumes of the past decade have a positive impact on current investments. Inclusion of the dynamic parameters in the model brings proper results from

the econometric point of view. Statistical significance of the lagged dependent variable indicates the reliability of empirical results.

To investigate the global financial crisis effect on capital mobility in the EU countries, crisis dummies were introduced into the basic and dynamic models. Table 3 presents results of standard and dynamic GMM models with inclusion of dummies.

***Table 3.*** GMM Estimations with the financial crisis dummy variable

| Country | GMM | | | Dynamic GMM | | | |
|---|---|---|---|---|---|---|---|
| | $\alpha_0$ | β | $\alpha_2$ | $\alpha_0$ | $\alpha_1$ | β | $\alpha_2$ |
| **Austria** | **30.592** (1.615)** | **-0.292** (0.057)** | | **28.108** (2.495)** | **0.016 (0.057)** | **-0.219** (0.065)** | - |
| D1 | 25.751** (1.698) | -0.109' (0.061) | -8.213 (17.550) | 18.478** (2.127) | 0.146* (0.061) | 0.027 (0.049) | -6.798 (17.266) |
| D2 | 32.430** (2.079) | -0.363** (0.075) | 5.111 (6.113) | 33.106** | 0.067 (0.065) | -0.437** (0.082) | 6.311 (6.734) |
| D3 | 33.429** (2.272) | -0.399** (0.082) | 8.103 (7.963) | 39.302** (4.368) | -0.079 (0.069) | -0.542** (0.116) | 9.929 (8.685) |
| D4 | 29.308** (1.739) | -0.251** (0.061) | 1.743 (2.791) | 30.598** (2.692) | 0.018 (0.049) | -0.308** (0.075) | 1.488 (3.011) |
| **Belgium** | **2.535* (1.141)** | **0.695** (0.044)** | | **6.325** (1.988)** | **-0.177** (0.044)** | **0.691** (0.050)** | |
| D1 | 2.149 (1.268) | 0.712** (0.049) | -4.187 (2.315) | 5.000 (2.259) | -0.134* (0.054) | 0.708** (0.055) | -2.031 (2.001) |
| D2 | -1.384 (1.777) | 0.845** (0.068) | -5.227 (2.934) | 2.134 (2.804) | -0.159* (0.052) | 0.837** (0.077) | -4.684 (3.039) |
| D3 | 2.008 (1.190) | 0.717** (0.047) | -2.907 (2.094) | 5.889** (2.074) | -0.166** (0.045) | 0.699** (0.052) | -0.956 (1.151) |
| D4 | 4.826** (1.074) | 0.605** (0.041) | 3.658 (5.691) | 10.852** (2.022) | -0.242** (0.046) | 0.568** (0.052) | 4.030 (6.691) |
| **Bulgaria** | **23.885** (0.078)** | **-0.173** (0.042)** | | **6.553** (1.204)** | **0.763** (0.046)** | **-0.087** (0.029)** | |
| D1 | 23.303** (0.865) | -0.122** (0.041) | 28.102 (18.022) | 5.960** (0.898) | 0.840** (0.047) | -0.132** (0.040) | -20.483* (8.253) |
| D2 | 23.857** (0.774) | -0.162** (0.042) | 24.533* (9.405) | 7.156** (1.100) | 0.715** (0.044) | -0.066** (0.025) | 14.225** (3.732) |
| D3 | 25.571** (0.906) | -0.278** (0.070) | 27.652* (12.379) | 6.690** (1.047) | 0.759** (0.043) | -0.088** (0.037) | 1.041 (3.400) |
| D4 | 22.877** (0.768) | -0.105** (0.039) | 34.117 (18.096) | 7.391** (1.174) | 0.683** (0.046) | -0.043 (0.025) | 20.697* (7.328) |
| **Cyprus** | **18.996** (0.318)** | **-0.048** (0.009)** | | **2.154** (0.803)** | **0.964** (0.043)** | **-0.085** (0.007)** | |
| D1 | 18.044** (0.386) | -0.009 (0.016) | 43.336* (21.391) | 1.884 (1.047) | 0.984** (0.062) | -0.089** (0.009) | -1.955 (3.451) |
| D2 | 19.279** (0.332) | -0.075** (0.013) | 31.229* (15.043) | 4.453 (1.577) | 0.839** (0.084) | -0.089** (0.009) | 7.839 (4.382) |
| D3 | 18.933** (0.331) | -0.053** (0.009) | 16.337** (6.182) | 1.395 (0.972) | 1.009** (0.055) | -0.088** (0.007) | -4.086** (1.493) |
| D4 | 18.675** (0.331) | -0.035** (0.011) | 9.013** (3.094) | 2.571** (0.938) | 0.939** (0.054) | -0.083** (0.008) | 0.645 (1.122) |
| Czech **Republic** | **34.655** (1.289)** | **-0.221** (0.045)** | | **32.631** (3.884)** | **0.054 (0.112)** | **-0.203** (0.046)** | |
| D1 | 34.771** (1.413) | -0.227** (0.049) | 2.141 (2.437) | 36.589** (3.991) | -0.054 (0.114) | -0.237** (0.052) | 2.643 (2.488) |
| D2 | 35.492** (1.357) | -0.254** (0.047) | 9.511** (3.881) | 37.076** (4.242) | -0.028 (0.119) | -0.284** (0.051) | 19.053* (9.195) |
| D3 | 35.208** (1.378) | -0.242** (0.049) | 5.793** (2.365) | 43.207** (4.862) | -0.232 (0.135) | -0.294** (0.061) | 10.092** (3.486) |
| D4 | 34.706** (1.382) | -0.224** (0.048) | 3.927** (1.433) | 35.417** (4.466) | -0.022 (0.122) | -0.227** (0.057) | 4.532** (1.678) |
| **Denmark** | **15.441** (1.722)** | **0.166** (0.067)** | | **4.672** (1.071)** | **0.669** (0.064)** | **0.075** (0.028)** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D1 | 15.399** (1.103) | 0.168** (0.045) | 16.428 (12.015) | 3.007* (1.420) | 0.780** (0.084) | 0.055* (0.028) | -3.367 (4.028) |
| D2 | 15.261** (1.287) | 0.174** (0.051) | 8.103 (9.542) | 8.008** (1.581) | 0.431** (0.101) | 0.127** (0.035) | 7.438 (7.129) |
| D3 | 15.003** (1.271) | 0.184** (0.049) | 8.599 (8.692) | 3.831** (1.163) | 0.726** (0.063) | 0.064** (0.027) | -1.345 (2.507) |
| D4 | 14.874** (1.073) | 0.181** (0.042) | 23.064 (31.309) | 6.632** (1.552) | 0.519** (0.094) | 0.112** (0.030) | 3.431 (7.693) |
| **Estonia** | **15.457** (1.814)** | **0.572** (0.075)** | | **-7.619** (3.106)** | **0.799** (0.057)** | **0.537** (0.077)** | |
| D1 | 13.186** (1.761) | 0.645** (0.077) | 28.958 (17.169) | -7.562* (3.183) | 0.805** (0.057) | 0.529** (0.082) | -1.928 (8.751) |
| D2 | 15.093** (1.796) | 0.579** (0.075) | 11.326 (7.818) | -7.347* (3.157) | 0.796** (0.057) | 0.532** (0.078) | -3.187 (5.346) |
| D3 | 15.854** (1.886) | 0.548** (0.079) | 12.281 (10.393) | -7.134* (3.220) | 0.799** (0.057) | 0.517** (0.085) | 2.116 (2.765) |
| D4 | 12.571** (1.814) | 0.667** (0.078) | 30.691 823.797) | -7.398 (3.331) | 0.713** (0.066) | 0.622** (0.076) | 11.427 (12.193) |
| **Finland** | **7.978** (9.308)** | **0.367** (0.028)** | | **10.371** (1.671)** | **-0.129* (0.062)** | **0.368** (0.034)** | |
| D1 | 5.912** (1.128) | 0.439** (0.038) | -5.851 (6.945) | 7.726** (1.937) | -0.077 (0069) | 0.429** (0.035) | -6.916 (8.629) |
| D2 | 8.084** (0.925) | 0.363** (0.031) | 0.353 (1.939) | 10.381** (1.702) | -0.165* (0.073) | 0.392** (0.042) | -1.903 (1.914) |
| D3 | 8.727** (1.041) | 0.339** (0.034) | 2.869 (3.917) | 11.816** (1.715) | -0.164** (0.060) | 0.341** (0.039) | 3.492 (4.428) |
| D4 | 8.483** (1.097) | 0.349** (0.036) | 1.729 (2.618) | 10.785** (1.879) | -0.143* (0.064) | 0.364** (0.039) | 0.748 (1.712) |
| **France** | **15.876** (0.918)** | **0.157** (0.045)** | | **3.871** (1.041)** | **0.688** (0.102)** | **0.102** (0.016)** | |
| D1 | 15.556** (0.931) | 0.167** (0.045) | 8.902 (5.194) | -0.873 (1.171) | 0.946** (0.053) | 0.097** (0.021) | -5.211 (4.409) |
| D2 | 17.046** (1.009) | 0.096* (0.048) | 6.360* (3.195) | 5.803** (1.058) | 0.616** (0.052) | 0.074** (0.018) | 3.621 (1.973) |
| D3 | 15.731** (0.893) | 0.162** (0.044) | 4.853* (2.271) | 4.132** (1.133) | 0.672** (0.055) | 0.104** (0.016) | 0.491 (0.813) |
| D4 | 15.196** (0.953) | 0.188** (0.047) | 2.573 (1.726) | 5.604** (1.311) | 0.577** (0.068) | 0.118** (0.018) | 2.865 (2.752) |
| **Germany** | **27.209** (0.875)** | **-0.295** (0.034)** | | **27.237** (1.299)** | **-0.014 (0.036)** | **-0.288** (0.039)** | |
| D1 | 25.495** (0.993) | -0.225** (0.037) | -5.895 (3.836) | 23.168** (1.088) | 0.094** (0.037) | -0.206** (0.032) | -6.374 (5.056) |
| D2 | 28.877** (1.083) | -0.367** (0.042) | 6.360 (3.564) | 28.436** (1.478) | 0.058 (0.055) | -0.394** (0.039) | 7.776 (4.772) |
| D3 | 28.537** (1.160) | -0.353** (0.045) | 6.267 (3.434) | 29.652** (1.554) | -0.029 (0.045) | -0.374** (0.046) | 5.735 (3.159) |
| D4 | 26.983** (1.101) | -0.292** (0.042) | 5.954* (3.102) | 27.836** (1.128) | -0.017 (0.039) | -0.309** (0.037) | 5.183* (2.578) |
| **Hungary** | **2.809* (1.249)** | **0.746** (0.048)** | | **-13.473** (3.574)** | **0.284** (0.045)** | **1.118** (0.105)** | |
| D1 | 3.732 (2.139) | 0.710** (0.081) | -6.672 (9.491) | -9.569** (3.386) | 0.279** (0.042) | 0.979** (0.107) | -10.724 (11.148) |
| D2 | 2.794* (1.307) | 0.746** (0.052) | -6.515 (8.097) | -12.040** (5.014) | 0.288** (0.077) | 1.059** (0.129) | 4.981 (9.669) |
| D3 | 2.727* (1.227) | 0.746** (0.049) | -1.555 (5.680) | -16.052** (4.806) | 0.311** (0.056) | 1.204** (0.147) | -10.038 (9.264) |
| D4 | 4.065** (1.225) | 0.649** (0.048) | 29.986 (77.057) | -0.749 (3.297) | 0.076 (0.042) | 0.769** (0.097) | 23.075 (68.633) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Italy** | **14.698** (0.789)** | **0.247** (0.038)** | | **2.663 (1.943)** | **0.603** (0.063)** | **0.248** (0.051)** | |
| D1 | 11.467** (1.921) | 0.394** (0.093) | 12.108 (10.692) | 3.679** (1.521) | 0.525** (0.074) | 0.271** (0.048) | 4.623 (4.295) |
| D2 | 17.279** (1.019) | 0.119* (0.048) | 7.400 (6.140) | 5.457* (2.339) | 0.538** (0075) | 0.176** (0.051) | 3.167 (2.857) |
| D3 | 14.099** (0.753) | 0.279** (0.036) | -0.781 (1.208) | 0.472 (1.683) | 0.705** (0.064) | 0.261** (0.039) | -4.113 (4.275) |
| D4 | 15.493** (0.749) | 0.206** (0.037) | 5.434 (5.401) | 4.704** (1.247) | 0.600** (0.047) | 0.149** (0.033) | 6.280 (4.616) |
| **Latvia** | **3.808 (3.710)** | **1.349** (0.224)** | | **-3.729 (3.289)** | **0.458** (0.073)** | **1.100** (0.175)** | |
| D1 | 3.571 (3.725) | 1.356** (0.226) | 7.738 (7.493) | -4.171 (2.992) | 0528** (0.076) | 1.013** (0.157) | -14.838 (12.290) |
| D2 | 0.499 (3.855) | 1.536** (0.239) | 34.948** (14.468) | -5.346 (3.881) | 0.439** (0.079) | 1.220** (0.191) | 27.538* (14.099) |
| D3 | 4.219 (4.441) | 1.305** (0.277) | 29.711** (12.155) | -3.903 (3.106) | 0.479** (0.073) | 1.064** (0.166) | 6.715 (5.259) |
| D4 | 1.148 (4.032) | 1.491** (0.250) | 33.361 (24.839) | -5.711 (3.884) | 0.402** (0.077) | 1.296** (0.218) | 21.911 (14.943) |
| **Lithuania** | **22.292** (0.914)** | **-0.032 (0.054)** | | **12.881** (1.849)** | **0.379** (0.084)** | **0.048 (0.051)** | |
| D1 | 20.964** (0.879) | 0.043 (0.053) | 11.132 (6.145) | 12.753** (1.864) | 0.395** (0.085) | 0.034 (0.053) | -5.138 (5.938) |
| D2 | 19.961** (0.934) | 0.096 (0.058) | 26.765* (13.956) | 12.163** (2.088) | 0.316** (0.086) | 0.160** (0.054) | 26.901 (15.738) |
| D3 | 22.759** (1.378) | -0.078 (0.084) | 21.752 (11.745) | 15.798** (2.150) | 0.305** (0.079) | -0.040 (0.077) | 10.906 (5.991) |
| D4 | 19.894** (0.975) | 0.090 (0.055) | 26.471 (20.062) | 14.586** (1.890) | 0.228* (0.089) | 0.123* (0.056) | 24.455 (14.885) |
| **Luxemburg** | **12.259** (3.091)** | **0.224** (0.067)** | | **11.243* (4.464)** | **-0.192 (0.123)** | **0.336** (0.086)** | |
| D1 | 13.981** (4.083) | 0.186* (0.088) | 1.822 (5.700) | 8.726 (4.978) | -0.099 (0.163) | 0.347** (0.085) | -2.884 (5.662) |
| D2 | 7.169 (4.352) | 0.340** (0.096) | -8.536 (14.676) | 5.639 (4.153) | -0.191 (0.129) | 0.464** (0.082) | -11.521 (14.499) |
| D3 | 12.318** (3.276) | 0.223** (0.071) | -2.438 (8.195) | 8.081 (4.396) | -0.206 (0.125) | 0.415** (0.086) | -14.264 (11.879) |
| D4 | 15.936** (3.383) | 0.140* (0.073) | 15.718 (13.335) | 20.904** (4.919) | -0.371** (0.131) | 0.211* (0.097) | 18.602 (12.138) |
| **Netherland** | **17.019** (1.760)** | **0.118' (0.066)** | | **-6.221** (2.225)** | **0.726** (0.050)** | **0.416** (0.053)** | |
| D1 | 18.961** (1.867) | 0.043 (0.068) | 3.146 (2.174) | -16.769** (4.343) | 0.895** (0.092) | 0.673** (0.094) | -6.835 (6.350) |
| D2 | 18.226** (1.888) | 0.071 (0.071) | 5.127 (4.293) | -5.785* (2.463) | 0.723** (0.063) | 0.402** (0.053) | 0.551 (1.836) |
| D3 | 17.804** (1.908) | 0.084 (0.070) | 3.013 (2.330) | -8.046** (2.622) | 0.780** (0.061) | 0.444** (0.061) | -2.909 (3.360) |
| D4 | 21.501** (1.945) | -0.049 (0.073) | 7.660 (6.767) | -6.001* (2.629) | 0.724** (0.052) | 0.409** (0.068) | 0.224 (1.463) |
| **Poland** | **1.127 (0.849)** | **1.019** (0.031)** | | **0.412 (1.087)** | **0.031 (0.022)** | **1.025** (0.032)** | |
| D1 | 2.012* (0.828) | 0.987** (0.029) | -5.909 (12.624) | -1.504 (0.922) | 0.136** (0.021) | 1.027** (0.034) | -16.362 (24.075) |
| D2 | 1.403 (0.862) | 1.008** (0.031) | 0.765 (3.335) | 0.063 (1.128) | 0.051 (0.032) | 1.026** (0.033) | 3.965 (4.623) |
| D3 | 1.296 (0.958) | 1.012** (0.035) | 2.012 (3.981) | 0.423 (1.169) | 0.032 (0.023) | 1.026** (0.038) | -0.829 (3.991) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D4 | 2.560** (0.943) | 0.941** (0.038) | 7.174 (9.616) | 3.273* (1.629) | -0.014 (0.026) | 0.917** (0.056) | 8.154 (15.167) |
| **Slovenia** | **10.814** (2.543)** | **0.549** (0.092)** | | **1.184 (1.142)** | **0.934** (0.022)** | **0.017 (0.041)** | |
| D1 | 2.854 (4.296) | 0.874** (0.164) | -16.983 (10.692) | -6.578** (1.866) | 1.003** (0.033) | 0.257** (0.059) | -11.600 (15.690) |
| D2 | 14.322** (2.744) | 0.409** (0.105) | 12.346 (11.188) | 3.027* (1.533) | 0.929** (0.024) | -0.053 (0.054) | 6.608 (6.268) |
| D3 | 21.560** (3.725) | 0.125 (0.145) | 23.955 (21.616) | 1.687 (1.718) | 0.932** (0.023) | -0.001 (0.060) | 0.825 (2.365) |
| D4 | 15.137** (3.605) | 0.371** (0.135) | 16772 (24.775) | 0.794 (1.137) | 0.942** (0.022) | 0.027 (0.039) | -3.238 (1.975) |
| **Slovakia** | **40.457** (2.856)** | **-0.517** (0.094)** | | **34.066** (2.957)** | **0.189** (0.069)** | **-0.464** (0.069)** | |
| D1 | 39.973** (2.812) | -0.484** (0.093) | -19.401 (15.248) | 31.835** (2.954) | 0.247** (0.067) | -0.427** (0.067) | -12.572 (10.314) |
| D2 | 41.339** (3.004) | -0.556** (0.101) | 11.896 (8.771) | 33.832** (3.035) | 0.212** (0.067) | -0.482** (0.072) | 7.233 (6.039) |
| D3 | 43.311** (3.202) | -0.632** (0.106) | 25.174 (20.905) | 36.892** (3.058) | 0.156* (0.074) | -0.542** (0.073) | 10.214 (13.468) |
| D4 | 40.389** (2.999) | -0.526** (0.099) | 23.054 (18.626) | 34.432** (2.985) | 0.178** (0.071) | -0.477** (0.070) | 14.205 (13.997) |
| **Spain** | **14.071** (0.974)** | **0.497** (0.046)** | | **-9.891** (1.746)** | **0.799** (0.042)** | **0.668** (0.049)** | |
| D1 | 11.503** (1.215) | 0.601** (0.052) | 20.622 (18.070) | -9.537** (1.766) | 0.756** (0.045) | 0.702** (0.047) | 3.141 (2.293) |
| D2 | 15.839** (1.048) | 0.408** (0.051) | 18.973 (17.136) | -7.249** (1.746) | 0.723** (0.044) | 0.628** (0.046) | 16.217 (10.582) |
| D3 | 12.008** (1.123) | 0.583** (0.051) | 10.028 (7.186) | -9.662** (1.682) | 0.774** (0.047) | 0.689** (0.046) | 0.348 (2.604) |
| D4 | 14.139** (1.077) | 0.489** (0.052) | 4.982* (2.402) | -9.789** (1.777) | 0.785** (0.044) | 0.678** (0.050) | 1.712 (1.253) |
| **Sweden** | **7.410** (1.008)** | **0.379** (0.037)** | | **7.296** (1.117)** | **-0.036 (0.063)** | **0.405** (0.058)** | |
| D1 | 5.252** (1.261) | 0.461** (0.046) | -9.133 (7.089) | 4.093** (1.259) | 0.118 (0.069) | 0.427** (0.051) | -10.993 (9.129) |
| D2 | 8.702** (1.181) | 0.328** (0.044) | 7.821 (5.136) | 8.908** (1.076) | 0.035 (0.058) | 0.299** (0.057) | 7.163 (5.104) |
| D3 | 7.185** (1.125) | 0.387** (0.042) | 0.622 (1.601) | 7.967** (1.153) | -0.033 (0.061) | 0.381** (0.059) | 0.007 (1.584) |
| D4 | 8.793** (1.007) | 0.324** (0.038) | 9.092 (7.632) | 9.353** (1.270) | -0.113 (0.063) | 0.375** (0.064) | 9.118 (7.749) |
| **UK** | **9.648** (1.265)** | **0.405** (0.074)** | | **0.316 (0.767)** | **0.797** (0.041)** | **0.176** (0.031)** | |
| D1 | 14.587** (2.345) | 0.106 (0.136) | 34.092* (14.468) | 1.612 (1.181) | 0.729** (0.054) | 0.162** (0.040) | 4.189 (4.379) |
| D2 | 8.121** (1.651) | 0.485** (0.093) | 7.720 (5.562) | -0.528 (0.709) | 0.903** (0.060) | 0.127** (0.038) | -3.527 (3.241) |
| D3 | 9.467** (1.249) | 0.414** (0.072) | 3.614 (3.648) | 0.573 (0.791) | 0.761** (0.043) | 0.194** (0.034) | 1.709 (2.298) |
| D4 | 9631** (1.234) | 0.406** (0.071) | 1.809 (2.666) | 0.359 (0.789) | 0.795** (0.042) | 0.175** (0.032) | -0.125 (1.498) |

*Notes:* ** and * denote statistical significance at 1 and 5% levels, respectively. $\alpha$ and $\beta$ coefficients are from equation 1. Number of instruments varies between 5 and 9, values of Sargan test for GMM estimations vary between 0.20 and 0.30 indicating efficiency of chosen models.

Dummies represent quarters of the year 2008, which is indicated as the first year of the global financial crisis with the highest negative effect on European Union countries. Every dummy is separately included and estimated in equations (3) and (4). In Table 3, estimated dummy coefficients are presented by $\alpha_2$ coefficients. Only in a few country cases, the estimates for dummy coefficients were found significant. These are Bulgaria, Cyprus, Czech Republic, France, Germany, Latvia, Lithuania and the UK in the GMM application and the same countries with the exception of France and the UK in the dynamic GMM application. In all cases where dummy coefficients were found significant, the sign of coefficient is positive, indicating increase in investment flows during the considered period, except the first quarter in Bulgaria and the third quarter in Cyprus, where decline in investment flows was detected.



One of purposes of this study was to examine the change in the saving retention coefficient, which determines the capital mobility with the consideration of the global financial crisis. The results illustrate that the inclusion of dummy variables brought only minor changes in saving retention coefficients. Hence, inclusion of dummy variables in eleven countries led to the increase of the saving-retention coefficient value, indicating the decline of capital mobility in these countries, particularly in Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, France, Hungary, Latvia, Slovakia and the UK. The increase in the saving retention coefficient is very slight, about 0.1 rise, for example in Austria the coefficient increased from 0.3 to 0.4, while in Belgium the increase from 0.7 to 0.8 is observed. In other mentioned countries the change in the coefficient is even less.

There was found a tendency for a slight increase in capital mobility in Bulgaria, Finland, Luxemburg, Poland and Slovenia, when the quarters of 2008 year were introduced in the model as dummy variables. Values of the saving retention coefficient were estimated at a lower level. For example the coefficient decreased in the case of Poland from 1.01 to 0.9, in case of Slovenia it declined from 0.5 to 0.3 when the fourth quarter is included. Finally, estimations for Germany, Italy, Spain and Sweden provided mixed results where the saving retention coefficients increased

with inclusion of some quarters of 2008 and decreased with the inclusion of another quarters. Values of the saving retention coefficient were not found significant in cases of Lithuania and Netherlands. As a result, the inclusion of dummy variables in terms of quarters that represent the early stage of the global financial crisis did not have significant effect on changes in the capital mobility estimations. These results indicate that the inclusion of the global financial crisis in estimations has very low impact on the capital mobility indicators.

**4. Conclusion**

This study attempted to make a contribution to the literature on the Feldstein-Horioka puzzle employing a dynamic econometric technique. Level of capital mobility of 27 individual European countries is studied in this paper employing the GMM framework. In addition, this study investigates the impact of the global financial crisis of 2008 on the level of European countries' capital mobility. Four different regressions are estimated for every country alternating the inclusion of the global financial crisis effect in standard and dynamic models (see equations (1), (2), (3) and (4)). In a case where the impact of the global financial crisis is not considered, Table 2, the dynamic models estimations provided higher saving retention coefficients in most countries. The inclusion of the dynamic parameter, the first lagged value of investments, leads to higher saving retention coefficients. The level of capital mobility in European countries is estimated at a lower level when the dynamic nature of investments is considered indicating a dependence of investments decision in their past experience.



The early effect of the global financial crisis on the capital mobility level is investigated in this study by estimation of four alternative dummy variables. The most negative impact of the crisis on world economies is indicated in 2008; therefore, this year is estimated as the year of the crisis. This study investigates the impact of four quarters of the year 2008; thus, estimations for every country are made for four alternative quarters, which are represented by dummies in Table 3. Only in eight countries out of 27 countries, the coefficients of

dummy variables were found significant. These are Bulgaria, Cyprus, Czech Republic, France, Germany, Latvia, Lithuania and the UK. In most countries where the global financial crisis was found significant, the saving retention coefficient was estimated at slightly higher level indicating a lower level of capital mobility.

The standard GMM estimation results indicate a relatively high level of capital mobility and rejection of the Feldstein Horioka puzzle in European countries. However, the inclusion of the dynamic parameter indicates that historical changes in investment and savings decrease capital mobility in European countries. Experience of previous capital movements negatively influence decisions for future capital flows. Consideration of the impact of the global financial crisis in the model does not significantly change the results of capital mobility. The policy implication of this article is that in order to decrease risk of negative effects of a possible financial crisis countries making decisions on capital flows have to take into account their historical changes. This may decrease capital mobility, however the negative impact of a global financial crisis decreases. The future research is planned to be conducted on an inclusion of year 2009 as a dummy for measuring prolonged impact of the global financial crisis.

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