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The Relation Between Monetary Integration, the Economic Development of the Euro Area and Sports Performance

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Abstract

Nowadays, heavily influenced by the emergence of the new capitalism, people are increasingly less concerned with sport, which is very important, both for the harmonious development of the individual and to promote the image of a nation or a region. This paper is intended as a study on the relationship between monetary integration, the economic development of the euro area and sports performances of this region. In short, we wanted to ask if the euro can act as a team and to the sport, as it does in other areas. In doing so we realized an econometric analysis of this area and then we analyzed the performance of its sport. The conclusion is that yes, it can act as a unified team, but it have to take some risks, including those related to the number of participating athletes, dominate and related to existing economic disparities between countries.

Keywords: Euro Area, monetary integration, economic development, sport, performance

1. Introduction

One of the activities that are part of the branches of the national economy is the sports and recreational activities. Typically, this task is hidden in a cone of shadow by researchers, especially by those in the economic field, because the employed population in this area and producing revenue represents a share too low. We believe that a nation has as much need of sport activities and auxiliaries, as well as other activities. Therefore, in the present work we wanted to examine what impact can have economic development of a region, in this case, the Euro area, the sport performance.

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More specifically, I'm trying to show if monetary integration can be taken as an example in the sport, so that the Euro area can be considered a single team at the upcoming major sporting events such as the Olympics and if this would be beneficial or not.

2. Methodology

In order to achieve the purpose of this study we conducted, at first, an econometric analysis in which we have shown in what manner the Euro area economy was badly affected by the economic and monetary integration, and then, for about the same period, to analyze the performance of the Member countries of the Euro area and the Euro area overall, at the Olympics.

Thus, we have chosen to analyze the correlation between the real growth rate of gross domestic product in the Euro Zone, foreign direct investment in the Euro area, as well as the growth rate of the population occupied the same space (Alfaro L. et all , 2004; Basu P., Chakraborty C. and Reagle D., 2003; Borensztein E., De.Gregorio J. & Lee J-W., 1998; Trevino L.J. and Upadhyaya K.P., 2003). The period chosen for this endeavour is located between 1996 and 2010. This includes both years before the introduction of the single currency, but also years during the current crisis facing the entire planet.

The method used in regression analysis is multi-factorial (Sima et all., 2012), and the platforms used were Excel and Eviews.

3. Results

Table 1. Indicators used in econometric analysis

Indicators	Semnification	The nature of the variable
pib_ze	Real growth rate of gross domestic product in the Euro area (%)	Endogenous variable (criterion)
isd_ze	The growth rate of foreign direct investment in the Euro area (%)	Exogenous variable (predictor)
pop_ocup_ze	The growth rate of the occupied population in the Euro area (%)	Exogenous variable (predictor)
a_1,a_2,a_3	Econometrically determine coefficients	

Source: Table drawn up by the authors

Table 2. Evolution of indicators between 1996 and 2010 (%)

Year	pib_ze	isd_ze	pop_ocup_ze
1996	1,5	1,33	0,6
1997	2,6	1,42	0,9
1998	2,8	2,75	1,9
1999	2,9	6,72	1,9
2000	3,8	11,62	2,5
2001	2	5,75	1,4
2002	0,9	5,31	0,7
2003	0,7	3,59	0,5

2004	2,2	2,04	0,8
2005	1,7	4,35	1
2006	3,3	3,96	1,6
2007	3	6,62	1,7
2008	0,4	2,92	0,8
2009	-4,3	3,37	-1,8
2010	1,9	2,72	-0,5

Source: Table drawn up by the authors based on data taken from www.eurostat.eu

Analyzing the evolution of gross domestic product (see Table 2) in the Euro area in the period from 1996 to 2010, it is observed that in the year 2000, it reached a peak, reaching a growth rate of 3.8 percent. A similar increase was felt in 2006, reaching a value of 3.3%. Perhaps this trend upward in 2006 would have continued if not break out in 2007 and began to propagate the global financial crisis. It is noted that these shocks on the international markets have produced a major change to this trend, as the minimum to be achieved in 2009, when he had a value of 4.3%. Measures to combat the negative effects of the crisis, managed in 2010 that the real growth rate of gross domestic product in the Euro Area to take back positive values, with 1.9 percent.

In terms of foreign direct investment in the Euro area, it is noted that they have been positive throughout the period of reference. The peak of these investments was reached in 2000 when their growth rate was at 11,62%. After this year, this indicator has seen a significant increase in 2007, exactly at the beginning of the crisis. Minimum point was in 1996, only 1.33%.

Another indicator taken into account and which has a major influence on the endogenous variable is the rate of increase in employment in the Euro area.

Note that for this indicator, the maximum was reached in 2000 when he recorded a value of 2.5%, and the minimum was reached in 2009, with a value of-1.8%.

Identification of regression function is carried out with the help of graphic of variable pib_ze depending on the other two variables, isd_ze, respectively pop_ocup_ze (see also Table 1).

Analyzing the graphs noted that the link between pib_ze and isd_ze, respectively pib_ze and pop_ocup_ze can be approximated by a straight line. Thus, the model chosen is a multifactorial, because being correlated with linear pib_ze isd_ze, the pop_ocup_ze is available, and it will be easily correlated linearly and in relation to both factors.

Further we realized the estimate model parameters. For this we turned to the least-squares Method applied in Eviews, which requires the following calculation: getting the system of equations by calculating the partial derivatives with respect to the parameters of the model.

$$F(a_1,a_2,a_3)=min\Sigma(pib\_ze - a_1 - a_2*isd\_ze - a_3*pop\_ocup\_ze) \quad (1)$$

After estimating equation we obtained the following results:

a_1=0,645497 σ_{a1}=0,491528 Prob.= 0,2137 > 0.05 => accept H_0
a_2=-0.142968 σ_{a2}=0.116482 Prob.=0.2432 > 0.05 => accept H_0
a_3=1.781048 σ_{a3}=0.293636 Prob.=0.0001 < 0.05 => accept H_1
σ_{et}=0.974678

Estimators are significantly different from zero, with a threshold of significance α if it check the following relationships:

$$\frac{\hat{a}_1}{\sigma_{a_1}} > t_{calc.} \quad \frac{\hat{a}_2}{\sigma_{a_2}} > t_{calc.} \quad \frac{\hat{a}_3}{\sigma_{a_3}} > t_{calc.} \quad (2)$$

Having all the data above and working at a threshold of significance $\alpha = 0.05$, the t-student distribution value for t, n-k-1, meaning $t_{0,025;\ 12} = 2,179$.

Thus, by comparing the results that we obtain for the a_1, $t_{calc.} = 1,3132$, so it is smaller than the t_{tab}, from which it follows that the null hypothesis is accepted, so there is no free time estimator significantly different from zero.

We have that for a_2, $t_{calc.} = -1,227383$, less than the value of the t_{tab}, so any estimator this parameter do not differ significantly from zero.

For a_3, its value $t_{calc.} = 6,065503$, greater than the value of the t_{tab}'s estimator, so this parameter is significantly different from zero.

These considerations were the results of the analysis carried out on a number of 15 observations. Due to the fact that I am counting on the assumption that the normal distribution is an estimation around the true value , the model obtained should be tested.

Test "t" has led to the conclusion that the a_2 is not significant, being very close to zero, so the "foreign direct investment" was not too well chosen as the factor of influence of gross domestic product, having an indirect influence on them, while the a_3 differ significantly from zero, so the population factor "occupied a determining influence on the gross domestic product.

To verify the model's verisimilitude we applied in Excel the ANOVAs and Regression tests (Table 3), with the following results:

Table 3. ANOVAs and Regression tests

Regression Statistics	
Multiple R	0,88329915
R Square	0,78021738
Adjusted R Square	0,74358694
Standard Error	0,97467849
Observations	15

ANOVA

	df	SS	MS	F	Significance F
Regression	2	40,46935534	20,23467767	21,29970182	0,000112709
Residual	12	11,399978	0,949998166		
Total	14	51,86933333			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0,64549713	0,491527851	1,313246301	0,213657056	-0,425450054	1,716444317
X Variable 1	-0,1429677	0,116481739	-1,22738286	0,243212884	-0,396759596	0,110824217
X Variable 2	1,78104786	0,293635662	6,065502537	5,62395E-05	1,141270708	2,420825003

Source: Table drawn up by the authors based on the Excel results

It is noted that the report of multiple correlation (Multiple R) is 0,88329915 and show a very strong link between the variables. Determination coefficient R^2 (R-squared) has the value 0,78021738. It is expressed as a percentage (78%) and shows how dependent variable of the variance is explained by the estimated equation. The

closer to 1 (100%), the proportion of the variation explained his pib_ze is higher and so the link between variable intensity is stronger. To test the validity of the model took into account the two hypotheses:

- H_0: the model is invalid
- H_1: valid pattern

How we have $F_{calc.}$, i.e. $F_{statistic}$ =21,29, and $F_{tabelar}$, in our case $F_{05;\ 2;\ 12}$ = 3,885, so $F_{calc} > F_{tab.}$, it appears that the model chosen is a valid one, and parameters are relevant for the model, the function being well chosen.

In the analysis of autocorrelation of residual variables the most commonly used test is the Durbin-Watson. Assumptions of this test are:

H_0: p = 0, so there is no residue series-level autocorrelation

H_1: $p \neq 0$, so there is the autocorrelation

Analyzing out-put of Eviews we noted that the DW statistic of the model chosen by us is 1.86. Critical values of statistics depends on the number of exogenous variables within the model (2), the number of observations (15) and the threshold of significance chosen (0.05). Breakpoints include tables for items specified as a pair of values d1 and d2, d1= 0.95 and d2 = 1.54. Note that DW belongs to the range (d2, 4-d2), which is why it can be asserted that there is no autocorrelation of error, so it is acceptable to the hypothesis H_0.

To test the heteroskedasticity test I applied White (cross terms). It is defined for the following assumptions:

- H_0: the model is homoskedastic
- H_1: model is heteroskedastic

Test statistic: W = n * R-squared = 15 * 0,470518 = 7,05777

The critical value of statistics depends on the number of parameters that appear in the application of White test (6) and significance level chosen (0.05). So, we'll determine the χ^2 distribution for 6 degrees of freedom and α = 0.05, the critical value of 12,592. Note that comparing values we noted that W<12,592, which means that the null hypothesis is accepted, and the model chosen is homoskedastic.

To test for the existence of multicoliniarity we defined the assumptions:

- H_0: $r^2_{x1/x2}$ < R-squared, model does not present the phenomenon of multicoliniarity
- H_1: $r^2_{x1/x\,2}$ > R-squared, it is suspected the presence of multicoliniarity in the model

To verify the existence of the multicoliniarity we applied the Klein test. So, we calculated the matrix coefficients of the linear correlation as explanatory variables, from which we extract the value $r_{x1/x2}$ = 0,537449. Since $r_{2x1/x2}$ = 0,28885 < R-squared = 0,780217 one can say that the phenomenon of multicoliniarity is not present in the regression model.

Testing of the normality we did it with the help of histogram. We took into account the two hypotheses:

- H_0: Skewness = 0, Kurtosis = 3, so the distribution is normal
- H_1: the distribution is not normal

In the analysis we present that the distribution is asymmetrical, one oriented towards positive values (Skewness = 1.2), with a flattening of 5.4. Also, the Jarque-Bera shows a value of 7,28 > 0,05 therefore we accept the assumption that the errors are not normally distributed.

Following this econometric tests it has been observed that the term has coefficient 0,645497 free. The term free means that point of explanatory variables are 0. Since t = 1, the probability is 0,21 and threshold of significance is 0.05, it means that the coefficient is insignificant. Moreover, the fact that the lower limit of the confidence interval (- 0,42545 ≤ a1 ≤ 1,716444) for this parameter is negative, and the upper limit is positive, show that the parameter is null.

Coefficient a_2 is - 0,142968, which means that an increase of foreign direct investments by 1%, the GDP will fall by 0.14%. Since t =-1,227, probability is 0,2432, and in particular the significance threshold is 0,05 it means that the coefficient is insignificant. Moreover, the fact that the lower limit of the confidence interval (- 0,396759

≤ a1 ≤ 0,110824217) for this parameter is negative, while the upper limit is positive, we indicate that the candidate is approximately zero. The a_3 being 1,781048, we show that the employment is in direct positive relationship with gross domestic product, i.e. an increase of 1% in the rate of employment in the Euro area, the gross domestic product of the region will increase by 1.78%. The fact that the candidate is significantly different from zero and is confirmed by the confidence interval (2,420825003 ≤ a1 ≤ 1,41270708) which has both the lower and upper limit, positive. As regards the second part of this study, we have chosen a number of six summer Olympics, respectively Spain 1992, United States of America in 1996, Australia 2000, Greece 2004, China 2008 and United Kingdom 2012. In the following table are listed the results (the medals) obtained by the analyzed group.

Table 4. Medals obtained at Olympics

	Spain 1992	USA 1996	Australia 2000	Greece 2004	China 2008	United Kingdom 2012
						2
Austria	2	3	3	7	3	0
Belgium	3	6	5	3	2	3
Cyprus	0	0	0	0	0	1
Estonia	2	0	3	3	2	2
Finland	5	4	4	2	4	3
France	29	37	38	33	41	34
Germany	82	65	56	49	41	44
Greece	2	8	13	16	4	2
Ireland	2	4	1	0	3	5
Italy	19	35	34	32	27	28
Luxembourg	0	0	0	0	0	0
Malta	0	0	0	0	0	0
Netherlands	15	19	25	22	16	20
Portugal	0	2	2	3	2	1
Slovakia	*	3	5	6	6	4
Slovenia	2	2	2	4	5	4
Spain	22	17	11	19	18	17
Euro Area	185	205	202	199	174	168

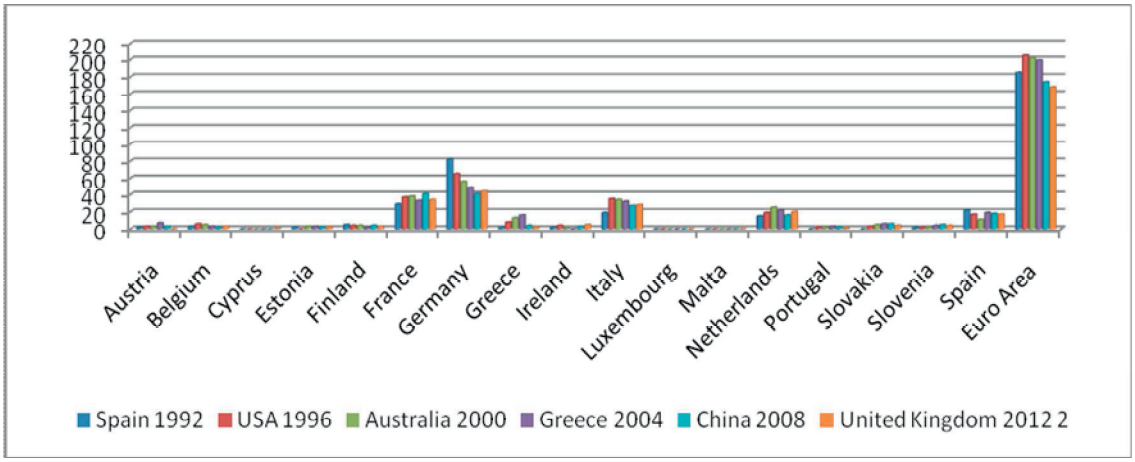

Fig. 1 Medals obtained at Olympics

Source: Prepared by the authors based on the data retrieved and processed on the website: http://www.bbc.co.uk/sport/olympics/2012/games-so-far

Thus, the table and the chart above (Table 4 and Fig. 1) is that the trend of the medals earned at Olympics, Euro area as a whole, is one sinusoidal, with a high point at the US Olympics (1996), when he won a total of 205 medals and a minimum at the Olympics in the United Kingdom (2012), when they won only 171 times. It is also pretty clear that the strongest country in this area is Germany, and it has suffered from certain factors so that the disruptive number of medals earned in 1992 was 82, while continuing to fall until 2008, when it reached only 41 medals, and later, in 2012, to grow again, the fairly weak. The second country in the top medalists France, which is a trend increasing from 1992 until 2008, when he won 41 medals, following in 2012 to win only 34 medals.

Realizing further analysis broken down by periods when it was set up for the Euro area and by now, we obtained the following results:

Table 5. Medals for the Euro area, on the stages of evolution

	Euro Area -11	Euro Area -12	Euro Area -15	Euro Area -17
Australia 2000	179			
Greece 2004		186		
China 2008			166	
United Kingdom 2012				168

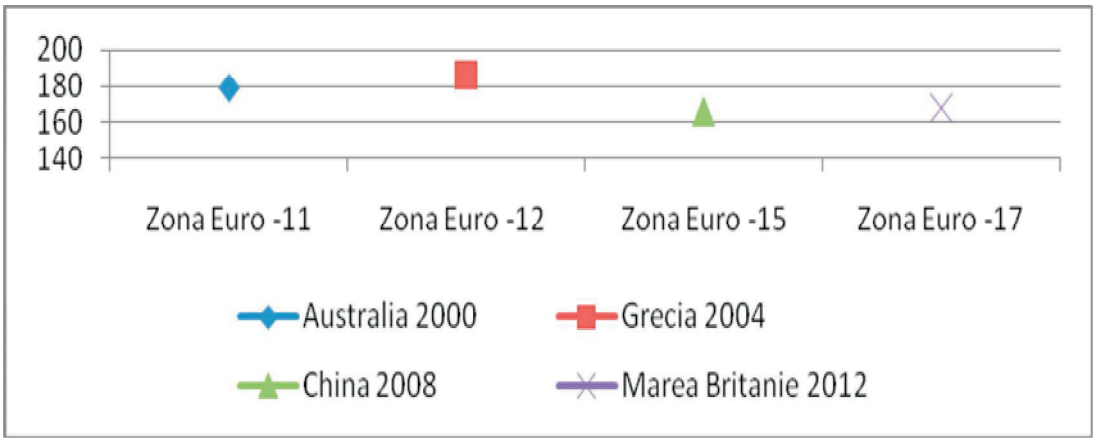

Fig. 2 Medals for the Euro area, on the stages of evolution

Source: Prepared by the authors based on the data retrieved and processed on the website: http://www.bbc.co.uk/sport/olympics/2012/games-so-far

Note that the trend for winning medals by the Euro Area (Table 5 and Fig. 2), stages of development, is one clear point of maximum sinusoidal, being represented by the Olympics in Greece (2004) with a total of 186 medals won, when the Euro zone were 12 Member States, and the minimum being at the Olympics in China (2008) when he recorded a number of only 166 medals won. This trend has not changed much nor at the Olympics (2012) in United Kingdom, Euro zone winning with only two medals in addition to previous Olympics, although the number of States is higher, the acting performances and asymmetric shocks deriving from the global crisis and crisis in the Euro area in particular.

4. Conclusions

Overall, the period taken into account it is noted that between gross domestic product and foreign direct investment in the region considered there was a reverse negative relationship. As I mentioned at the beginning of this review, in economic theory is noted that foreign direct investment would have positive effects on the economy of the region. However, there are cases, like the one described above, in which foreign direct investment may have an opposite effect on the economy of the region. Although foreign direct investment raises the productivity of investment and consumption, they may also decrease the economy due to the improper allocation of prices or biases of resources. Another cause which could determine this relationship negative would be that the output of the Euro area investment exceeds the level entries. It should also be borne in mind that the analysis is composed of 17 different countries with economies. Another important factor is that in the Euro area employment growth rate of population is quite low (some Euro area countries confronted with high unemployment) so that there is a lack of human capital, so the effect of FDI on the gross domestic product is negative.

Should not be ignored nor that the Euro area is currently in a strong crisis, which made their presence felt since 2007 and has had significant negative effects on the less developed countries in this region.

All of these things above were reflected in an econometric model, more specifically in its results. We can thus preview that once its anti-crisis measures will also benefit the relationship between Member States will regain vigour, economic and monetary integration of these will return to the normal parameters, which will determine economic growth as good as before the crisis, if not even better.

So, how can it be that monetary integration to influence the integration of sport and thereby the performance of the Euro area? Well, if we considered the example of the two separate Germanys which produced weaker

performance in sports than unified Germany, the same thing can happen and if Euro area, more accurately reflects those 17 States would participate from now on as a single team. The only drawback would be that of the number of participating athletes, who would be limited, but we must take into account the fact that the Euro area would make the team only the best athletes.

The link between the economic status of the area and its sporting performance is very strong because, for example, the level of foreign direct investments, they are reflected in the activities of the sports infrastructure. Another indicator that affect performance in sports and that it took into account is gross domestic product, the level of which is reflected in the expense that an athlete is willing to do to improve performance (expenditure on vitamins, nutrition, equipment, training, etc.). The third indicator under analysis, the employed population, is relevant because there are persons employed in the field of sport, without which the athletes ' performance would not be able to operate in optimal conditions.

In conclusion, between monetary integration, the economic development of the Euro area and sports performances of the region there is a relationship of interdependence, sports performance is strongly influenced by the other two components.

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