

# The Link between Productivity And Labor Compensation In Selected Central And Southeast European Countries

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## Abstract

The link between labor productivity and labor compensation has been of great interest in economic research. The traditional economic theory argues that there is a positive link between productivity and workers' compensation. According to this theory, increasing labor productivity will cause an increase in the wage level and will boost the average household purchasing and consumption power. However, many research studies addressing this issue indicate a weakening of the link between labor productivity and compensation received by employees, with a rising divergence since the 1980s, when labor productivity started growing faster than real wage. The purpose of this research is to analyze the extent of the decoupling phenomenon in selected CEE countries compared to Western European countries. In this respect, the paper attempts to explore the causal relationship between productivity and real labor compensation and offer empirical evidence for the existence of the so-called Great decoupling between the two variables.

**Keywords:** productivity, labor market, decoupling, regression analysis, European Union countries

**JEL classification:** E24, J24, E3

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## Introduction

Labor productivity growth is recognized in economic theory as a basic precondition for a healthy growth of the economy. It should be, however, noted that according to economic theory real labor compensation and labor productivity should move with a synchronized trend. This assertion assumes that real compensation received by employees should reflect their work efforts. Yet since the 1970s the link between these two variables begins to weaken, i.e. labor productivity and real labor compensation exhibit a widening gap in their movements. Moreover, at the beginning of the 1980s the diverging trend gains substantial dynamics in many countries, primarily in the USA and Japan. Empirical studies have found that the first and second oil shock, the fast development of technology and the increase of the share of in GDP influenced the divergence of the trends of labor productivity and employee's compensation. The increased presence of the so called decoupling between labor productivity and employee's compensation motivated the emergence of numerous empirical studies worldwide. Most studies are focused on the USA though, which is justified considering the fact that the American economy experienced the largest divergence in the movement of labor productivity and real labor compensation. Mishel and Bernstein (1994) triggered the question of the worsening condition with employee's wages and the wide inequality in income distribution in the American economy. Stansbury and Summers (2017) claim that if there is a delinkage of wage growth from productivity growth that may be a consequence of some structural factors and technological change. Also in this research paper Stansbury and Summers went a step further and tried to empirically measure the causal relationship between the two variables. They conclude that an increase of labor productivity of 1% contributes to an average growth of real labor compensation between 0.4 and 0.7% for an average production/nonsupervisory worker. Pasimeni (2018) analyzed this causal link in the countries of the European Union and found that the relative proportion of labor productivity growth transferred as labor compensation is somewhere between 50-60%, thus confirming that even though not strongly pronounced, there is still a certain level of divergence in the movement of labor productivity and real labor compensation in the EU.

Here, one should emphasize the structural differences in the economic and political systems of Central Eastern European countries, and Western EU countries. As for the countries of the former Eastern Bloc (CEE), they underwent a complex process of creating a liberal, integrated market, done both under positive internal pressure, and by external objective needs. In this respect these countries made changes in their economic, political and social reality. It can be concluded that all CEE countries have one common feature, they have undergone a profound transformation of the structure of the economic and political system. Here it should be noted that, although each country based on its specific circumstances, intellectual potential, complemented by the ideological and political will, has individually charted its path in the direction of profound changes in society. However, all the countries in this group have the common goal of establishing a modern capitalist system based on market principles.

The structural changes in the economic and political system have an impact on the overall economic relations and performance in this group of countries. In this regard it should be mentioned that by reforming the labor market, for the first time this market functions in the true sense of the word, i.e. its primary function is to inform labor supply and demand. However, the changes that have taken place in this direction have implications on the unemployment rate, low

labor productivity, etc. Such structural changes are only mentioned in this analysis, but are not subject to deeper quantitative measurements. This is because the analyzed period does not correspond to the transformation period of the countries on the one hand, but also due to the qualitative nature of the reforms, it can be difficult to make objective assessments in their quantification.

The aim of this paper is to estimate the level of causality between labor productivity and real labor compensation in the EU countries for the period 1997-2018, more specifically, the impact of labor productivity on real labor compensation. The paper provides a descriptive analysis of the trend of both variables on single country cases and estimates the level of causality between labor productivity and real labor compensation for old member states (Western EU countries) and new member states (CEE countries), respectively, using a panel regression technique. To our best knowledge this is one of the few research papers attempting to analyze the differences in the labor productivity movement and the real labor marketization in Central Eastern European countries compared to Western EU countries. The paper is structured as follows. Following the Introduction, a brief review of the empirical literature is provided. Further, the methodology used in the empirical exercise is explained, followed by a discussion of the empirical results and the concluding remarks.

## **1. Literature review**

The analysis of the dynamics and the causal relationship between labor productivity growth and real labor compensation receives increasing attention in the debate among the creators of economic policies and in empirical research worldwide. The postulates of the classical economic theory that the relationship between labor productivity and labor compensation is positive and that the marginal labor productivity growth is followed by a linear growth of wages do not comply with the real trends after the 1970s. In an empirical study, Karabarbounis and Neiman (2014) conclude that, beginning from the 1970s onward, almost all developed economies experienced a large shift in the distribution of income, that is a substantial decline in the share of labor in the income distribution.

Nikulin's (2015) research included the new member states of the EU in the analysis of the dynamics of labor productivity and wages. His estimates yielded a conclusion that in Slovenia, Slovakia, Hungary, Estonia and the Czech Republic there is a significant level of divergence in the trend movement of wages and labor productivity, whereas Poland exhibits a high positive relationship between the two variables. In their research, Brynjolfsson and McAfee (2013) analyzed the "Great decoupling" theory, where the main finding is that the technological progress has a positive impact on labor productivity. The study includes also the change in worker's wages and employment, which both grow with a noticeable lag when compared to productivity growth.

Most of the empirical studies of the decoupling phenomenon are focused on the USA. Mishel and Bernstein (1994) provided a descriptive analysis of employee's pay and labor distribution. They concluded that there was a trend of decline of employee's wages, which in turn causes higher inequality in the income distribution. Feldstein (2008) analyzed the labor productivity

and labor compensation in the second half of the 20<sup>th</sup> century, using the product price deflator for both variables when analyzing the functional distribution of income. He found no statistically significant divergence in the evolution of labor productivity and employee's compensation. On the other hand, Stansbury and Summers (2018) aim to examine how strongly labor compensation depends on productivity growth, i.e. how much labor productivity growth improves the living standard (in the form of real labor compensation) of workers. This analysis, unlike Feldstein's (2008), employs a consumer price deflator to calculate the real values of the variables. Since the ultimate goal of the research is to examine the changes in the living standard of workers, the consumer price deflator is considered best fitted. The authors concluded that 1% labor productivity growth will contribute to an average labor compensation growth of 0.4-0.7 percentage points per worker. Pasimeni (2018) analyzed this causal link in the countries of the European Union and found that the relative proportion of labor productivity growth transferred as labor compensation is somewhere between 50-60%, thus confirming that even though not strongly pronounced, there is still a certain level of divergence in the movement of labor productivity and real labor compensation in the EU.

## 2. Data and Methodology

The data on all the variables used in this empirical study are taken from the European Commission database AMECO. The analyzed countries are the members of the EU (except for Malta and Cyprus<sup>5</sup>). The countries are divided into two groups based on their economic characteristics, the year of their EU accession and geographical location. The first country group includes the Western EU countries – the countries that joined the European Union before 2004 (Belgium, France, Spain, Germany, Italy, Finland, Luxembourg, the Netherlands, Sweden, Denmark, Ireland, Austria, Great Britain, Greece, Portugal), while the second group consists of the Central East Europe countries (CEE) - the countries that have joined the Union since 2004 (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia, Slovakia, Bulgaria, Romania and Croatia).

As explained above, the aim of the paper is to analyze the causal relationship between labor productivity and real employee compensation for the period 1997-2018. In order to address this question, the paper examines two variables: labor productivity per hour worked and real compensation per hour worked. It is useful to note that as a variable for the reward received by workers the variable real wage could also be used. However, in line with previous empirical research on this issue on one hand, and the larger level of objectivity provided by this variable on the other hand, this study uses real compensation of employees per hour worked. It should be additionally explained that this variable is in real terms and represents the real value received by employees, i.e. calculated using private consumption as a deflator (as the most relevant criterion for the consumption power of employees).

The empirical analysis examines the causal relationship between labor productivity and real labor compensation per hour worked. Therefore, the model includes the following two variables:

- Real hourly compensation (private consumption deflated), which is calculated by dividing Real compensation per employee with Average annual hours worked, and

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<sup>5</sup> Excluded from the analysis due to lack of data.

- Real hourly productivity, calculated by dividing real GDP (in 2010 prices) with Total annual hours worked.

In order to estimate the level of causality between hourly labor productivity growth and real hourly employee compensation and the level of decoupling between the variables, the following simple panel regression is performed:

$$\text{Compensation} = \text{constant} + \beta \text{ productivity} + \mu$$

Where *compensation* stands for real hourly compensation, *productivity* is real hourly productivity per worker. The  $\beta$  coefficient shows the percentage change in real hourly compensation as a response to an increase in labor productivity per hour worked of 1%. If the labor productivity is completely transferred to the workers, the coefficient would be 1 and this would indicate a complete rejection of the decoupling phenomenon. The other extreme is a  $\beta$  coefficient of 0, when there is no relation between the two variables, i.e. there is a complete decoupling. The empirical studies, however, show that the coefficient  $\beta$  is mainly somewhere between 0 and 1 and its value indicates the level of decoupling. Thus, the paper aims to estimate the  $\beta$  coefficient of both country groups for the period 1997-2018 in order to find the level at which workers manage to benefit from the labor productivity growth in the form of real labor compensation, for both groups of countries.

### 3. Discussion of Results

Figures 1 to 26 in the Appendix show the dynamics of the index of labor productivity per hour worked and the index of real worker's compensation per hour worked for individual countries. In the Western EU countries (Figure 1 to 15), a certain level of synchronization in the movement of labor productivity per hour and real hourly employee compensation can be noticed. However, on average hourly labor productivity grows at a higher rate than real hourly labor compensation. There are however, exceptions from this trend. For example, in Germany, France, Luxembourg and Sweden real hourly compensation grows with a faster pace than hourly productivity growth. Ireland is an interesting case where since 2012 labor productivity records a more intensive growth, while real labor compensation exhibits a stagnation, which is the most dazzling example of decoupling. Even though with smaller dynamics, such trend exists also in Great Britain, Portugal, Greece, Spain, Italy. The Italian case is also worth mentioning, where from 1997 until 2008, the hourly labor productivity and real hourly compensation record an evident difference, the biggest gap among all countries within this group. It should be noted, though, that in the countries with a high level of decoupling, certain individual factors enhanced this phenomenon. The trend movement of the variables, even though with smaller differences is noticeable also in the case of Luxembourg where the rate of real hourly compensation has a bigger extend of growth compared with extend of growth of real hourly productivity.

The second country group consists the Central and Eastern Europe countries or EU member states which were part of the former Eastern bloc. Also these countries are characterized as middle income countries based on GNI per capita and joined the EU in 2004 and later. Figures 16 to 25 in the Appendix analyze the dynamics of the indexes of hourly labor productivity and

real hourly worker compensation in individual countries within this group. On average, the group does not record too large divergences in the trend of the variables. Thus the decoupling phenomenon is not evident in this group on average, implying a satisfactory level of transferring productivity growth to workers in the form of real compensation. Still, we can notice that certain countries deviate from this average trend characteristic for this group. The dynamics of hourly labor productivity and hourly labor compensation in Croatia indicate the existence of a substantial level of divergence between the two variables. Labor productivity grows at a higher rate than labor compensation, indicating that an increased value from labor productivity contributes to a smaller increase in labor compensation. On the other hand, in Bulgaria real hourly labor compensation grows at a higher rate than real hourly labor productivity. Still, this trend is under a large influence from the legal changes related to the several times increase of the legally established minimum wage in the case of Bulgaria. In Romania, there is a convergence of the two variables.

There is a stagnation in the growth of labor productivity growth and real labor compensation growth in 2008-2009, primarily caused by the financial crisis, which had repercussions on the real economy. Beginning in 2010, the two variables record a positive growth, yet labor productivity grows at a faster rate than real labor compensation, meaning that a relatively smaller share of the added value produced by the higher labor productivity goes to the workers as real compensation. In 2017 there is an overlap of the two variables, indicating a growth of real labor compensation and an increasing percentage of labor productivity growth is allocated to the employees. Further, in Lithuania and Latvia, the growth of real labor compensation is more dynamic compared to the growth of hourly labor productivity, indicating a certain level of decoupling, which is however led by the intensive growth of real hourly labor compensation compared to the growth of hourly labor productivity.

Table 1 and 2 present the results from the econometric panel regression analysis of the two groups of countries. The results from the panel estimation aim to provide an answer to the question about whether there exists a decoupling between labor productivity growth and real employee compensation growth and the impact of the first on the latter. This was done by testing the causal relationship between labor productivity per hour worked and real compensation per hour worked on one hand and for the extent of the relationship on the other. The results in table 1 refer to the Western EU countries (first group of countries). They indicate a statistically significant positive causal relationship between the two variables.

The value of the  $\beta_1$  coefficient of 0,414 signifies percentage change real hourly labor compensation caused by a 1% increase in hourly labor productivity. From the coefficient value of 0.414, it can be concluded that the share of the value of employees in labor productivity growth is 0.414% while the rest is attributed to other factors of production, primarily technology. These results coincide with previous studies focused on this set of countries. We can conclude that even though there is a statistically significant causal relationship, it indicates the beginning of achieving a certain level of decoupling between labor productivity and real labor compensation received by employees.

Table No. 1:

Dependent Variable: RHC				
Method: Panel EGLS (Cross-section random effects)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RHP	0.41418	0.042445	9.757993	0.0000
C	54.05306	4.115354	13.13448	0.0000
Weighted statistics				
R-squared	0.773771			
Adjusted R-squared	0.757559			
S.E. of regression	3.763036			
F-statistic	47.72874			
Prob(F-statistic)	0.000000			

Source: Authors' calculations.

Table No. 2:

Dependent Variable: D(RHC)				
Method: Panel EGLS (Period random effects)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RHP)	0.688001	0.098555	6.980876	0.0000
C	1.313812	0.361383	3.635515	0.0003
Weighted Statistics				
R-squared	0.297176			
Adjusted R-squared	0.261874			
S.E. of regression	3.460639			
F-statistic	8.418176			
Prob(F-statistic)	0.000000			

Source: Authors' calculations.

The results in table 2 refer to the Central Eastern Europe countries (second group of countries) and indicate that there is a statistically significant causal relationship between hourly labor productivity growth and real hourly labor compensation. The coefficient  $\beta_1$  of 0.688 indicates the percentage change in real labor compensation as a response of a 1% increase in hourly labor productivity. This leads to the conclusion that the share of the value of employees in the labor productivity growth in this group of countries is higher than in the first group of countries. It should also be noted that in this group of countries, compared to the first group, there is a lower level of technological development. Accordingly, a larger relative proportion is allocated to the employees, i.e. labor has a larger share in productivity growth. On the other hand, the goodness of fit of the regression models is less than 30%, implying that the changes in real labor compensation are 70% explained by other factors not included in the model. Thus the assertion

that real compensation is also explained by the level of syndical organization, i.e. the capacity of syndicates to provide better conditions and rights for workers.

#### 4. Conclusion

This research aims to analyze the existence of the great decoupling phenomenon, i.e. the divergence of the dynamics of labor productivity and real labor compensation in the case of the countries of the European Union for the period 1997-2018. Research on this topic thus far, primarily for the USA and Japan, conclude that there is a certain lag in the wage growth that should accompany/follow labor productivity growth. This lag is above all due to the 1970s oil shocks, the dynamic development of technology and the increase of services as a share in GDP, which all have an impact on the divergence of the trends of labor productivity and employee's compensation.

The research finds, on average, a synchronized movement of labor productivity per hour worked and real labor compensation per hour worked within the Western EU countries (first country panel). However, in the case of Germany, France, Luxembourg and Sweden has a exceptions from this trend. The real compensation growth is faster than real productivity, while in Ireland since 2012 labor productivity records a more intensive growth, while real labor compensation exhibits a stagnation, which is the most dazzling example of decoupling. Even though with smaller dynamics, such trend exists also in Great Britain, Portugal, Greece, Spain, Italy. The Italian case is also worth mentioning, where from 1997 until 2008, the hourly labor productivity and real hourly compensation record an evident difference, the biggest gap among all countries within this group. It should be noted, though, that in the countries with a high level of decoupling, certain individual factors enhanced this phenomenon. The trend movement of the variables, even though with smaller differences is noticeable also in the case of Luxembourg. The panel regression analysis for this group of countries indicates the existence of a statistically significant relationship between hourly labor productivity growth and real hourly labor compensation growth. Yet, the regression coefficient of 0,414 means that this relationship is not proportional. An increase in labor productivity of 1% leads to a growth of real employee compensation of 0,414%. This indicates a certain level of decoupling between labor productivity growth and real compensation received by the employees.

The second country panel consists of Central Eastern Europe countries. This group exhibits less deviations on average in the trend of labor productivity and real labor compensation. However, some countries deviate from this rule. For example, the dynamics of hourly labor productivity and hourly labor compensation in Croatia indicate the existence of a substantial level of divergence between the two variables. Labor productivity grows at a higher rate than labor compensation, indicating that an increased value from labor productivity contributes to a smaller increase in labor compensation. On the other hand, in Bulgaria real hourly labor compensation grows at a higher rate than real hourly labor productivity. Still, this trend is under a large influence from the legal changes related to the several times increase of the legally established minimum wage in the case of Bulgaria, while in Romania, there is a convergence between the growth of the real hourly compensation per employee and the real hourly productivity.

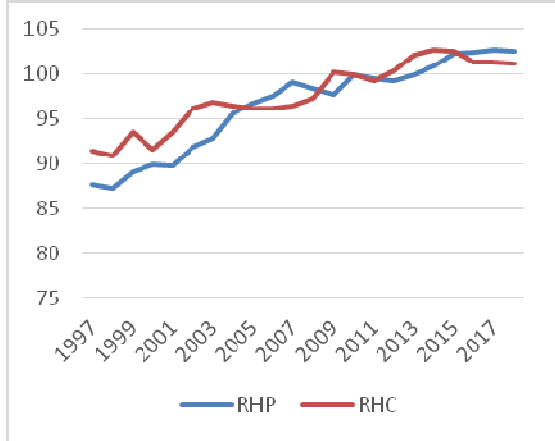


The results from the estimated panel regression for this country group indicate that there is a statistically significant positive relationship between labor productivity growth and the growth of real employee compensation. The regression coefficient of 0,688 show a higher level of compensation of employees from labor productivity growth compared to the first group of countries. Finally, this paper tries to empirically examine the existence and the extent of diverging trends of labor productivity and the compensation received by the employees. This is only a partial effort to explore the decoupling phenomenon and aims to trigger further research of this issue with more thorough analyses.

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## Appendix

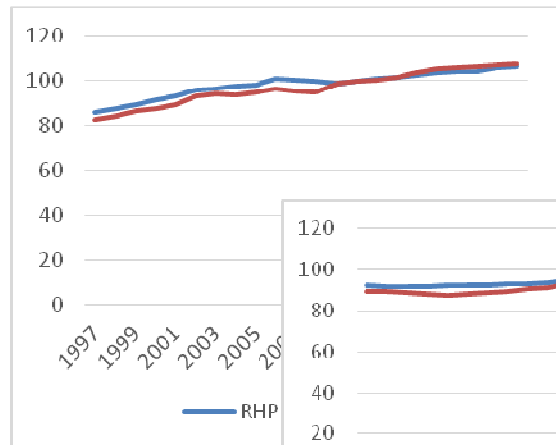


**Figure 1: Belgium 1997-2017 (2010 = 100)**

Source: AMECO database.

**Figure 2: France 1997-2017 (2010 = 100)**

Source: AMECO database.

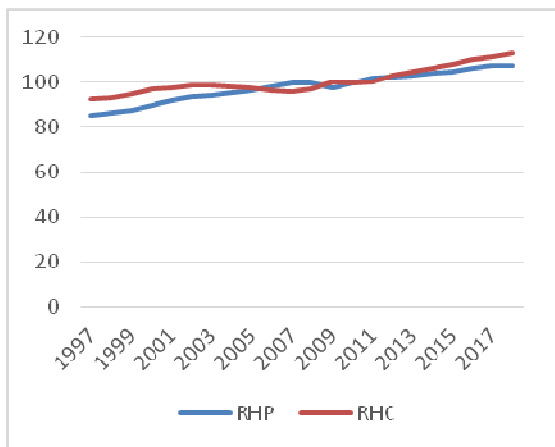


Source: AMECO database.

**Figure**

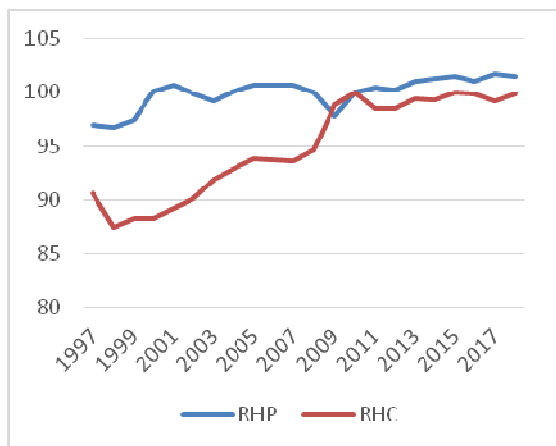
**Figure 3: Spain 1997-2017 (2010 = 100)**

Source: AMECO database.



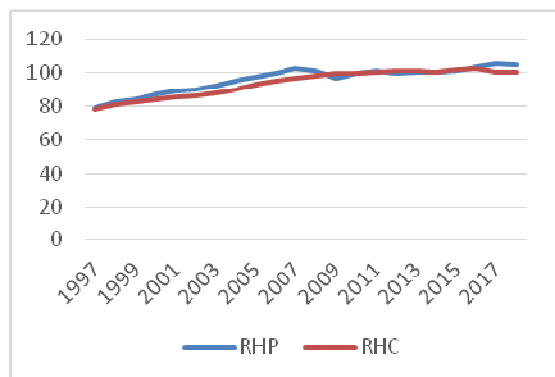
**Figure 4: Germany 1997-2017 (2010 = 100)**

Source: AMECO database.



**Figure 5: Italy 1997-2017 (2010 = 100)**

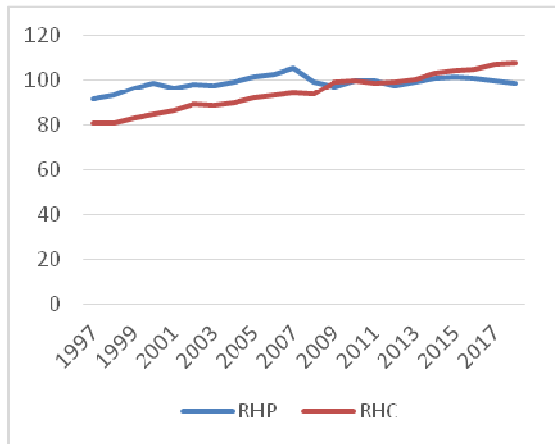
Source: AMECO database.



**Figure 6: Finland 1997-2017 (2010 = 100)**

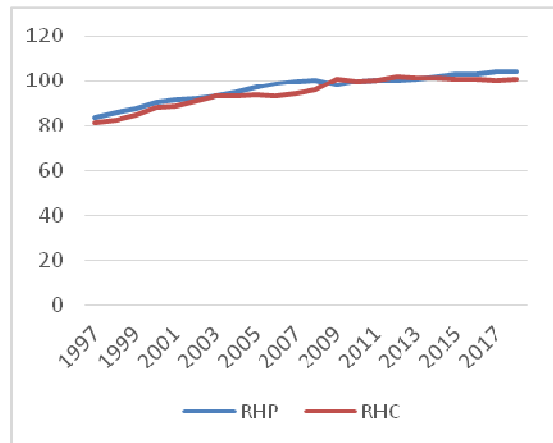
Source: AMECO database.

**Figure 7: Luxembourg 1997-2017 (2010 = 100)**



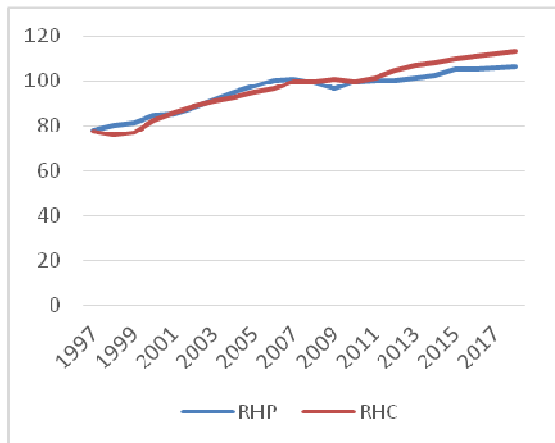
Source: AMECO database.

Source: AMECO database.



**Figure 8: Netherlands 1997 - 2017 (2010 = 100)**

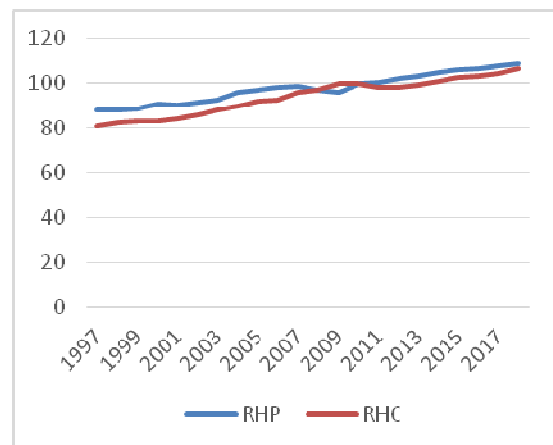
**Figure 9: Sweden 1997-2017 (2010 = 100)**



Source: AMECO database.

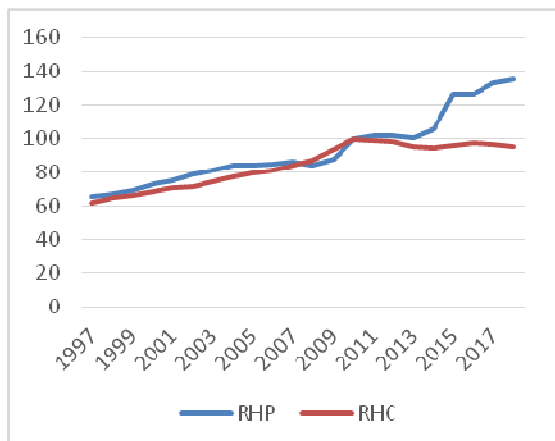
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Source: AMECO database.



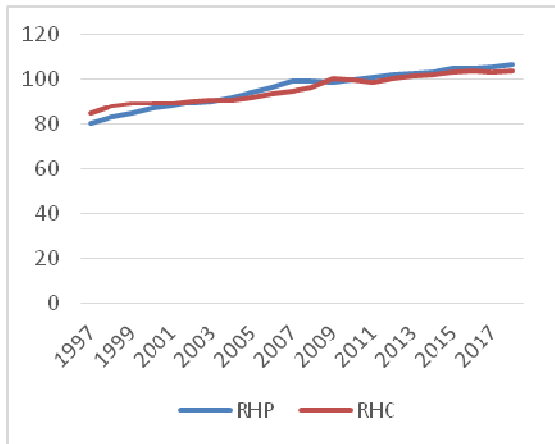
**Figure 10: Denmark 1997 - 2017 (2010 = 100)**

**Figure 11: Ireland 1997-2017 (2010 = 100)**

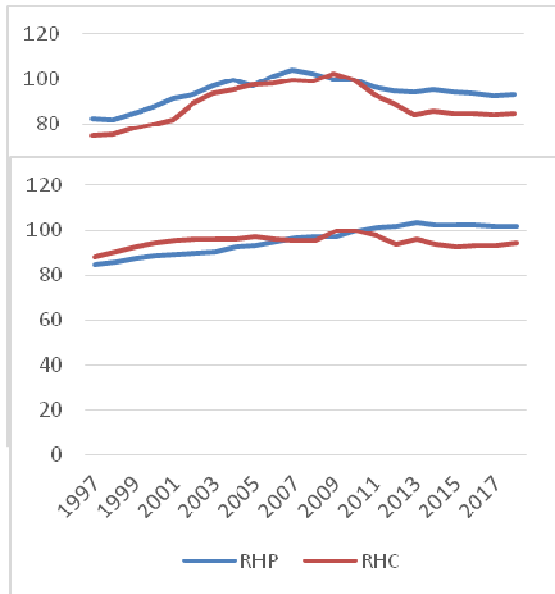


Source: AMECO database.

**Figure 12: Austria 1997-2017 (2010 = 100)**

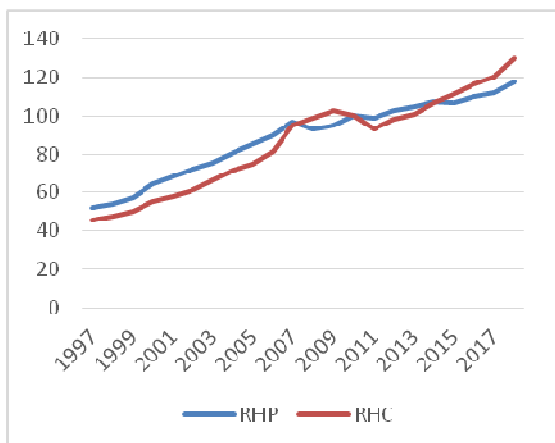


Source: AMECO database.



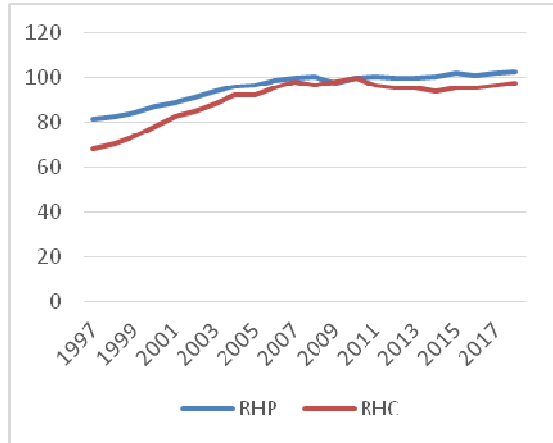
2017 (2010 = 100)

Source: AMECO database.



Source: AMECO database.

**Figure 13:**  
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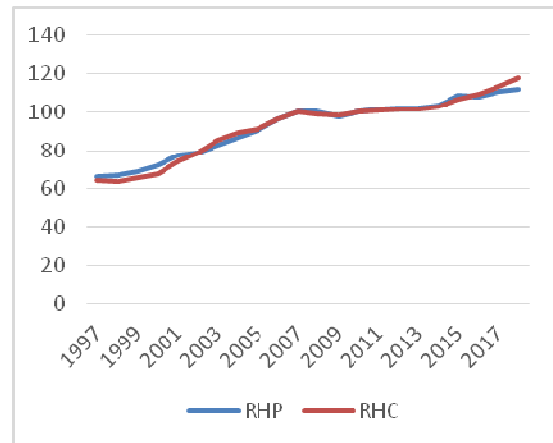


**Figure 14: Greece 1997-2017 (2010 = 100)**

Source: AMECO database.

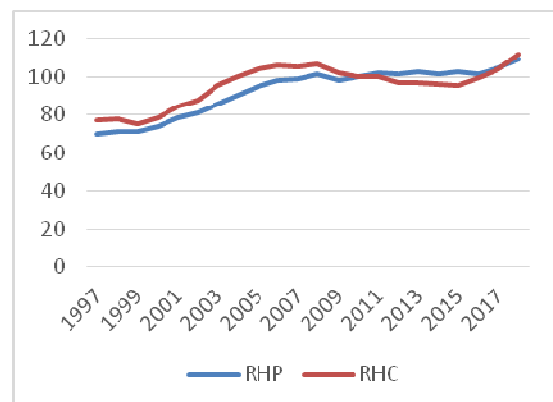
**Figure 15: Portugal 1997-2017 (2010 = 100)**

Source: AMECO database.



**Figure 17: Estonia 1997-2017 (2010 = 100)**

Source: AMECO database.

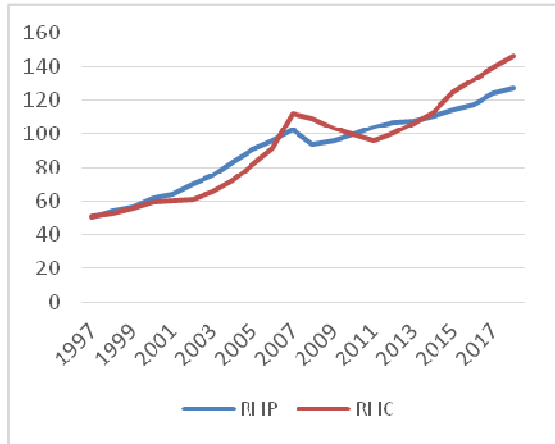


**Figure 16:**  
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**Figure 18:**  
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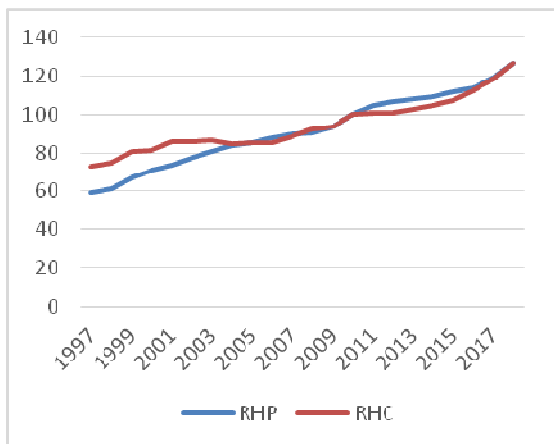
-2017 (2010 = 100)

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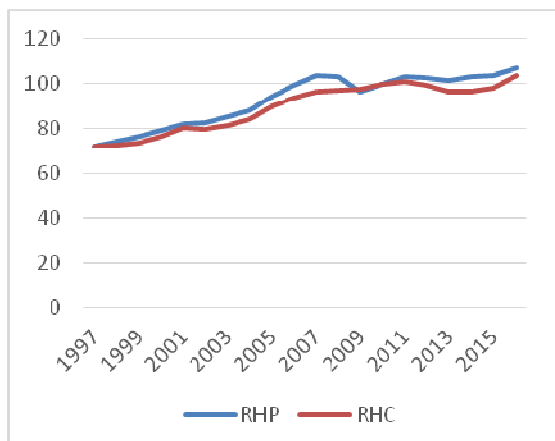


Figure 19: Latvia 1997-2017 (2010 = 100)

Source: AMECO database.

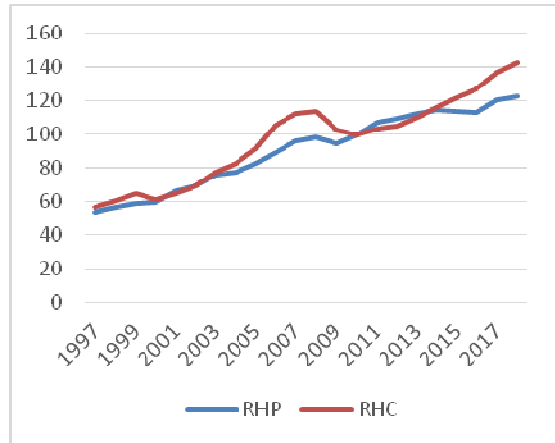
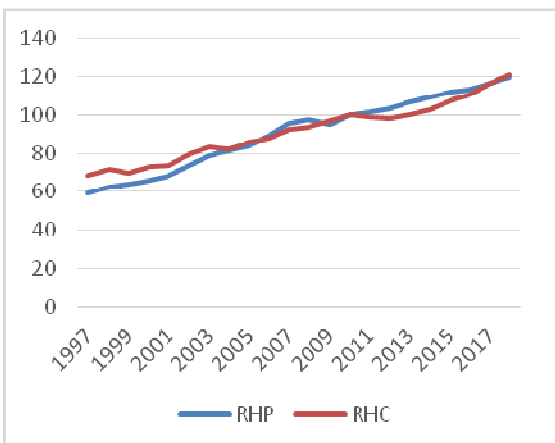


Figure 21: Poland 1997-2017 (2010 = 100)

Source: AMECO database.



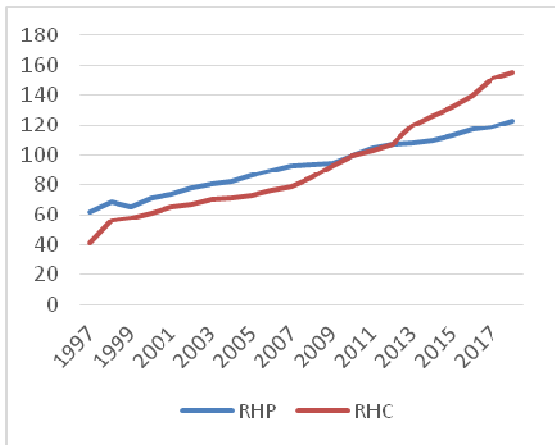
nia 1997-2017 (2010 = 100)

Source: AMECO database.

Figure 20: Lithuania 1997-2017 (2010 = 100)

Figure 22: Slovak Republic 1997-2017 (2010 = 100)

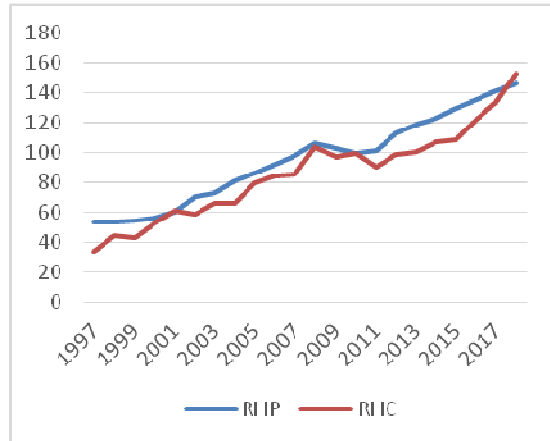
Figure 23: Slovenia 1997-2017 (2010 = 100)



Source: AMECO database.

**Figure 24: Bulgaria 1997-2017 (2010 = 100)**

Source: AMECO database.



**Figure 25: Romania 1997-2017 (2010 = 100)**

**Figure 26: Croatia 1997-2017 (2010 = 100)**

Source: AMECO database.

