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Strategies of Tax Competition and Harmonization in Enlarged European Union (25) and Their Potential Impact on Net Transfers of European Union to "New" Member States

Simulation of Adoption by Poland, Czech Republic and Slovakia the Selected Tax Policies of Greece, Spain and Ireland

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Introduction

Construction of the unified European Union integration cluster requires coordination of numerous policies including also a policy of tax harmonization. The range of required coordination of such a policy can be diversified because tax harmonization policy may cause different economic effects for particular member countries. Entering the EU by ten new members enlarged needs for structural development assistance. In the new Financial Perspective for Years 2006-2013, new indices were adopted to determine eligibility for structural assistance. They tie the maximum size of assistance with the average level of Gross National Income (GNI) per capita (PPS) in the assisted regions. It means that the higher growth rate of those regions the shorter period in which the structural assistance must be provided. Because GNI ceilings indices were adopted as a ruling instrument, the European Union can reduce its structural assistance to the new members only when the GNI growth rate of new members will be higher than now. The issue of economizing on structural assistance for new EU members can be transferred into the problem how to increase growth rates of the new member states to reduce the period in which the assistance should be provided.

To achieve this goal a number of instruments, including tax instruments, can be applied to accelerate the pace of the economic growth. The research conducted by the Institute for Private Enterprise and Democracy revealed that a negative impact of tax harmonization on GDP growth in Central Europe countries was observed in the pre accession period. If such tendency is continued it would impact on the reduction of the GDP growth, what would prolong the period in which the structural assistance is provided.

European Union countries which are the net suppliers of structural assistance financing should have a clear picture what kinds of tax policies of the new members may facilitate achieving the higher growth rates and what are the costs of restraining the economic growth by too high tax burdens. The presented paper is aimed at showing the options of tax policies for Poland, Czech Republic and Slovakia, which may accelerate the growth rates of GDP and allow for the shortening the structural assistance period.

1. Impact of taxation on economic growth. Options of tax policies for Central Europe countries

1.1. Main conclusions from review of literature on taxation impact on economic growth

One of the most controversial issues in economics is answering the question whether the tax cut is able to influence the economy and accelerate its growth rate. In 2000, Agnell and Person (Agnell, Persson, 2000) published a paper which presented the results of simulated reduction of tax burdens in 16 OECD countries on basis of endogenous growth model. They concluded that the highest increase in the growth rate can be achieved in Sweden, Finland and Denmark, i.e. in countries which possessed the highest tax burdens. It suggests that the tax relaxation policy can produce the best results in countries with the highest tax burdens.

The size of tax rates and progression of taxation can influence the labor force mobility. Gentry and Hubbard (Gentry, Hubbard, 2002) examined the relation between tax progression and labor force mobility on basis of TAXISM model applied by National Bureau of Economic Research. They concluded that labor force mobility reacts both on tax rates changes and for reduction of tax progression. Tax cuts facilitate better jobs seeking because employees are convinced that eventual income increase will not be subject to higher marginal tax rate.

In 2002 Cullen and Gordon (Cullen, Gordon, 2002) published an article on the impact of taxation on undertaking entrepreneurial activities. Using tax regression models they concluded surprisingly that tax cuts reduce propensity to start up business. They explained the revealed paradox by the fact that the tax cuts reduced benefits from subtracting costs of loans financing from taxable base. The most of businesses finance operations by loans and benefits of such operations are reduced when tax cuts are introduced. They concluded that tax cuts may reduce the propensity to take a business risk. Besides, as underlined Domar and Musgrave (Domar, Musgrave, 1944), the lower PIT rates also reduce the share of the government in business risk. Starting up a business activity is less attractive for persons who are not willing to take such risks. The presented research results show that there are different opinions on the impact of tax cuts on entrepreneurship.

The labor supply and its indirect measure – taxable income are important factors which decide on the level of optimal tax rates. The issue of reaction of labor supply on tax rates changes is a key issue of optimal taxation theory. The measurement of reaction of taxable income on tax rates changes was done by Gruber and Saez (Gruber, Saez, 2000). They used a complete observation panel of 46 000 tax forms in the period of 80-ties when significant tax cuts were made by R Reagan administration. The research revealed that taxable income elasticity for tax cuts grows with the increase of taxable income. The taxpayers from higher tax groups stronger react for tax cuts than taxpayers with medium size incomes. The accounted elasticities for USA amounted to 0,180 for the group with taxable income between 10 and 50 thousand USD, 0,106 for the group with taxable incomes between 50 and 100 thousand USD, and 0, 567 for the group with incomes over 100 thousand USD. The tax cuts introduced in the US in 80-ties caused significant increase of taxable income of the taxpayers group over 100 thousand USD.

A. Goolsbee in his paper *What Happens When You Tax the Rich? Evidence from Executive Compensation* (Goolsbee, 1997) discussed a problem of reactions of taxable income of executives for changes of marginal tax rates. The research embraced a period of 1991-1995. The results of the research showed that taxable income strongly reacts for the increase of marginal tax rate. Goolsbee accounted elasticities for three income groups and the lower group elasticity was 0,39, medium group 0,81 and 2,21 for the upper group. His research confirms that taxpayers with higher taxable incomes stronger react for tax increase than taxpayers from medium and lower groups.

G.D. Myles (Myles, 1999) reviewed the historical models of growth considering the impact of tax variables on the growth path. He showed that it is possible to isolate numerous channels in which taxation influences the growth rate. A part of models shows significant impact and similar number indicates insignificant impacts of taxation on the growth rate. Myles concludes that the review of growth models reveals that there are not convincing evidences on the significance of the impact of taxation on economic growth in the long run.

Mendoza, Milesi-Ferrati and Asea (Mendoza, 1997) showed in their regression models that the correlation between taxation and the growth rate is insignificant. Opposite evidences presented Leibfritz, Thronton and Bibbee (Leibfritz, 1997). They estimated that in the OECD countries, in the period of 1980-1995, each 10% of the growth of taxation rate was accompanied by the decline of the GDP growth rate by 0,5%.

The main conclusion on the presented models is that there are not convincing evidences for negative or positive correlation between tax burdens and the growth rate. It is especially true in the long run. In the short run evidences show that the impact of taxation on GDP is stronger. Therefore in the short run tax cuts can cause somehow impulse accelerating the growth rate but after some time this impulse is exhausting its potential for moving the economy forward. This creates very unclear picture on how taxation impacts the economic growth.

1.2. Applied tax policies and tax policy options for Central Europe

Analyzing the problem of the impact of tax policies on the size of net transfers, it is possible to come to the conclusion that from the Central Europe and the European Union as the unity points of view the only logical approach is to set up non – conflictive policies of tax harmonization and competition which would be beneficial both for the old and new members. The key interest of the both groups could be defined in the following way:

1) The key interest of old members is a reduction of the size of financial assistance transferred to the new members, probably through shortening the period of assistance and reduction of the size of assistance in relation to GDP.
2) The key interest of the new members is achieving the life standards on the level as in the old EU members group countries possibly in the shortest period of time.

The joint interest of those two groups is to accelerate the pace of GDP growth of the new members what would facilitate both: improvement of life standards in the new members countries and reduction of the size and period of financial assistance for the new members.

Therefore the issue on how tax harmonization and tax competition policies could impact the size of net transfers to the new members could be transferred into the issue how tax harmonization and competition policies could accelerate the GDP growth of the new members.

The paper analyses options of adoptions of selected tax policies of Greece, Spain and Ireland by Poland, Czech Republic and Slovakia. It is possible to divide the applied tax policies in Central Europe into two groups:

1) **Tax harmonization policies** – they were considered with application of demand-side models showing the impact of tax harmonization with EU on demand and GDP.
2) **Tax burdens policies**, deciding on the division of the overall tax burden among different types of taxes. The applications of those policies were considered from the supply side with the use of supply side models.

It was accepted that adoption of policies used by old EU members who quite recently had relatively low GDP per capita level can be useful for Central Europe and would have a diagnostic character for the future growth. Tax policies features applied by particular countries of Europe in the period 1996-2004 are characterized in the table below.

Table 1. Characteristics of the applied tax policies by Poland, Slovakia, Czech Republic, Greece, Spain and Ireland in the period of 1996-2004

Policy type	Poland	Slovakia	Czechs	Greece	Spain	Ireland
Harmonization of alcohol and tobacco taxes	Low pace, below EU average	Low pace below EU average	Low pace, below EU average	Low pace	Pace above the EU average	Pace slightly above EU average
Harmonization of fuel taxes	**Very high**	**Below EU average**	No data	**Significantly lower than average EU**	**Below EU average**	**Below EU average**
Harmonization of energy taxes	**High**	**Very high**	No data	Medium size level	Very low level	On the EU average
Policy of direct tax burdens	**Extremely low level**	No data	**High level of burdens**	Low level	Average EU level	**Extremely high burdens**
Policy of indirect tax burdens	High increase and high level	No data	**High level of burdens**	Very high level	Lower level than EU average	**Extremely high level**
Policy in social contributions burdens	**Very high growth and high level**	No data	**High level of burdens**	High level	High level	**Extremely low level**

Source: own elaboration on basis of statistical data of Eurostat

On basis of the data included in the above table the following policy options can be determined for the Central Europe countries:

1) Slow down the pace of indirect taxes harmonization in those Central Europe countries which observe a negative impact of tax harmonization on economic growth. Central Europe countries can follow policies of Greece, Spain and Ireland in this scope.
2) Moderate reduction of indirect taxes level to stimulate demand and supply. Spanish policy can constitute a pattern to follow up in this scope.
3) Reduction of the high level of social contributions which optionally will be compensated by the increase of direct taxes level to stimulate supply. The Irish tax policy can constitute a pattern for such an option.

The detailed information on the size of tax burdens is available in the Eurostat Internet accessible data base. The data base presents the size of absolute values and allow accounting relative measures in relation to GDP. Those statistics will be presented gradually on needed basis.

2. Simulations of application of different tax harmonization policies in EU and their impact on the growth pace of Poland and Slovakia

2.1. Simulation methodology

Simulations of application of different policies of tax harmonization were based on the synthetic characteristics of the policies, presented above, which for simplification reasons were named: Polish, Slovak, Greek, Spanish and Irish tax harmonization policies. From the point of view of economic policy correctness, an important issue is an answer for two questions:

1) What would be the effects of application of different harmonization policies in the given historical period and whether the change of the tax harmonization policy would bring economic benefits, mostly the higher pace of GDP growth?

2) What possible effects are available in the future as the effect of the shift from the present harmonization policy to the new tax harmonization policy in comparison to the continuation of the present policy in the future?

The answer for those questions has a key character to assess the quality of the present harmonization policy and the eventual future policy choice options.

2.1.1. Assumptions

Knowledge on tax harmonization policies, despite the fact that it was enlarged by numerous economists, does not give clear indications on the policy choice options. Applications of the present methods, sometimes highly mathematically sophisticated, do not give any practical answers how to shape harmonization policy. Taking into account the new EU member point of view, e.g. Poland, it seems to be important what country tax policy should constitute a patter to follow. The simplest option is to choose such a policy which brings the best results in the similar conditions. Simplifying, it can be accepted that in two countries, in similar conditions and comparable economic environment, the same tax instruments can bring similar results. This way of thinking, so often present among international financial institutions economists, allows for broad opportunities of economic simulations both: in relation to historical periods and going into future. This simulation accepts this way of thinking.

Assumptions:

1) The shift of the harmonization policy by the given country for the tax policy used by the other country brings the same results as in the country from where the policy was derived,

from the moment of the application of the policy in the given country. It means that the strength and direction of harmonization variables impact on GDP after adoption of the new policy is the same as in the country delivering the new policy.

2) The impact of remaining variables on GDP in the policy changing country remains unchanged, what means the adoption of *ceteris paribus* principle. However this unchanged impact of the remaining variables can also be analyzed and may influence the GDP level.

3) It is possible to isolate cause-effect interrelations between harmonization variables and GDP, and those interrelations are copied by the country which adopts the new policy in the unchanged way.

2.1.2. Simulation task

The task of this simulation is estimation of possible effects of changing Polish and Slovak tax harmonization policies into policies used in Greece, Spain and in Ireland. Estimation should be done in the past historical period, for which comparative data are available and in the future period up to 2015.

The presented simulation should be considered as a conditional estimation of GDP levels with applications of different tax harmonization policies. Conditional estimation allows for the usage of econometric modeling for building a simulation models, however it cannot be considered as econometric forecasting for obvious reasons (assumptions).

2.1.2. Analyzed variables

The following variables were applied in the modeling:

GDP_t – Gross Domestic Product in constant prices
FC_t – Final Consumption in constant prices
GCF_t – Gross Capital Formation in constant prices
Ex_t – Exports in constant prices
Im_t – Imports in constant prices
$NHIal_t$ – Net tax harmonization index: alcohol and tobacco [1]
$NHIfu_t$ – Net tax harmonization index: liquid fuels
$NHIel_t$ – Net tax harmonization index: electricity
$CTRG_t$ – Current transfers to the government (only Greece, Spain and Ireland)
$CTRP_t$ – Current transfers to private persons (only Greece, Spain and Ireland)

The above variables were applied with lags reaching the period of t-4. Quarterly data on time series were derived from Metabase of Eurostat. For estimation reasons, to fulfill stationarity of time series postulate, the logarithmic variables were used. Precisely: differences of logarithms of the variable in the t period and lagged t-1. Such variables had valuable features: they presented the logarithms of quarterly growth or decline of economic values. For example:

[1] Net harmonization indices define the pace of indirect tax harmonization in the given country in relation to the EU average. They are counted as relation of CPI index for harmonized goods in relation to CPI general for all goods in the country divided by analogical index for the EU average. Accepting that market conditions in EU countries are similar, the main reason for prices differentiation is tax harmonization policy.

$DLGDP_t = lnGDP_t - lnGDP_{t-1} = ln(GDP_t/GDP_{t-1})$

When having estimated value of $DLGDP_t$ and lagged value of GDP_{t-1} it was possible to estimate the absolute values of GDP_t by applying the equation:

$(GDP_t/GDP_{t-1})=e^{DLGDPt}$

and:

$GDP_t = GDP_{t-1} * e^{DLGDPt}$

Estimations of GDP in the form of logarithms differences were transferred into absolute values using the above presented features of logarithms.

2.1.3. Methodology of estimations

A. Estimation of results of changing harmonization policies of Poland and Slovakia in historical period

The following procedure was used in estimations:

1) Regression models were estimated. They had GDP_t as explained variable and explaining variables were elements of the global demand: FC_t, GFC_t, Ex_t, Im_t and additionally harmonization variables: NHI_{alt} NHI_{fut} NHI_{elt}. The regressions were estimated for Poland, Slovakia, Greece, Spain and Ireland. All estimated regressions had good or very good econometric features. Regression errors of GDP_t were low. It allowed for accepting a simplification that regressions may have a character of simulation functions (simulation regressions) and present stable and unchanged in time linear interrelations. It was accepted that explaining variables may have a lagged character.

2) In regression functions for Poland and Slovakia, values of structural parameters standing at harmonization variables were changed for parameters values derived from the regressions estimated for Greece, Spain and Ireland. It responded to the key assumption that the adoption of foreign tax policy copies features of such a policy, especially the strength of harmonization impact and remains the functioning of the rest of variables unchanged. Those changed forms of functional equations were called simulation functions (regressions).

3) Simulation functions were elaborated in two variants: accepting lags of the country changing the policy (variant No 1) and accepting lags of the country delivering the policy (variant No 2).

4) Data on values of harmonization variables of Greece, Spain and Ireland were introduced to simulation functions for Poland and Slovakia, the remaining variables copied either Polish or Slovak existing data values. A new estimation was done for Poland and Slovakia, with changed structural parameters and data values into data and parameters of Greece, Spain and

Ireland in relation to harmonization variables. It was done in the historical period for which comparative data were available. In this way the simulated values of GDP, after changing the tax policy, were estimated.

The first three steps of the discussed procedure can be presented with application of the following estimations and conducted simulations:[2]

1) Regressions estimations

Below, there are estimations of regressions which were the base for constructing simulation functions (regressions):

Table 2. Estimations of linear regressions of GDP_t for Poland, Slovakia, Greece, Spain and Ireland on basis of demand variables and harmonization variables

Variable DL…	$DLGDP_t$				
	Greece	Spain	Ireland	Poland	Slovakia
	GR	ES	IR	PL	SK
FC_t	0,87438	0,46524	0,48702	0,44473	0,69953
GCF_t	0,20757	0,11774	0,18698	0,095524	0,29441
EX_t	0,23168		0,66842	0,052638 (t-1)	0,72973
IM_t	-0,34158	-0,14452 (t-3)	-0,48873	0,086026	-0,71580
$NHIal_t$	-0,060931 (t-1)	0,21510 (t-3)	0,20393 (t-2)	-0,63618	0,13315 (t-4)
$NHIfu_t$	0,020619 (t-1)	0,28506 (t-3)	0,20370	-0,13517 (t-3)	-0,14716
$NHIel_t$		-0,20527 (t-1)			0,031420 (t-4)
$CRTG_t$	0,0017793 (t-1)	0,0034582	-0,0028525		
$CRTP_t$	0,0061405 (t-3)	-0,021503 (t-1)	0,011013 (t-1)		
U_t	0,00114533	0,0036941	0,0021462	0,0013855	-0,0015183
R^2	0,97548	0,94967	0,96863	0,99066	0,99152
DW	2,1997	2,0098	2,1592	1,9853	2,4594

Source: own estimation on basis of data from Eurostat Metabase.

Values included in the table indicate relatively good quality of regression estimations. It allowed for the acceptance of the simplification that estimations can have a character of simulation functions and present stable and unchanged in time linear interrelations of variables. Estimations were based on time series on periods from 1996-2003.

[2] Simulation results are presented in the following point.

2) Introduction of simulation functions based on estimated regressions

Below, there are formulas of transformation of existing regression estimations into simulation functions for Poland and Slovakia.

Table 3. Simulation of Greek harmonization policy by Poland. Proposed simulation functions

	$DLGDP_t$			
Variable	Regression estimations		Simulation functions	
DL…	Poland	Greece	Pl-GR1	PL-GR2
FC_t	0,44473	0,87438	0,44473	0,44473
GCF_t	0,095524	0,20757	0,095524	0,095524
EX_t	0,052638 (t-1)	0,23168	0,052638 (t-1)	0,052638 (t-1)
IM_t	0,086026	-0,34158	0,086026	0,086026
$NHIal_t$	-0,63618	-0,060931 (t-1)	**-0,060931**	**-0,060931 (t-1)**
$NHIfu_t$	-0,13517 (t-3)	0,020619 (t-1)	**0,020619 (t-3)**	**0,020619 (t-1)**
$NHIel_t$				
$CRTG_t$		0,0017793 (t-1)		
$CRTP_t$		0,0061405 (t-3)		
U_t	0,0013855	0,00114533	0,0013855	0,0013855
R^2	0,99066	0,97548		
DW	1,9853	2,1997		

Source: own estimation

In table 3, simulation functions were presented in two variants: in the first one lags of harmonization variables from the Polish regression were accepted and in the second one lags form the Greek regression were accepted. Below, the following formulas of simulation functions (regressions) are presented.

Table 4. Simulations of Spanish and Irish harmonization policies by Poland. Proposed simulation functions

	$DLGDP_t$			
Variable	Simulation functions		Simulation functions	
DL…	PL-ES1	PL-ES2	PL-IR1	PL-IR2
FC_t	0,44473	0,44473	0,44473	0,44473
GCF_t	0,095524	0,095524	0,095524	0,095524
EX_t	0,052638 (t-1)	0,052638 (t-1)	0,052638 (t-1)	0,052638 (t-1)
IM_t	0,086026	0,086026	0,086026	0,086026
$NHIal_t$	**0,21510**	**0,21510 (t-3)**	**0,20393**	**0,20393 (t-2)**
$NHIfu_t$	**0,28506 (t-3)**	**0,28506 (t-3)**	**0,20370 (t-3)**	**0,20370**
$NHIel_t$				
$CRTG_t$				
$CRTP_t$				
U_t	0,0013855	0,0013855	0,0013855	0,0013855
R^2				
DW				

Source. own estimation

Table 5. Simulations of Greek harmonization policy by Slovakia. Proposed simulation functions

	$DLGDP_t$			
Variable	Regression estimations		Simulation functions	
DL…	Slovakia	Greece	SK-GR1	SK-GR2
FC_t	0,69953	0,87438	0,69953	0,69953
GCF_t	0,29441	0,20757	0,29441	0,29441
EX_t	0,72973	0,23168	0,72973	0,72973
IM_t	-0,71580	-0,34158	-0,71580	-0,71580
$NHIal_t$	0,13315 (t-4)	-0,060931 (t-1)	**-0,060931 (t-4)**	**-0,060931 (t-1)**
$NHIfu_t$	-0,14716	0,020619 (t-1)	**0,020619**	**0,020619 (t-1)**
$NHIel_t$	0,031420 (t-4)		0,031420 (t-4)	0,031420 (t-4)
$CRTG_t$		0,0017793 (t-1)		
$CRTP_t$		0,0061405 (t-3)		
U_t	-0,0015183	0,00114533	-0,0015183	-0,0015183
R^2	0,99152	0,97548		
DW	2,4594	2,1997		

Source: own estimations

Table 6. Simulations of Spanish and Irish harmonization policies by Slovakia. Proposed simulation functions

	$DLGDP_t$			
Variable	Simulation functions		Simulation functions	
DL…	SK-ES1	SK-ES2	SK-IR1	SK-IR2
FC_t	0,69953	0,69953	0,69953	0,69953
GCF_t	0,29441	0,29441	0,29441	0,29441
EX_t	0,72973	0,72973	0,72973	0,72973
IM_t	-0,71580	-0,71580	-0,71580	-0,71580
$NHIal_t$	**0,21510 (t-4)**	**0,21510 (t-3)**	**0,20393 (t-4)**	**0,20393 (t-2)**
$NHIfu_t$	**0,28506**	**0,28506 (t-3)**	**0,20370**	**0,20370**
$NHIel_t$	**-0,20527 (t-4)**	**-0,20527 (t-1)**	0,031420 (t-4)	0,031420 (t-4)
$CRTG_t$				
$CRTP_t$				
U_t	-0,0015183	-0,0015183	-0,0015183	-0,0015183
R^2				
DW				

Source: own estimations

In estimations for Greece, Spain and Ireland variables presenting current transfers to the government and to the private sector were included to the equation. Transfers had high values and at least some impact on the global demand. Those variables were not important for Poland and Slovakia at least up to 2003 and they did not influenced global demand significantly. Significant transfers influencing global demand were started up just after accession in 2004, but this period is not reflected in equations.

3) Variant lags

Tables 2 to 5 present two variants of simulation regressions for each combination of countries. Adoption of policy importer country lags was based on thinking that at least some elements of harmonization mechanism in the policy importing country remain unchanged. It was supposed that such solutions would have better simulation features. Second variants copy the impact path of policy exporter in full what reflects accepted assumptions totally.

A. Estimation of effects of changing harmonization policies of Poland and Slovakia in the future up to 2015

Procedure of the prognostic simulation was based on the following steps. For simplification, this procedure was presented on the example of Poland and Greece. Analogical principles were accepted for the any other combination of countries.

1) Regression models were estimated for Poland, Slovakia, Greece, Spain and Ireland. They were described above.
2) On basis of existing time series, autoregressive functions were estimated for variables which were the elements of the global demand (except harmonization variables) for Poland and Slovakia. On basis of estimated autoregressions, the future values of the global demand variables were estimated.
3) In place of future values of harmonization variables for Poland, historic time series for Greece were introduced (with relative transformation)[3], accepting that from the 1st quarter 2004 Poland changed its harmonization policy into Greek one.
4) The future values of explaining variables were input to simulation function (simulation regression), and the simulated values of GDP were estimated when the policy was changed.
5) Future values of GDP of Poland were estimated for the continuation policy. In this case, for harmonization variables, historical time series for Poland were repeated. A simulation for Poland was created with unchanged harmonization policy.
6) Simulation of GDP with the changed policy was estimated in two variants, with Polish harmonization variables lags and with Greek ones.
7) A comparison between continuation policy and the changed policy was done in two variants.

The first phase of simulation copies historical simulation and cannot be discussed. Autoregressions estimated for demand variables had the following forms and features:

For Poland:

1) Final consumption - FC_t

$$DLFC_t = \underset{(-18,4728)}{-1,0287}DLFC_{(t-2)} + \underset{(3,5271)}{0,50854}DLNHIal_{(t-4)} - \underset{(-1,5954)}{0,077608}DLNHIfu_{(t-4)} + \underset{(9,3864)}{0,017575} + e_t$$

$R^2 = 0,95439$ DW=1,8194

[3] It was accepted that the NHI value for Poland from 2003q04 = 100% of the analogical value for Greece.

2) Gross capital formation - GCF_t

$DLGCF_t = -0,66294GCF_{(t-1)} -0,32309GCF_{(t-3)} +4,6832DLFC_{(t-3)}$
(-6,0063) (-3,0989) (5,3321)

$+7,3696DLFC_{(t-4)} -3,5735DLNHIal_{(t-1)} +4,5904DLNHIal_{(t-3)}$
(5,3727) (-4,0634) (3,7888)

$-0,34636DLNHIfu_{(t-3)} -0,099399 +e_t$
(-1,2939) (-8,8274)

$R^2= 0,99178$ DW = 1,8826

3) Exports – Ex_t

$DLEx_t = -0,69280DLEx_{(t-1)} -8,7835DLFC_{(t-1)} +8,7110DLFC_{(t-2)} +0,30271 +e_t$
(-5,6530) (-5,9669) (9,3510) (0,85459)

$R^2=0,90701$ DW= 2,1897

4) Imports – Im_t

$DLIm_t= -0,38751DLImt_{(t-2)} + 0,51103DLIm_{(t-4)} -3,6295DLNHIal_{(t-1)}$
(-3,8777) (3,8321) (-2,2598)

$-0,073808DLEx_{(t-3)} +0,013327 +e_t$
(-1,8193) (0,95349)

$R^2=0,89745$ DW = 1,8178

For Slovakia:

1) Final consumption - FC_t

$DLFC_t = -0,43026DLFC_{(t-1)} -0,53447DLFC_{(t-2)} -0,53322DLFC_{(t-3)}$
(-2,5052) (-2,8607) (-3,1228)

$+0,51857DLFC_{(t-4)} -0,17510DLNHIel_{(t-2)} +0,020343 +e_t$
(2,6738) (-1,7115) (2,3056)

$R^2 = 0,92087$ DW=1,8765

2) Gross capital formation - GCF_t

$DLGCF_t = -0,42046DLGCF_{(t-2)} -0,69147DLFC_{(t-1)} +0,51006DLFC_{(t-3)}$
(-3,1652) (-2,9965) (2,6081)

$- 2,0118DLNHIal_{(t-4)} +1,7077DLNHIfu_{(t-4)} -0,51576DLNHIel_{(t-1)} +0,011643 +e_t$
(-2,6081) (2,0053) (-2,0576) (0,67018)

$R^2= 0,77046$ DW = 1,9975

3) Exports – Ex_t

$DLEx_t = -0,60410DLEx_{(t-1)} -0,79012 DLFC_{(t-1)} -0,86451DLFC_{(t-2)} -0,71523DLFC_{(t-3)}$
(-3,0766) (-3,8798) (-3,8112) (-3,3204)

$-0,39001DLFC_{(t-4)} +0,67101DLNHIal_{(t-1)} +1.2334DLNHIal_{(t-2)} +1,1312DLNHIal_{(t-3)}$
(-1,8252) (2,5385) (3,8129) (3,1274)

$-0,69758DLNHIfu_{(t-2)} +0,90398DLNHIfu_{(t-4)} +0,075992 +e_t$
(-1,9696) (2,1314) (5,5810)

R^2=0,84234 DW= 1,9787

4) Imports – Im_t

$DLIm_t= -0,49902DLImt_{(t-1)} -0,52022DLIm_{(t-3)} -1,1517DLNHIfu_{(t-2)} +0,031595 +e_t$
(-3,6977) (-3,4700) (-1,9898) (2,5489)

R^2= 0,68181 DW = 2,1377

Regressions for Poland had good and very good econometric and predictive features. Regressions for Slovakia had good and acceptable econometric and predictive features.

On basis of estimated autoregressive models of explaining variables, the future values of those variables were estimated up to 2015. Because the differences of logarithms from the given period and lagged (-1) can be explained as quarterly pace of change of variables values, they included a development tendency, seasonal changes and random factors. However, because the simulation period is relatively long, the simulations cannot be considered as an econometric forecast rather as prognostic simulation. In this paper they were named prognostic simulations.

The following steps of the simulation procedure were discussed above. The estimated results of historical and prognostic simulations are presented in the following points.

2.2. Simulation results

2.2.1. Historical simulations

A. Historical simulations for Poland

For the clearness reasons, first simulations for Poland were presented, next for Slovakia.

POLAND- GREECE

The estimated impact of adoption of the Greek harmonization policy by Poland on GDP is presented in the below table. The first five rows present annual GDP data in constant prices in millions PLN, next five rows present relative values, where Polish GDP real values were accepted as 100.

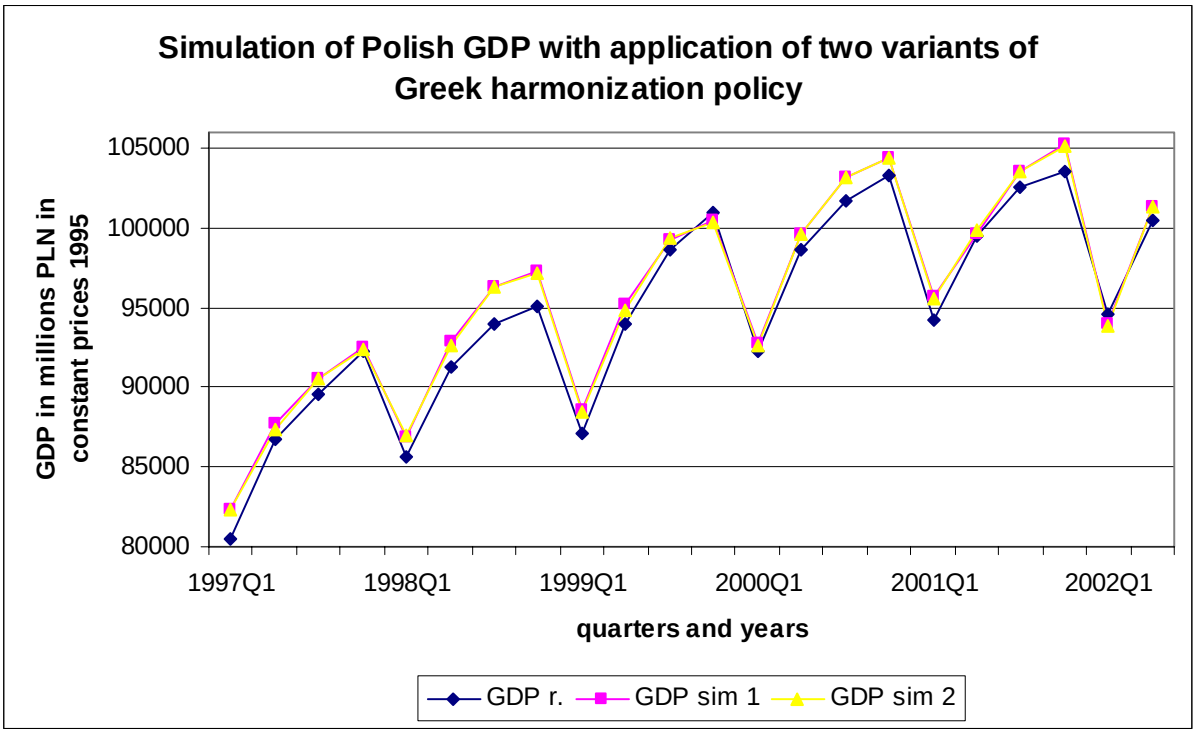
Table 7. Simulation of application of Greek harmonization policy on the level of Polish GDP in years 1997-2001

	GDP of Poland in constant prices 1995 in M PLN and in relative values/ policy variant				
	PL real	PL-GR1	PL-GR2	Differences 1	Differences 2
1997	349022,4	353201,1	352563,2	4178,7	3540,8
1998	366005,8	373293,5	373130,5	7287,7	7124,7
1999	380615,2	383501,9	383012,6	2886,7	2397,4
2000	395931	399872,3	400017,8	3941,3	4086,8
2001	399867,9	404153,2	404112,6	4285,3	4244,7
1997	100,00	101,20	101,01	1,20	1,01
1998	104,87	106,95	106,91	2,09	2,04
1999	109,05	109,88	109,74	0,83	0,69
2000	113,44	114,57	114,61	1,13	1,17
2001	114,57	115,80	115,78	1,23	1,22

Source: own estimations

The estimated results show that application of Greek harmonization policy by Poland would increase, in the period of 1997-2001, GDP values, in relation to real GDP values, from 0,83% to 2,09% annually in the first variant, and from 0,69% to 2,04% in the second variant. Greek harmonization policy was characterized by faster harmonization of alcohol and tobacco taxes and very slow harmonization of fuel taxes. Polish harmonization policy was focused on fast harmonization of taxes for fuel and energy. The impact of simulated change of the policy was relatively high. The positive results of such a change would be the largest in the second year after the change of the policy. Poland would benefit significantly if Greek harmonization policy was adopted in the past. The changes in quarterly dimension are presented by the following figure.

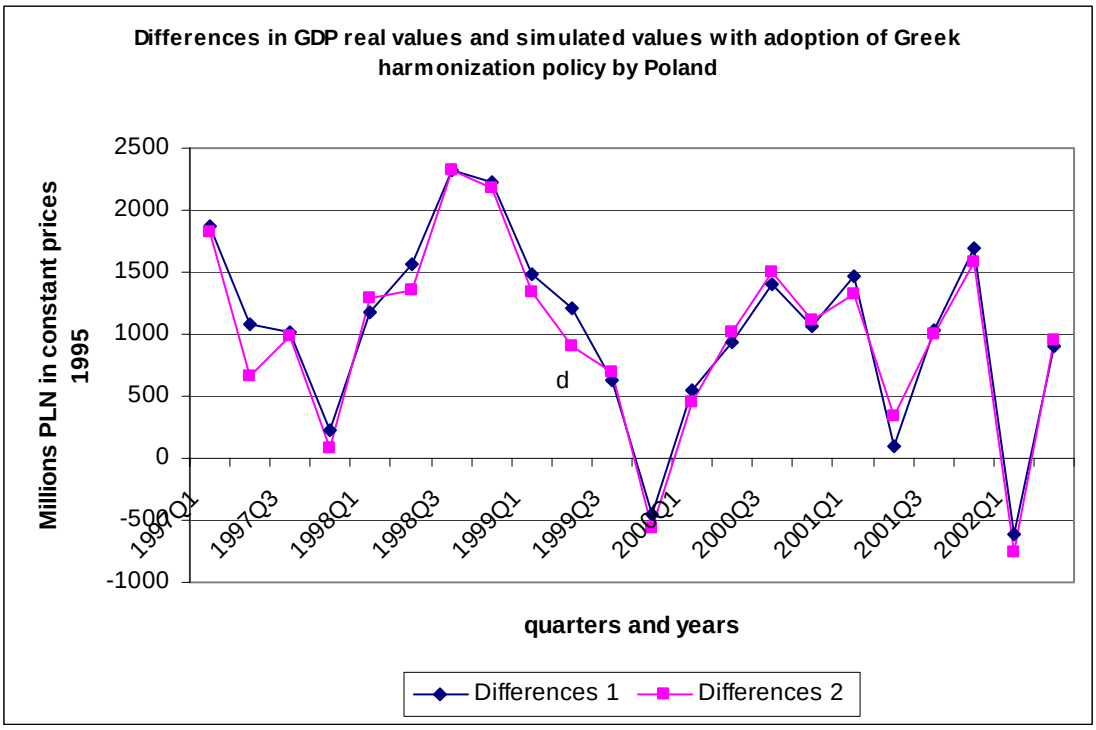
Figure 1



Source: own estimations

The following figure presents quarterly differences between real GDP values and simulated values. With exception for one quarter all simulations gave positive differences.

Figure 2



Source: own estimations

Summing up: Poland would benefit significantly adopting Greek harmonization policy.

POLAND - SPAIN

Spanish tax harmonization policy was characterized by faster than EU average harmonization of alcohol and tobacco taxes and significantly slower than the EU average harmonization of energy and fuel taxes. Taxes for energy products were harmonized in the very slow pace in Spain (above 20% percentage points lower than the EU average in the part of the analyzed period). The impact of application of the Spanish tax harmonization policy on simulated Polish GDP is presented in the following table.

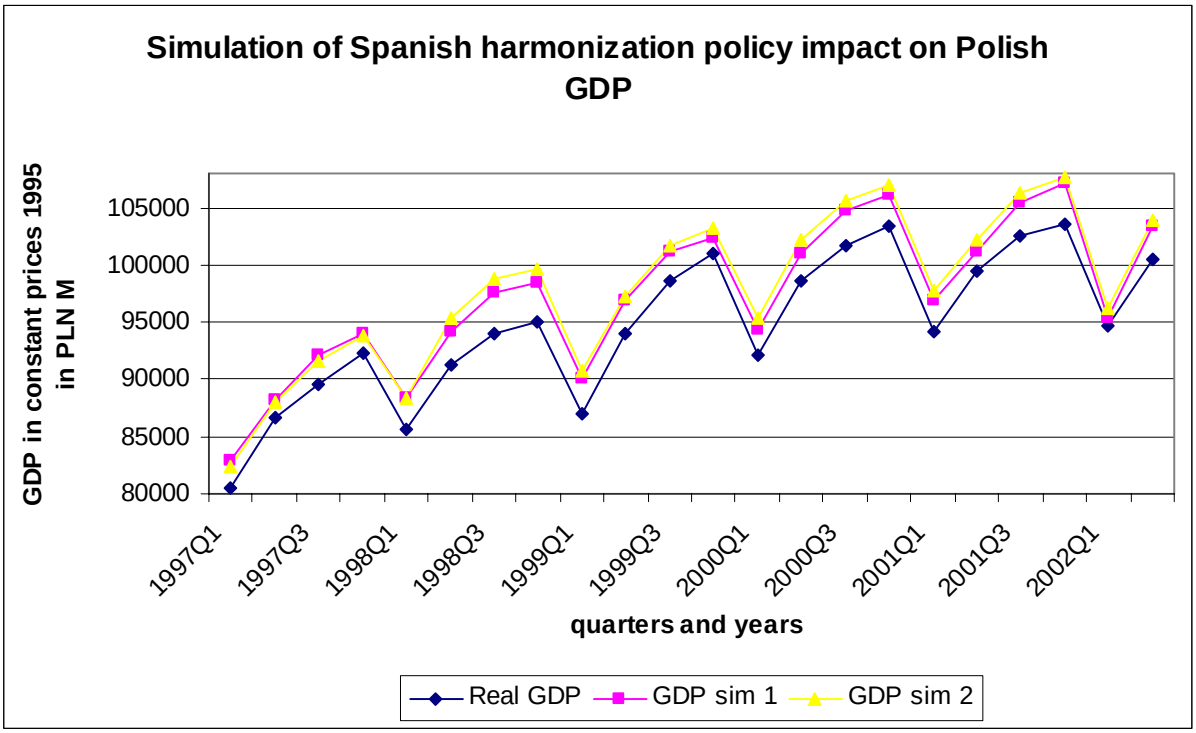
Table 8. Simulation of application of the Spanish tax harmonization policy on the Polish GDP in the period of 1997-2001

	Polish GDP in constant prices 1995 in M PLN and in relative terms/simulation variants				
	Real GDP	PL-ES1	PL-ES2	Differences1	Differences 2
1997	349022,4	357119,5	355915,1	4178,709	3540,766
1998	366005,8	378787,8	382272,6	7287,688	7124,671
1999	380615,2	390578	392891	2886,724	2397,443
2000	395931	406193,9	410177,4	3941,275	4086,786
2001	399867,9	410659	414081,6	4285,265	4244,73
1997	100,00	102,32	101,97	2,32	1,97
1998	104,87	108,53	109,53	3,66	4,66
1999	109,05	111,91	112,57	2,85	3,52
2000	113,44	116,38	117,52	2,94	4,08
2001	114,57	117,66	118,64	3,09	4,07

Source: own estimation

The results of simulation indicate that Poland would gain additional benefits from adopting the Spanish harmonization policy in comparison to adoption of the Greek policy. Differences of real and simulated GDP are significant and amount: from 2,32% to 3,66% of the real GDP in the first variant and from 1,97% to 4,07% of real GDP in the second variant. It seems that the main reason of this result is positive influence of energy and fuels taxes harmonization on the GDP, observed in the Spanish model. Those positive imapcts were transferred to the Polish model. Secondly, it can be noted that some results of tax harmonization can be beneficial for the GDP level. For example the harmonization of tobacco taxes could facilitate the reduction of their consumption, therefore it can facilitate the reduction of the mortality rate. When mortality rate is falling down, more consumers are on the market and therefore overall consumption can be higher, facilitating the GDP growth. The below figure presents quarterly comparisons of adoption of the Spanish policy simulations and the levels of the real Polish GDP.

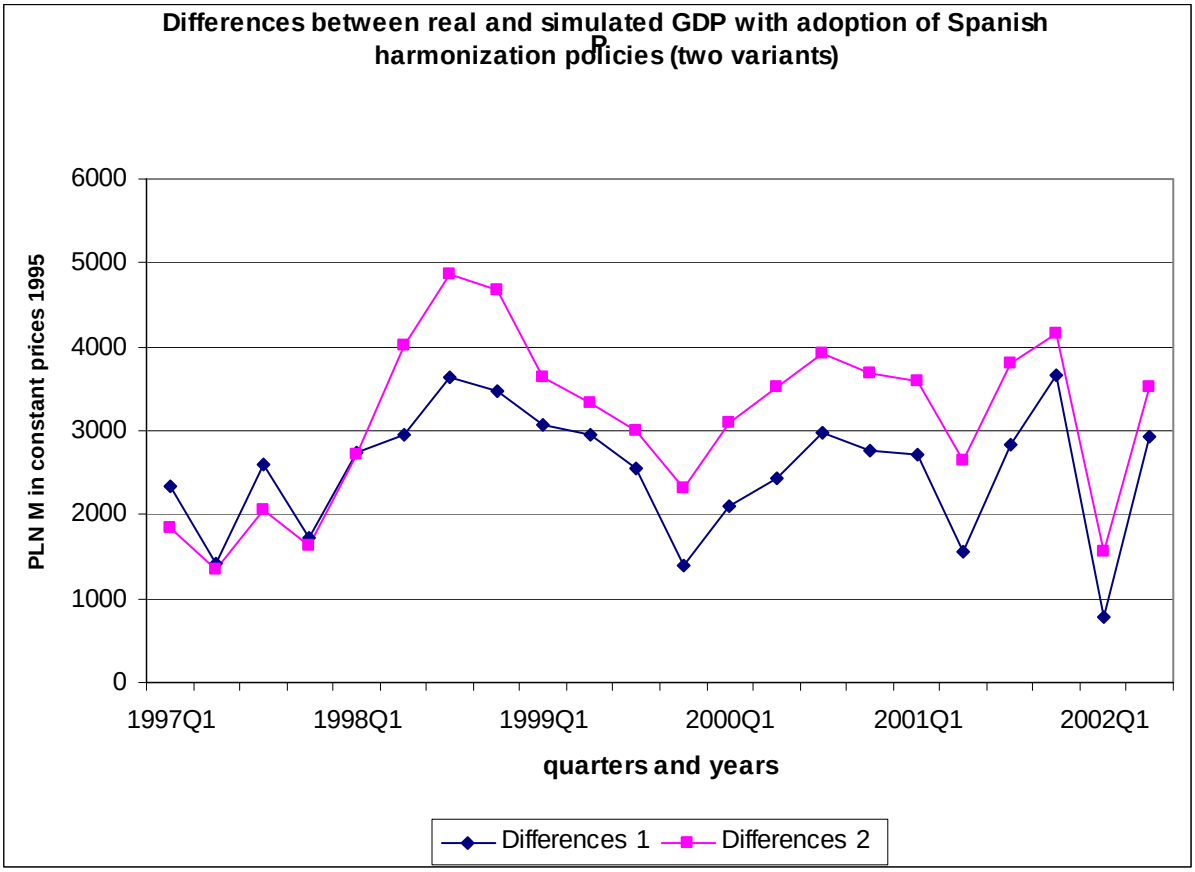
Figure 3



Source: own estimation on basis of simulations

The following figure presents quarterly differences between the simulated and the real levels of GDP in Poland. In both analyzed variants, the differences were positive.

Figure 4



Source: own estimation on basis of simulations

POLAND - IRELAND

Tax harmonization policy applied in Ireland was based on faster than the EU average harmonization of alcohol and tobacco taxes, below the EU average harmonization of fuels taxes and medium size harmonization of energy taxes. None of harmonization variables was significantly differentiated from the EU average. It should be however noted that Irish fuel taxes harmonization indices were lower than Spanish ones. The results of simulations of adoption by Poland the Irish tax harmonization policy were presented in the following table.

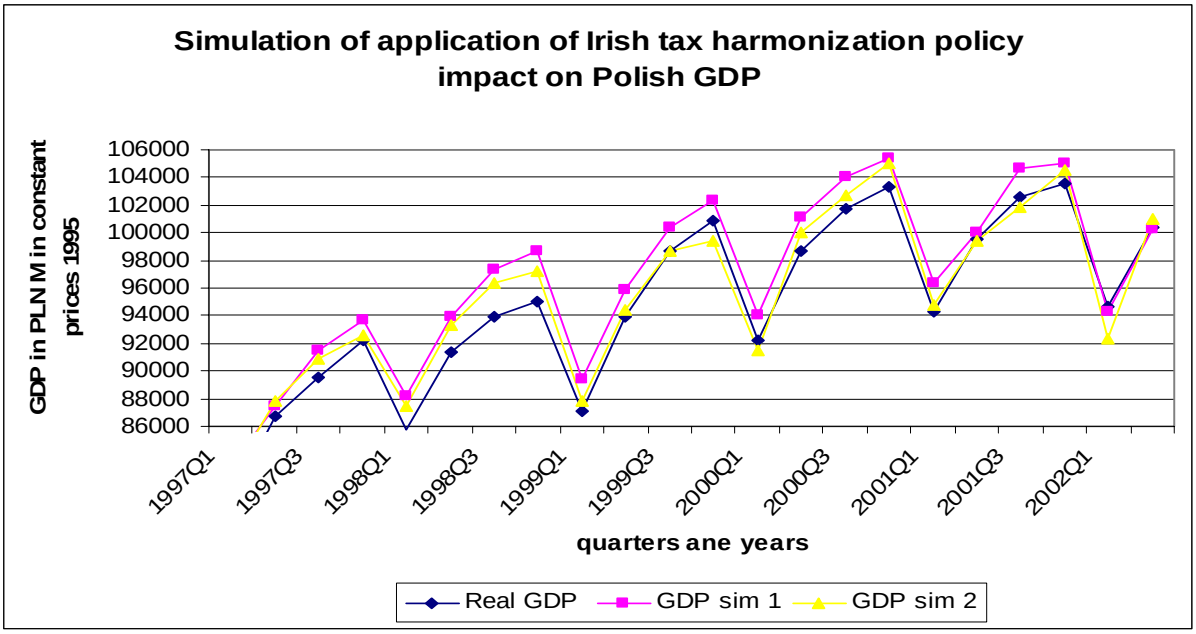
Table 9. Simulation of the impact of application of the Irish tax harmonization policy on the level of Polish GDP in years 1997-2001

	Polish GDP in M PLN in constant prices 1995 and in relative values/ simulation				
	Real GDP	PL-IR1	PL-IR2	Differences 1	Differences 2
1997	349022,4	355639,4	353658,2	4178,7	3540,8
1998	366005,8	378266,4	374304,4	7287,7	7124,7
1999	380615,2	388091,5	380376,9	2886,7	2397,4
2000	395931	404562,9	399365,3	3941,3	4086,8
2001	399867,9	405893,5	400566	4285,3	4244,7
1997	100,00	101,90	101,33	1,90	1,33
1998	104,87	108,38	107,24	3,51	2,38
1999	109,05	111,19	108,98	2,14	-0,07
2000	113,44	115,91	114,42	2,47	0,98
2001	114,57	116,29	114,77	1,73	0,20

Source: own estimation on basis of simulations

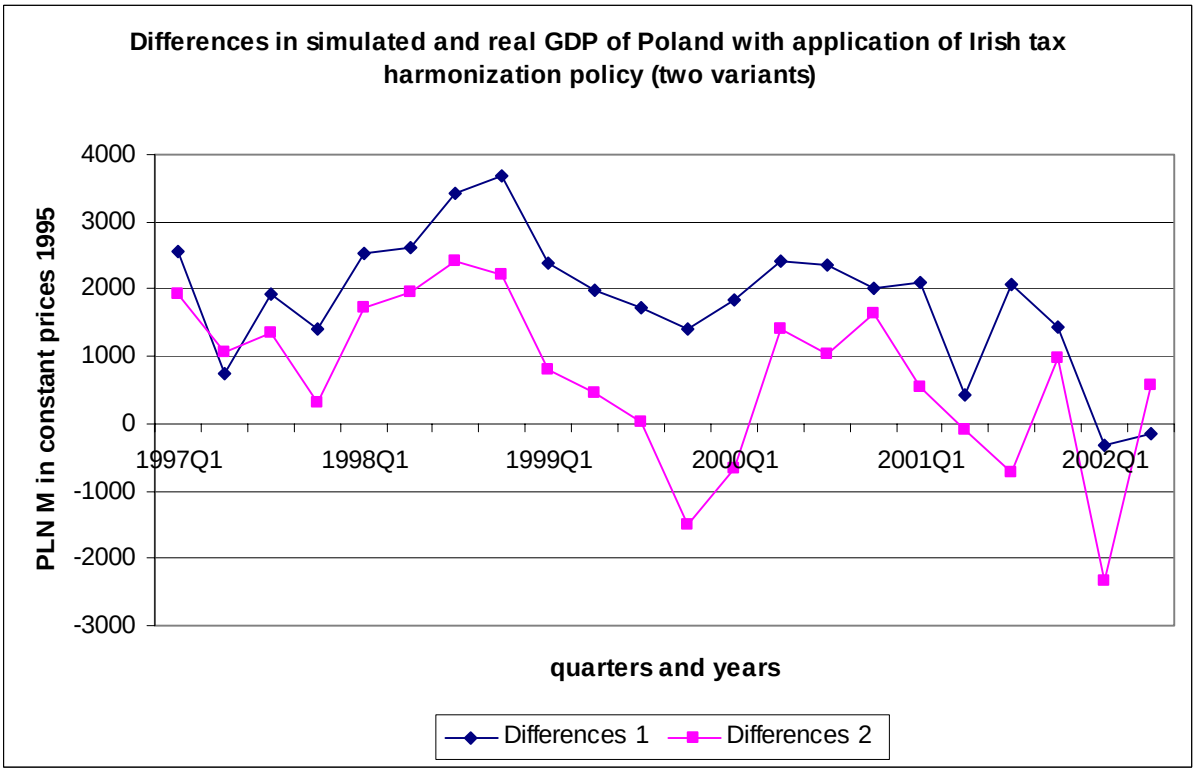
The results of the simulation of the Irish tax harmonization policy applied by Poland indicate that, with exception for one year in the second variant, simulated GDP is above the real level. The increase is however significantly lower than in the Spanish policy simulation but in the first variant significantly higher than in the Greek policy simulation. Quarterly simulations of Irish policy and data on the levels of real GDP are presented on the following figure. They should be analyzed together with data on quarterly differences between simulation variants results and real data.

Figure 5



Source: own estimation on basis of simulations

Figure6



Source: own estimation on basis of simulations

Both figures show that simulations bring higher levels of GDP than the real Polish GDP, but beneficial results of adoption of the Irish tax harmonization policy are declining in time.

The simulations of adoption of Greek, Spanish and Irish tax harmonization policies by Poland indicate that each time they could bring better results than the original Polish policy. Does it mean that the Polish tax harmonization policy was so defective? It is possible. None of analyzed countries conducted tax harmonization of fuel taxes with the pace over 20 percentage points higher than the EU average in the most of analyzed period. This type of harmonization negatively affected Polish GDP and significantly reduced its growth pace. Adoption of any tax harmonization policy, other than Polish one, could bring better development results for Poland, than conducting own Polish policy.

B. Historical simulations for Slovakia

Slovak tax harmonization policy was characterized by low values of NHIal and NHIfu indices, significantly lower than the EU average (about 10 percentage points), however there were extremely high values of NHIel index. As revealed by the econometric model, such a combination of policies proved to be relatively beneficial for Slovak GDP growth. High values of energy tax harmonization indices could base on the extremely extensive subsidizing of energy prices in the past in this country. Liquidation of such subsidizing caused so high values of NHIel indices in Slovakia.

Simulations for Slovakia were conducted using the same methodology as in Polish simulations. The below table presents results of different simulations for Slovakia. The upper part of the table presents simulation results in Slovak crowns (SKK) and the down part in relative values, accepting Slovak data on 1997 as 100.

Table 10. Simulations of adoption of Greek, Spanish and Irish tax harmonization policies and their impact on GDP of Slovakia

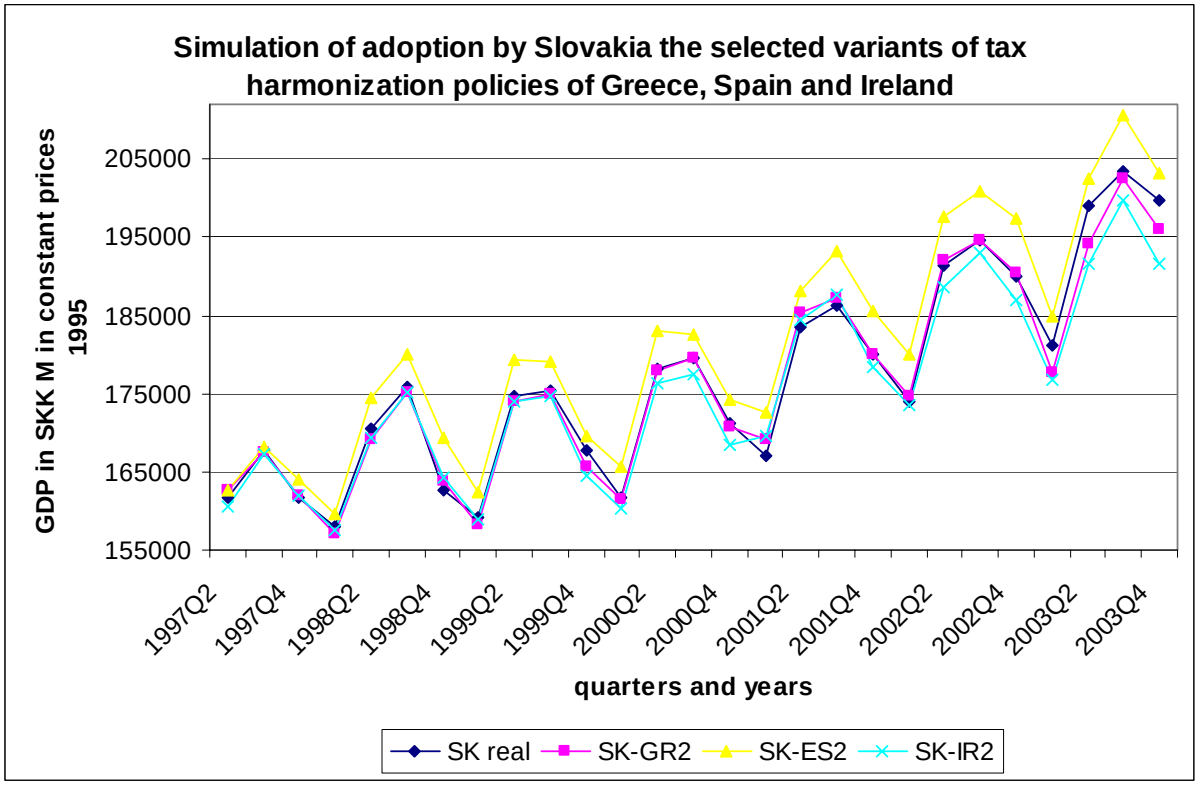
Year	GDP in SKK M in constant prices 1995						
	Real data	Variant of tax harmonization policy					
	GDP real	SK-GR1	SK-GR2	SK-ES1	SK-ES2	SK-IR1	SK-IR2
1997	640151	638966,1	641064,5	641236,6	643942,1	639154,4	638672,8
1998	667107	663239,8	665207,7	676856	683320,9	668325,7	666751,2
1999	676919	670486,6	672906,6	688536,8	690495,5	678072,7	672044,4
2000	690697	687892,6	689646,3	700552,3	705622,9	689766	682742,8
2001	716845	719265,3	721958,4	733691,2	739779,7	717705,6	720032,4
2002	749937	750339,2	751630,6	774271,3	776042,9	745514,4	742149
2003	783406	768111,5	770311,6	793590,9	801107,2	763728,7	759660,8
	1997 =100						
1997	100,00	99,81	100,14	100,17	100,59	99,84	99,77
1998	104,21	103,61	103,91	105,73	106,74	104,40	104,16
1999	105,74	104,74	105,12	107,56	107,86	105,92	104,98
2000	107,90	107,46	107,73	109,44	110,23	107,75	106,65
2001	111,98	112,36	112,78	114,61	115,56	112,12	112,48
2002	117,15	117,21	117,41	120,95	121,23	116,46	115,93
2003	122,38	119,99	120,33	123,97	125,14	119,30	118,67

Source: own estimation on basis of simulations

Results of simulations presented in the above table indicate that only adoption of the Spanish tax harmonization policy would bring better results for Slovak GDP than using the original

policy. The Spanish policy would be more beneficial but the differences would not be high. Only when the second variant of policy would work, the 2003 simulated GDP would be significantly higher than the original one. Adoption of Greek and Irish policies by Slovakia would be inexpedient. Greek and Irish simulations brought significantly worse results that continuation of Slovak policy. The simulation results of the second variants of Greek, Spanish and Irish policies are presented on the following figure.

Figure 7



Source: own estimation on basis of simulations

Analyzing simulation results of adoption of Greek, Spanish and Irish tax harmonization policies by Slovakia, significant differences in comparison to Poland should be noted. Slovak tax harmonization policy was more neutral than the Polish one from the point of its impact on GDP. Secondly, Slovak tax harmonization policy was based on relatively moderate fuel taxes harmonization, in comparison to Poland, what did not restrain GDP growth, like in Poland. Alcohol and tobacco tax harmonization policies in both countries were similar. Summing up. Slovak tax harmonization policy was more beneficial for the GDP growth than the Polish one.

2.2.2. Prognostic simulations

POLAND

Prognostic simulations up to 2015, were based on the assumption that key elements of the total demand would be estimated on basis of autoregressive functions and tax harmonization variables would continue tendencies of the past Polish tax harmonization policy, and this policy would be modified by simulation of adoption of Greek, Spanish and Irish policies.

The simulation of the Polish continuation policy is based on the regression function using time series of 1997-2002 and assumes repetitions of those time series in the period of 2004-

2015. It is based on the pessimistic assumption that Poland would continue its defective tax harmonization policy.

Simulations of applications of Greek, Spanish and Irish tax harmonization policies assumed the adoption of structural parameters from the regressions estimations of policy delivering countries and time series from those countries, adopted from the past, and repeated in the future. It was assumed that those policies would operate in the future like they operated in the past. This procedure allowed for comparisons of adoption of Greek, Spanish and Irish policies and Polish continuation policy in the period from 2004q01 to 2015q04.

In the prognostic simulation the same policies were simulated like in historical simulation (in two variants). The results of simulations are presented in the below table. The upper part of the table presents data in PLN M in constant prices, the down part in relative values accepting the Polish 2004 level as 100.

Table 11. Results of the prognostic simulations of adoption of Greek, Spanish and Irish tax harmonization policies by Poland in two variants

Year	GDP in PLN M in constant prices 1995						
	Continuation simulation	Simulation of adoption of policies					
	PL-PL	PL-GR1	PL-GR2	PL-ES1	PL-ES2	PL-IR1	PL-IR2
2004	399404	411140	410694	414192	410690	410498	410793
2005	412972	422764	421780	432427	426585	424733	423946
2006	411816	429159	428200	438775	438310	432363	428803
2007	422241	441104	440128	450633	448603	444878	436913
2008	435073	453892	453473	460294	459285	456320	453537
2009	449772	461359	460763	468915	467242	460862	456255
2010	475862	477704	476899	485848	484022	475839	471596
2011	496019	491154	490339	493334	494877	487413	485606
2012	478884	492895	491821	490513	489898	485126	488255
2013	481040	507016	505873	506185	500518	498395	498967
2014	495854	521738	520781	527740	522327	518694	516511
2015	495151	529626	528283	534311	532629	525682	520220
	In relative terms, PL-PL 2004 =100						
2004	100	102,9384	102,8267	103,7026	102,8257	102,7778	102,8516
2005	103,3971	105,8487	105,6023	108,2682	106,8053	106,3418	106,1447
2006	103,1076	107,4498	107,2097	109,8574	109,7411	108,2522	107,3608
2007	105,7178	110,4406	110,1963	112,8264	112,3181	111,3855	109,3913
2008	108,9305	113,6424	113,5374	115,2453	114,9926	114,2504	113,5535
2009	112,6108	115,5118	115,3627	117,4038	116,9848	115,3874	114,234
2010	119,143	119,6042	119,4027	121,6434	121,186	119,1372	118,0749
2011	124,1899	122,9718	122,7677	123,5177	123,904	122,0351	121,5826
2012	119,8998	123,4076	123,1387	122,8112	122,6574	121,4625	122,2459
2013	120,4394	126,9433	126,657	126,7352	125,3164	124,7848	124,928
2014	124,1486	130,6292	130,3895	132,132	130,7767	129,867	129,3204
2015	123,9724	132,604	132,2678	133,777	133,3561	131,6166	130,2491

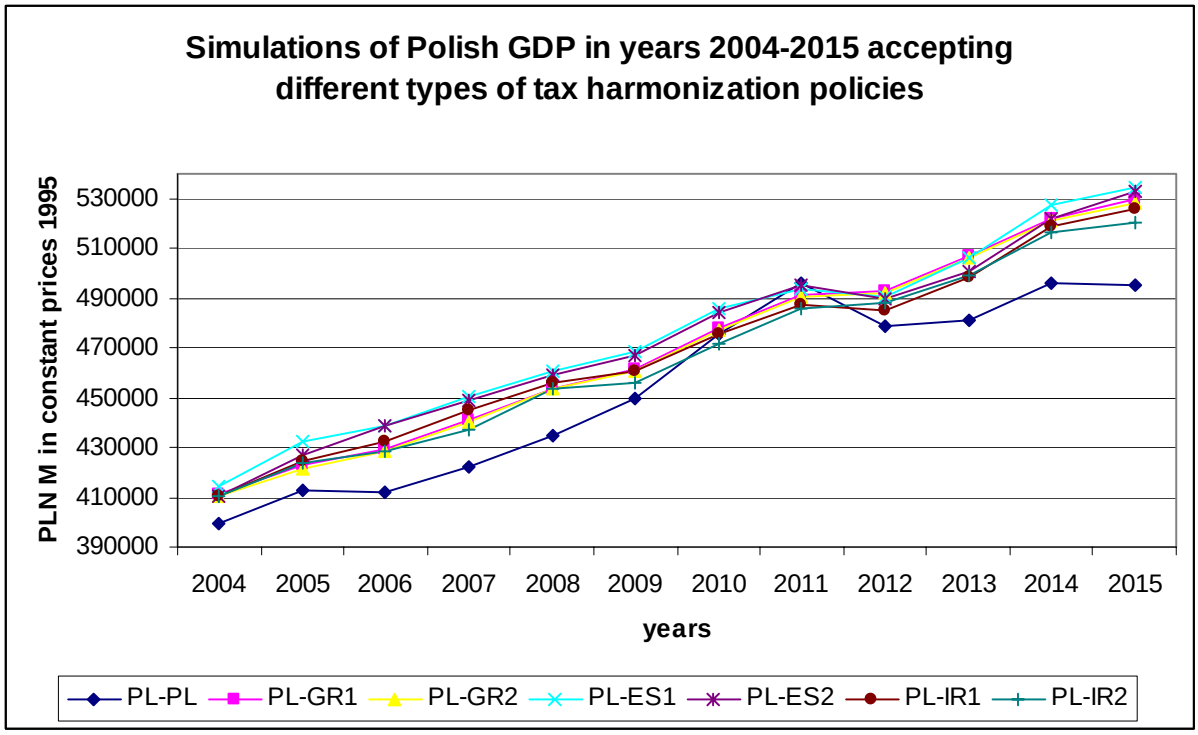
Source: own estimation on basis of simulations

The basic simulation of the Polish continuation policy resulted in 23,98% GDP growth within eleven years. This result was based on the pessimistic assumption that negative impact of that tax harmonization policy would not change.

The results of adoption of Greek, Spanish and Irish policies brought higher levels of Polish GDP by 7-10% than the continuation policy. It confirms conclusions from the historical simulation. Each change of the Polish tax harmonization policy on the historical policies of Greece, Spain and Ireland would produce better results up to 2015 than the continuation of the Polish policy.

The best final results for Poland would be achieved by adoption of Spanish and Greek policies. In those policy variants Polish GDP grows faster than in the continuation policy by 9-10 percentage points. The results of different simulation policies are presented on the next figure.

Figure 8



Source: own estimation on basis of simulations

Simulations results show that with exception for year 2011 adoption of all policies of Greece, Spain and Ireland brought better results than the continuation policy marked as PL-PL. The estimation of differences between simulation variants and the continuation policy were presented the below table (relatively) and on the figure (in absolute values).

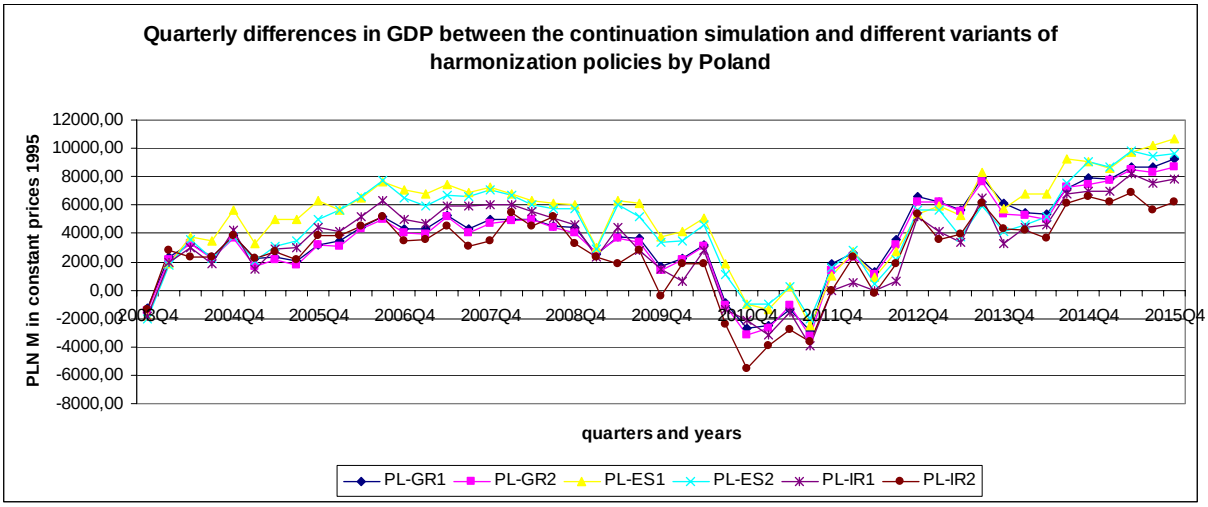
Table 12. Relative differences in GDP levels of Poland. Continuation simulation and adoptions of Greek, Spanish and Irish policies

Year	Continuation simulation PL-PL 2004 =100					
	Variant of harmonization policy					
	PL-GR1	PL-GR2	PL-ES1	PL-ES2	PL-IR1	PL-IR2
2004	102,94	102,83	103,70	102,83	102,78	102,85
2005	102,37	102,13	104,71	103,30	102,85	102,66
2006	104,21	103,98	106,55	106,43	104,99	104,12
2007	104,47	104,24	106,72	106,24	105,36	103,47

2008	104,33	104,23	105,80	105,57	104,88	104,24
2009	102,58	102,44	104,26	103,88	102,47	101,44
2010	100,39	100,22	102,10	101,71	100,00	99,10
2011	99,02	98,85	99,46	99,77	98,26	97,90
2012	102,93	102,70	102,43	102,30	101,30	101,96
2013	105,40	105,16	105,23	104,05	103,61	103,73
2014	105,22	105,03	106,43	105,34	104,61	104,17
2015	106,96	106,69	107,91	107,57	106,17	105,06

Source: own estimation on basis of simulations

Figure 9



Source: own estimation on basis of simulations

Both the table and the figure indicate that, in 2010-2011, results of different policy change simulations gave lower results than the simulation of the continuation policy. The reason for his is an assumption of the continuation of policies, which provide for repeating data from the past. Years 2010-2011 provided the repetition of data in which harmonization slowed down and the data from the other countries provided for acceleration of harmonization pace. It does not change the long-run assessment of policies.

In the long run adoption of each tax harmonization policies of Greece, Spain and Ireland by Poland would bring better results for GDP growth than the continuation policy. The best results could be achieved by Poland when Spanish policy would be adopted and relatively the worst when Irish policy is adopted. Despite this observation, Irish policy adoption would also be very beneficial for Poland.

SLOVAKIA

The prognostic simulations for Slovakia were prepared using on the same principles as for Poland. The results of simulations for years 2004-2015 are presented in the below table.

Table 13. Results of the prognostic simulations of Slovak GDP after adoption of different variants of tax harmonization policies of Greece, Spain and Ireland

Year	GDP in SKK M in constant prices 1995						
	Continuation simulation	Variants of tax harmonization policies					
	SK-SK	SK-GR1	SK-GR2	SK-ES1	SK-ES2	SK-IR1	SK-IR2
2004	921374	928619	930261	900448	975294	929714	941300
2005	991020	991318	992387	978618	1060158	1003179	1009357
2006	1061657	1062611	1064493	1063014	1159562	1071788	1078683
2007	1025436	1028936	1029563	1029707	1117576	1027647	1034116
2008	1098524	1102330	1104143	1094361	1190869	1103886	1117497
2009	1084645	1083215	1083105	1083264	1178216	1080813	1085599
2010	1180349	1164107	1165190	1173638	1274492	1159014	1165959
2011	1196917	1184743	1186951	1195912	1298162	1178867	1189957
2012	1417341	1410202	1414481	1413637	1531496	1416338	1421495
2013	1508804	1513824	1518894	1515479	1642440	1510759	1516528
2014	1583490	1588942	1590585	1609475	1749673	1585264	1597148
2015	1652344	1658326	1661102	1701317	1847851	1644591	1655300
	In relative terms, SK-SK 2004 =100						
2004	100,00	100,79	100,96	97,73	105,85	100,91	102,16
2005	107,56	107,59	107,71	106,21	115,06	108,88	109,55
2006	115,23	115,33	115,53	115,37	125,85	116,33	117,07
2007	111,29	111,67	111,74	111,76	121,29	111,53	112,24
2008	119,23	119,64	119,84	118,77	129,25	119,81	121,29
2009	117,72	117,57	117,55	117,57	127,88	117,30	117,82
2010	128,11	126,34	126,46	127,38	138,33	125,79	126,55
2011	129,91	128,58	128,82	129,80	140,89	127,95	129,15
2012	153,83	153,05	153,52	153,43	166,22	153,72	154,28
2013	163,76	164,30	164,85	164,48	178,26	163,97	164,59
2014	171,86	172,45	172,63	174,68	189,90	172,05	173,34
2015	179,33	179,98	180,29	184,65	200,55	178,49	179,66

Source: own estimation on basis of simulations

The simulation of the Slovak tax harmonization continuation indicates that this policy supports economic growth. It results in the 79,93% increase of GDP within eleven years, more than three times higher than in Poland. In the long run adoption of the Greek or Irish policies by Slovakia brings similar results as the continuation of the Slovak policy. Only adoption of the Spanish policy by Slovakia can bring better results than the continuation policy. When the Spanish regression model lags are accepted it results in the GDP level higher by 21 percentage points than the result of the continuation policy.

Slovak and Spanish tax harmonization policies differ by the pace of energy taxes harmonization. In Spain energy taxes harmonization was very low in comparison to the EU average, in Slovakia extremely high. Slovakia can correct its policy in this area and achieve significant GDP growth, accordingly to simulations results.

3. Simulations of application of different types of tax burdens policies in European Union on the pace of growth of new member states

3.1. Methodology of simulation

Simulations of application of different policies of tax burdens were based on the synthetic characteristics of the policies, presented in chapter 1, which for simplification reasons were named: Polish, Czech, Greek, Spanish and Irish tax burdens policies. From the point of view of economic policy correctness an important issue is an answer for two questions:

1) What would be the effects of application of different tax burdens policies in the given historical period and whether the change of the tax policy would bring economic benefits, mostly the higher pace of GDP growth?

2) What possible effects are available in the future as the effect of the shift from the present tax burdens policy to the new tax burdens policy in comparison to the continuation of the present policy in the future?

The answer for those questions has a key character to assess the quality of the tax burdens policy and the eventual future policy choice options.

3.1.1. Key assumptions

The impact of tax burdens on the GDP growth is a supply side issue. Tax burdens influence on both: propensity to conduct business activity and propensity to work. Those issues were the subject of numerous publications which do not bring uniform conclusions: there are not obvious evidences that tax burdens influence on the GDP growth pace in the long run. The presented simulations are not intended to bring conclusions which were not brought by the other examinations but they are intended to present potential results of adoption of the other countries tax burdens policies.

Taking into account the new EU member point of view, e.g. Poland, it seems to be important what country tax policy should constitute a patter to follow. The simplest option is to choose such a policy which brings the best results in the similar conditions. In harmonization policy analysis it was accepted that in two countries, in similar conditions and comparable economic environment, the same tax instruments can bring similar results. This assumption could be accepted in demand side analysis, in which elements of the global demand played a critical role and harmonization variables – played an additional role.

Supply side approach requires different way of thinking. If negative impact of tax burdens on GDP growth is accepted as an assumption – therefore a negative impact path of taxation is

observed towards production and propensity to take jobs. This impact path is not changing in the short run because both: entrepreneurs and employees plan their operations in the long run. Therefore the short run labor supply curve is flat. However in the long run such an observation could not be necessarily true. It is because that significant relaxation of the tax burdens can change the entrepreneurs and employees behaviors but under condition that both groups will accept changes as stable. If changes are accepted as stable the impact path can change. On the opposite, both groups will consider the tax relaxation as temporary and will improve financial liquidity as the only reaction for the change. When the tax burdens relaxation is introduced a critical issue is to build common understanding that tax changes are stable. If such feeling is not introduced a negative taxation impact path is prevailing. It may mean that despite of introduction of tax relief, in numerous cases, a negative impact will last continually.

When the given country copies solutions of the other country, which provide for increasing tax burdens - it seems logical that also a negative impact path of taxation on GDP is copied.

The key assumptions are the following:

1) Both in the short and in the long run the impact path of taxation on GDP can change for more beneficial through the adoption of the impact path from the country with lower taxes.

2) If tax reductions and compensating tax increases are introduced simultaneously it is logical to accept that an economy will grow on basis of the old growth path for a long time. Entrepreneurs and employees will treat reductions of some tax burdens as compensation of increases of the other tax burdens. Their behaviors will not change. In the long run a negative impact path of taxation on GDP is not changing, despite significant tax relaxation, until the change is considered as stable in the long run. Central Europe observes a significant political instability therefore it seems possible that enterprises and employees cannot consider tax burdens reduction as stable.

3) When a given country adopts solutions which increase tax burdens, it is highly probable that it will copy a negative impact path of taxation on GDP from the country with higher taxes.

4) The remaining variables influencing GDP in the country which changes a tax policy operate in the unchanged way, what means the acceptance of *ceteris paribus* principle.

3.1.2. Simulation task

The simulation is aimed at estimation of possible results of changes of the Polish and Czech tax burdens policies into models used in Spain and in Ireland, particularly:

1) Simulation of application of the Irish policy of low social contributions burdens and its impact on GDP of Poland and Czech Republic.
2) Simulation of application of the Irish policy of low social contributions burdens compensated by the increase of direct taxes on the economy of Poland.
3) Simulation of adoption of the Spanish policy of moderate indirect taxes on Polish GDP.

The presented simulation should be considered as a conditional estimation of GDP levels with applications of different tax burdens policies. Conditional estimation allows the usage of econometric modeling for building a simulation models, however it cannot be considered as econometric forecasting for obvious reasons (assumptions).

3.1.3. Analyzed variables

The following variables were used in simulations:

GDP_t – Gross Domestic Product in constant prices
GCF_t – Gross Capital Formation in constant prices
QEM_t – Employment of high quality personnel: the number of persons included to: managerial staff, self - employed, free professions, and technicians in manufacturing, in thousands.
$IWBI_t$ – Income and wealth tax burden index showing the relation of burdens to GDP in %
$ITBI_t$ – Indirect taxes burden index showing the relation of burdens into GDP in %
$SConBI_t$ – Social contributions burden index showing the relation of burdens into GDP in %
$NIWBI_t$ – Net $IWBI_t$ index in relation to analogical EU average index, in %
$NITBI_t$ – Net $ITBI_t$ index, in relation to analogical EU average index, in %
$NSConBI_t$ - Net $SConBI_t$ index, in relation to analogical EU average index, in %
$CTRG_t$ – Current transfers to the government (only Greece, Spain and Ireland)
$CTRP_t$ – Current transfers to private persons (only Greece, Spain and Ireland)
IIN_t – Investment income form FDI in the given country

The above variables were applied with lags reaching the period of t-4. Quarterly data on time series were derived from Metabase of Eurostat. For estimation reasons, to fulfill stationarity of time series postulate, the logarithmic variables were used. Precisely: differences of logarithms of the variable in the t period and lagged t-1. Such variables had valuable features: they presented the logarithms of quarterly growth or decline of economic values. This issue was discussed in chapter 2

3.1.3. Estimations methodology

A. Estimations of results of the tax burdens policy change in Poland and in Czech Republic in the historical period

The following procedure was used to estimate results of the tax policy change:

1) Regression models of GDP were estimated for Poland, Czech Republic, Greece, Spain and Ireland from the supply side. GDP_t was an explained variable and as explaining variables factors influencing supply were accepted. The explaining variables were: Gross Capital Formation GDP_t and quality employment QEM_t. The second variable much better presented a supply side impact of employment on GDP than total employment. Besides, typical supply side variable regressions included variables showing the influence of different tax burdens directly influencing GDP level like: $IWBI_t$, $ITBI_t$, $SConBI_t$. It was assumed that they influence on the domestic enterprises and employees. To take into account FDI context, additional variables were adopted to regressions. They presented the relative tax burdens in comparison to the average EU level. It was assumed that comparative levels of tax burdens

can influence the FDI flows and international enterprises. They were: $NIWBI_t$, $NITBI_t$, $NSConBI_t$. All regression estimations had good and very good econometric features. Regression errors of GDP_t were not significant. It allowed for accepting a simplification that regressions may have a character of simulation functions (simulation regressions) and present stable and unchanged in time linear interrelations. It was accepted that explaining variables may have a lagged character.

2) In regression functions for Poland and Czech Republic Slovakia, values of structural parameters standing at harmonization variables were kept unchanged.

3) To estimate the new simulated GDP values after policy change, values of tax burdens variables of Greece, Spain and Ireland were input to the Polish and Czech regressions. The data for the remaining supply side variables for Poland and Czech Republic remained unchanged. The estimation of the new GDP was done in historical period.

1) Estimations of supply side regressions

Estimations of regressions which were the subjects for defining simulation functions are presented below:

Table 14. Estimations of linear regressions of GDP_t for Poland, Czech Republic, Greece, Spain, and Ireland on basis of supply side variables and tax burdens variables

Variable	$DLGDP_t$				
DL…	Greece	Spain	Ireland	Poland	Czech R.
GCF_t	0,19775	-0,086336 t-4	0,073444	0,15686	0,32880
QEM_t	0,061261 t-2	0,24284 t-3	1,2235 t-2	-0,18333 t-4	0,017279 t-4
$IWBI_t$	-0,024202	0,40363	0,073091 t-1	0,018373	0,17523
$ITBI_t$	-0,058940 t-1	0,17310	-0,16567	-0,11989 t-3	0,14167 t-4
$SConBI_t$	0,022823 t-4	0,20137 t-3	0,57882	0,48261	0,50775
$NIWBI_t$	0,026777 t-4	-0,41461	0,071821	-0,0037060 t-3	-0,10197
$NITBI_t$	-0,064023 t-4	-0,26317	-0,095496 t-4	-0,11153	0,18861
$NSConBI_t$	0,016292	-0,14767	-0,66697	-0,35687	-0,62379
$CTRG_t$	0,0053773 t-4	-0,0064907	-0,0012057 t-4	-0,0025853 t-4	0,016522
$CTRP_t$	0,011053 t-4	0,063610	-0,0086057 t-3	0,055137 t-2	-0,019346 t-2
IIN_t	-0,035788	-0,038846	0,065787	-0,012996	-0,021573
Ut	0,0061466	0,0097714	0,0044183	0,0082079	0,00005043
R^2	0,99640	0,99598	0,98872	0,9999	0,97834
DW	1,7327	1,5714	1,6818	1,6957	2,1351

Source: own estimations on basis of Eurostat data

Linear regressions were estimated on basis of time series embracing quarterly data for the period 2000-2004, they embraced maximum 20 quarter units. It was due to the availability of Eurostat data. The estimated regressions are therefore only an approximation of existing

tendencies and cannot be a subject for typical econometric forecasting. The presented examinations are however intended as historical and prognostic simulations not the forecasts. Simulations allow for the acceptance of significant simplifications. The estimated regressions were adopted as simulation functions, which were the base for simulations done accordingly to the procedure defined in points 2 and 3. The results of simulations are presented in the separate point.

B. Estimation of the tax burdens policy change impact on GDP by Poland and Czech Republic in the future period up to 2015

To estimate the results of the policy change for the level of Polish and Czech GDP, the following procedure was adopted:

1) The estimated regressions were used as simulation functions.

2) It was accepted that values of structural parameters standing at tax burdens variables in simulation regressions for Poland and Czech Republic are changing on values of structural parameters of regressions of policy deliverer – Central Europe adopt not only values of changed variables but also the positive impact path of those variables on GDP, detected in the policy delivering country.

3) When tax burdens relaxation policy was accompanied by simultaneous compensating tax increases in the different type of tax burden the old impact path was accepted (basic regression form).

4) Data for future simulations were provided on basis of continuation of past tendencies, what meant the repetition of logarithmic time series from the past in four year cycle, starting from year 2005, quarter 1.

5) It was assumed that the change of the policy takes place in the second quarter of 2005. The results of simulations were presented in the following point.

3.2. Results of simulations of the tax burdens policy change on GDP level

3.2.1. Results of historical simulations

POLAND

1. Simulation of application of the Irish policy of low social contribution burdens policy on GDP of Poland

The level of social security contributions in Ireland is significantly lower than in Poland . W years 2000-2004 the share of social contributions in GDP oscillated in Ireland between 5% and 7%, depending on the quarter. In Poland relevant relations amounted from 14% to 23%.

In Poland social contribution costs were at least 2,5 times higher than in Ireland. It was logical to count on the increase of Polish GDP when social contribution burdens tension is reduced. The estimated results of simulations are presented in the below table and on the figure.

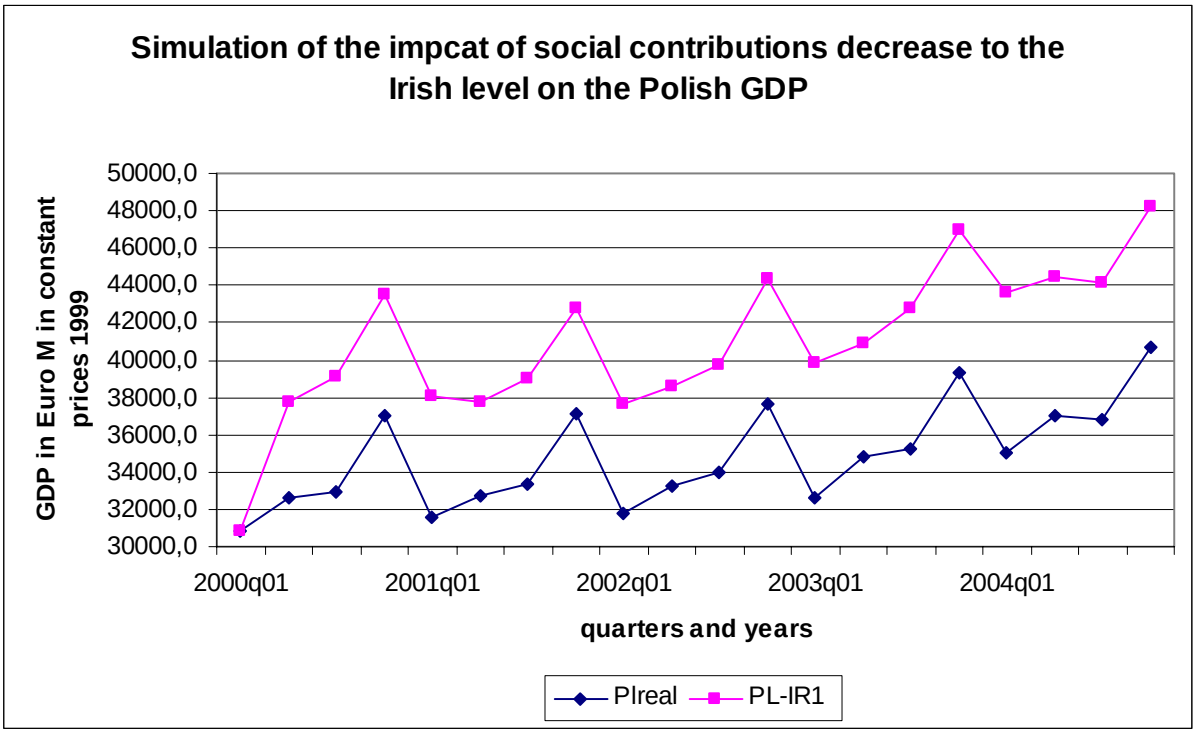
Table 15. Simulation of adoption of the Irish policy of social contributions burdens by Poland in years 2000-2004

Year and quarter	GDP in Euro M in constant prices 1999		Differences	
			Euro M	In %
	Real GDP	PL-IR1	Differences	Differences %
2000q01	30881,3	**30881,3**	0,0	0,00
2000q02	**32572,9**	37730,8	5157,9	15,83
2000q03	32969,2	39127,7	6158,5	18,68
2000q04	37031,8	43458,0	6426,2	17,35
2001q01	31524,0	38114,5	6590,5	20,91
2001q02	32767,1	37702,0	4934,9	15,06
2001q03	33386,0	39008,3	5622,3	16,84
2001q04	37134,9	42729,3	5594,4	15,07
2002q01	31734,7	37660,8	5926,1	18,67
2002q02	33296,6	38596,7	5300,1	15,92
2002q03	33939,8	39763,4	5823,6	17,16
2002q04	37687,7	44388,2	6700,5	17,78
2003q01	32573,8	39841,6	7267,8	22,31
2003q02	34830,5	40858,6	6028,1	17,31
2003q03	35218,3	42795,6	7577,3	21,52
2003q04	39280,7	46923,3	7642,6	19,46
2004q01	35055,1	43571,4	8516,3	24,29
2004q02	37035,3	44486,6	7451,3	20,12
2004q03	36808,4	44097,2	7288,8	19,80
2004q04	40726,8	48229,2	7502,4	18,42
Suma	696454,9	819964,4	123509,5	17,73

Source: own estimation on basis of simulations

Accordingly to simulations results adoption of Irish policy of social contribution burdens by Poland would bring significant increase of GDP if Poland copy the Irish impact path of social contributions on GDP. In the analyzed period of 2000-2004 Polish GDP would be higher by 17,73% than the real one. Production would gain large supply incentive. The separate question is how this undertaking could be financed. The figure 10 shows the size of the discussed impact.

Figure 10



Source: own estimation on basis of simulations

2. Simulation of application of the Irish policy of low social contribution burdens policy compensated by the increase of direct taxes to the Irish level on GDP of Poland

The above simulation brought very good results, but its weakness is a problem of finding sources to finance such a strong incentive. Because the indirect tax burdens level is very high in Poland, the only way to find sources to finance social contribution decrease is the increase of direct taxes. Below, the estimation assuming reductions of social contributions compensated by the rise of direct taxes (both to Irish levels) is presented.

Table 16. Simulation of adoption of theIrish policy of social contributions burdens reductions compensated by the increase of direct taxes by Poland in years 2000-2004

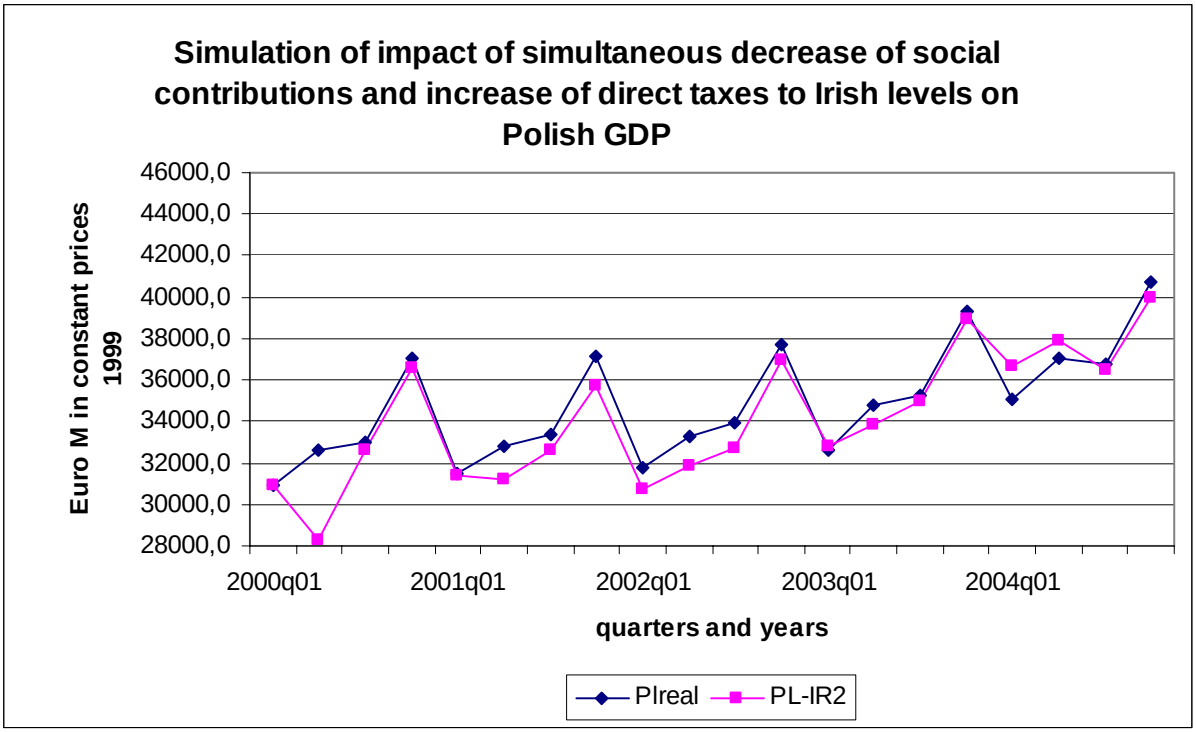
Year and quarter	GDP in Euro M in constant prices 1999		Differences	
			Euro M	In %
	Real GDP	PL-IR2	Differences	Differences %
2000q01	30881,3	30881,3	0,0	0,00
2000q02	**32572,9**	28288,4	-4284,5	-13,15
2000q03	32969,2	32638,6	-330,6	-1,00
2000q04	37031,8	36572,4	-459,4	-1,24
2001q01	31524,0	31352,8	-171,2	-0,54
2001q02	32767,1	31171,3	-1595,8	-4,87
2001q03	33386,0	32608,5	-777,5	-2,33
2001q04	37134,9	35729,8	-1405,1	-3,78
2002q01	31734,7	30774,0	-960,7	-3,03
2002q02	33296,6	31843,0	-1453,6	-4,37
2002q03	33939,8	32728,9	-1210,9	-3,57

2002q04	37687,7	36922,1	-765,6	-2,03
2003q01	32573,8	32812,1	238,3	0,73
2003q02	34830,5	33871,5	-959,0	-2,75
2003q03	35218,3	35003,4	-214,9	-0,61
2003q04	39280,7	38952,3	-328,4	-0,84
2004q01	35055,1	36640,6	1585,5	4,52
2004q02	37035,3	37880,8	845,5	2,28
2004q03	36808,4	36518,9	-289,5	-0,79
2004q04	40726,8	39922,7	-804,1	-1,97
Suma	696454,9	683113,5	-13341,4	-1,92

Source: own estimation on basis of simulations

Accordingly to the simulation results, simultaneous reduction of social contributions, compensated by increase of direct taxes, totally cuts positive results of only social contribution reductions. Simulation for 2000-2004, with application of the Polish growth path gives negative results[4]. Under accepted assumptions the GDP simulated for Poland would be lower than the real one by nearly 2%. The largest costs would be born by Polish economy in the first year of such a shift. With time negative impact would be reduced but the final result of simulation is negative. The unbeneficial result of such a policy can be observed on the next figure.

Figure 11



Source: own estimation on basis of simulations

It can be observed on the above figure that simultaneous decrease of social contributions compensated by the increase of direct taxes limits the GDP growth pace in the most of analyzed periods and in some period causes GDP loses.

[4] When first type burdens are growing and the other are being reduced, the entrepreneurs try to compensate losses from the first group by the other. In the short run they do not change their behaviors. This is why Polish growth path was adopted in this simulation.

3. Simulation of application of the Spanish policy of moderate indirect taxes on Polish GDP

Presented in chapter 2 simulations suggest that Central Europe countries can achieve additional GDP growth from slowing down the pace of harmonization policy. It is especially correct for Poland. Therefore it was accepted that Poland could adopt more moderate indirect tax burdens policy, than used in the past, and reduce the indirect taxation to the Spanish level. This reduction would amount to about 3% in relation to GDP. The results of such simulation are presented in the below table.

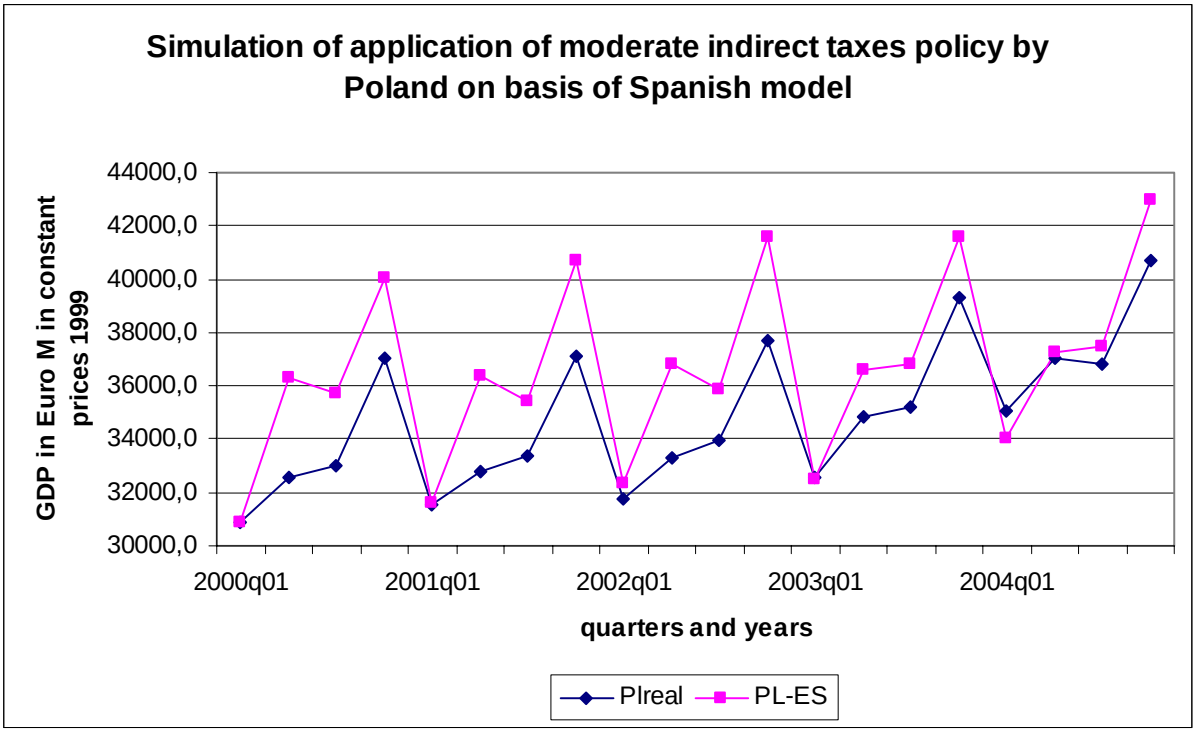
Table 17. Simulations of the decrease of indirect taxes by Poland to Spanish levels

Year and quarter	GDP in Euro M in constant prices 1999		Differences	
			Euro M	In %
	Real GDP	PL-ES	Differences	Differences %
2000q01	30881,3	30881,3	0,0	0,00
2000q02	**32572,9**	36277,2	3704,3	11,37
2000q03	32969,2	35691,5	2722,3	8,26
2000q04	37031,8	40066,3	3034,5	8,19
2001q01	31524,0	31634,9	110,9	0,35
2001q02	32767,1	36348,0	3580,9	10,93
2001q03	33386,0	35394,9	2008,9	6,02
2001q04	37134,9	40678,6	3543,7	9,54
2002q01	31734,7	32310,1	575,4	1,81
2002q02	33296,6	36835,3	3538,7	10,63
2002q03	33939,8	35855,7	1915,9	5,64
2002q04	37687,7	41550,3	3862,6	10,25
2003q01	32573,8	32514,2	-59,6	-0,18
2003q02	34830,5	36609,7	1779,2	5,11
2003q03	35218,3	36782,6	1564,3	4,44
2003q04	39280,7	41581,8	2301,1	5,86
2004q01	35055,1	34067,7	-987,4	-2,82
2004q02	37035,3	37221,8	186,5	0,50
2004q03	36808,4	37456,9	648,5	1,76
2004q04	40726,8	42979,7	2252,9	5,53
Suma	696454,9	732738,4	36283,5	5,21

Source: own estimation on basis of simulations

As indicate simulation results, moderate reduction of indirect taxes brings nearly at once results – GDP grows, under condition that Poland would copy a Spanish growth path. It seems to be quite real assumption and it can be admitted that Polish economy has been benefiting from somehow relaxed policy in indirect taxes burdens since 2005, especially as the problem of reduction of excise tax on fuels is concerned. Very positive results of such a policy are presented on the figure 12.

Figure 12



Source: own estimation on basis of simulations

As indicate the above historical simulations the adoption of the Spanish indirect taxes burdens policy influence on the significant increases of GDP especially in the first three years of simulation. It is a very beneficial solution from the point of electoral preferences.

CZECH REPUBLIC

The simulation model, presenting the impact of tax burdens on GDP, estimated for Czech Republic, has got significantly lower diagnostic features than the Polish one. The most important problem of Czech Republic is high level of all tax burdens and nearly each tax reduction should generate GDP growth. However, the model estimated for Czech Republic indicated only the impact of social contributions reduction on GDP (to the Irish level). Data on this impact are presented in the below table.

Table 18. Simulation of the social contributions reduction to the Irish level on Czech GDP

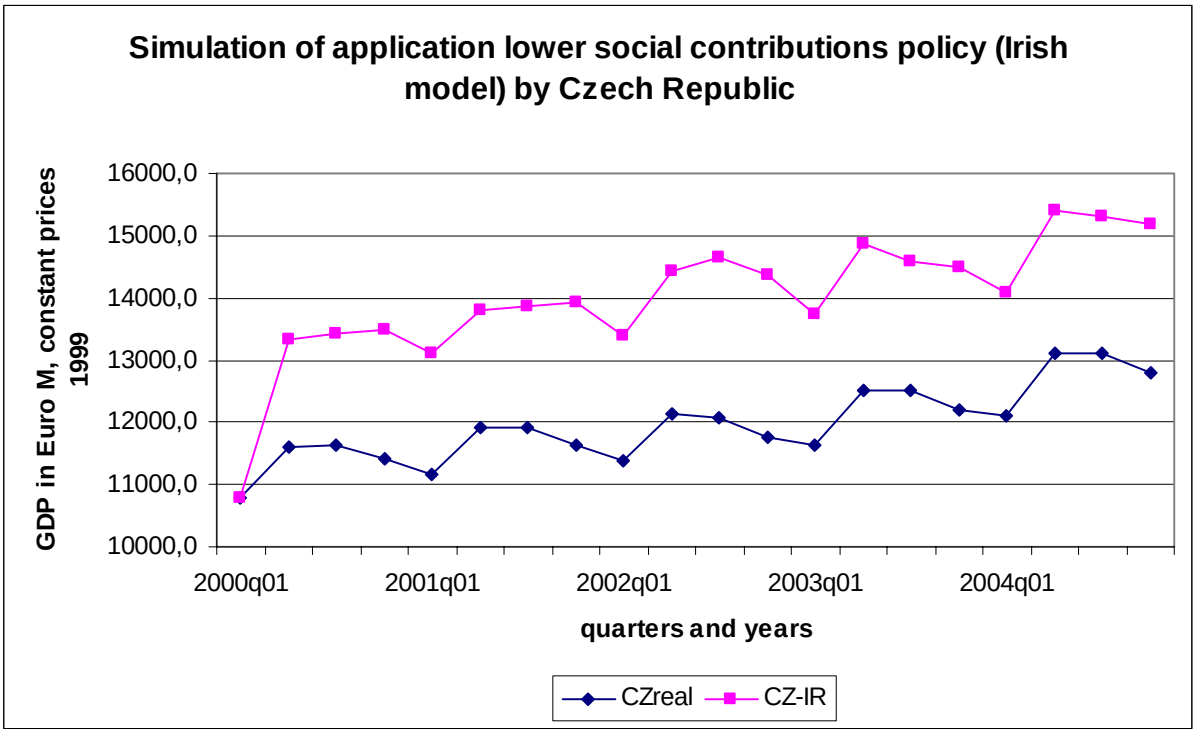
Year and quarter	GDP in Euro M, constant prices 1999		Differences	
			Euro M	In %
	Real GDP	CZ-IR	Differences	Differences %
2000q01	10789,2	**10789,2**	0,0	0,00
2000q02	**11596,4**	13314,2	1717,8	14,81
2000q03	11636,9	13426,1	1789,2	15,38
2000q04	11409,2	13500,7	2091,5	18,33
2001q01	11156,9	13096,9	1940,0	17,39
2001q02	11928,8	13808,9	1880,1	15,76
2001q03	11920,6	13861,1	1940,5	16,28
2001q04	11624,3	13927,9	2303,6	19,82

2002q01	11367,7	13396,2	2028,5	17,84
2002q02	12123,9	14423,2	2299,3	18,96
2002q03	12067,0	14644,3	2577,3	21,36
2002q04	11766,6	14379,0	2612,4	22,20
2003q01	11639,9	13736,2	2096,3	18,01
2003q02	12504,7	14870,2	2365,5	18,92
2003q03	12506,0	14572,8	2066,8	16,53
2003q04	12193,2	14499,1	2305,9	18,91
2004q01	12104,8	14068,4	1963,6	16,22
2004q02	13105,3	15412,5	2307,2	17,61
2004q03	13119,4	15303,3	2183,9	16,65
2004q04	12805,7	15185,7	2380,0	18,59
Suma	239366,5	280216,2	40849,7	17,07

Source: own estimation on basis of simulations

Accordingly to the historical simulation results for years 2000-2004, the decrease of social contributions in Czech Republic would cause a strong supply side effect, under condition that Czech economy would copy the Irish growth path. The received results are significant and similar to Polish ones. The results of the simulation are presented on the below figure.

Figure 13



Source: own estimation on basis of simulations

It must be admitted that serious problem, in the frames of the conducted examinations, was caused by results of simulations of increase of Czech direct taxes to the Irish level. Those simulations indicated the growth of Czech GDP what is opposite to conventional economic thinking. Therefore it was decided not to publish those results. It is however worth asking whether Czech tax policy is targeted at collecting tax incomes which serve for partial

subsidizing FDI. In such a case the increase of direct taxes could cause the increase of FDI and finally the increase of GDP. If it would be true, the received simulations could be probable.

4. Comparison of alternative tax policies in historical simulation for Poland

The below table contains comparison of different simulation models results. The results of simulations were compared to real GDP values.

Table 19. Comparison of simulation results for Poland

Year and quarter	GDP in Euro M in constant prices 1999		Differences	
			Euro M	in %
	Plreal	PL-IR1	PL-IR2	PL-ES
2000	133455,2	151197,82	128380,74	142916,3148
2001	134812	157554,1	130862,44	144056,4687
2002	136658,8	160409,1	132267,98	146551,4249
2003	141903,3	170419,05	140639,36	147488,2456
2004	149625,6	180384,36	150962,99	151725,9653
Sum	696454,9	819964,44	683113,51	732738,4193
Sum	**100,00**	**117,73**	**98,08**	**105,21**
2000	100,00	113,29	96,20	107,09
2001	101,02	118,06	98,06	107,94
2002	102,40	120,20	99,11	109,81
2003	106,33	127,70	105,38	110,52
2004	112,12	135,16	113,12	113,69

Source: own estimation on basis of simulations

As indicates comparison in table 19, the most effective policy which could be adopted by Poland is a policy of social contributions reduction. However when social contributions reduction would be compensated by increase in direct taxes, Polish GDP would loose about 2%. Relatively beneficial is a policy of moderate reduction of indirect taxes which brings fast results. In the analyzed period of 2000-2004 it would bring additional 5% of GDP in relation to the real level of GDP in Poland.

3.2.2. Results of prognostic simulations

Results of prognostic simulations are included in the below table. They were limited only to Poland, because the Polish simulation model shows strong influence of taxation on GDP. When analyzing the presented results, the character of continuation simulation should be taken into account. Polish continuation policy would be based on low direct taxes, high social contributions and high indirect taxes, which strongly disturb GDP growth by negative impact of tax harmonization policy. This policy would mean the overall increase of tax burdens. The assumption of the continuation of such a policy seems to be very pessimistic.

As indicates the present practice in tax burdens policy in Poland in 2005 and 2006, Poland rather relaxes indirect taxation by reducing fuel excise taxes than continues the unbeneficial past model. In the prognostic simulations the following variants were taken into account:

1) Simulation of continuation policy – marked as PL1
2) Simulation PL-IR1 – decrease of social contributions to the Irish level, based on the Irish impact path of social contributions on Polish GDP
3) Simulation PL-IR2 – decrease of social contributions to the Irish level, compensated by increase of direct taxes to the Irish level, based on the Polish growth path
4) Simulation PL-ES – moderate decrease of indirect taxes to the Spanish level, based on the Spanish growth path.

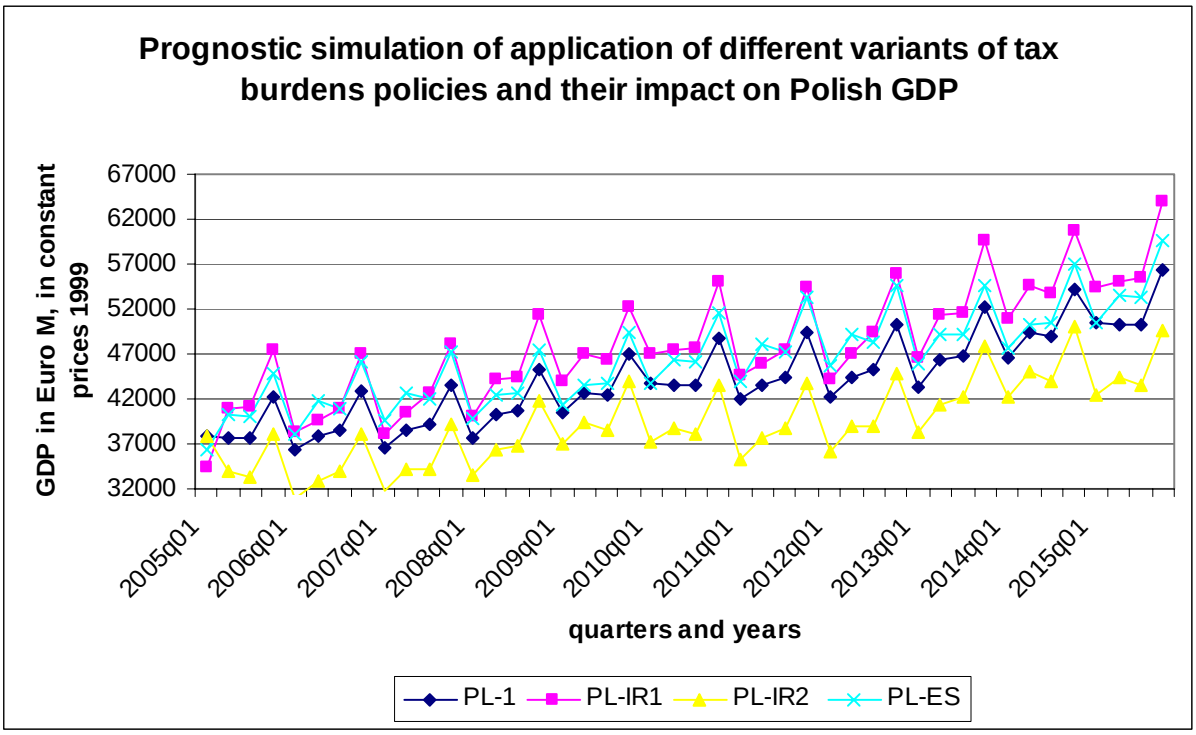
Table 20. Prognostic simulations of tax burdens policies impact on the level of Polish GDP

Year	GDP in Euro M, in constant prices 1999			
	PL1	PL-IR1	PL-IR2	PL-ES
2005	155708,5	163882,8	143244,4	161411,9
2006	155589,9	165846,1	135951	166997,7
2007	157730,5	169331,1	139137	171294,4
2008	163711,2	180018,8	148526,9	172507,3
2009	172612,7	189587,2	158521	177904,3
2010	179637	197242,8	157386,4	187966,2
2011	179500,1	192409,6	155406,3	192683,5
2012	181969,8	196452,7	159048,2	197641,1
2013	188869,5	208852,4	169781,8	199040,6
2014	199138,9	219953,3	181206,1	205267,7
2015	207242,7	228835,1	179909,3	216877,2
Sum E	1941711	2112412	1728118	2049592
Sum %	**100,00**	**108,79**	**89,00**	**105,56**
2005	100,00	105,25	92,00	103,66
2006	99,92	106,51	87,31	107,25
2007	101,30	108,75	89,36	110,01
2008	105,14	115,61	95,39	110,79
2009	110,86	121,76	101,81	114,25
2010	115,37	126,67	101,08	120,72
2011	115,28	123,57	99,81	123,75
2012	116,87	126,17	102,14	126,93
2013	121,30	134,13	109,04	127,83
2014	127,89	141,26	116,38	131,83
2015	133,10	146,96	115,54	139,28

Source: own estimation on basis of simulations

As indicates comparison included in the table, the worst results are brought through adopting the policy of social contributions reductions and simultaneous increase of direct taxes to the Irish levels. Good results are caused by adoption of Spanish policy of moderate indirect taxes. The best results could be achieved by the adoption of social contributions reduction without any compensation in other taxes increases. Those results are presented on figure 14.

Figure 14



Source: own estimation on basis of simulations

4. Conclusions

The conducted simulations of applications of Greek, Spanish and Irish tax policies by Poland, Slovakia and Czech Republic indicate conclusions both for the tax harmonization policy and for strategy of tax competitiveness. Those conclusions may be set up both for the Central Europe countries and for the European Union as the unity.

Conclusions from the research for the new EU member states

1) The tax harmonization research indicated that slowing down the pace of harmonization policy can influence on the increase of the GDP growth of Central Europe countries and on the reduction of necessary size of net transfers required as structural assistance. Therefore Central Europe countries should strongly suggest slowing down the pace of this policy in the European Union. On their own they should apply harmonization on the lowest possible level. Poland is the country which could achieve the largest GDP increases after slowing down the pace of harmonization policy. Adoption of each foreign harmonization policy gave better results than continuation of the Polish one.
2) The low purchase power of consumers in the new EU member states is a key argument against extensive harmonization. When the same minimum level of excise taxes is applied in different countries and they are converted into national currencies, the impact of the same Euro amounts on consumers in the new member states will be many times stronger than in the old EU states. The policy aimed at equalizing the

market conditions becomes a policy of discrimination consumers, producers and employees in the new states. It leads to consumption and GDP decreases. It prolongs the structural assistance provision.

3) It seems that asymmetry between structural support policy and harmonization policy is an important problem to be solved. Structural support policy operates a category of Gross National Income (GNI) per capita (PPS) as a decision factor to match the region to the assistance range. Annual assistance cannot exceed the given level of GDP but this level is decided by the GNI PPS, which includes a purchase parity multiplier. The EU tax harmonization policy operates categories in absolute values. This type of policy slows down the GDP growth pace of Central Europe countries what prolongs the assistance period. Asymmetry of critical criteria of both policies leads to prolongation of assistance what is unbeneficial both for Central Europe and for old member states (EU 15).
4) Countries with lower price levels should demand on the EU re - estimation the minimum values of excise taxes for fuels and energy (critical factors for growth) using PPS parities. It would equalize operation conditions for producers, consumers and employees in all EU countries.
5) The issue of tax burdens policy choice was neither solved nor decided in this research. The level of tax burdens is not a factor deciding on the GDP level. The example of Czech Republic, the country with significantly higher tax burdens and significantly higher FDI inflow per capita than in Poland, is an example. The Czech Republic tax policy phenomenon can be explained. The high level of internal taxation burdens is accompanied by the high level of governmental transfers to foreign investors. It is significantly higher in absolute values than in Poland. Czech government collects higher taxes from their citizens and enterprises and subsidizes new foreign investment. This policy is very effective. Large investments are located in Czech Republic and in Slovakia (following CR) and avoid Poland.
6) Analyzed strategies of reducing social security contributions seemed to be effective instruments to accelerate GDP growth. It was proved by simulations for Poland and Czech Republic. However when social contributions reduction policy is accompanied by simultaneous increase in direct taxes the final result of such reduction is at least neutral or even negative. This was proved by simulations for Poland.
7) Strategy of moderate reduction of indirect taxes to the Spanish level proved to be an effective tool to accelerate the Polish GDP growth pace. Partly it could be caused by negative impact of indirect tax harmonization policy conducted in Poland.
8) Out of three analyzed countries of Central Europe, only Polish economy was extremely sensitive to the impact of tax factors on GDP. Economies of Czech Republic and Slovakia were significantly less sensitive for tax factors than the Polish one.

Conclusions for the European Union

1) European Union should consider more flexible approach to the harmonization of indirect taxes. Assuming that the assistance period should be shortened, EU should provide to its members the opportunity to use more symmetric instruments allowing for building non-discriminatory conditions for consumers, employees and producers in area of production and consumption of harmonized goods.
2) To stimulate economic development of both new and old member states EU should support tax competition among members. Each country should be supported to seek

its own solutions in this sphere because there is not uniform reflection of tax policies in GDP growth. This support policy should not be financed from EU funds.

Besides, short run conclusions were formed for Poland

1) In light of received simulation results, the government of Poland should avoid any increases of excise taxes, especially as taxes for fuels and energy are concerned. Each increase of excise taxes can lead to decrease of GDP growth. Evidences are obvious.
2) The government should keep excise taxes level on the minimum level, allowed by EU. The only acceptable exclusion are the excise taxes for tobacco products.
3) In periods of the low levels of Euro exchange rate into zloty, the government should support the GDP growth by reduction of excise taxes.
4) The decrease of indirect taxes should be considered for 2007, e.g. to the level of Spain.
5) Very slow growth of high quality employment seems to be a serious problem of Poland. Only in the Polish supply side regression, a negative interrelation between the GDP growth and quality employment growth, was observed. The increase of quality employment is an important factor of growth. The government of Poland should decrease the level of marginal PIT rate from 40% (41,25% including health tax) to Czech level of 32%. At present Poland maintains the highest level of marginal PIT tax in Central Europe, despite the lowest direct tax burden level! Discrimination of high qualified labor in Poland is obvious.
6) Following Czech example, the government of Poland should spend a part of additional tax revenues for subsidizing foreign direct investment in manufacturing. The size of this subsidizing should reflect the size of the country. Such solutions should be included to the budgetary plan for 2007.

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