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## ARITHMETIC OF INFLUENCE OF DEBT CRISIS ON ECONOMIES OF VISEGRAD GROUP AND CHALLENGES AHEAD

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**Summary:** The global financial and economic crisis has fully revealed the risks of over-indebted countries, whose cause was, inter alia, the maintenance of structural deficits for many years. Economies of the Visegrad Group (V4 Group) conducted even less disciplined fiscal policy than the EU. Nevertheless, the V4 Group has weathered the crisis better than the EU, even though its initial fiscal position was worse. However, in the long term, the fiscal consolidation process will be hindered due to unfavorable demographic trends and the burden on public finances imposed by scarce social security systems. In this respect, the V4 Group is going to experience even greater challenges than the EU. The purpose of this article is to show the arithmetic course and consequences of the sovereign debt crisis on economies of V4 Group as well as the challenges related among others to ageing process its population is going to face in medium and long term.

**Keywords:** V4 Group, sovereign debt crisis, general government debt, fiscal consolidation, ageing of population.

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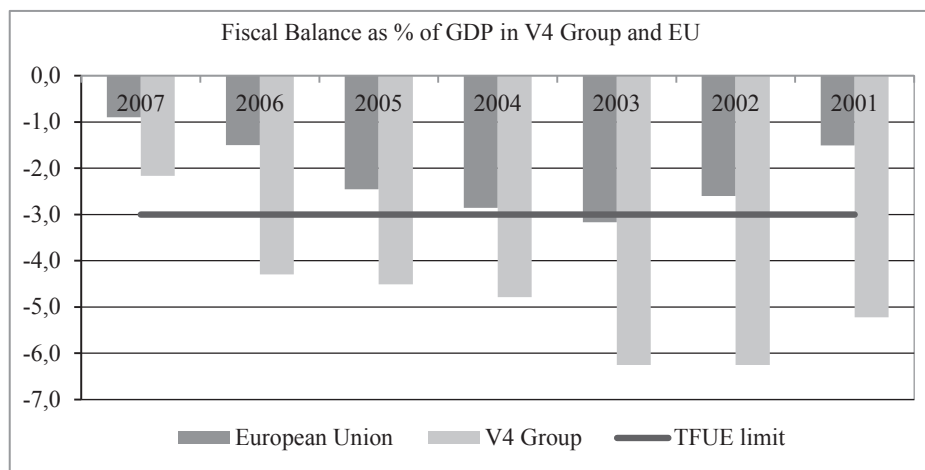
### 1. Introduction

The global financial and economic crisis was neither the only nor major cause of profound deterioration in public finances in Europe. It was largely caused by irresponsible fiscal policies pursued by governments before the crisis for purposes other than stabilizing the economy. In this matter, economies of the Visegrad Group (V4)<sup>1</sup> conducted even less disciplined fiscal policy than in the EU on average. In the

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<sup>1</sup> The Visegrad Group (also known as the “Visegrad Four” or simply “V4”) reflects the efforts of the countries of the Central European region to work together in a number of fields of common interest within the all-European integration. The Czech Republic, Hungary, Poland and Slovakia have always been a part of single civilization sharing cultural and intellectual values and common roots

years 2001-2007, the average fiscal deficit in those countries was more than twice higher than in the EU (Fig. 1) and considerably higher than the acceptable limit, recorded in the Treaty on the Functioning of the European Union (TFUE) and in the Stability and Growth Pact (SGP).



**Figure 1.** Fiscal Balance in V4 Group in the years 2001-2007

Source: AMECO database, European Commission. Calculations by the author based on GDP at market prices as a weighted measure.

When the global financial and economic crisis intensified after the collapse of Lehman Brothers, the Visegrad Group countries (V4) were strongly affected, as reflected, not only in a significant decline in GDP growth but first of all in a significant deterioration of fiscal position. But the impact of the crisis on V4 economies varied considerably. While Poland weathered the crisis relatively well, being the only EU country to record positive GDP growth in 2009, other V4 members experienced a significant decline in GDP. Nevertheless, the V4 Group has weathered the crisis better than the EU on average, even though its initial fiscal position was worse. More than five years into the economic crisis, the time is ripe for reflection on the fiscal changes the region has undergone in this period.

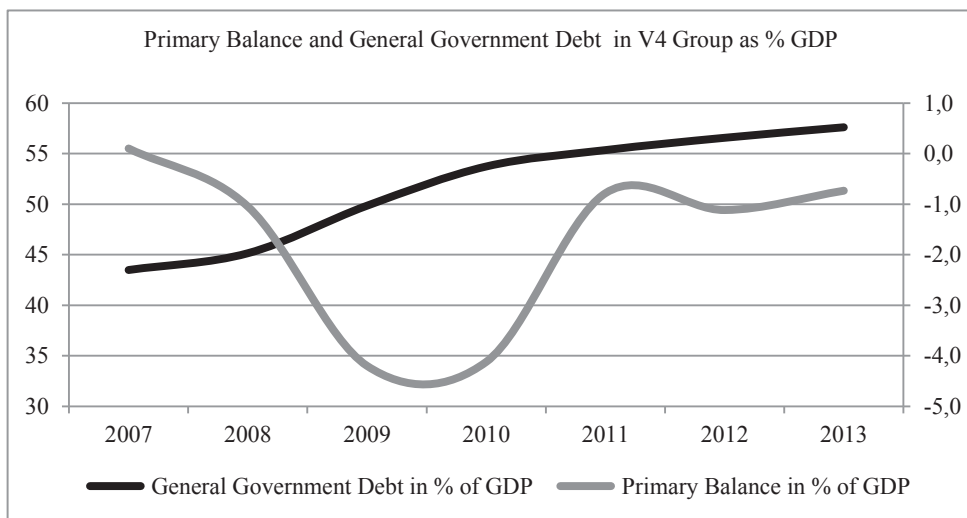
The purpose of this article is to show the arithmetic course and consequences of the sovereign debt crisis on economies of V4 Group as well as the challenges related among the others to ageing process its population is going to face in medium and long term.

## 2. Fiscal picture of economies of Visegrad Group in crisis years

The recent development of budget deficits and public debt has become a significant policy problem in most industrialized countries. This is not surprising as markets and the public place great importance on a reasonably low and stable ratio of government debt to GDP. They tend to interpret a high and still growing debt ratio as a signal of endangering the fiscal sustainability or even looming public insolvency. Keeping the debt ratio below an upper bound to reassure economic agents is well founded, as an ever increasing debt ratio would eventually result in a fiscal debt crisis and default either outright or through inflation or other means.

The global financial and economic crisis has fully revealed the risks of over-indebted countries, whose cause was, inter alia, the maintenance of structural deficits for many years. An unavoidable aftermath of the crisis was a rapid deepening of budget deficits and the jumping growth of debt-to-GDP ratio.

The primary fiscal balance is the best available proxy for the overall fiscal picture within government's control. The primary balance consists of government revenue less spending excluding the debt cost servicing. It is the most accurate reflection of the government's fiscal policy decisions.

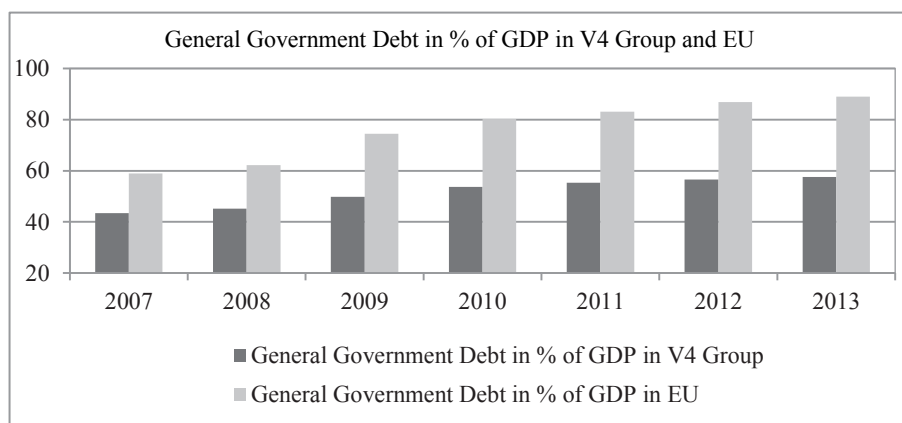


**Figure 2.** Primary Balance and General Government Debt in V4 Group in the years 2007-2013

Source: AMECO database, European Commission. Calculations by the author based on GDP at market prices as a weighted measure.

The global financial crisis resulted in the most pronounced and pervasive peacetime worsening of the primary fiscal balance, with the average primary fiscal deficits in 2008-2009 larger than at any other point in history aside from the World Wars [Mauro,

Romeu, Binder, Zaman 2013]. In economies of V4 Group the overall fiscal picture was not different. Figure 2 presents the government debt and primary fiscal balance in V4 Group both prior to the crisis and during the crisis years. The right axis corresponds to the fiscal primary balance.



**Figure 3.** General Government Debt in EU and V4 Group in the years 2007-2013. Calculations by the author based on GDP at market prices as a weighted measure

Source: AMECO database, European Commission.

A significant deterioration in the primary balance was accompanied by a sharp rise in debt-to-GDP ratio. Only fiscal consolidation undertaken by governments led gradually to a slowdown in the growth of debt in relation to GDP. However, against the EU average, the V4 Group performed much better in terms of the rise in debt-to-GDP ratio (Fig. 3). In the years 2008-2013, the debt-to-GDP ratio in V4 Group increased by 12.5 pp., whereas in the EU by already 26.9 pp.

### 3. Arithmetic of deficit-debt

Even though there is no formula that allows a clean additive decomposition of changes in the debt ratio into the most interesting underlying factors, such as interest rates, inflation, fiscal adjustment, etc., the following equation, comes close to it [Escolano 2010]:

$$d_t - d_{t-1} = \frac{i_t}{1 + y_t} d_{t-1} - \frac{y_t}{1 + y_t} d_{t-1} + p_t$$

$d_t$  = Debt at the end of period  $t$ , as a ratio to GDP at  $t$ .

$d_{t-1}$  = Debt at the end of period  $t - 1$ , as a ratio to GDP at  $t - 1$ .

$i_t$  = Nominal interest rate in period  $t$ ; paid in period  $t$  on the debt stock outstanding at the end of  $t - 1$ .

$y_t$  = Nominal GDP growth rate between  $t - 1$  and  $t$ .

$p_t$  = Primary fiscal deficit in  $t$ , as a ratio to GDP at  $t$ .

This equation indicates that the change in the debt ratio equals the impact of interest (positive) and nominal GDP growth (negative), plus the contribution of the primary deficit. After simplification<sup>2</sup>:

$$d_t - d_{t-1} = p_t + d_{t-1} \left[ \frac{i_t - y_t}{1 + y_t} \right] \quad [1]$$

The equation [1] shows that the change in debt-to-GDP ratio is a sum of primary fiscal deficit and so-called “snow ball effect” which expresses the combined effect of the interest rate of government bonds and the growth rate of nominal GDP on debt-to-GDP ratio. Maintaining a constant debt-to-GDP ratio requires that left side of equation [1] be equal zero. The condition to stabilize the debt-to-GDP ratio at a specified debt level is to ensure that:

$$-p_t = d_{t-1} \left[ \frac{i_t - y_t}{1 + y_t} \right] \quad [2]$$

The equation [2] indicates that the condition for stability of the debt-to-GDP ratio requires that the relation of primary deficit to GDP equals the “snow ball effect”. Indeed, the public debt does not grow, if the primary deficit is compensated by the surplus of growth of nominal GDP above the average nominal interest of debt. In other words, the debt ratio will increase indefinitely if nominal interest rate exceeds the growth rate of nominal GDP, unless the primary budget is in sufficient surplus to compensate for that. Very often, in order to stop the process of increasing debt, not only a primary balance shall be achieved, but also a primary surplus. This is the case many European countries are experiencing now. Hence, crucial for the debt dynamics is a sign of expression  $(i - y)$ .

#### **4. Impact of public debt on the economic growth and the level of interest rates**

A large number of empirical studies show that a certain level of debt beyond a given threshold has negative consequences on the economy and policy making. The relationship between government debt and economic growth is insignificant for

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<sup>2</sup> It was assumed that the impact of so-called stock-flow adjustment factor equals zero in this equation.

debt ratios below a given threshold, but above it the average growth rate starts to fall rapidly [Reinhart, Rogoff 2010]<sup>3</sup>. For example, Reinhart and Rogoff [Reinhart, Rogoff 2009] placed the threshold at which public debt is associated with lower contemporaneous growth at about 90% of GDP for advanced economies and 60% for emerging economies in relation to external debt. Other studies [Reinhart, Reinhart, Rogoff 2012] with alternative methodologies and samples yield similar estimates<sup>4</sup>. However, according to the International Monetary Fund, emerging economies are completely safe to incur the debt in relation to GDP at around 25% [Topalova, Nyberg 2010].

Based on recent sovereign debt crisis and earlier episodes, it can be seen that a high level of debt can reduce room for country's ability to deal with shocks to interest rates. The shock to cost of servicing the debt in a country with higher public debt will be more significant than for countries with a lower public debt. For instance, in countries where government debt exceeds 100% of GDP, a relatively small rise of 10 basis points in cost of debt servicing increases government outlays by more than 0.1% of GDP annually [European Commission 2009].

A high level of debt is also likely to lead to the threshold effects, whereby once the debt reaches a certain level, its further increase will push interest rates even higher. This increase might hinder to continue encouraging markets to buy government bonds and might lead to the effect of crowding out private investment. In addition, higher spending on public debt service is usually leading either to the worsening of public spending structure (cuts in public investment take place mainly instead of social services) or to higher taxes which hamper the economic growth [Rzońca, Varoudakis 2007].

Overall, the explosion of public debt increases the vulnerability of economy to the crisis of confidence from the side of financial markets. An increasing public debt undermines the credibility of the country, leads to a lower rating and ultimately to the increase in the cost of debt servicing along with even threatening to fall into the debt trap.

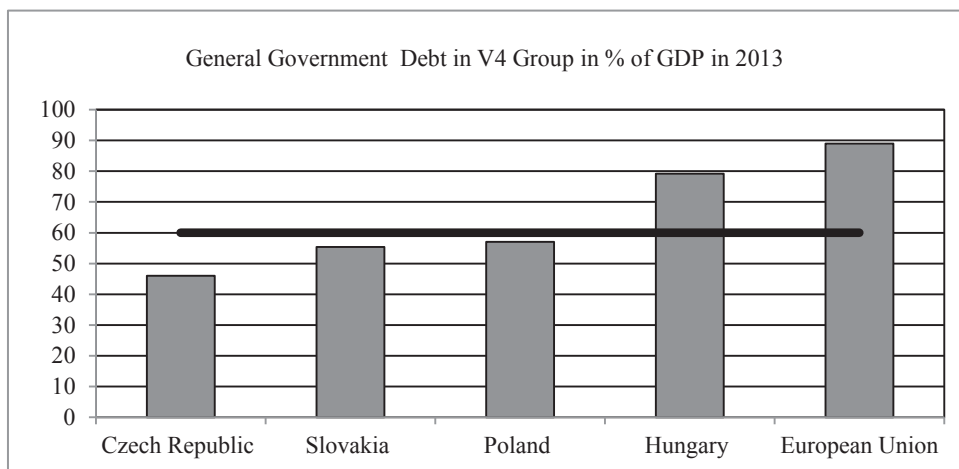
Current situation in V4 Group shows that only in Hungary the debt-to-GDP ratio exceeds acceptable limit of 60% recorded in the Treaty on the Functioning of the European Union (TFUE) and in the Stability and Growth Pact (SGP) (Fig 4). The economic performance of Hungary confirms the results of those empirical studies mentioned above. In the years 2008-2013 this country has developed the least among the V4 Group (-0.7% vs. 0.8% on average in V4 Group) and experienced the deepest

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<sup>3</sup> It is essential to mention here that the article "Growth in a Time of Debt" has met with fierce criticism recently. Other economists, taking the same data and using the same method of analysis, could not come to the same conclusions. See e.g. [Herndon, Ash, Pollin 2013; Krugman 2013].

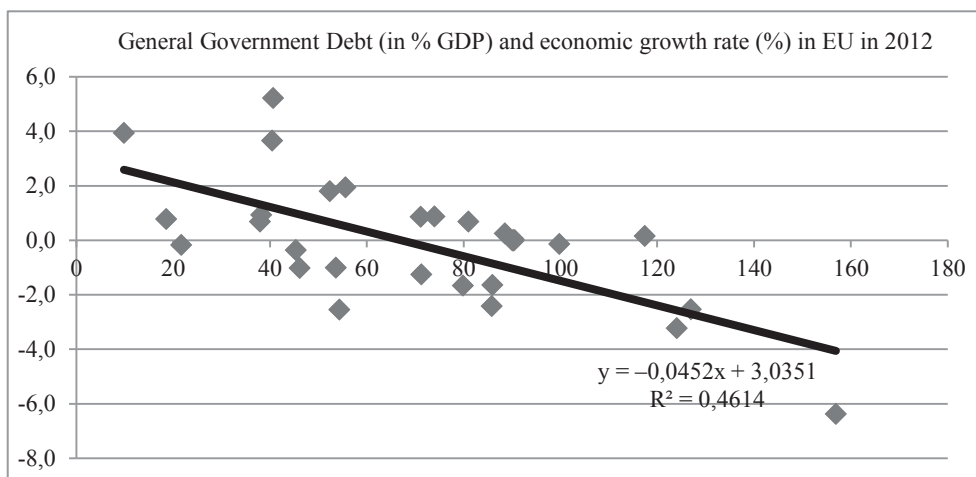
<sup>4</sup> It is important to add that a critical threshold for debt level depends on an individual position of a particular country including such factors as the share of foreign debt in total debt, the average maturity of debt, the value of the assets held by general government, country's demographic structure, but also on the phase of the business cycle and the risk aversion of investors. See e.g. [Eichengreen et al. 2011].

recession in 2009 ( $-6,8\%$  vs.  $-3,6\%$  on average in V4 Group). This might confirm that exceeding a certain threshold has a negative impact on the economic growth.



**Figure 4.** General Government Debt in V4 Group in % of GDP in 2013

Source: AMECO database, European Commission.



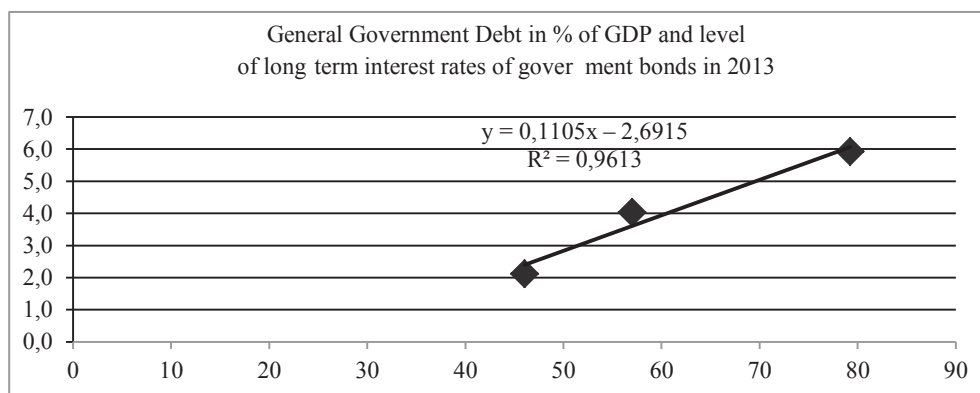
**Figure 5.** General Government Debt (in % of GDP) and economic growth rate (%) in EU in 2012

Source: own calculation based on AMECO database, European Commission.

Furthermore, the example of the European Union illustrates well the relationship between the level of public debt and the economic growth. Figure 5 indicates that there is a statistically significant, negative correlation between the level of debt and

the rate of economic growth in the EU in 2012: increase in debt-to-GDP ratio by 10 pp. was associated with an average fall of GDP growth rate by 0.45 pp.

In turn, Figure 6 illustrates the relationship between the level of debt and the level of long-term interest rates of government bonds in V4 Group<sup>5</sup> in 2013. The figure shows that there is a statistically significant and positive relationship between those variables: increase in debt-to-GDP ratio by 1 pp. was associated with an average increase in the level of interest rates of government bonds by about 11 basis points.



**Figure 6.** General Government Debt (% of GDP) and the level of long-term interest rates of government bonds (%) in Czech Republic, Hungary and Poland in 2013

Source: own calculation based on AMECO database, European Commission.

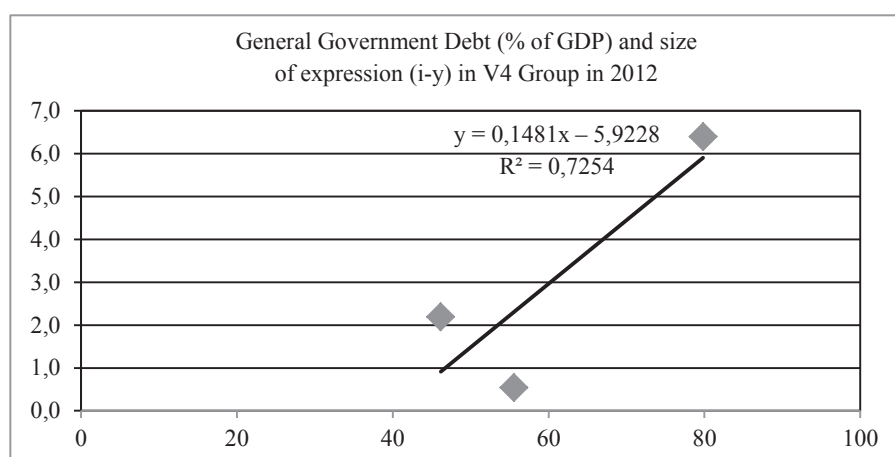
After having investigated the correlation between the level of debt and the rate of economic growth in the EU and V4 Group as well as the level of interest rates of government bonds, it is important to consider the impact of debt dynamic on both the expression  $(i-y)$  and the primary deficit sufficient for stabilizing the debt-to-GDP ratio at a given level in accordance with equation [2]. In this equation, the expression  $(i-y)$  is regarded as a constant parameter which implies a linear correlation between the deficit and the debt.

However, a deeper analysis of this equation and first of all the experience of recent sovereign debt crisis in Euro Zone and other similar episodes suggest that

<sup>5</sup> On purpose, this and later analysis is limited to the Czech Republic, Hungary and Poland. Slovakia as a member of Euro Zone (in the Czech Republic, Hungary and Poland there is no fixed date of the euro introduction, but it is widely expected not to happen before 2020) is eliminated due to the fact that it does not conduct an independent monetary and exchange rate policies compared to the rest of V4 Group. The United Kingdom and Spain are good examples to illustrate the importance of those factors. In 2012, the average interest rates of long-term government bonds in Spain equaled 5.9% but in UK only 1.7% despite even higher debt-to-GDP ratio. However, UK is not a member of Euro Zone and conducts an independent monetary policy.



actual correlation may be rather non-linear and may be of accelerating character, at least above a certain level of debt. This means that the values of parameters  $i$  and  $y$  are not constant and independent of values of parameters  $d$  and  $p$ , but they follow the changes of debt-to-GDP ratio [Rosati 2013]. In particular, the recent sovereign debt crisis proves that for high debt-to-GDP ratios, the value of  $i$  starts to increase, whereas the value of  $y$  starts to fall. As a result, the expression  $(i-y)$  becomes positive and greater in absolute terms. This, in turn, requires to maintain not only a primary balance, but also a primary surplus sufficient to stabilize the debt-to-GDP ratio. Figure 7 shows the relationship between the level of debt and the size of expression  $(i-y)$  for V4 Group.



**Figure 7.** General Government Debt (% of GDP) and size of expression  $(i-y)$  in V4 Group in 2012

Source: own calculation based on AMECO database, European Commission

Based on this chart, there is a statistically significant and positive relationship between analyzed variables: increase in debt-to-GDP ratio by 10 pp. is associated with an increase in size of expression  $(i-y)$  by 1.5 indicating that the correlation is of non-linear and dynamic character. In 2012 among the V4 Group Hungary had the highest debt-to-GDP ratio and paid the highest interest on their government bonds. On the other hand, one must note that the second parameter of expression  $(i-y)$  has an equal impact on its overall value. Out of those three countries, the Czech Republic had the lowest debt-to-GDP ratio and paid the lowest interest on their government bonds (2.8% vs. 5% in Poland and 7.9% in Hungary), however, due to the low dynamics of nominal GDP, the value of  $(i-y)$  expression was higher than e.g. in Poland.

Sovereign debt crisis in Euro Zone illustrates well that the rapid growth in the value of expression  $(i-y)$  constitutes an evidence that a country in which the debt-to-GDP ratio reaches a high value, sooner or later encounters a limit, beyond

which servicing the debt becomes unmanageable<sup>6</sup>. In accordance with equation [2] the primary balance should be in such a high surplus to compensate for the size of expression (i-y) that this seems generally impossible from socio-political reasons. Furthermore, gaining the political support for a prolonged period of adjustment becomes highly challenging, particularly in a cyclical adverse conditions and when additional efforts are required to address extra costs as e.g. age related costs. As the history shows clearly under such circumstances governments often decide to accuse debt service and ask international organizations for financial assistance. Recent example of Greece is a glaring evidence here.

## 5. Sustainability of general government debt in V4 Group

According to equation [2] the value of primary balance needs to equal its right side in order to stabilize the debt-to-GDP ratio. However, with high and positive value of expression (i-y) stabilizing the debt-to-GDP ratio requires to maintain not only a primary balance but also a sufficient primary surplus. Currently, all V4 countries are aiming to achieve a primary surplus. In this respect, in the years 2010-2014 the progress was highly noticeable and was a result of conducting a fiscal consolidation. Table 1 presents a sustainability of general government debt in V4 Group.

**Table 1.** Sustainability of General Government Debt in V4 Group

	Primary Balance as % of GDP		Threshold of Primary Balance beyond which the debt starts to fall	
	2010	Forecast 2014*	Scenario 1**	Scenario 2***
Czech Republic	-3.3	-0.5	-0.1	-1.0
Hungary	-0.2	0.9	1.8	0.2
Poland	-5.1	-0.1	0.4	-0.7
Slovakia	-6.2	-1.1	0.8	-0.3

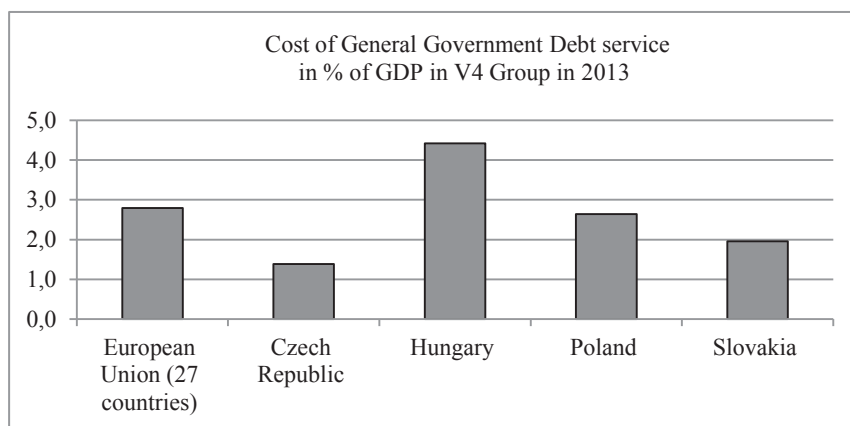
\* Based on European Economic Forecast, Spring 2014, European Economy 3/2014, European Commission; \*\* Scenario 1 reflects lower inflation and real GDP rates by 0.5 pp. compared to Forecast 2014; \*\*\* Scenario 2 reflects higher inflation and real GDP rates by 0.5 pp. compared to Forecast 2014.

Source: own calculations based on AMECO database. Level of debt and long-term interests are from 2013.

The table includes two sensitivity scenarios in order to illustrate the changes in relation to the required level of primary balance better. Scenario 1 assumes lower inflation and real GDP rates by 0.5 pp. compared to the forecast for 2014. In this case, the value of primary balance beyond which the debt starts to fall increases considerably

<sup>6</sup> In 2010, Greece, Ireland and Portugal were forced to ask for financial assistance to international organizations.

(only in the Czech Republic a primary balance still allows a decrease in debt-to-GDP ratio). In turn, scenario 2 assumes higher inflation and real GDP rates by 0.5 pp. compared to the forecast for 2014. In this case, the value of primary balance beyond which the debt starts to fall decreases considerably (only in Hungary a low primary surplus is required, whereas in the rest of the countries a primary deficit allows a decrease in debt-to-GDP ratio). Hungary has definitely the least favorable position out of V4 Group. First of all, the highest debt-to-GDP ratio requires the highest share of GDP dedicated to debt cost servicing (Fig. 8).



**Figure 8.** Cost of General Government Debt service (% of GDP)

Source: AMECO database, European Commission.

Furthermore, high public debt undermines credibility of a country, leads to a lower rating and hence higher risk premium included in government bonds. Indeed, among V4 Group, in 2013 Hungary paid the highest interests on long-term government bonds: 5.9% vs. 2.1% in Czech Republic, 4.0% in Poland and 3.2% in Slovakia (the same tendency refers to government bonds issued in euro currency; Tab. 2). Similar information is provided by a comparison of the quoted rates of CDS (credit default swap) – a contract used by investors to hedge the credit risk of the issuer. Price secured by a five year CDS contract for bonds issued by Hungarian government equals 190 basis points, whereas for the rest of V4 Group only 54 on average (Tab. 2).

However, for the time being, Hungary is the only country among V4 Group that is out of the Excessive Deficit Procedure (EDP) due to undertaken fiscal measures. In fact, Hungary managed to reduce the debt-to-GDP ratio by 3 pp. in the years 2010-2013.

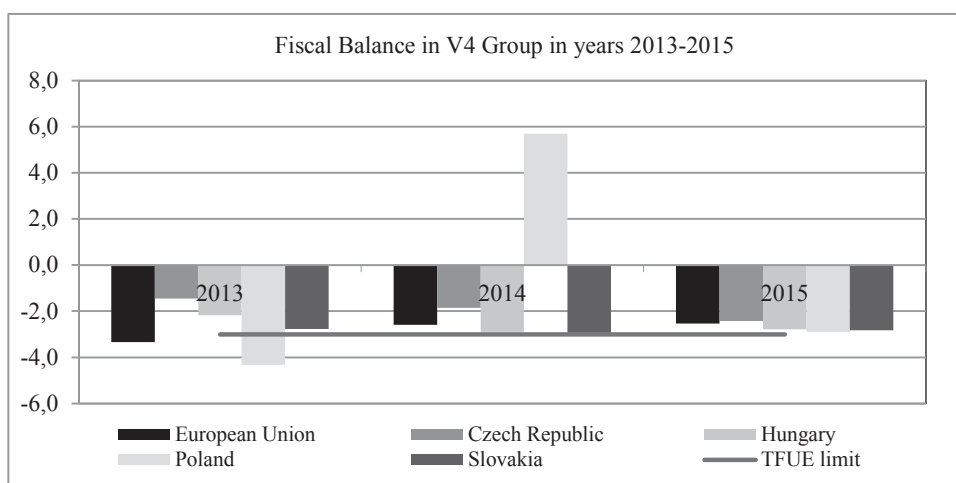
Overall, due to fiscal consolidation carried out, V4 Group should have its fiscal position much improved in 2015 meeting the limit of fiscal general government deficit recorded in the Treaty on the Functioning of the European Union (TFUE) and in the

**Table 2.** Interests of government bonds in euro, quota of CDS and rating in V4 Group

Country	Interests of government bonds in euro (%)*	CDS**	Rating***		
			S&P	Moody's	Fitch
Czech Republic	1.78%	53	AA-	A1	A+
Hungary	3.29%	190	BB	Ba1	BB+
Poland	2.38%	59	A-	A2	A-
Slovakia	2.32%	50	A	A2	A+

\* Interests of 10 year government bonds in euro in May 2014; \*\*price secured by a five year CDS contract for bonds issued by V4 Group governments in May 2014; \*\*\* rating in May 2014 for foreign currency long-term.

Source: Reuters and Bloomberg.

**Figure 9.** Fiscal Balance in V4 Group in the years 2013-2015

Source: European Economic Forecast, Spring 2014, European Economy 3/2014, European Commission.

Note: Poland moved from deficit of 4.3% of GDP in 2013 to a surplus of 5.7% in 2014, largely due to a one-off operation related to the transfer of assets from the privately owned second pillar of the pension system to the first pillar located within the general government sector.

Stability and Growth Pact (SGP). Figure 9 presents a fiscal forecast for V4 Group up to 2015 against the EU.

## 6. Sovereign debt crisis in the light of challenges related to ageing of European population

The challenges of reducing debt in the EU are compounded themselves by unfavorable demographic trends due to low fertility rates, steady increases in life expectancy and the retirement of the baby-boom generation. Ageing of European population is going

not only to mark social economic consequences but will also constitute a significant burden for government budgets in the future, endangering the medium and long-term sustainability of public finance.

For instance, a dramatic increase in both total and old age dependency rates is expected to materialize in 2060. In the EU27 the ratio of inactive population aged 65+ as percentage of the employed (aged 20-64) is projected to increase from 40 in 2010 to 74 in 2060. From this standpoint, the ratio in V4 Group will be even higher – equaling 90.5. Those changes are only enhanced by the increase in life expectancy and the fall in fertility rates. At EU27 level, the life expectancy at birth for women is projected to increase from 82.5 years in 2010 to 89.1 by 2060, while for men it is set to increase from 76.7 years to 84.6. On the other hand, the fertility rate (births per woman) is projected to increase from 1.6 to only 1.7 (in V4 Group only to 1.6) so to the level much below the natural replacement rate of 2.1 (births per woman) [European Commission 2012].

The ageing of the population has both direct (increase in age-related expenditure) and indirect (decline in potential GDP as a result of a reduction in labor supply) impact on public finances. The ageing population increases government expenditure in the provision of age-related transfers and services. In the projections of European Commission [*The 2012 Ageing Report 2012*] four age-related items are projected: expenditure on public pensions (depending on the number of pensioners and average life expectancy on retirement), healthcare expenditure (depending on the way the health sector is organized and the split of costs between government, patients and private institutions), long term care expenditure (depending on the “quality” of ageing and support from the government) and education expenditure (they fall along with ageing of society decreasing share of young people in total population). Table 3 shows projected age-related expenditure for the EU in the horizon of 2010-2060 in % of GDP.

**Table 3.** Projected age-related expenditure for the EU, 2010-2060, percentage points of GDP

	Projected age-related expenditure for EU and V4 Group, 2010-2060, percentage points of GDP											
	Pensions			Health care			Long-term care			Education		
	Level	Change		Level	Change		Level	Change		Level	Change	
	2010	2010-2020	2010-2060	2010	2010-2020	2010-2060	2010	2010-2020	2010-2060	2010	2010-2020	2010-2060
<b>UE</b>	11,3	-0,1	1,5	7,1	0,3	1,1	1,8	0,2	1,5	4,6	-0,3	-0,1
<b>Czech Republic</b>	9,1	-0,4	2,7	6,9	0,4	1,7	0,8	0,1	0,7	3,4	0,0	0,2
<b>Hungary</b>	11,9	-0,4	2,8	4,9	0,2	1,1	0,8	0,1	0,6	4,3	-0,3	-0,4
<b>Poland</b>	11,8	-0,9	-2,2	4,9	0,4	1,9	0,7	0,1	1,0	3,9	-0,6	-0,5
<b>Slovakia</b>	8,0	0,6	5,2	6,2	0,6	2,1	0,3	0,0	0,4	3,1	-0,3	-0,1
<b>V4 Group</b>	10,2	-0,3	2,1	5,7	0,4	1,7	0,7	0,1	0,7	3,7	-0,3	-0,2

Source: [*The 2012 Ageing Report 2012*, p. 40].

Against the EU, V4 Group itself will experience even greater demographic changes. Due to this, the growth of age-related expenditure will be more significant

compared to EU (see Tab. 3) on average. In particular, spending on pensions and health care will be those categories to grow faster than in EU on average.

Overall, the ageing population is expected to have a significant impact on economic growth and leads to significant pressures on public spending. Similarly to the Member States, it will be challenging for V4 Group to maintain sound and sustainable public finances in the medium and long term. Apart from the prompt necessity of carrying out a traditional fiscal consolidation, this will require a credible strategy of entitlement reform (pensions, health care, long-term care) to address the expected growth in age-related spending.

## 7. Conclusions

The global financial and economic crisis has fully revealed the risks of over-indebted countries, whose cause was, *inter alia*, the maintenance of structural deficits for many years. The economies of Visegrad Group (V4) conducted even less disciplined fiscal policy than the EU countries on average. In the years 2001-2007, the average fiscal deficit in those countries was more than twice higher than in the EU and considerably higher than the acceptable limit, recorded in the Treaty on the Functioning of the European Union (TFUE) and in the Stability and Growth Pact (SGP).

The Group (V4) economies were strongly affected by the crisis, as reflected, not only in a significant decline in GDP growth but, first of all, in a significant deterioration of fiscal position. Nevertheless, V4 Group has weathered the crisis better than the EU on average, even though its initial fiscal position was worse. In the years 2008-2013, the debt-to-GDP ratio in V4 Group increased by 12.5 pp., whereas in EU by already 26.9 pp.

The analysis carried out in the article confirms that markets and the public place great importance on a reasonably low and stable ratio of government debt to GDP. The standard model of dynamics of the deficit-debt does not take into account the feedback between the level of debt and the rate of growth of GDP and the level of interest rates on government bonds. However, the sovereign debt crisis in Europe provides strong evidence that the higher the debt-to-GDP ratio, the lower the rate of growth and higher level of interest rates on government bonds. An increase in debt-to-GDP ratio leads to the worsening of an expression  $(i-y)$  and constitutes evidence for non-linear and accelerating character of relationship reflected in equation [2], at least above a certain level of debt. Out of V4 Group Hungary with the debt-to-GDP ratio at 80% is a good example that illustrates those relations.

Currently, all V4 countries are aiming to achieve the primary surplus. In this respect, in the years 2010-2014 the progress was highly noticeable, which was a result of conducting a fiscal consolidation. Relatively good growth prospects, much lower debt-to-GDP ratio (57% of GDP) compared to the EU (89% of GDP) should make the process of further fiscal consolidation less rigid short-term.

However, the process of growing out of debt will be compounded by unfavorable demographic trends due to low fertility rates, steady increases in life expectancy and the retirement of the baby-boom generation. Progressive ageing of European population is going not only to mark social economic consequences but will also constitute a significant burden for government budgets in the future, endangering the medium and long-term sustainability of public finance. In this respect, V4 Group is going to experience even greater challenges than the EU.

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## ARYTMETYKA WPLYWU KRYZYSU ZADŁUŻENIA NA GOSPODARKI GRUPY WYSZEHRADZKIEJ A WYZWANIA NA PRZYSZŁOŚĆ

**Streszczenie:** Światowy kryzys finansowy i gospodarczy ujawnił w pełni ryzyko nadmiernego zadłużania się krajów, którego przyczyną było m.in. utrzymywanie deficytów strukturalnych przez wiele lat. Gospodarki Grupy Wyszehradzkiej (Grupa V4) prowadziły nawet mniej zdyscyplinowaną politykę fiskalną niż kraje UE. Niemniej jednak Grupa V4 przetrwała kryzys lepiej niż UE, pomimo gorszej początkowej pozycji fiskalnej. Jednakże w dłuższej perspektywie proces konsolidacji fiskalnej będzie utrudniony ze względu na niekorzystne tendencje demograficzne i obciążenie finansów publicznych deficytowymi systemami zabezpieczeń społecznych. W tym aspekcie Grupa V4 doświadczy nawet większych wyzwań niż kraje UE. Celem niniejszego artykułu jest arytmetyczne pokazanie przebiegu i konsekwencji kryzysu zadłużenia suwerennego w Europie dla gospodarek Grupy Wyszehradzkiej oraz wyzwań związanych m.in. z procesem starzenia się ludności w średniej i długiej perspektywie.

**Słowa kluczowe:** Grupa Wyszehradzka, kryzys zadłużenia suwerennego, dług publiczny, konsolidacja fiskalna, starzenie się społeczeństwa.