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## **The influence of crisis on the sector structure of economy focusing on agriculture.**

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### **Abstract**

The Czech Republic entered the crisis with relatively good starting conditions - showed no significant macroeconomic imbalances and financial system was not destabilized. However, the crisis has here also been and a decline in GDP in 2009 to 4.1% was mainly due to economic recession in the Euro zone. In many countries there has been a change in the sector scope. The Czech Republic belongs to the industrial-oriented countries and the significance of recession is also demonstrated by the development of industrial production and exports. Further economic increase depends mainly on exports, because there are many industries in the Czech Republic with foreign majority and a large part of their production goes abroad. Czech agriculture has been also facing adverse impacts of the crisis. These have occurred since the second half of 2008. The article analyses the contributions to GDP and trends in future years. There are also described changes in the sector economic structure with focus on agriculture.

### **Key words**

GDP, crisis, economic performance, sector of agriculture.

### **Anotace**

Česká republika vstoupila do krize s poměrně dobrými výchozími podmínkami – nevykazovala výraznější makroekonomickou nerovnováhu a finanční systém nebyl destabilizován. Nicméně krize se zde projevila také a pokles HDP v roce 2009 o 4,1% byl způsoben především díky ekonomické recesi v Eurozóně. V mnoha zemích došlo k sektorové změně. Česká republika se řadí k průmyslově orientovaným ekonomikám a významnost rozsahu recese dokládá také vývoj průmyslové výroby a exportu. Zpracovatelskému průmyslu u nás dominují velké firmy s majoritním zahraničním podílem a velká část jejich produkce směřuje do zahraničí. To ještě více zvyšuje závislost ekonomiky na exportu<sup>1</sup>. Také české zemědělství, podobně jako jiné sektory národního hospodářství, zaznamenalo nepříznivé dopady ekonomické krize. Ty se na agrárním trhu začaly projevovat již ve druhé polovině roku 2008. Následující příspěvek má za cíl analyzovat příspěvky jednotlivých složek HDP a trendy vývoje v budoucích letech. Následně je zde popsáno, jak se změnila sektorová struktura ekonomiky se zaměřením na zemědělství.

### **Klíčová slova**

HDP, krize, ekonomický výkon, zemědělský sektor.

<sup>1</sup> Junková, S. Hospodářské krize – historie a možné dopady současné finanční krize na ČR. Disertační práce, Praha, 2010, s. 127-146.

## Introduction

Gross domestic product (GDP) is a financial aggregate of the total value of goods and services newly produced in a given period and the area. Although it is not an ideal indicator, but it is most commonly used for the determination of economic performance. From the supply side of GDP, the production performance of economy can be measured for example as a Gross value added (GVA). Although the primary sector has the lowest share on GVA, his position is irreplaceable and that's why this article mainly deals with the agriculture.

The significant decrease of GDP may lead to national bankruptcy. Economists E. Borensztein and U. Panizza in "*The Costs in Sovereign Default*" examined the context between the GDP decline and the possibility of national bankruptcy. In their analysis the collapse of the state finances is associated to a GDP decline by 1,2. percentage points per year<sup>2</sup>. This is generally consistent with the conclusions of other economists – F. Sturzenegger and J. Zettlemeyer (2005). They estimated the GDP decline about 0,5-2,0. percentage points. This study indicates that the impact of state bankruptcy is only a short-term. There were tested also a dependence of other three periods on this event, but the test provided to be statistically insignificant. F. Sturzenegger and J. Zettlemeyer (2006) also mention that debt crises (solvency crises) "could be a result of large adverse shock to economic fundamentals"<sup>3</sup>.

## Material and methods

The aim of this paper is to describe following impacts of financial crisis<sup>4</sup> on the development of

GDP with focus on agriculture. In the analysis of changes in GDP growth will be also carried out the decomposition of GDP to components by expenditure approach. Based on the identification of the above mentioned goal, the paper is focused on estimating the potential further development of the examined macroeconomic aggregate and to describe the development of the GDP sector's changes. The sector studies began to be process relatively recently in the Czech Republic and their main purpose is to provide a detailed view of selected economic sectors. There are also examined all the factors that have the potential to influence the development of the sector in the coming years/future. This may include macroeconomic, technological, legislative, financial, procedural, demographic trends, or even competitive. The impact of crisis on GDP will be identified on the analysis of time series<sup>5</sup>. The purpose of time series analysis is to obtain information about the process that this numbers represent, identify the mechanisms and dynamics of the process, and subsequently to predict the possible future development of this process. For this purpose it was chosen the Box-Jenkins methodology. The basic element of this model is considered the random component that may be a correlated by a random variables. The core lies not in the construction of a systematic component (trend), as in the case of the classical model, but the focus is placed on the correlation analysis of more or less dependent observations, arranged in the form of time series. One of the categories in the model of the Box-Jenkins methodology is called autoregressive models (AR), which are based on the correlation analysis. Autocorrelation function can be simply described as the correlation functions of one variable at a time. It will help us to determine the regulation of the autoregressive process. The Seasonal autoregressive process of Procedure 1 was used in this paper for the calculation of the likely scenarios for the future development of GDP and its components (expenditure method). The seasonal component of time series means periodic fluctuations, which have systematic character. This variation in macroeconomic time series takes place during one calendar year and repeats each year in

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<sup>2</sup> Borensztein, E., Panizza U. *The costs of sovereign Default*. IMF, IMF WP 08/238, October 2008, p.8.

<sup>3</sup> Sturzenegger F., Zettlemeyer, J.: *Debt defaults and Lessons from a decade of crises*. 2006, p. 42.

<sup>4</sup> According to IMF definition, the financial crisis is "a potentially negative impact of the financial markets, which by the deterioration of the efficiency of markets can have adverse effect on real economy". IMF here refers to **Frederic Mishkin** (2001), who claimed that the financial crisis is a failure of the financial markets in which the problems of moral hazard and adverse selection becomes more difficult to overcome. According to Mishkin as a direct consequence of the crises is the inability of financial institutions to fulfil one of their basic functions, namely the efficient money / finance transfer from their owners to the investors.

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<sup>5</sup> The time series are observations which are materially and spatially similar and which are clearly structured in terms of time in the direction past-present. (Arlt, Arltová, 2003)

the same or modified form. Indisputable disadvantages of using these models remains that, for modeling future developments we have only a short time series, therefore, for the analysis were selected quarterly data. As the source of data were used data from the website of the Czech Statistical Office (ČSÚ) and Czech National Bank (ČNB) -the system of time series Arad.

## Results

Due to the outcomes of the above mentioned studies of economists Borensztein E., Panizza U. (2008) and Sturzenegger F. (2005) and to the ongoing crisis, the GDP is currently widely watched indicator. Many institutions provide the estimates of GDP future development.

Current forecasts of real GDP growth in%

ČNB:

2010: 2,3%, 2011: 1,2%, 2012: 2,5%,

MFČR:

2010: 2,5%, 2011: 2,2%, 2012: 2,7%,

OECD:

2010: 2,0%, 2011: 3%,

IMF:

2010: 2,0%, 2011: 2,2%,

According to the used model, the forecast of annual real GDP growth for next three years is following:

2010: 2,1%, 2011: 2,6%, 2012: 2,0%.

In the last quarter of the year 2008 Czech economy entered into recession and in 2009 its total output fell by a dramatic 4.1% (see figure 1). The significant annual decline in GDP in 2009 was caused by already mentioned economic recession in the Euro zone. This fact causes adverse impacts in terms of reduction of domestic and international orders on the demand side of GDP, respectively lack in the domestic and external markets consumption. Negative impact on GDP growth was also contributed by a decrease in investments. If we examine the contribution of GDP components, we carry out decomposition of GDP. It can be calculated in three ways: (1) the production method, (2) the expenditure approach and (3) the income approach (Holman, 2004).

## GDP by expenditure method

GDP by this method is calculated as an aggregate of expenditures, which is the sum of final consumption expenditures, gross capital formation and net exports (the difference between export and imports) (Holman, 2004).

Final consumption expenditures

Development of final consumption expenditure consists of household and government consumption. In the case of household consumption, we see a downward trend since 1996. According to the Czech Statistical Office (ČSÚ), this decline was particularly thanks to low growth in real wages and more recently the decline in employment. An important indicator of the weight of the agrarian sector in the national economy is the share of household expenditure on food, beverages and tobacco in total expenditure on goods and services. According to quarterly data in 2009, this proportion decreased to 22.1%, while actual expenses for food and non-expenditure were 19.3% of total expenditures<sup>6</sup>.

The development of government final consumption expenditures becomes to decline slightly after 2006. Government, as well as households cut down on their expenses. In 2009 there was a significant increase in government consumption - the government tried through higher spending to alleviate the economic downturn. The prediction of the Ministry of Finance (MFČR) expects that the government will reduce the expenditures, according to the adopted stabilization measures and consolidation strategy in the coming years.

The figure below, which includes a prediction according to used model, shows expected flat development of this component of GDP

The forecast of annual final consumption expenditures for next three years, according to the used model which was described in methodology, is following:

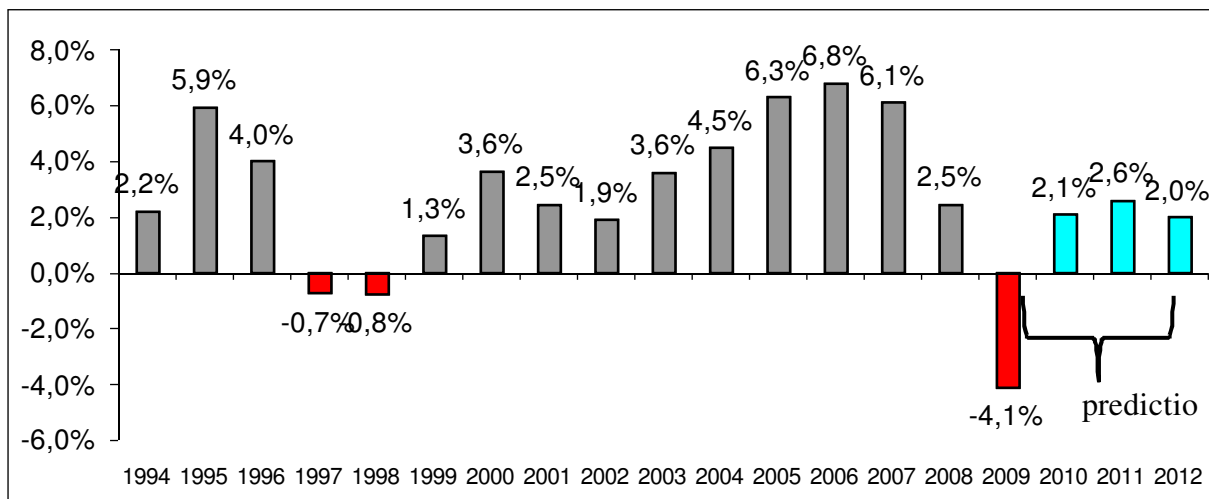
2010: 0,64%, 2011: 0,58%, 2012: 0,60%.

The prediction of the Ministry of Finance is following:

2010: 0,53%, 2011: 0,76%, 2012: -0,28%.

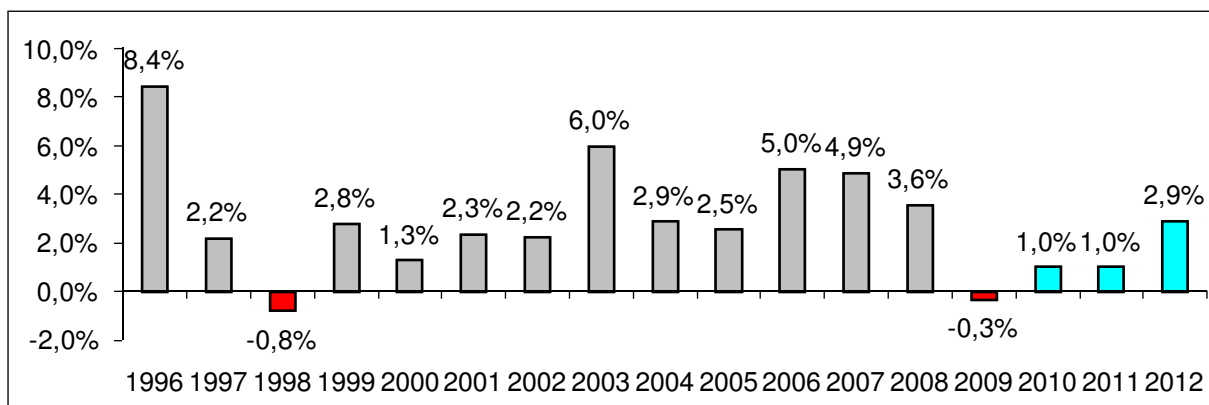
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<sup>6</sup> Ústav zemědělské ekonomiky: Zelená zpráva 2009. p. 4.



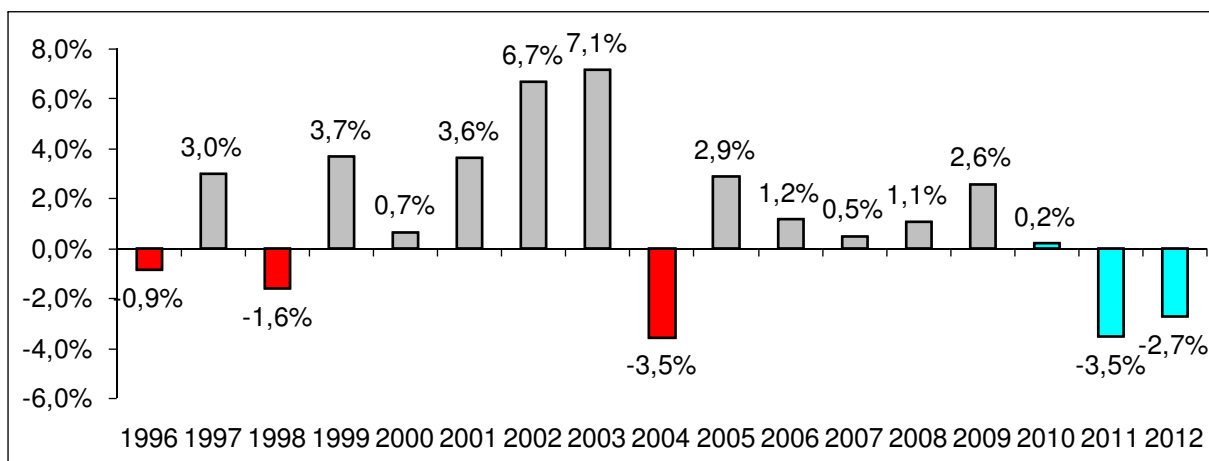
Source: data ČNB, ARAD time series, prediction-own

Figure 1: Annual Czech republic real GDP – year over year (YoY) development, in %.



Source: data CZSO, prediction by MFČR

Figure 2 Annual changes in consumption expenditures by household YoY, in %, 1996-2013.



Source: data CZSO, prediction by MFČR

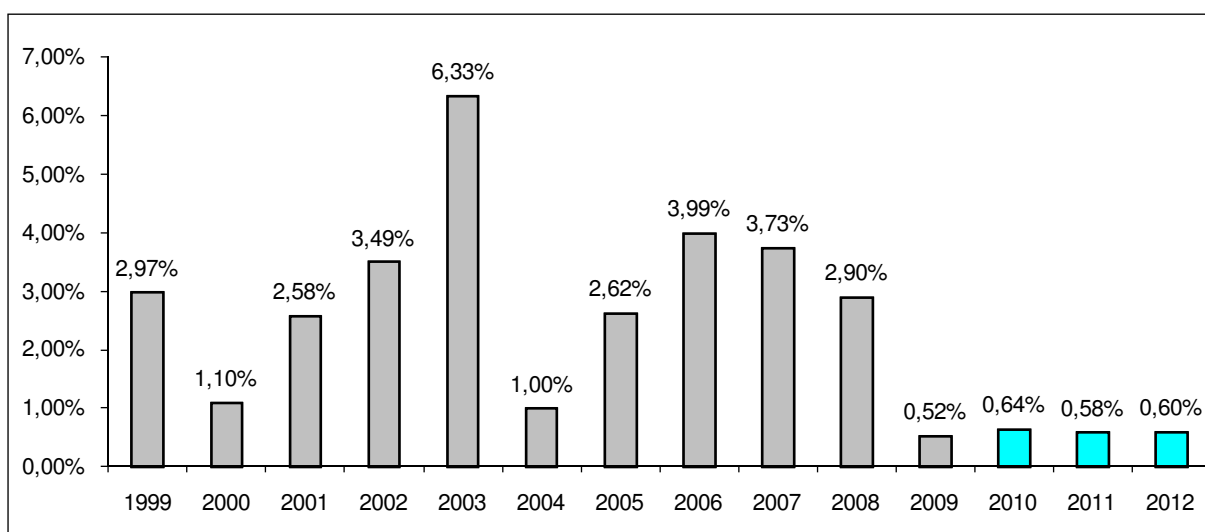
Figure 3 Annual changes in consumption expenditures by general government YoY, in %, 1996-2013.

### Gross capital formation

Gross capital formation and its evolution since 1996 is again reflected in the accompanying figure below. From it we see that gross capital formation fell for the first time in 1997 and 1998, during the banking crisis. Another decline followed in 2003 and 2005. The most significant annual decline occurred in 2009. This was mainly due to unfavourable external and internal environment development, which has dampened investment activity of firms. The decline in external and

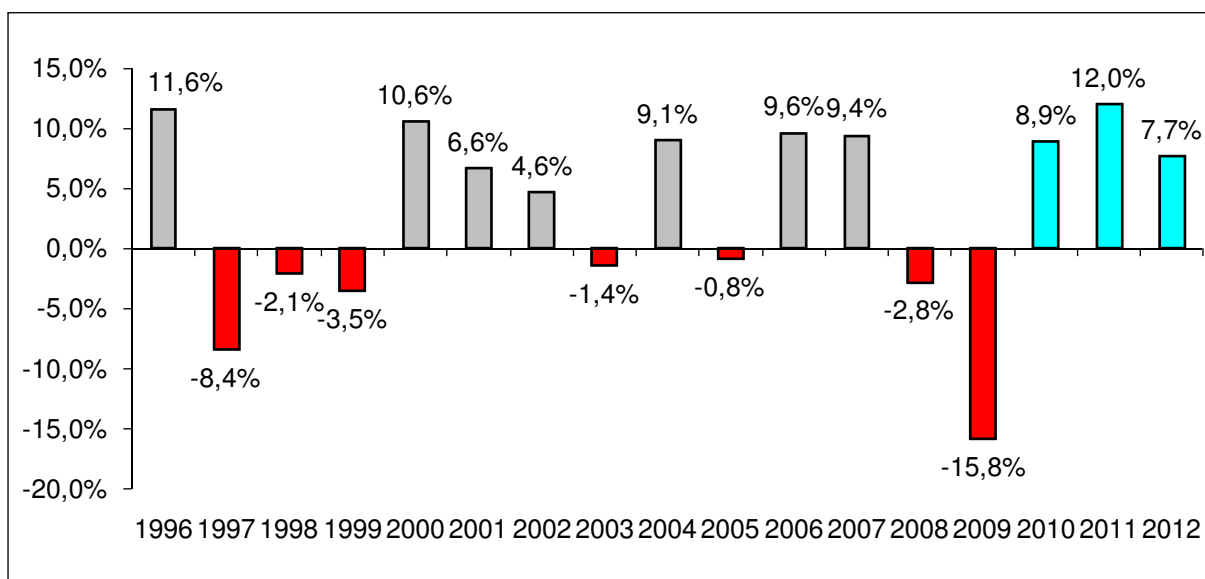
domestic demand, in turn, provoked a negative outlook on future business development. Another negative factor was the lack of funds caused by the increased caution of banks in granting new loans to firms. Moreover, households also decreased investment in housing, which was again due to limited access to obtain credit. Part of household also speculated on the decline in property prices.

Since the third quarter of 2009 has begun recovery in external demand. In this recovery is partially contributed to the so-called “scrap” of cars



Source: data CZSO, prediction-own

Figure 4 Annual changes in Final consumption expenditures YoY, in %, 1999-2012.



Source: data CZSO, prediction-own

Figure 5 Annual development YoY of Gross capital formation, in %, 1996-2012.

introduced in certain European countries<sup>7</sup>.

The forecast of annual Gross capital formation for next three years, according to the used model, is following:

2010: 8,9%, 2011: 12%, 2012: 7,7%.

The prediction of the Ministry of Finance is following:

2010: 7,0%, 2011: 3,6%, 2012: 3,6%.

Export and Import of goods and services

Export of goods and services

This component increases the value of GDP and its development shows the bellow attached figure. After 2006 there was a continuous decline in exports and reached its peak in 2009. This decline is attributed due to the openness of our economy, particularly the recession in the economies of our major trading partners.

The share of the agricultural exports on total exports grew from 4.3% to 4.9%. The main export commodities were in 2009 wheat, beer, rape, concentrated milk and cream etc.

In terms of geographical structure of exports has slowed the most in Slovakia, Germany, Poland, Austria, England, Italy and France. It was managed to increase exports to some Asian (e.g. Turkey) and African countries. Overall, however, Czech exports fell. There was also a structure change of exported commodities. With the introduction of the already mentioned most scrappage increased exports of vehicles, which raised exports and encourage domestic automobile production.

The forecast of annual Exports for next three years, according to the used model, is following:

2010: 13,3%, 2011: 9%, 2012: 6,7%.

The prediction of the Ministry of Finance is following:

2010: 14,5%, 2011: 11,3%, 2012: 10,2%.

Import of goods and services

The growth rate of imports also dropped most significantly in 2009. This decline is still limited demand of Czech firms and households for foreign goods. The reason was not only the ongoing downturn in the domestic economy, but also the depreciation of the Czech koruna, which began in the second half of 2008 and more expensive imports.

The share of the agricultural imports in total imports grew from 5.4% to 6.7%. The most imported agrarian commodities in 2009 were pork meat, bakery goods, chocolate, cheese, cheese preparations used for animal feed, coffee, etc. Growth tempo of total imports shows next figure.

In 2010 positively affects the external balance the recovery - especially in partner countries. For 2011 is expected a loss of imports for photovoltaic, because it's annual growth will be at a lower level than in the 2010<sup>th</sup>.

The forecast of annual Imports for next three years, according to the used model, is following:

2010: 14,5%, 2011: 12,9%, 2012: 10%.

The prediction of the Ministry of Finance is following:

2010: 15,1%, 2011: 9,7%, 2012: 9,5%.

For 2010, the Ministry of Finance expected an increase in real GDP of 2.5%. It's one of the highest expectations from all mentioned institutions. Economic growth according to Ministry of Finance should be driven mainly by foreign trade; it is expected to revive the economies of our major trading partners.

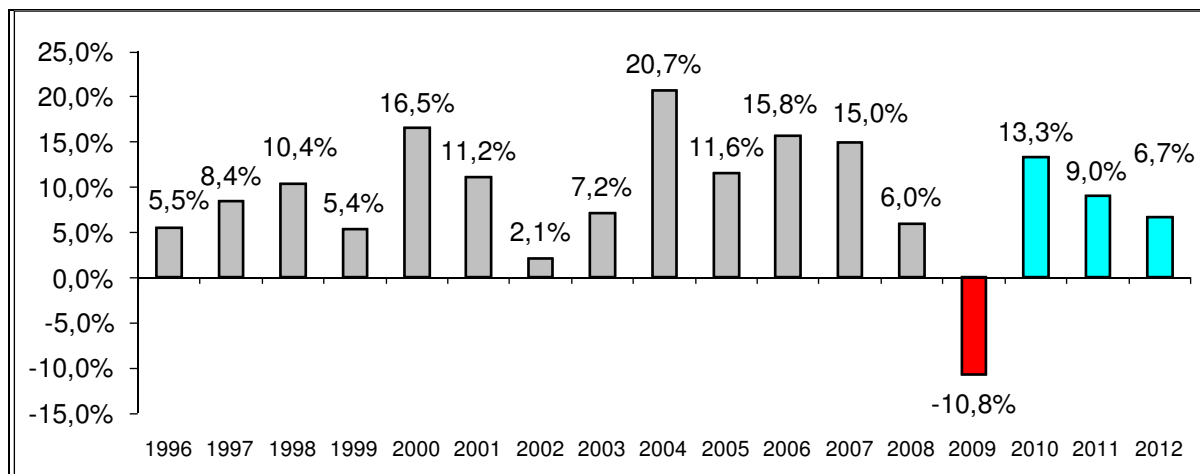
## **Sector structure**

In 2008 and 2009 was due to the economic crisis reflected GDP a sector's change. Expressed as a percentage of GVA (Gross Value Added) at current prices, there was a decline of primary and secondary sector, and conversely an increase in the tertiary sector. In the case of the Czech Republic's share of the secondary sector is over the "benchmarks", the share of the tertiary sector under it, but its role is growing. According to the analysis method of manufacturing GDP, we can identify trends in selected sectors.

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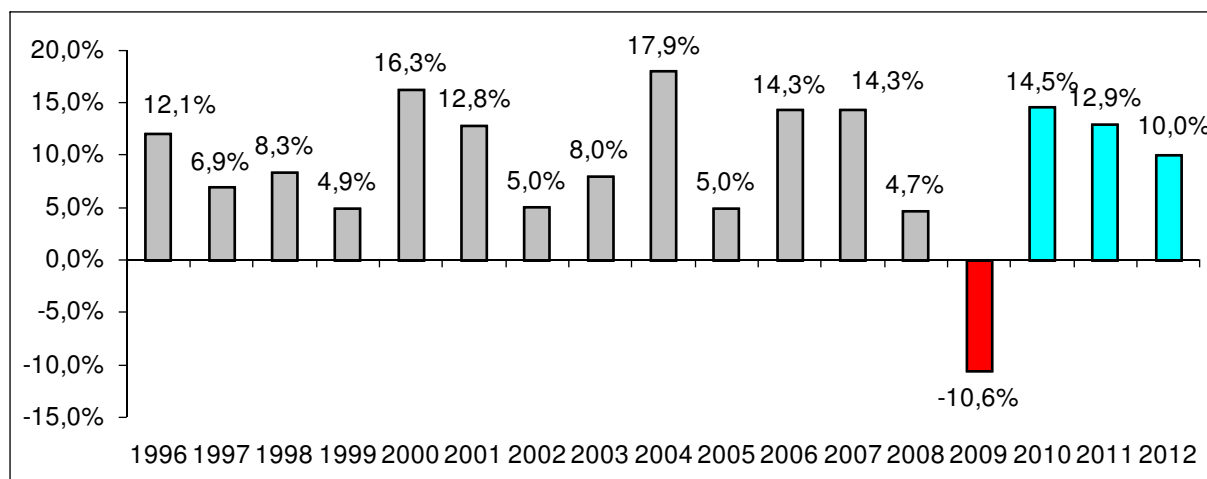
<sup>7</sup> The „scarp“ of cars were introduced in countries like Slovak republic, Austria, Germany, USA, Great Britain, France, Italy, Luxembourg, Netherlands, Spain, Canada and in most countries it was valid for certain period (mostly during 2009, sometimes partly in 2010). In Canada it's valid till 03/2011.





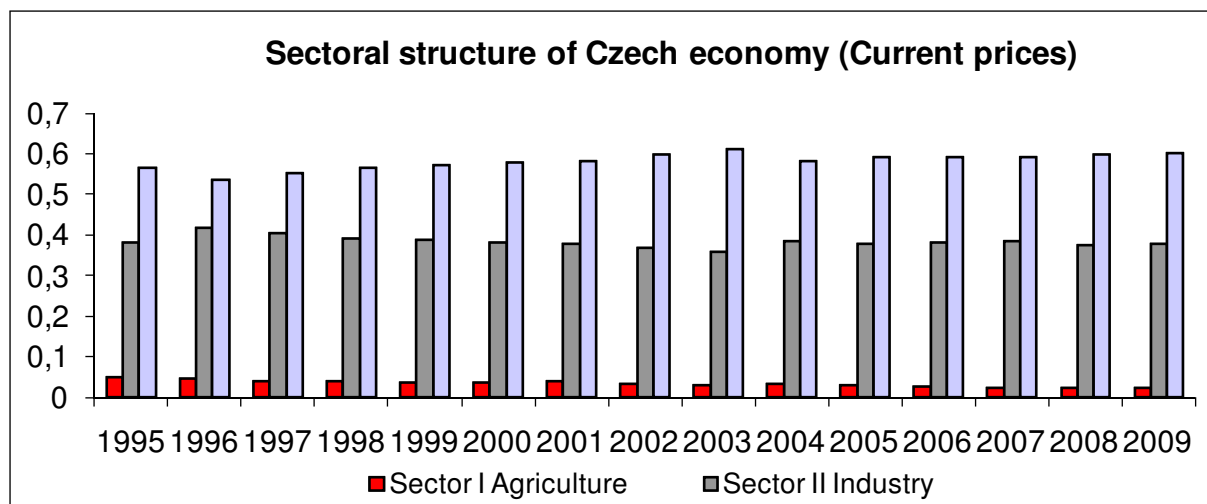
Source: data CZSO, prediction-own

Figure 6 Annual development of Exports YoY, in %, 1996-2012.



Source: data CZSO, prediction-own

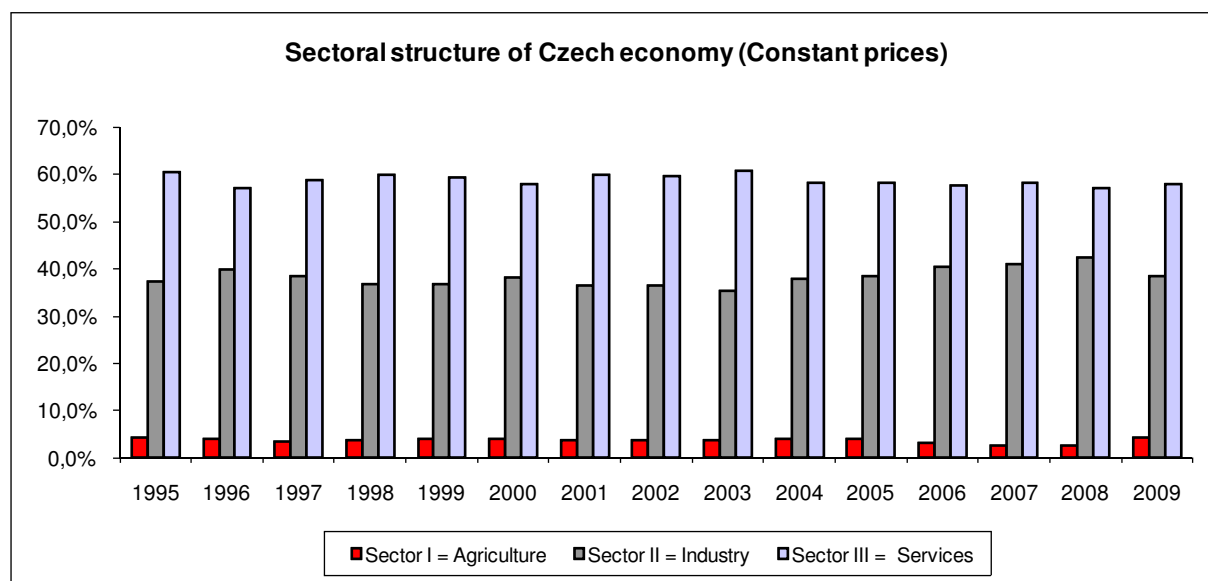
Figure 7 Annual development of Imports YoY, in %, 1996-2012.



Source: data CZSO

Figure 8 Sectoral structure of Czech economy, YoY (Current prices) .





Source: data CZSO

Figure 9 Sectoral structure of Czech economy, YoY (Constant prices).

According to the share of GVA at constant prices of 2000, however, there was a decrease in the primary sector only in the years 2007-2008, in 2009, has recorded an increase, as seen from the graph below. The decrease is mainly due to the changing scope of domestic and foreign demand. In 2005 kick-started the weakening of its share in gross value added (in Constant prices) up to 2.6% in 2007, the lowest value in the period.

### Primary sector

While the share of agriculture on total GVA (in Constant prices) increased by 1,5%, the share expressed in current prices showed a decline. The reason is the unfavourable evolution of prices of agricultural producers. An average annual decline was 24,8% which represents the largest drop recorded in the period since 1993. The largest contributions to changes in input prices have the price of feed, energy<sup>8</sup> and lubricants (especially motor fuels<sup>9</sup>) and seeds and seedlings (mostly barley). Agricultural producer prices fell year over year (YoY) more than price of agriculture inputs<sup>10</sup>. Prices of inputs to agriculture fell by 7,4%. Prices of agricultural producers for crop production overall dropped by 32,2%, mainly due to a

significant reduction in cereal prices by 41% and oilseeds by 35,3%. Prices of agricultural producers for animal production overall dropped by 33,1%.<sup>11</sup> It was observed in all food (or beverage) groups either decline in prices, or slowing the pace of price growth. Dynamic reduction of consumer prices was in the group, whose prices rose most importantly in 2008, i.e. bread, milk, dairy products, inc. eggs and oils and fats, as well as in fruit and fruit products.

According to Economic accounts of agriculture (EAA) the 2009 crop production was 52,7% and the livestock production was 44,1% of the agricultural sector output. 2009 production in the agricultural sector in constant prices fell by 3,2% YoY, crop production fell by 1,9% and livestock fell by 4,8%.

### Secondary sector

Unlike agriculture, the position of the other two sectors in the Czech economy stronger. The share of secondary sector (industry, mining, construction) in 2009 after four years of increases fell. Industry in total gross value added accounts for about 33%. The ongoing restructuring of the industry supported the dynamics of performance.

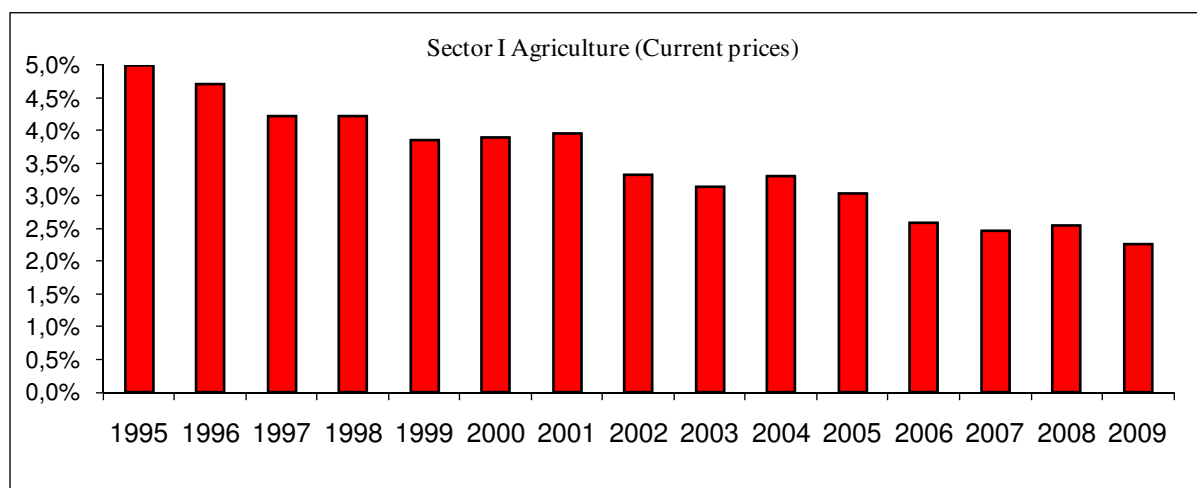
The industry faced cheaper competing imports from Asia, which pushed the heavy and light industry. On the other hand it increased areas with potential

<sup>8</sup> decline in natural gas prices, agricultural commodities and food prices on world markets.

<sup>9</sup> decline of world oil prices

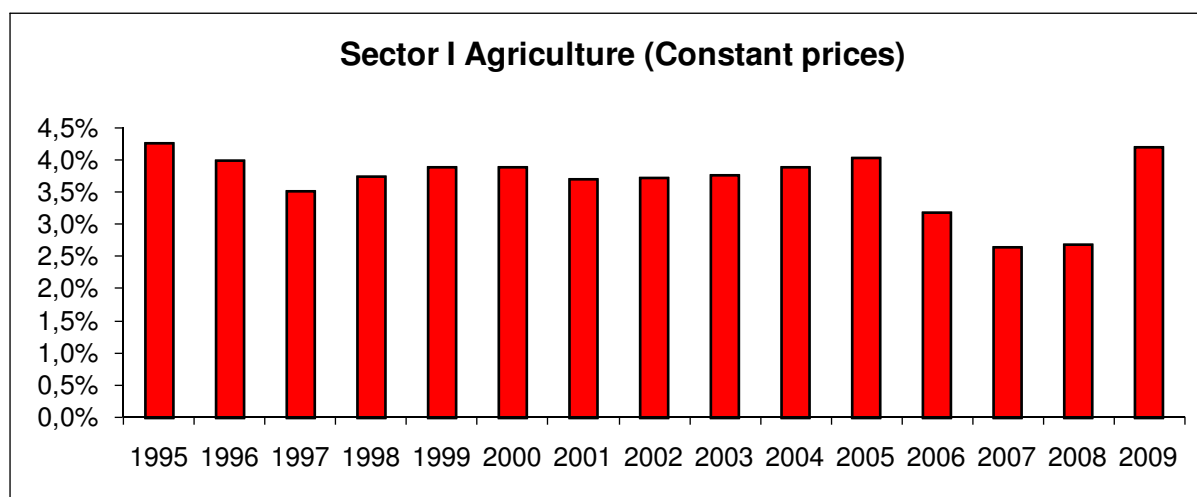
<sup>10</sup> Ústav zemědělské ekonomiky: Zelená zpráva 2009. p. 3.

<sup>11</sup> Ústav zemědělské ekonomiky: Zelená zpráva 2009. p. 235-236.



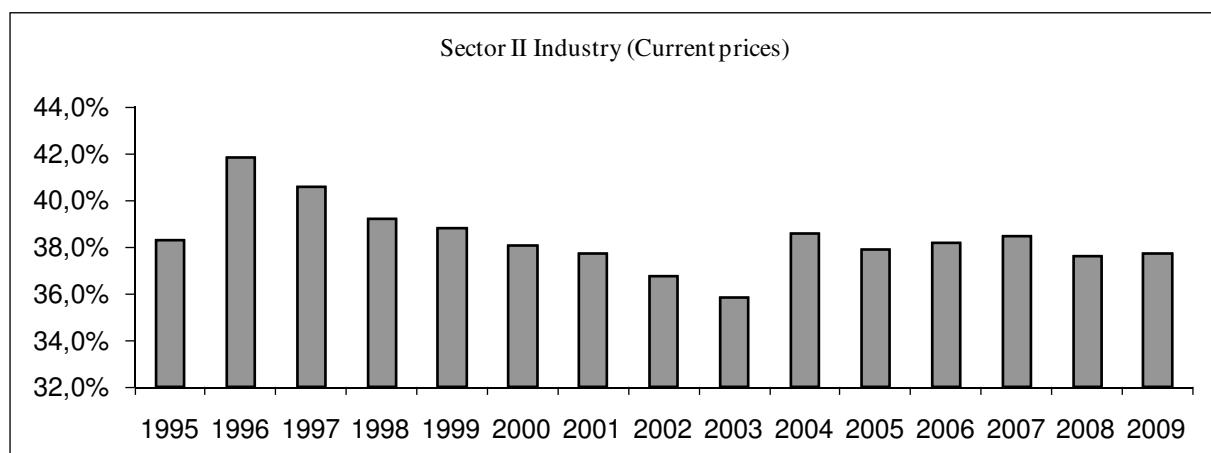
Source: data CZSO

Figure 10 Sector I – Agriculture, share on Gross Value Added YoY, in Current prices.



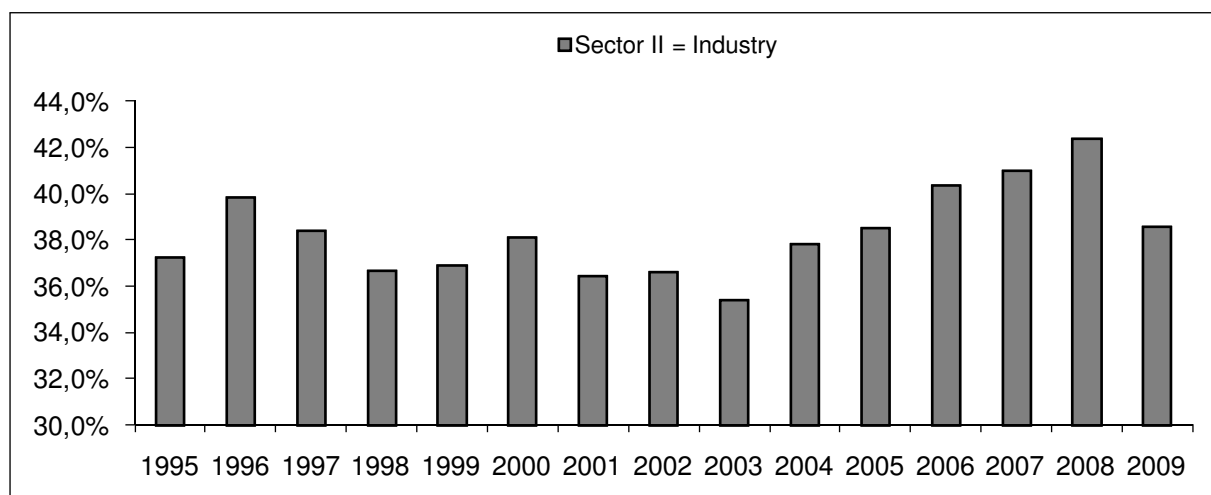
Source: data CZSO

Figure 11 Sector I – Agriculture, share on Gross Value Added YoY, in Constant prices.



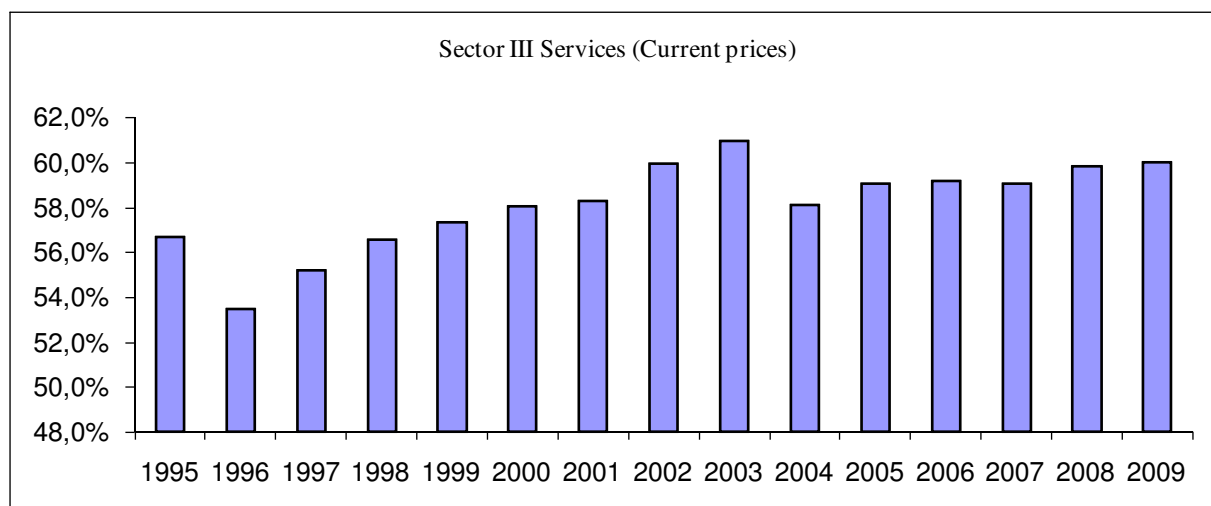
Source: data CZSO

Figure 12 Sector II – Industry, share on Gross Value Added YoY, in Current prices.



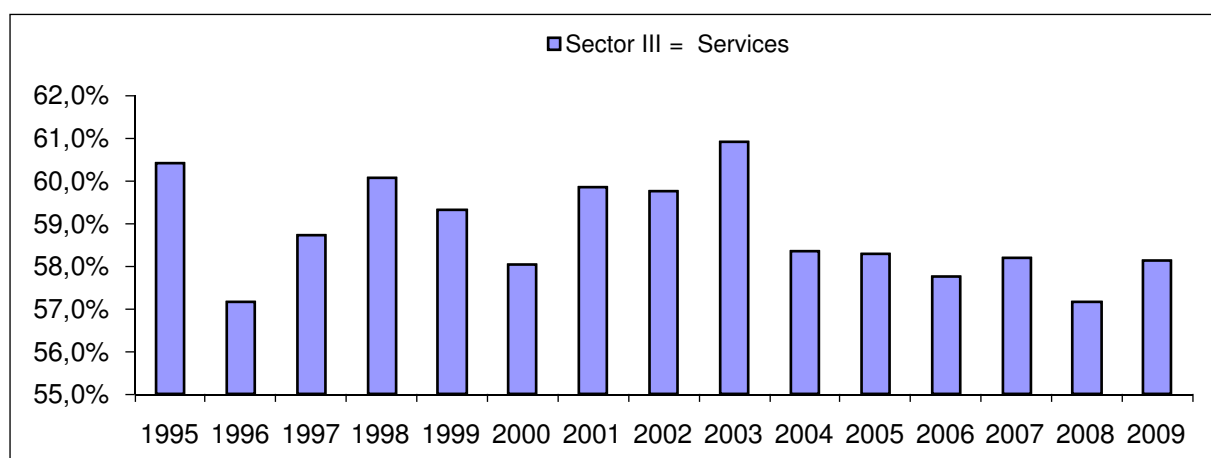
Source: data CZSO

Figure 13 Sector II – Industry, share on Gross Value Added YoY, in Constant prices.



Source: data CZSO

Figure 14 Sector III – Services, share on Gross Value Added YoY, in Current prices.



Source: data CZSO

Figure 15 Sector III – Services, share on Gross Value Added YoY, in Constant prices.

exports<sup>12</sup>. In the second half of 2008 has started to drop in industrial production in constant prices and continued also in 2009, when industrial production dropped by 13,5%. In 2009 there was a decline in industrial production in constant prices of 2000. The main reason is the slowdown in demand from abroad.

Food industry in the Czech Republic is still one of the key manufacturing sectors, although in 2009 was also influenced by the negative impact the current recession. However, the decline in the economic cycle in this sector was not as great as some other industries. Manufacturing sector in 2009 review of sales of own products and services in current prices, recording a decrease, even by 15,4%. Therefore the production of food and beverages dropped less. The share on manufacturing in 2009 increases to 9,8% (in 2008) this share was only 8,8%)<sup>13</sup>.

### **Tertiary sector**

On the contrary, the services sector, tertiary sector, strengthening its position in the menu structure and reaches almost 60% of the GVA. The reason was the change of investment opportunities, but also the structure of demand and lower energy intensity of services.

### **Conclusion**

There are many theories that give a wider context of the crisis to internal or external conditions. For instance Irwing Fischer (1932) in his debt-deflation theory sees the cause of financial crisis in excessive credit expansion. Broader overview from Czech authors offers Musílek (2004).

Given the results presented above, the evolution of the Czech economy can have a V development however the bottom of 90% confidence interval admits that it might even lead to a further decline in GDP (W development). In addition, the selected model may be simplify in the sense that the GDP forecast is carried out only on the basis of previous values of GDP and does not take into account other variables that affect the GDP (GDP EU and especially Germany, the development of unemployment, indebtedness of the state, etc.).

In the second quarter of 2010 our main business partners thrive, so it is expected GDP growth in the second quarter. Net exports could therefore contribute positively to GDP growth. Fixed investment, inventories can also positively contribute to GDP growth, but their expansion is limited to permanent recovery in demand. On the contrary, the planned fiscal restraint should significantly affect household consumption. Since the solar boom ends and it can be assumed that fiscal restraint will last, I believe that the model predicted GDP growth for 2011 (2.6%) is unrealistic. I expect the value of annual growth may be around 2%. The forecast of GDP, especially in this turbulent period is very complex and development of W-shaped is still quite real. The difficulty of GDP prediction these days show a significant difference of predicted GDP values by above mentioned institutions.

Regarding agriculture, the fact that the demand for food is relatively independent, is the reason why the primary sector does not influence at what stage is the global economy - recession, depression or crisis. And this fact is emphasized in the conclusions of the medium-term outlook of the Organisation for Economic Cooperation and Development (OECD)<sup>14</sup>, that agriculture is likely to survive the current economic situation better than any other sector. The increasing quality and environmental requirements of domestic and foreign demand in the Republic remains one of the main weaknesses of this sector.

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<sup>12</sup> For example manufacture of transport equipments, electrical and optical equipments etc.

<sup>13</sup> Ústav zemědělské ekonomiky: Zelená zpráva 2009. p. 221-222.

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<sup>14</sup> OECD – FAO: Agricultural Outlook 2009-2018, p. 32-48.

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## **References**

- [1] Arlt, J., Arltova, M. Finanční časové řady. Praha. Grada Publishing, 220s., 2003. ISBN 80-247-0330-0.
- [2] Borensztein, E., Panizza, U. The Cost of sovereign Default. IMF Working Papers, WP 08/238, October 2008. Dostupné na: <http://imf.org/external/pubs/ft/wp/2008/wp08238.pdf>
- [3] Fischer, I.: Booms and Depressions. Adelphi, London, 1933.
- [4] Holman, R. Makroekonomie. Praha, C. H. Beck 2004, 424 str., ISBN 80-7179-764-2.
- [5] Imf: Financial Crises: Characteristics and Indicators of Vulnerability. IMF, 1998, Dostupné na <http://www.imf.org/external/pubs/ft/weo/weo0598/pdf/0598ch4.pdf>
- [6] Junkova, S.: Hospodářské krize – historie a možné dopady současné finanční krize na ČR. Disertační práce, Praha 2010.
- [7] Manase, P., Roubini, N. Rules od Tumb for Sovereign Debt Crises. IMF Working Papers. 2005. Dostupné na: <http://www.imf.org/external/pubs/ft/wp/2005/wp0542.pdf>
- [8] Mishkin, F.: Financial Police and the Prevention of Financial Crises in Emerging Markets Countries. USA 2001.
- [9] Musilek, P.: Analýza příčin a důsledků české finanční krize v 90. letech. Výzkumná studie grantové agentury ČR GA 402/02/1308, Praha, 2004.
- [10] OECD FAO: Agricultural Outlook 2009-2018. OECD/FAO 2009.
- [11] Sturzenegger, F., Zeittelmeier, J. Debt defaults and Lessons from a decade of crises. 2006, Cambridge, USA, 2006. ISBN 978-0-262-19553-9.
- [12] Sturzenegger, F., Zettelmeier, J. Haircuts: Estimating Investor Losses in Sovereign Debt Restructurings 1998-2005. IMF Working Papers, WP 05/137, 2005.
- [13] Dostupné na: <http://www.imf.org/external/pubs/ft/wp/2005/wp05137.pdf>
- [14] Ústav zemědělské ekonomiky: Zelená zpráva 2009.