Evaluation of the performance of Czech agriculture

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ABSTRACT

Agriculture in the Czech Republic is one of major sectors of the economy, as it provides a substantial share of the basic food requirements of the population. An important part of agricultural companies’ production consists of livestock, especially because of the effective use of crop production as a source of all kinds of animal feed. It is also proven that livestock production plays a significant role in the creation and cultivation of the landscape. Czech agriculture has shown a profit since joining the EU thanks to a significant increase in subsidies. The aim of this paper is to show the impacts of the globalization of the economy and climate change on the economic performance of agricultural companies in the Czech Republic. Serious consequences of global climate change are already evident, and their intensity will grow with the ongoing warming of the planet.

Key words: Agriculture, Climate change, Czech Republic, Production, Profit, Subsidies.

INTRODUCTION

Given the natural conditions of the Czech Republic, a lot of agricultural companies and individual entrepreneurs farm practice a suitable combination of animal and crop production. Crop production indicates long-term growth in the share of agricultural production by volume, mainly due to the expansion of areas planted with crops for use as ingredients in bio fuels. The result of the increasing share of crop production is an increasing proportion of cultivated cereals, particularly wheat and rape. The Czech Republic produces wheat at 150% self-sufficiency, rape at 125%, pork at 60% and poultry at 80%.

The agricultural sector is one of the most riskiest industries in the CR. “Risk can be viewed as a difference between the real future state and the expected future state. This difference arose due to the change of the risk factors, which translated the utility of subjects” (Šrédl, 2010). “A better farming system approach is needed to minimize risk, increase productivity, increase water-use efficiency, sustain soil health and increase the income of farmers” (Paramasivan et al., 2016).

As follows from the analysis of ČEKIA (2012), every second company is threatened with bankruptcy in this sector. Enterprise in the agricultural sector is complex because of European Union regulations and continuous growth in imports of cheaper food. “The situation has worsened due to the Russian sanctions, when it suddenly became necessary to place products which were originally destined for the Russian market onto other markets within the EU” (Kütner, 2014). The share of agriculture in the domestic economy, therefore, is in decreasing trend.

The number of enterprises which fall into the category of “excellent” is one third lower than in other national industries; agricultural enterprises are threatened by bankruptcy in 123% more cases than other national enterprises. These results suggest the high risks and complexity of the sector (ČEKIA, 2012). Among the reasons for this situation are the growing competition of agricultural markets and the rising amount of investments necessary for compliance with EU standards. Czech agriculture has also been forced to face cheaper agricultural products from abroad since joining the EU. The decline in production is significant, especially for livestock production, the production of pigs and cattle (Šrédl and Mikhalkina, 2015). This was recently reflected in the purchase prices of pork, which are currently the lowest in four years and far below the production costs of the farmers.

The aim of this paper is to show the impacts of the globalization of the economy and climate change on the economic performance of agricultural companies in the Czech Republic.

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MATERIALS AND METHODS

In this study the primary method used is descriptive (especially for describing the structure of agricultural production), along with comparative analysis of the development of production value indicators, profits and subsidies in agriculture in individual years. In the case of the mentioned indicators of the economic performance of Czech agriculture, the data for individual years was put into graphs, of which some were statistically tested, and the possibility for the further development of these indicators was expressed. The legend added an explanation of the causes of the development of the indicators to the charts.

The results of the evaluation are based on the ČEKIA Stability Rating model. The aim of the rating is to estimate the risk of bankruptcy of enterprises for a given year.

The data for the research were obtained from the Czech Agrarian Chamber, Czech Statistical Office (CZSO), Eurostat, Ministry of Agriculture CR and Zemědělský svaz ČR. The monitored period ranges from 2011 to 2016. In some figures, we used an even longer time period to confirm the development trend.

The development of the number of workers in Czech agriculture: Czech livestock production is second after crop production in terms of the number of jobs in recent years; while ordinarily it has created more working places than other agricultural businesses. “Livestock sector plays a vital role in the income generation of both rural and semi-urban economy” (Saikia et al., 2017). The Czech Statistical Office (2012) states that 110,000 people worked in the agricultural sector in 2011. 58,000 people left the agricultural industry within the decade 2001-2011.

Among the reasons for the decline in the number of jobs is the increasing trend towards crop production, which creates fewer jobs than livestock production. Agricultural subsidies also support crop production while omitting support for livestock businesses. The Czech Agrarian Chamber is therefore trying to convince the Ministry of Agriculture to redirect subsidies to livestock production, which will create more jobs (Šrédl and Mikhalkina, 2015).

The long-term reduction in agricultural employment continued in 2013, but at a slower rate compared to previous years. The number of employees decreased by less than 2% in 2013, to 103,000 workers (Fig 1). The departure of people from agriculture has probably slowed due to the growth in wages in the sector. Another persistent problem in Czech agriculture is the aging of the workforce (CZSO, 2014). The reliability factor ($R^2$) of 0.9144 shows the high predictive ability of our model.

The reduction of employment in agriculture continued at a slow rate in 2014, too. The year-on-year loss of employees in agricultural companies was 1.4%, and their numbers decreased to approximately 102,000. Employment in agriculture as a share of the total employment in the national economy of the Czech Republic was 2.1%, practically unchanged compared to the previous year.

The overall employment structure according to legal forms has not changed significantly in recent years. In 2014, more than 50% of people working in agriculture (53.9%) continued working in trading companies, about one fifth (21.0%) in cooperatives, and one quarter (25.0%) in small businesses (run by natural persons) (eAGRI, 2016). The decrease in the employment rate in the sector of agriculture in 2015 continued in at a slower pace. The decrease in the number of workers employed on farms amounted to 1.2%. Their number amounted to approximately 100.9 thousand.

The number of agricultural workers in the Czech Republic declined again in 2016, their number dropping by 0.7 percent year-over-year, to 100,200. As the Ministry of Agriculture of the Czech Republic (2016) reports in the working version of the Report on the State of Agriculture, over half of them are over 45 years old. Therefore, the Ministry wants to accelerate the recruitment of Ukrainian workers by Czech agricultural companies; it should be up to 1,500 people a year. Concurrently, the development of rural

![Graph showing the development of the number of workers in Czech agriculture](source: Czech Statistical Office, 2017)

Fig 1: Development of the number of workers in Czech agriculture for the years 2000-2016 (thousands workers).
Areas should be supported, and also the interest of young people in studying and working in traditional agricultural sectors, in order to prepare the future generation of farmers.

Impacts of climate change on agricultural companies in the Czech Republic: “Climate is one of the main determinants of agricultural production” (Chakraborty and Hazari, 2017). “It is reported sporadically in different countries of the world including India that climate change has adverse effect on livestock productivity, particularly on milk production and growth which is reflected in meat production indirectly” (Das, 2018). “Integrated conservation and management of agricultural areas affected by the current global warming represents a priority at international level following the implementation of the principles of sustainable agriculture and adaptation measures” (Rusu et al., 2017). “In the past 10 years, most countries and cities have published a national adaptation strategy that outlines the strategic approach to reduce the vulnerability to climate change and to adapt to the impacts of it” (Juhola, 2016). However, as presented in a study published in 2014 by the Intergovernmental Panel on Climate Change (IPCC), countries have not yet developed sufficient scenarios regarding the types of measures to be accepted in order to cope with the changing climate; this reproach applies to the Czech Republic as well. The Ministry of the Environment has therefore prepared a strategy for adaptation to climate change in the Czech Republic. It describes changes that can be expected in the following years and the principles by which specific measures should abide. Resources from EU funds should be directed to some of these steps in the coming years.

The possibility that the IPCC message is mistaken regarding agricultural risks is small. It is said that in the Czech Republic nobody is fully aware yet of the severity of the climate change problem. In south Moravia, for example, the growing of barley is halting due to changes in the climate; farmers expected this to happen around the year 2025 at the earliest. On the other hand, the production of red wine, which needs a greater number of above-average days temperature-wise and has done well until now mainly in the subtropical areas of southern Europe, has started flourishing. The prediction of climate change impacts also does not take into account significantly lower rainfall in the Czech Republic, and that more water will evaporate from the soil. It will therefore be necessary to improve water retention in the landscape.

According to the IPCC (2015), the impacts of climate change till 2050 will be similar regardless of whether the world starts reducing greenhouse gas emissions or not. A significance difference among scenarios will occur in the second half of 21st century. The essential message is: measures need to be implemented now, although their effect will come later.

The year 2016 will probably be the warmest year on record. According to the World Meteorological Organization (WMO) (2016), preliminary data collected within the first nine months of the year show that the average global temperature this year is about 1.2 degrees above pre-industrial levels. The climatic phenomenon El Niño has an effect on temperature increases. However, greenhouse gas emissions are still the most important factor.

Scientists from the IPCC do not dare to estimate the expenses that will be incurred by climate change consequences. Estimates talk about losses in the order of 0.2% to 2% of world GDP for an increase of global temperature of 2 degrees. Costings of the economic impact of carbon dioxide release range from several dollars to several hundreds of dollars per ton of carbon. In this way, the IPCC itself partly fuels those critics of the fight against climate change who claim that the investments required of governments do not match the damage which will possibly be caused in the future by climate change (Stuchlík, 2014).

The global climate agreement concluded in Paris in 2015 came into force on 4 Nov 2016. According to the agreement, global warming should be kept below 2°C, preferably below 1.5°C compared to the preindustrial era. Signatories to the agreement committed themselves to further reduce emissions in their countries, particularly emissions of carbon dioxide. The agreement was ratified by fifty-five countries which are responsible for over 55% of greenhouse gas emissions (CNA, 2016).

RESULTS AND DISCUSSION

The economic performance of the Czech agricultural sector (in output values and profits)

The output values and profits of agricultural enterprises are among the most important indicators of the economic performance of the sector. As the results from the past few years show, Czech agriculture has been growing and thriving; it achieved record profits of CZK 22.9 billion in 2014. However, the significant success of 2014 was determined, to a considerable extent, by two factors: record yields, especially of plant commodities, and the exchange rate of the Czech crown against the euro (CZSO, 2017).

The value of agricultural production: The value of Czech agricultural output increased by 2.9% to CZK 122.4 billion, measured at current prices in the year 2012. The share of crop production continued to increase to up to 59% of total agricultural production. The value of agricultural outputs at current prices increased from CZK 122.4 billion in 2012 to CZK 128.2 billion in 2013 (CZSO, 2014). The annual growth of 5% in total agricultural output was caused by the higher share of crop production, the growth of milk prices and the increase in subsidies. Crop and livestock production have increased by more than 4%. According to the Czech Statistical Office, the long-term growth of crop production continued in 2013. In 2014, not only profits from and
subsidies for Czech agriculture, but also total agricultural production - which reached CZK 136.6 billion - were record-breaking. Total production was more than CZK 8 billion higher compared to 2013. Crop production has increased by circa 5% to CZK 79.5 billion, while the value of animal production has risen by one tenth to CZK 51.6 billion (CZSO, 2014) (Fig 2).

In 2015, agricultural production reached CZK 127 billion, which means an increase of 0.4% compared to the average from 2011-2014. However, it decreased by CZK 9.6 billion compared to 2014 (eAGRI, 2016). The decrease of 7% in the value of agricultural production compared to the record year of 2014 is mainly due to the decline in purchase prices of agricultural produce. In 2015 the purchase prices of animal products have fallen the most - especially milk and pigs for slaughter.

In 2016, the year-over-year agricultural production rose by 1.8% to CZK 129.3 billion. Crop production grew by 3.5% to CZK 77.3 billion. The value of livestock production fell by 0.2% to CZK 46.3 billion (CZSO, 2017).

The profit of the Czech agricultural sector: Based on the data of the CZSO, Czech agriculture made a profit of CZK 7.6 billion in 2010. In the previous year, 2009, farmers managed a profit of CZK 2.8 billion, which was the worst result since the entry of the Czech Republic to the EU. However, positive development with growing profits for Czech agriculture continued in the following years as well. According to Eurostat statistics, the result in terms of profits for the year 2011 achieved CZK 17.4 billion (Fig 3). Hence the domestic agricultural sector has shown a profit since joining the EU and among the reasons for this increasing trend towards profits could be the significant growth in agricultural subsidies (Eurostat, 2017).

However, profits in the agricultural sector in 2012 decreased year-on-year by CZK one billion to CZK 16.4 billion, as is revealed by more specific data of the CZSO. The annual profits of Czech agriculture decreased again in 2013 by circa CZK 80 million to CZK 16.3 billion. Yet the economic results of the sector for 2013 were the third best since statisticians started monitoring this indicator in 1998; the farmers made bigger profits only in 2011 and 2012 (CZSO, 2014).

The profits of Czech agriculture in 2014 increased year-on-year by 40%, meaning that the total profit rose to CZK 22.9 billion (Fig 3). This result was the best since 1998, when statistical records started. An exceptionally good harvest, favourable developments in the prices of animal commodities and an increase in subsidies were all involved in these record profits (CZSO, 2015).

The net profit of Czech agriculture for 2015 is CZK 16.9 billion. It has decreased by 27.3% compared to the previous year (CZSO, 2016). The profit of agricultural companies has decreased in 2015 due to the decrease in both crop and livestock production.

The year-over-year crop production has declined by 5.4% due to the lower yields of major commodities. The prolonged drought has caused a lower cereal yield, a decrease of 6.3% in comparison with the previous year. The yield of corn for grain has declined by a huge 46.8%, the potato yield has declined by 27.6% and the sugar beet yield by 22.7%. The value of livestock production has actually declined by 10.7% in comparison with 2014 (CZSO, 2016). Production has increased for cattle, poultry and milk. Conversely, a fall in prices has been recorded, with the exception of cattle, sheep, goats and eggs. The price index has decreased significantly for pigs and milk and slightly for poultry.

“Diversified agriculture is an integration of several crops and livestock’s, in production system for a higher food production and farm profitability” (Meena et al., 2018).

In 2016, the year-over-year profits of Czech agriculture grew by 25.9% to CZK 20.22 billion. It was the second best result since 2000, and bettered only in 2014 (CZSO, 2017).
**Subsidies in Czech agriculture:** Czech agriculture is mainly profitable thanks to the European subsidies it has been receiving since joining the European Union. “The necessity for agriculture to receive state support, including financial support, aimed at stimulating growth in its efficiency, is determined by the characteristics of the agrarian sector” (Maitah *et al.*, 2016). The amount of agricultural subsidies increased by CZK 1.6 billion to CZK 29.2 billion in 2012. In 2013, the subsidies granted for agricultural production in the Czech Republic increased by 3.4% to CZK 30 billion in comparison with 2012 (CZSO, 2014). Experts are warning that the dependence of farmers on domestic subsidies is increasing in the long term, which is not good.

In 2014, after the stagnation of growth for two years previously, the agrarian sector obtained more money from the State Agricultural Intervention Fund, which distributes and controls European subsidies. CZK 37.6 billion of subsidies were paid to farmers in 2014 from European and national funds (Eurostat, 2017).

The largest portion came again as direct payments, of which CZK 24.3 billion were drawn from the EU budget in 2014. The second largest amount was directed from the Fund through the Rural Development Programme – CZK 12.5 billion. (More than 1/5 of this amount came from the state budget, almost 4/5 from the EU budget.) A total of CZK 718 million were directed to the common organization of the market (Kütnér, 2015). This is the money that the state has used, for example: to support the consumption of milk; to make deliveries of fruit and vegetables to schools; to improve the manufacture of bee products; to support the restructuralization of vineyards and to support producers of fruit and vegetables.

CZK 38.8 billion of subsidies were paid to farmers in 2015 from European and national funds (Fig 4). The reliability factor ($R^2$) of 0.888 shows the high predictive ability of our model.

**Comparison of trends in profits and subsidies in Czech agriculture**

Although agriculture in the Czech Republic was profitable in 2011-2015 due to EU subsidies (Fig 5).

Despite a significant increase in subsidies from both the EU and the Ministry of Agriculture, the profits achieved between 2011 and 2013 decreased. Subsidies to Czech farming increased from 2013 to 2014 by CZK 7.6 billion, but the profits only increased by CZK 6.6 billion. Thus, developments over the past few years have clearly shown the dependence of the profitability of Czech agriculture on subsidies (both from EU funds and domestic sources) and the influence of agricultural production prices in other EU member states, which is reflected in the choice of agricultural commodities produced in the Czech Republic.

In 2015 the purchase prices of animal products fell the most - milk and pigs for slaughter (eAGRI, 2016). The above-given facts show that maintaining subsidies to agriculture in the coming years is an essential factor in maintaining the employment of the Czech rural population as well as the influence of farming on the landscape.

Source: Czech Statistical Office, 2016

**Fig 4:** Subsidies in Czech agriculture for the years 2011-2015 (billion CZK).
The results of the analysis of the impact of climate change on the performance of agricultural companies

As is evident from the above analysis of the economic results of agricultural companies, significant changes in global climate do not have a significant impact on the performance of agricultural companies in the Czech Republic. Climate change only has a noticeable impact on the structure of the crops grown in certain countries. The impact it has is that the zone within which certain crops can be effectively grown (e.g. barley, potato or white grapes) moves towards the north, and accordingly, crops that thrive in the subtropical zone (e.g. red grapes) grow more effectively in the Czech Republic as a result of global warming. The world prices of agricultural commodities, i.e. the movement of their prices on crop exchanges, have a considerably larger impact on the decline in corporate profits. These then significantly influence the agricultural commodities’ purchase prices, for which farmers produce them on the domestic market.

The international trade in agricultural commodities can thus replace the loss of most crops on the market in the event of crop failure in the Czech Republic due to higher summer temperatures (e.g. the years 2015-2016). The damage to agricultural crops was extreme in 2016. Winemakers and rapeseed growers suffered damage to their crops, and wheat was damaged by numerous hailstorms in warm months. In 2016, insurance companies paid farmers CZK 422 million; in 2015, it was only CZK 183 million (CNA, 2016). The EU subsidy policy in the agricultural sector therefore enables the stabilization of the profits of agricultural companies in the long term and thus prevents their exit from agribusiness. In the short term (YOY), however, a decrease in the profits of agricultural companies for selected crops (i.e. commodities) may occur as a result of crop failures caused by climatic fluctuations. The decline in the agricultural workforce in the Czech Republic has halted after a long slump and the decline had actually led to more efficient agricultural production in many cases.

Besides the fact that the greening of Czech agriculture is advancing very slowly (with an impact on the health status of the population), the aging of the farming population is also one of the main problems that must be urgently addressed by Czech agriculture.

CONCLUSION
Agriculture is still among the most risky fields of business in the Czech economy. According to an analysis by the association ČEKIA, almost every other company active in agriculture is in danger of bankruptcy. As a consequence of climate change it will be necessary to improve the water retention of the landscape. It is said that so far nobody in the Czech Republic is really aware of the seriousness of the climate change problem. In south Moravia, for example, the growing of barley is halting due to changes in the climate; farmers expected this to happen around the year 2025 at the earliest. A decrease in the labour force in the sector is caused by the current orientation of agriculture to crop production, which creates distinctly fewer vacancies than cattle, pig and other animal farming. An analysis of the statistical data has shown that despite the decrease in the number of workers in Czech agriculture, the value of agricultural production and profits in the sector are not declining. Among the factors contributing to productivity growth in the agricultural sector could be European Union subsidies and the growth in the level of prices of some agricultural commodities on the Czech market.

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