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A Comparative Analysis of Organic and Conventional Farming Profitability

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Abstract

The objective of this article is to determine the economic performance of organic farms compared with conventional farms. The analysis included a set of farms the concentration of which is in natural and climatic conditions typical for this type of farming high. The outputs may be therefore considered representative and generalised.

In order to determine the performance of these farms, their production basis was first assessed by using the indicators of available assets and assets coverage resources. Consequently, their efficiency was assessed based on the profit. For the purposes of comparison, the profit was (in various forms) converted to a hectare of agricultural land. The economic results were also compared with the average level achieved in the EU. The final part of the research focused on the evaluation of the economic and financial standing of the farms using selected return, liquidity, debt, and activity related ratio indicators. The established results show that the situation of organic farms on the national level tends to be economically more favourable. This is demonstrated by the higher share of profit-making farms and more favourable values of certain ratio indicators, i.e. those concerning profitability, liquidity, and interest coverage. The comparison with the average values achieved in the EU revealed a significantly more favourable situation in the Czech Republic.

Keywords

Conventional farms, farms as legal entities, financial analysis, ratio indicators, loss-making farms, organic farms, profitable farms.

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Introduction

In connection with the increasing competitiveness and global openness of the markets, the economic performance of any sector has been the topic of ever more frequent discussions. It is the objective of any business in any entrepreneurial field to be successful, develop for the future, and consolidate its position on the market.

The position of agriculture among other sectors of the economy is rather specific because its importance is irreplaceable in terms of nourishing the population and protecting all the components of the environment. Because of the specifics of this sector (regarding both the production process and the market operation process), economic performance is more difficult to achieve than in other economic sectors.

This also applies to organic farming, which, unlike conventional farming, also includes additional characteristics (such as higher production costs, stricter rules applicable to the production process, more complex sales of bio products, etc.) that can hinder the achievement of the performance requirements. However, support for organic farming and for ensuring its efficiency appears desirable because the demand for, and public interest in, high-quality and safe foodstuffs as well as in animal welfare and in the preservation of natural resources has been rising in recent years.

In these difficult times, with the ending era of cheap natural resources and with each farm striving to use all resources as efficiently and effectively as possible, it is necessary to learn how to use such resources sustainably so as to reduce the environmental impact. The space for the development of organic farming and its stable support are advisable.

In the scientific literature, the issue of economic performance is one of the key topics and receives

the attention of many authors. Farrell (1957) was the first one to introduce this concept: "A firm is technically efficient if it cannot produce the same volume of goods using a lower quantity of one factor of production without increasing the volume of another factor of production." According to Samuelson and Nordhaus (2001), efficiency is: "the use of economic resources that produces the maximum level of satisfaction possible with the given inputs and technology" At the level of an undertaking, efficiency is defined by Hindls et al. (2003): "At the most general level, economic efficiency is the ability of a business to create value out of the resources invested in the enterprise" or, for example, by Petrackova (1995) "… the efficiency of the resources input in the production, evaluated from the perspective of their results."

A number of international and Czech authors have observed the performance of agricultural undertakings. Research focused on conventional farms prevails significantly. Businesses following the principles of organic farming have received less attention.

The issue of performance is mostly observed by the authors in connection with the transition from conventional to organic farming. However, the outcomes do not provide clear conclusions to confirm success or failure.

Each study follows its own methodology (the selected farms came from different climatic and production conditions, different evaluation methods and procedures), which complicates any comparison and clouds the clarity of the findings.

Certain research studies conducted among conventional farmers, e.g. in Belgium, show the lack of knowledge and the underestimation of the economic potential of organic farming and the prevailing opinion that the additional limitations associated with organic farming will unavoidably lead to reduced income. According to De Cock (2005), this negative perception is the predominant cause for the low willingness of Belgian farmers to convert. The model proposed by Kerselaers (2007) is also based on the example of Belgian farming, utilising specific accounting data of organic and conventional farms to show the potential income changes resulting from the conversion to organic farming. According to this model, the economic performance is not clearly positive for all the farms and it is dependent on the type and nature of the farm.

The observations made by Madau (2007) also confirm the lower performance of organic farms in comparison with conventional farms.

The above-mentioned studies are rather sceptical about the transition to organic farming and do not consider economic profit very realistic.

On the contrary, however, there are studies (e.g. that by Offermann and Nieberg, 2000) that have demonstrated the economic success of farms. Nevertheless, we need to remember to accept these assertions with caution because the analysed samples may (and the studies did indeed) also include companies whose profitability was lower than that of the conventional farms they were compared to.

While Lund et al. (2002) or Nowak (1987) consider economic performance an important factor limiting the existence of organic farming (without mentioning other factors), other authors (e.g. Köhne and Köhn (1998), Lampkin and Padel (1994)) also mention other motivations that should be considered when converting to organic farming. They hold that economic motivation is less important than other (non-economic) motives such as environmental concerns, animal welfare, psychosocial characteristics, etc. These aspects must be considered when evaluating economic data regarding organic farms. The evaluation cannot be one-sided even though the economic aspects are, without doubt, important.

The research on the efficiency of conventional and organic farming in the Czech Republic also provides rather varied outputs.

Some authors focus on economic performance at the general level – e.g. Sarapatka and Urban (2006) or Kopta and Kourilova (2008).

Using their own samples of entities (organic versus conventional farms), they go on to examine the efficiency of selected plant and livestock farming products (most commonly involving dairy farms and farms keeping cows without the market production of milk; in terms of plant production, wheat, potato and oats growing is represented most commonly), e.g. Zivelova et al. (2003), Jansky et al. (2006) or Hrabalova and Zander (2006).

Governmental institutions also pay attention to the actual economic situation of farms. Under authorisation from the Czech Ministry of Agriculture, the Institute of Agricultural Economics and Information (IAEI, the FADN liaison agency) uses the so-called Farm Accountancy Data Network (FADN CZ) to monitor the results and economic situation of selected farms. It is

a selected sample of legal entities, representing both conventional and organic farms (with conventional farms prevailing at the ratio of 89:11). As a novelty, the performance of purely organic farms is presented separately (since 2013) but it is only done in the form of the FADN EU standard output (at the level of items such as Gross Farm Income, Farm net value added, Family Farm Income, i.e. items used for the purposes of comparing farms among all EU Member States), while the items required for determining the profit/loss (in the same structure as that in the overall FADN database) according to Czech financial statements is missing.

The IAEI also collects data from organic farms in regular yearly intervals (through supervisory authorities). The exercise is commissioned by the Czech Ministry of Agriculture and the data, defined by Eurostat, is used for the purposes of comparison among the EU Member States (Sejnohova et al., 2015). Within the framework of the basic statistical data, the development of the share of profitable farms (by production focus) is also monitored to assess the economic performance. However, more detailed economic categories (selected profit/loss items, selected assets/liabilities items) which are monitored at the level of the FADN sample as a standard and could be used to establish the economic profit of the organic farming sector as a whole (through the application of selected economic methods) are missing.

It was therefore the objective of this research to respond to this fact and use the economic analysis of organic farms to assess their economic performance in greater detail (and compare it to the performance of conventional farms), and thus to contribute to addressing the persisting need for information about whether or not such entities are viable in our conditions and whether or not they may contribute to meeting the requirements for environmentally friendly and sustainable farming. The results of the analysis should be used to propose measures aimed at improving the awareness of the performance of the entire organic farming sector. This is a must for the government agencies, which should be interested in feedback, mainly based on the fact that they financially support this sector. They should be therefore interested in whether these resources are spent effectively.

The above-mentioned main objective is divided in the following partial objectives:

- Map and evaluate the production basis of the organic farm as the prerequisite for the subsequent establishment of the efficiency of these undertakings. Evaluate the production basis on the basis of the indicators of assets availability and resources covering these assets. For higher-quality output, make a comparison with conventional farms and with farms from the FADN CZ sample;
- Evaluate the efficiency of organic farms in comparison with the same groups of samples as in the previous point as follows:
  1. according to profit (in absolute terms; in relative terms per hectare of agricultural land);
  2. through selected financial ratio indicators;
- Propose measures to improve awareness of the economic profit of this sector for the needs of the public administration as well as of farmers.

While one of the authors has conducted research in the field for some time (Brozova, 2011a, 2011b), there is definitely space for further evaluations, in particular of the economic nature. The author now seeks to follow up on her previous research, in which she worked with other authors (e.g. Vanek et al., 2011) to create a map portal in the region of South Bohemia, and go on to focus on the economic aspects of the issue. She intends to continue researching the region both because of its continued dominant position among the regions of the Czech Republic and in connection with the previous outputs, allowing for the comparison of the outcomes.

Organic farming is mainly centred in the less favourable mountain and sub-mountain areas in the Czech Republic and the region of South Bohemia offers suitable conditions for this type of farming. That is why it has the largest area of organically farmed land in the country (15.2% of the total area of organically farmed land in the Czech Republic – as of 31 December 2015) and the region has also dominated in the long run in terms of the number of farms (13.7% of the total number of eco farms in the Czech Republic – as of 31 December 2015 (MoA, 2016). For these reasons, the authors consider the region suitable for the presentation of conclusions regarding the economic profit of the organic farming sector.

Materials and methods

For evaluating the efficiency of organic farms in comparison with conventional farms, primary data from three main sources were used:

- Amadeus database. It provides financial and economic information about the companies based on processing their financial statements. The data taken into consideration was that which can be accessed – i.e. data concerning legal entities, which have the legal obligation to publish their financial statements. 31 final accounts of organic farms and 99 final accounts of conventional farm were analysed. Farms were selected based on an identification number. These farms were located in the South Bohemia Region which is typical for its organic farming. The highest number of organic farms and largest area farmed organically is located in the region. The largest portion of the total agricultural land fund area is permanent grassland (almost 86%), the rest is arable land (about 9%) and orchards and vineyards (only 0.4%). Livestock production of these farms specialises mainly in cattle breeding without the market production of milk, either exclusively or in combination with another livestock category (sheep, goats, horses). The production orientation of plant and livestock production is also reflected in the average size of organic farms in the region, which is 141 ha (slightly above the national average – 127 ha). The structure of the agricultural land fund and orientation of livestock production is not significantly different from the national average, they just confirm that farms are concentrated in areas at higher altitudes and unfavourable natural conditions. For this reason, it is possible to consider the farm selection to be representative and generalise the result on the national level.
- Farm Accountancy Data Network (FADN). It is based on the methodology of the annual economic result statement of enterprises with double-entry bookkeeping. The database provides the results of a sample survey organised from different perspectives, allowing a comparison of economic results of agriculture enterprises in different natural conditions for companies of various legal forms, sizes, and types of farming. The results are presented in the form of a weighting system.
- IAEI database. It is created by representatives of monitoring organisations directly on farms throughout the year. The data is collected by inspectors when conducting a proper review. The collection was made using a questionnaire annually updated according to the European Commission requirements. Since 2007, the output is the annual "Statistical Survey of Organic Farming". In addition to ordinary statistical data relating to the evaluation of production base, it includes data on sales and use of organic farms production, and data on the economic result of the enterprise.

The data of 31 organic farms (sample 1 in the presented results) and 99 conventional farms (sample 2) were taken from the Amadeus database. Sample 3 included data from the FADN CZ database, while the number of enterprises ranged from 233 to 529 farms monitored in 2008 – 2013. The number of organic farms included in the IAEI database ranged from 1849–3926.

In addition to the above mentioned main sources, the documents were supplemented and confronted with databases and information sources accessible to the public (e.g. REP - Register of Organic Entrepreneurs, LPIS - Land Parcel Identification System, FADN EU).

In the first part of the research, the evaluation of economic performance of agricultural enterprises focused only on the evaluation of their production base. For this, ratios of assets availability (total assets per hectare of agricultural land, fixed assets per hectare of agricultural land and current assets per hectare of agricultural land) and of assets coverage resources (equity per hectare of agricultural land, external resources per hectare of agricultural land) were selected. The comparison was made between the individual types of enterprises (cooperatives, corporations, and total legal entities), between farming systems (organic and conventional farming), and with the companies included in the FADN database.

The second part of the research focused on the performance evaluation based on the profit. At first, the profit was monitored in absolute terms (the share of profitable and loss-making farms in samples 1, 2 and IAEI sample was monitored) and then the profit was converted to a hectare of agricultural land for the purposes of comparison with sample 3. Three methodologically different profit categories were selected - Operating profit 1

(= added value - personal expenses - depreciation), operating profit 2 (same as operating profit, taken from line 30 P&L statement) and accounting profit (identical to the result for the accounting period, taken from line 60 P&L statement).

To be able to compare the profitability of farms in the Czech Republic and EU, the cash flow category was also selected. For comparison were chosen category of cash flow. It is reported in two ways calculations. CF1 represents the holding's capacity for saving and self-financing = Receipts - Expenditure for the accounting year, not taking into account operations on capital and on debts and loans. This indicator is close to that used by EUROSTAT on the basis of Macro-economic accounts = Net Receipts of Agricultural activity and Other Receipts + Balance farm subsidies and taxes + Balance subsidies and taxes on investments = Sales of products + Other Receipts + Sales of livestock - All costs paid - Purchases of livestock + Farm subsidies - Farm Taxes + VAT balance + Subsidies on investments - Taxes on investments. CF2 represents the holding's capacity for saving and self-financing = Receipts - Expenditure for the accounting year = Net receipts of agricultural activity and other receipts + Balance farm subsidies and taxes + Balance subsidies and taxes on investments + Balance of operations on capital + Balance of operations on debts and loans = Sales of products + Other receipts + Sales of livestock - All costs paid - Purchases of livestock + Farm subsidies - Farm taxes + VAT balance + Subsidies on investments - Taxes on investments + Sales of capital – Investments + Closing valuation of debts - Opening valuation of debts.

In the final part of the research, financial analysis ratio indicators were selected out of elementary methods of technical analysis. These included selected indicators of profitability, liquidity, indebtedness, and economic activities of the company - Return on Assets, Return on equity, Liquidity, Gearing, Interest coverage, Net assets turnover. In the design of indicators authors patterns based primarily on publications Mrkvicka and Kolar (2006), or the construction of some indicators adjusted (due to the absence of items of financial statements of companies).

Other scientific methods, such as analysis, synthesis, induction, deduction, comparison and questioning, were used in the processing of the article. The data was processed using MS Excel.

Results and discussion

In order to comprehensively evaluate the performance of farms, it is first necessary to assess the production basis of these entities and only then to proceed by evaluating their economic profit through profit. That is why the focus of the first part of the research was on evaluating the production basis of the organic farms (operated by legal entities) in the region of South Bohemia using the assets available indicator (total assets per hectare of agricultural land, fixed assets per hectare of agricultural land, and current assets per hectare of agricultural land) and the indicator of the resources of assets coverage (equity per hectare of agricultural land, liabilities per hectare of agricultural land). In order to enable comparison among the individual types of legal entities (cooperatives, corporations, and total legal entities), between farming systems (organic versus conventional farming), and with the companies included in the FADN CZ database, the indicators were calculated per hectare of agricultural land.

The average values of these indicators achieved by the specified groups of legal entities (cooperatives, corporation) and by legal entities in total in organic farming (sample 1), in conventional farming (sample 2) and in the FADN CZ sample (sample 3) is shown in tables 1a, 1b, and 1c for the period 2008 - 2013.

The tables 1a, 1b and 1c indicate that *the availability of assets per hectare of agricultural land* is significantly higher in conventionally operated farms. In addition, the differences between cooperatives and corporations are not as striking for conventional farming as they are between cooperatives and corporations for organic farming. Agricultural cooperatives posted significantly lower results than corporations. The values for cooperatives from the FADN sample were between the borderline values of sample 1 and sample 2 (except for the year 2013).

In terms of the structure of assets, fixed assets prevail in the total assets over current assets in all the samples (in the interval of 53% to 68%).

As for *the capital structure*:

- Among farms operating as legal entities, there is a prevailing share of own funds over external funding in all the samples (in the interval of 54% to 67%).
- There are more significant differences between agricultural cooperatives and corporations mainly in the organic farm

Ratios CZK .ha^{-1}	sample	Cooperatives					
		2008	2009	2010	2011	2012	2013
Total assets	1	23,625	23,434	22,750	25,234	31,493	31,393
	2	75,752	73,319	72,810	77,342	81,827	81,461
	3	66,556	66,471	67,523	72,875	79,975	84,938
Fixed assets	1	11,089	12,440	13,031	13,618	19,165	19,638
	2	45,854	45,751	45,559	47,084	51,418	52,998
	3	38,799	40,340	41,581	44,478	50,436	53,291
Current assets	1	12,537	10,994	9,718	11,616	12,328	11,755
	2	29,898	27,568	27,251	30,258	30,409	28,463
	3	27,128	25,744	25,545	27,982	29,146	31,197
Equity	1	9,889	7,062	6,121	8,191	9,885	10,734
	2	41,585	40,627	40,838	44,853	47,531	47,740
	3	36,291	36,468	38,651	42,043	45,585	49,195
Liabilities	1	13,737	16,372	16,629	17,044	21,608	20,659
	2	34,167	32,686	31,977	32,521	34,314	33,694
	3	30,031	29,908	28,790	30,705	34,233	35,624

Source: authors, based on the Amadeus database (2016), Farm Accountancy Data Network (FADN CZ) (2016)

Table 1a: Production basis of agricultural cooperatives farming in the region of South Bohemia in 2008 – 2013.

Ratios CZK .ha^{-1}	sample	Corporations					
		2008	2009	2010	2011	2012	2013
Total assets	1	46,439	47,278	46,122	48,232	46,447	52,076
	2	61,829	62,576	70,019	73,449	77,617	78,378
	3	59,833	62,347	64,540	71,020	75,161	80,255
Fixed assets	1	31,415	31,364	30,343	30,455	29,081	32,377
	2	36,102	37,804	43,091	45,968	49,334	48,695
	3	33,878	36,824	38,885	42,418	45,895	49,505
Current assets	1	15,024	15,914	15,779	17,777	17,365	19,699
	2	25,726	24,773	26,928	27,482	28,283	29,683
	3	25,291	25,061	25,298	27,996	28,772	30,281
Equity	1	31,103	31,707	30,341	31,572	31,133	33,235
	2	34,124	35,110	36,434	39,651	42,826	44,038
	3	36,333	39,508	41,023	45,340	46,780	51,390
Liabilities	1	15,336	15,571	15,782	16,661	15,314	18,841
	2	65,669	26,959	65,215	33,360	65,854	34,339
	3	23,313	22,660	23,356	25,453	28,149	28,622

Source: authors, based on the Amadeus database (2016), Farm Accountancy Data Network (FADN CZ) (2016)

Table 1b: Production basis of corporations farming in the region of South Bohemia in 2008 – 2013.

sample. There is a substantially lower share of equity in the total capital in agricultural cooperatives (in the reporting period it was between 27% and 42%) than in corporations (between 62% and 67% in the reporting period).

It can be said overall that there are differences in the available assets of the farms and in the structure of their capital both among the sample groups observed (the organic farm sample, conventional farm sample, and the FADN CZ sample) and within these samples. There are a number of factors underlying this situation. This is, for example, due to: the manner in which the entity was created and the initial resources invested in the enterprise (tangible, financial as well as information resources); the attitude of the owner(s) to securing an assets base, investment activities, acquiring external sources of financing, etc.

Ratios CZK .ha^{-1}	sample	Legal entities total					
		2008	2009	2010	2011	2012	2013
Total assets	1	42,837	43,513	42,432	44,601	44,086	48,810
	2	69,719	68,664	71,600	75,655	80,003	80,125
	3	62,200	64,122	65,536	71,518	76,953	81,858
Fixed assets	1	28,206	28,376	27,609	27,797	27,515	30,366
	2	41,628	42,307	44,490	46,600	50,515	51,133
	3	35,728	38,415	39,933	43,186	47,769	50,930
Current assets	1	14,631	15,137	14,822	16,805	16,570	18,445
	2	28,090	26,357	27,111	29,055	29,488	28,992
	3	25,826	25,278	25,227	27,809	28,739	30,471
Equity	1	27,754	27,816	26,516	27,880	27,778	29,682
	2	38,352	38,236	38,930	42,599	45,492	46,136
	3	35,889	38,003	39,725	43,622	45,990	50,132
Liabilities	1	15,083	15,697	15,915	16,721	16,307	19,128
	2	31,164	30,243	32,624	33,075	34,520	33,974
	3	26,108	25,981	25,686	27,716	30,769	31,537

Source: authors, based on the Amadeus database (2016), Farm Accountancy Data Network (FADN CZ) (2016)

Table 1c: Production basis of total legal entities farming in the region of South Bohemia in 2008 – 2013.

The second part of the research focused on evaluating the performance of organic farms in comparison with conventional farms and with those included in the FADN CZ (all in the same region) and FADN EU.

Profit is the indicator that is most commonly used to evaluate the success of the economic activities of a company. That is why this category:

- was first observed in absolute terms, i.e. to determine the share of profitable and loss-making farms in samples 1 and 2.
- For the purposes of comparison with sample 3, the profit was then recalculated per hectare of agricultural land used. Three different categories of profit were selected: *operating profit 1, operating profit 2, and book profit (profit/loss for the accounting period)*. As stated by Svobodova et al. (2011), "the efficiency of operations is mainly reflected in the creation of added value, thus in operating profit 1 (op. P_1[1]). However, it does not take into considerations other operating items such as income from the sale of fixed assets, from the creation and clearing of provisions, from the difference between other income and expenditure, where subsidies represent an important revenue item." However, operating subsidies represent a significant part of the revenues in all farms, especially in organic farms. That is why both of these categories (op. P_1 and op. P_2[2]) were examined.
- It was also used for the construction of the efficiency (profitability) indicators - ROA and ROE.
- Finally, the category of profit and compared with those achieved in the EU. With regard to a number of methodological differences and the presentation of outputs at the level of EU FADN was chosen categories cash flow (CF1, CF2).

The following table (Table 2) shows the share of profitable and loss-making farms in samples 1 and 2 in the region of South Bohemia. For comparison purposes, the results of the annual statistical surveys by the IAEI Brno are also presented (e.g. Sejnohova et al. 2015).

The table suggests that, except in the last two years, the share of profitable farms was significantly higher in organic farming than in conventional farming. However, this concerned the category of profit (book P_1, i.e. profit/loss for the accounting period posted in row 60 of the P&L statement), the calculation of which already included subsidies (operating subsidies[3]). If they were not included

[1] op. P_1 = added value – personnel expenses – depreciation of fixed assets

[2] op. P_2 = operating profit/loss – see row 30 of the P&L statement

[3] Subsidies of an operating nature include, for example, SAPS, TOP UP support; for organic farms, they also include support for organic agriculture under agri-environmental measures (AEMs) as well as support under other AEM schemes, LFA payments, etc.

year	farms	sample 1		sample 2		IAEI survey
		book P1	book P2	book P1	book P2	book P1
2008	**profitable**	82.2	13.1	78.2	20.7	75.5
	loss-making	17.8	86.9	21.8	79.3	19.0
2009	**profitable**	78.8	11.3	56.6	21.8	82.8
	loss-making	21.2	88.7	43.4	78.2	6.7
2010	**profitable**	89.6	15.7	82.1	30.2	90.7
	loss-making	10.4	84.3	17.9	69.8	9.1
2011	**profitable**	92.6	17.1	89.3	34.5	92.0
	loss-making	7.4	82.9	10.7	65.5	5.5
2012	**profitable**	81.5	12.8	94.9	41.7	91.0
	loss-making	18.5	87.2	5.1	58.3	6.0
2013	**profitable**	85.2	14.2	89.3	36.8	95.7
	loss-making	14.8	85.8	10.7	63.2	3.4

Source: authors, based on the Amadeus database (2016), Sejnohova et al. (2015)

Table 2: Profitable and loss-making farms in organic and conventional farming in South Bohemia and in organic farming in the Czech Republic (%).

(book P_2 – the authors' own calculation), most farms (both organic and conventional) would post a loss. The importance of subsidies for operating profit can also be demonstrated using the results of the survey by the IAEI Brno (which also reported on the operating profit/loss the calculation of which included subsidies) – for details see Table 2.

The importance of subsidies is also suggested by Table 3, in which the profit/loss is expressed in relative terms per hectare of agricultural land. The presented results show that operating profit/loss (in case of operating profit 1) is not efficient (in samples 1 and 2; FADN CZ does not follow this category). The average values of the farms in both samples were negative in all the periods in question. However, after subsidies were included (operating profit 2), only cooperatives were not efficient - and only in a single year (but in all the samples in question, i.e. in sample 1, sample 2 and in the FADN CZ sample).

As far as the category of book profit was concerned, the situation in South Bohemia was almost identical with operating profit 2.

A high degree of dependence of farms on subsidies, in particular, as regards farms operating in mountain LFAs, is mentioned by Lososova and Zdenek (2014) as well as by Sarapatka and Urban (2006), according to whom certain types of farms could not otherwise exist (subsidies account for 15-20% of their revenue).

In terms of the achieved amount of profit per hectare of agricultural land, the legal entities operating in organic farming mostly reported lower values than the legal entities involved in conventional farming. A more detailed look at the individual types of companies (cooperatives, corporations) and farming systems (organic farming, conventional farming) suggests differences between the farms, to a greater or smaller extent. Such differences are not exceptional and their general causes are difficult to find. We need to remember a number of variations resulting from the different farming systems. As Kourilova (2006) suggests, they could contribute to the lower production efficiency in organic farming because of the higher risks involved (based on the limits set by the strict standards, a more limited number of processing parties, the marketability of the commodities, objective risks, etc.). On the other hand, the higher subsidies (coming from a broader range of support schemes), higher selling price of bio products and foodstuffs, and diversification of activities should contribute to increased performance.

However, in addition to these economic factors, there are other, non-economic, ones that play a major part in affecting performance. They include, for example, the natural and climatic conditions in the area, the production focus of the farm, market access, management skills, as well as the availability of information, available information and communication technologies, etc.

Another reason for lower profit per hectare of agricultural land in certain farms could be the larger areas typically farmed by organic farms in comparison with conventional farms (the average area of an organic farm in the Czech Republic is 123 hectares, while that of a conventional farm is

	year	Indicators								
		op. P_1 (CZK.ha^{-1})			op. P_2 (CZK.ha^{-1})			book profit (CZK.ha^{-1})		
		sample			sample			sample		
		1	2	3	1	2	3	1	2	3
Co-op	2008	-4,156	-7,018	-	1,313	1,736	1,005	876	1,323	633
	2009	-12,284	-11,835	-	-2,087	-1,486	-1,599	-2,401	-1,987	-1,870
	2010	-9,427	-6,530	-	111	2,114	1,608	-265	1,615	1,216
	2011	-2,335	-5,482	-	2,898	4,177	3,989	2,420	3,369	3,248
	2012	-3,056	-5,730	-	3,047	4,047	3,329	2,391	3,175	2,598
	2013	-5,018	-6,022	-	1,235	3,836	3,606	770	2,759	2,637
Corporations	2008	-10,535	-7,422	-	2,652	1,676	2,489	1,742	840	1,725
	2009	-8,485	-6,339	-	2,694	2,295	332	2,143	1,536	-159
	2010	-12,356	-6,415	-	1,907	2,654	2,434	1,438	1,592	1,666
	2011	-11,850	-4,935	-	1,956	4,807	4,564	1,447	2,905	3,152
	2012	-11,025	-3,812	-	1,138	5,288	4,736	587	3,640	3,217
	2013	-12,164	-4,050	-	1,790	4,592	4,427	878	2,826	2,967
Legal ent. total	2008	-8,145	-7,321	-	2,413	1,113	1,550	1,605	1,710	1,036
	2009	-11,314	-9,547	-	1,888	-460	-859	1,425	152	-1,213
	2010	-11,891	-6,754	-	1,561	1,605	1,897	1,169	2,348	1,373
	2011	-15,185	-5,714	-	2,048	3,168	4,189	1,601	4,450	3,215
	2012	-15,082	-4,894	-	1,396	3,377	3,741	872	4,585	2,779
	2013	-9,191	-5,712	-	1,651	2,788	3,873	861	4,164	2,744

Source: authors, based on the Amadeus database (2016)

Table 3: Economic results I of farms (operating as legal entities) in South Bohemia in 2008 – 2013.

75 hectares). With 133 hectares, the average area of an organic farm in South Bohemia exceeds the national average; in addition, the region ranks first, with a great margin, nationally in terms of permanent grassland and the farms' orientation on cattle farming.

The final part of the research focused on evaluating the economic and financial situation of the farms (both organic and conventional) in South Bohemia. Ratio indicators from the following areas were selected for that purpose: return, liquidity, indebtedness and activity. Their choice was limited by the items available from the financial statements of the farms (provided by Amadeus) – they did not all have the detailed structure required for the construction of certain indicators.

No comparison of the indicators with the FADN database was possible because of the absence of data in certain years in the period or question and because of the different methodology applied in the calculation of the relevant indicators.

The *ROA (Return on Assets)* is the main measure of a company's ability to use the assets input in the entrepreneurial activity. There may be various modifications of the profit that is entered as the numerator. If EBIT (Earnings before Interest and Taxes) is entered, it suppresses the impact of the financial structure and taxation and the focus is only on the operating activities of the farm.

Operating profit/loss according to the Czech methodology represents a reliable assessment of the company's operating performance and is an acceptable substitution for EBIT (Mrkvicka and Kolar, 2006).

The other (and probably the more suitable) option is to enter profit/loss before tax in the numerator. However, it was not known for most companies in the examined samples, for which reason the profit/loss after tax, i.e. the profit/loss for the accounting period – row 60 of the P&L statement – was used.

Therefore, both of these categories of profit/loss were used for the calculation of the ROA – i.e. EBIT for the calculation of ROA_1 and profit/loss for the accounting period for the calculation of ROA_2.

As the values contained in Table 4 show, the values of ROA_1 and ROA_2 were significantly higher in organic farming compared to those in conventional farming both in terms of the average value for legal entities in total

Ratios	sample	Cooperatives						Corporations						Legal entities total					
		2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
ROA_1 (%)	1	3.12	-7.54	0.46	11.08	6.76	5.01	8.45	9.32	5.82	5.86	5.46	3.70	7.97	7.72	5.26	6.33	5.58	3.82
	2	1.91	-3.50	1.57	5.02	4.19	4.04	2.69	3.55	2.72	4.90	6.90	3.62	2.26	-0.38	2.10	4.96	5.44	3.84
ROA_2 (%)	1	2.18	-7.51	0.52	10.00	5.86	4.25	5.96	7.75	4.86	5.11	4.28	3.06	5.61	6.20	4.41	5.55	4.43	3.17
	2	1.79	-3.05	1.50	4.32	3.70	3.42	2.13	3.31	2.87	3.98	5.68	2.71	1.94	-0.24	2.13	4.16	4.61	3.09
ROE (%)	1	3.90	-24.94	3.18	31.09	18.49	11.26	11.25	12.70	9.71	16.70	5.50	6.03	10.59	9.12	8.98	18.07	1.83	6.56
	2	3.13	-7.35	6.32	9.96	8.57	7.90	-5.56	7.63	8.46	14.83	23.20	12.08	-0.66	-0.75	7.27	12.08	15.20	9.79
Total liquidity (x)	1	4.52	2.56	3.35	1.86	2.42	1.88	3.31	3.87	2.87	2.68	4.26	4.20	3.42	3.75	2.92	2.60	4.09	3.97
	2	2.17	2.01	2.26	2.20	2.16	2.20	1.85	1.80	1.64	1.66	2.36	2.77	2.03	1.92	1.97	1.95	2.26	2.46
Gearing (%)	1	201.41	259.11	283.77	190.66	185.97	167.32	54.89	74.96	60.11	47.94	34.68	90.73	68.85	92.50	84.96	68.85	49.81	98.39
	2	115.04	108.06	95.78	85.48	87.71	91.51	108.30	107.15	98.11	113.77	93.61	103.38	112.18	107.67	96.79	62.96	90.36	96.80
Interest coverage (x)	1	6.54	-14.39	6.42	23.47	9.35	17.55	18.59	35.20	25.48	42.54	58.32	39.05	17.83	30.24	23.36	40.72	53.66	37.00
	2	4.90	-4.30	9.57	19.93	25.55	12.03	8.73	14.53	8.09	15.62	12.03	11.44	6.58	4.00	8.90	17.94	19.59	11.76
Net assets turnover (x)	1	0.81	0.75	0.84	0.95	0.94	0.77	1.76	1.39	4.52	1.27	2.96	1.35	1.48	1.32	4.02	1.06	2.59	1.10
	2	0.79	0.68	0.96	0.87	1.02	1.18	1.62	1.60	1.64	1.26	3.77	2.49	1.16	1.08	1.27	1.05	2.25	1.77

Source: authors, based on the Amadeus database (2016)

Table 4: Economic results II of farms (legal entities) operating in the region of South Bohemia in 2008 – 2013.

and for corporations and cooperatives. Even though these findings do not correspond to the results of profit per hectare, they confirm the higher efficiency of organic farmers, despite the higher level of risk involved. The reasons for this are apparent and have been commented on above.

ROE (Return on Equity) is another profitability indicator and a crucial criterion for owners in evaluating the success of the company. This indicator shows the net yield from the resources invested in the company. The numerator in the fraction uses profit/loss after tax. The values achieved in this case are not unambiguous, either, but they again tend to favour organic farming.

Total liquidity is another indicator and it is used to assess the liquidity of a company. It shows the ability of the company to use cover (using short-term financial assets, short-term receivables and inventory) its short-term debt (short-term payables, short-term loans and short-term borrowings). The corporations operating in organic farming reported clearly higher values; the values for cooperatives were also higher but not in all the years.

On the one hand, the higher values can be seen as a positive – the farm can meet its obligations. On the other hand, however, the resources involved in inventory or in receivables do not bring a profit to the company and thus reduce its returns. An individual approach must be taken to address this situation and a specific strategy must be adopted depending on the attitude of the farm's management to risk and depending on the required returns.

The *indicator of gearing - an indicator showing the level of indebtedness* - was selected for evaluating the level of coverage of the company's assets with external resources. This indicator was constructed as the ratio of external and internal sources of financing. As is the case of the values of equity per hectare of agricultural land, the values of indicators calculated for legal entities in total mostly show a higher share of the farm's own sources compared to external sources (mainly in the sample of organic farms). A more detailed view of the individual types of companies and of the individual samples shows rather large differences between the calculated values. While external capital prevails in organic farms operating as cooperatives and the farms' own capital prevails in organic farms operating as corporations, the situation is exactly the opposite in conventional farming.

A certain level of debt is healthy for the company as it increases the capital yield. On the other hand, a very high share of external sources may suggest lower financial stability and higher business risks.

No clear conclusions can be drawn because of the varying results. The specific values of the indicators would have to be examined to a greater detail (considering also the structure of external financing). While this could be done at the level of a single entity, it cannot be done to interpret the results for an entire sample of farms.

In this case, we have to do with only stating the value of the indicator. Higher values may be viewed as an opportunity to increase capital efficiency; lower values may be seen as the less

risky choice of strategy by those farms that prefer a lower financial risk.

The ability of the farms to cover the costs involved in using external sources of financing was assessed using the *Interest coverage* indicator. It was designed as the ratio of EBIT and interest expenses. The higher the indicator value the better. The generally accepted rule is that the value should be at least 3, ideally greater than 7. The table clearly shows the differences between the groups of organic farms in terms of the in the values achieved as corporations achieved significantly higher values of the indicator. In comparison with conventional farms, the values in organic farming were usually much better (even though the value for cooperatives in 2009 represents the so-called "uncovered debt"). The ideal value was exceeded or at least nearly met in organic farming in most of the reporting years.

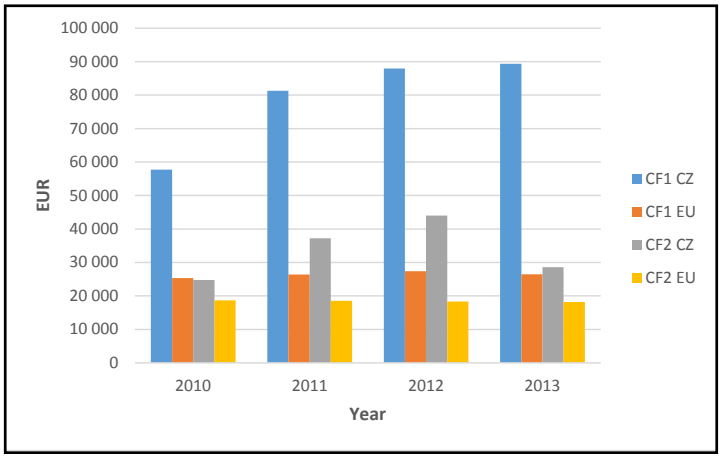
The *net assets turnover* (the ratio of revenue to the total assets) was the last indicator observed with a view to evaluating the efficiency of assets use. It is the indicator of entrepreneurial activity and of the efficiency of creating value out of fixed and current assets in the farm's production activities. While the availability of assets per hectare was significantly higher in conventional farming than in organic farming, the differences were not as striking between these two systems (organic versus conventional) in terms of the efficiency of the use of these assets. Significant disproportions were observed only between cooperatives and corporations. The higher values reported by corporations suggest a higher ratio of yield to the value of the assets, i.e. a higher efficiency in using the assets.

At the conclusion, the profit of farms in the Czech Republic compared with the average achieved in the EU.

The graph shows values significantly higher profit in the Czech Republic than the EU average. Among individual states, there are wide differences. Significantly higher than the national average achieved eg. in Luxembourg, the Netherlands and Belgium, while lower values eg. in Romania, Bulgaria or Poland.

Conclusion

The results provided above rather diverse outcomes. Nevertheless, they tend to show a more favourable situation of organic farms, which is consistent with the findings of the author's previous research conducted in this region (Brozova, 2011b). Note, however, that those are average results. As the samples may include entities whose results greatly deviate from this average, these findings need to be accepted with caution. Nevertheless, the authors still believe that these outputs may be considered sufficiently representative and they are convinced that organic farms significantly participate in meeting the requirements for environmentally friendly and sustainable farming. It is also necessary to take into consideration the vacuum of the data base (which is still insufficient despite certain improvements in recent years). For this reason, there is a persisting need for a high-quality data base including the basic economic characteristics in order to determine the economic profit of the entire organic farming sector in the Czech Republic.



Source: Economicanalysisof EU agriculture FADN (2016)

Graph I: Profit of farms in the Czech Republic and the EU (the average farm in EUR).

The solutions may include:

- extending the FADN CZ sample to include a representative sample of organic farms with the same structure as is applied in the general FADN database, i.e. to monitor selected profit/loss items, including detailed cost and revenue items and selected items of assets and liabilities (for agricultural cooperatives, corporations and legal entities in total) in accordance with the financial statements of the Czech Republic, broken down by region;
- extending the existing database of the IAEI Brno (which monitors nearly all the organic farms in the Czech Republic) to include a more detailed structure of cost and revenue items for the purposes of determining economic performance.

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