Economic Viability of Farms

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Abstract: The paper assesses the economic viability of Czech agricultural enterprises and the connection between economic viability and the ability to create value. From the possible definitions of economic viability, we choose the concept of Farm Economic Viability and use IN99 to estimate the ability of the farm to create value. The empirical analysis was carried out on a sample of agricultural enterprises from the collected database from 2013 - 2022. Differences in the viability of enterprises were tested according to the enterprise's affiliation with disadvantaged areas. The results indicate a strong dependence of value creation on the economic viability of farms.

Keywords: viability, sustainability, agriculture, value.
JEL Classification: M21; Q14.

1 Introduction

Economic viability is closely related to economic sustainability and the risk of business failure. Although EU agricultural policy has focused on environmental goals in recent decades, the main goal is still to ensure the economic viability of agriculture. The literature provides several methods of measuring viability, but no universal definition exists (Špička et al., 2019). According to Barnes et al. (2015), financial viability defines the ability of a business entity to continue to achieve its operational goals and fulfil its mission in the long term. Many studies use profitability as one of the measures of farm viability (Hayden et al., 2019; Coppola et al., 2020), and one of the most frequently used indicators of farm viability is also solvency (Savickiene et al., 2016). Different approaches consider viability as a measure of farm household welfare or opportunity cost (Vrolijk et al., 2010; O'Donoghue et al., 2016; Hloušková et al., 2022). According to Frawley and Commins (1996), viability is determined by the ability to provide a minimum wage, as well as by the ability to provide additional income from non-land assets.

Viability is influenced by several factors, such as the degree of diversification and structural, biophysical and institutional factors, although their importance and extent may vary across regions (Barnes et al., 2015). Some common aspects of economic viability are also related to economic sustainability. Sustainability is perceived as viability in the long term in a changing economic context (Latruffe et al., 2016; Ribašauskienė et al., 2024). In the case of agriculture, especially family farms, economic sustainability is perceived as the ability to transfer the farm to successors (Latruffe et al., 2016), and thus economic sustainability is the long-term viability of agricultural households, while economic viability measures the farm's ability to grow (Špička et al., 2019). According to Barnes et al. (2020), succession planning positively affects farm viability. However, new entrants may lead to more innovative approaches and search for new markets (Winter & Lobley, 2016).

Economic viability is primarily measured by profitability, liquidity, stability and productivity (Latruffe et al., 2016). However, evaluation using these indicators is more financial viability but does not consider the opportunity cost of own land, labour and capital. Therefore, some authors combine financial indicators and productivity (Argiles, 2001), which expresses the ability of production factors to generate output (Latruffe et al., 2016). The predictive ability of indicator systems grouped into multivariate models is limited, especially for such a specific sector as agricultural production (Kopta, 2009), due to subsidy bias, among others. According to Špička et al. (2019), when measuring farm viability, the optimal solution is to separate family farms, which are more focused on cash flow, from non-family farms, which are focused on profit. In addition, large Czech farms farm 80% of their land on leased land, which some profitability indicators do not consider.

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This paper aims to assess the viability of agricultural enterprises and compare the relationship of viability with their ability to create value. For this purpose, we use one of the latest farm economic viability indicators proposed by Hlavsa et al. (2020).

2 Data and Methods

2.1 Data

We use farm data from our database for the period 2013–2022. The data are based on standard financial statements supplemented by production indicators. Regarding the legal form of business, on average, 40% are cooperatives, 40% are joint-stock companies, and 20% are limited liability companies. According to the EU classification (EC, 2006), 70% of farms are small and 30% medium-sized. Regarding belonging to ANC (Areas with Natural Constraints), 10% of farms farm in mountain ANCs, 52% in other ANCs and 38% outside ANC areas. The distribution according to production focus represents around 20% of farms focused on crop production (more than 2/3 of sales are realised from crop production), 35% of farms are focused on animal production (more than 2/3 of sales are realised from animal production) and 45% realise mixed agricultural production. The average area of agricultural land is 1572 ha, the degree of cultivation is 76%, and the share of leased land is 83%. Due to the nature of the data used, these are mainly larger non-family farms that keep accounts. Table 1 shows the essential characteristics of the sample.

Table 1 Basic characteristics of the average company in the sample

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Number of farms	103	85	104	95	84	85	72	69	56	53
Agricultural land (ha)	1 712	1 639	1 614	1 594	1 536	1 542	1 556	1 483	1 509	1 373
Assets (thous. CZK)	149 874	152 924	158 315	160 194	162 691	167 921	180 355	173 284	187 442	185 514
Profit (thous. CZK)	6 442	7 411	4 234	5 148	4 639	4 497	3 091	4 237	4 783	12 530
Labour force	53	52	51	49	49	46	47	43	47	40
Subsidy (CZK/ha)	8 761	9 424	9 621	10 526	9 954	11 655	11 047	11 117	11 008	10 979

Source: Calculation on a sample of farms

The limiting factor of this work is the absence of farms of natural persons for whom financial statements are not available. However, according to the Czech Statistical Office (CZSO 2024), 69 % of the agricultural land in the Czech Republic is managed by legal entities.

2.2. Methods

To determine the economic viability of farms, we use the approach according to Hlavsa et al. (2020). They performed their analysis on data from the Farm Accountancy Data Network. They developed the Farm Economic Viability (*FEV*) indicator based on the Modified Farm Net Value Added approach (*MFNVA*). *MFNVA* should cover employee wages, the expected wages for the unpaid labour force and opportunity costs of equity and own land. Considering the opportunity cost of equity, labour and land, a farm is viable when

$$FNVA - (IP + OCC) - (RP + OCL) > W + UL,$$

where *FNVA* is Farm Net Value Added, *IP* is Interests Paid, *OCC* is Opportunity Costs of Equity (Non-Land), *RP* is Rent Paid, *OCL* is Opportunity Costs of Own Land, *W* is Wages, and *UL* is Expected Wages for Unpaid Labour.

Hlavsa et al. (2020) further define the FEV indicator as

$$FEV = [FNVA - (IP + OCC) - (RP + OCL)] / (W + UL).$$

FEV varies in the interval $(-\infty, +\infty)$, with $FEV = 1$, meaning that *MFNVA* covers employees' wages, including the opportunity cost of unpaid work (Hlavsa et al., 2020). A farm with $FEV > 1$ is considered economically viable, and a farm with $FEV < 1$ is not.

The sample on which we process the evaluation differs from the data for which the *FEV* indicator was derived by Hlavsa et al. (2020). This is connected with the necessary adjustments in the definition of the content of net added value, which is based on the financial statements. Net value Added is determined as profit after tax + interest expenses + personnel expenses. Furthermore, we do not determine the alternative costs of own land (or we work with them in the costs

of equity). Because family farms do not appear in the sample, neglecting the expected wages of unpaid workers is possible. The result is a relationship

$$FEV = (PAT + W - OCC) / W,$$

where *PAT* is profit after tax.

OCCs are determined by the product of equity and the cost of equity rate. Mařík et al. (2011) recommend that risk premiums be calculated from world or, even better, US market data when applying the capital asset pricing model. Therefore, we adopt the cost of equity rates from Damodaran online (2024). We follow values for the Farming/agriculture sector for Europe for the years 2013 to 2022, which are shown in Table 2.

Table 2 Costs of Equity

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cost of Equity (%)	7.46	7.59	8.31	7.09	6.55	7.94	6.56	4.59	5.08	10.08

Source: Damodaran online (2024)

We estimate the ability of a company to create value for its owners using the *IN*99 model (Neumaierová & Neumaier, 2002). The model is following

$$IN99 = -0.017\, x_1 + 4.573\, x_2 + 0.481\, x_3 + 0.015\, x_4,$$

where x_1 is Assets / Total debt, x_2 is Operational profit / Assets, x_3 is Revenues / Assets, and x_4 is Current Assets / Short-term Liabilities.

If the *IN*99 value is higher than 2.07, the firm has a positive economic profit value (creates value for the owners); if the *IN*99 value is below 0.684, then the firm shows a negative economic profit (Neumaierová & Neumaier, 2002).

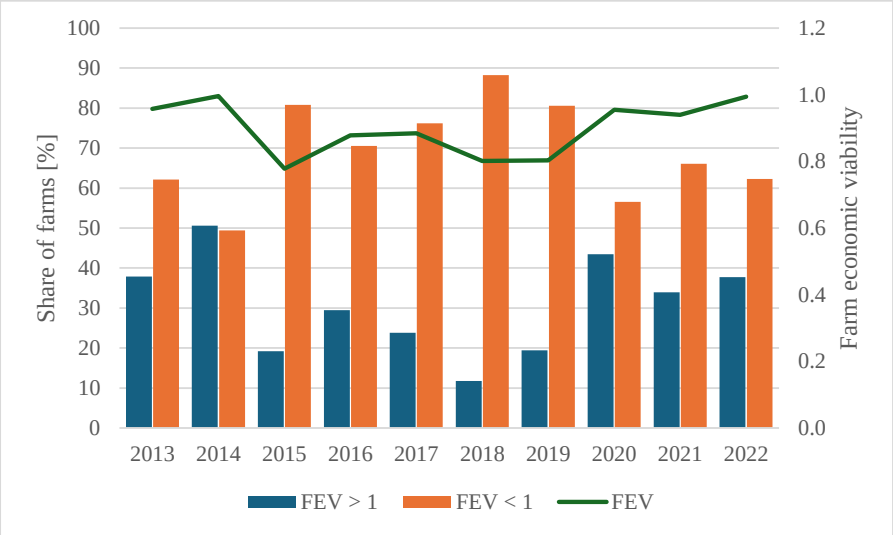
3 Research results

3.1 Farm Economic Viability

The viability of the average farm was the lowest in 2015 (0.778) and the highest in 2014 (0.996), and thus, the *FEV* value did not reach one during the entire period under review. Regarding the average farm by ANC affiliation, the *FEV* was greater than one only in 2022 for NON ANC. When broken down by production focus, the *FEV* is greater than one for crop production in 2013 and 2022, for mixed production in 2014, and for livestock production in 2022. The lowest *FEV* (0.56) was in 2018 for the average crop-oriented enterprise production, where the most pronounced year-to-year fluctuations in the *FEV* value were manifested. On the contrary, the smallest differences between individual years were manifested in the average farm focused on animal production.

The number of enterprises considered economically viable (*FEV* > 1) ranges from 12% to 51% in individual years (Fig. 1). From the point of view of viability during the observed period, 2018 was the worst year, and 2014, on the other hand, was the most favourable. Nevertheless, it meant almost half unviable enterprises, even in the most favourable year.

Figure 1 Farm Economic Viability and share of viable and unviable farms



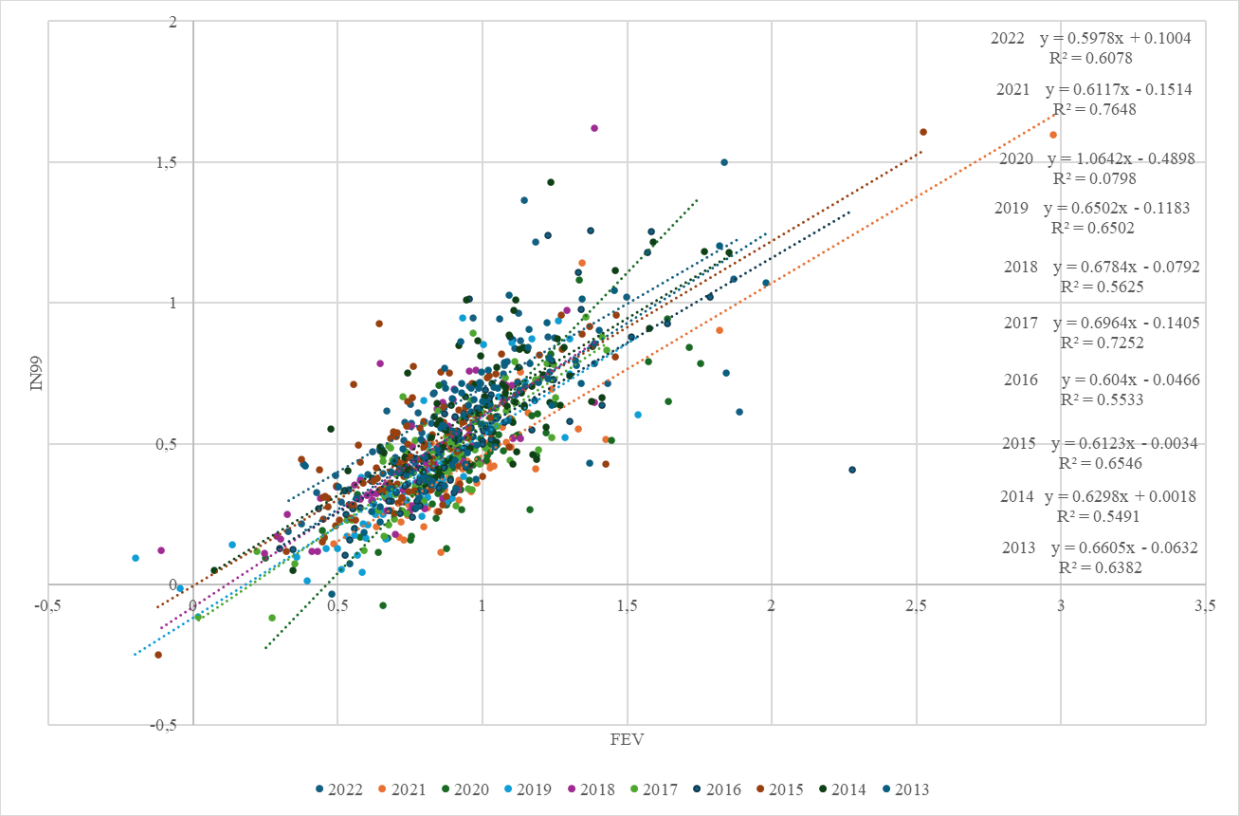
Source: Calculation on a sample of farms

The differences between the two groups of companies relate mainly to financial indicators. Differences between economic size, acreage, farming conditions (ANC), production focus and other production climate indicators seem minimal. Therefore, we sorted out enterprises whose *FEV* < 0.5 and compared their indicators with viable enterprises and the whole sample. Surprisingly, enterprises operating in ANC are not significantly represented in this group, but significant differences were not found in the size of the enterprise, the share of foreign land, or even in labour productivity. Only the representation of enterprises dealing mainly with plant production is more significant at 46%, in contrast to the entire set, where they are represented by only 22%. This is related to the lower altitude and lower subsidies per hectare in this group of enterprises. Focusing on crop production seems to make farms much more sensitive to changes in external farm conditions, especially price volatility and conditions affecting in-kind yields.

3.2 The relationship between FEV and the company's ability to create value

The dependence of value creation (measured by *IN*99) on farm viability (measured by *FEV*) varies from year to year and is relatively strong overall (r = 0.52). The lowest dependence appeared in 2020 (r = 0.28) and the highest in 2021 (r = 0.87). The high dependence (fig. 2) of the two concepts makes sense because both are based on an economic model that adds the cost of equity to the accounting model.

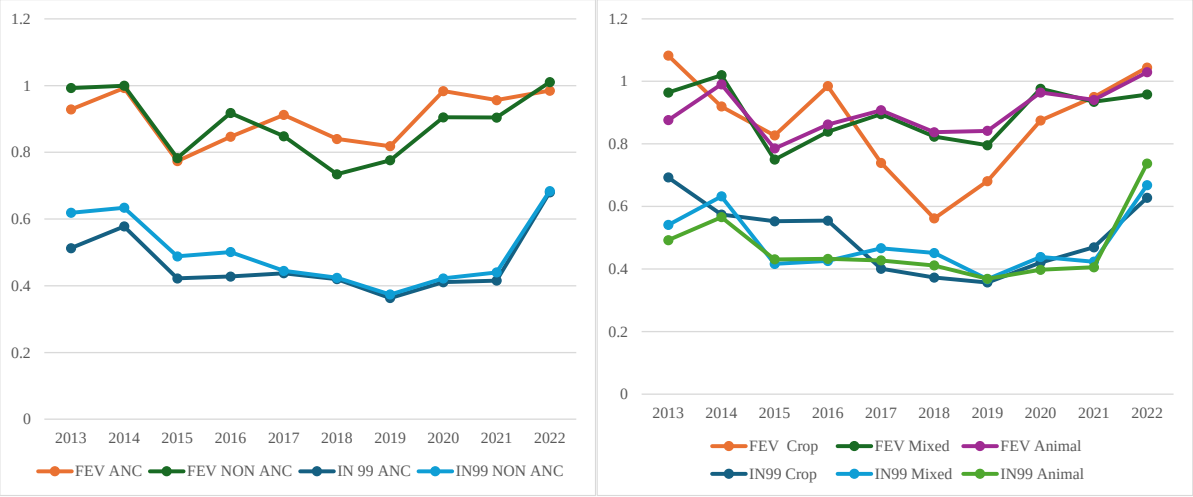
Figure 2 The dependence of the enterprise's ability to create value on economic viability



Source: Calculation on a sample of farms

The development of *FEV* and *IN*99 of an average enterprise according to ANC affiliation and production orientation is shown in Figure 3. As mentioned above, this graph shows a significant drop in *FEV* for an average enterprise focused on crop production between 2017 and 2020. In these years, the share of enterprises with mainly crop production and *FEV* < 1 was the highest (table 3). Regarding the breakdown by affiliation to the ANC, the differences are minimal, and the development trends are almost the same. The shares of enterprises with *FEV* < 1 are higher in NON ANC in 2018-2021, the biggest difference can be seen in 2016, when in ANC the share of enterprises with *FEV* < 1 was higher by 21% than in NON ANC.

Figure 3 Development of FEV and IN99 according to ANC and production focus



Source: Calculation on a sample of farms

Table 3 Share of farms with FEV < 1 according to production focus and affiliation to ANC (%)

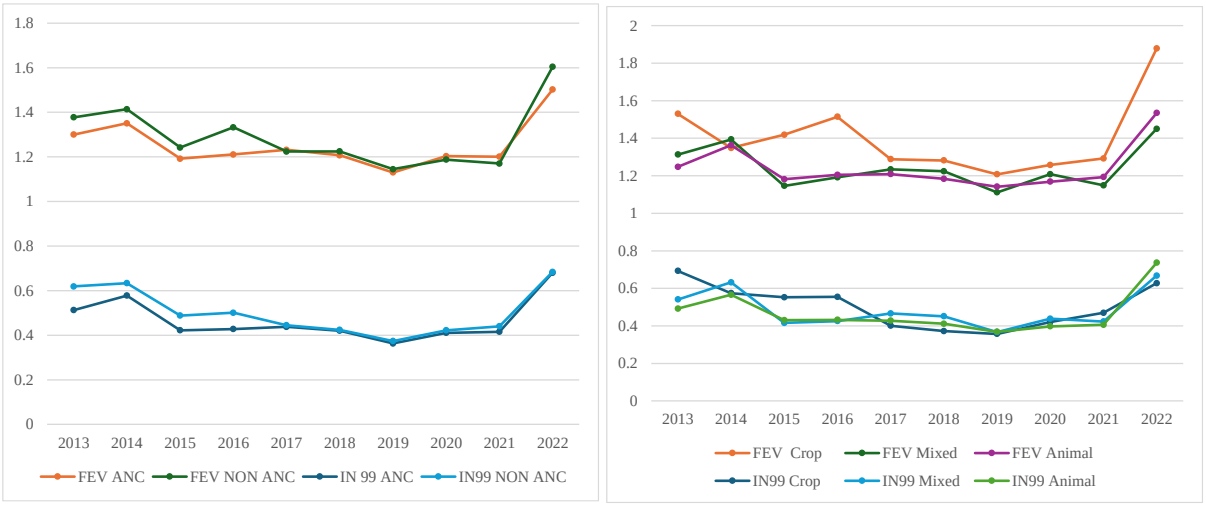
Group	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Crop production	33.3	46.7	74.1	45.8	78.6	94.1	87.5	57.9	71.4	58.3
Mixed production	63.0	50.0	88.1	82.1	77.1	89.2	78.6	43.5	66.7	54.2
Animal production	77.8	50.0	77.1	75.0	74.3	83.9	78.6	66.7	61.1	76.5
NON ANC	55.8	50.0	83.3	58.5	71.4	90.3	81.5	57.7	78.95	50.0
ANC	66.7	49.0	78.6	79.6	79.6	87.0	80.0	55.8	59.46	69.7

Source: Calculation on a sample of farms

3.3 Viability of farms without the opportunity cost of capital

If we do not consider the cost of equity capital when expressing viability, then the dependence of *IN*99 on *FEV* will decrease (r = 0.445). In this case, the proportion of viable businesses will increase, with the lowest being 47% in 2021 and the highest in 2013, when 96% of businesses are viable. In this case, if we divide the companies according to affiliation to the ANC, the differences decrease even more, and the development shows an almost identical trend. In the case of breakdown according to production orientation, the *FEV* is highest in almost all years for enterprises focused on crop production. Therefore, the opportunity cost of equity capital is most pronounced when the company is oriented towards crop production (Fig. 4).

Figure 4 Development of FEV without OOC and IN99 by ANC and production focus



Source: Calculation on a sample of farms

4 Conclusions

The economic viability of agricultural enterprises depends on a combination of internal and external factors. Effective management, production modernisation and adaptation to changing market and environmental conditions are essential. Emphasis on innovation, diversification and strategic cooperation between businesses can lead to long-term sustainability and competitiveness.

In this paper, we found that economic viability and the ability of a business to create value are closely related. The connection between the viability of the enterprise and the affiliation of the enterprise to the ANC has not been proven. Higher subsidies, in this case, probably offset the effects of natural constraints to a large extent. Whether a business is viable depends mainly on the opportunity cost of equity, which was most evident in companies focused on crop production. The drop in *FEV* for enterprises focused on crop production in some years also indicates a higher sensitivity of crop production to changes in external economic conditions.

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