# TENDENCIES IN VARIATION OF ECONOMIC VIABILITY OF FARMS IN LITHUANIA

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**Abstract**
The study identified the economic viability of farms trends in Lithuania during 2009-2013. The investigation found that the subsidies have greatest impact on the viability of farms, especially small and medium-sized. Subsidies positively influence number of financial indicators and artificially maintains economic viability of very small, small and medium-sized farms. The large farms remain viable without subsidies. During research many economic viability indicators were calculated. It is possible to identify only one special indicator - manufacturing subsidies and net profit ratio, which shows that 72 per cent  farms from all economic groups remain viable only with financial assistance.

**Keywords:** Economics viability, small- and mid-size farmers' farm, tendencies

**Introduction**
Agriculture is a specific branch of business characterised by its competitive environment, seasonal effects, scope of the EU trade, and entrepreneurship of the sector. The importance of agriculture for national economy lies not only in that it creates the gross added value and new jobs, but also brings social, ethno cultural and environmental benefits.

The Lithuanian agricultural strategy has been aimed at supporting the Lithuanian farmers in development of profitable business focused on long-term perspective, based on state of the art eco-friendly technologies and farming traditions that are passed down from generation to generation, meeting the local market demand for quality agricultural and food products, and ensuring the development of export. The first post-2013 task of the policy is boosting the economic viability of small and mid-sized farms (Pasiūlymai dėl Lietuvos..., 2012). Enhancing the competitive ability and

viability of farms engaged in all types of agricultural activities is also one of the priorities set in the Rural Development Programme of the EU.

Comprehensive analysis of economic viability of farms, influencing factors and evaluation of the possibilities for its increase must be carried out prior to implementation of the mentioned objective. Analysis of the scientific literature has suggested that economic viability of Lithuanian farms has been little studied, and planning any measures for this policy of Lithuanian agriculture, i.e. increase of viability of small- and mid-size farms, is rather difficult. This issue has been covered in articles by foreign authors. Economic viability of farms has been studied by researchers in view of various factors, such as profit, innovations, information, human resources, farm size, soil productivity rating, local economy, subsidies, etc. Some authors use only one factor for the analysis (Adelaja, Sullivan, 1989; Adelaja, Derr, Rose, 1998; Agriles, 2001), while others (Scott, 2001; Adelaja, 2005; Popelier, 2005; Adelaja, Peterson, Lake et al., 2007; Scott, 2008a) analyse a set of factors of economic viability in order to study economic viability of farms. Researchers also suggest that subsidies are largely the decisive factor that supports economic viability of farms.

Information generated by comprehensive analysis of economic viability of farms would bring benefit not only to the farm itself, but also to its stakeholders. In order to validate the suitability of policy, empirical study of tendencies in economic viability of farms in Lithuania is necessary.

*Research object*: economic viability of Lithuanian farmers' farms.

*Research aim*: to identify the tendencies of economic viability of Lithuanian farmers' farms.

The following *objectives* are undertaken to reach the research aim:

- to calculate and compare the economic viability of farmers' farms sampled for the study;
- to identify whether or not subsidies are the decisive factor of economic viability of Lithuanian farmers' farms.

**Research methodology**

Although a number of factors that characterise viability of a farm have been generated by the scientific literature review, not all factors are significant. In particular, Scott (2001), Scott, Colman, (2008a), Savickienė, Slavickienė (2012a) have identified *return on investment* as the key indicator in evaluation of economic viability of a farm. Where the *return on investment* of a farm is lower than the return on any other investment, the farm is considered to not be encouraging investment, and its operations may become unprofitable.  This indicator may be used to determine whether or not the farmers' investments are profitable and the farmers' capability of profitable use of the available funds (Šakienė, Puleikienė, 2009). The value

of at least 5 % of *return on capital* suggests that the farm is economically viable. The ideal value of this indicator is 10 %, meaning that the farm is competitive and promising (Scott, Colman, 2008b).

Savickienė and Slavickienė (2012a) have performed an empirical study using Lithuanian farms as the example and have determined that *return on investment, debt to net income ratio, expense to income ratio, direct payments to producers and dependency ratio* are the key indicators for evaluation of economic viability of a farm. These indicators have been determined by identification of strength of the relationship under the method of pair correlation. This may partially point at suitability of the indicators for the econometric model used for evaluation of economic viability of farms. Table 1 presents the indicators and their thresholds that will be referred to by the author of this paper to evaluate economic viability of the Lithuanian farmers' farms.

Table 1. Indicators of economic viability and their thresholds (Scott, 2001, Scott, Colman, 2008b, Slavickienės, Savickienės, 2012a).

| Indicators | Viability Threshold |
|---|---|
| Return on investment % | More than 5 % |
| Expense to income ratio % | Less than 80 % |
| Debt to net income ratio % | Less than 600 % |
| Direct payments to producers and dependency ratio % | Less than 20 % |

The 4 mentioned financial indicators are calculated for evaluation of economic viability of farms analysed in this paper. The indicators, however, are modified and, in one case, subject to conventional calculation, i.e. by adding subsidies to the total output, while in other case, the subsidies are eliminated from the calculation.

These financial indicators may provide objective evaluation of condition of the farm. The indicators evaluated by using income from sales are calculated under two methods: method one – by considering the scope of support (i.e. by adding the subsidies), method two – without considering the scope of support taken into account. Indicators calculated without the amount of support demonstrate the alternative value of the respective indicators of the farm without the subsidies.

Accounting data of 97 Lithuanian farmers' farms have been used for the study. The sample size of the study has been determined based on the universal set, i.e. sampled from all the Lithuanian farms registered with the Lithuanian Register of Farmers' Farms (Lietuvos ūkininkų ūkių...,2014). 119336 farms were registered in Lithuania as at 1 June 2014.

The research sample has been determined under the following equation:

$$(1)\ n_{min} = \frac{z^2 \times N \times p(1-p)}{(\Delta p)^2 (N-1) + z^2 \times p(1-p)}$$

N – universal set (119336).

p – probability of an attribute, in this case – 0.5.

Δp – tolerance of the share of attribute. The results presented in the paper are subject to 10 % tolerance.

Z – normal distribution coefficient. Research work usually relies on 95 % reliability, if the normal distribution coefficient is z = 1.96. (Kardelis, 2002 ).

Data of the Lithuanian farmers' farms have been collected, and the farms have been grouped by their economic size (ES) during random sampling. 8 groups have been formed: ES 4 – 8, ES 8 – 15, ES 15 – 25, ES 25 – 50, ES 50 – 100, ES 100 – 250, ES 250 – 500, ES 500 – 750 thousand Euros. Analysed period: year 2009 – 2013.

Two approaches towards the effect of support on economic viability of farms have been identified during the analysis of researchers' approaches and research findings. Some authors (Scott, 2005; Cain, Anwar, Rowlinson, 2006; Whitaker, 2009; Offermann, Nieberg, Zander, 2009; Scotti, Bergman, Henke et al., 2011) have asserted that governmental policy of support to farmers is one of the key financial factors that boosts economic viability of farms. Farms receiving the support are claimed to become more viable, have more possibilities for development of their operations and long-term perspectives. Other authors claim that the support does not bring any impetus for development of farms or search for new possibilities of entrepreneurship. The researchers also assert that the support may only have positive effect on small- and mid-size farms (Aggelopoulos, Samathvakis, Theocharopoulos et al., 2007). Comprehensive research is required to either support or reject these approaches. Very few studies of this kind have been conducted in Lithuania, and this study is aimed at proving or rejecting the following hypotheses:

$H_1$ – support is the factor that determines economic viability of farms.

$H_2$ – support has the decisive effect on viability of small- and mid-size farms.

$H_3$ – support does not have any decisive effect on economic viability of large-sized farms.


**Results and discussion**

According to certain authors (Lappin, FitzSimons, 1982;Scott, 2005; Cain, Anwar, Rowlinson, 2006; Huck, 2007; Whitaker, 2009; Offermann, Nieberg, Zander, 2009), subsidies are the prerequisite for continued viability of farms. Subsidies must be allocated to maintain prices of products at a certain level. Participation in government support schemes ensures long-term economic viability of farms. P. Huck (2007) builds on the viability theory to evaluate the effect of the overall agricultural policy on long-term

sustainability of the soil fertility, which is viewed by the author as one of the key factors of continued long-term viability of farms.

The share of capital that may be allocated to the working capital and investment is important to sustain economic viability of a farm; and, considering that equity is usually not sufficient enough for large investments, economic viability of a farm is highly dependent on state subsidies and support from the EU (Scotti, Bergmann, Henke, et al., 2011).

Calculation of the indicator *return on investment* of the Lithuanian farmers' farms (figure 1) has shown that 90 % of farms are viable on average. On the other hand, analysis of this indicator in farms grouped by the economic size (ES) has shown the tendency of farm viability to decrease along with decrease with ES of the farm. The indicator *return on investment* is > 5 % for 78 % of farms in group ES 4 – 8 for the analysed period. Thus, 22 % of the analysed farms belonging to the mentioned group are not viable according to the indicator *return on investment*.

In 2009 – 2013, over 90 % of the analysed farmers' farms in groups ES 8 – 15, ES 15 – 25 and ES 500 – 750 exceeded the set threshold of 5 %, which has pointed at their viability and capability of profitable use of available funds.

*Return on investment* in farms of ES 25 – 50, ES 50 – 100, ES 100 – 250 and ES 250 – 500 during the analysed period (Figure 1) exceeded the threshold of 5 % in 99 % of the farms. This has suggested that these large-size farms were viable during the analysed period.
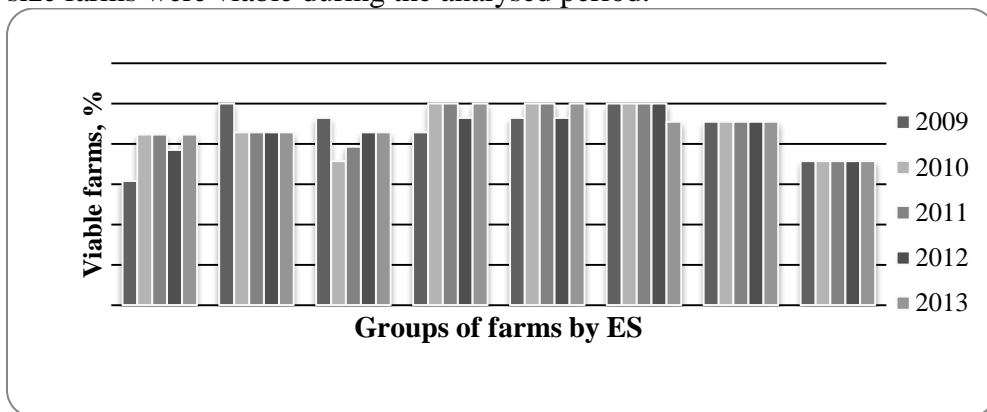


Fig. 1. Lithuanian farmers' farms by farm ES with > 5 % return on investment with subsidies in 2009 – 2013

The value of indicator *return on investment* is higher, if subsidies are included into the income. This is suggested by the data presented in Figure 2. In case indicator *return on investment* is calculated without subsidies for the period 2009 – 2013, 77 % of the analysed Lithuanian farmers' farms on average are viable, i.e. by 13 percentage points less than

share of viable farms according to the calculations based on the income with subsidies. Only 52 % of farms of ES 4 – 8 have exceeded the set threshold and are viable according to the indicator *return on investment* after elimination of the subsidies, i.e.  by 26 percentage points less than the share of farms in this group resulting from calculation of the indicator *return on investment* with the subsidies included.
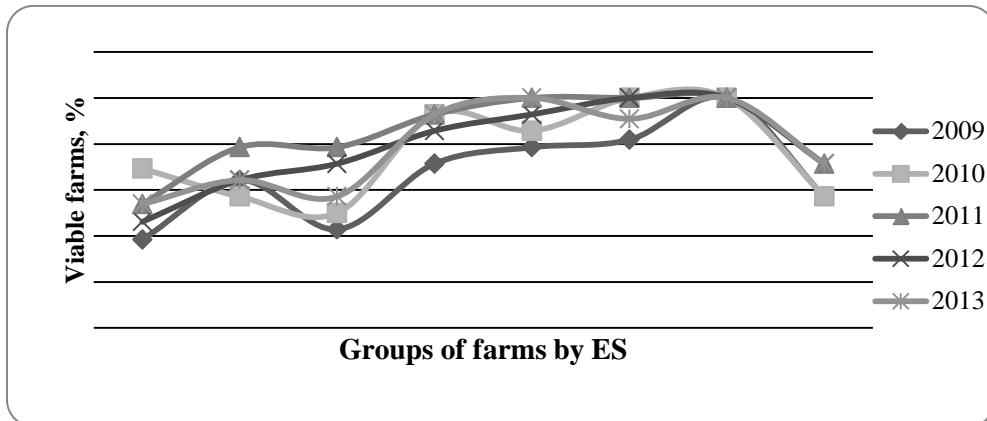


Fig. 2. Lithuanian farmers' farms by farm ES with > 5 % return on investment without subsidies in 2009 – 2013.

Analysis of the indicator *return on investment* without any subsidies included in the income has resulted in only 66 % of farms of ES 8 – 15 and 60 % of farms of ES 15 – 25 being viable, i.e. the share of viable farms in each of the two groups is less than the share according to the indicator *return on investment* with the subsidies included, by 23 percentage points each.

There were 9 percentage points less viable farms of ES 25 – 50 in 2009 – 2013 according to the indicator *return on investment* without subsidies compared to the share resulting from the same indicator with subsidies included.  Viability of farms of ES 50 and more is the same, i. e. almost 100 % of the farms are viable. This suggests that subsidies have effect on the viability of farms of ED 50 and less only, with no effect on larger farms, i.e. these farms remain viable both with and without subsidies.

Another indicator calculated for evaluation of viability of the Lithuanian farmers' farms is the **expense to income ratio**. This is a highly important indicator, as it shows whether the farmer earns profit or he needs to borrow in order to continue with the operations. The indicator shows the expenses incurred by the farm to earn the income. The higher the ratio, the higher is the risk of the farm. Farms are viable, where the expense to income ratio is less than 80 %.  Where the indicator falls between 80 and 100 %, the operations are considered to be ineffective, while the indicator over 100 % means that the farm is unviable (Scott, Colman, 2008b).
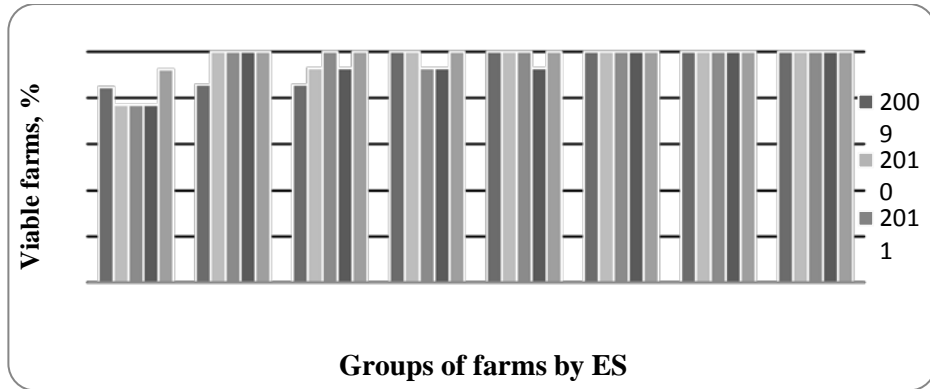
Fig. 3. Lithuanian famers' farms by farm ES with < 80 % expense to income ratio in 2009 – 2013

96 % of farms on average are viable according to the calculated *expense to income* ratio with the subsidies included into the income in Lithuanian farmers' farms in 2009 – 2013 (Figure 3). This suggests that a very large share of the analysed farmers' farms earn profit and do not need to borrow in order to continue with the operations. In case of ES 4 – 8 farms, only 82 % of the farms are viable according to the mentioned indicator. *Expense to income* ratio is lower than the set viability threshold of 80 % in 97 % of farms in groups ES 8 – 15 and ES 25 – 50 and 100 % of farms of ES over 50. These data suggest that the share of viable farms is lower among smaller farms, i.e. farm group of ES 50 or less, than among larger farms, if assessed according to the *expense to income ratio*.

Where the subsidies are not included into the income used in calculation of *expense to income* ratio, the ratio has not exceeded the set threshold in 81 % of the Lithuanian farmers' farms on average in 2009 – 2013 (Figure 4), and these farms were viable. Nonetheless, this result is lower by 15 percentage points compared to the share of viable farms according to the same indicator, but with the subsidies included, which supports the mentioned conclusion that the subsidies have effect on viability of farms.
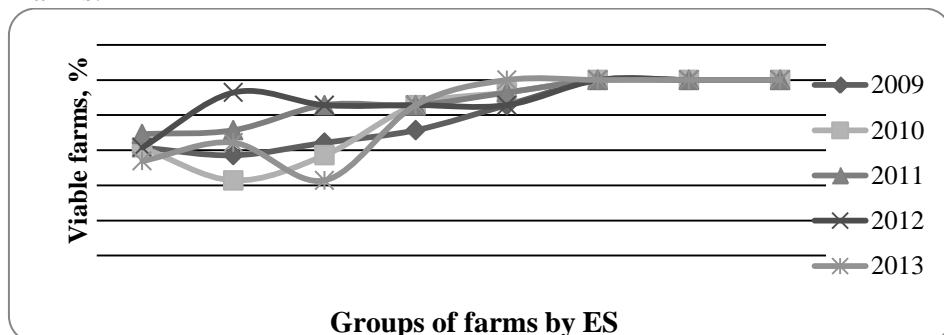


Fig. 4. Lithuanian farmers' farms by farm ES with expense to income ratio without the subsidies < 80 % in 2009 – 2013.

Of all the analysed farms of ES 4 – 8, ES 8 – 15 and ES 15 – 25, respectively, 62 %, 66 % and 67 % of farms are viable for the period 2009 – 2013, while the share of viable farms is lower by, respectively, 20, 31, 27 % according to the *expense to income ratio* with the subsidies included. Almost 100 % of farms of ES 50 and more are viable according to the expense to income ratio without any subsidies included in the income. Thus, the subsidies have effect on viability only of the farms that belong to group Another indicator used to determine viability of the Lithuanian farmers' farms is the debt to net income ratio. This indicator shows the risk related to earning of income and the farmer's debt capacity. The latter has been applied to the agricultural sector. This indicator is supposed to be less than 600 % (Scott, 2001).
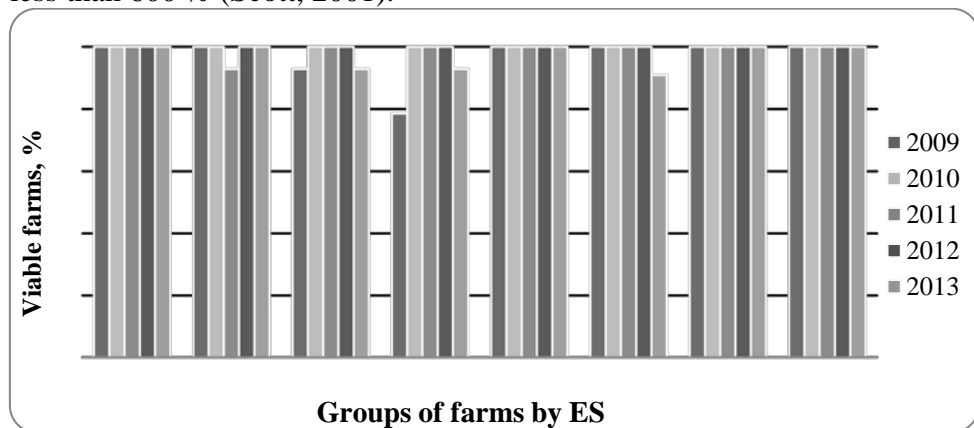


Fig. 5. Lithuanian farmers' farms by farm ES with <600 % debt to net income ratio in 2009 – 2013

As shown in Figure 5, 100 % of all the analysed 97 Lithuanian farmers' farms were viable in 2010 and 2012 according to the *debt to net income* ratio with the subsidies included, while in 2013, there were 3 percentage points less viable farms.

After the farms have been grouped by their economic size and their *debt to net income ratio* has been calculated, 99 % of farms in group ES 8 – 15 and 100 % of farms in group ES 50 and more have been determined as viable during the analysed period. *Debt to net income ratio* was less than 600 % in 97 % and 94 % of farms belonging to groups ES 15 – 25 and ES 25 – 50.  This means that the Lithuanian farmers' farms are extremely good at managing the risk related to earning of income and debt capacity. However, the share of viable farms in groups of smaller farms is much lower, where subsidies are not included into income for calculation of the *debt to net income* ratio (Figure 6).
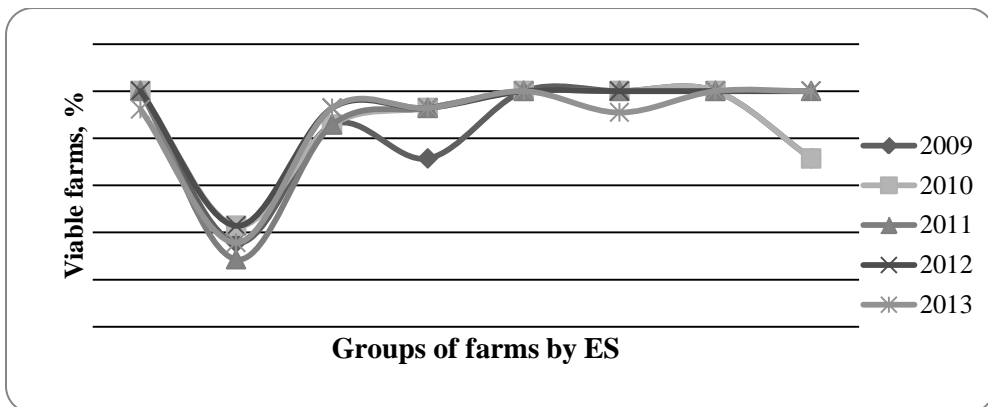
Fig. 6. Lithuanian farmers' farms by farm ES with < 600 % *debt to net income* ratio in 2009 – 2013

The share of viable farms for the analysed period in group ES 15 – 8 is 37 % according to the *debt to net income* ratio without any subsidies included.  This shows that the share has reduced by 65 percentage points compared to the *debt to net income* ratio of the same farms, but with the subsidies included into calculations. This indicator has not changed in farms of ES 50 – 750, and they remained viable throughout the analysed period, even after the subsidies have been eliminated from the debt to net income ratio. This suggests that farms of ES 50 and less use subsidies to cover their debts and, at the same time, sustain their **Groups of farms by ES**

Direct payments to producers and dependency ratio determines the amount of direct payments to producers per one Litas of gross profit. The higher the indicator, the more dependent the farm is on the direct payments to producers, meaning lower economic viability of the farm.
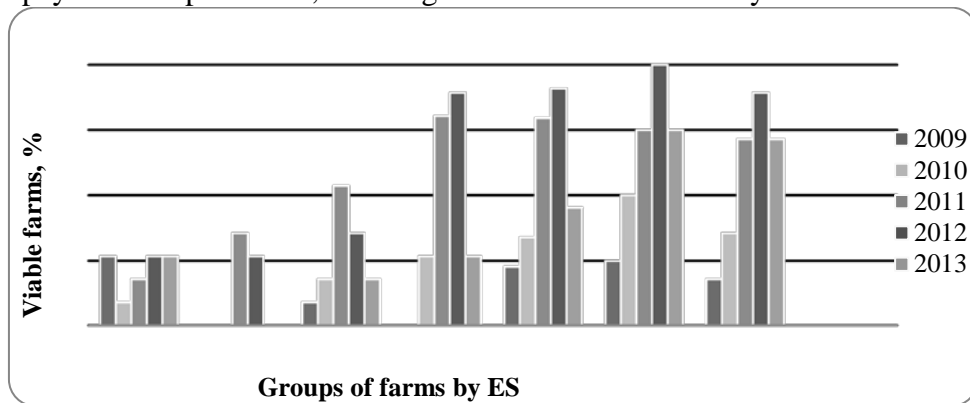


Fig. 7. Lithuanian farmers' farms by farm ES with < 20 % of direct payments to producers and dependency ratio in 2009 – 2013

*Direct payments to producers and dependency* ratio of the Lithuanian farmers' farms in 2009 – 2013 shows that only 28 % of farms on

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average were viable according to this indicator. The share of viable farms was growing from 2009 to 2012. Only 12 % were viable in 2009, while as many as 43 % of viable farms have been determined for the year 2012.  Only 24 % of 97 Lithuanian farms were viable in 2013. This suggests high dependency of farms on the subsidies.

17 % of Lithuanian farmers' farms belonging to groups ES 4 – 8 and ES 8 – 15 each, and only 10 % in group ED 15 – 25 were viable. The average of 45 % of the rest of the analysed farms belonging to groups ES 50 – 750 were viable and independent of the direct payments to producers. Thus, analysis of *direct payments to producers and dependency* ratio by grouping the farms according to their economic size has clearly shown that subsidies have more effect on viability of smaller farms that belong to group ES 50 and less.

In order to generalise the research findings and provide clearer definition of the tendencies of economic viability of farms in Lithuania, the farms have then been grouped into four groups according to the criterion of economic size: very small farms (standard production (SO) from 4 000 to 8 000 €), small-sized farms (8 000 – <25 000 €SO), mid-sized farms (25 000 – <100 000 €SO) and large-sized farms (100 000 €SO and more).

Table 2. Lithuanian farmers' farms within the thresholds of viability indicators

| Indicators | Group I (4-8 ES) | Group II (8-25 ES) | Group III (25-100 ES) | Group IV (100 and more ES) |
|---|---|---|---|---|
| | Viable farms, % | | | |
| Return on investment >5 % | 78 | 86 | 96 | 92 |
| Return on investment without subsidies >5 % | 52 | 63 | 89 | 89 |
| Expense to income ratio <80 % | 82 | 96 | 98 | 100 |
| Expense to income ratio without subsidies <80 % | 62 | 66 | 87 | 100 |
| Debt to net income ratio <600 % | 100 | 89 | 97 | 99 |
| Debt to net income ratio without subsidies <600 % | 98 | 63 | 94 | 96 |
| Direct payments to producers and dependency ratio <20 % | 17 | 14 | 36 | 47 |

In order to determine the effect of subsidies on economic viability of farms in individual groups, the number of viability indicators (3 in total: *return on investment, expense to income* ratio, *debt to net income* ratio) without subsidies satisfied by the specific farm (Figure 8) needs to be determined.

Of the 13 analysed very small farms, 4 farms are within the thresholds of all 3 viability indicators calculated without any subsidies, and 6 farms are within the thresholds of 2 of 3 indicators (*expense to income* ratio, *debt to net income* ratio) for the analysed period. However, the *direct payments to producers and dependency* ratio of these farms is considerably above the set threshold of 20 %, meaning that farms depend on direct payments to producers, and their economic viability is lower.

2 farms of 13 very small farms are within the threshold of only one viability indicator (debt to net income ratio), calculated both with and without the subsidies. *Direct payments to producers and dependency* ratio of thee farms exceeded the set threshold for the analysed period.
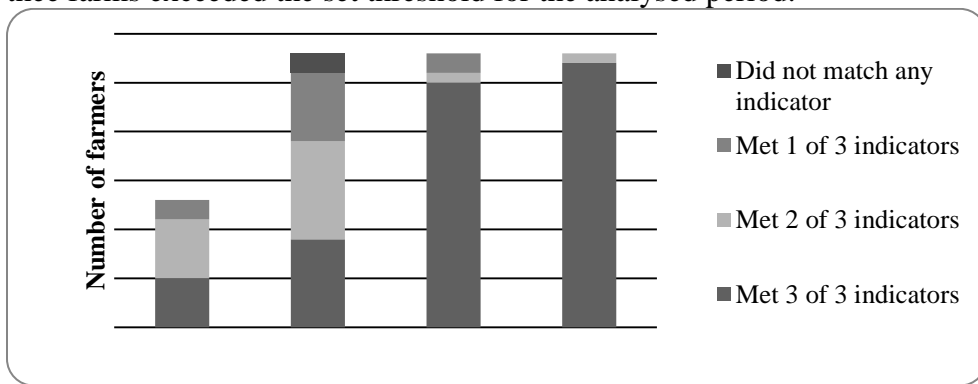


Fig. 8. Lithuanian farmers' farms within the threshold of viability indicators

9 of all 28 farms in group II are within the thresholds of all 3 viability indicators, both with and without the subsidies. Nonetheless, the *direct payments to producers and dependency* ratio has exceeded the set viability threshold of 20 % during the entire period, which suggests lower viability of the farms.

Another 10 farms of all 28 farms in group II have satisfied 2 of 3 indicators. Most of the farms, i.e. 5 o 10, are viable according to the indicators of *return on investment* and *expense to income* ratio without the subsidies. Analysis of these 5 farms and calculation of their four viability indicators with the subsidies included have shown that these farms satisfy the indicator of *return on investment*, *expense to income* ratio (including calculation without the subsidies) and *debt to net income* ratio, but are not viable according to the *direct payments to producers and dependency* ratio.

7 farms in the group of small-sized farms have satisfied 1 of 3 viability indicators: 3 farms are viable according to *return on investment*, and 3 farms – according to *debt to net income* ratio.  Calculation of the four viability indicators of these 7 farms with the subsidies included has shown that all of these farms are viable. *Direct payments to producers and dependency* ratio is the exception, as only 1 of the 7 farms do not exceed the

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threshold set for this indicator, which proves the effect of subsidies on economic viability of small-sized farms.

2 of 28 farms in group II are unviable, i.e. have not fallen within the threshold of any indicator including the subsidies. On the other hand, viability indicators with the subsidies included, with the exception of *direct payments to producers and dependency* ratio, show the opposite, i.e. that the same farms are viable. This means that economic viability of these farms is sustained by subsidies.

25 of the analysed 28 mid-sized farms (group III) have complied with 3 of 3 viability indicators calculated both with and without subsidies. On the other hand, only 5 these 25 farms have not exceeded the threshold set for the *direct payments to producers and dependency ratio*. This means that the remaining 20 farms – although viable according to *return on investment*, *expense to income* ratio, *debt to net income* ratio either with or without subsidies – are dependent on direct payments to producers due to high value of *direct payments to producers and dependency* ratio.

27 of the analysed 28 large-sized farms (group IV) have been determined as viable according to 3 of 3 indicators both with and without subsidies. Thus, almost 100 % of large-sized farms are viable both with and without subsidies. On the other hand, only 13 of these 27 farms have not exceeded the 20 % threshold of the *direct payments to producers and dependency* ratio. The remaining 15 farms exceeded the threshold of this ratio insignificantly, suggesting that subsidies do not have any decisive effect on economic viability of large-sized farms.

This study has proven that support is the factor that influences economic viability of farms, whereas viability of very small, small-sized and mid-sized farms is subjected to the biggest effect of support. Support does not have any decisive effect on viability of large-sized farms. This means that all the three hypotheses have been proven.

Findings of this study have led to the issue of viability of very small, small-sized and mid-sized farms. Lithuanian Rural Development Programme 2014-2020 states that more attention to modernisation and increase of competitiveness of small- and mid-sized farms is needed in order to maintain sustainable structure of farms in Lithuania. Preservation of small- and mid-sized farms in the long-run would contribute to greater stability of national agriculture. Two distinctive support schemes for different stages of farm operations would be considered as one of the options. One scheme would be dedicated to start-up and growth of small-sized farms, another – for development of existing farms. Results of the study support the significance of the direction taken by this programme and suggest the conclusion that different support strategies and different goals should apply to small- and mid-sized farms.

**Conclusion**

1. Analysis and comparison of economic viability of Lithuanian farmers' farms have shown that the indicators of economic viability with subsidies included are considerably different from the respective indicators without the subsidies, and this difference is particularly evident in case of very small, small-sized and mid-sized farms:

- According to *return on investment* indicator, 91 % of 97 farms were viable on average in 2009 – 2013, or 77 % after elimination of subsidies from the calculations. The majority of unviable farms are very small, small- and mid-sized farms. 78 % of very small farms, 86 % of small-sized farms, and 96 % of mid-sized farms very viable according to the respective indicator with the subsidies included and, respectively, 52 %, 63 % and 89 % without the subsidies. In terms of large-sized farms, 92 % are viable for the analysed period according to *return on investment* indicator with the subsidies included, and 89 % - without the subsidies.

- According to *expense to income* ratio, 97 % of the analysed farms are viable with the subsidies included, and 81 % - without the subsidies.  82 % of very small, 96 % of small-sized, and 98 % of mid-sized farms are viable for the analysed period according to this indicator with the subsidies included, but, upon elimination of the subsidies from the calculations, 62 %, 66 %, and 87 % of the farms in the respective groups are viable. 100 % of farms have remained viable according to this indicator, both with and without the subsidies.

- According to *debt to net income* ratio, 98 % of farms are viable for the analysed period, and 87 % upon elimination of subsidies from this indicator. The greatest share of unviable farms according to this indicator, calculated with the subsidies, are small-sized farms, i.e. 89 %, or 63 % with subsidies.

2. The study has suggested that subsidies have positive effect on many financial indicators and *artificial* effect on economic viability of very small, small-sized and mid-sized farms. Large-sized farms have remained viable even without the subsidies. Of all the indicators of economic viability evaluated in the study, one specific indicator (*direct payments to producers and dependency ratio*) should be noted, as it has shown that 72 % of the farms of all economic groups combined have remained viable due to financial support only. The findings of this study have supported the significance of the issue and suggested the conclusion that different support strategies and different goals should apply to small- and mid-sized farms within the framework of the Lithuanian Rural Development Programme 2014-2020.

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