FAMILY FARM EFFICIENCY ACROSS FARMING TYPES IN LITHUANIA AND ITS MANAGERIAL IMPLICATIONS – DATA ENVELOPMENT ANALYSIS

Tomas Baležentis, Irena Kriščiukaitienė
Lithuanian Institute of Agrarian Economics

This study aims at analyzing dynamics of productive efficiency across different farming types in Lithuania. Furthermore possible managerial improvements leading to increase in efficiency are discussed. The research covers years 2003–2010 and is based on the aggregate Farm Accountancy Data Network (FADN) data. The data envelopment analysis and statistical analysis were applied for the research. The analysis showed that efficiency of an average Lithuanian farm fluctuated between 76.5% and 92.2% throughout 2003–2010. In addition, it had been somehow subdued during 2005–2007. Mixed crop and mixed livestock (mainly grazing) farming was peculiar with the highest technical efficiency estimate for the period of 2003–2010. Slack analysis revealed that low land productivity, returns on assets, and intermediate consumption productivity are the most important sources of the inefficiency, in that order.

Key words: efficiency, productivity, farming types, Lithuania, data envelopment analysis.
JEL codes: C440, C610, Q100, Q130.

Introduction

Reasonable strategic decision making requires an integrated assessment of the regulated sector. The agricultural sector is related to voluminous public support as well as regulations. The application of benchmarking, thus, becomes especially important when fostering sustainable agricultural development. Furthermore, productive efficiency gains might result into lower costs as well as greater profit margins for the producer and better prices for the participants in the agricultural supply chain (Samarajeewa, 2012). It is due to A. Alvarez and C. Arias (2004) and M. Gorton and S. Davidova (2004) that frontier techniques are the most widely applied methods for efficiency measurement in agriculture. Indeed, the frontier methods can be grouped into parametric and non-parametric ones (Bogetoft, 2011).

The parametric frontier methods rely on assumption that inefficiency can be caused by technical draw-backs as well as random errors. However, the exact production function needs to be specified for these models. On the other side, non-parametric frontier methods do not allow statistical noise and thus the whole distance between the observation and production frontier is explained by inefficiency. In addition, the production frontier (surface) is defined by enveloping linearly independent points (observations) and does not require subjective specification. Therefore non-parametric models are easier to be implemented. Stochastic frontier analysis and data envelopment analysis (DEA) are the two seminal methods for, respectively, parametric and non-parametric analysis.

The Lithuanian agricultural sector was analyzed by employing non-parametric methods, DEA and free disposal hull (Vinciūnienė, 2009; Rimkuvienė, 2010;

Baležentis, 2011). These studies, however, paid less attention to efficiency differences across farming types. Thus there is a need to further analyze these issues.

The aim of this study is to research into family farms' efficiency dynamics across different farming types in Lithuania and to define possible managerial improvements leading to its increase. The research covers years 2003–2010. The aggregate Farm Accountancy Data Network (FADN) indicators describing performance across different farming types were employed for the analysis. The *R* programming language and package *FEAR* (Wilson, 2010) were employed to implement the DEA model.

The paper is organized as follows. Section 1 overviews the previous studies on assessment of productive efficiency in Lithuanian agricultural sector. The following Section 2 describes the DEA method. Finally, Section 3 presents results of the analysis.

1. Non-parametric estimations of Lithuanian farming efficiency: a literature review

Central and East European countries are specific with agricultural sectors contributing to relatively high share of GDP in those countries. Therefore a number of studies have attempted to research into farming efficiency there by employing frontier techniques (Gorton, 2004). Lithuanian agricultural sector, though, received less attention in the latter scientific area. Moreover, those few examples employed non-parametric methods, whereas parametric methods (e. g. stochastic frontier analysis) remain underused. This section overviews earlier papers which analysed efficiency of the Lithuanian agricultural sector by the means of frontier measures, namely DEA.

The pioneering paper in the discussed field is that of V. Vinciūnienė and J. Raulušlevičienė (2009). The latter study attempted to research into technical and scale efficiency and its relations to farm size. The research relied on the FADN aggregates (74 observations in total). The authors employed the following procedure for estimation of technical efficiency: 1) the input variables were selected on the basis of correlation analysis (output vs. respective input indicators), 2) the selected variables were divided by output thus defining respective ratios, 3) DEA models were established for each pair of ratios and efficiency scores were obtained, 4) Cobb-Douglas production function was employed for computation of weights for efficiency scores obtained by different DEA models, 5) efficiency scores were aggregated with respect to the weights. Thus the analysis suggested that larger farms were operating more efficiently.

The paper by D. Rimkuvienė et al. (2010) also addressed the farming efficiency by performing an international comparison on a basis of DEA and free disposal hull – the two non-parametric methods. This study also discussed the differences between terms *efficiency* and *effectiveness* which are often misused in Lithuanian scientific works. The research covered years 2004–2008 and some 174 observations (aggregates) for EU and non-EU states. Input- and output-oriented DEA models yielded efficiency scores of 43.2 and 41.4%, respectively. In addition the effectiveness of capital and intermediate consumption was observed in Lithuania.

T. Baležentis and A. Baležentis (2011) followed the similar framework for international comparison. However, the latter study employed not only DEA but also multi-criteria decision making method MULTIMOORA. The agricultural efficiency was assessed with respect to the three ratios, namely crop output (EUR) per ha, livestock output (EUR) per LSU, and farm net value added (EUR) per AWU. Therefore, the land, livestock, and labour productivity were estimated. According to the DEA efficiency scores, Lithuania and Latvia reached the efficiency of 52 and 54%, whereas Estonia and Poland that of 58%. The high value of slacks in crop otput (land productivity) and the net value added per AWU (labour productivity) for the three Baltic States indicated the necessity of qualitative and quantitative changes to be implemented here.

It was Douarin and Latruffe (2011) who offered the single foreign contribution to the DEA-based efficiency analysis of Lithuanian agriculture. The aim of that study was to estimate the farming efficiency and possible outcomes of the incentives provided by EU Single Area Payments. Moreover, this study was based on micro- rather than aggregate data. Thus, farm efficiency estimation was followed by questionnaire survey which tried to identify the farmers' behaviour, namely decisions to expand their farms or stay in the farming sector, as a result of public support distribution. The research showed that 1) larger farms operated more efficiently, 2) subsidies were related to lower efficiency scores. The Heckman model was employed to quantify the impact of various factors on farmers' decisions to stay in farming or expand the farm. It was concluded that the overall farming efficiency should decrease, for lower efficiency farms were about to expand and thus increase competition in the land market.

To conclude, productive efficiency is still promising area for further researches in Lithuania. Micro data analysis is especially underemployed.

2. Preliminaries for DEA

Data envelopment analysis (DEA) is a nonparametric method of measuring the efficiency of a decision–making unit (DMU) such as a firm or a public–sector agency (Ray, 2004). The very term of efficiency was initially defined by G. Debreu (1951) and then by T. C. Koopmans (1951). It was Debreu who discussed the question of resource utilization at the aggregate level, whereas Koopmans offered the following definition of an efficient DMU: *A DMU is fully efficient if and only if it is not possible to improve any input or output without worsening some other input or output*. Due to similarity to the definition of Pareto efficiency, the former is called Pareto–Koopmans Efficiency. Finally, M. J. Farrell (1957) summarized works of G. Debreu (1951) and T. C. Koopmans (1951) thus offering frontier analysis of efficiency and describing two types of *economic efficiency*, namely *technical efficiency* and *allocative efficiency* (indeed, a different terminology was used at that time). It worth to note, that the seminal paper of M. J. Farrel (1957) was also dedicated to analysis of agricultural production in the United States. The concept of technical efficiency is defined as the capacity and willingness to produce the maximum possible output from a given bundle of inputs and technology, whereas the allocative efficiency reflects the ability of a DMU to use the inputs in optimal proportions, considering respective marginal costs (Kalirajan, 2002). However, M. J. Farrell (1957) did not succeed in handling Pareto–Koopmans Efficiency with proper mathematical framework.

The modern version of DEA originated in studies of A. Charnes, W. W. Cooper and E. Rhodes (Charnes, 1978, 1981). Hence, these DEA models are called CCR models. Initially, the fractional form of DEA was offered. However, this model was transformed into input– and output–oriented multiplier models, which could be solved by means of the linear programming (LP). In addition, the dual CCR model (i. e. envelopment program) can be described for each of the primal programs (Cooper, 2007; Ramanathan, 2003).

Unlike many traditional analysis tools, DEA does not require to gather information about prices of materials or produced goods, thus making it suitable for evaluating both private– and public–sector efficiency.

Assume there are data on N inputs and M outputs for each of I firms (DMUs). The NxI input matrix, $\mathbf{X}$, and the MxI output matrix, $\mathbf{Q}$, represent the data for all I firms. For the i-th firm these are represented by the column vectors $\mathbf{x}_i$ and $\mathbf{q}_i$, respectively. The following BCC (R. D. Banker, A. Charnes and W. W. Cooper) output-oriented DEA linear programming model yields the estimates of technical efficiency (Banker, 1984; Coelli, 2005):

$$\begin{aligned} & \max_{\phi,\lambda} \phi \\ \text{s. t.} \quad & -\phi \mathbf{q}_i + \mathbf{Q}\boldsymbol{\lambda} \geq 0, \\ & \mathbf{x}_i - \mathbf{X}\boldsymbol{\lambda} \geq 0, \\ & \mathbf{I1}^{\mathrm{T}} \boldsymbol{\lambda} = 1, \\ & \boldsymbol{\lambda} \geq \mathbf{0}, \end{aligned}$$

where $\mathbf{I1}$ is Ix1 vector of ones; $\boldsymbol{\lambda}$ is Ix1 vector of peer weights; and $1/\phi$ is a measure of TE. In Eq. 1; the restriction $\mathbf{I1}^{\mathrm{T}}\boldsymbol{\lambda} = 1$ imposes variable returns to scale assumption. By removing it one would arrive at the CCR model with constant returns to scale (CRS) assumption. Indeed, CRS indicates that the producer is able to scale the inputs and outputs linearly without increasing or decreasing efficiency (Ramanathan, 2003).

3. Data and results

The research relies on aggregate data. As for benchmarking in agriculture, the FADN is the most elaborated data source. The FADN reports (Ūkių ..., 2011) provide with the relevant data describing performance of family farms with respect to farming type, farm size, and geographic location. This paper focuses on the first option. The farming type assigned to certain farm depends on its output structure in terms of production value. In our case, nine alternatives were considered, namely eight different farming types and one average value.

Usually, the following main variables presented in FADN reports are considered when analyzing the farming efficiency (Douarin, 2011; Bojnec, 2008): output (Lt), utilized land area (ha), labour (AWU), total assets (Lt), and intermediate consumption (Lt). These four input indicators and one output indicator were thus chosen for further analysis. The data cover the period of 2003–2009. Firstly, the three indicators expressed in monetary terms were deflated by employing respective agricultural input or output price indexes provided by EUROSTAT. Secondly, output was divided by each of the four input indicators. Therefore, the four output indicators were defined for DEA, namely land productivity (Lt/ha), labour productivity (Lt/AWU), return on assets (%), and intermediate consumption productivity (times).

As one can note, the four indicators are measured in different dimensions. The first two indicators were obtained by dividing output by utilized agricultural area and labour input. The third indicator measures return on assets (ROA) and was calculated by dividing output by the total assets. This ratio can be multiplied by 100% and thus expressed as a percentage. The last indicator identifies the efficiency of employment of the working capital, namely seeds, fertilizers, feedstuffs, and farming overheads.

The relative farming efficiency (i. e. technical efficiency) was estimated by DEA method across different faring types during 2003–2010 (Table 1). The *FEAR* package was employed for the analysis (Wilson, 2010).

Table 1. Productive efficiency across farming types in Lithuania, 2003–2010

Period	1. All farms	2. Specialist cereals, oilseeds	3. General field cropping	4. Horticulture, permanent crops	5. Specialist dairying	6. Mixed cropping	7. Mixed livestock, grazing	8. Field crops – grazing livestock	9. Field crops – granivores, pigs
2003	0.871	0.891	0.825	0.983	0.872	0.935	1.000	0.936	0.939
2004	0.867	0.945	0.912	1.000	0.832	0.870	0.965	0.849	1.000
2005	0.765	0.792	0.768	0.796	0.771	0.860	0.835	0.774	0.800
2006	0.853	0.848	0.867	1.000	0.813	0.984	0.922	0.858	1.000
2007	0.859	0.872	0.827	1.000	0.840	1.000	0.955	0.853	0.859
2008	0.884	0.852	0.898	0.950	0.851	1.000	1.000	0.929	0.829
2009	0.883	0.897	0.907	0.817	0.848	0.975	0.961	0.924	0.860
2010	0.922	0.923	0.918	0.942	0.898			0.912	
Average	0.863	0.878	0.865	0.936	0.841	0.946	0.948	0.879	0.898

According to data in Table 1, the efficiency of an average Lithuanian farm fluctuated between 76.5% and 92.2% throughout 2003–2010. In addition, it had been somehow subdued during 2005–2007.

Mixed crop and mixed livestock (mainly grazing) farming was peculiar with the highest TE estimate for the period of 2003–2010. Indeed, the most recent FADN report does not cover these two farming types. Horticulture, however, remained the third most efficient farming type throughout the research period. The latter farming type, though, has also been facing the decreasing efficiency since 2008. To be specific, TE decreased by some 4 percentage points. Nevertheless, the mean efficiency placed this farming type in the third place.

Meanwhile, dairying remained the most inefficient farming type, albeit it managed to improve its efficiency score from 87% in 2003 up to some 90% in 2010.

The steepest increase in efficiency was observed for general field cropping (from 82.5% up to 91.8%), whereas mixed field crop – granivore (pig) farms exhibited the most significant decrease in efficiency (from 93.9% down to 86%).

Indeed, the efficiency scores themselves give little information about the underlying causes of inefficiency. The DEA method, however, offers an additional measure for the latter purpose, namely slacks. For the output-oriented DEA model, slack shows how much certain output should be increased-given inputs remain fixed – for a DMU in order to approach a production frontier. The following Tables 2–4 report relative slacks, i. e. percentage of actual outputs, across different periods and farming types.

Table 2. Slacks for long term assets productivity (ROA), 2003–2010

Period	1.	2.	3.	4.	5.	6.	7.	8.	9.	Average
2003	0.0	12.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
2004	4.2	55.5	60.0	0.0	5.9	0.0	0.0	0.0	0.0	14.0
2005	20.5	115.9	89.0	28.1	32.3	0.0	0.0	30.2	2.5	35.4
2006	4.9	53.8	40.3	0.0	11.4	0.0	1.3	6.7	0.0	13.2
2007	15.0	63.6	19.9	0.0	21.2	0.0	5.8	8.8	0.0	14.9
2008	2.6	48.6	17.2	19.1	0.0	0.0	0.0	0.0	0.0	9.7
2009	33.7	108.5	50.9	20.9	27.6	4.4	17.3	30.5	21.7	35.1
2010	43.8	167.3	83.8	14.9	27.8			37.2		62.5
Average	15.6	78.2	45.4	10.4	15.8	0.6	3.5	14.2	3.5	21.6

The mean slack for long term assets productivity (ROA) was 21.6% (cf. Table 2). To be specific, the highest mean values of such slacks were observed for specialist cereal farming and general field cropping, 78 and 45%, respectively. It might be related to (i) inappropriate machinery allocation and (ii) accounting discrepancies. The former issue can be tackled by encouraging machinery sharing practices (Раманаускас, 2011), whereas the latter one – by improvement of the methodological basis of financial accounting.

The lowest slacks of ROA were observed for mixed farming, namely cropping, livestock (mainly grazing), and field cropping – granivores (pigs).

Table 3. Slacks for intermediate consumption productivity, 2003–2010

Period	1.	2.	3.	4.	5.	6.	7.	8.	9.	Average
2003	54.6	27.6	12.2	54.5	51.5	45.0	0.0	43.4	27.3	35.1
2004	0.0	42.4	30.8	0.0	0.0	0.0	11.9	3.4	0.0	9.8
2005	0.0	108.1	58.8	0.0	0.0	10.2	0.0	0.0	59.6	26.3
2006	0.0	48.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0	5.6
2007	0.0	41.0	0.0	0.0	0.0	0.0	0.0	0.0	43.6	9.4
2008	0.0	33.6	0.0	0.0	0.0	0.0	0.0	0.0	28.4	6.9
2009	0.0	58.6	8.4	63.5	0.0	0.0	0.0	0.0	55.2	20.6
2010	0.0	62.7	4.4	49.8	0.0			0.0		19.5
Average	6.8	52.8	14.6	21.0	6.4	7.9	1.7	5.8	30.6	16.5

The intermediate consumption productivity slacks were less scattered across farming types if compared to ROA or land productivity slacks (see Table 3). The mean value of 16.5% was observed for all farming types. Indeed, the highest mean slack was estimated for specialist cereal farming (52.8%) and was followed by field cropping – granivores (pigs) and horticulture, permanent crops (30.6% and 21%, respectively). The high slack values for crop farming might be related to underperforming land amelioration system, whereas swine farming suffers from inefficient feeding stuff structure. Thus appropriate scientific research and institutional incentives should be aimed at these issues.

Table 4. Slacks for land productivity, 2003–2010

Period	1.	2.	3.	4.	5.	6.	7.	8.	9.	Average
2003	64.7	205.7	105.6	0.0	42.4	21.6	0.0	45.0	6.5	54.6
2004	49.8	211.6	132.2	0.0	32.1	4.6	8.4	31.5	0.0	52.2
2005	74.5	361.0	172.6	0.0	42.7	5.8	0.0	65.5	0.0	80.2
2006	42.0	250.3	84.1	0.0	18.9	0.0	10.0	32.0	0.0	48.6
2007	53.8	222.4	62.7	0.0	15.6	0.0	15.2	40.3	0.0	45.5
2008	61.7	235.3	71.8	0.0	9.3	0.0	0.0	47.8	0.0	47.3
2009	54.5	228.7	71.4	0.0	12.8	0.0	13.6	50.5	0.0	47.9
2010	50.0	271.2	80.2	0.0	12.1			58.9		78.7
Average	56.4	248.3	97.6	0.0	23.2	4.6	6.7	46.4	0.9	56.0

The labour productivity slacks are not presented here, for only one of observations was attributed with slack of this type. This finding, thus, offers some insights. First, labour plays an insignificant role at the aggregate level. A farm-level analysis, though, might support or reject the hypothesis about labour impact on output and efficiency. Second, FADN practice could be improved in terms of working time estimations.

The analysis showed that land productivity is the most problematic indicator for the Lithuanian family farming (Table 4). The mean value of some 56% was observed for an average farm. Horticulture and field cropping – granivores (pigs) exhibited zero slacks. This can be explained by production specifics: indeed, these farming types require lesser amounts of land and higher land productivity thus becomes an intrinsic characteristic thereof. At the other end of spectrum, specialist cereals and general field cropping were specific with the highest slack values (averages of 248.3% and 97.6%, respectively). Hence, the incentives for crop structure adjustment should be imposed in order to increase land productivity.

Conclusions

1. Efficiency of an average Lithuanian farm fluctuated between 76.5% and 92.2% throughout 2003–2010. In addition, it had been somehow subdued during 2005–2007.

2. Mixed crop and mixed livestock (mainly grazing) farming was peculiar with the highest TE estimate for the period of 2003–2010. Meanwhile, dairying remained

the most inefficient farming type, albeit it managed to improve its efficiency score. The observed inefficiency might be explained by overcapitalization and low land productivity. The shrinking horticultural efficiency is also affected by low returns on intermediate consumption. The steepest increase in efficiency was observed for general field cropping.

3. Slack analysis revealed that low land productivity, returns on assets, and intermediate consumption productivity are the most important sources of the inefficiency, in that order. Low land productivity is especially important for specialised cereals and general field cropping. Therefore, the incentives for crop structure adjustment should be imposed in order to increase land productivity. The highest mean values of return on assets slacks were observed for specialist cereal farming and general field cropping. The latter issue can be tackled by increasing technological knowledge for enhanced farming management, by encouraging machinery sharing practices, and by improving the methodological basis of financial accounting.

4. Labour productivity slacks showed that labour plays an insignificant role at the aggregate level analysis. Therefore further studies should employ a farm-level analysis, whereas FADN practice needs to be improved in terms of working time estimations

References

1. Alvarez, A., Arias, C. (2004). Technical efficiency and farm size: a conditional analysis // Agricultural Economics. Vol. 30.
2. Baležentis, T., Baležentis, A. (2011). A multi-criteria assessment of relative farming efficiency in the European Union Member States // Žemės ūkio mokslai. T. 18. Nr. 3.
3. Banker, R. D., Charnes, A., Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis // Management Science. Vol.30. No. 9.
4. Bogetoft, P., Otto, L. (2011). Benchmarking with DEA, SFA and R. International Series in Operations Research and Management Science. Vol. 157. – Springer.
5. Charnes, A., Cooper, W. W., Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units // European Journal of Operational Research. Vol. 2. No. 6.
6. Charnes, A., Cooper, W. W., Rhodes, E. (1981). Evaluating Program and Managerial Efficiency: An Application of Data Envelopment Analysis to Program Follow Through // Management Science. Vol. 27. No. 6.
7. Coelli, T. J., Prasada Rao, D. S., O'Donnell, C. J., Battese, G. E. (2005). An Introduction to Efficiency and Productivity Analysis. – Springer.
8. Cooper, W. W., Seiford, L. M., Tone, K. (2007). Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References and DEA-Solver Software. Second Edition. – Springer.
9. Debreu, G. (1951). The Coefficient of Resource Utilization // Econometrica. Vol. 19. No. 3.
10. Douarin, E., Latruffe, L. (2011). Potential impact of the EU Single Area Payment on farm restructuring and efficiency in Lithuania // Post-Communist Studies. Vol. 23, No. 1.
11. Farrell, M. J. (1957). The Measurement of Technical Efficiency // Journal of the Royal Statistical Society. Series A (General). Vol. 120. Part 3.
12. Gorton, M., Davidova, S. (2004). Farm productivity and efficiency in the CEE applicant countries: A synthesis of results // Agricultural Economics. Vol. 30.

13. Kalirajan, K. P., Shand, R. T. (2002). Frontier production functions and technical efficiency measures // Journal of Economic Surveys. Vol. 13. No. 2.
14. Koopmans, T. C. (1951). An Analysis of Production as an Efficient Combination of Activities. // Koopmans, T. C. (ed.) Activity Analysis of Production and Allocation. Cowles Commission for Research in Economics. Monograph. No. 13. – New York: Wiley.
15. Ramanathan, R. (2003). An Introduction to Data Envelopment Analysis: A Tool for Performance Measurement. – Sage Publications.
16. Ray, S. C. (2004). Data Envelopment Analysis: Theory and Techniques for Economics and Operations Research. – Cambridge University Press.
17. Rimkuvienė, D., Laurinavičienė, N., Laurinavičius, J. (2010). ES šalių žemės ūkio efektyvumo įvertinimas // LŽŪU mokslo darbai. Nr. 87(40).
18. Samarajeewa, G., Hailu, G., Jeffrey, S. R., Bredahl, M. (2012). Analysis of production efficiency of beef cow/calf farms in Alberta // Applied Economics. Vol. 44.
19. Ūkių veiklos rezultatai (ŪADT tyrimo duomenys) 2010. (2011). – Vilnius: Lietuvos agrarinės ekonomikos institutas.
20. Vinciūnienė, V., Rauluškevičienė, J. (2009). Lietuvos respondentinių ūkininkų ūkių techninio ir masto efektyvumo neparametrinis vertinimas // LŽŪU mokslo darbai. Nr. 85(38).
21. Wilson, P. W. (2010). FEAR 1.15 User's Guide. – Clemson. South Carolina: Clemson University.
22. Раманаускас, Ю., Радзявичюс, Г. (2011). Оценка различных форм совместного использования техники в аспекте устойчивого развития фермерских хозяйств // Management theory and studies for rural business and infrastructure development. Nr. 5 (29). – ASU-LAEI: S. Jokužio leidykla-spaustuvė.

SKIRTINGŲ TIPŲ ŪKININKŲ ŪKIŲ VEIKLOS EFEKTYVUMAS IR VADYBINIAI SPRENDIMAI – DUOMENŲ APGAUBTIES ANALIZĖ

Tomas Baležentis, Irena Kriščiukaitienė
Lietuvos agrarinės ekonomikos institutas

Santrauka

Šio straipsnio tikslas – išanalizuoti skirtingų ūkių tipų gamybinio efektyvumo tendencijas ir nurodyti galimus vadybinių sprendimų variantus efektyvumo didinimui užtikrinti. Tyrimo periodas – 2003–2010 m. Tyrimas remiasi agreguotais Ūkių apskaitos duomenų tinklo duomenimis. Tyrimui naudotas duomenų apgaubties analizės metodas, kuris leido ne tik įvertinti efektyvumą, bet ir identifikuoti rezultatų rodiklių gerinimo rezervus, taip pat taikyta statistinė analizė. Tyrimas parodė, kad vidutinio Lietuvos ūkio 2003–2010 m. efektyvumas – 76,5–92,2 proc. Efektyvumas buvo sumažėjęs 2005–2007 m. Tyrimo periodu efektyviausiai veikė mišrūs ūkiai vyraujant augalininkystei ir galvijininkystei (žolėdžiams). Rezervų analizė leido įvertinti nagrinėtų veiksnių svarbą veiklos neefektyvumui (didžiausią neigiamą įtaką darė žemas žemės našumas, turto grąža).

Raktiniai žodžiai: efektyvumas, duomenų apgaubtis, Lietuva, našumas, ūkininkavimo tipai.
JEL kodai: C440, C610, Q100, Q130.