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Efficiency and total factor productivity in post-EU accession Hungarian sugar beet production

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Abstract

This paper analyses efficiency and total factor productivity (TFP) in Hungarian sugar beet production applying non-parametric frontier techniques. For 2004 and 2005 efficiency and TFP are calculated by Data Envelopment Analysis (DEA) and by a Malmquist index respectively. Betwee 2004 and 2005 the average technical efficiency wasvery stable, around 0.80 for CRS efficiency and 0.87 for VRS efficiency, suggesting that in both years farms were similarly clustered towards the frontier. The analysis of returns to scale reveals that during both years half (48%) of the sugar beet growers were operating under increasing returns to scale. In the two analysed years changes occurred between decreasing returns to scale and scale efficient farms, when the first increased from 32% to 37%, while the second decreased from 20% to 15%. In 2004 the highest technical efficiency can be observed in Szerencs district followed by Kaba district and then Szolnok district, while the efficiency rating changed in 2005 when the most efficient district was Kaposvár, followed by Szerencs and Petőháza.

Between years TFP increased by 9%. The main reason for the observed TFP increase was technical progress of 8%, while technical efficiency played a limited role in improving the performance of sugar beet production. At the same time there was a clear convergence which can be identified and thus improving efficiency scores among individual holdings. Although in the analysed period TFP increased, our empirical results have revealed pure technical inefficiency. In the first three most efficient sugar beet production districts the technical efficiency decreased while in the two least efficient districts technical efficiency increased and they became more homogenous to the frontier compared to the former three districts in 2005.

Key words

Efficiency, TFP, Data Envelopment Analysis, Sugar beet production, FADN.

1. Introduction

The aim of this article is to analyse efficiency and productivity in Hungarian sugar beet production in the first two years after EU accession. This is carried out after taking into account reform in the sugar regime driven by an institutional price cut and slight trade liberalisation, which should encourage beet producers to improve efficiency. Many studies have analysed the total factor productivity of Hungarian agriculture. These include Hughes (1998), Banse et al., (1999), Mathijs and Vranken (2000), Mathijs and Vranken (2001), Daviova et. al (2002), respectively Mathijs and Noev (2002) analysed the total factor productivity of Hungarian agriculture. These articles explore efficiency and productivity, especially in Hungarian argriculture's main sectors (crops and livestock). In the literature there are however no studies regarding the efficiency and productivity of Hungarian sugar beet or other agricultural goods production. Curtiss (2002), however, argued that industriousness and market arrangements may vary from production to production, and therefore may influence the specific efficiency scores.

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After accession sugar beet producers faced a different policy which led to higher profitability than for other Common Agricultural Policy (CAP) agricultural activities. This article scrutinizes policy change consequences on sugar beet producers' performance. Based on Data Envelopment Analysis, this is done by using a panel of 54 Hungarian sugar beet growers in the first two years after accession. The following questions are analyzed empirically:

Have sugar market regulation changes influenced the performance of sugar beet producers?

Due to an absence of competition, one can expect there to be inefficient sugar beet growers. This is because distribution quotas determine a guaranteed high price for sugar beet and purchase of output. In inefficient sugar beet operations, the degree of inefficiency reveals the potential for improvement in the use of factors. To predict future trends in sugar beet production, a decrease or increase in efficiency is important.

Which producers will survive in a more market oriented environment?

This question is examined according to production districts. Future sugar beet production utterly depends on the sugar beet processing factories decision to continue production or not. Through greater compensation in the intitial Common Market Organization (CMO) reform, these factories are encouraged to close down. In subsequent years this compensation will diminish.

Our assumption is that, in the future, the most technically efficient and prosperous total factor productivity districts will continue sugar beet production.

The paper is organized as follows. The next section provides a short overview of trends in Hungarian sugar and sugar beet production. Reference is made to international sugar market trends as well as reform of the EU sugar market structure. The third section details the methodology, and the fourth section describes the data sets. Results are presented in section 5 and in section 6 the article offers conclusions.

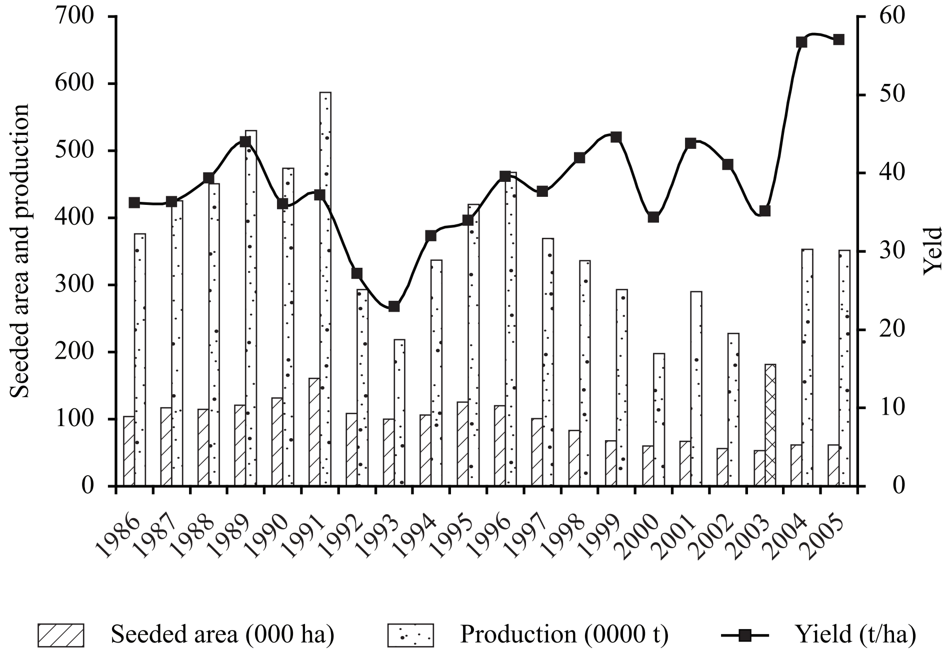
2. Trends in sugar beet production

2.1. Overview of sugar beet and sugar production

In the two years after EU accession Hungarian sugar beet production was limited by EU sugar quotas and stabilised at 3.52 million tonnes. The crop was produced on nearly 62 thousand hectares with an average yield of 57 tonnes per hectare. After a 1991 peak of 5.87 million tonnes, in the last fifteen years sugar beet production declined and fell to almost 2 million tonnes in the pre-accession years. (Figure 1). The 1991 peak was obtained on 161 thousand hectares of seeded area yielding 37.16 tonnes per hectare. This means that in the event of abolition of the production quota or dispersal of the existing quota among member states, Hungarian sugar beet production can increase as long as sugar beet growers are more efficient than their competitors.

Figure 1

Evolution in main Hugarian sugar beet production natural indicators 1986-2005



Source: Hungarian Central Statistical Office (2006).

In the two years after EU accession Hungarian crop producers faced increasing input costs, and changes in producer prices, but also received higher subsidies (Potori and Udovecz, 2005). Compared to the pre-accession period, sugar beet producers' income has increased almost tenfold, this stemming from the CMO sugar policy. For example, in the case of sugar raw material, the minimum price for sugar beet has been increased. After the CMO sugar reform, this income is estimated to decrease, but will remain double or triple that of the pre-accession period. According to Csillag and Fogarasi (2005), if there are no changes in technology and input costs, compared to 2004 only 35% of Hungarian sugar beet can be produced. In 2004 the estimated sugar beet price was € 25.05 per tonne minimum. However, for three reasons this sharp decline in sugar beet production will not occur. Firstly, because the minimum price reduction will occur in two steps, allowing farmers to more easily adjust their production to new market conditions. Secondly, short-term production decisions are based on variable costs, and thirdly the Hungarian currency has depreciated against the Euro, which in the short term has resulted in a higher price for sugar beet.

During the transition to a market economy and subsequent preparation for EU accession, the sugar industry became more highly concentrated. This was due to privatization of existing capacities and an opening to foreign capital investors (Jansik, 2001). In this respect the number of sugar factories decreased while the capacity of remaining factories increased from 3,825 tonnes per day in 1989 to 7,400 tonnes per day in 2004.

In Hungary there are five sugar beet processing factories. Depending on the area, sugar beet is produced at different average costs and consequently the income per hectare varies between these areas. According to Fogarasi and Radóczné Kocsis (2005), the lowest per hectare sugar beet income was around Petőháza, where there was a Magyar Cukor Ltd.[2] Factory. In this area the institutionalized sugar beet price cut has been a significant burden for beet producers. Morevover, in coming years sugar companies' decisions will be of utmost importance regarding sugar beet production.

Compared to other agricultural products, world sugar prices have historically been characterised by a high degree of volatility. Since 1995, due to excess production, Berkum et al. (2005) confirmed the decreasing trend of sugar prices. Between 1980-2002 the annual growth rate for production and consumption was 2.5% and 1.9% respectively (EC, 2006). After the CMO sugar reform, the EU-27 sugar price is approaching world price, but the difference will still remain high until 2009/2010 when bilateral trade agreements become effective and preferential imports of sugar at world price are allowed in the common market.

Analysing global sugar consumption, Csillag (2005) concluded that at the international level further increases in demand for sugar can be expected. Due to increasing world population and the processing level of food products, global sugar consumption increased from 60 million tonnes per year in the sixties to 130 million tonnes in 2005. Increases of up to 160 and 176 million tonnes are expected until 2010 and 2015 respectively. However, increasing sugar production was mainly because of sugar cane plantation expansion, while production from sugar beet stagnated. Cane sugar production increased from 56% in the sixties to 75% in 2005. Similar increases in sugar cane production cannot be sustained without further environmental damage. Moreover, after oil price increaes, it has become more profitable for the leading sugar exporter, Brazil, to produce sugar cane fuel instead of sugar. It is therefore expected that the proportion of sugar beet sugar will increase to meet world demand.

2.2. Policy overview

Not until 2006 were there important changes in CMO sugar policy, however, several critics and reform scenarios were formulated. In the first part of this section are presented several criticisms and reform proposals. In the second part are the main changes in CMO sugar policy. For many producers price differences are unfair. This is because beet producers in Ireland, Italy, the Netherlands and United Kingdom (UK) have received an average price for their sugar, regardless of the quota (A-, B- or sometimes C). On the other hand, producers in other countries have received a different price for the three types of sugar. Consumers have also complained about the high price of sugar in the EU and have shifted to other types of sweeteners, raising questions about the long-term sustainability of the regime.

Burou et al. (1996) suggested reforming the sugar regime by allowing quota transfers among EU member countries as well as among regions within the same country. They estimated how transferring cross-border quotas could influence production in various EU regions. They found that roughly 45% of production could be reallocated from Southern Europe and Benelux and then mainly directed towards France, Germany and Denmark. Moreover, substantial transfers could take place between producers in different regions within the same country.

[2] Magyar Cukor Ltd is part of the Agrana Group, who own 36.36% of Hungarian sugar quota (147,137 tonnes), while the other two operators in this industry Nordzucker Group and Eastern Sugar Group are owner of 36.36% (146,452 tonnes) and 29.96% (108,093 tonnes) respectively of Hungarian sugar quota.

What cannot be accepted are defined quotas based on member states' administratively specified production efficiency level. Bozik and Izakovic (2004) have argued that investments in the Slovak sugar industry were large in the years preceding EU accession and have specified pertinent sugar factories. They concluded that the sugar beet producers' situation is following a similar course. They also have contended that, for Slovakia, until 2011 the projected economic ramifications due to the 'fall in prices' regarding EU sugar reform match pre-accession conditions.

Giha et al. (2006) estimate that even if there were a 40% reduction in sugar beet price, 52% of UK beet production would remain viable. However, farmers would need to reduce their average costs by 20%. If not, only less than 20% of sugar beet production could be attained. Giha and Renwick (2005a) established that the average cost reduction would not be due to farmers' operational changes but basically because high cost producers would simply cease sugar beet production. With respect to output changes, in the event of reduced UK prices Giha and Fenwick (2005b) submitted that the main replacement crop would likely to be winter wheat, then winter barley, oil seed rape and spring crops. For input usage they felt that reduced production would impact significantly on miscellaneous costs, meaning contract harvesting and haulers. Morever, usage of seed, fertiliser, spray and other variable inputs per hectare of sugar beet grown would reduce medium term costs.

Since July 2006, the European Commission has implemented reforms for the EU sugar regime. This is the first fundamental change in CMO sugar policy since its 1968 foundation. More specifically, the Council decided (I) a progressive cut in the EU white sugar reference price of up to 36% (i.e., about 41% of the sugar beet minimum price) over a period of four marketing years;.(II) Direct compensatory payments of 64.2% of the estimated revenue loss over three marketing years.. (III) A single quota arrangement for the period 2006/07-2014/15 (European Council, 2006).

These measures imply further productivity and efficiency improvement for beet growers enjoying a comparative advantage. Consequently they should produce more competitively in a market with lower institutional prices and slightly more free trade (Demont, 2006).

3. Methodology

In order to measure Hungarian sugar beet farmers' efficiency, this study employs Data Envelopment Analysis (DEA) An efficiency analysis of Hungarian wheat, maize, sunflower and pork sectors was performed by Varga (2006). DEA was used coupled with detailed presentation of this methodology. The following section describes the DEA method used in the empirical analysis. As an example, see studies by Lissitsa and Odening (2005), and Latruffe et al. (2005); for more detailed discussion see Coelli et al. (1998).

DEA creates a nonparametric frontier over data points and thus all observations lie on or below the frontier. This method has two alternative orientations, input and output. The input oriented model estimates the proportional decrease in the use of input as output remains unchanged, although slacks can allow nonproportional input changes (Coelli et al., 1998). The output oriented model measures the proportional increase in outputs that could be attained with constant inputs, with slacks providing information about nonproportional changes in outputs.

DEA is a deterministic method devoid of any assumption regarding the original data distribution. Deviation from an estimated frontier is interpreted purely as inefficiency.

DEA requires detailed data about inputs and outputs. The analysis can be performed at the activity or holding level and usually uses micro level accounting and statistical data, such as the Farm Accountancy Data Network (FADN). Activity analysis however requires separability of inputs by activity.

In this study DEA was chosen over the stochastic frontier analysis (SFA) for several reasons. First, it facilitates the split of total technical efficiency into pure technical efficiency and scale efficiency, as well as identifying farms that operate under increasing or decreasing returns to scale. Total technical efficiency is estimated assuming that farms have constant return to scale. (CRS). The term pure technical efficiency is used if returns to scale are assumed to be variable (VRS). Pure technical efficiency estimates the farmers' management abilities rather than farm size. Optimally sized farms can be identified through scale efficiency, meaning the residual ratio between CRS efficiency and VRS efficiency. Second, DEA does not necessitate specification of a functional form for the frontier as it uses linear programming. Third, multiple outputs and inputs can be considered simultaneously.

Table 1

Variables used in the efficiency analysis

Variables	Definitions
Output	
Sugar beet production	Metric tonnes
Inputs	
Labour	Working hours in sugar beet growing activity in the holding
Land	Seeded area of sugar beet in hectares
Capital	Amortisation of assets used for sugar beet production only
Variable inputs	Seeds, fertilisers, pesticides, fuel, paid services, other inputs used for sugar beet production only

In this article we utilise an input oriented DEA method with one output and four inputs. The inputs are labour, land, capital and variable inputs (as specified in Table 1) and this applies to the first two years following EU accession. The inputs expressed in HUF, namely capital and variable inputs, are deflated by the agricultural machinery investment price index (105.6) and the agricultural variable inputs price index (–0.7) at 2004 prices.

4. Data used

The empirical productivity and efficiency analyses are based on individual farm data from the Hungarian 2004 and 2005 FADN database. During both years a sample of 60 sugar beet grower-holdings was taken and, after excluding the farms with unrealistic figures, data from 54 farms per year were used. Extending the balanced panel data to previous years was not possible as it reduced the sample too much.

In Table 2, the basic characteristics of the sugar beet grower-holdings are presented. In 2005 the sugar beet production mean increased comparative to 2004 by 24.5%, while minimum production decreased by 36.8% and maximum production increased by 19.8%.

The labour production factor was based on beet growers' annual average working hours. The mean of labour utilised in sugar beet production increased by 13.6%, which was less than output increase, but at the same time minimum and maximum utilised labour decreased by 23.4% and 7.2% respectively.

The input land is measured in physical units (hectares). The mean of sugar beet seeded area grew by 4.2%, while the minimum and maximum decreased by 71.8% and 7.2% respectively.

Table 2

Descriptive input and output statistics for the analysed farms

	Total output (tonnes)	Labour (hours)	Land (hectare)	Capital (mil HUF)	Variable inputs (mil HUF)
2004					
Mean	2,766	1,779	56.64	1.15	13.19
SD	4,179	3,799	86.36	1.72	19.54
Min	95	94	4.11	0.01	0.57
Max	28,154	27,140	543.10	9.89	127.93
2005					
Mean	3,443	2,020	59.04	1.16	14.49
SD	5,888	3,641	88.27	2.29	20.70
Min	60	72	1.20	0.01	0.30
Max	33,724	25,190	504.10	15.71	128.89
2005/2004 %					
Mean	124.5	113.6	104.2	100.9	109.9
SD	140.9	95.8	102.2	133.1	105.9
Min	63.2	76.6	29.2	156.7	52.6
Max	119.8	92.8	92.8	161.7	100.8

SD: standard deviation; Min: minimum; Max: maximum; mil HUF: million Hungarian Forint.
Values in constant 2004 prices.
Source: Data from Hungarian FADN, 2004 and 2005.

The third capital input variable is approximated by reported depreciation. Efficiency results may be affected if the rate of investment of the farms differs, though this is unlikely for sugar beet production as the market is heavily regulated. The mean of capital in sugar beet production increased in real terms by 0.9%, while the minimum and maximum capital increased by 56.7% and 61.7% respectively.

The fourth production factor is variable inputs which includes seed, fertilizers, pesticides, fuel, paid services and other inputs expressed in real terms. The mean of variable inputs grew by 9.9%, while minimum and maximum decreased by 47.4% and 0.8% respectively.

5. Main findings

5.1. Analysis of technical efficiency

A direct efficiency comparison between different years is not possible. Lissitsa and Odening (2003) remind one that the efficiency values, meaning efficiency as a relative indicator, should be interpreted only with regard to the underlying sample. As seen in Table 3, the average technical efficiency was very stable between 2004 and 2005, around 0.80 for CRS efficiency and 0.87 for VRS efficiency, suggesting that farms are similarly clustered towards the frontier in both years. Just as they did in 2004, in 2005 farms employed homogeneous practices.

Table 3

Technical efficiency and scale efficiency summary statistics in Hungarian sugar beet production

	Total technical efficiency	Pure technical efficiency	Scale efficiency
2004			
Mean	0.796	0.876	0.912
SD	0.159	0.133	0.131
Min	0.501	0.563	0.501
ShareMax (%)*	17	33	19
2005			
Mean	0.808	0.871	0.931
SD	0.161	0.144	0.114
Min	0.265	0.273	0.527
ShareMax (%)*	15	31	15

* ShareMax – Share of farms with efficiency score of 1.

For scale efficiency one sees a slight increase, meaning that sugar beet growers were more clustered towards the frontier in 2005 than in 2004.

The analysis of returns to scale (not presented here) reveals that in both years half (48%) of the sugar beet growers were operating under increasing returns to scale (IRS). IRS indicates that they are too small to be scale efficient even though these farms increased their size from 18 hectares to 22 hectares between 2004 and 2005. This coincides with Cooper et al. (1999) findings cited by Lissitsa and Odening (2005) that improving efficiency cannot be achieved through increasing the size, but only through rationalisation.

During the two years in question, changes occurred between decreasing returns to scale (DRS) and scale efficient (constant returns to scale, CRS) farms. The share of DRS farms increased from 32% to 37%, while scale efficient farms decreased from 20% to 15%. However, more than half of the farms (52%) didn't alter their status, position, remaining scale efficient, DRS or IRS efficient farms.

Table 4 presents the average slacks for each input for total technical efficiency. All slacks, except for capital, increased between the two years, but labour seems to be the most excessively used input. This means that, during the two years in question, at the 0.80 technical efficiency scores all inputs can be reduced by 20% without decreasing output. Moreover, labour can be reduced a further 8% and 14% in 2004 and 2005 respectively without decreasing output. Morevoer, utilized capital can be also be further reduced by 6% and 2%, and variable inputs by 2% and 5% in 2004 and 2005 respectively. The former can occur without changing sugar beet output.

Table 4

Input slacks on total technical efficiency in Hungarian sugar beet production

	Land (hectares)	Labour (hours)	Capital (1000 HUF)	Variable inputs (1000 HUF)
2004	0.61	111	79.81	255.90
2005	1.01	215	31.61	660.73
%				
2004	0.58	7.87	5.74	1.48
2005	0.90	14.09	2.10	4.81

5.2. Changes in total factor productivity

In Table 5 are changes in average *total factor productivity* (TFP) for the studied sugar beet farms between 2004 and 2005. Column 1 indicates that the Malmquest Productivity Index (MPI) amounts to 1.087, meaning the TFP increased by almost 9%; this also shows that the TFP scores decreased for 35.2% and increased for 64.8% of sugar beet growers.

The average MPI greater than 1 can essentially be attributed to 7.5% technical progress, whilst total technical efficiency rose by 1.2%. Almost 80% of the sugar beet producers underwent technical progress. For farms technical efficiency decreased for 37.0% and increased for 56.6% of farms. The increase in technical efficiency (column 3) can be attributed essentially to an enhanced scale efficiency of 2.3%. The scale efficiency of sugar beet growers improved for 48.1% of them and worsened for 42.6%.

Table 5

Malmquist index summary in Hungarian sugar beet production

	Malmquist Productivity Index	Technical change	Total technical efficiency change	Pure technical efficiency change	Scale efficiency change
Mean	1.087	1.075	1.012	0.989	1.023
SD	0.303	0.099	0.273	0.174	0.304
Min	0.348	0.772	0.300	0.566	0.348
Max	1.717	1.303	1.664	1.749	1.712
Share of farms, %					
Worsened	35.2	20.4	37.0	37.0	42.6
Unchanged	0.0	0.0	7.4	16.7	9.3
Improved	64.8	79.6	56.6	46.3	48.1
	100.0	100.0	100.0	100.0	100.0

5.3. Changes in total factor productivity on factories' districts

The annual efficiency scores between districts can be compared thanks to the calculations on the same frontier and later separated into districts (see Table 6). The highest technical efficiency can be observed, in 2004, in the Szerencs district, then followed Kaba district and then Szolnok. In these districts during the following year technical efficiency decreased, meaning that the efficiency scores average was closer to the frontier in 2004 than in 2005. In those districts with the lowest technical efficiency, namely Petőháza and Kaposvár, this indicator increased in 2005 compared to the previous year, exceeding technical efficiency level in the other three districts. This shift in sugar beet production technical efficiency can be linked to the processors' future strategy in these districts and was due to improving pure technical efficiency and scale efficiency. However, other than Kaba district's scale efficiency improvement, in 2004 these indicators worsened in the three most efficient districts.

Table 6

Hungarian sugar beet production Technical efficiency and scale efficiency summary statistics by production districts

	Total technical efficiency	Pure technical efficiency	Scale efficiency
2004			
District of Szolnok	0.876	0.901	0.973
District of Szerencs	0.964	0.980	0.984
District of Kaba	0.849	0.951	0.893
District of Kaposvár	0.786	0.825	0.953
District of Petőháza	0.663	0.796	0.833
2005			
District of Szolnok	0.711	0.780	0.911
District of Szerencs	0.810	0.829	0.977
District of Kaba	0.764	0.813	0.939
District of Kaposvár	0.939	0.956	0.982
District of Petőháza	0.774	0.879	0.881

In Table 7 are TFP changes in 5 sugar beet producing districts. In 2004 TFP increased only in Petőháza and Kaposvár, and this was because of greater technical change and technical efficiency. In Petőháza district technical efficiency increased by 20% and was vital to pure efficiency increase (10.4%) and scale efficiency (5.7%). For Kaposvár district the pure technical efficiency increased by 16.0% and scale efficiency by 3.1%.

In 2004 in the more technically efficient districts TFP decreased because of a sharp decline in their technical efficiency. This largely stemmed from a drop in pure technical efficiency. This means that, in the districts where TFP dropped, growth in technical change was not supported by the growth in total technical efficiency change. Therefore, despite technical progress efficient use of inputs worsened.

Table 7

Malmquist index means on the factories' districts

	Malmquist Productivity Index	Technical change	Total technical efficiency change	Pure technical efficiency change	Scale efficiency change
District of Szolnok	0.872	1.076	0.811	0.866	0.937
District of Szerencs	0.890	1.059	0.840	0.846	0.993
District of Kaba	0.950	1.056	0.900	0.855	1.052
District of Kaposvár	1.241	1.038	1.195	1.160	1.031
District of Petőháza	1.287	1.102	1.168	1.104	1.057

6. Conclusions

The empirical results regarding efficiency and total factor productivity estimations indicate that between 2004 and 2005 the increase in sugar beet production was attained with a very stable total technical efficiency, which was around 0.80 for CRS efficiency and 0.87 for VRS efficiency, and a total factor productivity improvement of 9%. The stable total technical efficiency suggests that in both years farms have a similar pattern of being clustered towards the frontier, which means that farms in 2005 had the same homogeneous practices as in 2004. The primary cause of productivity growth was the enterprises' technical change growth of 7.5%. This means that with the same inputs used in sugar beet production the output increased due to sectoral regulatory changes, namely the advent of CMO sugar policy. The technical change increase was not followed by a similar increase in total technical efficiency (1.2%), which suggests that opportunities generated by technological change were not exploited in terms of efficiency. The technical efficiency scores imply that all inputs can be reduced by almost 20% without altering the output, while input slacks suggest further input reduction can be performed. This is especially true for labour and wouldn't entail a decrease in output.

The analysis of returns to scale indicates that almost half of sugar beet producers (48%) operate under IRS, which means that they are too small to produce at scale efficient level. The share of DRS sugar beet growers grew, while the number of scale efficient farms declined.

These support our expectation that the EU sugar beet production regulatory system does not prompt an improvement in efficiency.

During the years in question the efficiency ranking of sugar beet production districts changed . In the first year the most efficient district was Szerencs, followed by Kaba and Szolnok, and in the second year Kaposvár, then Szerencs and Petőháza. As for change in total technical efficiency, only in Kaposvár and Petőháza was technical change exploited. In the districts where the total technical efficiency was higher than technical change, sugar beet producers improved their efficiency performance and these sugar beet growers (districts) become more competitive. However, in the coming years sugar beet production depends on whether or not the processors choose to continue

One of the primary tasks of agricultural policy is to support necessary changes in CMO sugar policy to facilitate productivity and efficiency. Vital to this is allowing quota transfers within member states and between production districts. If this occurs, one can increase the number of scale efficient sugar beet growers.

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