



Determinants of microregional agricultural labour productivity – Evidence from Czechia



Jan Ženka^{*}, Ondřej Slach, Luděk Krtička, Petr Žufan

Department of Social Geography and Regional Development, Faculty of Science, University of Ostrava, Chittussiho 10, CZ-710 00 Ostrava, Slezská Ostrava, Czech Republic

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ABSTRACT

In this paper we aimed to explain differences in agricultural labour productivity at microregional level. We tested the effects of three major independent variables – farmland fragmentation, urbanization economies and farm size structure with particular emphasis on the relationship between land-use fragmentation and microregional differences in agricultural labour productivity. Our principal question therefore was if higher agricultural labour productivity at microregional level is associated with internal scale economies resulting from large average farm size (in terms of employment), proximity to large cities as a proxy for urbanization economies and lower levels of land-use fragmentation. We also asked if productivity gains from large average size of plots is higher than potential losses resulting from land tenure (tenants are generally less productive than farmland owners). Drawing on a case study of Czechia – a country with extremely fragmented farmland ownership, but the largest average size of plots in the EU and a strong role of farmland rental market – we confirmed our initial expectation that land-use fragmentation affects negatively microregional agricultural labour productivity. Larger average size of plots is positively related to microregional agricultural labour productivity despite potentially negative effects of land tenure. At the same time, no significant effects of urbanization economies and farm size structure were documented.

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1. Introduction

In this paper we aim to fill four main gaps in the research of agricultural productivity in the European Union (EU). Firstly, although agricultural productivity has been extensively studied at (inter)national (e.g. Giannakis & Bruggeman, 2015; Hayami & Ruttan, 1970; Headey, Alauddin, & Rao, 2010) and farm level (e.g. Alvarez & Arias, 2004; Bojnec & Latruffe, 2013; Helfand & Levine, 2004), very little is known about its regional differences (Alexiadis, Ladias, & Hasanagas, 2013). Secondly, research of agricultural productivity at microregional level (local administrative units “LAU1”) has been almost neglected.¹ Recent papers focusing on regional agricultural productivity in the EU and its member

states were written for the NUTS² or NUTS3 level³ (Alexiadis, 2010; Cuerva, 2012; Esposti, 2011; Ezcurra, Iráizoz, Pascual, & Rapún, 2011). Thirdly, despite several attempts (Adamišin, Kotulič, KravčákováVozárová, & Vavrek, 2015; Alexiadis, 2010; Latruffe, Fogarasi, & Desjeux, 2012; Ženka, Žufan, Krtička, & Slach, 2015b), we still do not know much about regional differentiation of agricultural labour productivity in Central and Eastern Europe and its underlying forces. Fourthly, although there were several comprehensive and sophisticated analyses of the relationship between farmland fragmentation and farm economic performance (e.g. Austin, Ulunma, & Sulaiman, 2012; Kawasaki, 2010; Latruffe &

^{*} Corresponding author. Dvořákova 7, 701 03 Ostrava 1, Czech Republic.

E-mail address: jan.zenka@osu.cz (J. Ženka).

¹ Apart from our own current research (Ženka et al. 2015b) we found only one exception: analysis of the relationship between natural climatic conditions and agricultural productivity/economic efficiency performed for local administrative units (LAU1 - districts) in Slovakia (Adamišin et al. 2015).

² NUTS = Nomenclature of territorial units for statistics in the EU28; NUTS regions are administrative territorial sub-national units of roughly comparable population size (NUTS2 regions – between 800 thous. and 3 mil. inhabitants; NUTS3 regions between 150 and 800 thous. inhabitants) – see EC, 2003.

³ Esposti (2011) analysed regional agricultural productivity in Italy, but he focused on total factor productivity, not labour productivity. Latruffe et al. (2012) compared technical efficiency of farms in France and Hungary at NUTS3 level, but he drew primarily on the farm level analysis. Aggregations for NUTS3 regions were used only for presentation of results.

Piet, 2014; Manjunatha, Anik, Speelman, & Nuppenau, 2013; Rahman & Rahman, 2009; Van Hung, Gordon Mac Aulay, & Marsh, 2007), farmland prices (Sklenicka, Molnarova, Pixova, & Salek, 2013) or farmland degradation (Sklenicka, Janovska, Salek, Vlasak, & Molnarova, 2014), there is no study using farmland fragmentation to explain agricultural productivity at microregional level and comparing its effects with other relevant factors such as overall natural conditions, population density or farm size structure.

The principal question immediately arises: why does it matter to fill those gaps? Why should we bother to study agricultural productivity at microregional level? How can empirical evidence from Central Europe (specifically from Czechia) contribute to our understanding of regional agricultural productivity and its basic factors? Finally, is it relevant to use farmland fragmentation not only to explain farm performance, but also to explain microregional differentiation of agricultural productivity? Let us now briefly answer the above-mentioned questions.

The relevance of regional dimension is apparent, when considering the persisting importance of the Common Agricultural Policy (Alexiadis et al. 2013), overlap between EU agricultural and rural development policies (Pelucha, Kveton, & Jilkova, 2013) and claims about regional cohesion in the EU. Until now, the principal goal of authors, concerning the issue of regional agricultural productivity in the EU, was to determine if regional convergence in agricultural productivity has been taking place and to identify its key underlying factors (Alexiadis, 2010; Cuerva, 2012; Esposti, 2011; Ezcurra et al. 2011).

There are also some arguments supporting the necessity of microregional level analyses. In contrast to internally heterogeneous NUTS2/NUTS3 units (Pelucha et al. 2013), microregions allow for more detailed assessment of: a) natural conditions and farmland fragmentation b) localisation or cluster economies (Dannenberg & Kulke, 2005) stemming from the spatial concentration of farms or proximity between farms and food processing industry; c) urbanization economies pushing up the farm productivity in metropolitan areas and finally d) geographical indications linking the quality of agricultural products to their geographical origin (Belletti, Marescotti, Sanz-Canada, & Vakoufari, 2015, p. 94), where the locality with a unique mix of natural resources, know-how, traditions and culture is the key source of competitive advantage in high value added agricultural production.

When considering the possibilities for generalization based on empirical evidence from Central Europe, Czechia provides an excellent option for case studies of the effects of farmland fragmentation on agricultural productivity. Czechia has the second (after Slovakia) highest share (89%) of utilised agriculture area tilled by the largest size category of farms⁴ (Eurostat, 2012). At the same time, privatization of agricultural land in 1990s resulted into current state when Czechia is one of the countries with the most fragmented farmland ownership in the EU (Sklenicka & Salek, 2008).

Nevertheless, thousands of small, irregularly shaped, and hardly accessible plots owned by people unwilling or unable to work in agriculture are rented to large tenants - business companies or agricultural cooperatives (Sklenicka et al. 2014). According to Eurostat (2012) 83% of farmland is farmed by tenants, only 17% by owners. The dominant position of the farmland rental market and prevalence of large tenants can lead to homogenization of land-use patterns (Sklenicka & Salek, 2008), with possible benefits for farm performance on one hand and negative effects on land degradation on the other (Sklenicka et al. 2014). Therefore, Czechia or Slovakia -

countries with the largest average size of plots in the EU - provide the most likely case (Kofroň, 2012; Seawright & Gerring, 2008) for studying the effects of internal scale economies on agricultural productivity. In other words, if farmland fragmentation really matters when it comes to microregional agricultural labour productivity, Czechia and Slovakia are countries where the effects of farmland fragmentation should be manifested stronger than in other EU countries.

On the other hand, high share of rented farmland may reduce agricultural productivity as a consequence of a) impossibility to use leased land for mortgages, which hampers capital investment into building and machinery; b) insecurity about a farm continuity hampering capital investment as well (Van Dijk, 2003). When trying to explain regional differences in agricultural labour productivity, we still do not know much about the question how farmland fragmentation interacts with ownership fragmentation and other relevant factors such as population density and farm size, when it is used to explain agricultural productivity. Therefore, drawing on empirical evidence from Czechia, we ask whether higher average size of plots is associated with higher microregional agricultural labour productivity despite constraining effects of ownership fragmentation and land tenure. We focused solely on labour productivity of business companies and agricultural cooperatives, because datasets for individual farmers were not available.

In Section 2 we start with a brief discussion of farmland fragmentation as a factor of agricultural productivity. In addition, we also consider other factors related to farmland fragmentation - overall natural conditions for agricultural production that may interact with farmland fragmentation are mentioned - population density as a proxy for urbanization economies and farm size structure as an indicator of internal scale economies. Section 3 discusses some specifics of agricultural production in Czechia and its regional aspects in order to provide contextualisation. Section 4 describes data sources and methods employed to test our hypotheses. Section 5 presents the most important results of regression models. Section 6 provides discussion with theoretical expectations and empirical findings of previous authors. Section 7 concludes.

2. Theoretical framework

Recent papers concerning factors of regional agricultural productivity at NUTS2/NUTS3 level proposed similar results. Cuerva (2012, p. 255) argued that low agricultural productivity is associated with smaller farm size, lower skills, higher average age of workers and lower rate of mechanization. Ezcurra et al. (2011, p. 130) documented a significant positive relationship between agricultural labour productivity and GDP per capita, investment per agricultural worker and mean farm size and negative relationship with share of less favoured areas (LFAs), the farm owner's age, the share of non-owned (leased) land and dominant type of agricultural production - field crops or grazing livestock. Let us now briefly discuss the role of three selected factors that may significantly affect agricultural productivity at microregional level - farmland fragmentation, population density and farm size structure.

Agricultural (labour) productivity may be significantly constrained by farmland fragmentation (Bentley, 1987). Farmland fragmentation is generally understood as a situation where a farm operates multiple and physically separated plots (Kawasaki, 2010, p. 509). Several interrelated dimensions of this complex phenomena that may affect agricultural productivity can be distinguished: a) Small average size of plots not allowing for exploitation of scale economies (King & Burton, 1982, p. 476); b) Spatial dispersion of plots operated by a given farm increases transport costs and various expenses for secondary farm buildings or additional equipment

⁴ Farms with more than 100 ha of utilised agricultural area.

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