

Effects of Agricultural Land Dispersion and Fragmentation on the Cost of Agricultural Products (Case Study: Rainfed Wheat in Province of Guilan)

VAHIDEH ANSARI^{1*}, FARZANEH HASSANI DIYARJAN², HABIBOLLAH SALAMI³

1, Assistant Professor, Department of agricultural economics, Faculty of Economics and Agricultural Development, University of Tehran, Karaj, Iran

2, Ph.D Student, Department of agricultural economics, Faculty of Economics and Agricultural Development, University of Tehran, Karaj, Iran

3, Professor, Department of agricultural economics, Faculty of Economics and Agricultural Development, University of Tehran, Karaj, Iran

(Received: Jul. 26, 2019- Accepted: Nov. 23, 2019)

ABSTRACT

It is believed that land fragmentation and small size of the farms causes low productivity and, high cost of production and results in a decrease in the farmers' net income. Thus, it is worth to study empirically the effects of lands fragmentation on the cost of production. Guilan province is one of the areas where agricultural land Fragmentation is widely observed. Therefore, the main goal of this study is to estimate the effect of agricultural land fragmentation on the production cost of rainfed wheat in Guilan province. To this end, production and cost data of wheat and barley was collected for the crop year 2014-2015 through questionnaires from Deylaman and Malakut regions in the Guilan province. An indirect cost function approach was utilized and the best functional form was chosen using econometric criteria. Based on the estimated parameters of the chosen model, the cost elasticities of all variables including numbers of land fragments were estimated. Results indicate that, the Translog functional form is most appropriately represents production technology of wheat and barley in the study regions. Also, result confirms that fragmentation of land causes increase in the average cost of production and demand for labor input in these two crops. In addition, the estimated scale elasticities reveal an increasing returns production technology in the studied crops. Accordingly, land consolidation and augmentation policies are suggested to reduce average cost of production.

Keywords: land fragmentation, production costs, functional form, wheat, Guilan province.

Extended Abstract

Objectives

One of the main challenges in the Iranian agricultural sector is land fragmentation and small size of the farms. It is believed that this phenomena causes low productivity and, high cost of production and results in a decrease in the farmers' net income. Thus, it is worth to study empirically the effects of lands fragmentation on the average cost of production. Guilan province is one of the areas where agricultural land Fragmentation is widely observed. Therefore, the main goal of this study is to estimate the effect of agricultural land fragmentation on the production cost of the main crop, the rainfed wheat, in Guilan province.

Methods

For examining effects of agricultural land fragmentation on the cost of rainfed wheat, an indirect cost function approach was utilized and "numbers of land fragments" were entered to the cost function as an exogenous variable. Three flexible functional forms of cost functions, namely, Translog, Normalized Quadratic and Generalized Leontief cost functions were estimated with input demands equations as a system of equations. Then, the best functional form for cost function was

E-mail: vansari@ut.ac.ir

* نویسنده مسئول: وحیده انصاری

chosen using econometric criteria. Based on the estimated parameters of the chosen cost function, own and cross price elasticities of input demands were computed. In addition, scale elasticity and, demand elasticity of inputs with respect to numbers of land fragments were calculated. Finally, average cost function for rainfed wheat was estimated based on the best functional form and average cost elasticity with respect to numbers of land fragments were specified. To this end, production and cost data of rainfed wheat was collected for the year 2015 through questionnaires from Deylaman and Malakut regions in the Guilan province using cluster sampling. Exogenous variables entered the model were: wage of labour (Rial/per person per day), rental price of machinery (Rial/per hour), quantity of wheat production (Kg), numbers of land fragments, average distance among fragments (Km), average distance between fragments and place of residence (Km), quantity of seed (Kg), leveling of farm land (dummy: steep and medium slope=1, otherwise=0), quality of soil (dummy: good fertility=1, otherwise=0), use of only unpaid family labour (dummy: yes=1), use of only paid labour (dummy: yes=1), use of fertilizer (Dummy: yes=1), Region (dummy: Deylaman=1, Malakut=0).

Results

Results indicate that, among three estimated functional forms, the Translog cost function most appropriately represents production technology of rainfed wheat in the study regions. Maintained functional form satisfies all the properties of the cost function such as linear price homogeneity, concavity and monotonicity in input prices and monotonicity in output quantity. Based on estimated input demand functions, the magnitudes of input elasticities are very small. Own price elasticities of labour and machinery are -0.12 and -0.24 respectively, so both input demands are inelastic. Cross price elasticity of labour and machinery is 0.16 which indicates the presence of substitution relationship between two the inputs. Demand elasticity of machinery with respect to numbers of land fragments is -0.11 which implies an increase in numbers of land fragments lead to a decrease in demand for machinery input. Also, result indicate that fragmentation of land causes increase in the average cost of wheat production. For instance, increasing land fragments from one to two pieces causes 13 percent increase in average cost of wheat production. Based on the results, average cost is not very responsive to the leveling of land. Also, employing unpaid family labour, and fertilizer is not increasing significantly average cost of wheat production. Moreover, production of wheat in Deylaman region is less costly than in Malakut region. In addition, the estimated scale elasticity reveals an increasing return to scale in wheat production technology.

Discussion

According to the results, land dispersion and fragmentation increase average cost of wheat production. So, land consolidation is suggested to reduce average cost of production. For achieving this goal, implementing support policies aimed to encourage establishing agricultural cooperatives can be effective. Also, encouraging farmers to exchange farm land to may be useful. Since the effects of the other variables on the average cost of wheat production; such as leveling and quality of land, and distance between fragments and place of residence are negligible, it seems farmers do not resist accepting exchange of farm lands. In addition, the revealed economies of size in wheat production technology, suggests that expanding the size of wheat farms can reduce average cost of production and is recommended. Finally, small magnitude of own and cross price elasticities of input demands imply that changing relative input prices would not have significant effect on using and substituting inputs in the production process.