

## What may determine the off-farm income? A review

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**Abstract:** Farming is treated as one of the riskiest businesses. Political decisions, especially these related to the agricultural sector, may be treated as of a great importance. As a consequence, farm owners seek to diversify their sources of income and run other strategies aiming to stabilize their earnings i.e. by off-farm activities. The paper selected key groups of the determinants of the off-farm income with the aim to evaluate the current state and to propose further steps of the detailed analysis. The authors identified the mechanisms how the particular instruments influence farmers' decisions on generating the off-farm income. It may be concluded that the significance of direct payments is still very high. Subsidies generally discourage farmers from the non-agriculture employment. The influence of socio-demographic characteristics is significant, however, the strength of this impact is determined by the additional factors like the situation in the labour market. In case of environmental determinants, it should be noted that there is a limited group of factors that may be out of control by the farm operators. The value added of the article is an attempt to identify the mechanisms how the particular instruments may influence farmers' decisions on generating the off-farm income. The article finishes with the authors' recommendations for further empirical studies.

**Keywords:** agriculture, farm efficiency, income diversification, off-farm employment

Farming is treated as one of the riskiest businesses. This results from the impact of the combination of environmental conditions, unpredictable economic shocks, and consequently, the financial situation of farm households. Therefore, in many areas, it is not possible to perform the large scale production. In addition, the farms are influenced by economic conditions of the given country which determine the disparities of farming profitability due to the changes in the prices of production factors. Political decisions, especially these related to the agricultural sector, may be treated as of a great importance. As a consequence, the farm owners seek to diversify their sources of income and run other strategies aiming at stabilizing their earnings. An important

element of these strategies is getting the off-farm income by farmers.

Exploring microeconomic models of farm household may be treated as a starting point for a further analysis of the off-farm income. Agricultural economists, particularly in the U.S., have developed a theory of the farm household income, deriving from the neo-classical microeconomic theory. An integration of the theory of farm production and household consumption has posed a complex and subtle dilemma for agricultural economists. Barnum and Squire (1979: 79) indicated a series of empirical studies (for example, they enumerated Chayanov 1925; Sen 1966). Berry and Soligo (1966) and Nakajima (1969) referring to this abovementioned research problem<sup>1</sup>. Levins and

<sup>1</sup>References that are important from the point of view of the evolution of agricultural economics are given in the bibliography of the article written by Barnum and Squire (1979).

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Cochrane (1996) noted that the so-called “treadmill model”, proposed by Cochrane in 1958, explains why rural residents leave farming. The technology treadmill, driven by the adoption of new technologies, results in lowering their income. Barnum and Squire (1979) underlined the fact that “the decrease in household labour supply leads to a substantial increase in the demand for off-farm labour” (p. 16). Furthermore, Ward (1993) underlined the implications of development in agriculture from the perspective of the rural environment.

The off-farm income may be determined by many factors. The following article focuses on the most important ones. On this basis, recommendations for the socio-economic policy are formulated. In addition, we have identified some niches and proposed further directions in research areas. Our article sheds light on the typology of determinants of the off-farm income. The conclusions show the determinants that may help farm operators to minimize the risk related with farming.

According to the literature we have studied, there are many categories describing the “off-farm income” that are used synonymously: non-farm, non-agricultural. However, there is some inconsistency in this terminology, the authors define the off-farm income as an income generated from various assets and activities different from farming.

Our research objective was to identify and analyse the determinants of generating the off-farm income at various levels. We focused on the chosen group of determinants that are mostly studied in the literature and have a significant impact on the off-farm activity. These factors are presented in the following categories: agricultural policy, social and demographic characteristics, environmental determinants, farm productivity. The last category can be treated also as the consequence of generating the off-farm income. Additionally, the relations between the particular groups of determinants and their impact on the non-farm income are also discussed.

The remainder of our article is as follows. In the first section, we present the selected aspects relating to the instruments of agricultural policy. The second section describes the socio-demographic characteristics as potential determinants of the off-farm income. In the third section, we focus on the environmental aspects. The fourth section analyses the farm productivity and its impact on the non-farm employment. Our article concludes with the recommendations for the policymakers and proposals for a further in-depth empirical research.

### **The perspective of agricultural policy: how may the combination of support instruments affect the farmers’ decision on the off-farm work?**

The off-farm income as a broad economic and financial category is affected by a set of various factors, including the macro, mezzo and micro levels. There is a growing body of literature on the significance of the instruments of agricultural policy, mainly the governmental payments. Reardon et al. (2007) reported that rural off-farm income has accounted for 40–60% of farm income in the Latin America, Asia and Africa. This means that such non-farm incomes are significant for the farm households. According to Jelínek et al. (2010), Zhao and Barry (2014), the off-farm revenues (and, consequently, the off-farm income) are significant as a crucial element of the safety net.

Serra et al. (2005) showed that the introduction of fixed decoupled payments in 1996 may have contributed to reducing the likelihood of the non-farm economic activity. The negative impact of decoupled payments on labour in the non-farm sector suggests that a growth in payments supporting the farm income can reduce the sources diversification of the farm income, while increasing the dependency on the production carried out on the farm or mainly on the subsidies. However, it is also true that the effects of payments supporting the farm income, diminishing the increase in the participation in the non-farm labour, can be reduced by decreasing the government involvement in the agricultural market, which could be an incentive to take job in the non-farm sector.

Mishra and Goodwin (1997) argued that the government farm payments lessened the need for the off-farm work by farm households in the USA. Ahearn et al. (2006) underlined that after the introduction of the 1996 Farm Act in the USA introducing decoupled payments, the observed increase in the participation of farms – that received the decoupled payments – in the non-farm labour market, was not the result of the policy changes from 1996. The government payments – decoupled or coupled – have a negative impact on the participation of farms in the non-farm labour market.

The research on decoupling and the off-farm labour market participation of Irish farmers was dealt with by Hennessy and Rehmann (2008). They underlined that the decoupling of direct payments is likely to increase the probability of the farm households participating in the off-farm market. Nonetheless, Bojnc

and Ferto (2013) confirmed the negative impact of the government subsidies on the technical efficiency of farms with and without the off-farm incomes in Slovenian farms in 2004–2008. This indicates that a potential impact of agricultural subsidies (incl. the CAP payments) for farmers seems too ambiguous.

As Jette-Nantel (2013) indicated, the problem of the income diversification as a kind of income support instruments (incl. payments) has increasingly become exposed. This abovementioned Canadian economist (2013) compared the off-farm income to ‘a private risk management tool’. However, promoting the income diversification may improve the ongoing agricultural policies in developed countries. Ibekwe et al. (2010), stated that the shift from ‘closed’ agricultural policies with various support instruments to a significant level of the openness to international markets in the near future, with the on-farm or off-farm diversification, will affect the structure of agricultural sector (McNamara and Weiss 2005).

The issue of the impact of payments for agro-environmental services (PES) in Costa Rica was profoundly explored by Arriagada et al. (2015), who used the household-level data from 2005 from 3 regions of the abovementioned country. A conceptual framework was based on a survey method, referring to the changes in the rural household’s situation between 1996 and 2005. The results from the empirical study of Arrigada et al. (2015) indicate a neutrality of the agro-environmental payments as a stimulant of the decision on the off-farm labour.

Another aspect was explored by Mishra and Paudel (2011), who investigated the concept of the “permanent income” of the U.S. farm households. They noted that the “estimated permanent income” may be useful for the explanation of “the variations in household wealth”. Results of the empirical studies of Mishra and Paudel (2011) show that the participation in the farm commodity programs reduced the price variability – the positive coefficient of the variable describing government payments. On the other hand, the off-farm income was a statistically significant determinant of the ‘total household income’ and the ‘farming income’, respectively. However, in the line with some presumptions, the off-farm income had a negative impact on the income from agricultural activities (called the “farming income”). Generally, Mishra and Poudel (2011) put an emphasis on the fact that the role of the off-farm income cannot be reduced only to the selected functions related to the “transitory income” for farm households. Similar

empirical studies were conducted by Renner et al. (2010), who explored the dependencies between the income diversification and other farm’s and household’s specific factors. An estimation of an empirical model of Mishra et al. (2004) indicated that farms generating the off-farm income were less diversified, whereas the entities benefiting from governmental programmes shifted to a higher diversification. Renner et al. (2010) proved that a potential increase in the farm income may be the main rationale for the farm income diversification. Additionally, from the perspective of agricultural policy, they proposed focusing on the ‘heterogeneous need’ of rural households.

Direct payments are treated as the fundamental element of the “farm safety net” within the Common Agricultural Policy. For example, the results from the broad empirical studies of Kleinhanss (2015) showed that the income support in the form of direct payments was necessary even for the large-sized agricultural holdings in German. The dependence of farm households on the EU subsidies meant, at least, an ability to remunerate own and external factor costs’. Similarly, Beckman and Schimmelpfennig (2015), who dealt with identifying the determinants of farm income, deliberately omitted governmental payments and other forms of support, given the ‘insulating effect’ of various income support instruments.

El-Benni et al. (2012) analysed the effect of agricultural policy on the income variability of Swiss farms. On the one hand, generating an additional income resulted in the increased level of the revenue risk. Consequently, El-Benni et al. (2012) argued that designing the revenue insurance product should include the off-farm income.

Lagerkvist et al. (2007) shed some light on the interrelation between the off-farm labour (and consequently, the off-farm income) and the farm capital accumulation. They employed ‘a recursive two-step simultaneous censored equations model’ for data between 1993 and 2002. They underlined a significant “off-farm labour state dependence”, with interrelations between the past and present farm behaviour.

Mishra and Chang (2009) analysed what determined the precautionary savings of the U.S. farm households. A higher income risk results in an increase in the level of these financial resources. Mishra and Chang (2009) stressed that the stabilisation-oriented policies consequently reduced the income variability, and, as a result, reduced the level of the precautionary savings.

Blanck and Bahrs (2009) analysed if the income deposits as an income risk management tool may be

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implemented to the German agriculture sector. They noticed that strong fluctuations of the farm income may lead to new solutions in the income stabilization. Income equalization deposits, consistent with slight changes in the tax law, may motivate farmers to use financial reserves.

To conclude, several empirical studies focus on the dependencies between various payments and the income diversification. In general, the impact of the governmental or the EU payments may be assessed as ambiguous and depends on the perspective on the analysis (the research period, location). The results from empirical studies we cited indicate that the type of the support instrument is of a great importance for generating the off-farm income.

### Social and demographic characteristics

Socio-demographic characteristics constitute a very significant groups of determinants affecting the off-farm income. The transfer of research methods in social sciences has led to an in-depth analysis of farm operators.

Lien et al. (2010) conducted research about the determinants of the off-farm work and its effects on the farm performance among the Norwegian grain farmers in the period 1991–2005. The results show that social factors, such as the age and family circumstances, have an impact on the participation of farmers in the off-farm work. They found that the effect of the farmer's age on the off-farm work had an inverted "U" shape. Additionally, the peak of the inverted "U" was at 31 years (when as a dependent variable used the farmer's and/or partner's off-farm combined work, and 34 years when as a dependent variable used only the farmer's off-farm work hours). They underlined that the farmers are more eager to increase their work effort in the earlier years (in their middle years) in order to expand their incomes, which was supported by the studies of Huffman (1980). Lien et al. (2010) also estimated that the farmers, who are single, are not so engaged in the off-farm work as the farmers with partners. What is more, Goodwin and Mishra (2004) say that the presence of children under the age of thirteen years in the household considerably decreases the supply of the off-farm labour. The cross-sectional studies of Zhao (2014) indicated that the family size as the proxy of the rural human capital can stimulate rural households to be interested in the off-farm diversification. Moreover, Zhao (2014) noted that the patterns of the income

diversification may be explained by 'referring to the neighbouring household behaviour'.

Huffman (2001) also indicated that the farmers with a better education are more likely to use the opportunity of the off-farm labour market because they have a better earning capacity off-farm. Goodwin and Mishra (2004) confirmed that education has a high impact on the supply of labour to the off-farm employment opportunities. They calculated that each additional year of education means the growth of the annual supply of labour by more than 15 hours.

Gillespie and Mishra (2011) presented results of the tobit model of the off-farm work hours in the USA. They showed that the age and age squared (for the consideration of nonlinearities) are significant and the quantity of the off-farm hours work increased until the age of 39 and decreased hours after the age of 39. Also VanWey and Vithayathil (2013) focused on the social capital in taking the off-farm work in a rural settlement in the Santarem region of the Brazilian state of Para. They explored the role of the human capital (i.e. gender, age and education), labour supply and demand and other features of the households in securing the off-farm work (Berdegue et al. 2001; Ferreira and Lanjouw 2001; Murphy 2001; Reardon et al. 2001; Yúnez-Naude and Taylor 2001). They underlined that a 30-year-old male's predicted likelihood of working off the farm in a lower-pay work is greater than his likelihood of working off the farm in a higher-pay work; the reverse holds true for the females. Women are far less likely to work off the farm, but those who do so are more likely to engage in a higher-pay work. VanWey and Vithayathil indicated also that the education is a characteristic which helps to predict the probability of participating in the higher-pay off-farm work. The research gave the results that for a 30-year-old with 7 plus years of education, the likelihood of taking the off-farm higher-pay work is more than 3 times greater than the probability of taking the off-farm lower pay job.

Goodwin and Mishra (2004) focused attention on an important intangible factor influencing the work decisions – career objectives. This satisfaction is related to the career goals and aspirations. They found that the career objectives are important in determining the allocation of the labour effort for farmers. They also evaluated the relationship between the off-farm work and farming efficiency. Goodwin and Mishra expected that the farming efficiency has a negative and statistically significant effect on the off-farm labour supply. They also proved that each

additional year of education increases the annual supply of labour by more than 15 hours.

Howley et al. (2014) conducted an interesting research related to the non-pecuniary benefits affecting the decision to enter the off-farm labour and the amount of time spent working off-farm in Ireland in 2011. They found that the non-pecuniary benefits act as a barrier to taking up an off-farm job. They introduced the variable such as “farming values” which consists among others of: independence of farmers, pride associated with business ownership, opportunity to work outdoors and social interactions. Their research means that the farmers try to find a balance between their economic and social goals.

Another important aspect related to the socio-demographic characteristics of farm households seems to be the number of family members. For example, Mishra and Chang (2012) used two stages of econometric modelling on the farm-level data in order to analyse the significance of various groups of variables explaining the off-farm work decisions and the household expenditures on the private health insurance and retirement savings. They included “the number of children under 6 years of age” and “the number of adults” as variables describing human capital. Similarly, the empirical studies of Van Leeuwen and Dekkers (2013) shed light on the detailed set of socio-demographic variables that may explain the off-farm income generation. It should be noted that they based their research on the spatial micro-simulation accompanied by the GIS techniques in order to employ a micro-level data. They included “the number of family members” as one of the potential explaining variables. Although their studies were oriented to the attempt to identify the spatial patterns, the most interesting results indicated that the socio-demographic characteristics were not important as the features describing agricultural productions and the access to job centres.

To conclude, many previous studies highlighted that the demographic characteristics play a significant role in the rural household income. For example, improving the education level of farmers is expected to raise the farm outputs and non-farm wage rates which was analysed by Huffman (1980), Taylor and Yunez-Naude (2000) and others. Also the gender of household head is considered to be a relevant factor that affects the farm operating efficiency (Zhao 1999; Yunez-Naude and Taylor 2001; Brosig et al. 2007). Zhao and Barry (2014) analysed the agricultural market in China and proposed two policy implications

such as: one is to promote the supply of the off-farm job opportunities by encouraging the establishment of labour-intensive firms in agricultural areas; the second one is to improve the rural labour quality by extending training programs and education that facilitate the households’ migration and entrances into the off-farm activities.

#### **“Environmental” determinants of the off-farm income**

As Bessant (2006) stressed, the economists investigated the part-time farming since 1930s. Amongst the micro-determinants, there are numerous factors, related to the relationship between a farm household and environment.

Hu et al. (2015) explored the ‘rural workers’ locational choice’. They included ‘site characteristics’ (distance to town/cities, urbanization, population) and ‘capital city variables’ (distance, population, house price and wage). In line with the expectation, both the distance to the railway station and the ‘border of destinations’ were negatively correlated to the variable describing the off-farm worker’s destination choice. Opposite results were indicated by Alasia et al. (2009). Based on the micro-level data from the 2001 Census of Agriculture with the community level data from the 2001 Census of Population, Alasia et al. (2009) analysed the off-farm labour decisions of Canadian farm operators and identified reasons why the rural residents generate off-farm decisions. They found that a relatively small distance did not affect positively the off-farm income work engagement.

Whereas Bessant (2000), De Janvry and Sadoulet (2001), VanWey and Vithayathil (2013), Van Leeuwen and Dekkers (2013) and Key et al. (2015) identified that the role of factors concerning the location of farms (namely, the regional characteristics) cannot be neglected in the analysis of factors determining the off-farm income, McNamara and Weiss (2005) referred to the role of environmental aspects. The empirical studies of De Janvry and Sadoulet (2001) investigated the urban-rural linkages, namely the number of urban centres.

McNamara and Weiss (2005) identified, inter alia, the determinants of the off-farm diversification (part-time farming) of farms in the Federal State of Upper Austria (Austria). The estimated model based on the panel data from Data Census in 1985 and 1990. McNamara and Weiss (2005) also included some explanatory variables concerning environmental as-

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pects. The results from the estimation of econometric models indicated that the location of farm households in more productive areas decreased the probability of generating the off-farm income.

Key et al. (2015) analysed the income instability of farm households in the Continental United States. They used a panel dataset of the Agricultural Resource Management Survey from 1996 to 2013. They found that one of the exogenous characteristics, namely the location of farm households, explained the income variability.

De Janvry and Sadoulet (2001) analysed the determinants of the access to the off-farm sources across rural households in Mexico. They built detailed models from various types of income (including the off-farm income). The results from tobit models indicated that the location characteristics played a significant role in explaining the participation in the off-farm activities. Location characteristics included: the number of urban centre within 1 hour, the number of rural centres within 1 hour, regions (North Pacific, Centre, Gulf, South). The number of rural centres within 1 hour travelling distance affected the probability to generate the off-farm income. De Janvry and Sadoulet (2001) also included the characteristics connected with the land assets (the area of irrigated land owned, rainfed area owned, pasture area owned). The off-farm sources of income were negatively affected by the households located on the irrigated and rainfed lands.

Mishra and Chang (2011) analysed the impact of the off-farm income generated by ‘the farm operator and the spouse on the healthcare expenditures and retirement savings of farm households in the United States’. They used data from the 2003 Agricultural Resources Management Study (ARMS). The first step in the econometric framework was to identify the reasons why the farm operator and the spouse select the off-farm work. Moreover, Mishra and Chang (2011) included the group of variables referring to the location and the local economy (inter alia, the distance to the nearest town > 10 000 inhabitants, the percentage of the labour market area population living in urban areas). Their results indicated that the characteristic related to local economies affected the off-farm employment of farm couples. It should be noted that the urban share of population positively influenced the likelihood of generating the off-farm income.

Based on interviews with the male farm operators in Southern Manitoba, Bessant (2000) used the principal axis factoring. The list of input variables

for the factor analysis included, among others, the motivational and attitudinal factors, the ‘anticipated changes’ and the ‘positive/negative attitudes toward farming’. One of the factors (Factor II: Large-scale Crop Production) referred to the farm characteristics and their relation to environment (inter alia, the ‘total number of hectares cultivated/owned’).

Hennessy and Rehman (2008) analysed how the ‘decoupling’ reform of the Common Agricultural Policy affected the labour allocation decisions of farmers in Ireland. They based their research on the Irish National Farm Survey (NFS) dataset for 2002. Their econometric approach for building the model included various independent variables concerning the farm description, including the agricultural area, the number of livestock units.

Van Leeuwen and Dekkers (2013) analysed how various group of determinants (‘household, farm and spatial characteristics’) affect the off-farm income in the Netherlands. They also investigated into the role of spatial patterns (including the strength of the connection between rural areas and the local town). Their findings were consistent with the previous results of broader empirical studies showing that spatial characteristic may affect decisions on the engagement in the off-farm employment (Van Leeuwen 2010). Moreover, VanWey and Vithayathil (2013) investigated the factors affecting the off-farm work among rural households in the Brazilian Amazon. Their empirical studies shed light on the role of the characteristics of households (including the location of the farm property, and, additionally, spatial features, such as the “travel time to city” or the “road quality”).

To summarise, numerous sets of factor describing spatial characteristics of farms (location, relation between farms and environment) seems to constitute the so-called “exogenous layer” that cannot be controlled or may be controlled only slightly by the farm operator. As we explored, a detailed analysis of determinants of the off-farm income includes a group of variables referring to the agricultural policy. ‘Environmental’ determinants relate to the spatial patterns and seem to be relatively stable over the long period of time. Considering factors related to the socio-demographic characteristics of farm operators is of great importance

### Farm productivity

The economy development provides more employment opportunities for farmers in the non-farm

sector. The economy development is not directly focused on the economy growth but influences the conditions under which the production and services occur. It creates the economy, society and culture that build up the environment where people live in the terms of income, services, life chances, education etc. (Jeníček 2016).

According to the literature, much attention has been paid to the relations between the off-farm employment and farm productivity, which is also determined by the farm size, the farm assets value, the value of production, specialization etc. The off-farm employment influences the allocation of the family labour and thus affects the farm productivity. On the other hand, the off-farm income stabilizes the household financial situation by minimizing the risk associated with agricultural production and reducing the total farm income variability. However, some studies indicate that one of the fundamental factors that force farm proprietors to the off-farm activities is the technical inefficiency and the low farm productivity.

Chang and Wen (2011) compared the production behaviour of rice farmers including the farm and off-farm employment. The results show that the technical efficiency and the productivity of farmers with the off-farm work is lower. It is suggested, that the farmers without off-farm work are more concentrated on the farm management and have a better knowledge about the inputs of production what is reflected in their more productive use of own labour, pesticides and fertilizer. The differences in the input uses are also observed in the hired labour. It is believed that supervision may improve the hired labour productivity what is strongly observed among the farmers without the off-farm work, as the off-farm employed farmers are less able to supervise their hired workers. The production yields of the farmers without the off-farm employment are also more responsive to their investments into the machinery and equipment comparing to the farmers with the off-farm work.

Bessant (2000) suggests that the off-farm work, especially when the household assets (like buildings, machinery, equipment etc.) have a limited productivity, might be a very efficient management decision, assuming that undertaking the off-farm work is not driven by saving the farm.

Damianos and Skuras (1996) found that the farm size is not statistically significant for the off-farm employed farmers. The greater land, the higher the willingness to maintaining the traditional farm production and services.

Gillespie and Mishra (2011) indicate that the relation between the off-farm work and farm productivity is also influenced by the farm specialization. The off-farm employment increases the farm production value in case of beef or broilers and lowers the production of milk or crops. In some cases, as the dairy production and many field crops (grains, soybeans, cotton and others), the farm production and the off-farm work do not appear to be complementary due to the extensive government programmes that provide payments to farmers directly. So that those receiving higher governmental payments worked less off-farm and were the dairy and crop farmers rather than the beef and broiler. Therefore, the relation between the off-farm employment, farm productivity and government payments is observed.

Goodwin and Mishra (2004) proved that the farm efficiency is decreased by a greater engagement in the off-farm employment what is in line with the previous studies indicating that the off-farm work may have implications for the efficiency of farming. According to Godwin and Mishra (2004), an additional 1 hour of the off-farm work lowers the farm efficiency ratio (measured by the relation of the gross cash farm income and the total variable costs) by 0.17. Such relation is not statistically significant in the case of the county – level average yield and the total acres operated.

Lagerkvist et al. (2006) tested the farm households' joint decisions to work off-farm, and their investments into the farm capital, respectively, using a farm level data set involving 252 sole proprietorships in the South-western Minnesota. A strong support is found for the endogeneity of the farm capital in the off-farm reliance model. The off-farm income, on the other hand, has no explanatory power in the farm capital model. In addition, the evidence of a true state dependence of the off-farm income reliance is supported by the data.

Khanal and Mishra (2014) consider agritourism and the off-farm work as the income diversification choices simultaneously and analysed factors influencing such choices. Further, the study assesses the impact of agritourism, the off-farm work and both on the gross cash farm income and the total farm household income. The authors utilized a large set of nationwide farm survey data and the selectivity-based multinomial choice model. An important finding of this study is that the small farms have a higher household income if they choose both income diversification strategies rather than a single strategy.

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Papadopoulos and Papanikos (2005) investigate the employment of wine growers on a Greek island (Samos) where an attractive alternative employment opportunities exist, particularly in the tourist sector. The authors characterized some descriptive statistics on the demographics of wine growers and the characteristics of vineyards and developed a probit model to identify the demographic and other determinants of the probability of the off-farm and off-vineyard work participation. The most important source of data information is the primary data collected by the authors, using a questionnaire, which was completed by a representative sample of vine growers from the island of Samos. The empirical findings suggest that the promotion of winegrowing requires policies that will enlarge the size of the vineyards, promote investments into the human and physical capital, and improve the public infrastructure. The empirical evidence of Samos supports some elements of the rural development programs suggested by the earlier researchers. First, given the extent of the off-farm work participation, the only way that vine growing can be sustained is by encouraging the pluriactivity of vine growers. Second, there is a need for investments into the human and physical capital. Third, the policies to promote the economies of scale in farm production are recommended. The empirical evidence has shown that the size of the vineyard is small.

Low farm productivity might be a crucial factor determining the decision of the non-farm employment as necessary to the safety of the farm. However, as some studies highlighted, there are situations in which the non-farm activity is undertaken despite the relatively good farm productivity. This causes certain consequences, as lowering the farm productivity due to the limited farm supervision. Surprisingly in some studies, the positive relation between the farm productivity and the off-farm incomes is also observed. This may be explained by the fact that acquiring new knowledge, skills and experiences influenced the operators' efficiency on their own farms.

### Farm exiting

The economy development provides more employment opportunities for farmers in the non-farm sector. The economy development is not directly focused on the economy growth but influences the conditions under which the production and services occur. It creates the economy, society and culture that builds up the environment where people live in

terms of income, services, life chances, education etc. (Jeníček 2016).

The influence of the off-farm employment opportunities on farming are not clear. On the one hand, the off-farm income is expected to influence positively the farm activity as an additional financial source. It gives the opportunity to survive and supports the "way of life" in the periods of crisis. On the other hand, it might be an important factor in increasing the probability of farm exiting. In that case, the farm proprietors find better possibilities derived from quitting farming and becoming fully off-farm employed.

Foltz (2004) found that farm exits are increased by the development pressures and historically low unemployment rates. It was also noticed that according to the relatively high importance of the non-price variables in determining the farm exits, price policies alone will not maintain farming in the case of dairy farmers in Connecticut.

Tiller et al. (2009) concluded that since 2004, 50% of the sample burley tobacco growers in Tennessee, North Carolina and Virginia have exited farming over the period of three years. The factors that influence inversely the farm exiting are the tobacco price, the percent of income from tobacco and the farm size. The direct variation was observed in the case of the farm size and the farmers level of education. It was found that the exit hazard rates are significantly different among the states studied because of the farm size that mostly describes these states heterogeneity.

Möllers and Fritzsche (2010) investigated the factors determining farm exits on the base of the Croatian family farms. The authors found that mixed activities and the part-time farming are at the core of the expected future farm developments. The exit from farming is the least probable in the case of elderly farmers and those who are successful in farming. The clear trend toward the off-farm employment is observed, however, according to the authors, it does not lead to the final abandonment of farming.

Mishra et al. (2014) verified whether the farm exit is influenced by the program payments intensity or by the decisions related to the off-farm employment of the farm operator or his/her spouse. Farm programs payments provide the income stability to the farm operator households and increase the staying power to farm for the next generations. The opposite effects were observed according to the off-farm employment. If the farm operator has a full-time non-farm employment, then he or she has a lesser likelihood of exiting the farm in comparison to those who are

part-time employed. The authors also found that due to the perception of the financial security, the access to retirement benefits positively influences the farm exit. The likelihood of exiting farming is also positively related with:

- having grown up on the farm – farm operators who were raised on the farm are more likely to exit farming, probably as a result of the lack of financial security available for them and their families and the further generation;
- education – those farmers with a lower level of education have a stronger willingness to exit the farm due to the limited managerial skills.

In addition, the factors like the location, the size and type of the farm also influence exiting.

Bragg and Dalton (2004) studied the reasons why dairy producers leave the industry. According to the authors, farm exit decision is a function of the demographic, efficiency and opportunity costs. They proved that older producers, an off-farm income, lower returns over variable costs and a greater diversification of the farm income influence more the decisions to exit the farm. The odds of farm exiting are lower when the off-farm income is less important than the on-farm income. Thus, the off-farm income raises the probability of farm exiting when the proportion to the total farm income is greater than in the case of the on-farm income. If the off-farm income dominates in the total farm income, the probability that the farm proprietor will quit raises by nearly 5 times.

Viira et al. (2014) aimed to investigate the process of structural changes in Estonia. It was concluded that in the case of Estonia, the exit from farming is positively related with the off-farm employment and age (younger farmers have a lower probability of exiting). In contrast, the likelihood of farm exits decreases with the availability of successors and the level of education that increases the farm growth and the survival probabilities.

Breustedt and Glauben (2007) proved that the off-farm employment is one of factors decreasing the farm exit rates in the European Union agriculture. In this study, the off-farm work was measured as a share of the farm operators working more than 50% of their time off-farm. So in that case, the higher the share of the part-time farm operators, the lower the farm exit rates, what is in contrast to the previous studies.

Farming is characterized by a relatively high operational risk. As the studies indicate, exiting from farming may be determined by many factors: politi-

cal, environmental and socio-demographic as well. The opportunities created by the economy provide occasions to gain additional financial sources that support the income stabilization. While the regional programs dedicated to the agriculture development help to maintain farming, the non-farm activities, especially the full-time employment, often lead to exiting from farming. Exiting from farming is also highly determined by the farmers' individual situation (age, education, family status) and the farm profitability.

We state that in the line with the existing literature, the farm exit decision may be driven by an increasing share of the off-farm income in the total income.

## CONCLUSION

Our paper reviews the selected key groups of determinants of the off-farm income, in particular these related to the agricultural policy, the socio-demographic characteristics of farm operators, the environmental and microeconomic aspects, with the aim to propose further steps of a detailed analysis. The value added of our article is an attempt to identify the mechanisms how the particular instruments may influence the farmers' decisions on generating the off-farm income. That was enabled by a broad analysis, taking into account the current literature from the EU countries, the USA, Canada and, to a lesser extent, also other countries (e.g. China).

A complex of support instruments of agricultural policy may affect it in an ambiguous way. In general, as mainly American agricultural economists found, the obtained subsidies, regardless of their type (coupled vs. decoupled, production or price support instruments), may discourage farmers from the decision on the non-agricultural employment. The participation of the members of the farm family households in the non-farm labour markets depends strongly on the policy of decoupling. That was noted, for example, in the EU Member States (for example, in Ireland by Henessy and Rehmann (2008) or Bojnek and Ferto (2013)). It should be noted that a significance of direct payments is still very high, even in very developed agricultural sectors (for example, German agriculture with relatively large-sized farms). This corresponds to the concept of the "farm safety net". The role of agro-environmental payments (PES) on generating the off-farm income seems to be ambiguous. This may result from a limited number of empirical studies.

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The socio-demographic characteristics (inter alia, the educational background, gender, age and marital status) of farm operators affect significantly generating of the off-farm incomes and their amounts. Nevertheless, the strength of this impact depends on the situation in labour markets (wage rates, unemployment rate as for the local labour markets).

The explored link between a single farm and its environment (in general, the “site characteristics”, related to the location of farm households) indicates that there is a limited group of factors that may be out of control by the farm operators. This may refer to the issue of urban-rural linkages and migration processes in developed countries.

We propose some methodological suggestions concerning further empirical studies. Panel models (consisting a farm-level data) should base on a relatively long period of research, which allows to capture the impact of changes in agricultural policy on the off-farm income generation (as a dummy variables), their amounts and structure of the farm family income. As for investigating the potential impact on the non-farm activities, the spatial micro-simulation accompanied by the GIS techniques (for example, utilised by Van Leeuwen and Dekkers (2013)) may be a useful modern tool for more in-depth analyses. The so-called “environmental” determinants of the off-farm income may be explored by the combination of the abovementioned GIS technique, the techniques of the multidimensional comparative analysis and the Data Mining approach (for example, the classification trees, the Kohonen maps). There is a strong need for preparing the typologies of farm households representing various attitudes to the decision on the off-farm activities. A particular attention should be paid to the spatial characteristics of farm households.

We recommend that before changes concerning the amount and form of the support instruments, a research (even on a sample of farmers that are deliberately selected) concerning the possibility of the impact of their decisions on the labour market should be carried out. Results from empirical studies (for example, based on a Delphi method) may be utilised as a valuable tool for the policymakers. The main question is whether the off-farm income should be treated as the “transitory income” of rural households with their “heterogeneous need” (Renner 2010). Consequently, various rural development programmes (RDPs), regardless of their geographical location, should stimulate actions to support the development of rural labour markets, including initiatives in

entrepreneurship, taking into account the paradigm of the sustainable public finances. Various types of investment into the legal and social infrastructure (for example, the small-sized food or fibre processing, agro tourism) for generating the off-farm income should pay off in a long-run perspective. Investments of the public sector related to the improvement of the educational level of the population of “native” agricultural inhabitants of rural areas should be underlined not only in the developing countries, but also in the developed states. A key issue is to reduce or eliminate some obstacles that may hinder the transition from the profile “agricultural-oriented” educational background to a more flexible general education. Life-long learning programmes (mainly, financed from the international or public national funds) may help to change the current educational habits of the members of farmers’ families. The “exogenous” layer of the determinants of generating the off-farm income needs a particular attention of the policy makers. Particularly, the accelerated processes of the depopulation in rural areas with a poor suitability for agricultural production (e.g. poor, sandy soil) may be a prerequisite for shaping the regional development programmes, given the development of infrastructure surrounding small urban centres.

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