JEL: Q11, Q13

Inna Koblianska[1], Serhii Seheda[2], Olha Khaietska[3], Larysa Kalachevska[1,4], Tetiana Klochko[1]

[1]Sumy National Agrarian University
[2]Vasyl' Stus Donetsk National University
[3]Vinnytsia National Agrarian University
[4]University of Applied Sciences Weihenstephan-Triesdorf (HSWT)
[1-3]Ukraine
[4]Germany

DETERMINANTS OF POTATO PRODUCER PRICES IN THE PEASANT-DRIVEN MARKET: THE UKRAINIAN CASE

Purpose. *Potato is one of the most important crops to ensure food security globally; potato growing is also a source of income and livelihood for the poorest, especially in developing countries. In view of this, studies on factors affecting potato prices could stimulate agripolitical measures in food security, rural wealth, potato industry and small farms' development. This paper aims to explore whether the factors affecting potato prices for business entities and farm households operating in the same (but peasant-driven) market are different. Based on the available statistical data and the research background, we focus on the relationships between wages, production (yields and harvested areas), and potato producers' prices in Ukraine.*

Methodology / approach. *Using the cross-sectional data on potato producer prices, harvested area, and yields of enterprises and households, and average monthly wages in Ukrainian regions for 2018–2020, we used a system of simultaneous equations to model behavior of potato producers' prices (for enterprises and households) through the two-stage least squares method.*

Results. *The Ukrainian potato industry is featured high rates of potato self-provision (through subsistence farming) and the dominance of farm households at the market, allowing exploring trends and factors of peasant-driven potato market development. The results obtained through modelling of an interrelation of potato producer prices indicate different potato price determinants for enterprises and households: price in enterprises adjusts to fluctuations of potato yields in both enterprises and households (calculated average elasticities are -0.27 and -0.55, respectively, indicating the more significant influence of the latter); households' price responds to changes of enterprises' potato prices and average monthly wage rates (with average elasticities 0.49 and 1.35, respectively).*

Originality / scientific novelty. *Research results empirically evidence that households' dominance and a large portion of food self-provision constrain the potato industry development. This enhances a better understanding of subsistence farming's impact on markets and food industry development and extends the theoretical framework of households' economics and peasant-driven market functioning.*

Practical value / implications. *Understanding the role of households in the slow (obstacle) development of the potato industry reveals the need for a policy promoting storage and potato processing capacities development that could mitigate the adverse effects of peasant-driven market performance, decrease price vulnerability, and facilitate potato industry growth.*

Key words: *peasant economy, potato industry, price determinants, subsistence farming, price of fresh potato.*

Introduction and review of literature. Being a staple food for more than 1.3 billion people worldwide, the potato is the third most important crop given food security (after wheat and rise) [1]; it has diverse distribution patterns and, being cultivated in areas with high levels of poverty, malnutrition, and hunger, provides food, employment, and income for the most vulnerable groups of the population, especially in developing countries [1–6]. Given this, studies on factors affecting potato prices could stimulate agripolitical measures in the field of food security, rural wealth, potato industry, and small farms' development.

Studying potato industry development, scholars identify different factors affecting potato producer prices: demand growth [7], consumption (per capita, for feed), quality [8], losses during the storage [7], weather [2; 9], output, area, yields, logistics, market infrastructure, general economic conditions [5; 8; 10], production costs [9], world oil prices [2], labour and land inputs [4], etc. Taking into account that these factors are rather general and influence the pricing of different agricultural commodities, a set of product features should be highlighted, explaining the specificity of development in fresh potato market and price fluctuations: the potato is locally grown and consumed [1; 2], a perishable commodity with no residual stock between seasons and is not subsidized, as a rule [11–15]. Therefore, the fresh potato's price, being less dependent on global price fluctuations [1; 2], hardens with the new harvest and adjusts even to small changes in supply and demand following an "inverse demand function" [11–14]. The abovementioned studies and the obtained results are essential in view of food security provision and development of appropriate policy measures, but, being focused on the organized potato market, don't provide insights on potato pricing strategies applied by farm households and factors affecting these decisions, so they are not sufficient to support policymakers concerning the measures to ensure food security, income, and livelihood for the poorest, especially in developing countries.

Unlike business entities, peasant farmers underreact to market signals [16] and, making decisions on farm development and pricing, rely instead on certain expectations and beliefs, then forecasts and calculations [17; 18]. This is explained by the dual role of farms as producers and consumers of products [20–21], conditions of their functioning, i.e., an imperfect (or even missing) markets of goods and production factors [19; 22–24], and information asymmetry [25–27]. At the same time, it is the inseparability of production and consumption processes in farms that determines the specifics of their behavior and decision-making regarding production, consumption, sales and pricing [28; 29]. Due to inseparability, individual, intra-household factors [23; 30], much more important are the motives of farming [31], features of resource evaluation and results through "shadow prices" [31–33], which cause a weak connection between production decisions of farming and economic incentives [23]. Farm household economics is also closely linked to the labour market and labour economics [21; 23]. Labour market failures are one of the factors leading to the expansion of subsistence farming [24; 31], which in this case plays an important social role in ensuring food security and employment [34; 35]. This, together with the fact that labour is the most critical input in the production of basic food, causes the close

interrelation of prices and wages [16]. The dual nature of the farm household determines the dual relation between wages and food prices: wage increase can lead to an increase in food prices both by stimulating demand and increasing production costs [36–42]. The latter is a more critical reason for increasing food prices [43]. Moreover, in the case of missing food and labour markets (typical for most peasant economies [44]), food prices will rise with rising wages [37]. Because of its close relationship with the labour market, the wage rate is expected to be a significant issue concerning the farm household pricing decisions as a measure of opportunity costs of labour, and the value of the labour involved in farm household production [33; 45]. For potato production (due to its high labour intensity in farm households), the relationship between labour resources, wage rates, and farm households' decisions is critical: an increase in wages can lead to a curtailing of new potato growing technologies implementation [46] and even to a general decline of production volumes [41]. At the same time, there are no studies concerning the wage influence on farm households' prices for produced potatoes.

The purpose of the article. This paper aims to explore whether the factors affecting potato prices for business entities and farm households operating in the same (but peasant-driven) market are different. Based on the available statistical data and the research background, we focus on the relationships between wages, production (yields and harvested areas), and potato producers' prices in Ukraine.

Data and methods. Research data involve average annual data from the State Statistics Service of Ukraine on potato producer prices, yields, harvested areas, outputs and sales by enterprises and peasant farms for 1995–2020 to overview the industry and market long-term development trends, to outline the main actors and their power at the Ukrainian potato market. Data on foodstuffs' consumption and shares of foodstuffs produced by private farm holdings in Ukraine in 2020 are used to illustrate the peasant-driven nature of the Ukrainian potato market and the subsistence farming spread in this sector. To identify the main factors affecting potato producer prices at agricultural enterprises and farm households, the data on potato producer prices, yields, harvested areas and average monthly wages for 24 Ukrainian regions for 2018–2020 (from the State Statistics Service of Ukraine) by different types of producers was used. Due to many missing values and outliers, the final sample constitutes a cross-section of 44 observations. To eliminate the impact of inflation on economic values, nominal wage rates and prices were deflated with the GDP deflator (2018 = 100). We applied GRETLe-git (Ver. 3) to find the parameter estimates of the simultaneous equations system modelling the potato producers' prices behaviour (for enterprises and households) through the two-stage least squares (TSLS) method [47; 48].

Results and discussion. *Overview of the Ukrainian potato industry and market.* Since 2011, Ukraine produces more than 20.0 million tons of potatoes annually and is one of the leaders in world potato production. In 2019, in the rating of world potato producers, Ukraine ranks fourth after China, India and Russia with the production of 20.27 million tons. It enters "the world top three" on harvested area of potatoes (after China and India). At the same time, Ukraine is only 95th in the world ranking of

countries by potato yield, with 3.3 times lower yields compared to the world leader – Kuwait [50]. The low average yield is explained by the dominance of potato production in farm households.

Rural and urban households are the leading potato producers in Ukraine. With lower yields compared to enterprises, households harvest potatoes in areas that are more than 75 times larger than agricultural enterprises' areas. For example, harvested areas of potatoes in households was 1308 thousand hectares, while in enterprises – only 17.2 thousand hectares in 2020 [51] (Figure 1).

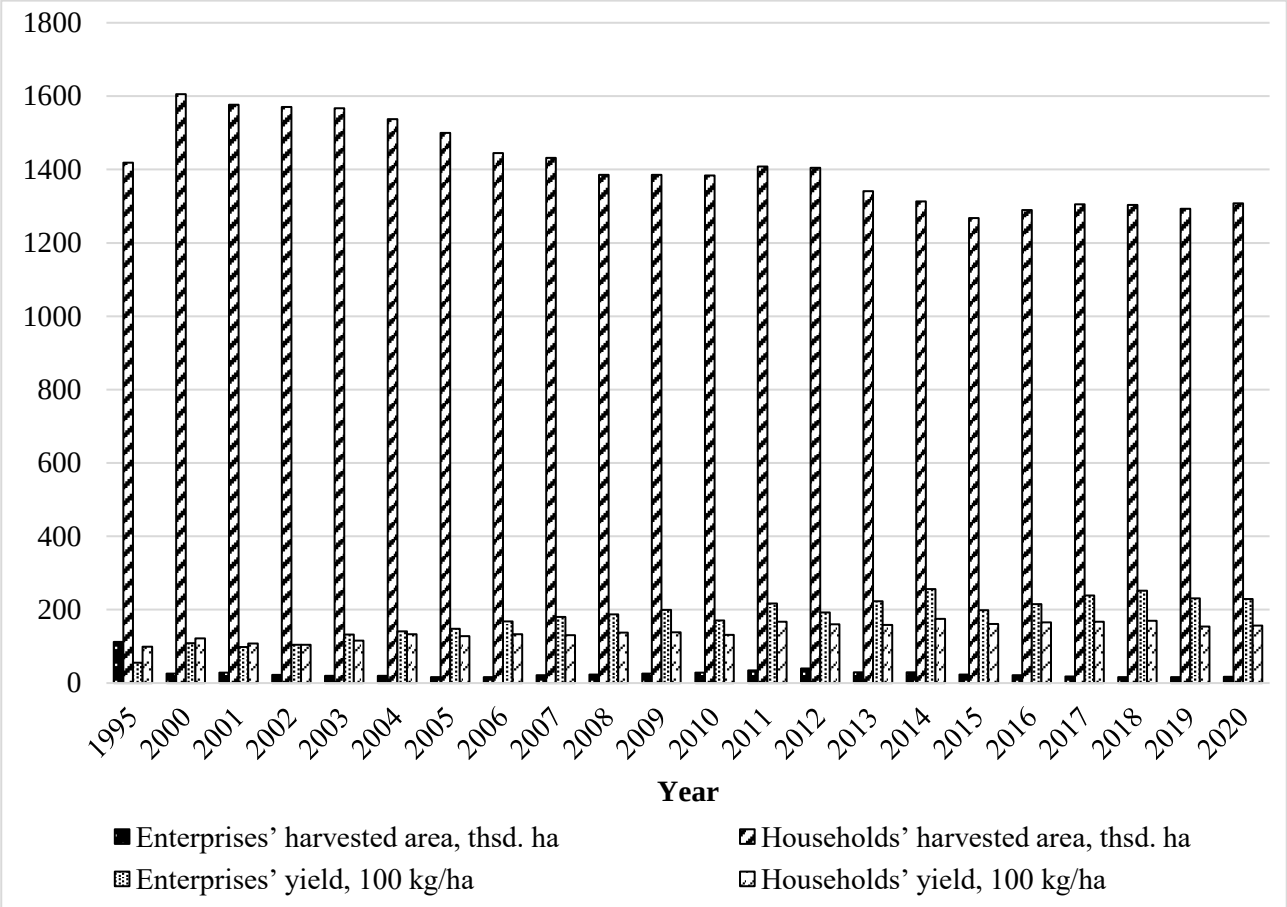


Figure 1. Harvested area of potatoes and yields by types of producers in Ukraine

Source: authors' elaboration on data of State Statistics Service of Ukraine.

Within the first fifteen years of Ukraine's independence, industrial production of potatoes (by harvested areas) gradually decreased: from 112.3 thousand hectares in 1995 to 16.4 thousand hectares in 2006. A revival of the industrial output in 2007–2012, typified by an almost doubled increase in harvested areas of potatoes in agricultural enterprises (from 21.6 thousand hectares in 2007 to 39.4 thousand hectares in 2012), was accompanied by the state support for vegetables and potatoes' storage infrastructure development resulting in the more than double increase of capacity of potato storage facilities (up to 650 thousand tons during 2009–2012). However, an abolishment of state support for the potato industry in 2012 caused a decrease in industrial potato production up to 17.2 thousand hectares in 2020. By applying modern technologies, industrial producers significantly increase potato yields: from 5.5 t/ha in 1995 to almost 23 t/ha in 2020, exceeding similar indicators in households by 46 %.

Being relatively stable from 2000–2019, households' average potato yield amounts to only 14 t/ha with a standard deviation of 2 t/ha (Figure 1).

To give a complete picture of households' engagement in potato production, it is expedient to point out that about 8315.3 thousand households in Ukraine have land plots as of the beginning of 2020 (56.2 % of all households). It is every third household in urban areas (36.0 %) and almost all in rural settlements (98.5 %), with 0.3 ha of land used per urban household and 2.8 ha per rural on average. Rural households' average share of potato sown area amounts to 11.8 % of the total area under crops per household [52].

The per capita consumption of potatoes (for all purposes) fluctuates on average at 136.3 kg per year [53]. Potato is an important element of the diet of an average Ukrainian: the annual consumption of fresh potatoes as foodstuff amounts to 72 kg. The urban household spend for potato 3.1 % of total food expenditures in average, while rural household – 5.5 % (the sum of total expenditures amounts to 4675.48 UAH and 4694.28 UAH respectively) [52]. Members of rural households consume 1.6 times more potatoes compared with urban ones (Figure 2). According to 2020 statistics, 99.8 % of potatoes consumed in rural households are self-produced; members of urban households satisfy their needs in potatoes as foodstuff by their own production for 19.1 %. Potato is the only food product in the Ukrainian economy characterized by such a level of self-provision (58.5 % on average), as it is shown in Figure 2.

According to the state statistics [54], the following households demonstrate the highest level of potato self-supply, compared to the average (58.5 %):

1) consisting of more than five persons (84.3 % of the consumed potato is produced in private farm holding);

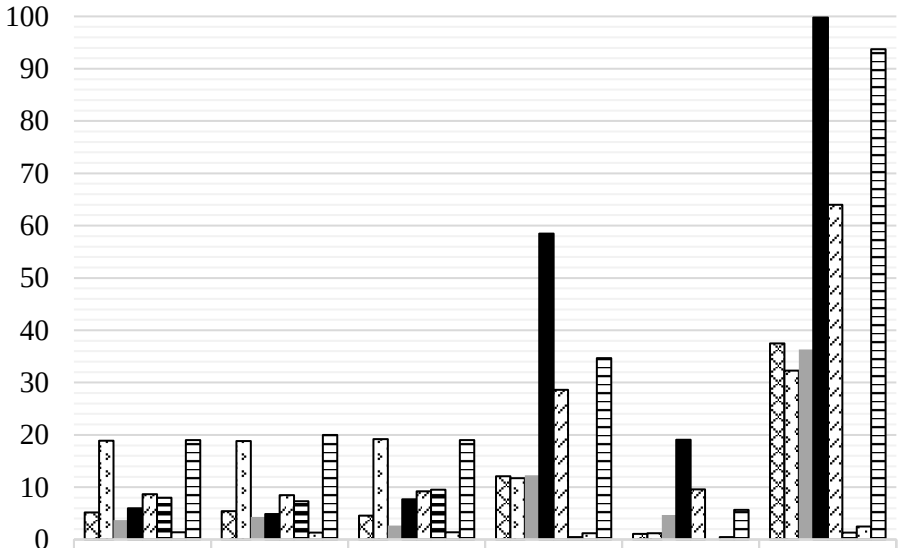
2) having the income of self-employment as the main source of household's functioning (75.7 %) (for those where the wage is the primary source of income, the level of self-provision is the lowest – 53.4 %);

3) having women at the age of 36–58 (64.9 %) and/or men at the age of 60 and older (67.3 %) in their composition. In urban settlements, the same groups of households demonstrate the highest level of self-provision (22.5 % and 25.9 %, respectively). In rural areas, households composed of women aged 18–58 years and/or men aged 18–60 years and older produce 100.0 % of the potatoes consumed, while the average self-provision of potatoes is 99.8 %.

Among households without children, the highest potato self-provision is typical for households consisting of only one person of beyond working age (64.6 %) and households composed of two or more persons, where there are both persons of working age and beyond (63.1 %). Households having employed persons in their composition satisfy needs in potatoes for food on their own for 56.6 % on average; households composed of two employees have the lowest level of self-provision (49.7 %), while those consisting of three and more employees have the highest self-provision (79.3 %). Households without employees in their composition also show a high level of self-supply of potato (64.9 %) [54].

The abovementioned testifies the peasant-driven and subsistence nature of potato

farming in Ukraine. Growing potato (and consumption of self-produced food) is not only the case for households consisting of elder people – availability of labour, employment and income opportunities determine the engagement of household's members in subsistence potato farming.



	Consumption of foodstuffs by households' members, kg per capita per month			Share of consumed foodstuffs produced by private farm holding by households, %		
	All	Urban	Rural	All	Urban	Rural
Meat and meat products (incl. fat)	5.2	5.4	4.6	12.1	1.1	37.5
Milk and milk products (incl. cheese and bread)	18.9	18.8	19.2	11.7	1.2	32.3
Fruits, berries, grape, nuts	3.7	4.3	2.7	12.3	4.7	36.3
Potato	6.0	4.9	7.7	58.5	19.1	99.8
Vegetables and melon crops	8.7	8.5	9.2	28.6	9.6	64.0
Broat and products	8.0	7.3	9.5	0.5	0.0	1.3
Fish and fish products	1.4	1.3	1.4	1.2	0.5	2.5
Eggs, pcs.	19.0	20.0	19.0	34.7	5.7	93.7

Figure 2. Characteristics of foodstuffs consumption and self-provision by households in town and rural areas in Ukraine in 2020, per household in average

Source: authors' elaboration on the data of [54].

Putting up to sale at the organized market only a small share of output (about 2.5 %), households, nonetheless, dominate in the potato market with on average doubled sales volume compared to enterprises (Figure 3), thus increasing uncertainty, risk, and price volatility.

Potato producer prices' dynamics are more volatile as compared to the general change of agricultural products' prices in Ukraine at both enterprises and households (Figure 4), with noticeable acute fluctuations in households' potato prices.

The above illustrates the peasant-driven nature of the Ukrainian potato market and lays the foundation for further study of price determinants for agricultural enterprises and farm households producing potatoes.

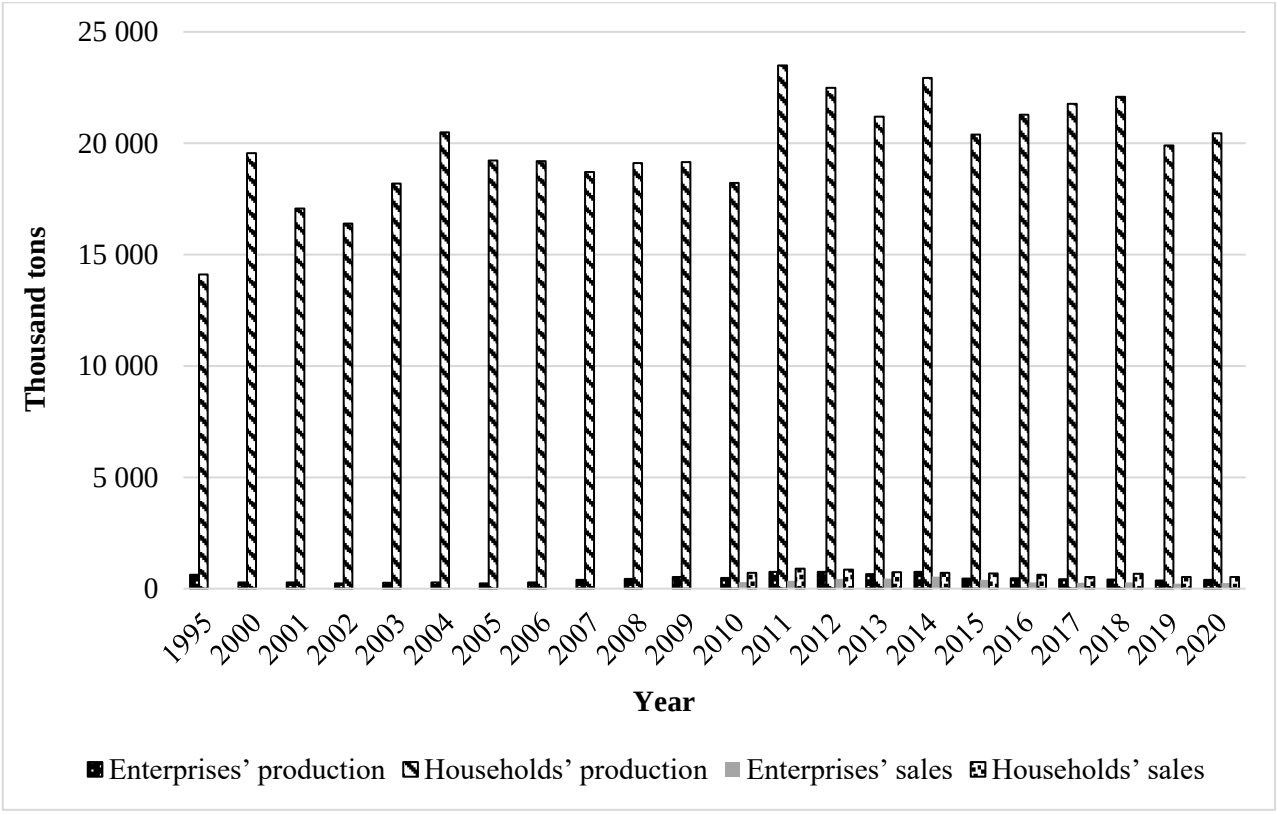


Figure 3. Development trends of the Ukrainian potato industry and market by types of producers: production volumes and sales*

Note. *Data on potato sales available only since 2010.

Source: authors' elaboration on data of State Statistics Service of Ukraine.

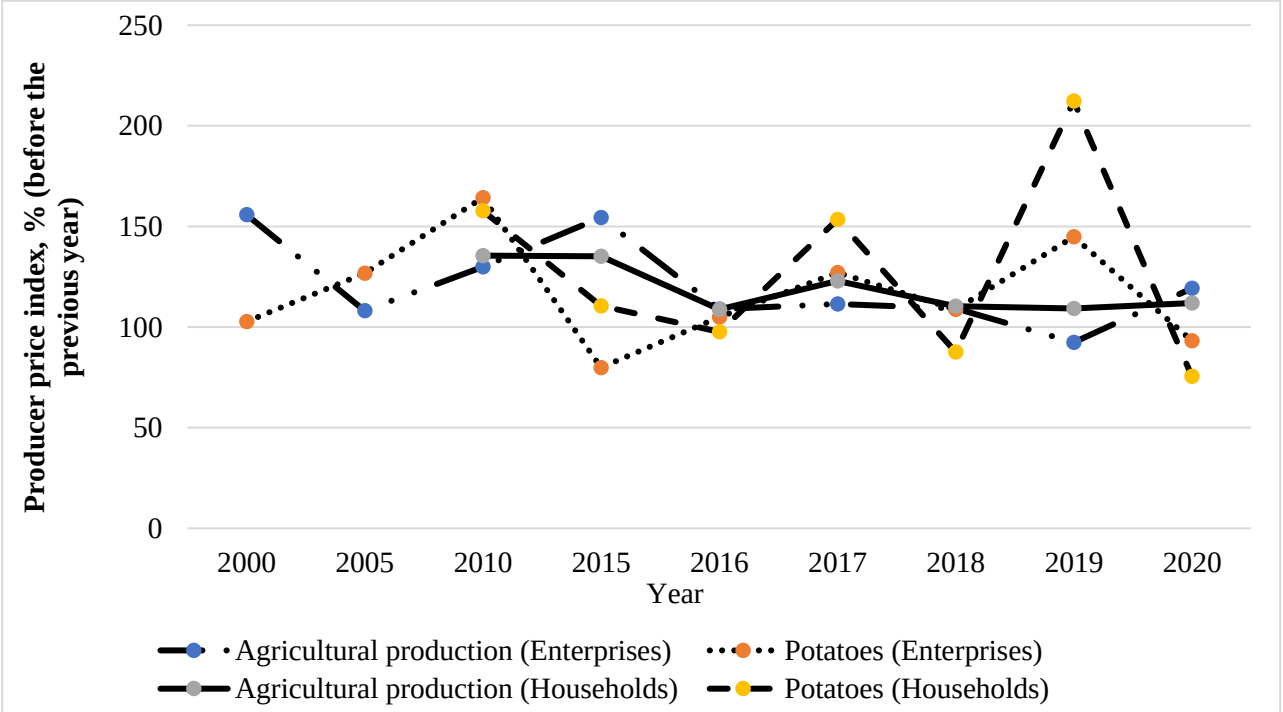


Figure 4. Indices of producer prices for agricultural products and potatoes by enterprises and households

Source: authors' elaboration on data of State Statistics Service of Ukraine.

Modelling of potato price determinants by type of producers in Ukraine. Table 1 summarizes the cross-sectional data used in the study. Initially, taking deflated potato producer price of households and enterprises (RPH and RPE, UAH/t) adjusted with the GDP deflator as dependent variables, we used independent variables of area harvested by households and enterprises (AH and AE, ha), the yield of households and enterprises (YH and YE, t/ha) to present the production volumes – according to the approach [2; 11; 13]. RAMW variable is the deflated (with the GDP deflator) average monthly wage (UAH).

Table 1

Description of the Ukrainian potato industry and market data

Variable	Mean	Median	Standard deviation	Min.	Max.	Range of variation	Range of variation to mean ratio (%)	Coefficient of variation (%)
RPE (UAH/t)	4669	4487	1299	2681	7293	4612	98.8	28.0
RPH (UAH/t)	6101	5680	2294	2895	11417	8522	139.7	38.0
AE (ha)	1007	550	1161	13.19	5000	4987	495.2	115.0
AH (ha)	59332	57350	24968	18500	109400	90900	153.2	42.0
YE (t/ha)	20.44	19.57	7.47	5.71	37.80	32.09	157.0	36.5
YH (t/ha)	15.21	16.50	3.50	8.20	20.79	12.59	82.8	23.0
RAMW (UAH)	8266	8036	900	6969	10828	3860	46.7	11.0

Source: authors' development.

Testing variables for normality, we reject the normal distribution for AE and RAMW at 95 % significance and use the logs instead. In the next step, we used a correlation matrix to check for the variables' relationships, also including logarithmic economic variables – logs of real potato price of households (l_RPH) and real potato price of enterprises (l_RPE) – which is consistent with an economic theory for modelling price behaviour (Table 2).

Table 2

Correlation matrix for all analyzed variables*

Variable	l_AE	AH	YE	YH	l_RAMW	RPH	RPE	l_RPE	l_RPH
l_AE	1								
AH	0.442	1							
YE	0.658	0.324	1						
YH	0.322	0.716	0.297	1					
l_RAMW	-0.015	0.003	-0.146	-0.264	1				
RPH	-0.018	-0.014	-0.108	-0.320	0.394	1			
RPE	-0.395	-0.453	-0.497	-0.561	0.118	0.361	1		
l_RPE	-0.359	-0.418	-0.479	-0.547	0.154	0.374	0.990	1	
l_RPH	-0.021	-0.029	-0.134	-0.351	0.421	0.986	0.383	0.399	1

Note. * 5 % critical value (bilateral) = 0.2973 for N = 44.
Source: authors' development.

The correlation matrix (Table 2) shows the significant (at 95 %) correlation between dependent variable RPE and explanatory variables YH, YE, AH, l_AE, l_RPH (in decreasing order of the strength of relationship) and between measured variable l_RPH and regressors l_RAMW, l_RPE, YH. This allows us to assume the following structure of a system of simultaneous equations for modelling the variables RPE and l_RPH (formulas 1–2).

$$\begin{cases} RPE_i = b_{11} + b_{12} l_{AE_i} + b_{13} AH_i + b_{14} YE_i + b_{15} YH_i + b_{16} l_{RPH_i} + e_i & (1) \\ l\_RPH_i = b_{21} + b_{22} l\_RAMW_i + b_{23} l\_RPE_i + b_{24} YH_i + e_i, & (2) \end{cases}$$

where i – is the observation's number in the cross-section;

e – is the error term.

An analysis of variables (formulas 1–2) attests to the over-identified system, and this allows for finding parameter estimates through the two-stage least squares (TSLS) procedure. Applying the built-in GRETL tool to solve the simultaneous equations model with the TSLS [47; 48], we accept the hypothesis on zero-values of estimates for l_AE, AH, and l_RPH parameters in the first equation (1) and for YH in the second (2) equation of the system (formulas 1–2). The resulting parameter estimates are in the table below (Table 3). The GRETL procedure of simultaneous equations' estimation through the TSLS presupposes the automatic running of the Breusch-Pagan test, which can be used for all linear cases where residuals are normally distributed [47–49]. The Breusch-Pagan test and Doornik-Hansen test for normality of residuals didn't show misspecifications.

Table 3

Parameter estimates for the determinants of potato producer prices (TSLS, Dependent variables: l_RPH, RPE, N = 44)

Independent variable	RPE	l_RPH
	Coefficient [t-ratio]	
Intercept	8517.56*** [11.87]	-7.59 [-1.66]
YE	-62.97*** [-2.94]	n/a
YH	−168.44*** [−3.69]	n/s
l_RPE	n/a	0.49* [1.69]
l_RAMW	n/a	1.35*** [0.49]
Adjusted R-squared	0.41	0.26

Note. */**/*** denote 10 % / 5 % / 1 % significance level; n/a – not applied; n/s – not significant.
Source: authors' development.

Finally, specified models for 40.7 % (for RPE) and 25.6 % (for l_RPH) describe the behaviour of the dependent variables.

The resulting parameter estimates for a system of simultaneous equations, modelling the potato producer prices at enterprises and farm households' determinants,

indicate the different factors affecting potato price fluctuations. Notably, the potato producer price set by enterprises depends on the change of yields of both enterprises and farm households, and the latter is more influential. An increase in potato yields in farm households by one t/ha will cause a decrease in potato price in enterprises by 168.44 UAH/t, while an increase in own yields will decrease the price by only 62.97 UAH/t. Average elasticities show that a 1 % increase in potato yields in farm households will cause a 0.55 % decrease in enterprises' price for potatoes compared to their average value, while for the same rise in potato yields in enterprises, potato price in enterprises will decrease only by 0.27 %.

Contrasting to business entities, farm households' potato price responds to fluctuations of the average monthly wage rate and potato prices in enterprises, neglecting the yields (as well as area harvested) changes. The estimated model (log-log) allows commenting the average elasticities directly: 1 % increase in enterprises' potato price causes an increase in farm households' potato price by 0.49 %, and the same increase in average monthly wage rate increases the price by 1.35 % compared to the average value.

The results go in line with previous research results on potato producer prices following the inverse demand function at an organized market [11–14] and concerning the dependence of farm households' prices for goods produced from market prices and wage rates [30; 32; 33].

The research results also indicate the insensitivity of farm households to fluctuations in potato production volumes and even changes in yields [30] when setting prices. We can consider the dependence of farm households' potato prices on enterprises' prices as evidence of information asymmetry. So, by relying on enterprises' prices (which depend on yield fluctuations), farm households respond to overall changes in production.

Wage fluctuations are insignificant for enterprises' potato pricing (although the wage is a part of production cost) and affect only farm households' potato price changes. This, on the one hand, can be interpreted as evidence of the high level of the labour intensity of potato cultivation in farm households and on the other – as evidence of households' accounting for opportunity labour costs [16; 45], given the characteristics of Ukrainian households with the highest levels of potato self-provision. More concrete, the substance of this relation is in an increase in the value of time spent on potato growing at farms and the shadow value of this food (due to the rise in the monetary value of the average monthly wage rate) reflected in an increase in the potato price embodying these values.

Additionally, the results empirically prove that subsistence farming restrains the agricultural markets and industry development [23]. In particular, the higher elasticity of enterprises' potato price of households' yields compared to own yields indicates the high uncertainty and risk for industrial potato production caused by a high level of potato self-provision and the prevailing role of households in the market.

The use of appropriate panel data analysis approaches and procedures could improve this research allowing us to consider the individual effects caused by

characteristics of regional peasant-driven potato markets in Ukraine. However, the applied cross-sectional approach to data analysis, caused by many missing values in both spatial and temporal dimensions, significantly narrows the panel, allows for the study of the nationwide average effects and is well suited to the research goal. Including data on production costs (for enterprises) and per capita potato consumption (as determinants of prices that are significant for farming households, which is logical given the dual nature of households) could provide more insights into potato price determinants. Still, the lack of this data for 2020, against the background of incomplete data for 2018–2019, could lead to an even more significant narrowing of the sample and its unreliability. Studying the above-mentioned issues could constitute the content for further research in this field.

Conclusions. The results of the study provide evidence of various factors influencing potato price fluctuations for industrial and subsistence food producers. For the business entities, potato price responds to the overall change in yield fluctuations following an inverse demand function. In contrast, farm households' potato prices fluctuate according to market price shifts and wage rates. In this research, we emphasize the high rates of potato self-provision and the dominance of farm households in the Ukrainian potato market. The most important thing is that the results empirically testify that a market characterized by households' dominance and by a large portion of food self-provision, increasing uncertainty and risks, constrains the development of business entities (which are more efficient). Research findings deepen the theoretical framework of households' economics and peasant-driven market functioning. At the same time, the research results are of an applied nature: understanding a households' impact on the potato market and industry development allows elaborating measures to mitigate adverse effects. The weakening of agricultural enterprises threatens further fresh potato industry and market development (leading to a decrease in the demand and implementation of R&D in this field). It even exacerbates the food security problems, especially for urban habitats. To avoid this, state support for potato storage and processing capacity development is needed – this could revitalise the potato industry. Investigation of the production function, cost-price relationship, and investment efficiency could constitute the future research roadmap in this field aimed to promote the potato industry's efficient development.

References

1. Devaux, A., Goffart, J.-P., Petsakos, A., Kromann, P., Gatto, M., Okello, J., Suarez, V., & Hareau, G. (2020). Global food security, contributions from sustainable potato agri-food systems. In H. Campos & O. Ortiz (Eds), *The Potato Crop* (pp. 3–55). Springer, Cham. https://doi.org/10.1007/978-3-030-28683-5_1.

2. Anwar, M., Shabbir, G., Shahid, M. H., & Samreen, W. (2015). *Determinants of potato prices and its forecasting: a case study of Punjab, Pakistan*. MPRA Paper 66678. University Library of Munich, Germany. Available at: https://mpra.ub.uni-muenchen.de/66678.

3. Koblianska, I., & Kalachevska, L. (2019). Implementation of local food concept for social-economic revitalization in rural areas: the case of Ukraine. *Indian*

Journal of Economics and Development, 7(10). Available at: http://52.172.159.94/index.php/ijed/article/view/148032.

4. Salmensuu, O. (2021). Potato importance for development focusing on prices. *Journal of Risk and Financial Management,* 14(3), 137. https://doi.org/10.3390/jrfm14030137.

5. Koblianska, I., Kalachevska, L., Minta, S., Strochenko, N., & Lukash, S. (2021). Modelling and forecasting of potato sales prices in Ukraine. *Agricultural and Resource Economics,* 7(4), 160–179. https://doi.org/10.51599/are.2021.07.04.09.

6. Seheda, S., Datsenko, G., Otkalenko, O., & Musil, P. (2019). The agrarian food consumption in Ukraine and its association with socio-demographic indicators of human development. *Economic Annals-XXI,* 1-2(175), 45–52. https://doi.org/10.21003/ea.V175-08.

7. Holbrook Working Division of Agricultural Economics (1922). *Factors determining the price of potatoes in St. Paul and Minneapolis.* The University of Minnesota Agricultural Experiment Station. Technical Bulletin 10. University Farm, St. Paul, USA. https://doi.org/10.22004/ag.econ.7528.

8. Pusateri, F. P. (1958). What factors influence the price of potatoes. *American Potato Journal,* 35(8), 633–641. https://doi.org/10.1007/BF02854994.

9. Wang, Y., Liu, X., Ren, G., Yang, G., & Feng, Y. (2019). Analysis of the spatiotemporal variability of droughts and the effects of drought on potato production in northern China. *Agricultural and Forest Meteorology,* 264, 334–342. https://doi.org/10.1016/j.agrformet.2018.10.019.

10. Firleja, K., & Kubala, S. (2020). Determinants of variation of potato prices in the European Union. *Economia Agro-alimentare*, 21(3), 697–707. https://doi.org/10.3280/ECAG2019-003007.

11. Bolotova, Y. V. (2017). Recent price developments in the United States Potato industry. *American Journal of Potato Research*, 94(5), 567–571. https://doi.org/10.1007/s12230-017-9590-4.

12. Loy, J.-P., Riekert, S., & Steinhagen, C. (2011). Potato prices as affected by demand and yearly production: a German perspective. *American Journal of Potato Research*, 88(2), 195–198. https://doi.org/10.1007/s12230-010-9176-x.

13. Pavlista, A. D., & Feuz, D. M. (2005). Potato prices as affected by demand and yearly production. *American Journal of Potato Research*, 82(4), 339–343. https://doi.org/10.1007/BF02871964.

14. Thorne, F. (2012). *Potato prices as affected by supply and demand factors: an Irish case study*. 123rd EAAE Seminar "Price Volatility and Farm Income Stabilisation. Modelling Outcomes and Assessing Market and Policy Based Responses", February 23–24, 2012. Dublin. https://doi.org/10.22004/ag.econ.122473.

15. Rumyk, I., Laptev, S., Seheda, S., Akimova, L., Akimov, O., & Karpa, M. (2021). Financial support and forecasting of food production using economic description modeling methods. *Financial and Credit Activities: Problems of Theory and Practice,* 5(40), 248–262. https://doi.org/10.18371/fcaptp.v5i40.245098.

16. Dorward, A. (2012). The short- and medium-term impacts of rises in staple

food prices. *Food Security*, 4, 633–645. https://doi.org/10.1007/s12571-012-0210-3.

17. Mayer, E., & Glave, M. (1999). Alguito para ganar (a little something to earn): profits and losses in peasant economies. *American Ethnologist*, 26(2), 344–369. https://doi.org/10.1525/ae.1999.26.2.344.

18. Sitikantha, P., Silu, M., & Soumyajit, R. (2020), Inflation expectations of households: do they influence wage-price dynamics in India? *Macroeconomics and Finance in Emerging Market Economies*, 13(3), 244–263. https://doi.org/10.1080/17520843.2020.1720264.

19. de Janvry, A., & Sadoulet, E. (2006). Progress in the modeling of rural households' behavior under market failures. In A. de Janvry & R. Kanbur (Eds), *Poverty, Inequality and Development. Economic Studies in Inequality, Social Exclusion and Well-Being*. Vol. 1. Springer, Boston, MA. https://doi.org/10.1007/0-387-29748-0_9.

20. Henning, Ch. H. C.A., & Henningsen, A. (2005). *Modeling price response of farm households under imperfect labor markets: a farm household approach to family farms in Poland*. 94th EAAE Seminar 'From households to firms with independent legal status: the spectrum of institutional units in the development of European agriculture', 9–10 April 2005, Ashford (UK). https://doi.org/10.22004/ag.econ.24431.

21. Henning, Ch. H. C. A., & Henningsen, A. (2007). Modeling farm households' price responses in the presence of transaction costs and heterogeneity in labor markets. *American Journal of Agricultural Economics*, 89(3), 665–681. https://doi.org/10.1111/j.1467-8276.2007.00980.x.

22. Bryceson, D. F. (2000). Peasant theories and smallholder policies: past and present. In D. F. Bryceson, C. Kay & J. Mooij (Eds), *Disappearing peasantries: rural labour in Africa, Asia, and Latin America* (pp. 1–36). IT Publications, London, UK. https://doi.org/10.3362/9781780440118.001.

23. Brüntrup, M., & Heidhues, F. (2002). *Subsistence agriculture in development: its role in processes of structural change*. Institute of Agricultural Economics and Social Sciences in the Tropics and Subtropics. Forschung zur Entwicklungsökonomie und Politik – Research in Development Economics and Policy. Discussion Paper 1/2002. Available at: https://entwicklungspolitik.uni-hohenheim.de/fileadmin/_migrated/content_uploads/DP_0_2002_Bruentrup_03.pdf.

24. Nuppenau, E. A. (2003). Commercialisation of subsistence agriculture in transition economies: on imperfect competition, market development and support policies. In S. Abelle & K. Frohberg (Eds), *Subsistence agriculture in central and Eastern Europe: how to break the vicious circle?* IAMO: Studies on the Agricultural and Food Sector in Central and Eastern Europe. Vol. 22. Available at: http://www.iamo.de/fileadmin/documents/sr_vol22.pdf.

25. Alexander, J., & Alexander, P. (1991). What's a fair price? Price-setting and trading partnerships in Javanese markets. *Man*, 26(3), 493. https://doi.org/10.2307/2803879.

26. Nakasone, E. (2013). *The role of price information in agricultural markets: experimental evidence from rural Peru*. Agricultural and Applied Economics

Association's 2013 AAEA and CAES Joint Annual Meeting, August 4–6, 2013, Washington, DC. Available at: https://www.ifpri.org/publication/role-price-information-agricultural-markets.

27. Mersha, M., Demeke, L., & Birhanu, A. (2017). *Analysis of factors affecting potato farmers' gross margin in Central Ethiopia: the case of Holeta District*. MPRA Paper No. 92828. Available at: https://mpra.ub.uni-muenchen.de/92828.

28. LaFave, D. R., & Thomas, D. (2016). Farms, families, and markets: new evidence on completeness of markets in agricultural settings. *Econometrica,* 84(5), 1917–1960. https://doi.org/10.3982/ECTA12987.

29. LaFave, D. R., Peet, E. D., & Thomas, D. (2020). *Farm profits, prices and household behaviour.* Working Paper 26636. National Bureau of Economic Research, Massachusetts Avenue, Cambridge, MA. Available at: http://www.nber.org/papers/w26636.

30. Falcon, W. P. (1964). Farmer response to price in a subsistence economy: the case of west Pakistan. *The American Economic Review*, 54(3), 580–591. Available at: http://www.jstor.org/stable/1818541.

31. Kostov, P., & Lingard, J. (2004). Subsistence agriculture in transition economies: its roles and determinants. *Journal of Agricultural Economics*, 55(3), 565–579. https://doi.org/10.1111/j.1477-9552.2004.tb00115.x.

32. Chibnik, M. (1978). The value of subsistence production. *Journal of Anthropological Research*, 34, 561–576. Available at: https://www.jstor.org/stable/3629650.

33. Arslan, A., & Taylor, J. E. (2009). Farmers' subjective valuation of subsistence crops: the case of traditional maize in Mexico. *American Journal of Agricultural Economics*, 91(4), 956–972. https://doi.org/10.1111/j.1467-8276.2009.01323.x.

34. de Janvry, A., & Sadoulet, E. (2011). Subsistence farming as a safety net for food-price shocks. *Development in Practice*, 21(4–5), 472–480. https://doi.org/10.1080/09614524.2011.561292.

35. Koblianska, I., Pasko, O., Marenych, T., Kotseruba, N., & Tkachenko, V. (2020). What drives peasant household to commercialize? An investigation of the factors leading to commercialization of semi-subsistence farming in Ukraine. *Economics of Agriculture*, 67(4), 1169–1190. https://doi.org/10.5937/ekoPolj2004169K.

36. Heflebower, R. B. (1948). Food prices, wage rates, and inflation. *The Review of Economics and Statistics*, 30(1), 27–29. https://doi.org/10.2307/1927622.

37. de Janvry, A., Fafchamps, M., & Sadoulet, E. (1991). Peasant household behaviour with missing markets: some paradoxes explained. *The Economic Journal*, 101(409), 1400–1417. https://doi.org/10.2307/2234892.

38. Lee, C. (2000). Minimum wage and food prices: an analysis of price pass-through effects. *The International Food and Agribusiness Management Review*, 3(1), 111–128. https://doi.org/10.1016/S1096-7508(00)00032-X.

39. Lee, C., Schluter, G., & O'Roark, B. (2000). How much would increasing the

minimum wage affect food prices? *Agriculture Information Bulletin*, 3, 747. https://doi.org/10.22004/ag.econ.33598.

40. Kundu, S. (2018). *Rural wage dynamics in India: what role does inflation play?* Working Papers 12774. Available at: https://ideas.repec.org/p/ess/wpaper/id12774.html.

41. Manishimwe, R., Niyitanga, F., Nsabimana, S., Kabayiza, A., & Mutimawurugo, M.-C. (2019). Socio-economic and institutional factors influencing the potato (Solanum tuberosum L.) production at smallholder farmers level in the Gicumbi district in Rwanda. *Tropicultura*, 37(2), 604. https://doi.org/10.25518/2295-8010.604.

42. Rasool, H., & Tarique, Md. (2018). Testing the link between rural wages and food inflation in India a co-integration approach. *IOSR Journal of Business and Management (IOSR-JBM)*, 20(1), 87–98. https://doi.org/10.9790/487X-2001018798.

43. Guha, A., & Tripathi, A. K. (2014). Link between food price inflation and rural wage dynamics. *Economic and Political Weekly*, 49(26/27), 66–73. Available at: https://www.jstor.org/stable/24480170.

44. Koblianska, I., Pasko, O., Hordiyenko, M., & Yarova, I. (2020). Are peasant households feasible in terms of policy? The debate on the future of semi-subsistence households in Ukraine. *Eastern European Countryside*, 26(1), 127–179. https://doi.org/10.12775/eec.2020.006.

45. Tzouvelekas, V. (2011). Production and consumption decisions of rural households under price risk: a mean-variance approach. Available at: https://www.ucy.ac.cy/econ/documents/seminar-papers/2011/Household.pdf.

46. Begum, M. E., Miah, M. A. M., Rashid, M. A., Matin, M. A., & Hossain, M. I. (2015). Socioeconomic determinants of modern potato varieties adoption and resource use efficiency in Northern Bangladesh. *Bangladesh Journal of Agricultural Economics*, 1–2, 103–113. https://doi.org/10.22004/ag.econ.278758.

47. Wooldridge, J. M. (2013). *Introductory econometrics: a modern approach* (5th ed.). South-Western, Cengage Learning. Available at: https://economics.ut.ac.ir/documents/3030266/14100645/Jeffrey_M._Wooldridge_Introductory_Econometrics_A_Modern_Approach__2012.pdf.

48. Adkins, L. C. (2010). *Using gretl for principles of econometrics* (3rd ed.). Available at: http://www.LearnEconometrics.com/gretl.html.

49. Waldman, D. M. (1983). A note on algebraic equivalence of White's test and a variation of the Godfrey/Breusch-Pagan test for heteroscedasticity. *Economics Letters*, 13(2–3), 197–200. https://doi.org/10.1016/0165-1765(83)90085-X.

50. FAOSTAT (2022). *Statistical database of food and agriculture organization of the United Nations*. Available at: http://faostat.fao.org/faostat.

51. State Statistics Service of Ukraine (2021). *Statistical Yearbook of Ukraine 2020*. Available at: http://www.ukrstat.gov.ua.

52. State Statistics Service of Ukraine (2021). *Socio-economic characteristics of households in Ukraine 2020*. Available at: http://www.ukrstat.gov.ua.

53. State Statistics Service of Ukraine (2021). *Balances and consumption of the*

main food products by population of Ukraine in 2020. Available at: http://www.ukrstat.gov.ua.

54. State Statistics Service of Ukraine (2021). *Expenditures and resources of households Ukraine in 2020*. Available at: http://www.ukrstat.gov.ua.

Citation:

Стиль – ДСТУ:

Koblianska I., Seheda S., Khaietska O., Kalachevska L., Klochko T. Determinants of potato producer prices in the peasant-driven market: the Ukrainian case. *Agricultural and Resource Economics*. 2022. Vol. 8. No. 3. Pp. 26–41. https://doi.org/10.51599/are.2022.08.03.02.

Style – APA:

Koblianska, I., Seheda, S., Khaietska, O., Kalachevska, L., & Klochko, T. (2022). Determinants of potato producer prices in the peasant-driven market: the Ukrainian case. *Agricultural and Resource Economics*, 8(3), 26–41. https://doi.org/10.51599/are.2022.08.03.02.