


MINISTRY OF EDUCATION AND SCIENCE OF REPUBLIC OF KAZAKHSTAN Kazakh  
National Research and Technical University named after K.I. Satbayev  
Project Management Institute  
Scientific and Educational Centre of Mathematical Economics

**Admitted to the defence**  
Head of the Scientific and  
Educational Centre of  
Mathematical Economics

  
Aubakirova S.K.  
“4th” of June 2021

## DIPLOMA PROJECT

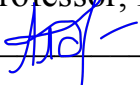
Household production in Kazakhstan

Major 5B070500 – Mathematical and Computer Modelling

Completed by:

Aidana Abdeshova


Research supervisor:  
Aldashev A.A,  
Professor, PhD

  
“3rd” of June 2021

Almaty, 2021

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**ASSIGNMENT  
for the diploma project**

Full name of the student: Abdeshova Aidana

Full title of the project: Household production in Kazakhstan

Approved by the Order from the Rector of Satbayev University №2131-b from  
24.11.2020

Deadline for the completion of the diploma project: 23.05.2021

Summary of the diploma project:

- 1) *Overview of households and their role in the economy*
- 2) *Descriptive statistics of the survey*
- 3) *Graphical analysis*
- 4) *Regression analysis*

The list of graphical material (with an exact indication of the mandatory drawings)  
shown in: *10* slides of presentation work






Recommended main bibliography: *8 references*

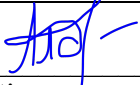
Almaty, 2021

**Schedule  
for preparation of the diploma project**


Section name	Submission deadline	Notes
Literature review	11.01.2021 – 25.01.2021	
Hypothesis and research plan	26.01.2021 – 08.02.2021	
Research and analysis	09.02.2021 – 22.03.2021	
Conclusions	23.03.2021 – 05.04.2021	
Compilation of the work according to standards	06.04.2021 – 21.05.2021	

**Signatures  
of the consultants and normcontroller on the finished diploma project  
based on the sections that applied to them**

Section name	Consultant's full name (academic degree, job title)	Date of signature	Signature
Literature review	A.A. Aldashev, PhD, professor	25.01.2021	
Hypothesis and research plan	A.A. Aldashev, PhD, professor	08.02.2021	
Research and analysis	A.A. Aldashev, PhD, professor	22.03.2021	
Conclusions	A.A. Aldashev, PhD, professor	05.04.2021	
Normcontroller	S.K. Aubakirova, MSc, head of the centre	21.05.2021	

Research supervisor   
Signature

Aldashev A.A.  
Full name

Student accepts all the assigned tasks   
Signature

Abdeshova A.I.  
Full name

Date

11<sup>th</sup> of January 2021

**REVIEW**

**OF THE RESEARCH SUPERVISOR**

to the diploma project of **Aidana Abdeshova**  
(Full name of the student)  
5B070500 - “Mathematical and Computer Modelling”  
(code and name of the major)

Title of the diploma project: Household production in Kazakhstan

The diploma work analyses the production of households based on data of Kazakhstan statistical agency. In this work Aidana had only raw unorganized data which she had to clean and this required programming in R and Stata. Then the ready-to-use dataset was analysed using econometric techniques. Statistical analysis performed by Aidana Abdeshova revealed interesting patterns. First, she observed that while the horticulture production of households remains stable over time (experiencing seasonality) the production of animal products has been steadily rising. Also households were selling the produced goods and the revenue has been increasing. Interestingly the return on investment in land was very low and statistically insignificant. The return on investment in livestock was significant and was estimated to be around 3-4%.

In my view, the student did a remarkable job showing skills in data management using programming methods and data analytics skills in interpretation of the results. Aidana Abdeshova deserves the highest mark.

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**Research supervisor**

Alisher Aldashev, Professor of the NSE



(signature)

«06» June 2021

## **АННОТАЦИЯ**

Дипломная работа на тему «Производство домохозяйствами в Казахстане» содержит 28 страниц текста, в том числе 14 таблиц и 6 рисунков, и включает следующие составные части: Введение; Обзор домашних хозяйств и их роли в экономике; Краткая информация о сельскохозяйственном производстве в Казахстане; Описательная статистика опроса; Ежеквартальная статистика опроса; Статистика по регионам; Графический анализ; Регрессионный анализ; Краткое описание результатов регрессионного анализа; Заключение; Библиография; Приложение.

## **АҢДАТПА**

«Қазақстандағы үй шаруашылығы» тақырыбындағы диссертация 28 бет мәтіннен тұрады, соның ішінде 14 кесте мен 6 суреттен тұрады және келесі бөліктерін қамтиды: Кіріспе; Үй шаруашылығына және оның экономикадағы рөліне шолу; Қазақстандағы ауыл шаруашылығы өндірісі туралы қысқаша ақпарат; Сауалнаманың сипаттамалық статистикасы; Тоқсан сайынғы сауалнама статистикасы; Аймақтық статистика; Графикалық талдау; Регрессиялық талдау; Регрессиялық талдау нәтижелерінің қысқаша сипаттамасы; Қорытынды; Пайдаланылған әдебиеттер тізімі; Қосымша.

## **ABSTRACT**

The thesis on “Household production in Kazakhstan”. The project contains 28 pages of text, including 14 tables and 6 images, and includes the following components: Introduction; Overview of households and their role in the economy; Brief information about Agricultural production in Kazakhstan; Descriptive statistics of the survey; Quarterly statistics of the survey; Statistics by region; Graphical analysis; Regression analysis; A brief outline of regression analysis; Conclusion; Bibliography; Appendix.

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## INTRODUCTION

Within the framework of economic systems at different stages of development of human society, the household as an institution had different organizational forms, played a certain role in the country's economy, and was regulated by a system of internal and external instruments. The household has always been one of the main subjects of the national economy, acting in it as a set of formal and informal rules of behavior.

The driving motive for the functioning of the household is the creation and maintenance of conditions for the normal life of the family, the performance of its basic functions. Thus, in modern economics there is an attempt to look at the household from different angles, considering different points of view. As a result, the institution of the household can be represented as a set of formal and informal rules of behavior in the aggregate of various social and economic relations that develop both within a given subject and in its relations with the external environment, in performing the functions of the production of labor, a supplier of resources to the market and a recipient of income.

It is not only important to examine households as consumers, but also as producers. In the current society, households are the most important subject, the results of which not only depend on the well-being of an individual economic unit, but also of the entire population of the country as a whole. The economic role of the family in a market economy is extremely complex, household production is the key to

The purpose of this project is the statistical analysis of household production, to study the relationship between household income and various aspects of production of goods by the household. The data for this analysis was collected and processed from the results of a survey conducted by the Agency of the Republic of Kazakhstan on Statistics - Quarterly Household Expenditure and Income Questionnaire.

We hypothesize that household production in Kazakhstan is tied to the cultivation of livestock and that households are often consumers of their own production output.

## **1 Overview of households and their role in the economy**

A modern developed household is the result of a historically long evolution of a given subject as an institution. It is known that human society existed and developed under the conditions of successively changing economic systems. A common point for all economic systems is that production itself plays a primary role. In all systems, economic resources are required for production, and the results of economic activity are distributed, exchanged, and consumed in a certain way. Moreover, in any economic system, as an integral component of the subject, the household existed and developed in a variety of forms. Finally, in each system, it was an object of regulation, had its own special regulation mechanism. At the same time, there are elements in economic systems that distinguish them from each other. They are socio-economic relations based on the forms of ownership of economic resources and results of economic activity that have developed in each economic system, organizational and legal forms of economic activity, an economic mechanism, that is, a way of regulating economic activity at the macroeconomic and microeconomic levels.

In the process of evolution of the household, the following main stages can be distinguished. The first stage is associated with the formation of the clan and community. The clan is divided into families, and the community into family labor households, where both biological and production functions are concentrated. On this basis, the family is formed as a separate subject of economic activity. At the second stage, the process of separation of the family and its formation as a subject of private property took place. At this time, a market environment was formed, in which individual families were involved. At the third stage, the state becomes the regulator of economic activity in general and of the household in particular. The fourth stage is associated with the formation of a family, where the performance of the production function was carried out outside the household. The household acquires the features of a market entity, acting on it as a seller of resources and a consumer-buyer of goods and services. Regulation of household activities is carried out mainly by the market with the influence on economic life from the state. The regulating influence of the family way of life, age-old traditions, which are already of secondary importance in a market economy, is also preserved. The fifth stage is characterized by the emergence of a new economic entity - enterprises. The regulation of the activities of enterprises is carried out by their own means of production and by the state in accordance with the laws of the market. The sixth stage is determined by the emergence of qualitatively new economic relations between the household and enterprises. In the process of interrelationships between the subjects, production activity was divided into types. The first type of activity carried out by the enterprise is the production of commodities intended for exchange. Another type of activity performed by the household is the production of consumer goods within the household for self-



sufficiency and the sale of economic resources in the market in order to generate income (Bagautdinova, N. et al., 2014).

At each stage of the development of human society, the household appeared in the appropriate organizational forms: under the conditions of the traditional economic system, this is the economy of a primitive community, then a separate family; in the ancient world - the economy of the slave owner, free citizens; in the Middle Ages - a feudal estate, the economy of a serf, a free peasant, an artisan, a merchant, a usurer; in a market economic system - the economy of an entrepreneur, hired worker, free peasant, artisan, merchant, etc. The main product of activity and a commodity of the household is labor power, which, in specific historical conditions, one way or another, for one purpose or another, was consumed, being realized in labor within the economy itself, outside it. As a consumer, the household must have a source of necessary goods to meet its needs. In a traditional economy, these benefits were created within the economy itself and consumed in their natural form, so such an economy could exist apart from others. In a market economy, the bulk of the consumed goods is acquired outside the economy, which requires money. In the traditional economic system, the activity of the economy of the society as a whole and its component part - the household, was regulated by the rules, habits, and way of life of people in different conditions that had developed over many centuries. Each farm was guided by its own interests, realizing them by its own means, since it could rely mainly on its own strengths and capabilities. In a market economy, the result of the activity of an individual household began to depend not only on its internal organization, but also on the breadth and depth of its ties with other economic entities. Now there are economic relations common to all between the main subjects of the economy - households and enterprises - market relations, and also the influence of the state on the economic life in the country is increasing (Schreyer, P. et al., 2011).

Household economy is a multifaceted phenomenon and is actually connected with all spheres of society, therefore it has become a subject of study for economic theory, and in particular institutionalism, sociology, statistics, demography, psychology, jurisprudence, pedagogy, etc. A multilateral approach makes it possible to get a general idea of the institution of the household as a set of formal and informal rules of behavior in a complex set of various social and economic relations that develop both within a given subject and in its relations with the external environment. Theoretical comprehension of the issues of the activity of the household as an institution, its influence on economic and social progress arouses serious interest among representatives of various sciences, primarily economic theory (Becker, G, 1965).

The housekeeping institution existed at all stages of the development of human society. Successively replacing each other economic systems reflect in a condensed form the main features of the previous stages. At each of them, the institution of the household had its own regulation mechanism, depending on the instruments of regulation: in the

traditional system - traditions, habits, order, in the market - traditions, habits, order in a narrowed form, the market with its elements in an expanded form, in a planned system of regulation - the previous regulators, only in an even more narrowed form. In the main exogenous regulation by the state and in a mixed economy, almost all the main regulators of the previous systems are active. The set of instruments for regulating the household in a mixed economy is the result of evolutionary development and the selection of means of influencing the functioning of the household in traditional, market and planned economic systems that ensure the progressive development of the economy. Consequently, in a mixed economy, the role and place of the institution of the household in the institutional environment increases. And therefore, an important area of Kazakhstan's economic development is the creation of an effective mechanism for regulating the institution of the household as one of the conditions for the development of the country's national economy.

Households are the owners of a significant part of the resources in the national economy and the "producers" of human capital. They form consumer demand in the market for goods and services, as well as supply in the labor market. Even the dynamics of stock markets are determined by domestic economy, or rather, their representatives, trying to profitably dispose of their savings. In addition, there is still a need to develop a unified approach to the aggregate of families, cohabitants who do not have family ties, and single individuals leading independent farms, as a socio-economic institution. Ignoring the need to analyze this most important part of the social structure can distort the real picture of the transformations currently taking place in the domestic economy (Becker, G, 1964).

So, from the standpoint of institutionalism, the following adjustments are made to the neoclassical model. First, it is not groups or organizations that are recognized as actually acting agents of the social process, but individuals. Consequently, representatives of the institutional approach do not identify such concepts as "households" and "individual". It is quite possible to agree with this position, since when considering the household as the main decision-making unit, we are actually dealing with a group of individuals who form this joint household. Secondly, institutional theory pays considerable attention to the internal structure of the household, the motives for its formation, the goals of activity, which are not limited to the implementation of a production function or rational collective choice. Here, such concepts as "contractual agreements between individuals", "joint reduction of transaction costs", "opportunistic behavior of household members" are already more applicable. Third, the household is described as an economic entity operating in a certain institutional environment, from the features of which neoclassical theory has been distracted. It is this environment that forms a certain structure of the household and internal relations between its members. So, with the transition of the domestic economy to market relations from abroad, the institution of marriage contracts was borrowed, which made it possible to agree in advance on the forms

of interaction, individual and collective responsibility, as well as joint ownership and disposal of household property. Uncertainty, high transaction costs, vaguely defined property rights, and unreliable contracts are recognized as the most important characteristics of the external conditions that a household faces. These manifestations give a more realistic picture of the behavior of households, which, however, does not allow building logically flawless optimization models (Goldschmidt-Clermont, L, 2000).

In this regard, the family solves a variety of problems of housekeeping, family business, reproduction of the labor force, ensuring the necessary level of consumer demand, the formation of investment potential, and others. Modern statistics should distinctly accentuate the allocation of time and the importance of properly crediting the value of housekeeping duties, as well as the raising of children, which is mostly done by women (Ironmonger, D, 2000).

### **1.1 Brief information about Agricultural production in Kazakhstan**

In Kazakhstan, a household is a group of people living together, pooling their incomes (in whole or in part), which mainly include housing and food. A household can be one person. Household members, unlike a family, may not have a relationship of kinship. Agriculture is one of the most powerful sectors of the economy, therefore it is natural that it precedes among household production and output. In each region of the country, weather and geographic conditions allow the cultivation of certain crops, also great attention is paid to the development of farming.

Kazakhstan is simultaneously located in Eastern Europe and Central Asia; it is washed by the Aral and Caspian Seas. Winters in this area have little snow and cold, while summers are dry and hot. Almost half of the territory of Kazakhstan is semi-deserts and deserts. Soil is of great importance for agriculture. Most of the territory is covered by brown and chestnut soils, as well as black soil. Brown soils and gray soils are also present.

The development of agricultural production in Kazakhstan began in the middle of the last century. Due to the economic crisis, the Soviet government decided to expand the cultivated area as much as possible. At that time, work on the development of virgin lands was intensively carried out on the territory of Kazakhstan. It is worth emphasizing that this made it possible to collect record grain yields, however, this factor negatively affected the development of animal husbandry, as the areas for pastures sharply decreased. In the 60-80s of the 20<sup>th</sup> century, the most intensive development of agriculture had begun. Cooperative ownership was transformed into state ownership, and this made it possible to strengthen the control over finances. Because of this, most of the agrarians left the villages and the government was forced to attract workers from other union republics. Now almost all the land is in the hands of private farmers and, like many years ago, there is a serious problem with meat and dairy products.

Agriculture can be characterized by such features as high rates of development of animal husbandry and production of wool and leather, most of the crops that are grown are cotton, oilseeds, fruits and berries and grains. This is one of the main sectors of the economy. Every year it gives almost 38% of the income to the budget. This industry employs approximately 16% of the country's entire workforce. It should be emphasized that agriculture in Kazakhstan is on the 2nd place in the world in the cultivation of cereals with indicators of 967 kg per person. However, the productivity of animal husbandry is very low and this indicator in Kazakhstan is 142nd place (Agriculture in Kazakhstan, n.d.).

It should be noted the diversity of climatic and natural conditions in the country. Agriculture in South Kazakhstan is developing under conditions of high air temperature in the foothills. If artificial irrigation is organized correctly here, a good harvest of tobacco, sugar beets, rice and cotton can be reaped. Also in this region it is quite profitable to engage in viticulture. In Western Kazakhstan, agriculture is mainly based on animal husbandry, which can be explained by large meadows and pastures. Most often they are engaged in breeding camels, sheep, and horses. About 70% of the arable land is planted here with wheat, the rest of the land is grown for rye, millet, and barley. The North shows excellent results in the development of meat and dairy cattle breeding and in poultry breeding. However, the main industry in Northern Kazakhstan is sheep breeding. Crop production is mainly represented by grain crops and cotton. In East Kazakhstan, agriculture is represented by non-irrigated agriculture. Most of the land is allocated for sunflower crops. Peas, oats, wheat, and some vegetables are also sown in the immediate vicinity of the rivers. Also, meat and dairy farming is rapidly developing here (Agriculture in Kazakhstan, n.d.).

## 2 Descriptive statistics of the survey

The data for this paper refined from the results of an annual household income and expenditure questionnaire from The Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan – D 004. The data was collected from 2011 to 2017, reported in a quarterly manner. The dataset was manipulated through a statistical software Stata in order to process the information about different types of household production into variables which can be used for analysis.

**Table 1 – Description of variables regarding crop production (in tenge)**

	Mean	St.Dev	Processed Mean	Processed St.Dev
Ownership of land (dummy)	0.526	0.499		
Expenditure on land	463.634	5166.234	881.245	7096.669
Cultivation of crop (dummy)	0.177	0.382	0.337	0.473
Fruits sold	389.797	8157.067	739.323	11233.37
Vegetables sold	839.498	9376.665	1557.69	12805.42
Other types of crops sold	569.629	13173.98	979.385	16803.27
Total crop sold	1798.925	18914.76	3276.399	25026.53

The dummy variable for the ownership of land in Table 1 indicates whether the household has had access to the use of some land. The mean of the dummy suggests that half of the households in the sample were able to use land – 52.6%. Expenditure on land is how much money was invested on this land for procedures like rent and purchase of land, cultivation of farmland, purchase of fertilizers and pesticides, purchase of seeds and planting materials, hiring of the labor force related to the use of farmland, purchase, rental, and maintenance of agricultural machinery. According to the raw data, average expenditure on land was around 463.634 tenge per quarter. However, taking the dummy for the ownership of land into account, those that had the means to utilize it spent 881.245 tenge on average on its maintenance, but with a high standard deviation of 7096.669, it should be noted that there is a great variation from the average.

The cultivation of crop dummy shows if the household in question harvested any agricultural products. The data reveals that around 17.7% of the households yielded crop. For a sub-sample of households for which the dummy for the ownership of land is equal to 1, 33.7% of them cultivated crop. The total crop sold is the monetary value of fruits, vegetables and other types of crops sold in the given quarter. Variable for other types of crops includes wheat, maize, oats, buckwheat, grains, legumes, fodder root crops, hay grass and tobacco. In general, the average monetary value of harvest sold per quarter was 1798.925. For those that have a dummy variable for the cultivation of crop equal to 1, the mean for total crop sold was 3276.399 tenge, with a high variation from the mean since

the standard deviation was 25026.53. Furthermore, we note that 22.6% of the overall harvest sold were fruits, which amounted to 739.323 tenge on average, another 47.5% were vegetables sold, which were worth 1557.69 tenge, and 29.9% of the other types of crops sold for 979.385 tenge annually. Therefore, this shows that vegetables were the most popular type of harvest for sale, adding up to almost half of the total crop sold per quarter.

**Table 2 – Description of variables regarding livestock produce (in tenge)**

	Mean	St.Dev	Processed Mean	Processed St.Dev
Ownership of livestock (dummy)	0.268	0.443	0.493	0.499
Expenditure on livestock	4146.602	15406.71	15491.89	26666.4
Purchase of livestock (dummy)	0.018	0.133	0.067	0.249
Spending on purchase of livestock	750.995	10371.32	41934.95	65421.4
Sale of livestock (dummy)	0.031	0.171	0.114	0.318
Income from sale of livestock	3744.358	27663.72	122737.7	102378.9
Produce from livestock (dummy)	0.243	0.429	0.907	0.289
Total livestock produce sold	22041.68	65475.21	28279.81	72964.99
Meat sold	13397.7	58988.77	17189.46	66327.3
Eggs sold	757.687	3564.588	972.123	4011.725
Milk sold	7574.645	23334.38	9718.386	26033.85
Animal fur, down and skins sold	232.054	1943.708	297.729	2197.201
Honey sold	79.588	4343.094	102.113	4919.207

Dummy for the ownership of livestock shows whether a household owned cattle, birds, bees, or any other types of agricultural animals. 26.8% of the families included in the sample were in possession of livestock, while for those that had some land at their disposal, this indicator was equal to 49.3% (Table 2). Expenditure on livestock specifies how much a household spent on the purchase and keeping of livestock per quarter. These expenses cover feed, veterinary services, transport services and hiring of labor related to livestock management, slaughter and butchering of carcasses, and livestock insurance. For households which owned farm animals, expenditure on keeping and managing them was 15491.89 tenge per quarter on average. There is a big variation from the mean since the standard deviation for this variable is 26666.4. Overall, 1.8% of the households spent on the purchase of additional livestock each quarter, and for households involved in livestock farming the indicator was 6.7%, with an average spending of 41934.95 tenge. 3.1% of all the households chose to sell their livestock, earning 122737.7 tenge on average per quarter. This indicator was equal to 11.4% for those involved in animal farming.

Produce from livestock dummy shows whether the household cultivated any products from their farm animals. 24.3% of the households received livestock produce each quarter, and for a sub sample of livestock owners, this indicator was equal to 90.7%, the vast majority. Variable for the total amount of livestock produce sold includes sub variables such as meat, eggs, milk, animal fur, down and skins, honey sold per household for each quarter. The sub variable for the meat sold in turn incorporates beef, horse meat, pork, poultry, lamb, and a category for other types of meat and byproducts. The average total livestock produce sold by all households in the sample was equal to 22041.68 tenge, while those with a dummy variable for produce from livestock equal to 1, it is 28279.81 tenge per quarter. The high standard deviation of 72964.99 indicates that the variation from this average amount is great. Furthermore, we have 17189.46 tenge worth of meat sold on average annually, statistics for eggs sold - 972.123, milk - 9718.386, animal fur, down and skins - 297.729, honey - 102.113. Hence, wholesale of meat brings in the most revenue compared to other types of produce from livestock, and with a standard deviation of 66327.3 it is expected that the values for total amount of meat sold are spread over a broad range of numbers.

**Table 3 – Description of variables regarding goods produced (in tenge)**

	Mean	St.Dev	Processed Mean	Processed St.Dev
All goods produced	17750.07	29793.08	29402.52	36990.89
Bread produced	3406.036	5025.048	4328.739	5733.654
Dairy produced	4474.456	14665.19	9154.913	19940.57
Animal fats produced	2573.764	10665.03	5269.038	14759.93
Jam produced	2160.734	5469.72	3049.02	6718.451
Other types of goods	5121.701	13075.88	7577.184	14066.49
All goods sold	1388.996	11507.33	2552.492	12948.07
Bread sold	10.701	784.422	9.495	706.227
Dairy sold	727.734	6317.511	1491.583	8981.535
Animal fats sold	452.983	4294.19	925.813	6060.588
Jam sold	1.676	145.192	3.165	200.889
Other types of goods sold	194.457	7423.013	119.476	3632.191

Total goods produced variable is the monetary value of goods and products which were manufactured by the household. This variable consists of sub variables bread, dairy products, animal fats and oils, jam, and a category for any other types of goods produced. The latter category includes pastry, sausages, meat products, vegetable oil, wine from grapes and other fruits, canned fruits and berries, canned or processed vegetables, jam, flour, cereals, textiles and garments, wood and products from timber, building materials, and a category for other products. The data reveals that 17750.07 tenge worth of goods were produced in total (Table 3). Selecting households which own livestock or cultivate

crop, this estimate equals 29402.52 tenge. More precisely, during the period in question, the quarterly average amount of bread produced by the household was worth 4328.739 tenge, dairy - 9154.913 tenge, fats and oils produced from livestock - 5269.038 tenge, jam worth 3049.02 tenge and 7577.184 tenge worth of other types of produced goods. Consequently, it can be noticed that households predominantly produce dairy products, amounting to 31% of the goods produced in total.

When it comes to the value of goods sold in total each quarter, it was equal to 2552.492 tenge per household, which was only 8.7% of the amount produced. We can predict that the majority of households produce goods for their own utility, instead of putting them on sale for financial gain. The monetary value of bread sold on average was only 9.495 tenge, which was 0.2% of the bread produced each quarter. 16.3% of the dairy products manufactured on average had been sold, amounting to 1491.583 tenge per quarter. Animal fats and oils were sold for 925.813 tenge on average, which was 17% of the amount produced per quarter, while only 0.2% of the jam produced was sold for profit - 3.165 tenge. Lastly, a category of other goods that were produced by households on average was sold for 119.476 tenge each quarter, which was 1.6% of the total amount produced. Since dairy products were the most produced goods annually, they were also the most sold goods.

We can see that average expenditure on livestock was far greater than on land with a significant difference of 793.75%, so we can predict that households invest more on livestock because they expect receive more revenue from it compared to harvesting crops. From analyzing the data, households receive 1520.9% more profit from livestock produce than from harvest of land, the net profit from crop production was equal to 1335 tenge on average, while livestock production's net profit was 21639 tenge.

**Table 4 – Description of variables regarding income (in tenge)**

	Mean	St.Dev
Services provided by the household	49443.61	128081.3
Income from production	69373.08	123732.6
Household income	398061.3	259466.1

Variable for the income from services provided by the household consists of transport service, construction, repair and construction services, trade, sewing of clothes, shoes and their repair, photo making, hairdressers and beauty salons, other types of individual services, repair of household appliances and metal products, educational services, health services, renting out land or agricultural machinery, maintenance and repair of personal vehicles and other services. According to the data, a household supplied services for 49443.61 tenge on average per quarter (Table 4).



Variable for the household income is the overall income earned by members of the household each quarter. On average, this indicator was equal to 398061.3 tenge.

Other variables that were used for this work are unique numbers for each household, variables for year and quarter, a time trend – t.

**Table 5 – Amounts of crops and livestock produce yielded and sold**

	I	II	III	IV	Mean
Crops produced (kg)	0	45.58	1056.67	59.752	366.382
Crops sold (kg)	0	23.616	121.049	23.198	50.58
Livestock produce (kg)	54.522	30.635	31.009	103.926	50.624
Livestock produce sold (kg)	11.854	18.878	12.056	25.099	16.013
Milk produced in (l)	310.171	310.171	403.998	270.01	385.233
Milk sold in (l)	72.846	116.988	105.195	70.406	95.171
Eggs and animal skins produced	94.887	194.238	152.347	91.678	140.662
Eggs and animal skins sold	21.61	64.157	47.769	20.021	41.669

Table 5 shows the average values of produced agricultural output and how much of that was put up for sale. According to the data a household produced about 366.4 kg of fruits, vegetables, and other types of crops on average. Moreover, the greatest amount of crop production was observed in the third quarter, during the months of July, August, and September, measuring up to 1056.67 kg yielded. However, only about 13.8% of the crop produced by households was sold: 50.58 kg, while the rest of the produced crop was consumed by the members of the household, gifted to relatives, or processed into goods.

The average amount of livestock produce yielded by a household was 50.624 kg, and this indicator was the highest in the fourth quarter - 103.926 kg of various types of meat, honey and animal fur produced. 31.6% of the livestock produce yielded was subsequently sold for profit, while the rest of it was consumed and used by the household.

385.233 liters of milk was produced by households on average, and this indicator was the highest in the third quarter, amounting to 403.998 liters. Around 24.7% of the produced milk was sold for profit.

The number of eggs and animal skins produced by households according to the results of the survey was 140.662 on average, with 29.6% of them subsequently being sold.

## 2.1 Quarterly statistics of the survey

**Table 6 – Quarterly average values for cultivated crops (in tenge)**

	I	II	III	IV
Expenditure on land	170.261	1148.804	476.143	55.792
Fruits sold	0	269.263	907.751	100.805
Vegetables sold	0	629.915	1559.269	757.095
Other types of crops sold	0	323.064	1309.035	268.133
Total crop sold	0	1222.243	3776.056	1126.033

From Table 6, we can see that households invested the most in the second quarter compared to other periods of the year, which was equal to 1148.804 tenge on average. The months of April, May and June are usually the busiest time for farmers since they start planting and replanting their crops. There was no harvest sold in the first quarter, during the cold months of January, February, and March. Furthermore, it can be noticed that the third quarter brought the highest revenue from the sale of harvested crops, with a mean of 3776.056 tenge.

**Table 7 – Quarterly average values for produce from livestock (in tenge)**

	I	II	III	IV
Expenditure on livestock	2212.17	2793.832	7324.773	4304.136
Income from sale of livestock	3063.409	2742.552	4518.568	4679.9
Total livestock produce sold	23329.75	18970.27	18798.2	29975.78
Meat sold	15936.29	8789.877	10022.44	22479.79
Eggs sold	484.647	1082.678	837.934	442.092
Milk sold	6800.728	8669.579	7683.389	6630.226
Animal fur, down, skins sold	108.086	405.107	67.227	363.311
Honey sold	0	23.026	187.211	60.36

In Table 7, it can be noted that expenditure on livestock was the greatest in the third quarter, amounting to 7324.773 tenge on average by a household. Revenue from the sale of produce from livestock far exceeded the revenue from selling livestock in all quarters. The last quarter brought the most income from the produce of livestock, which was equal to 29975.78 tenge annually.

**Table 8 – Quarterly average values for manufactured goods (in tenge)**

	I	II	III	IV
All goods produced	8892.775	17186.85	28720.87	12204.5
All goods sold	572.619	2253.369	1783.764	721.590
Bread produced	3936.155	3447.896	2750.216	3728.421
Bread sold	13.306	13.19519	8.791	8.201
Dairy produced	2357.569	6707.447	5401.139	2878.175
Dairy sold	310.405	1184.491	945.478	350.387
Animal fats produced	804.055	4061.722	3475.09	1469.999
Animal fats sold	69.946	874.649	628.153	136.079
Jam produced	3.708	1510.83	5777.677	119.966
Jam sold	0	1.036	4.38	0.369
Other goods produced	1789.895	1446.828	11290.35	3999.215
Other goods sold	178.833	178.131	194.677	225.442

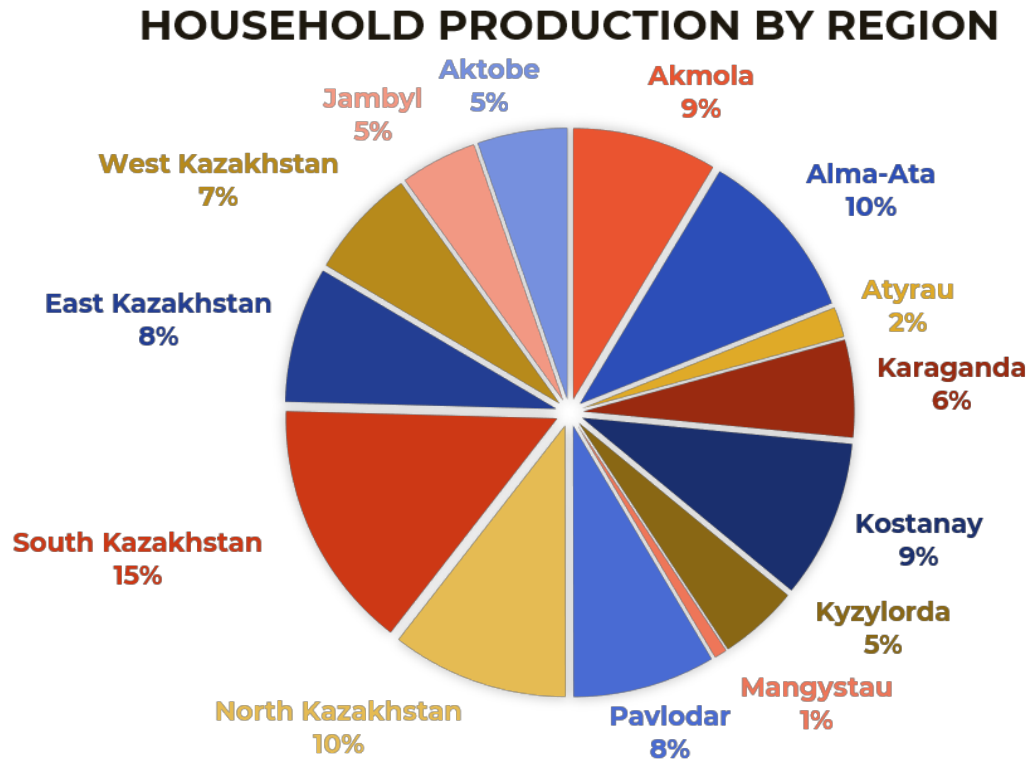
Table 8 shows that the average monetary value for the goods produced by the household was the at its highest in the third quarter, amounting to 28720.87 tenge. However the greatest profit from the goods sold was in the second quarter – 2253.369 tenge. Among the produced goods dairy products held the largest quarterly value, which was equal to 6707.45 tenge on average. The variable for the assortment of other goods produced reached its highest average in the third quarter – 11290.35 tenge, this included various manufactured products from flour to textiles and garments, building materials.

**Table 9 – Quarterly average values for household income (in tenge)**

	I	II	III	IV
Services provided by the household	53302.38	49445.83	42167.69	55347.25
Income from production	66244.51	64586.35	65410.53	84603.11
Household income	374956.1	393095.6	410451.2	414289.5

From Table 9, we see that services provided by the household brought the most profit on average during the first and last quarters, equal to 53302.38 and 55347.25 tenge respectively. Average income from the total amount of production by the household had its greatest value in the last quarter of the year, amounting to 84603.11 tenge. We note that the largest contributors to households' production, the sale of livestock produce and the provision of services also had the highest average during the last quarter.

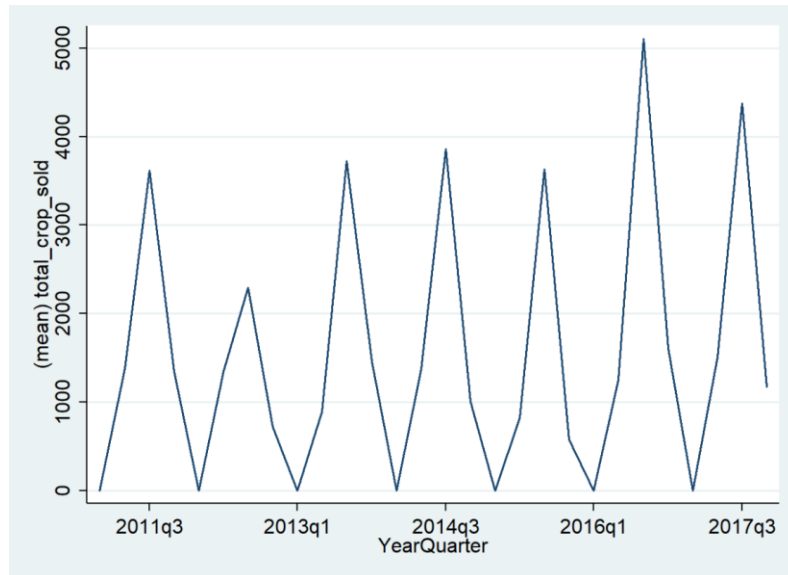
### 2.3 Statistics by region



**Image 1 – Household production statistics by regions in Kazakhstan**

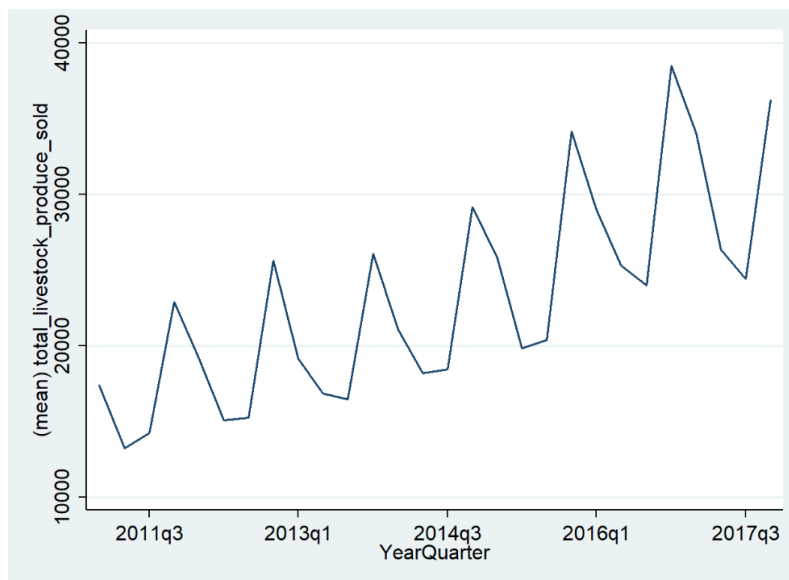
The region which was responsible for the highest yield of household production was South Kazakhstan, amounting to 15%, the warm winters and climate likely contributing to the region's leader position in production. Next, Alma-Ata Region and North Kazakhstan Region each amounted to 10% when it comes to the monetary value of goods and services provided by a household per quarter.

### 3 Graphical analysis



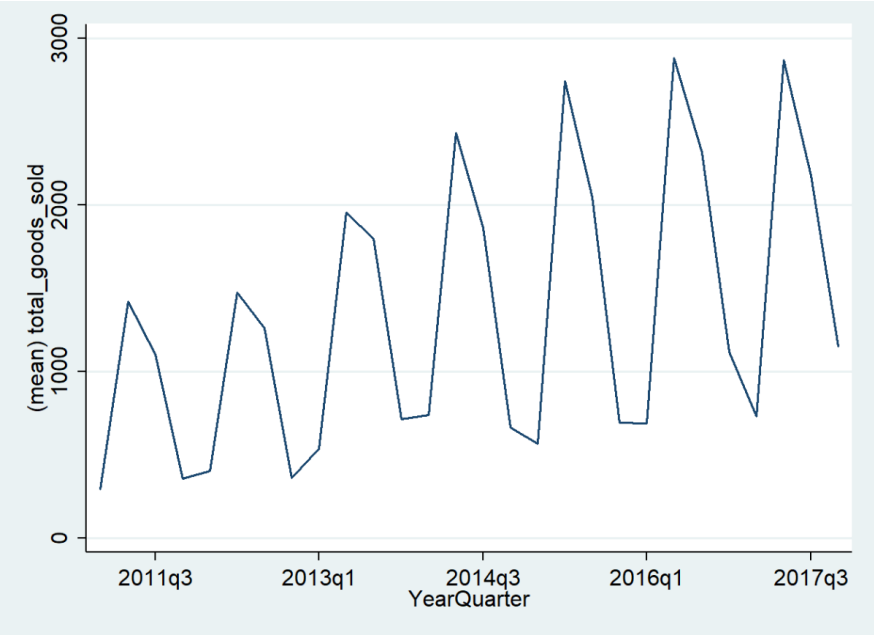
**Image 2 - Relationship between average crop sold versus time**

From the graph in Image 2, it can be seen that there is some seasonality to the amount of harvest sold each quarter. While there is no crop sold in the first quarter, third quarter observes the maximum amount of crop sold during the year. The highest amount of crops sold on average, which was equal to 5108.708 tenge, was observed in the third quarter of 2016. This indicator was equal to 4378.64 tenge in the same quarter a year later in 2017, second highest amount of crops sold, although it decreased by 15% from 2016.



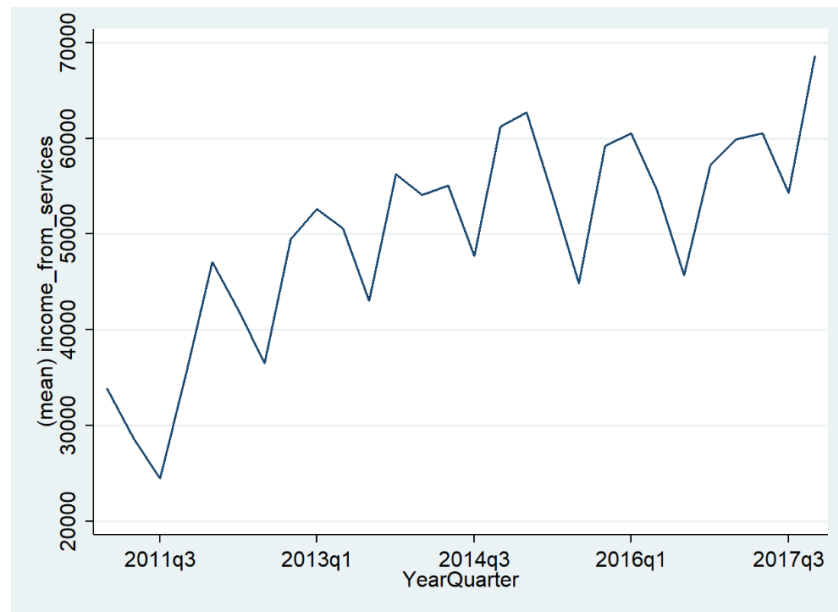
**Image 3 – Relationship between average animal produce sold versus time**

Declining after the first quarter, the second and third quarters observed the lowest average amount of animal produce sold throughout the time period in question, rising dramatically in the last quarter of the year (Image 3). The lowest average animal produce sold was observed in the second quarter of 2011. The fourth quarter of 2016 brought the highest income from the sale of produce from farm animals, amounting to 38492.73 tenge on average. Households in the fourth quarter of 2017 had the second highest average income from livestock produce, which was equal to 36217.65 tenge, decreasing slightly by 5.9% from the previous year.



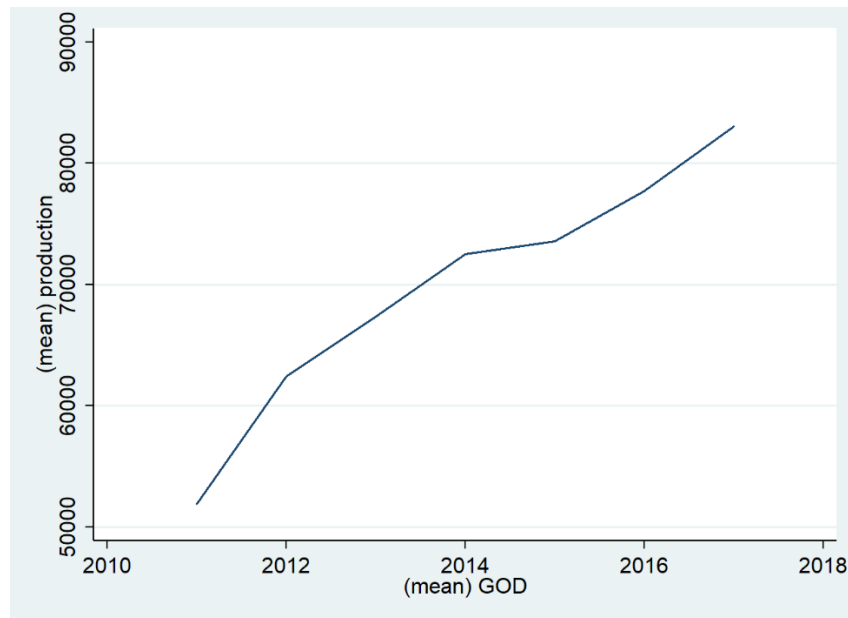
**Image 4 – Relationship between average goods sold versus time**

We have a sharp increase in the average amount of manufactured goods sold from the first quarter to the second, a slight decrease in the third quarter and a significant fall in the last quarter of the year annually from 2011 to 2017, as shown in the graph from Image 4. The fourth quarters of 2016 and 2017 had the greatest average revenue from goods sold, equal to 2882.213 and 2869.854 tenge respectively. The lowest statistic for this was in the first quarter of 2011, which was only 294.212 tenge on average.



**Image 5 – Relationship between income from services versus time**

Average income from services provided by a household had the greatest value in the first and fourth quarters through the years as shown in Image 5, a considerable decline in the third quarter was annually accompanied by a steep rise in the fourth quarter. The lowest amount of monetary value of the services provided was observed in the third quarter of 2011, amounting to 24463.05 tenge on average. On the other hand, the highest average income from various services was in the last quarter of 2017, which was equal to 68621.97 tenge.



**Image 6 –Income from household production versus time**

The average income from household production increased steeply from 2011 to 2012, from 51914.73 tenge to 62419.11 tenge, by 20.2% (Image 6). Then production income gradually increased up to 72491.85 tenge in 2014, after which the growth rate slightly slowed down. The highest average estimate was observed in 2017, reaching 83049.18 tenge.



## 4 Regression analysis

Model 1:

$$Y = \beta_0 + \beta_1 city + \beta_2 land + \beta_3 crop + \beta_4 lsk + \beta_5 lsksale + \beta_6 lskprod + u \quad (1)$$

**Table 10 – Results of regression (1)**

Variable	Coefficient	Std. Error	t-Statistic	P> t
<i>city</i>	0.0604947	0.0315544	1.92	0.055
<i>land</i>	-0.0115505	0.0028512	-4.05	0.000
<i>crop</i>	0.0442722	0.0019079	23.20	0.000
<i>lsk</i>	-0.0020801	0.0044268	-0.47	0.638
<i>lsksale</i>	0.4686356	0.0037046	126.50	0.000
<i>lskprod</i>	0.0700187	0.0040583	17.25	0.000
R-sq:	0.1702			
F-Statistic	19.23			
Prob (F-Statistic)	0.0000			

In the first model, the growth rate of household income per capita ( $Y$ ) is the dependent variable, and it is regressed on independent variables: the dummy variable for the city (*city*), dummy variable for the ownership of land (*land*), the dummy for ownership of livestock (*lsk*), dummy for cultivation of crop (*crop*), dummy for the sale of livestock (*lsksale*), dummy for the produce of livestock (*lskprod*) and the time trend. The proportion of variance in the growth of household income in this model: R-Squared is equal to 0.1702, which means that around 17% of the variance in the dependent variable can be predicted by the independent variables. For livestock owners, the household income was 0.2% less than others, but with a t-statistic=-0.47 and a large p-value:  $P>|t|=0.638$ , this does not hold statistical significance. For households which cultivated crops on their land, the growth of income was 4.4% higher. The t-statistic for the cultivation of crop dummy is equal to 23.2 and  $P>|t|=0.000$ , meaning that it is statistically significant. Households that sold their livestock earned about 46.8% more than others, with a t-statistic of 126.5 and a very small p-value:  $P>|t|=0.000$ , this indicator holds statistical significance. Households which yielded some type of livestock produce had an income which was 7% higher compared to households that did not. The t-statistic is equal to 17.25 and the p-value is close to zero:  $P>|t|=0.000$ , so this is statistically significant. Households which owned or rented some type of land had an income which was 1.2% less than others. The t-statistic for the ownership of land dummy is equal to -4.05 while  $P>|t|=0.000$ , so it is

statistically significant. Households located in cities earn about 6% more than those that reside in rural areas. The t-statistic for the city dummy is 1.92 and  $P>|t|=0.055$ , so it is statistically significant on the 10% level.

Model 2:

$$Y_c = \beta_0 + \beta_1 I_l + \beta_2 loan + \beta_3 size + u \quad (2)$$

**Table 11 – Results of regression (2)**

Variable	Coefficient	Std. Error	t-Statistic	P> t
<i>I<sub>l</sub></i>	0.0067645	0.0114092	0.59	0.553
<i>loan</i>	-0.1796432	0.0705449	-2.55	0.011
<i>size</i>	0.0071971	0.020369	0.35	0.724
R-sq:	0.6707			
F-Statistic	2.73			
Prob (F-Statistic)	0.0000			

In the second model, the growth of household production of crops ( $Y_c$ ) is regressed on the investment spent on the agricultural management of land ( $I_l$ ), size of the household (*size*), a dummy variable for taking a loan (*loan*) and the time trend. The effect of investment on agriculture of land on the growth of crop production was insignificant since the t-statistic is 0.59 and  $P>|t|=0.553$ . The coefficient for the size of the household did not hold statistical significance on the 5% level, because while the t-statistic was equal to 0.35, the p-value was equal to 0.724. The growth of crop production for households which took out a loan decreased by almost 18%, with a t-statistic of -2.55 and  $P>|t|=0.011$  it holds statistical significance on the 5% level.

Model 3:

$$Y_{l_{sk}} = \beta_0 + \beta_1 I_{l_{sk}} + \beta_2 loan + \beta_3 size + u \quad (3)$$

**Table 12 – Results of regression (3)**

Variable	Coefficient	Std. Error	t-Statistic	P> t
<i>I<sub>l<sub>sk</sub></sub></i>	0.0302605	0.0045191	6.70	0.000
<i>loan</i>	0.0645548	0.0324047	1.99	0.046
<i>size</i>	0.030092	0.0087955	3.42	0.001
R-sq:	0.1045			
F-Statistic	4.79			
Prob (F-Statistic)	0.0000			

In the third model, the growth of household production of livestock produce ( $Y_{l_{sk}}$ ), such as various types of meat, honey and animal fur is regressed on the investment spent on the management and cultivation of livestock ( $I_{l_{sk}}$ ), a dummy variable for taking a loan (*loan*), size of the household (*size*) and the time trend. When investment on livestock increased by 1%, the growth of production was 3%. The t-statistic is 6.7 and  $P>|t|=0.000$ , so this coefficient is statistically significant. When the size of the household increased by 1 member, the growth of production output was equal to 3%. The t-statistic for this coefficient is 3.42 and  $P>|t|=0.001$ , so it is statistically significant. Households that had taken out a loan yielded production which was 6.4% higher than others, the t-statistic is 1.99 and  $P>|t|=0.046$ , so it holds significance on the 5% level.

Model 4:

$$Y_m = \beta_0 + \beta_1 I_{l_{sk}} + \beta_2 loan + \beta_3 size + u \quad (4)$$

**Table 13 – Results of regression (4)**

Variable	Coefficient	Std. Error	t-Statistic	P> t
<i>I<sub>l<sub>sk</sub></sub></i>	0.0432783	0.0030973	13.97	0.000
<i>loan</i>	-0.0259368	0.0223784	-1.16	0.246
<i>size</i>	0.0135558	0.0056779	2.39	0.017
R-sq:	0.1865			
F-Statistic	8.06			
Prob (F-Statistic)	0.0000			

In the fourth model, the growth of household production of milk produced ( $Y_m$ ) is regressed on the investment spent on the cultivation of livestock ( $I_{lsk}$ ), size of the household ( $size$ ), a dummy variable for taking a loan ( $loan$ ) and the time trend. When investment on animal husbandry increased by 1%, the growth of production was 4.3%. The t-statistic is 13.97 and  $P>|t|=0.000$ , so this coefficient is statistically significant. When the size of the household increased by 1 member, the growth of production output was equal to 1.3%. The t-statistic for this coefficient is 2.39 and  $P>|t|=0.017$ , so it is statistically significant. Coefficient for taking out a loan does not hold statistical significance on the 5% level since  $P>|t|=0.246$ .

Model 5:

$$Y_e = \beta_0 + \beta_1 I_{lsk} + \beta_2 loan + \beta_3 size + u \quad (5)$$

**Table 14 – Results of regression (5)**

Variable	Coefficient	Std. Error	t-Statistic	$P> t $
$I_{lsk}$	0.0495707	0.0075098	6.60	0.000
$loan$	0.0906584	0.0530134	1.71	0.087
$size$	0.0302264	0.0149665	2.21	0.043
R-sq:	0.0646			
F-Statistic	13.29			
Prob (F-Statistic)	0.0000			

In the fifth model, the growth of household production of eggs and animal skins ( $Y_e$ ) is regressed on the investment spent on livestock ( $I_{lsk}$ ), size of the household ( $size$ ), a dummy variable for taking a loan ( $loan$ ) and the time trend. When investment on household's livestock increased by 1%, the growth of production was 4.9%. The t-statistic is 6.6 and  $P>|t|=0.000$ , so this coefficient is statistically significant. When the size of the household increased by 1 member, the growth of production output was equal to 1.3%. The t-statistic for this coefficient is 2.39 and  $P>|t|=0.017$ , so it is statistically significant. Coefficient for taking a loan does not hold statistical significance on the 5% level because  $P>|t|=0.087$ . On the 10% level of significance, households which took out a loan experienced a growth in production of eggs and animal skins by 9%.

#### **4.1 A brief outline of regression analysis**

From the regression analysis, we have that the growth rate of income per capita for households which cultivated crops on their land was 4.4% higher. Households that sold their livestock earned about 46.8% more than others. Households which yielded some type of livestock produce had an income which was 7% higher compared to households that did not. Households which owned or rented some type of land had an income which was 1.2% less than others. Households located in cities earn about 6% more than those that reside in rural areas.

The effect of investment on agriculture of land on the growth of crop production was insignificant. From descriptive statistics we learned that investment on crop production was indeed considerably less than on livestock. The coefficient for the size of the household did not hold statistical significance. However, the growth of crop production for households which took out a loan decreased by almost 18%. This might be tied to households using loans to invest into other areas of household economy, like consumption and production of livestock.

When investment on livestock increased by 1%, the growth of production of livestock produce was 3%. As the size of the household increased by 1 member, the growth of production output of livestock goods was equal to 3%. Households that had taken out a loan yielded production which was 6.4% higher than others.

When investment on livestock increased by 1%, the growth of production of milk was increased by 4.3%. When the size of the household increased by 1 member, the growth of production output was equal to 1.3%. Coefficient for taking out a loan did not hold statistical significance on the 5% level.

When investment on the management of a household's farm animals increased by 1%, the growth of production was 4.9%. As the size of the household increased by 1 member, the growth of production output was equal to 1.3%. Coefficient for taking a loan did not hold statistical significance on the 5% level. On the 10% level of significance, households which took out a loan experienced a growth in production of eggs and animal skins by 9%.

## CONCLUSION

Households consume the majority of the agricultural production they produce. They consume 86.2% of the crop production, 68.4% of the livestock output, 75.3% of the milk produced, 91.3% of the goods that were manufactured. This approves the theory that households can be both producers and consumers. Production from animal husbandry brought much more profit compared to crop production as hypothesized, 1520.9% more to be precise. However, the research also showed that production of services brought almost twice as much income as animal husbandry.

The highest level of crop production can be observed during the 3rd quarter, while the highest level of animal produce was yielded in the 4th quarter, along with the provision of services by the household.

The average amount of household production per quarter increased by the end of the period included in the survey, reaching 83049.18 tenge in 2017.

In general, production of goods and services was discovered to be a small portion of the household income, households invested very little into production of goods and services. From the regression analysis it was determined that the sale of farm animals was the part of household production which most affected the growth rate of income per capita, followed by the yield of livestock produce. While investment in the management and cultivation of livestock affected the growth rate of production of various types of meat, animal skins and fur, dairy and eggs, the investment in the cultivation of land did not affect the growth rate of crop production.

Allocation of time, which would give even more insight into the economics of household production, was not considered during the analysis, for it was not included in the annual quarterly household survey as a question.

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# APPENDIX

## Image 7 – First regression model

```
. xi: xtreg ln_household_income_percapita dummy_gorod dummy_land dummy_crop dummy_livestock dummy_sale_livestock dummy_produce_live
> stock i.GOD i.KVARTAL, fe
i.GOD          _IGOD_2011-2017      (naturally coded; _IGOD_2011 omitted)
i.KVARTAL      _IKVARTAL_1-4        (naturally coded; _IKVARTAL_1 omitted)

Fixed-effects (within) regression      Number of obs   =   331,571
Group variable: NOM_DX                 Number of groups =    39,211

R-sq:                                  Obs per group:
    within = 0.2320                    min           =     1
    between = 0.1791                   avg           =    8.5
    overall = 0.1702                   max           =    28

                                         F(15,292345)    =   5887.12
corr(u_i, Xb) = -0.0441                 Prob > F        =    0.0000
```

ln_household_income_p-a	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
dummy_gorod	.0604947	.0315544	1.92	0.055	-.001351 .1223404
dummy_land	-.0115505	.0028512	-4.05	0.000	-.0171388 -.0059621
dummy_crop	.0442722	.0019079	23.20	0.000	.0405327 .0480117
dummy_livestock	-.0020801	.0044268	-0.47	0.638	-.0107565 .0065962
dummy_sale_livestock	.4686356	.0037046	126.50	0.000	.4613747 .4758964
dummy_produce_livestock	.0700187	.0040583	17.25	0.000	.0620645 .077973
_IGOD_2012	.139223	.0021935	63.47	0.000	.1349238 .1435222
_IGOD_2013	.2455882	.0024948	98.44	0.000	.2406985 .2504779
_IGOD_2014	.3353932	.0026723	125.51	0.000	.3301556 .3406308
_IGOD_2015	.5331677	.0028016	190.31	0.000	.5276766 .5386588
_IGOD_2016	.6256543	.002933	213.32	0.000	.6199058 .6314029
_IGOD_2017	.7179534	.0031589	227.28	0.000	.7117619 .7241448
_IKVARTAL_2	.0311178	.0015091	20.62	0.000	.02816 .0340755
_IKVARTAL_3	.0669707	.0015295	43.78	0.000	.0639729 .0699686
_IKVARTAL_4	.0899081	.0013957	64.42	0.000	.0871725 .0926437
_cons	11.39275	.0165674	687.66	0.000	11.36028 11.42522
sigma_u	.48810184				
sigma_e	.28256807				
rho	.74898555	(fraction of variance due to u_i)			

F test that all u\_i=0: F(39210, 292345) = 19.23                      Prob > F = 0.0000



## Image 8 – Second regression model

```
. xi: xtreg logcropkg ln_investment_land dummy_loan NOMP i.GOD i.KVARTAL, fe
i.GOD          _IGOD_2011-2017      (naturally coded; _IGOD_2011 omitted)
i.KVARTAL      _IKVARTAL_1-4        (naturally coded; _IKVARTAL_1 omitted)
note: _IKVARTAL_4 omitted because of collinearity

Fixed-effects (within) regression              Number of obs   =   19,041
Group variable: NOM_DX                        Number of groups =    8,606

R-sq:                                         Obs per group:
  within = 0.7981                             min =           1
  between = 0.5679                             avg =           2.2
  overall = 0.6707                             max =           18

corr(u_i, Xb) = 0.0487                        F(11,10424)     =   3746.44
                                                Prob > F        =    0.0000
```

	logcropkg	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
ln_investment_land		.0067645	.0114092	0.59	0.553	-.0155997 .0291287
dummy_loan		-.1796432	.0705449	-2.55	0.011	-.3179248 -.0413616
NOMP		.0071971	.020369	0.35	0.724	-.0327301 .0471243
_IGOD_2012		.0057852	.0367978	0.16	0.875	-.0663456 .077916
_IGOD_2013		-.0026319	.0410001	-0.06	0.949	-.083 .0777362
_IGOD_2014		-.0671418	.0438504	-1.53	0.126	-.153097 .0188135
_IGOD_2015		-.0162865	.0464388	-0.35	0.726	-.1073155 .0747424
_IGOD_2016		-.0294799	.0494731	-0.60	0.551	-.1264566 .0674968
_IGOD_2017		-.1324793	.0543691	-2.44	0.015	-.2390531 -.0259055
_IKVARTAL_2		-2.32098	.0895949	-25.91	0.000	-2.496604 -2.145357
_IKVARTAL_3		1.917049	.0897405	21.36	0.000	1.741141 2.092958
_IKVARTAL_4		0	(omitted)			
_cons		4.307958	.1380728	31.20	0.000	4.037309 4.578607
sigma_u		1.3406573				
sigma_e		1.0131269				
rho		.63650736	(fraction of variance due to u_i)			

F test that all u\_i=0: F(8605, 10424) = 2.73                      Prob > F = 0.0000

## Image 9 – Third regression model

```
. xi: xtreg loglivestock_produce_kg ln_investment_livestock dummy_loan NOMP i.GOD i.KVARTAL, fe
i.GOD          _IGOD_2011-2017      (naturally coded; _IGOD_2011 omitted)
i.KVARTAL      _IKVARTAL_1-4        (naturally coded; _IKVARTAL_1 omitted)

Fixed-effects (within) regression              Number of obs   =   33,322
Group variable: NOM_DX                        Number of groups =    7,431

R-sq:                                         Obs per group:
  within = 0.1747                             min =           1
  between = 0.0885                             avg =           4.5
  overall = 0.1045                             max =           27

corr(u_i, Xb) = 0.0082                        F(12,25879)     =   456.43
                                                Prob > F        =    0.0000
```

	loglivestock_produce_kg	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
ln_investment_livestock		.0302605	.0045191	6.70	0.000	.0214027 .0391182
dummy_loan		.0645548	.0324047	1.99	0.046	.0010398 .1280698
NOMP		.0300092	.0087955	3.42	0.001	.0128524 .0473317
_IGOD_2012		-.0279313	.0484581	-0.58	0.564	-.1229118 .0670492
_IGOD_2013		.0141095	.0494713	0.29	0.775	-.082857 .1110759
_IGOD_2014		.0433583	.050099	0.87	0.387	-.0548385 .141555
_IGOD_2015		.1539033	.0507616	3.03	0.002	.0544078 .2533988
_IGOD_2016		.2219164	.0511195	4.34	0.000	.1217193 .3221136
_IGOD_2017		.2278312	.0522735	4.36	0.000	.1253723 .3302901
_IKVARTAL_2		-.1693329	.0135195	-12.53	0.000	-.1958319 -.1428339
_IKVARTAL_3		-.190481	.0138566	-13.75	0.000	-.2176407 -.1633213
_IKVARTAL_4		.5345152	.0132929	40.21	0.000	.5084603 .56057
_cons		3.65569	.0697583	52.41	0.000	3.51896 3.792421
sigma_u		.8561672				
sigma_e		.72479816				
rho		.5825244	(fraction of variance due to u_i)			

F test that all u\_i=0: F(7430, 25879) = 4.79                      Prob > F = 0.0000

## Image 10 – Fourth regression model

```
. xi: xtreg logmilk_produced ln_investment_livestock dummy_loan NOMP i.GOD i.KVARTAL, fe
i.GOD          _IGOD_2011-2017      (naturally coded; _IGOD_2011 omitted)
i.KVARTAL      _IKVARTAL_1-4        (naturally coded; _IKVARTAL_1 omitted)
```

```
Fixed-effects (within) regression          Number of obs   =   42,213
Group variable: NOM_DX                    Number of groups =    7,327
```

```
R-sq:                                     Obs per group:
  within = 0.3604                          min =           1
  between = 0.0556                          avg =           5.8
  overall = 0.1865                          max =           27
```

```
corr(u_i, Xb) = 0.0116                    F(12,34874)     =   1637.25
                                           Prob > F        =    0.0000
```

logmilk_produced	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_investment_livestock	.0432783	.0030973	13.97	0.000	.0372075	.0493491
dummy_loan	-.0259368	.0223784	-1.16	0.246	-.0697993	.0179256
NOMP	.0135558	.0056779	2.39	0.017	.0024269	.0246847
_IGOD_2012	-.0472224	.034929	-1.35	0.176	-.1156843	.0212394
_IGOD_2013	-.0045105	.0356151	-0.13	0.899	-.0743172	.0652962
_IGOD_2014	-.0175584	.0360735	-0.49	0.626	-.0882636	.0531467
_IGOD_2015	.0404719	.036467	1.11	0.267	-.0310046	.1119484
_IGOD_2016	.1201547	.0367605	3.27	0.001	.048103	.1922065
_IGOD_2017	.1287768	.0375647	3.43	0.001	.0551488	.2024049
_IKVARTAL_2	.8068965	.0083296	96.87	0.000	.7905703	.8232228
_IKVARTAL_3	.7338985	.0088089	83.31	0.000	.7166329	.7511642
_IKVARTAL_4	-.0275308	.0087839	-3.13	0.002	-.0447475	-.0103141
_cons	5.258632	.048983	107.36	0.000	5.162624	5.35464
sigma_u	.75545471					
sigma_e	.56280805					
rho	.64308113	(fraction of variance due to u_i)				

F test that all u\_i=0: F(7326, 34874) = 8.06                      Prob > F = 0.0000

## Image 11 – Fifth regression model

```
. xi: xtreg logeggs_skins_produced ln_investment_livestock dummy_loan NOMP i.GOD i.KVARTAL, fe
i.GOD          _IGOD_2011-2017      (naturally coded; _IGOD_2011 omitted)
i.KVARTAL      _IKVARTAL_1-4        (naturally coded; _IKVARTAL_1 omitted)
```

```
Fixed-effects (within) regression          Number of obs   =   38,448
Group variable: NOM_DX                    Number of groups =    7,776
```

```
R-sq:                                     Obs per group:
  within = 0.1475                          min =           1
  between = 0.1057                          avg =           4.9
  overall = 0.0646                          max =           27
```

```
corr(u_i, Xb) = 0.0604                    F(12,30660)     =   442.21
                                           Prob > F        =    0.0000
```

logeggs_skins_produced	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_investment_livestock	.0495707	.0075098	6.60	0.000	.0348512	.0642902
dummy_loan	.0906584	.0530134	1.71	0.087	-.01325	.1945669
NOMP	.0302264	.0149665	2.02	0.043	.0008914	.0595613
_IGOD_2012	.202438	.076395	2.65	0.008	.0527006	.3521753
_IGOD_2013	.2247705	.0779174	2.88	0.004	.0720492	.3774918
_IGOD_2014	.2782373	.0790545	3.52	0.000	.1232871	.4331874
_IGOD_2015	.2716356	.0802795	3.38	0.001	.1142843	.4289868
_IGOD_2016	.3254878	.0810238	4.02	0.000	.1666778	.4842978
_IGOD_2017	.3560682	.0829679	4.29	0.000	.1934477	.5186886
_IKVARTAL_2	.9972934	.0212085	47.02	0.000	.9557239	1.038863
_IKVARTAL_3	.8858937	.022269	39.78	0.000	.8422456	.9295418
_IKVARTAL_4	-.1076048	.0218751	-4.92	0.000	-.1504809	-.0647287
_cons	2.746468	.1125795	24.40	0.000	2.525807	2.967128
sigma_u	2.3475097					
sigma_e	1.2859679					
rho	.76918	(fraction of variance due to u_i)				

F test that all u\_i=0: F(7775, 30660) = 13.29                      Prob > F = 0.0000

## Протокол анализа Отчета подобия заведующего кафедрой

Заведующий кафедрой заявляет, что ознакомился (-ась) с Полным отчетом подобия, который был сгенерирован Системой выявления и предотвращения плагиата в отношении работы:

**Автор:** Абдешова Айдана Искакқызы

**Название:** Household production in Kazakhstan

**Координатор:** Алдашев Алишер Алмазович

**Коэффициент подобия 1:** 0.32%

**Коэффициент подобия 2:** 0%

Замена букв: 0

Интервалы: 0

Микропробелы: 0

Белые знаки: 0

### После анализа Отчета подобия констатирую следующее:

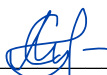
- обнаруженные в работе заимствования являются добросовестными и не обладают признаками плагиата. В связи с чем, признаю работу самостоятельной и допускаю ее к защите;
- обнаруженные в работе заимствования не обладают признаками плагиата, но их чрезмерное количество вызывает сомнения в отношении ценности работы по существу и отсутствием самостоятельности ее автора. В связи с чем, работа должна быть вновь отредактирована с целью ограничения заимствований;
- обнаруженные в работе заимствования являются недобросовестными и обладают признаками плагиата, или в ней содержатся преднамеренные искажения текста, указывающие на попытки сокрытия недобросовестных заимствований. В связи с чем, не допускаю работу к защите.

### Обоснование:

Все цитаты были оформлены верно и источники указаны корректно в библиографии. Коэффициент подобия 2 был равен 0%, что доказывает отсутствие плагиата. Вся работа была выполнена самостоятельно.

4 июня 2021


Дата

  
Аубакирова С.К.  
Подпись заведующего кафедрой

**Окончательное решение в отношении допуска к защите, включая обоснование:**

Допускаю Абдешову А.И. к защите дипломной работы, согласно анализам отчёта подобия научного руководителя и заведующего кафедрой. Все цитаты были оформлены верно и источники указаны корректно в библиографии. Коэффициент подобия 2 был равен 0%, что доказывает отсутствие плагиата. Вся работа была выполнена самостоятельно.

4 июня 2021  
Дата

  
Аубакирова С.К.  
Подпись заведующего кафедрой

## Метаданные

Название

**Household production in Kazakhstan**

Автор

**Абдешова Айдана**

Научный руководитель






**Алишер Алдашев**

Подразделение

**ИУП**

## Список возможных попыток манипуляций с текстом

В этом разделе вы найдете информацию, касающуюся манипуляций в тексте, с целью изменить результаты проверки. Для того, кто оценивает работу на бумажном носителе или в электронном формате, манипуляции могут быть невидимы (может быть также целенаправленное вписывание ошибок). Следует оценить, являются ли изменения преднамеренными или нет.

Замена букв		0
Интервалы		0
Микропробелы		0
Белые знаки		0
Парафразы (SmartMarks)		10

## Объем найденных подоби

Обратите внимание! Высокие значения коэффициентов не означают плагиат. Отчет должен быть проанализирован экспертом.



КП1

**25**

Длина фразы для коэффициента подобия 2



КП2

**5997**

Количество слов



КЦ

**38621**

Количество символов

## Подобия по списку источников

Просмотрите список и проанализируйте, в особенности, те фрагменты, которые превышают КП №2 (выделенные жирным шрифтом). Используйте ссылку «Обозначить фрагмент» и обратите внимание на то, являются ли выделенные фрагменты повторяющимися короткими фразами, разбросанными в документе (совпадающие сходства), многочисленными короткими фразами расположенные рядом друг с другом (парафразирование) или обширными фрагментами без указания источника ("криптоцитаты").

### 10 самых длинных фраз

Цвет текста

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ И АДРЕС ИСТОЧНИКА URL (НАЗВАНИЕ БАЗЫ)	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
1	<b>Sydykanov Muratbek (1).docx</b> Сыдыканов Муратбек <b>6/7/2019</b> Satbayev University (И_ЭиБ)	20	0.33 %
2	<b>Улучшение условий труда на основе аттестации рабочих мест Karachaganak Petroleum Operating b.v</b> Бекмухамбетова Асель Каиргалиевна <b>5/6/2019</b> Satbayev University (ИХИБТ)	16	0.27 %
3	<a href="https://www.cosmeticsurgeryandbeauty.com/">https://www.cosmeticsurgeryandbeauty.com/</a>	14	0.23 %

4	<b>Улучшение условий труда на основе аттестации рабочих мест Karachaganak Petroleum Operating b.v</b> Бекмухамбетова Асель Каиргалиевна 5/6/2019 Satbayev University (ИХИБТ)	14	0.23 %
5	<b>SUMDU/out2014/Medvid_T.A.Osobluvosti_legalizacii_kriminalnuh_dohodiv.pdf.txt</b> SUMDU 7/23/2019 Sumy State University (SUMDU)	13	0.22 %
6	<b>Modern methods of financing and assessment of investment projects efficiency (case of company)</b> Махатаев Максат 4/27/2016 NARXOZ (NEU) (Кафедра СЭД (ФМОП))	8	0.13 %
7	<b>Modern methods of financing and assessment of investment projects efficiency (case of company)</b> Махатаев Максат 4/27/2016 NARXOZ (NEU) (Кафедра СЭД (ФМОП))	6	0.10 %
8	<b>Улучшение условий труда на основе аттестации рабочих мест Karachaganak Petroleum Operating b.v</b> Бекмухамбетова Асель Каиргалиевна 5/6/2019 Satbayev University (ИХИБТ)	5	0.08 %
9	<b>Gender Based Wage Differentials in Turkey</b> Hakan ERCAN,Mehtar HİSARCIKLILAR;	5	0.08 %

#### из базы данных RefBooks (0.08 %)

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
<b>Источник: Paperity</b>			
1	<b>Gender Based Wage Differentials in Turkey</b> Hakan ERCAN,Mehtar HİSARCIKLILAR;	5 (1)	0.08 %

#### из домашней базы данных (0.92 %)

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
1	<b>Улучшение условий труда на основе аттестации рабочих мест Karachaganak Petroleum Operating b.v</b> Бекмухамбетова Асель Каиргалиевна 5/6/2019 Satbayev University (ИХИБТ)	35 (3)	0.58 %
2	<b>Sydykanov Muratbek (1).docx</b> Сыдыканов Муратбек 6/7/2019 Satbayev University (И_ЭИБ)	20 (1)	0.33 %

#### из программы обмена базами данных (0.45 %)

ПОРЯДКОВЫЙ НОМЕР	НАЗВАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
1	<b>Modern methods of financing and assessment of investment projects efficiency (case of company)</b> Махатаев Максат 4/27/2016 NARXOZ (NEU) (Кафедра СЭД (ФМОП))	14 (2)	0.23 %
2	<b>SUMDU/out2014/Medvid_T.A.Osobluvosti_legalizacii_kriminalnuh_dohodiv.pdf.txt</b> SUMDU 7/23/2019 Sumy State University (SUMDU)	13 (1)	0.22 %

из интернета (0.23 %)



ПОРЯДКОВЫЙ НОМЕР	ИСТОЧНИК URL	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)	
1	<a href="https://www.cosmeticsurgeryandbeauty.com/">https://www.cosmeticsurgeryandbeauty.com/</a>	14 (1)	0.23 %

### Список принятых фрагментов

ПОРЯДКОВЫЙ НОМЕР	СОДЕРЖАНИЕ	КОЛИЧЕСТВО ИДЕНТИЧНЫХ СЛОВ (ФРАГМЕНТОВ)
	Улучшение условий труда на основе аттестации раб... <input checked="" type="checkbox"/>	35 (0.58%)
	Sydykanov Muratbek (1).docx <input checked="" type="checkbox"/>	20 (0.33%)
	<a href="https://www.cosmeticsurgeryandbeauty.com/">https://www.cosmeticsurgeryandbeauty.com/</a> <input checked="" type="checkbox"/>	14 (0.23%)
	SUMDU/out2014/Medvid_T.A.Osobluvosti_legalizacii... <input checked="" type="checkbox"/>	13 (0.22%)