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## Agrifood sector transformation and its implications on development of small farmers in Kazakhstan

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*We investigate the process of agrifood sector transformation in Kazakhstan. Based on regional panel data, the implications of this transformation process on small producers' welfare are investigated. To the best of our knowledge this is the first study addressing this research topic for Central Asia.*

*The results of the study show a significant impact of urbanization, information and marketing services on modernization of the retail and processing sectors. The analysis shows further that individual farms have benefited from the transformation process. However, the link between processors and household producers seems to be less developed due to high transaction costs associated with linking household producers to markets. Therefore, only a limited impact of agrifood sector development on household producers is found which is mainly explained by spillover effects from larger farms. Improving rural infrastructure seems to be one important aspect in order to increase the market access of small producers*





## 1 Introduction

The rapid transformation of the agrifood industry in developing countries has gained a lot of research interest in recent years (Reardon *et al.*, 2009). Even though a wide range of studies has investigated the effect of supply chain modernization on the welfare of agricultural producers in developing countries, there is still an ongoing debate whether small-scale farmers can benefit from these changes or not since the scientific evidence on this question is rather mixed.

On the one hand, there are studies reporting positive impacts of participation in modern value chains for small-scale farmers. These studies highlight positive welfare effects through enabling access to credit, inputs, information and secured prices. For example, Rao and Qaim (2011) show that farmers participating in supermarket channels in Kenya obtain almost 50% more income than those who do not. Michelson (2013) found that participation in supermarket chains not only improved farmers' income in Nicaragua, but also their productivity. However, these results might be farm- as well as region-specific and thus require cautiousness in interpretation. In contrast, there is empirical evidence that supply chain modernization might exclude the participation of small producers due to difficulties in meeting quality standards, as for example discussed by Reardon and Berdegúé (2002) for Argentina, Brazil, Chile, Costa Rica, and Mexico. Stringer *et al.* (2009) also provide similar evidence from China, where agricultural processors prefer to work mainly with larger farm units to reduce transaction costs. Another study for China explains that this might be particularly due to relatively small farm sizes in China (0.5 ha) when compared to other Asian countries (Miyata *et al.*, 2009). Key and Runsten (1999) present information about activities of different processing companies in Mexico and show that the inclusion or exclusion of small farmers is company- specific. They report that several foreign-owned companies exclude small farmers, while local companies work mainly with small-scale family farms. Pritchard *et al.* (2010) show that supermarkets in India still involve traders in the procurement and do not have direct links to farmers.

Most studies available on the topic of agrifood industry transformations so far focus on Latin American, African and Asian countries. However, there is also a growing literature on agrifood supply chain transformations for Eastern European countries such as for example Poland, Hungary, Moldova and Bulgaria (Falkingham, 2005; Gorton *et al.*, 2006; Cungu *et al.*, 2008;



Dries and Swinnen, 2010; Van Herck *et al.*, 2012). These studies investigated how the development of the processing sector and the modernization of supply chains influenced the well-being of small producers in those transition economies. Such studies found that modernization and foreign direct investment into agrifood supply chains improved the quality standards for agricultural producers, as well as raising on-farm investment opportunities for small scale producers (Dries and Swinnen, 2004; Gorton *et al.*, 2006). Using aggregated level data, Dries and Swinnen (2004) show that the share of modern retail outlets strongly correlates with GDP as well as the level of economic reforms in Eastern Europe. Gorton *et al.* (2006) analyzed how supply chain disruption with a high level of asymmetric information between farmers and processors led to market failure in Moldova and present one case study from the dairy industry how to overcome such a situation. Even though these analyzed countries have a similar history as Central Asian countries in terms of state-controlled economies, transition paths of Central Asia countries were or still are quite different to the ones observed in Eastern Europe in terms of speed and form (Falkingham, 2005; Spoor, 2007). Thus, it seems reasonable to assume that results from Eastern European countries cannot easily be transferred to Central Asian ones, creating great interest in investigating those particularities.

Exploring developments in the agrifood sector in Central Asia and its impact on small-scale producers is becoming especially important taking into account the recently implemented Russian import restrictions. Even though most Central Asian countries might consider this as an opportunity to boost their exports to Russia, agricultural policies and investment plans of all Central Asian countries in the past largely targeted boosting the export of technical crops such as cotton and wheat. Yet, countries urgently need to develop their agrifood sector further to enable producers to produce more vegetables, fruits and livestock products which are currently on demand and are mainly produced by smallholders. However, it is not clear to which extent those small producers benefit from current developments in agrifood supply chains.

Thus, we provide first empirical evidence on this topic for Kazakhstan. Kazakhstan provides an especially interesting case for analyzing the impact of these developments in Central Asia because of the following reasons. First, the Kazakh agrifood sector has undergone enormous changes in terms of a sharp drop in production, processing and formal retail trade during the first decade since independence in 1991, as well as a fast recovery of the production, processing and



formalization of the retail sector in the second decade. Second, nowadays Kazakhstan belongs to the top ten exporters of wheat and wheat flour and has gained due to its good economic performance and rather political stability an internationally recognized position among the Post-Soviet countries (Liefert *et al.*, 2010; Petrick and Oshakbaev, 2014, forthcoming). Third, even though the share of agriculture in total GDP declined from 34% in 1990 to 5% in 2011, agriculture is still of great importance in Kazakhstan. 26% of the Kazakh population is employed in agriculture and there is a large share of subsistence-oriented producers involved in meat, dairy and horticulture production. Yet there are several literature emerging which discuss the challenges associated with supply chain constraints, especially for smallholder farmers (FAO, 2010; Jumabayeva, 2010; OECD, 2013; Petrick and Oshakbaev, 2014, forthcoming). However, existing studies in the region mainly discuss the challenges according to observations from several case studies and quantitative impact of agrifood sector transformation is yet to be investigated.

Most existing studies on the topic in the international literature consider the farm size as a crucial factor in the integration into modern supply chains. Surprisingly, there are not many studies available that discuss the importance of farm-type specific supply chain challenges. However, this could be an especially important aspect in the transition economies in Central Asia because of the rapid speed of structural changes at the farm level since the collapse of the command based economies and the existence of multimodal farm types. Therefore, this study contributes to the existing literature as follows. First, we analyze the transition process in the agrifood sector in Kazakhstan and discuss the role of small-scale producers in agricultural production and food security in the country. Second, we investigate the impact of the agrifood industry transformation on aggregated revenues of individual farms and household producers. Third, we compare the results between these two farm types and discuss the prevailing conditions which create farm-specific impacts of transformation.

## **2 Transformation of the Agrifood Sector in Kazakhstan**

### *2.1 Structural changes at farm level*





During the Former Soviet Union (FSU) period agricultural production was carried out by large scale mechanized state farms, *kolkhozy and sovkhozy*<sup>1</sup>. In the mid of the 1990s, *Perestroika* allowed rural people to obtain limited land plots from collective farms to produce agricultural commodities for their own needs leading to the emergence of so-called household producers. Thus, independent Kazakhstan inherited large-scale state farms and very tiny informal production units. In the early years of independence it became clear that those state farms could not survive in a market economy without financial transfers from the state. Thus, several reforms were implemented including the establishment of agricultural enterprises and cooperatives on the base of these state farms, which in fact had similar structure with those soviet farms. The latest reform related to these activities was the introduction of individual (private) farming into the legislation. Consequently, fully commercial and private type of agricultural producers emerged. Nowadays three types of agricultural producers can be distinguished in Kazakhstan: agricultural enterprises with an average size of 6,900 ha, individual farms with an average size of 253 ha and household producers with an average plot size of 0.11 ha (StatKaz, 2012). Agricultural enterprises, as former collective farms, are highly mechanized farms mainly specialized in production of grains and operate based on hired labor from neighboring villages and cities. Individual farms are mainly organized by family members and supplemented with hired (seasonal) labor in some cases. Household producers usually have very small vegetable plots, gardens and few livestock kept in a traditional way. Production at the household level is mainly carried out for self-consumption and plays an important role in maintaining food security in rural areas. However, these very small-scale producers also participate in markets since they often produce more commodities than consumed in the household. They play an especially important role in horticulture, dairy and livestock supply with almost half of the supplied volumes of these commodities being produced by these small producers.

There were 6,493 agricultural enterprises and 170,329 individual farms with total land of 44,956 and 48,691 thousand hectares (including pastures), respectively, in Kazakhstan in 2011 (StatKaz, 2012). In contrast, household producers only accounted for 253.3 thousand ha of arable land in the same year. *Agroholdings* are often considered as a fourth type of agricultural producers due

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<sup>1</sup> *Kolkhozy* means collective farms and *sovkhozy* means Soviet farm, see Djanibekov, N., Assche, v.K., Bobojonov, I., Lamers, J.P.A., 2012. Farm Restructuring and Land Consolidation in Uzbekistan: New Farms with Old Barriers. *Europe-Asia Studies* 64, 1101 - 1126. for more information on this.



to the horizontal and vertical integration of several business partners (OECD, 2013; Petrick *et al.*, 2013). These large agroholdings may consist of several producers belonging to both agricultural enterprise and individual farm types and often own their own storage and processing facilities.

Until 1995 individual farms had a very limited share in agricultural land use and agricultural outputs, with the major agricultural output being produced by large agricultural farms and household producers. This agricultural structure has changed quite substantially since 1995. Nowadays, individual farms account for 37.3 % in agricultural land use and 25.6 % in agricultural output. Besides, household producers play a significant role in agricultural supply. Despite their very limited share in total crop area (1.2 % in 2011), their share in Gross Agricultural Output is considerably high (Figure 1, Figure 2). Indeed, about 51 percent of gross agricultural output in 2011 was produced by household producers. Furthermore, gross agricultural production at the individual and family farm level is less volatile than production at agricultural enterprises during different climate conditions. This might be explained by usage of simple irrigation techniques in the home gardens and vegetable plots during drought years.

<location of Figure 1>

<location of Figure 2>

Moreover, nowadays two distinct regional agricultural systems can be observed. In the North and North Eastern regions large-scale farms specialized in grain and oilseed production dominate, whereas the regions in the South and South East are characterized by small-scale farming with mixed agriculture. Figure 3 illustrates this regional heterogeneity by showing the share of agricultural enterprises, individual farms and household producers in the gross agricultural output for each region. The contribution of agricultural enterprises to the Gross Regional Agricultural Product (GRAP) is very high in grain producing regions such as Akmola, Kostanay and North Kazakhstan and lower in other regions. These differences might initially be explained by agro-ecology conditions, land availability per person and off-farm employment options. Furthermore, access to markets, market infrastructure and the existence of processing industries



could be also considered as important factors influencing the commercialization and development of individual farms and household level production.

<location of Figure 3>

## 2.2 Transformation of the Processing Industry and the Retail Sector

As Reardon et al. (2009) point out the agrifood industry, which includes the processing, wholesale, and retail level, has worldwide undergone several structural changes. Similar to the world experience, the agrifood industry in Central Asia (CA) has also passed through structural changes, albeit with several differences compared to the rest of the world due to the command based economy. The first stage of these developments dates back to the early years of the Soviet State establishment, when all activities in the agrifood chain were taken from the hands of private businessmen. The socialist governments decided to demolish traditional markets (*bazaars*) to drive away private traders and establish government trade<sup>2</sup> organizations and stores. Although this did not have an immediate effect, all activities in the agrifood chains were controlled by the communist government in the second half of the twentieth century. Large-scale state processing plants, trade organizations and retail stores emerged, whereas the role of private production and trade was very limited until the *Perestroika* period.

Those processing plants, storage facilities and trade stores were privatized in the early years of independence, which is considered the second stage of transformation. However, most of those businesses collapsed or operated with very limited capacity due to lack of experience in a free market economy, as well as financial constraints (Goletti and Chabot, 2000; Meng *et al.*, 2000; Bobojonov and Lamers, 2008). Some specific supply chains survived due to strong state interventions, as observed in the case of the cotton and wheat sector in Turkmenistan and Uzbekistan (Goletti and Chabot, 2000). Similarly, the high interest of foreign investors also kept several supply chains from disappearing when lucrative export opportunities existed, as seen in the case of cotton production in Kazakhstan and Tajikistan (Sadler, 2006). Supply chains of vegetable and livestock commodities were the most traditionalized chains due to the collapse of the processing sector and a lack of trading organizations, which made traditional supply chains,

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<sup>2</sup> In this context we refer by using the term trade to wholesale, retail and export/import transactions.





*bazaars*<sup>3</sup> the main marketing channel in Central Asian countries. Besides, more than 50 % of commodities were sold through barter trade of agricultural outputs (StatKaz, 1999) and were seen as one of the important solutions against the high level of inflation and lack of financial resources during the early transition years (Meng *et al.*, 2000). All actors from those traditional supply chains had to bear very high risks due to the lack of formal agreements and a deteriorated market infrastructure. The prices of those commodities had very high seasonal and inter-annual fluctuations due to the lack of a functioning market infrastructure. At the same time, the import of fresh and processed food increased rapidly due to the failure of local processing and storage capacities. Those imported goods were also sold in the traditional retail outlets due to several reasons. Mainly, formal retail outlets provided very limited product lines as also observed in many other countries with similar background (Reardon and Swinnen, 2004). In contrast, traders in *bazaars* traded small quantities but with different varieties of products mainly delivered by shuttle traders from neighboring countries.

The third stage of the agrifood sector development in Kazakhstan started in the beginning of the twenty-first century when processing industries and formal market channels started to (re)emerge. This development is mainly explained by increasing per-capita incomes and urbanization coupled with growing demand for processed food as observed in many developing countries (Reardon and Timmer, 2014). Kazakhstan experienced a rapid increase in the value of processed commodities and the modernization of retail outlets in recent years. Trade share through modern retail stores (including supermarkets) was only 23.3 % in 1999 while in 2008 it was 60.1 %, an increase of 36.8 percentage points in less than ten years (Figure 4). At the same time as can be seen from Figure 5 the per-capita consumption of meat products, vegetables and fruits increased more or less steadily during the last ten years.

<location of Figure 4>

<location of Figure 5>

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<sup>3</sup> *bazaar* is a uniform term used for markets in Central Asia. Markets and *bazaars* are used interchangeable throughout the text to indicate informal retail outlets



Several large-scale super- and hyper markets emerged during the last ten years. These supermarkets have been established by foreign investors, joint ventures or by local entrepreneurs on the base of old soviet style trade outlets. These super and hypermarkets belong to large-scale companies such as Ramstore, Small, Metro, Magnum, Silk Way City, A-Store, GREEN Mart, Dastarhan and Interfood. From these companies, Ramstor, Interfood and Metro are established with foreign investment. The share of these large super- and hypermarkets in total retail is about 15-20 percent while the remaining 30-35 percent belongs to smaller stores (KURSIV, 2013). These smaller stores have less than two cash registers, often operate as family businesses and sell a wide range of products but with limited number of varieties when compared to large supermarkets. These shops usually buy agricultural commodities from importers or middlemen. Products in large supermarkets are usually imported except locally produced agricultural products and prepared fresh food (KURSIV, 2013). Furthermore, the share of imported and locally produced agricultural products and prepared fresh food differs from store to store. For example, more than 70% of the commodities are imported in Interfood store chains, while up to 90 percent of the products have local origin in Metro store chains (KURSIV, 2013). The global financial crisis had negative consequences on modern trade chains and their share in total retail dropped to 48.8 % in 2009. However, it started to rise again, reaching 53.6 % in 2012 (CISStat, 2013; GKS, 2013). The share of foreign companies in retail reached 3.5 % in 2012 (StatKZ, 2012). The share of modern trade outlets and foreign investors is lower when compared to Central and East European countries, although it is expected to reach similar levels as in Russia (87.6 % in 2010) in the next few years. The growth of large-scale supermarkets mainly started in large cities such as Almaty and Astana as observed in many other countries (see Reardon and Swinnen, 2004) and is now expanding to the other district capitals. Rural areas could be considered as the next stage of expansion of such modern trade facilities in the coming years.

Increasing income and demand for packaged food has created business opportunities for the processing industry in the country. Fostered by demand growth and a stable investment climate, the output of the food processing industry almost doubled between 1995 and 2011 (Figure 6). Gross processed food in Figure 6 indicates the total market value of food produced and sold by processing companies. The growing share of modern trade outlets and processing industry also



created secure marketing options for agricultural producers. One such example can be found in the milk processing sector, where the growing capacity of the processing industry created new actors in the dairy supply chain. Since milk is mainly produced by households (88% of total output in 2011), the processing industry needs to buy milk from those small producers due to limited supply from agricultural enterprises and individual farms. The main challenges for large-scale processing plants inherited from the Soviet Union associated with small-scale producers are economies of scale and quality heterogeneity (KazAgroMarketing, 2009).

Moreover, as can be seen from Figure 7 there are very large differences in retail trade structure across regions. The share of modern trade outlets (stores) is highest in the major cities (Astana, Almaty), followed by Kostanai, Aktube and Mangistau. By contrast, the lowest levels are observed in Kyzylorde, East Kazakhstan and Karaganda regions.

<location of Figure 6>

<location of Figure 7>

Based on the existing evidence from different parts of the world, it can be assumed that regions with a higher share of modern trade and processing might also offer opportunities for small scale producers. This question is addressed econometrically in the following sections using regional panel data for Kazakhstan.

### **3 Empirical Analysis**

#### *3.1 Data and methods*

Annual panel data from 16 regions (including two cities) of Kazakhstan for the period 1995-2011 is obtained from the Statistical Agency of Kazakhstan. Gross regional product (GRP), urbanization rate, value of information and marketing services are assumed to be the main factors explaining the retail sector transformation and thus summary statistics of these variables are presented in table 1. Additionally, we also consider the impact of information and marketing services on development of retail outlets, since media and advertisement is often postulated as one of the contributing factors to the global trend of retail modernization. However, until so far



there is no study available analyzing the impact of these developments on retail modernization empirically. The value of information services includes the marketed value of products (e.g., databases, information) of information agencies via internet, radio, TV and newspapers. The value of marketing services includes the payments received by advertisement and market research companies for their services. The statistical agency compiles such kind of information from the annual reports of the companies involved in these services.

The share of modern retail (i.e., formal stores, supermarkets) in total retail, the total value of retail food trade and the total value of processed food are used as the main variables reflecting the degree of supply chain transformation (Table 1). Additionally, prices of grain and meat are considered in our analysis since several studies mention the importance of increasing food prices for agricultural producers in Kazakhstan (Oskenbayev and Karimov, 2013; Petrick *et al.*, 2013). Furthermore, the development of the oil industry played an important role in the economic development of the country (OECD, 2013). Therefore, industry and service sectors, referred to as non-agricultural sector from here onwards, is considered as important factor which has influence on agricultural development and the structural changes at the farm level.

<location of Table 1>

In the analysis we take into account time invariant variables that are assumed to be crucially important in shaping the structure of retail trade such as for example climate, agro-ecological conditions or traditions by allowing intercepts to vary across cross sections (Greene, 2008; page 193). In this context it is important to distinguish whether cross-sectional differences need to be considered as fixed or random effects (Greene, 2008; p. 193, p. 200).

Thus our empirically model can be presented as:

$$y_{it} = \bar{\alpha} + \mu_i + X_{it}\beta + e_{it} \quad (1)$$

with  $y_{it}$  being the share of modern retail in total retail,  $X_{it}$  is a vector of explanatory variables,  $\bar{\alpha}$  is the mean intercept and  $\mu_i$  is the deviation of the  $i$ th region from the mean intercept. A similar



model is also used to investigate the impact of development of agrifood sector related variables on individual farms' and household producers' revenues..

The dependent and independent variables are log-transformed and estimated parameters correspond to elasticity. All monetary values are deflated with corresponding prices indexes for the year 2000. We apply the Hausman test to test whether cross sectional differences have a fixed or random nature (Greene, 2008). The period of 1998-2011 and 16 regions (including 2 cities) were considered in the analysis of determinants of agrifood industry development and processing industry growth. Unfortunately, data for the years 1995-1997 was not complete and thus could not be employed in this part of our analysis. Full dataset for the period of 1995-2011 is used in the analysis of transformation impact on farm revenues.

### 3.2 *Determinants of retail trade modernization and processing industry growth*

The Hausman test rejected the null hypothesis that individual effects are uncorrelated with the other regressors and thus a fixed-effect model with regional and year effects was estimated. The results are presented<sup>4</sup> in table 2.

<location of Table 2>

Our results at the regional level indicate that GRP per capita has no statistically significant impact on the changing structure of the retail sector. This might be explained by the usage of GRP at regional level which takes into account both rural and urban population. Since trade modernization in Kazakhstan is at the second stage of development, which means that modern outlets such as supermarkets are mainly rising in urban areas, the consideration of GRP or income per capita only from urban population might have been a better variable as considered in other studies (e.g. Hu *et al.*, 2004). However, unfortunately this kind of data was not available to test for this effect. In this context it is noteworthy to mention that Traill (2006) already postulated that GDP increases alone might not have a significant impact on retail modernization, especially in rather poor environments.

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<sup>4</sup> Regional and year effects are not presented in these tables since our major interest lies on the impact of the four variables presented above.





In contrast, the degree of urbanization has a statistically significant positive impact in both models. These results highlight the importance of the urbanization process for modernization of retail and demand for processed food in Kazakhstan. Our estimations show that an increase by one percent in urbanization increases the share of modern retail outlets by 0.42 percent. As theoretically expected and often discussed, information and marketing services also showed a statistically significant positive impact. One percent increase of spending on information services tends to increase the share of modern outlets by 0.05 percent. Similarly, one percent increase of spending on marketing and advertisement information tends to increase the share of modern retail by 0.08 percent. The adjusted R square is rather high in both models which is mainly associated with the fixed effects for years and regions.

Very similar results are found for the impact of GRP per capita, urbanization, and information and marketing services spending on the volume of processed food. Urbanization and spending on marketing services have a significant positive impact on volume of processed food, whereas GRP per capita and information service spending were found to be not significant.

### *3.3 Implications of agrifood sector development on small -scale producers*

We further empirically analyze the impact of supply chain transformation on agricultural revenues of individual farms and household producers for the period 1995 to 2011 and across 14 regions (the two cities Almaty and Astana are excluded).

We consider pooled data from crop and livestock producers (e.g., mixed farms). However, the share of livestock production in the gross agricultural revenues per farm type is considered in the analysis to elaborate structural differences associated with farm specialization. Almaty city is one of the largest markets for agricultural commodities due to high incomes and a high share of urban population. Therefore, a dummy variable to show the common border with Almaty region (in which Almaty city is located) is also considered in the analysis to include the importance of easy access to consumers.

The Hausman test rejected again the null hypothesis that individual effects are uncorrelated with the other regressors in both models and therefore fixed effect models are used. Moreover, a Wooldridge test for autocorrelation in panel data was conducted and no first-order autocorrelation was found in the defined model specification. Furthermore, a sensitivity analysis



was conducted to test the robustness of the estimated coefficients.<sup>5</sup> The final models are presented in Tables 3 and 4:

First, we will look at the results for the individual farms (Table 3). The results indicate that increasing food retail has enabled individual farms to increase their revenues, as can be seen from the positive significant coefficient on retail food trade. A one percent increase in food retail improves the revenues of individual farmers by 0.34 percent. Similarly, the growing share of modern trade outlets also positively impacted on the agricultural revenues of individual farms. A one percent increase in modern retail outlets tends to increase the revenues of individual farms by 0.24 percent. A similar positive impact is observed in the case of developments in the food processing sector. However, regions specializing in animal production obtain fewer revenues reflected in the negative sign of the variable presenting the share of livestock production in farm revenues. Similarly, the development of the non-agricultural sectors negatively impacted on revenues of individual farms. In contrast, prices of agricultural commodities positively contributed to the revenue development. As expected the neighborhood with Almaty has a significantly positive influence on revenues, showing the importance of market access.

<location of Table 3>

<location of Table 4>

In the household model (Table 4), the findings show that retail modernization also had a significant positive influence on the revenues of household producers. However, the estimated elasticities are lower when compared to the individual farms model. This finding is not surprising because many households usually produce for their own consumption and sell the remainder to the market. Nevertheless, a positive and significant elasticity for the modern retail share illustrates that households also have commercial interests, aside from being subsistence oriented producers. However, developments in the food processing industry do not seem to have a significant impact on revenues of household producers as it was the case for individual farms.

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<sup>5</sup> The sensitivity analysis was conducted via dropping some variables or adding new variables related to agricultural supply chains (e.g. investment into the infrastructure, number of cargo trucks) into the model.



Similar to the individual farm model, the neighborhood with Almaty provides better opportunities to households to have higher revenues explained by better market access. However, the coefficient is again smaller than the coefficient for individual farms.

#### 4 Discussions

Lack of experiences in a market economy as well as lacking financial capital and disrupted trade with other FSU countries were the main reasons for the disappearance of formal retail outlets and underutilization of the processing industry during the first years of independence in Kazakhstan. However, since the beginning of the 21st century modern supermarkets and small trade outlets have emerged and production capacity of processing plants has increased due to improvement of activities of existing large scale companies as well as establishment of new small-scale joint-venture companies (OECD, 2013). The empirical analysis of determinants contributing to these developments shows that urbanization plays an important role in the modernization of the retail sector and development of the processing industry. Growing incomes did not show a significant impact on these developments. This finding seems to be surprising at first glance. However, it confirms the postulation of earlier studies (e.g. Traill, 2006; Francesconi *et al.*, 2010) that supermarkets are not emerging as a place for high income people, but rather due to changing lifestyles. Furthermore, information and marketing services were found to be significant determinants of the retail modernization. A result in line with previous studies who mention the importance of information systems in identifying the buyers as well as improving relationship between farmer and supermarkets (Goetz, 1992; Hu *et al.*, 2004; Neven and Reardon, 2004). Thus, urbanization projections in Kazakhstan predict a 15 percent increase of population in cities and towns in 2050 which will most likely contribute further to the development of modern retail outlets.

The existing literature provides examples of difficulties for small-scale producers to participate in procurement mechanisms of modern retail outlets in Kazakhstan (e.g. FAO, 2010). Little attention was devoted to those medium and small-scale farms in the policy measures; most of the government support has been directed to large-scale agricultural enterprises. Despite limited support from the state, output of individual farms and household producers continuously increased in Kazakhstan. The importance of small-scale producers in Central Asia will most



likely even rise further since the recently established Russian import restriction for western goods might enable Central Asian countries to increase their exports of vegetable, fruits and livestock products to Russia. Small scale household producers and individual farms have relatively low costs of production and thus a comparative advantages in producing these products (OECD, 2013).

The finding of this study show that growing food retail has positively contributed to the development of individual farms. The modernization of retail outlets also contributed positively to the development of small-scale producers in Kazakhstan. This finding is in line with the conclusion of many studies worldwide (e.g Rao and Qaim, 2011) showing income increase of farms when they participate in the modern supply chains.

The positive impact of the processing industry development on individual farms found in this study is in line with literature findings from different countries of the world (Dries and Swinnen, 2004; Wilkinson, 2004). Formal contractual agreements with processors and provision of inputs might have created an investment conducive environment and higher incomes, as observed in many countries (Birthal *et al.*, 2005; Miyata *et al.*, 2009; Maertens *et al.*, 2012). The role of input, credit and credit provision by processors in the case of cotton production in Kazakhstan has been reported by Sadler (2006). The provision of these services is very important, given that obtaining credit from banks is difficult for small producers. Another explanation related to credit challenges is mentioned by (Petrick and Oshakbaev, 2014, forthcoming), where farmers are even not interested in obtaining credit due to high production risks. Thus, they might prefer to use less inputs and the provision of inputs by processors might increase their confidence, as was observed in some Eastern European countries (Dries *et al.*, 2009). Another explanation for the positive impact could be the case of reduced marketing costs for small producers when processors purchase commodities at the farm gates. There are also examples where dairy plants in Kazakhstan provide cooling tanks to the middlemen to collect milk when dairy plants do not have their own collection services (OECD, 2013). There are also cases of middlemen or processing plants providing feed for animals. These services reduce the transaction costs of small producers, since transportation costs might become higher than the output price when small producers market their commodity themselves. Therefore, progress in the processing industry



might help to commercialize individual farms and improve their production potential, as observed in the analysis of this study.

Similarly, our results indicate that household producers could also benefit from the modernization of the retail sector. However, the level of benefits gained from these developments seems to be smaller than for individual farms. Existing studies (e.g. Jumabayeva, 2010; Petrick and Oshakbaev, 2014, forthcoming) report that households, especially meat producers, usually sell their products in local markets (*bazaars*) due the lack of formal slaughterhouses and certification services for small producers. As a result of the lack of quality controls in the supply chains, supermarkets do not purchase their meat from the middlemen, who operate informally. Local bazaars are the only marketing options for those middlemen where they can bypass quality control certificates. Difficulties in meeting the quality standards and high transaction costs due to the small quantity of supplies could serve as a main reason for the exclusion of small farmers from the modern supply chains. This can be mainly explained by the remote location of small producers from the large cities and the high transaction costs for collecting the required amount and quality (OECD, 2013). High expenses for gathering commodities from small producers are often explained by the poor condition of roads and lack of supporting market infrastructure.

At first glance, our results thus may come as a surprise when compared with the abovementioned literature and case of meat marketing. However, some different picture can be obtained when looking at milk procurement where milk collecting services operate. Milk produced by households is collected by processing companies located in cities since there is not enough milk supplied by individual farms and agricultural enterprises to meet the demand (Petrick and Oshakbaev, 2014, forthcoming). Since in Kazakhstan more than 88% of milk is produced by households, the processing industry and supermarkets may not be in a position to exclude these small producers from the procurement via using middlemen as also observed in India (Pritchard *et al.*, 2010). Thus households may have benefited from development of retail modernization in general although some problems in selling meat are reported. Another explanation of positive gains are spillover effects of large farm development to household producers. Rural households are usually employed in agricultural enterprises (Petrick *et al.*, 2013). Therefore, developments in the agricultural enterprises, associated with policy support and retail modernization, may have





been further transmitted to rural households in the form of wages. Thus better income in turn created investment opportunities to boost the production at household levels.

According to our results, developments in the processing sector did not have a significant impact on household producers' revenues which might indicate some problems of linking these very small producer types with processors. It could be also explained by the fact that these types of producers usually supply fresh vegetables and fruits which are mostly sold without any processing, except in the case of dairy products.

Current policy priorities seem to favor large producers in the field of livestock production, similar to crop production (KazAgroMarketing, 2009; FAO, 2010). However, experience from Eastern European countries shows that small producers can also function as the main producing units when prevailing market infrastructure supports their development, as discussed by Gorton *et al.* (2006), Van Herck *et al.* (2012) and Dries *et al.* (2009). The results of our study also provide evidence that small-scale producers in Kazakhstan can contribute to production growth when properly linked to markets. Therefore, policy makers in Kazakhstan should take these aspects into account. Especially development of rural infrastructure is needed in order to integrate small-scale agricultural producers into modern supply chains if the current decision of the Ministry of Agriculture of Kazakhstan to reduce the wheat area and increase the oil-crop and vegetable area in order to diversify crop portfolio shall be successful (Kazinform, 2015).

## 5 Conclusions

The agrifood industry in Central Asia has undergone tremendous developments during the last decade. The increasing capacity of the processing industry and the modernization of the retail trade have been achieved. However, the factors contributing to these developments and the impact of these developments on small producers' welfare have not been investigated to date. With our study we offer a first insight into the process of agrifood sector transformation and the effect of these developments on individual and household farmers' revenues in Kazakhstan. The availability of a unique panel dataset allowed us contributing to the existing international literature with analysis of long term effects of agrifood sector transformation.

Our analysis shows that the transformation process of the agrifood sector in Kazakhstan was mainly caused by an urbanization process coupled with developments in information and



marketing services. Our findings further confirm the importance of agrifood sector modernization for the welfare of small-scale producers in Kazakhstan. Both individual farms and household producers benefited from retail modernization. Furthermore, development in processing industry also provided positive gains to individual farms. However, the processor and household producer link seems to be less developed due to very small size and underdeveloped rural infrastructure. Market infrastructure in rural areas need to be improved in order to link household producers to commercial markets. Better market infrastructure may also allow the country to reduce risks in the agricultural sector due grain monoculture and diversify revenues in rural areas.

Even though our study provides first empirical evidence on agrifood industry transformation effects in Kazakhstan it has some limitations. First, our empirical findings are based on aggregate data and not on farm level data. Thus, forthcoming studies should address those questions especially using farm level data in order to elaborate farm-specific characteristics into the analysis of transformation process impact. Second, the study considered mixed farming systems and analyzing the effect of transformation according to specific crop and livestock production types need to be considered as priority areas for research in the future.

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## Tables

**Table 1:** Descriptive statistics of the variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Modern retail, percent	272	48.22	18.52	11.92	92.89
GRP per capita, mln. tenge	285	0.72	0.97	0.00	6.48
Urbanization, percent	320	58.21	20.67	23.06	101.21
Information services, bln.tenge	237	0.72	2.67	0.00	31.60
Marketing services, bln. tenge	240	3.11	13.58	0.00	113.80
Agricultural revenues of individual farms, bln. Tenge	261	11.90	16.50	0.00	102.86
Agricultural revenues of households, bln. tenge	264	26.02	28.14	0.28	146.84



Retail food trade, bln. tenge	269	30.96	43.82	1.82	289.63
Food processing, bln. tenge	272	21.90	22.98	0.00	127.77
Share of livestock production in individual farm revenues	251	26.07	26.25	0.15	99.48
Share of livestock production in household revenues	264	69.99	17.47	7.82	100.00
Share of non- agricultural sector in GRP, percent	264	25.42	45.01	0.03	99.92
Grain price, tenge per kg	204	14.27	7.29	2.41	35.96
Meat price, tenge per kg	252	157.68	110.89	16.94	458.83

Source: Own compilation from various statistical yearbooks of Kazakhstan

Note: 223.53 Tenge = 1 Euro (December 2014)

**Table 2:** Determinants of retail modernization and processing industry growth in Kazakhstan

	Modern retail		Food processing	
	Coefficient	Std. Err	Coefficient	Std. Err
GRP per capita	-0.179	0.09	-0.117	0.12
Urbanization	0.417*	0.19	0.617*	0.25
Information services	0.050**	0.02	-0.027	0.02
Marketing and advertisement services	0.078*	0.04	0.118*	0.05
Constant	1.512*	0.75	6.136***	0.98
R <sup>2</sup>	0.828		0.921	
Adjusted R <sup>2</sup>	0.798		0.907	

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

**Table 3:** Estimation results for individual farms

	Coefficient	Std. Error
Retail food trade	0.335***	0.08
Modern retail	0.241*	0.11
Food processing	0.351**	0.11
Share of livestock production in farm revenues	-0.220***	0.05
Share of non- agricultural sector in GRP	-0.637***	0.16
Grain price	0.300*	0.14
Meat price	0.514**	0.18
Neighborhood with Almaty oblast	0.718***	0.19
constant	-8.696***	2.52
R <sup>2</sup>	0.941	
Number of obs. (N)	180	



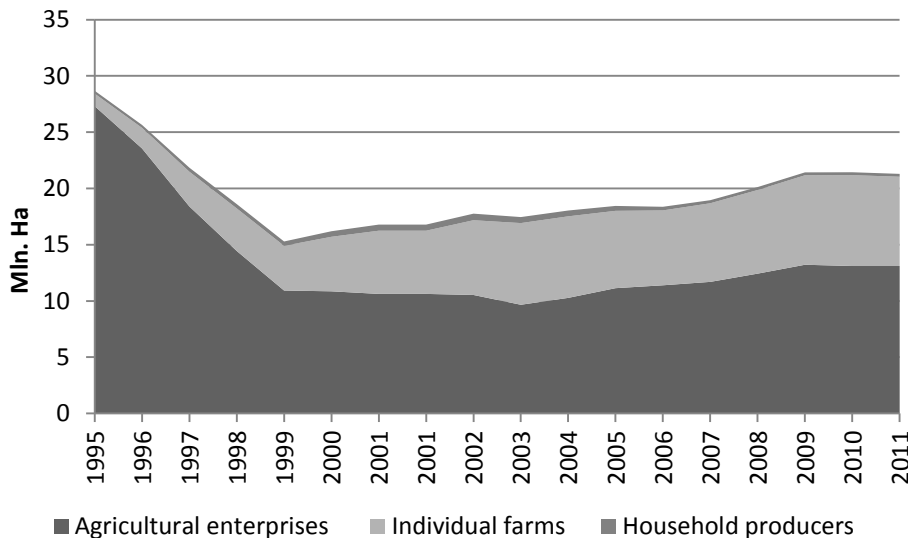
Legend: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

**Table 4:** Estimation results for household producers

	Coefficient	Std. Error
Retail food trade	0.022	0.032
Modern retail	0.118**	0.044
Food processing	-0.001	0.043
Share of livestock production in household revenues	-0.535***	0.099
Share of non-agricultural sector in GRP	-0.155*	0.061
Grain price	-0.008	0.058
Meat price	0.092	0.073
Neighborhood with Almaty oblast	0.483***	0.076
constant	5.998***	0.997
$R^2$	0.962	
Number of obs. (N)	193	

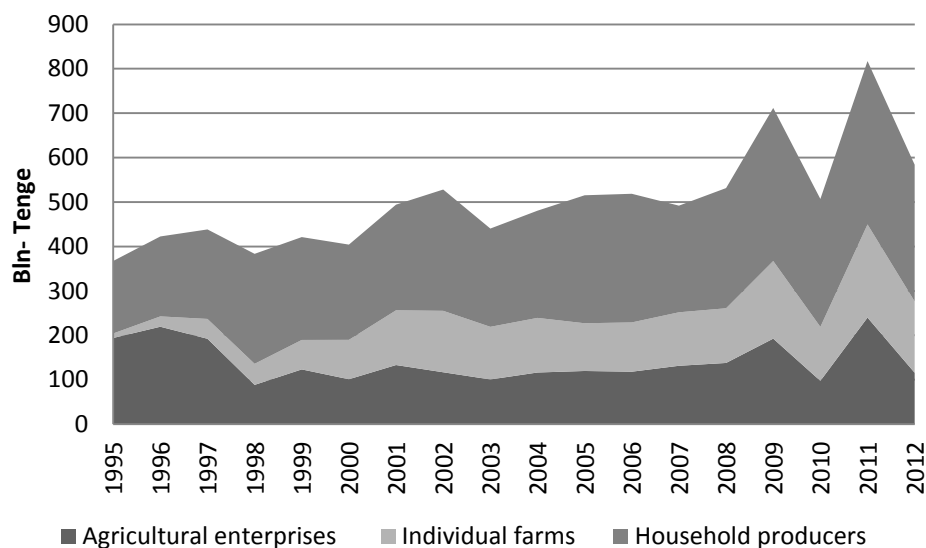
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## Figures

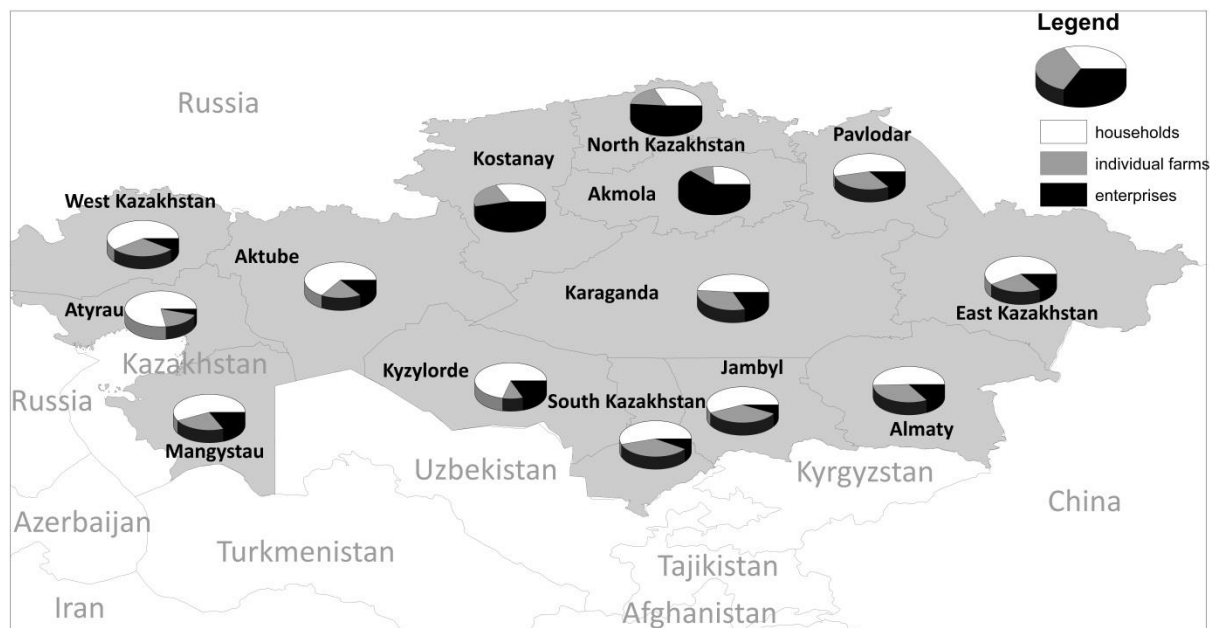


**Figure 1:** Land use for crop production by farm types in Kazakhstan;

Source: Statistical Yearbooks of Agriculture, Forestry and Fishery in Kazakhstan



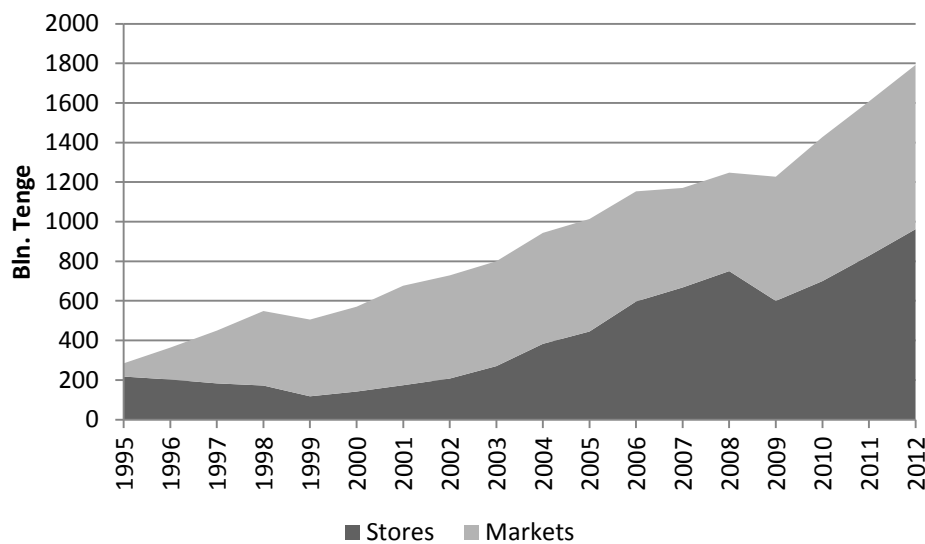
**Figure 2:** Gross Agricultural Output by farm types, deflated to the year 2000 with agricultural commodities price index; Source: Statistical Yearbooks of Agriculture, Forestry and Fishery in Kazakhstan



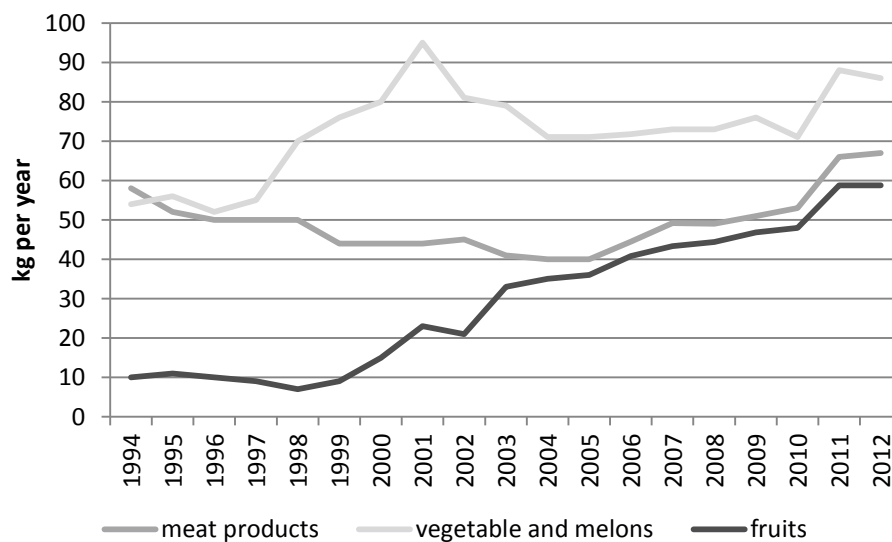


**Figure 3:** Share of farm types in Gross Regional Agricultural Product in 2011;

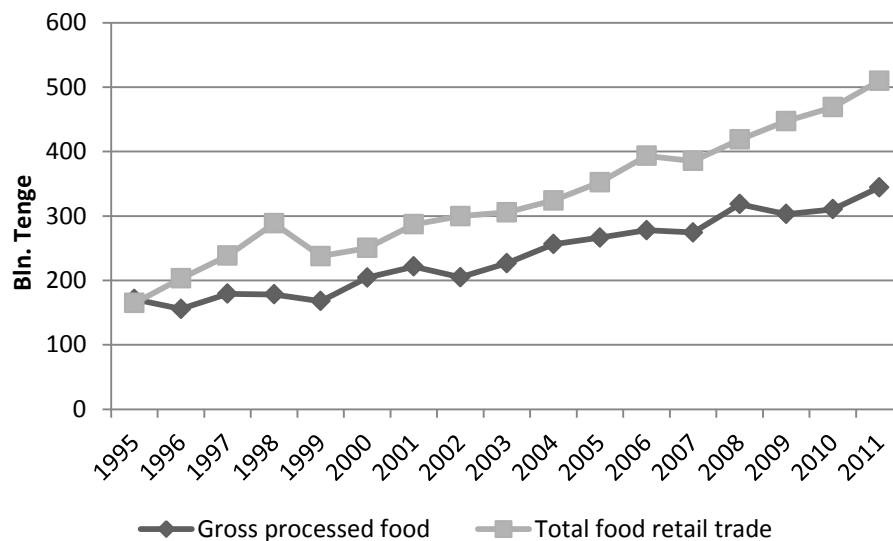
Source: Own presentation based on data from StatKaz (2012)



**Figure 4:** Gross value of retail trade according to the trade channels, deflated to the year 2000 with the consumer price index; Source: Authors' calculations based on Statistical Yearbooks of Retail and Wholesale Trade in Kazakhstan

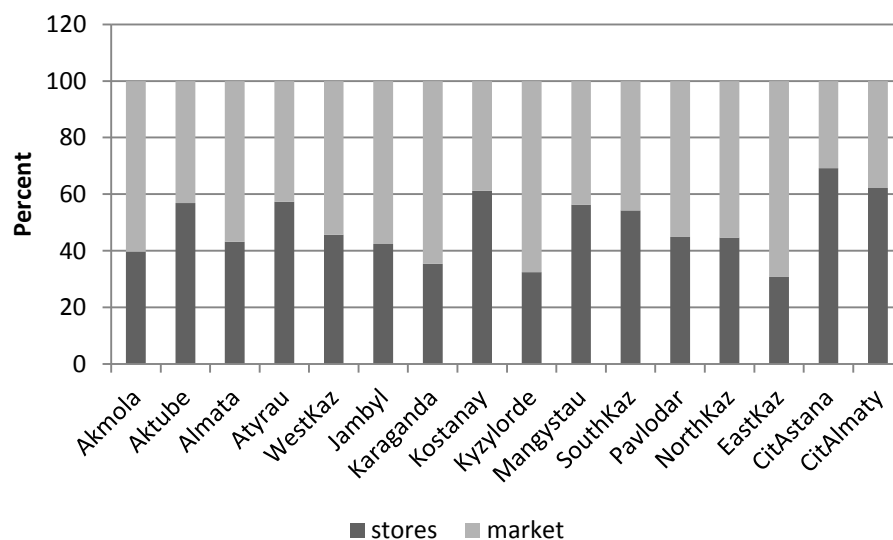


**Figure 5:** Per capita consumption of meat products, vegetables and fruits in Kazakhstan; Source: Statistical Yearbooks of Kazakhstan (various years).



**Figure 6:** Food retail and processed food volume, deflated to the year 2000 with the consumer price index

Source: Authors' calculations based on Statistical Yearbooks of Retail and Wholesale Trade in Kazakhstan.



**Figure 7:** Share of stores and markets in total trade turnover by regions in 2011

Source: Authors' calculations based on Statistical Yearbooks of Retail and Wholesale Trade in Kazakhstan.