THE DETERMINANTS OF SME DEVELOPMENT IN THE REGIONS OF KAZAKHSTAN

by

Ulzhan Maratkyzy

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BY
ULZHAN MARATKYZY
NU Student Number: 201437577

APPROVED

BY

PROFESSOR DR. JOZEF KONINGS

_____,
Signature of Principal Thesis Adviser

PROFESSOR GIULIO SECCIA

_____, and
Signature of the Committee Member

DR. MICHAEL G. ARGHYROU, READER IN ECONOMICS, CARDIFF BUSINESS SCHOOL

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Abstract

This paper analyses the regional SME development and estimates SME productivity determinants using panel data. Productivity of SME was estimated as a ratio of SME output and employed in SME. As determinants of SME industry output, investment to industrial sectors, average monthly wages, exports and imports in regional terms were used in the empirical model. The results of analysis using panel data estimations showed that most significant effects to SME development, expressed in productivity were international trade indicators, investment to industries and wages.

Keywords: SME, regional development, productivity growth, Kazakhstan.

JEL Classification: E24, P42, P33

Contents

1 Introduction

There are a lot of publications suggesting that large enterprises contribute to the growth and development much more than SME, because of production efficiency, easy access to capital market, financial resources and qualified labor force (Varum and Rocha, 2013). Yet there are others, who claim that not only large but small enterprises may be efficient (Shiersch, 2013). The debate of large enterprise versus SME became more popular academic topic and for the last five decades experts have been reconsidering the role of SME in the economy of most countries.

The interest of economists in SME have been raising immediately after the global fuel crisis in 1973-1975. From that period academia has been emphasizing the importance of SME and nowadays SME has a role of "shock absorbers" (Nurseiit, et al 2013) according to some literatures. One of the early works on analysing the role of SME in the economy belongs to Birch, who published the article about the job creation by SME in 1969-1976 years in the US (Birch, 1979). He found that about two thirds of the job creation in those periods belonged to SME with size of few than 20 employees. Some literatures highlight the aspects of job creation by giving this role to startups and young businesses (Haltiwanger et al, 2013).

Over 95% of firms and about 70% of employed people in OECD countries work in small and medium-sized enterprises (OECD, 2000). SME development is the main way for sustainable growth of emerging markets, because it plays enormous role in achieving Sustainable Development Goals (SGOs) by providing employment and persistent jobs for all people, developing sustainable industrialization and innovation, and reducing the inequality in a given country (OECD, 2017). Beside this SME is more labor intensive than some capital intensive

manufacture sectors which require huge investment into production processes (Wymenga et al, 2011). In fact, 66.7% of employed people worked in SME compared to large enterprise sector, which employed 33.3% working people, and 58.6% of value added was created in SME in 2008 compared to 41.4% in large enterprise in EU-27 countries (Eurostat, 2011). Therefore, SME is more valuable than large enterprise, and can act as one of economic policy tools.

Investigations in SME contribution to employment and GDP showed the significant positive correlation SME with GDP per capita, defining that the more country or region is wealthier, the more essential the role of SME in the economy (Ayyagari et al., 2003). SME development by its own can facilitate regional or country level economic growth if there are enough state support and favourable investment climate. Regional SME development thus can contribute more effectively in allocating financial resources from state support and reduce volatility of the economy from international market.

SME is important part of the economy in Kazakhstan, too. In 2016 SME employed more than 3 million people (it is about 36% of working population in Kazakhstan) and created more than 23% of gross value added (Committee of Statistics). For the 1st December 2017 1 156 436 active SME accounted in Kazakhstan[1]. SME development is one of the main priorities of the economic policies, and therefore such programs as "Joint Business support and development Program "Business Roadmap - 2020"[2] are launched and financed by state funds and some other international financial organisations like, "Damu", EBRD, etc.

One of the main trends in regional development in Kazakhstan is growing differentiations among regions since its independence. Growing importance of the large cities like Astana

[1]Main indicators of SMB on December 1, 2017 the site of Committee of Statistics of RK

[2]Joint Business support and development Program, Electronic government of the RK

and Almaty and international demand for oil and gas products made some regions and cities better than others, which lead to increasing the maximum difference in gross regional products of regions from 8.8 times in 2010 to 11.5 times in 2016.

According to this it is important to know what other factors beside oil and gas demand from international market, huge public investment in capital city like Astana can affect to the growth level of the regions. And estimation the effect of regional macro variables will be helpful to build sound regional policy to face the global problems and solve social and economic issues in regional term.

By investigating the role of SME in the regions thus we can find ways and variables that better explains the regional SME growth and thus can act as a strong policy tool for regional or sectoral policy development in future. International trade indicators, investment in industrial sectors, wages and sectoral output the main statistical indicators which help to reach this goal.

The paper is structured by following sections. The next section provides an evidence about SME in the regions through brief analysis of main indicators. The third section discusses the main literature findings given this topic. The fourth section discusses the theoretical framework of SME development factors. The fifth section describes the data used in the empirical part. The sixth section gives us information about econometric model which is going to be tested. In the seventh section I will try to give some hypothesis about the empirical model results. The eighth section provides the results of testing the model. And in the last part I conclude the main results of the paper and research findings.

2 Analysis of SME in the Regions of Kazakhstan

In order to analyse the SME, firstly, SME definition in Kazakhstan needs some clarification. SME as a legal entity is defined in 24th Article of Entrepreneurial Code of Kazakhstan by set of these following criteria:

for the small firms applied one of these

1) individual entrepreneurs and legal entities with average no more than 100 employees in a year; and/or

2) average annual income is no more than 300 000 times the monthly calculation index (MCI) (about KZT 680 million in 2017).

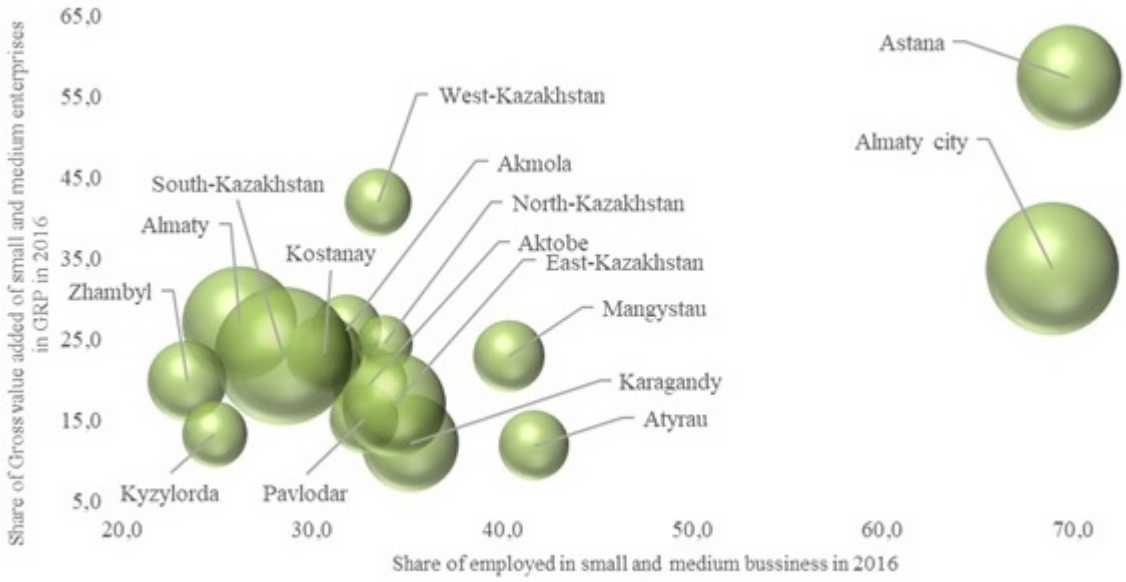

Figure 1: The representation of SME by regions

For medium sized enterprise:

1) average yearly employees is varying from 101 to 250; and/or

2) average annual income exceeds 300 000 MCI, but does not exceed 3000 000 MCI

(KZT 6.8 billion in 2017)[3]. For statistical purpose Committee of Statistics uses only the employment size criteria.

The analysis of three main indicators as the share of SME in employment and GRP, number of operating (active) SME in the regions shows us some groups which divide Kazakhstan regions. According to the first figure, we can see that most of the regions are located on the basis of horizontal axis, which explained as the SME in the regions are more interpreted by labor factor.

As we can see in the first figure, most of the regions' SME employment indicators lay between 30-40% and value added ones are located in the area of 15-30% [4].

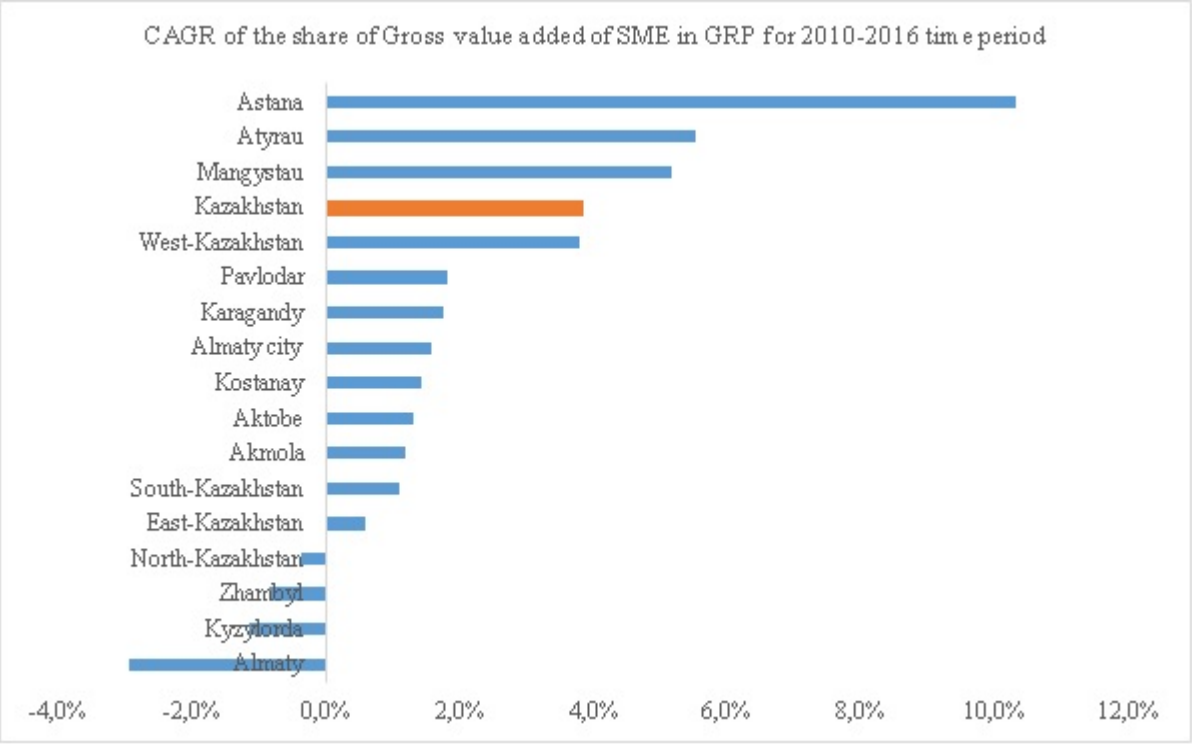

Figure 2: CAGR of the share of the GVA of SME in GRP for 2010-2016 time period

[3]Entrepreneurial Code of Republic of Kazakhstan

[4]The size of each region equals to the number of active subjects of SME in 2016: maximum 173791 active subjects of SME in South Kazakhstan and minimum 28789 active SME in North-Kazakhstan

In 4 out of 16 regions of Kazakhstan the share of SME in Gross value added is decreasing steadily (see Figure 2) from 2010 to 2016. Most of these regions specialized in agriculture and food processing manufacture sectors (Table 8 in Appendix). Three of those regions are located in the South Kazakhstan, near the borders Central Asian countries and China. Only North Kazakhstan from north and central regions experiencing decreasing the SME share in GRP of the region, which may be interpreted as the agriculture specialization of the region (23.9% of gross regional product gives an agriculture sector, see Appendix Table 8). On the

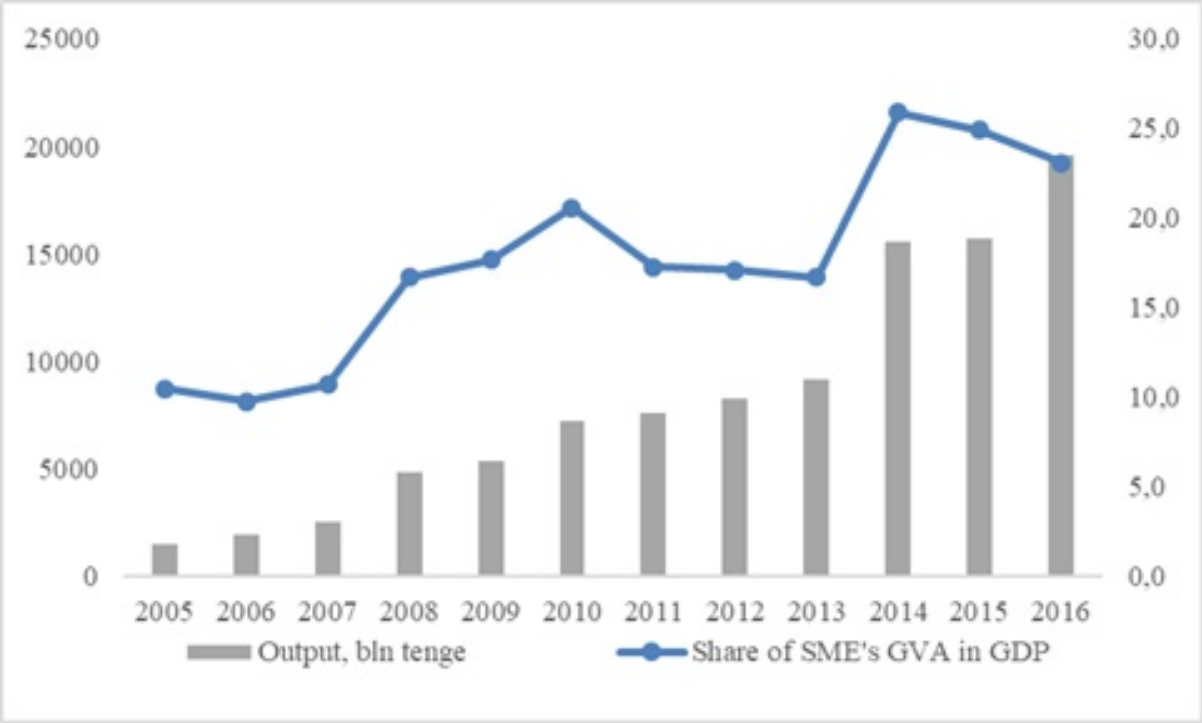

Figure 3: Output of SME's and the share of SME Gross Value Added in the GDP across 2005-2016

contrary to loosing advantages regions top regions are specialized in oil and gas industry and one of the leaders is Astana, the administrative city. Such representation explains us the existence of regional characteristics, such as oil and gas resource endowments and public

expenditures, which directly or indirectly affects the SME output in the region and city like Astana.

As we can see from Figure 3, the SME's contribution to GDP doubled in 12 years, reaching to 24% by 2016. The output level of SME had been growing about 23.6% annually from that period[5] .

The structure of the business entities for 2016 given in the Table 4 in Appendix. It shows us that individual entrepreneurs are the largest group among SME which takes 68.6% of all active SME subjects in Kazakhstan. Small business legal entities and farmers take about 16% and 15.2%, respectively, whereas the smallest share belongs to medium sized entrepreneurs sector, which contributed only 1.5% active SME subjects (See Appendix Table 4).

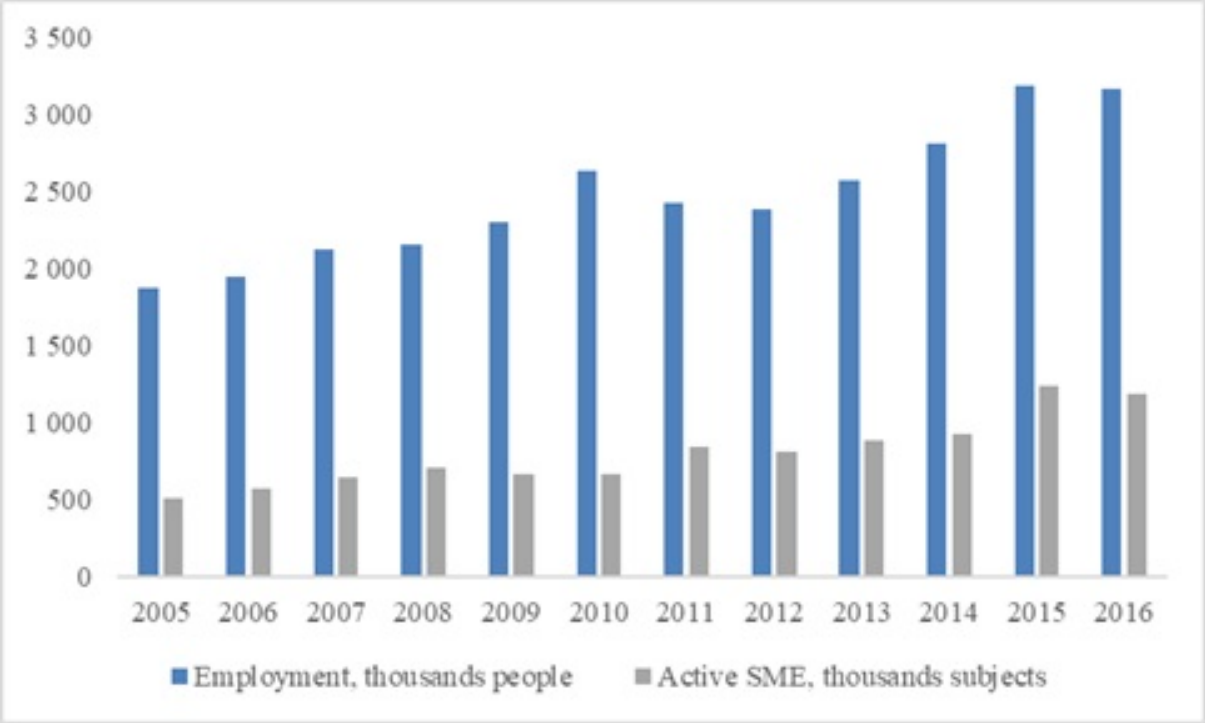

Figure 4: Employment in SME and the number of active SME across 2005-2016

[5]calculated using Committee of Statistic's data on SME

The SME in 2016 employed more than 3 million people. Mostly employed people worked in small business legal entities and as individual entrepreneurs (37.8% and 41.9%). People who worked in medium sized business and as farmers are relatively small (11.4% and 9%) (See Appendix Table 5).

According to Figure 4, the number of employed people in SME had been growing 4.5% annually [6]. The compaund annual growth rate of active subjects of SME in that period was 7.3% [7].

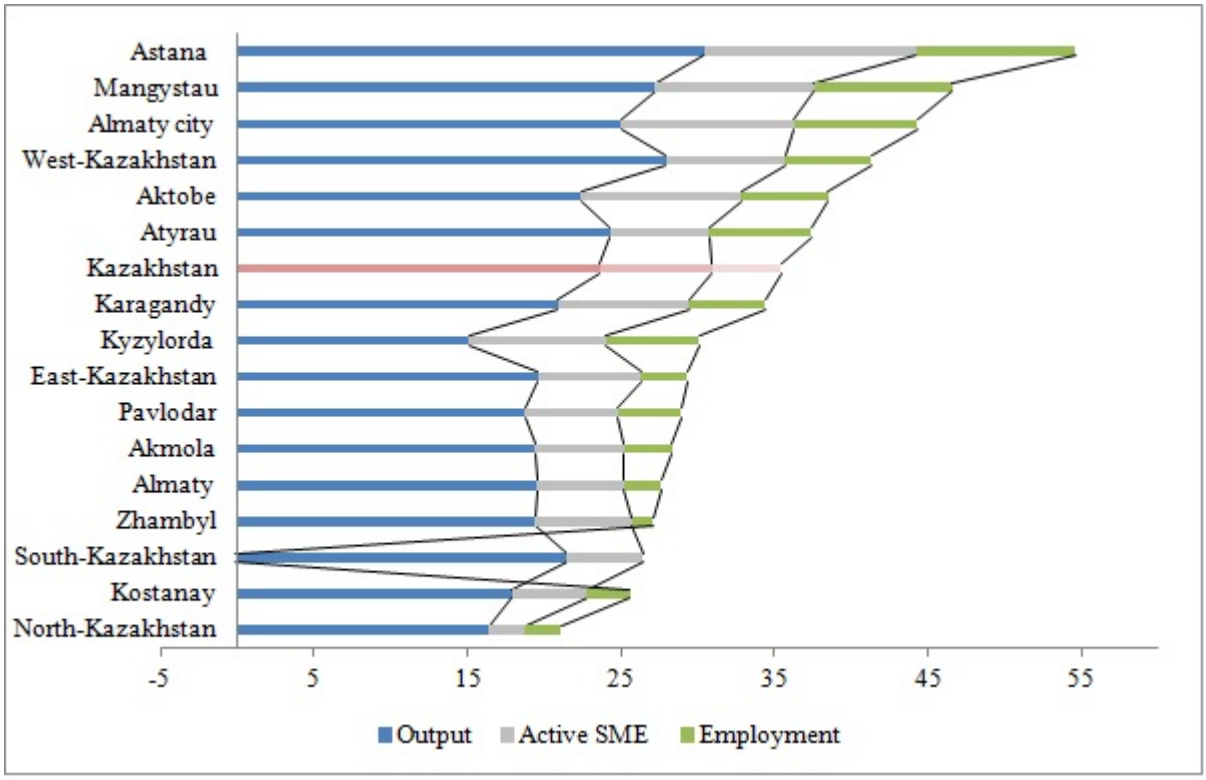

Figure 5: The CAGR of main indicators of SME in the regions during 2005-2016

The output of the SME in Kazakhstan regions is largely generated by small business legal entities. In 2016 the share of legal entities in small business in the output of SME was

[6] calculated using Committee of Statistic's data on SME

[7] calculated using Committee of Statistic's data on SME

69.2%. The next large portion of output (17.8%) in that year was produced by medium sized business legal entities. Individual entrepreneurs and farmer were produced 7.7% and 5.3% of total output, respectively, in 2016 (See Appendix Table 6).

If we analyse general trends in the regions, from Figure 5, we can clearly see that top regions specialized in oil-gas sector among with public administration. This means the existence of huge impact of local characteristics which directly affect to the regional SME. It is empirically proved that domestic oil-gas production positively affects to the SME development in oil and gas producing countries, like Nigeria (Tende and Obumneke, 2015). So, this statement seems to be true for Kazakhstan regions. Also, as we can see from Figures 1, 2 and 5, human capital also plays one of the deterministic role in concentrating the SME activity in the region or city. For instance, Almaty city is the largest city in Kazakhstan, where population is over than one million and today reaches to 1.801 million people, and Astana where population is about 1.033 million people[8].

3 Literature Review

Competitiveness of the economy hugely depend on the SME performance (Carvalho and Costa, 2014). And analysing the regional competitiveness more effective than doing it in the national level, because of the existence size differences in economies and huge heterogeneity among the regions of one economy (Konings and Marcolin, 2011). It is common to estimate the competitiveness of the economy of a country or regions, or even sector using international trade indicators (Arghyrou and Bazina, 2003).

[8]Bulletin "Population by gender, regions, cities, districts and towns of the RK as of January 1, 2018"

Analysis the firm level data hugely depend on such firm specific factors as profit level, financial constraints, and other important firm characteristics. The effect of credits to firm profitability was investigated in some literatures and it was found that micro-financing played crucial role in profit level of SME (Wang, 2013).

There are a lot of literatures concerning financial stability of firms and effect of financing to SME performance. Publications suggest that government support has effect on boosting the productivity level of the firms, participated in Public Programs. And some authors investigated the role of government support on SME performance in such country as Estonia (Hartsenko and Sauga, 2013). Their research results showed that financial support increases the productivity of the firms. The authors used data from Enterprise Estonia and Estonian Commercial Register, where analysing companies are grouped by Estonian Classification of Economic Activities (EMTAK). The time span was conducted from 2004 to 2010. The authors used fixed effect and random effect models in order to estimate the effect of grant financing the outcome of firm, by setting the dependent variables as sales revenue and labour productivity. This empirical paper highlights the importance of state support on productivity of SME, it is observed that money metric indicators like the amount of grants can be used in the empirical model as independent variable to describe the variances in productivity change.

Another important contribution on investigating the role of government programs on SME development was made by authors Lopez-Acevedo and Tinajero (2010). They estimated the impact of SME Programs on firm performance in Mexico using panel microdata and found that participation in such programs improves key factors of firms such as value added, gross production, and wages. In order to show this authors used panel data from 1995 to 2005. Authors used OLS, Cox proportional Hazard Model, fixed effect model to estimate the effects

of a program on firms. As most firm data based papers this paper shows that OLS method is the best panel data analysis tool.

Analysis of regional data and estimations of the effect of various factors to regional growth were published for Brazilian microregions. Cravo (2010) investigated the link between economic growth of 508 Brazilian microregions and small and medium sized enterprises for 1980-2004 time period. The author used standard panel data estimators to determine the Solow growth model based economical effect of SME size measured in the share of SME employment in total formal employment and the level of human capital measured in the average years of schooling of SME employees. The empirical result showed that the size of SME is not important for regional economy. The author found that the SME's human capital is more significant for growth in more developed regions. In comparing with this work I am going to use the ratio between SME output and SME employment as a productivity measurement of SME in the regions and compared with this model I use growth rate of productivity as a dependent variable. Thus this paper shades some light on the structure of the empirical part, which shows the employment variable can be used in for model specification.

There are a lot of papers based on the cross-country analysis of the SME constraints, which derived from such reports like Doing Business. On the basis of this data Rocha (2012) studied the influence of business environment on SME's size and employment using cross-country data. The author applied OLS estimation method for multiple linear regression in order to find how much of the cross-country variation in size and contribution to employment in SME could be explained by country variation in business environment regulation variables. Author concluded that adequate business climate with legislative framework which are transparent, easy to use and available for all may have positive effect on enhancing the role of SME in

the economy. The overall idea of this paper is close to my hypothesis about the effects of independent variables to the model. While if there is favourable investment climate in the regions, SME will enhance, leading to the productivity growth. Compared to this model I use money metric indicators for controlling investment decisions while in this model author tried to use indexed variables for business environment from World Bank Reports on "Doing Business".

Other important empirical publication based on cross-country estimation belong to Ayyagari et al. (2003). The authors in this paper investigated cross-country importance of SME. They used money metric indicators and productivity related indicator like GDP per capita in their model. The dataset shows significant variation in size and economic activity of SME in income groups. Countries with high GDP per capita have large share of SME in total employment and GDP. This paper separately estimates the effect of GDP per capita on the share of SME in total employment and in GDP. The findings of this paper approves our analysis in the second section of this paper, where we preliminary analysis showed that oil-rich and public cities which funded directly by republic budget has better SME performance. I will try to investigate all industrial and investment effects on local SME development. For regional model in this paper I use employment and output of SME to generate productivity variable.

It is interesting to consider mineral sector manufacture specialized countries experience and research based on this topic which is quite similar to Kazakhstani term. Eigbiremolen and Igberaese investigated the impact of SME to growth and development in Nigeria (Eigbiremolen and Igberaese, 2013). The authors found huge impact of SME to the GDP, and granger causality test showed only causality from SME to real GDP. Compared to this paper

I am going to estimate the effect of average wages, international trade and industrial output with investment to SME productivity. It is planned to use Hausman test to identify the endogeneity problem of empirical model in this paper.

Innovation is close cousin of development and identifying the regional factors which describes the regional innovations is quite interesting academic topic. Broekel and Brenner studied regional factors affecting the innovativeness of the regions (Broekel and Brenner, 2010). They aggregated 70 socio-economic variables of regions into 12 and tested whether four industry-specific attributes affect to regional innovation by using linear and log-linear models. Authors found that log-linear form of the model performs better than linear model. Compared with this paper I am planning to use log-log type of equation, because I expect that all money metric indicators have multiplicative effect on the productivity level of the SME in the regions.

The effect of various factors to the SME innovation was investigated by Jang (2017). He tried to identify the determinants of SME innovation, estimated in patents, through such indicators as profit, export, foreign ownership and inter-firm cooperation (alliances) using negative binomial estimation. The author found different results by controlling regional and sectoral effects. For instance, only export significantly affect to the innovation of the high-tech industry, while export and foreign ownership have significant effect on promoting innovation in low-tech industries. I am planning to include in the model not only export but import variables, because this indicator show how complex the economy of the region and the size of the import can affect also the SME output of the region, too.

Another important contribution to investigation the relation between SME and business cycles were done by Varum and Rocha (2013). They studied the impact of firm size on

employment growth during the crisis using microdata of Portuguese manufacturing firms. They found that economic fluctuations affect more negatively large enterprises than SME but small and medium sized business slowly recover after crisis than large ones by using fixed effect model. Our model also cover the periods of economic fluctuations in 2014 and 2015 (devaluation of tenge due to world prices fall for oil and gas) and in this period we can see the slowdown of the economic indicators.

Another important publication to resource boom countries economy and SME development was published by Tende and Obumneke (2015). These authors investigated the impact of natural resource to SME growth using the case of Nigeria. They found that from all independent variables such as imported oil, petroleum price, petroleum production only the last was significantly in the model, which showed positively effect to SME growth. I am planning to include in the model sectoral output and investigate the role of gross sector output to SME productivity. I expect that gross output in sectors will show negative result, because mining industry takes more than half of the industrial output in the economy and the share of SME low in this industry.

The relation between SME performance and R&D alongside with wages was emphasized in Luczka and Przepiora (2012) paper. They investigated regional determinants of SME efficiency growth for 16 provinces of Poland during 2003-2008 years. Their model with 11 explanatory variables showed that only Research and Development spending and labor wages are significantly in the model. According to this I include in the model average nominal wage corrected to the real term by CPI and expect as in the previous case that wages negatively affect to SME productivity.

As in cross-country investigation of Rocha (2012), some literatures investigated the re-

gional institutional factors affecting the SME financing decisions (Palacin-Sanchez and Pietro, 2013). In fact, Palacin-Sanchez and Pietro proved that regional institutional factors affect the SME financing using fixed effect model and Hausman-Taylor estimations for 638 SME subject in 17 regions of Spain for 1999-2007 years. Fixed effect best suits for dummy variable cases, with compared to this paper I only use money metric indicators and OLS estimation better provides the elasticity.

Given these previous research papers I am going to use macro regional aggregated indicators and link them with SME productivity in the region. The data set is taken from Kazakhstan, for 84 monthly time periods, covering from 2010 to 2016. The model of the empirical part is derived from given literatures and include mostly money metric indicators, such as output of industrial sectors, investment in manufacture, monthly wages, export and import, etc.

I expect that international indicators and industrial output alongside with real wages have significant impact on improving the level of SME development and boost the productivity of SME, operating in the regional market.

4 The Model

The theoretical model that specifies the SME development factors are derived from various theories that explain SME and regional development in the context of competitiveness and economic geography factors.

In terms of competitiveness and growth Porter (1990) argued that competitiveness of a nation depends on the ability of industry to innovate and challenge. Competitive advantage

is created through localization of production process. In determining the national level of competitiveness Porter used exports or/and foreign investments as a right tools. The location can contribute to its competitive advantage through productivity growth (Porter, 1998). And thus exports and productivity is the main characteristics of national and regional or industrial competitiveness.

According to Krugman (1991) emergence of such patterns like core and periphery among regions hugely depend on transportation costs, economics of scale and the share of manufacturing in national income. The economic geography theory emphasizes the role of specialization patterns such as distance to markets, scale production or agglomeration effects and the manufacturing. According to this theory regional specializations sharpen and concentration of manufacturing or production grows at higher rates in regions and in such situations, where markets are near and transportation costs low. Beside transportation costs there is huge effect of scale economies, which we can see from largest cities in developed and developing world, also localization effect: the share of the region in demand to the production has significant effect in regional growth models. So this publication emphasizes the huge impact of several factors as concentration, manufacturing and transportation costs to heterogeneity of regional growth in terms of specialization and agglomeration effects.

The theory of regional growth based on neoclassical view was supplemented by entrepreneurial activity (Audretsch and Keilbach, 2004). There is an evidence empirically based on German regions that entrepreneurship is important in explaining the labor productivity in the regions.

In this work we develop a model based on these basic theoretical assumptions. We claim that export, labor productivity, manufacturing is clue to define the regional business

competitiveness and link them with regional SME indicators, because they describe the huge part of SME activity in the regions.

We set up the model where SME indicators is defined through manufacturing, investment export, import, labor wages and productivity in our empirical part.

5 Data description

The dataset is combined from mainly 2 sources:

1) Committee of Statistics Ministry of National Economy;

2) Committee of State Revenue Ministry of Finance.

The data is covering from 2010 to 2016 monthly time periods. Some data like SME output and SME employment are observed only for periods 2010-2013 years, and after that period Statistics Committee began to publish these data for only quarterly basis. This also implies to labor wage which is available monthly for 2011-2014 years.

Data from Committee of Statistics

SME output, *routsme* is the amount of produced goods and services of SME in a given month, which estimated in million KZT and adjusted to its real value by CPI in the regions for a given time periods. This indicator is available for 2010-2013 years for monthly periods, so we use only this coverage in the model.

Employed people in SME, *empsme* - number of people occupied in SME in a given month. This indicator as previous one is available for monthly time periods for only 4 years from 2010 to 2013 including. So, we cover only this time span, when we use this two indicators in the model.

These described data for SME help us to identify the productivity level, *productivity*, of SME for monthly periods. According to OECD statistical methods (OECD, 2001) productivity can be driven as a ratio of gross output and labor. Productivity measurement in this specification will be million KZT per unit of labor occupied in SME.

Investments in fixed assets in all industry, *rinv*, represent a combination of costs aimed at the creation and reproduction of fixed assets in manufacture industry. Investments in fixed assets include the costs of construction and capital repairs of buildings and structures; purchase and overhaul of machinery, equipment, tools and equipment; other capital works and costs. This indicator is measured in thousand KZT and adjusted to its real value through CPI of regions for a given time periods.

Industrial output, *rindout* - the production of goods and services in all types of industry. Output in industry is measured in thousands KZT and adjusted to its real value through CPI for a given time periods.

The average monthly nominal wage of one employee, *rwages*, is determined by dividing the amount of the accrued wage fund by the actual number of employees and by the number of months in the reporting period.

Data from Committee of State Revenue

Export, *rexp* - the amount of produced goods in that region, sold to international market in a given month. The indicator is measured in thousands USD and adjusted to its real value through US CPI for a given time periods.

Import, *rimport* - the amount of goods which is bought from other countries. As in previous case this indicator is estimated in thousands USD and adjusted to its real value.

All money metric indicators adjusted to its real value by using the CPI of the regions

in a given periods. For USD data we use Historical Consumer Price Index for a given time periods (Bureau of Labor Statistics, 2017).

Descriptive Statistics

The given statistical indicators are combined to one dataset for the same data period. In the empirical part most these indicators will be used in the logarithmic form, so the log type of these indicators, which are used in the empirical model, will be find in Appendix part[9].

Table 1: Summary statistics of model variables

	mean	sd	min	max	N	measure
routsme	218808	275190	3899	2094923	752	mln. KZT
empsme	152976	83007	48388	390066	752	person
productivity	1.457	1.297	0.279	6.442	752	mln. KZT/person
rindout	78689739	76604448	5325864	449806624	1344	thous. KZT
rinv	16651455	24972019	506	231228352	1344	thous. KZT
rwages	93096	35622	47964	208447	752	KZT
rexp	2094815	3575364	0	28349970	1344	thous. USD
rimport	752555	1567233	0	14553748	1344	thous. USD

The Statistics Committee developed methodologies of sampling in identifying the average wages and indexes of wages, so I expect that there is no bias in sampling because it was done before the investigation of these indicators by Statistics Committee.

[9]See Table 10 in the Appendix part for the log type of this data

6 Econometric Model

I want to investigate the effect of various macro regional variables on the SME development in the regions. So, in order to determine the effects, I use log of *productivity* of SME variable as a dependent variable.

Econometric model of the research paper uses first difference instrument, because it can easily fix serial autocorrelations among monthly reported data. Also I estimate equations using fixed effect in order to compare what instrument best describes the model. Testing without first difference in fixed effect can cause autocorrelation and thus we use first difference method to fix this problem. We derive log of *productivity*, which calculated as a ratio of gross output of SME to employed people in SME for given periods.

$$lprod_{it} = \beta_0 + \beta_1 lrindout_{it} + \beta_2 lrinv_{it} + \beta_3 lrwages_{it} + \beta_4 lrexp_{it} + \beta_5 lrimport_{it} + \mu_i + \epsilon_{it} \quad (1)$$

where, *lprod* - is the log of productivity of SME, derived as the ratio of output to employed people in SME; *lrindout* - log of real industrial output; *lrinv* - log of real investment into industrial sectors in the region; *lrwages* - log of real wages in the region; *lrexp* - log of real export; *lrimport* - log of real import;μi - individual specific effects of region ϵ - the error term across $t = 1, .., 48$ times unit (4 years or 48 months) and $i = 1, ..., 16$ regions.

$$\begin{aligned} lprod_{it-1} = \beta_0 + \beta_1 lrindout_{it-1} + \beta_2 lrinv_{it-1} + \beta_3 lrwages_{it-1} \\ + \beta_4 lrexp_{it-1} + \beta_5 lrimport_{it-1} + \mu_i + \epsilon_{it-1} \end{aligned} \quad (2)$$

For consistency purposes we estimate first difference in this equation, which derived from the difference between first and second equation.

$$\Delta lprod_{it} = \Delta lrindout_{it}\beta_1 + \Delta lrinv_{it}\beta_2 + \Delta lrwages_{it}\beta_3 + \Delta lrexp_{it}\beta_4 + \Delta lrimport_{it}\beta_5 + \Delta\epsilon_{it} \quad (3)$$

I use log-log type of equation, because most literatures suggests to use growth rates for analysis and empirical models for productivity (Porter, 1998). Log of labor productivity gives us the growth rates of labor productivity of SME on a given time period. In left hand side of equation we use log of explanatory variables in order to specify the relationships between them as multiplicative (Lentz and Mortensen, 2008) and describe multifactor productivity relation between them (OECD, 2001).

For testing the endogeneity problem I use Hausman specification test in Stata and derive p-value for endogeneity assumption for each equation in the model (see the Table in Results section). As a consistent estimator I use fixed effect model and as efficient I use pooled OLS model results. We derive results without robustness standard error classification.

7 Hypothesis

Wages

According to ILO (2015) large firms tend to have higher productivity and higher wages compared with small firms. Riley and Bondibene (2015) found that increasing minimum wage contributed to the increase of labor productivity in Britain. So, we expect that the labor productivity and wages are positively related. In this model we do not consider the effects of various sectors and informal economy, we just emphasize that labor productivity grows with the same direction as wages. But this should not be hold in some cases, where we expect to see large variation of average wages across sectors and regions. Because, in this model labor productivity derived from SME output and employment, whereas average monthly wages from the average of all sectors including SME and large enterprises in the

region. Increase in wages in microeconomics leads to increasing the productivity (Meager and Speckesser, 2011) in firm level, because they minimize costs. Thus the relation of wages and productivity should be the positive.

Investment to Industry

Investment is one of the main sources of innovation in SME (Hall et al., 2009). Because it can affect both production and process innovations. Thus investment in industrial sector, especially, acquiring equipment and technology can boost productivity as investment in human capital (ILO, 2014). In this context we expect that investment in manufacture sector should positively related to productivity of SME.

Industry Output

About 50% of industry output of Kazakhstan consists from mining and quarrying sector production, where large enterprises, multinational companies are dominating. According to some literature emerging economies, specializing in producing oil and gas tend to have small business sectors (Tordo et al., 2013). Prevailing oil and gas sector in manufacture thus can reduce the level of productivity, because of resource allocation. Manufacture output growth linked with high concentration in mining sector reduces the productivity level of SME.

Export

Empirical results show that labor productivity of exporting firms are higher than non-exporting ones (US ITC, 2010), meaning that export and productivity is positively related (Berthou et al., 2015). Analysis of exports of Kazakhstan shows that about 68.6% of export are mineral products, whereas 18.1% metals and related products (Statistics Committee, 2017). Theory of the competitiveness suggests that exporting goods can facilitate not only those exporting sector but also related sectors and small and medium sized businesses which

provide services to those exporting sectors.

Import

As in export case most literatures suggest that import increases the productivity of firms, too (Amiti and Konings, 2007). Empirical research show that importer firms are more productive than non-traders (van den Berg, 2013), whereas importer firms are less productive than exporters and two-way trade companies. So the effect of imports to labor productivity should be positive.

8 Results

The result of estimation of this model is shown on the next table. For stationary purposes we use first difference of the variables for pooled OLS and fixed effect methods. For identifying each variables contribution I estimated four separate equations. As I expect from my hypothesis international trade indicators have positive relations with SME labor productivity, while wages contradict to hypothesis showing the negative sign. Industrial output have no effect on SME labor productivity growth.

Firstly, all variables explain the more than 95% of labor productivity in the regions. International trade indicators only explain more than two thirds of the labour productivity in the regions, which show the powerful effect of market availability for regional SME.

The results of Hausman test show that p-values are high enough to conclude that variables in the models are exogenous.

Table 2: Regression Results

	Pooled OLS				Fixed effect			
	Eq.1	Eq.2	Eq.3	Eq.4	Eq.1	Eq.2	Eq.3	Eq.4
D.lrexp	0.226***	0.226***	0.277***	0.388***	0.224***	0.224***	0.277***	0.386***
	(0.064)	(0.065)	(0.066)	(0.086)	(0.052)	(0.052)	(0.064)	(0.102)
D.lrimport	0.575***	0.573***	0.640***	0.454***	0.576***	0.574***	0.642***	0.454***
	(0.059)	(0.059)	(0.063)	(0.090)	(0.053)	(0.053)	(0.060)	(0.105)
D.lrwages	-1.022***	-1.047***	-1.107***		-0.777	-0.790	-0.925*	
	(0.375)	(0.372)	(0.392)		(0.491)	(0.489)	(0.511)	
D.lrinv	0.098***	0.098***			0.101***	0.101***		
	(0.029)	(0.029)			(0.030)	(0.030)		
D.lrindout	-0.044				-0.038			
	(0.053)				(0.059)			
Constant					-0.011**	-0.012**	-0.008	0.027***
					(0.005)	(0.005)	(0.005)	(0.001)
N	528	528	528	720	528	528	528	720
R2	0.964	0.964	0.961	0.664	0.964	0.964	0.961	0.663
Hausman test (p-value)	0.7295	0.5675	0.7042	0.8499				

Standard errors in parentheses *p<0.10, **p<0.05, ***p<0.01

Industrial Output

Industrial output has negative sign and insignificant in both pooled OLS and fixed effect models. This can be interpreted as the industry itself does not affect to the productivity of SME. As I mentioned earlier, regions have large differences in regional industrial structure (See Table 8 in Appendix, Columns Mining and Manufacture) where share of SME activity varies a lot. This result proves the existence of problems between industrial development and SME: most industrially developed regions specialized in mining industries and the share of SME in those sectors are small.

Investment to Industries

Investment to industrial sectors has positive effect on growing the productivity level of the SME. 1% increase in investment to manufacture sector increases the productivity of SME by 0.1% and this is significant at 1% level in both estimations. Investment hugely affect the local economy by participating into production of goods and services while industry output (especially, in the case of oil and gas sector) can be sold abroad and benefits from selling them can not be localized. This result proves previous investigations that financing SME is one the significant tools (Wang, 2013).

Average monthly wages

The wage negatively affect to the productivity and for pooled OLS estimation it is significant for 1% . However, for fixed effect estimation in first two equations it is insignificant and in third equation only real wages is significant at 10%. In the first equation 1% increase in wages decrease the productivity of SME by 1.022%. The second and third equations show similar results yielding 1% decrease in the productivity in SME. According to our hypothesis the empirical results show us the wage heterogeneity, because as we mentioned earlier, aver-

age wages variable is accounted as the average from all sectors, no matter what share of SME these sectors have. Negative sign can be interpreted as the dominance of large enterprises or public companies that setting the wage rate too high from the labor productivity level of the SME. Thus increase in average real monthly wages is attributable to large enterprises and legal entities in SME (which is about 16% in the active SME subjects)[10], because of prevailing non-SME in wage setting mechanism, the real wages negatively relates to productivity of SME.

Import

Import is significant in both pooled OLS and fixed effect estimations at 1%. In first estimation 1% increase in import increases the productivity at 0.575%, which is similar to the fixed effect equation results. The importing goods and services can boost the entrepreneurial activity where they directly affect to the output level by trade or introducing new equipment or technology that optimize labor cost. In all estimation results the coefficients of import variables is higher than export's which can be interpreted due to the diversified structure of import. For example, 37.9% of import belonged to equipments, machines and transportation techniques, 16% to chemical industry products, 12.5% metals; while 65% of export consisted from mineral products, and 16.8% from metals[11].

Export

As in previous case export is significant at 1% level in both estimation models, too. The first and second estimations show that 1% increase in export increase the productivity of SME by 0.226%. The export variable affect the region's SME productivity by increasing the

[10]Committee of Statistics counts only the wages of servants, i.e. by using the data from only legal entities

[11]Structure of export and import of the Republic of Kazakhstan by major commodity groups in 2016

local market capacity for given industry and entrepreneurial activity (Porter, 1991). Mining industry counts more than 65% of export share, however the effect of export remains positive to local SME, which interpreted as "leakage effect".

9 Conclusion

The paper is aimed to identify the main factors of developing the SME in the regions of Kazakhstan. Our results show that regional SME development is caused by factors of government policies as financing SME, developing the industrialisation among SME in the regions, and promoting international trade by increasing both import and the export of SME.

The estimation of the model showed several important moments to consider for further investigation. Firstly, the roles of industrial output and investment to all industrial sectors are different in the model: industries itself does not describe the SME productivity level, while investment to industries has positive effect on developing the SME productivity in the regions.

The second moment is the wages has negative effect on the productivity of SME in the regions and the result is significant at 1% in the model. The model estimations show that the wages in the regions are setting outside the SME by large enterprises and public companies, which lead to increase the difference between productivity of SME and average monthly wages in the regional labor market and thus costs of SME.

Two international indicators show that they are positively affect to SME productivity of the regions. Surprisingly, import coefficients are twice high compared to export coefficients in the estimations. This can be interpreted as the sophistication level of trade or imports

structure, where equipments, machine other technologies prevailing consists more than one thirds of the imports. As we can see from estimation results import optimizes the labor cost and increase the productivity of SME.

Finally, the model results show that at some level there are some links between regional SME productivity and such variables as investment to industrial sectors, wages export and import by regions.

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11 Appendix

Table 3: Cross-correlation table

Variables	lprod	lrindout	lrinv	lrwages	lrimport	lrexp
lprod	1.000					
lrindout	0.256	1.000				
	(0.000)					
lrinv	0.505	0.342	1.000			
	(0.000)	(0.000)				
lrwages	0.504	0.548	0.212	1.000		
	(0.000)	(0.000)	(0.000)			
lrimport	0.648	0.248	0.623	0.473	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)		
lrexp	0.633	0.674	0.384	0.679	0.614	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Table 4: Active subjects of SME in 2016

Regions	All	Type of Legal entities			
		small	medium sized	IE	Farmers
Kazakhstan	1 186 629	189 637	2 711	813 482	180 799
Akmola	44 872	5 726	117	35 465	3 564
Aktobe	50 794	8 279	101	37 817	4 597
Almaty	119 002	6 862	139	68 694	43 307
Atyrau	44 235	5 335	99	36 726	2 075
W.-Kazakhstan	40 448	4 762	91	30 878	4 717
Zhambyl	56 913	4 268	53	36 700	15 892
Karagandy	85 034	14 872	192	63 102	6 868
Kostanay	53 206	5 928	147	42 258	4 873
Kyzylorda	38 307	4 563	66	30 197	3 481
Mangystau	46 648	6 454	95	38 695	1 404
S.-Kazakhstan	173 791	13 922	159	91 778	67 932
Pavlodar	43 872	7 566	94	32 856	3 356
N.-Kazakhstan	28 789	4 218	135	21 590	2 846
E.-Kazakhstan	99 603	8 542	158	75 227	15 676
Astana	100 270	30 900	295	69 043	32
Almaty city	160 845	57 440	770	102 456	179

Table 5: Employment in SME in 2016, people

Regions	All	Type of legal entities			
		small	medium sized	IE	Farmers
Kazakhstan	3 074 777	1 160 901	349 308	1 288 167	276 401
Akmola	128 605	45 819	19 109	57 320	6 357
Aktobe	130 719	48 799	15 429	58 401	8 090
Almaty	249 162	56 908	19 521	98 748	73 985
Atyrau	123 199	45 987	17 572	57 110	2 530
W.-Kazakhstan	105 694	30 707	13 394	53 566	8 027
Zhambyl	116 527	26 821	8 278	49 635	31 793
Karagandy	227 781	83 074	24 805	107 324	12 578
Kostanay	148 925	46 751	22 393	70 851	8 930
Kyzylorda	80 155	25 798	9 763	39 925	4 669
Mangystau	108 399	37 016	15 232	54 875	1 276
S.-Kazakhstan	323 296	92 619	24 349	118 176	88 152
Pavlodar	128 086	48 194	13 175	60 431	6 286
N.-Kazakhstan	100 793	34 705	20 024	41 099	4 965
E.-Kazakhstan	231 788	65 316	25 537	122 195	18 740
Astana	302 859	156 686	28 973	117 195	5
Almaty city	568 789	315 701	71 754	181 316	18

Table 6: The output of SME subjects in 2016, thousands tenge

Regions	All	Type of legal entities			
		small	medium sized	IE	Farmers
Kazakhstan	16 857 335	10 813 810	3 494 599	1 511 733	1 037 193
Akmola	502 826	267 574	130 734	52 749	51 769
Aktobe	662 137	444 100	119 921	52 778	45 338
Almaty	867 822	341 871	226 230	97 495	202 226
Atyrau	942 214	654 614	186 666	85 532	15 402
W.-Kazakhstan	1 231 608	957 485	136 833	93 454	43 836
Zhambyl	375 537	167 993	69 895	38 067	99 582
Karagandy	736 735	426 358	144 961	83 900	81 516
Kostanay	567 101	278 400	144 440	65 924	78 338
Kyzylorda	244 535	136 300	60 258	31 497	16 481
Mangystau	705 839	479 514	147 516	74 356	4 453
S.-Kazakhstan	900 625	478 562	164 227	118 532	139 305
Pavlodar	497 186	288 803	101 481	48 304	58 598
N.-Kazakhstan	384 652	172 253	109 898	34 874	67 627
E.-Kazakhstan	651 543	293 523	147 897	77 451	132 672
Astana	3 128 426	2 325 557	612 232	190 609	29
Almaty city	4 458 548	3 100 904	991 410	366 211	24

Table 7: The CAGR of main indicators of SME for 2005-2016 time periods

	Output	Active SME	Employment
Kazakhstan	23,6	7,3	4,5
Akmola	19,4	5,8	3,1
Aktobe	22,4	10,4	5,7
Almaty	19,5	5,7	2,4
Atyrau	24,3	6,4	6,7
West-Kazakhstan	27,9	7,8	5,6
Zhambyl	19,4	6,3	1,4
Karagandy	20,9	8,5	5
Kostanay	17,9	4,9	2,8
Kyzylorda	15,1	8,9	6,1
Mangystau	27,2	10,4	9
South-Kazakhstan	21,5	4,9	-0,1
Pavlodar	18,7	6,1	4,1
North-Kazakhstan	16,4	2,3	2,4
East-Kazakhstan	19,6	6,7	3
Astana	30,4	13,8	10,4
Almaty city	25	11,3	8

Table 8: Share of main sectors in GRP of the regions in 2016

Regions / Sectors	Agriculture	Mining	Manufacturing	Construction	Trade	Transport	Real estate	Professional activities	Others
Republic of Kazakhstan	4.6	12.9	11.3	5.9	16.8	8.3	8.7	5.0	26.6
Akmola	15.1	3.1	19.2	5.9	13.8	8.4	9.9	0.9	23.7
Aktobe	4.9	22.2	10.8	5.4	17.6	8.6	8.0	1.5	21.1
Almaty	15.7	0.5	18.3	9.5	10.1	12.9	8.9	1.3	22.9
Atyrau	1.1	43.6	4.9	9.3	3.4	6.5	3.2	12.2	15.7
West-Kazakhstan	3.7	44.8	3.7	4.0	9.0	6.8	5.6	2.2	20.3
Zhambyl	10.7	2.7	12.4	7.9	11.8	16.1	8.5	1.0	28.8
Karagandy	3.7	9.3	31.7	3.4	14.0	8.5	6.5	1.5	21.2
Kostanay	12.6	8.9	11.9	4.2	16.9	13.1	8.7	1.3	22.4
Kyzylorda	3.7	28.7	6.7	4.7	7.6	16.2	5.2	4.1	23.1
Mangystau	0.5	41.9	3.9	5.9	4.4	6.2	6.3	3.4	27.5
South-Kazakhstan	9.8	5.5	17.9	6.0	11.1	10.2	12.6	1.7	25.2
Pavlodar	5.0	4.9	27.2	6.7	10.3	14.7	5.5	1.3	24.3
North-Kazakhstan	23.9	0.2	10.3	4.3	15.9	8.4	10.4	0.8	25.8
East-Kazakhstan	8.6	6.7	24.6	6.1	12.2	8.2	8.0	2.4	23.2
Astana city	0.1	0	3.8	11.0	17.7	6.4	12.4	10.8	37.9
Almaty city	0	0	3.9	2.5	35.6	5.3	11.8	6.5	34.4

Table 9: Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared
lprod	2.86	1.69	0.3496	0.6504
lrinv	2.49	1.58	0.4014	0.5986
lrexp	4.63	2.15	0.2158	0.7842
lrimport	3.43	1.85	0.2917	0.7083
lrwages	2.17	1.47	0.4617	0.5383
lrindout	2.80	1.67	0.3570	0.6430
Mean VIF	3.06			

Table 10: Summary statistics of the variables in empirical part

Variable		Mean	Std. Dev.	Min	Max	Observations
	overall	-.075	1.053	-3.580	1.863	N =752
lprod	between		.507	-.845	.799	n =16
	within		.931	-3.016	1.376	T =47
	overall	15.663	1.615	6.227	19.259	N =1344
lrinv	between		1.021	13.879	17.363	n =16
	within		1.278	8.012	18.266	T =84
	overall	13.396	1.742	7.700	17.160	N =1343
lrexp	between		1.536	10.847	16.01	n =16
	within		.905	9.268	14.935	T-bar = 83.938
	overall	12.587	1.392	7.904	16.493	N =1343
lrimport	between		1.052	10.706	15.22	n =16
	within		.947	9.093	14.717	T-bar = 83.938
	overall	11.380	.336	10.778	12.247	N =752
lrwages	between		.322	11.049	12.052	n =16
	within		.125	11.079	11.639	T =47
	overall	17.782	.921	15.488	19.924	N =1344
lrindout	between		.908	16.157	19.559	n =16
	within		.274	16.734	18.992	T =84