CONVERGENCE ACROSS KAZAKHSTAN REGIONS

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Vitae:

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Abstract

This paper studies σ-convergence and absolute β-convergence across the regions of Kazakhstan over the period of 1993-2012. First, we approach convergence directly by studying the dynamics of standard deviation and coefficient of variation of per capita GRP level across Kazakhstan's regions, which is called σ-convergence. Next, we study absolute β-convergence using cross-section approach. The results of this paper show that, in general, regions of Kazakhstan diverged over the period of 1993-2012 in the sense of σ-convergence and absolute β-convergence. For the government this means that convergence in Kazakhstan is not per se a process that accompanies economic development and that a strong regional policy is needed.

Keywords:

σ-convergence, β-convergence, region, economic growth

JEL classification:

O47, R11

1. Introduction

In this paper we study σ - convergence and unconditional β - convergence across the Kazakhstan regions over the period of 1993-2012.

Since it became an independent state in 1991 and after the period of economic recession caused by the switch from the planned socialist economy to the market-based relations, the Republic of Kazakhstan has undergone a period of rapid economic growth. The average growth rate of GDP over the last ten years was 7.25% per year, reaching a maximum of 10.7% in 2006. Over the period between 1993 and 2012, the real per capita GDP of Kazakhstan has grown three times.

However, such a dynamic economic development was accompanied by growing differences across various regions of the country. The analysis of statistical data shows that, presently, the per capita gross regional product (GRP) varies across Kazakhstan regions much more than it used to in Soviet times. For example, in 1993, the ratio of real per capita GRP of the richest to the poorest regions was only 4.08, while in 2012, it rose to 8.5.

The increase of regional inequality in Kazakhstan has been a factor in a number of economic, social, and political problems. Among these has been the slowdown of economic growth caused by the necessity to direct a part of resources towards regional alignment, instead of the stimulation of growth; the increase of unemployment and social tension, and the consequent rise of separatist feeling, further magnifying the process of disintegration, and so on.

The urgency to find a solution to the specified problems has made research into the dynamics of regional inequality a hot issue for both policy makers and economists. In order to address these issues, we will study convergence process across the Kazakhstan regions over the period of 1993-2012.

Many authors stress the importance of convergence studies across countries and regions. For example, Barro and Sala-i-Martin (1992a, p.223) claim: "A key economic issue is whether poor countries or regions tend to grow faster than rich ones." Islam (2003, p.309) says that convergence is "a central issue around which the recent growth literature has evolved." The problem of convergence across regions of a country is important from both practical and theoretical points of view.

From the practical point of view, the study of convergence is important because of the need to elaborate a policy directed towards diminishing regional disparities in economic development (Sala-i-Martin 1996). It is widely accepted that in cases where regional economic disparities are chronic (e.g. per capita income and unemployment rate) harmful economic effects inevitably follow. These in turn have negative social and political consequences (Armstrong, Taylor 2000).

From the theoretical point of view, the notion of convergence was associated with the need to justify theories of economic growth. In general, it was believed that convergence was an outcome of the neoclassical theory of growth, while the later endogenous theories do not imply convergence and allow the regional per capita outputs to diverge (Islam 2003, Capolupo 1998). In other words, many researchers tried to use the convergence hypothesis as a means to distinguish between two main approaches to economic growth, namely, neoclassical and endogenous (Sala-i-Martin 1996). For example, Rebelo (1991) and Romer (1986) used the empirical fact of the lack of convergence across countries all over the world as evidence in favour of endogenous growth theories, in contrast to the neoclassical approach. On the other hand, Mankiw, Romer and Weil (1992) showed that the traditional neoclassical model, modified to include human capital accumulation along with physical capital, was perfectly adequate to predict convergence across countries provided that capital accumulation and population growth are constant. This model explains existing cross-country differences in income per capita rather well.

However, with the appearance of other endogenous growth models predicting convergence, its presence or absence ceased to serve as a criterion in favour of either neoclassical or endogenous growth models. Among these endogenous models are both the models that directly predict convergence (Nelson, Phelps 1966, Abramovitz 1986, King, Rebelo 1989, Jones, Manuelli 1990, Rebelo 1991, Tamura 1991) and models that can predict convergence depending on the values of some parameters (Romer 1986, de la Fuente 2002).

For the present time, from the methodological point of view, only the neoclassical approach provides an exact theoretical basis for the empirical study of convergence (Cavusoglu, Tebaldi 2006). Therefore, the theoretical motivation of this paper is to try to empirically confirm the predictions of neoclassical growth theory, in framework of which convergence across the Kazakhstan regions is studied.

Another interesting theoretical motivation of this paper is concerned with the transition type of Kazakhstan economy that is switching from the planned to market-based relations. Several empirical studies (Petrakos 2001, Iodchin 2007, Skryzhevska 2008) show that economic disparities across regions of transition countries tend to increase in contrast to developed economies. Therefore, it would be interesting to check whether the development of the Kazakhstan regions is similar to other transition countries with respect to the convergence/divergence issue.

Thus, the aim of this paper is to study two types of convergence across the Kazakhstan regions, namely σ - convergence and unconditional β - convergence.

The paper is structured as follows.

Section 2 introduces definitions of β- and σ- types of convergence and reviews empirical findings on them across countries and regions. Section 3 introduces the problem of the uneven development of Kazakhstan describing widening of its regional disparities. Section 4 studies σ-convergence across Kazakhstan regions. Section 6 tests unconditional β-convergence across Kazakhstan regions. Section 7 concludes

2. Literature review

2.1. Notions of β- and σ- convergence

When economies that are poorer in a given sample, tend to demonstrate a faster growth rates than richer ones, thus narrowing income differentials, then the economies of such a sample are said to demonstrate β-convergence, and vice versa, when richer countries or regions grow faster, thus increasing their lead, then there is β-divergence in this sample. This notion of convergence answers the question: "... how fast and to what extent the per capita income of a particular economy is likely to catch up to the average of per capita incomes across economies?" (Barro, Sala-i-Martin 1991, p.112).

The notion of β-convergence is divided into conditional and unconditional (absolute) types. The latter suggests that the determinants of the steady-state position are equal for all the economies under consideration, while the former takes into account differences in the steady-state and implies that proper variables need to be added to the regression equation. According to Islam (2003, p.314), "... from a conceptual point of view, the most important distinction is probably between conditional and unconditional convergence." This could be illustrated by an example with a possible policy of alignment of regional development. If in a sample, a rather high absolute convergence is observed, then there is no necessity for carrying out a regional policy, as the convergence process occurs by itself. The only necessary measures would become the actions for the smoothing of short-term fluctuations, because convergence by itself is a long-term process. In a case of slow absolute convergence, the policy of the government should be directed to the acceleration of the process, by elimination of initial distinctions in incomes per capita. In a case of conditional convergence, when regional disparities (considered by the government as undesirable) can exist for infinitely long, measures directed at smoothing of long-term regional development are necessary. These measures should have long-term character and influence fundamental factors of the economic development of regions.

While, the notion of β-convergence naturally follows from the neoclassical growth model, another type of convergence, namely σ-convergence, is not related ingenuously to any growth model. According to the view of some authors (Friedman 1992, Quah 1993, and others), the convergence should be tested directly by studying the dynamics of the dispersion of the growth rate and/or income level across economies, instead of indirect testing through the sign of the initial income variable in the regression equation. This approach to test the behaviour of across-economy disparities is closest to the intuitive notion of convergence. If it is studied in these terms, then the concept of σ-convergence appears where σ is an indication of standard deviation of the cross-sectional distribution of either growth rate or income level (Barro, Sala-i-Martin 1990, 1992a). When the dispersion of output levels or growth rates diminishes over time, then the process of σ-convergence takes place, and vice versa, when the dispersion grows over time the process of σ-divergence takes place.

However, some authors (Iodchin 2007) consider a wider definition of σ-convergence as a decrease in the time of the socio-economic differences across countries or regions. This gives flexibility in that both a large set of indicators of social and economic development of the regions, and their various numerical characteristics, including statistical measurements of inequality, can be used for the analysis of σ-convergence. As variables for studying σ-convergence, any social and economic indicators, usually used for the estimation of the development of a country or region, could be taken, including GRP or GDP, incomes and expenses of households, investments, levels of poverty, unemployment, crime, etc. The differences of these indicators across regions depend on what statistics are used to measure them. These could be dispersion, standard deviation, coefficient of variation, coefficients of concentration, skewness and kurtosis. The first three statistics represent the indicators of differentiation, which describe the spread of observations from an average. The fourth group describes the concentration of observations and includes the Gini index, quintile and decile coefficients, indexes of entropy. The fifth and sixth statistics show the degrees of deviation in a sampling distribution.

Besides, for the analysis of the dynamics of differentiation it is possible to use such simple descriptive statistics as the ratio of minimum and maximum values or their ratio to an average. It should be noted that these characteristics do not reflect the real spread of regions, but show only the amplitude of fluctuations, i.e. they do not concern differentiation.

In spite of the fact that the notion of σ-convergence is not related directly to any growth model, it is related to the notion of β-convergence as follows. It is obvious that β-convergence is a necessary condition for the σ-convergence because the disparities of initial income will grow boundlessly if the rich grows faster than the poor, i.e. if there is a β-divergence. However, Barro and Sala-i-Martin (2003) show that even if a group of economies demonstrates unconditional β-convergence, the dispersion of income per capita does not necessarily tend to decrease over time: that is, β-convergence is not a sufficient condition for the σ-convergence.

2.2. Convergence-Divergence Mechanisms and Theories of Economic Growth

The literature contains a number of different approaches to the problem of convergence and these can best be understood by starting with the mechanisms that underlie the process of convergence. De la Fuente (2002, p.3) finds that contrasting predictions on convergence rest on "... the very basic assumptions about the properties of the production technology at a given point in time and about the dynamics of technological progress”. These mechanisms determine convergence/divergence behaviour as follows.

1. The first mechanism of convergence across countries or regions is the existence of decreasing returns to scale on capital (this, in the broad sense, includes both physical and human capital). Decreasing returns on capital mean that income grows with decreasing rates as capital accumulates; that is, the marginal productivity of capital decreases with its accumulation. This reduces both the contribution to the growth of capital investments and the incentive to save. Therefore, growth tends to slow down over time. Countries with scarcer capital stock will grow faster than those with richer stock of capital because they enjoy larger returns from capital investments. An open economy assumption reinforces this result because the flows of mobile factors and international and/or inter-regional trade will further equalize the local product per worker and factor prices. If increasing returns to capital are assumed, then the opposite divergence process dominates. That is, rich countries or regions exhibit tendency to grow faster than poor economies and the disparity widens because the return on investments grows with the per worker capital stock.

2. The second factor determining the divergence or convergence tendency of income per capita or productivity level is a technological progress. The differences across countries or regions in the production or adoption of new technologies result in differences in long-term growth rates. As de la Fuente (2002) points out, technical progress can be either a divergence or convergence factor. If a model assumes diminishing returns on technological capital, then the technical efficiency levels tend to equalize gradually. On the other hand, if scientific or production experiences reduce the cost of additional innovations, the cross-country distinctions in technological levels will persist in the long-term. Abramovitz (1986) points out another possibility of technical progress to be a convergence factor. According to him, less advanced countries profit by the international dimension of the public good properties of technological knowledge, absorbing foreign technologies and adapting them to their own production processes. Followers “... do not have to reinvent each wheel” (de la Fuente 2002, p.4). Hence, they can grow faster than a technological leader because they do not have to find the necessary expenses for the development of new technologies. This mechanism could considerably influence the

convergence process, especially for industrialized countries capable of using the benefits gained from technological imitation.

3. In addition to the two main convergence mechanisms discussed above, de la Fuente (2002) points out a third factor, which is of great practical importance, though less relevant in theoretical models. This factor acts through the reallocation of productive forces across various sectors of an economy; in other words, through structural change. Poor countries have more possibilities to reallocate the flow of resources out of such a low output sector as agriculture (because typically they have a relatively large agricultural sector) into manufacturing or service sectors, which give more returns on investments. This process has been observed over the past few decades in countries like China, Taiwan, India, and so on. An earlier example is the USSR with its special "Program of Industrialization" launched in 1929. As a result of this initiative, the former agricultural country turned into an industrialized power and moved to second place in the world (after the US) in industrial production. Over the period 1930-1940 the USSR had the highest growth rate in the world.

It can be argued, however, that the third mechanism is a particular case of the first one. For example, Islam (2003, p.347) says that "… Changes in the sectoral composition usually find reflection in changes in capital intensity, so that the latter may subsume the former." In addition, the majority of convergence studies are based upon one-sector models in which structural changes are impermissible. Therefore, in this research, we will take into account only two main mechanisms of convergence: capital deepening and technological diffusion.

It follows that, taking into account the two main above-mentioned factors or mechanisms responsible for producing of either divergence or convergence patterns, the growth models can be divided into three groups with various predictions of the time frame of the income disparities among countries and regions.

In the first group of models which predict convergence of per capita income levels or growth rates, either the first or second factor acts. The main representative of this group is the traditional neoclassical growth model (Solow 1956, 1957), where physical capital accumulation results in convergence. Some endogenous growth models holding the property of diminishing returns to capital (King, Rebelo 1989, Jones, Manuelli 1990, Rebelo 1991) also belong to this group. The convergence predictions of other endogenous models belonging to this group stem from the second convergence factor, namely technological progress. In these models, this factor acts either through the "catching up effect" (Nelson, Phelps 1966, Abramovitz 1986) or human capital convergence (Tamura 1991).

In the second group of growth theories neither first nor second factor acts. They predict the increase of per capita income disparities across economies that cause divergence in the long-term. This group includes some models of endogenous growth based upon the increasing or constant returns assumption and models which incorporate a hypothesis of the endogenous property of the rate of technological progress. Among the main representatives of the models belonging to this group are:

- AK models (Harrod 1939, Domar 1946, Frankel 1962), in which divergence follows from the constant returns to scale assumption;

- R&D models (Spence 1976, Dixit, Stiglitz 1977, Ethier 1982, Romer 1987, 1990, Grossman, Helpman 1991, Aghion, Howitt 1992). In these models, divergence follows from the increasing returns property, which, in turn, follows from the accumulation of knowledge.

- Lucas model (Lucas 1988), in which divergence follows from increasing returns on human capital accumulation.

The third group of models predicts mixed convergence/divergence behaviour depending on the values of some parameters, which reflect the two main convergence factors described earlier. For example, the model of learning-by-doing (Arrow 1962, Sheshinski 1967, Romer 1986) predicts either convergence or divergence behaviour depending on whether or not the externalities from learning-by-doing are sufficient to offset the influence of diminishing returns. Another model with mixed predictions on the convergence / divergence issue is the model of De la Fuente (2002). In this model, the values of such parameters as the rates of investment in physical or human capital, R&D investments, and the speed of technological diffusion determine whether convergence takes place.

Cavusoglu and Tebaldi (2006) surveyed the empirical literature on economic growth evidencing in favour of convergence hypothesis. They grouped the papers according to the testing model or the type of convergence they studied. The conclusion was that empirical literature provides support to the neoclassical models and the conditional convergence hypothesis. At the same time, they found that the convergence predictions of the basic endogenous growth theories are not empirically confirmed. In addition, endogenous growth models do not provide a rigorous mathematical framework for the testing of convergence hypothesis. Therefore, in this research, an empirical work rests mainly upon the neoclassical growth model.

2.3. Empirics of β- and σ- convergence

The hypothesis of absolute or unconditional β-convergence receives mixed confirmations in the literature. There are several stylized empirical facts concerning unconditional β-convergence.

The first fact is, if a broad range of countries is considered, no absolute convergence across them is observed. Such examples can be found in (Baumol 1986) – for 72 countries for the period of 1950-1980 and (Barro, Sala-i-Martin 1992a) - for 98 countries for the period of 1960-1985.

The second fact is, if the consideration is focused on the groups of countries with similar economic characteristics, then there is a negative dependence of the rate of growth of the real per capita GDP on the level of the logarithm of this variable at the initial time point that confirms the hypothesis of unconditional β-convergence. Barro and Sala-i-Martin (1992a) found that if the consideration is limited to the 20 original OECD countries, then the correlation coefficient between the 1960 logarithm of the real per capita GDP and the average rate of growth of the real GDP per capita over the period of 1960-1985 is negative. In other words, the absolute convergence takes place across this sample.

As to the absolute convergence across the regions of the same country, the stylized fact in the literature is that regions of developed countries tend to demonstrate unconditional β-convergence behaviour. The main argument for this is that the differences in institutions, preferences, and technology among regions of the same country are certainly much smaller than among countries. This is because households and firms of various regions of a country share a common government, legal system, and institutional setup. In addition, they have similar traditions and culture and access to similar technologies. Another factor leading to the absolute convergence across regions is that inputs are more mobile across regions than across countries. Labour force and capital can move from one region to another much easier than among countries. Barro and Sala-i-Martin (1991) studying convergence across 73 Western Europe regions since 1950 found that these regions do demonstrate absolute convergence expressed in negative dependence between the average rate of growth of GDP per capita and the logarithm[1] of it at the initial year of the period. Barro and Sala-i-Martin (1992a) observe absolute convergence across the US states over the period of 1880-1988 with the convergence speed of about 2% per year. Barro and Sala-i-Martin (1992b) test the β-convergence pattern in terms of per capita income across 47 prefectures of Japan over the period of 1930-1990. They discovered that the average rate of growth of prefectural per capita income over 1930-1990 is negatively correlated with the logarithm of income per capita in 1930. In other words, absolute convergence exists across Japanese prefectures. The convergence speed is estimated to be about 2.8% per year.

However, several authors observed the opposite behaviour of the regions of some transition economies. For example Skryzhevska (2008) and Iodchin (2007) report of absolute β- divergence among regions of the Ukraine and Russia respectively. Petrakos (2001) studies convergence across regions of four former socialist countries of Poland, Hungary, Romania and Bulgaria and discovers that these countries also demonstrate absolute β-divergence. The explanation of this fact comes from the "... socialist regional policy of equality that was dominant during the Soviet time" (Skryzhevska 2008, p.3). This policy aimed to reduce economic disparities across regions, sometimes to the detriment of economic efficiency. Although the goal of this policy was not realized during the Soviet period, the cessation of the efforts in this direction due to the breaking up of the socialist system has led to the increase of regional inequality in these countries.

The empirics of σ-convergence is similar to the empirics of absolute β-convergence in that usually σ-convergence is observed across regions of developed countries (Barro, Sala-i-Martin 1991, 1992a, 2003), while regions of transition countries tend to demonstrate σ-divergence (Petrakos 2001, Iodchin 2007, Skryzhevska 2008, Shiltcin 2010). The empirical evidence of σ-convergence depends heavily on the considered sample. For example, Lee, Pesaran and Smith (1997) using direct methodology demonstrate that σ-convergence is valid for the OECD countries. However, for the larger sample of 102 countries they found that output variance had grown from 0.77 to 1.24 between 1961 and 1989.

3. Regional Disparities in Kazakhstan

The Republic of Kazakhstan became an independent state in 1991 after the break-up of the Soviet Union. It is a very large country, which spreads from the Caspian Sea and

[1] The use of logarithms of income or output per worker instead of functions per se is usual practice in convergence research because, on the one hand, it linearizes production function and, on the other hand, it does not distort results when the growth rate – initial level dependence is studied.

Volga steppes in the west to the Altay Mountains in the east, and from the West-Siberian lowlands in the north to the foothills of the Tien Shan Mountains in the south and southeast. It occupies an immense area of 2724.9 thousand square kilometres, which makes it the ninth biggest country in the world in size. Kazakhstan is located in the centre of the Eurasian continent, at the joint of two continents - Europe and Asia - and between the largest countries in the world, the Russian Federation and fast-growing China; in the neighbourhood of the states of Central Asia and the regions of the Near East and Southern Asia.

According to the data of Statistical Agency, there are 17 125 000 inhabitants in Kazakhstan (the fiftieth place in the world). However, the population density is only 6.28 people per square kilometre. In latter years, the country has developed a positive demographic dynamic because of a rise in population.

Figure 1: Oblasts of the Republic of Kazakhstan.

Source: Cartography – Lammert Bies

Politically, Kazakhstan is divided into 14 oblasts (equivalent to provinces in other countries). Each oblast is subdivided into rayons (districts) (Figure 1). Two large cities: Astana, the capital of the country, and Almaty, the former capital, enjoy special political status. Of the 14 oblasts of Kazakhstan, 12 are frontier regions.

An initial analysis of Kazakhstan regional disparities reveals that the gap between the richest and poorest regions has increased substantially.

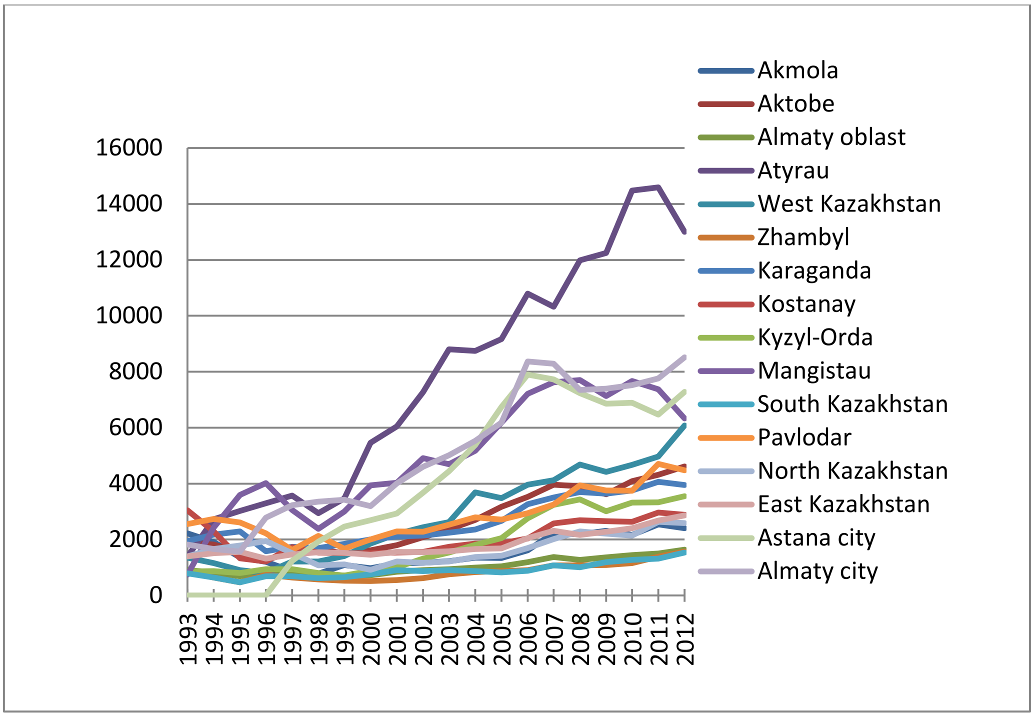

Figure 2: Real per capita GRP of Kazakhstan regions over the period of 1993-2012 (tenge in prices of 1993)

Source: Regions of Kazakhstan (1993-2012), author's calculation

The evolution of real per capita GRP of Kazakhstan regions over the period of 1993-2012 shown in Figure 2 indicates that the disparities are becoming larger. For example, real per capita GRP of Atyrau oblast has grown more than 9.35 times from 1390 tenge in 1993 to 12997 tenge in 2012. For the same period, the same indicator from the South Kazakhstan oblast shows growth of 1.92 times. These disparities were minor until the end of the 80s, when the economic system was not market-based and the country itself was part of the USSR, and began to grow from the moment economic reforms commenced to transform the economy on a market basis.

In 1993, the three poorest regions were Mangistau, South Kazakhstan, and Zhambyl with an average per capita GRP of 798 tenge. The three richest oblasts were Kostanay, Pavlodar, and Akmola with an average per capita GRP level of 2606 tenge, i.e. the difference between the three poorest and the three richest oblasts was 3.26 times per capita GRP on average.

By 2012, the three poorest oblasts were Almaty, Zhambyl, and South Kazakhstan with an average per capita GRP level of 1577 tenge in the prices of 1993. The three richest regions consisted of Atyrau oblast, the city of Almaty, and the city of Astana with an average of 9594 tenge per capita GRP at 1993 prices. The difference between three richest and three poorest regions has reached 6.08 times.

In 1993, the difference between the richest region (Kostanay oblast) and the poorest one (Mangistau oblast) was 4.08 times. By 2012, the situation changed considerably: the gap between the richest region (Atyrau oblast) and the poorest one (South Kazakhstan oblast) has grown 8.49 times.

The economic performance of some regions has changed dramatically since independence. In 1993, the Mangistau oblast was the poorest region in the country with respect to per capita GRP. However, in 2012, it took fourth place among the richest regions due to the intense development of the oil and gas industries. The real per capita GRP of Mangistau oblast increased 8.5 times from 745 tenge in 1993 to 6331 tenge in 2012 (in the constant prices of 1993). The performance was repeated by other oil and gas rich regions: Atyrau, West Kazakhstan, Aktobe, and Kyzyl-Orda (Table 1).

Table 1: Real per capita GRP of Kazakhstan regions in 1993 and 2012.

Position	Region	Real per capita GRP in 1993 (tenge)	Position	Region	Real per capita GRP in 2012*
1	Kostanay	3044.78	1	Atyrau	12997,50
2	Pavlodar	2550.38	2	Almaty city	8511,28
3	Akmola	2223.76	3	Astana city	7274,25
4	Karaganda	1943.69	4	Mangistau	6330,88
5	Aktobe	1906.37	5	West Kazakhstan	6073,31
6	Almaty city	1825.90	6	Aktobe	4611,66
7	North Kazakhstan	1400.89	7	Pavlodar	4472,24
8	East Kazakhstan	1400.58	8	Karaganda	3954,87
9	Atyrau	1390.05	9	Kyzyl-Orda	3548,43
10	West Kazakhstan	1349.27	10	Kostanay	2879,99
11	Almaty oblast	910.52	11	East Kazakhstan	2861,57
12	Kyzyl-Orda	854.83	12	North Kazakhstan	2583,18
13	Zhambyl	853.04	13	Akmola	2404,66
14	South Kazakhstan	796.76	14	Almaty oblast	1637,36
15	Mangistau	745.39	15	Zhambyl	1564,77
16	Astana city**	-	16	South Kazakhstan	1530,39

Notes: tenge, in constant prices of 1993.*
*** in 1993, the city of Astana was incorporated into Akmola oblast.*
Source: Regions of Kazakhstan (1993-2012), author's calculation

Conversely, in 1993 the Kostanay oblast was the best performing region in terms of per capita GRP. In 2012, it took only 10th place among 14 oblasts and two cities. The Akmola oblast, third place in per capita GRP in 1993, dropped to 13th position in 2012. The three leading regions of 1993 (Kostanay, Pavlodar and Akmola) gave up their pole positions to other regions (Atyrau, Almaty city, and Astana city).

The performance of the bottom three regions (Almaty oblast, Zhambyl oblast, and South Kazakhstan oblast) is characterized by considerable downshifting. While in 1993 they took respective 11th, 13th, and 14th positions at the bottom of the table, by 2012, their performances considerably declined, resulting in them occupying the last three places among 16 regions.

From a geographical perspective, the three worst performing regions in terms of GRP per capita are located in the south of the country, constituting with Kyzyl-Orda oblast a Southern Economical Region (Figure 1). The four best performing oblasts - Atyrau, Mangistau, West Kazakhstan, and Aktobe - are located in the west part of the country and constitute a Western Economical Region.

The average growth rates of real per capita GRP of Kazakhstan regions for the period of 1994-2012, displayed in Figure 3, vary significantly. For example, the indicator for the Kostanay oblast is 1.26% per year while in the Mangistau oblast it is equal to 18.51% per year. There are four regions with low average growth rates: Kostanay oblast at 1.26% per year; Akmola oblast at 2.05% per year; Zhambyl oblast at 4.77% per year; and East Kazakhstan oblast at 4.13% per year. At the same time, there are regions with very high average growth rates of per capita GRP: Mangistau oblast at 18.51% per year; Atyrau oblast at 14.64% per year; Astana city at 13.65% per year; Almaty city at 9.86% per year; Kyzyl-Orda oblast at 8.66% per year; West Kazakhstan oblast at 9.67% per year.

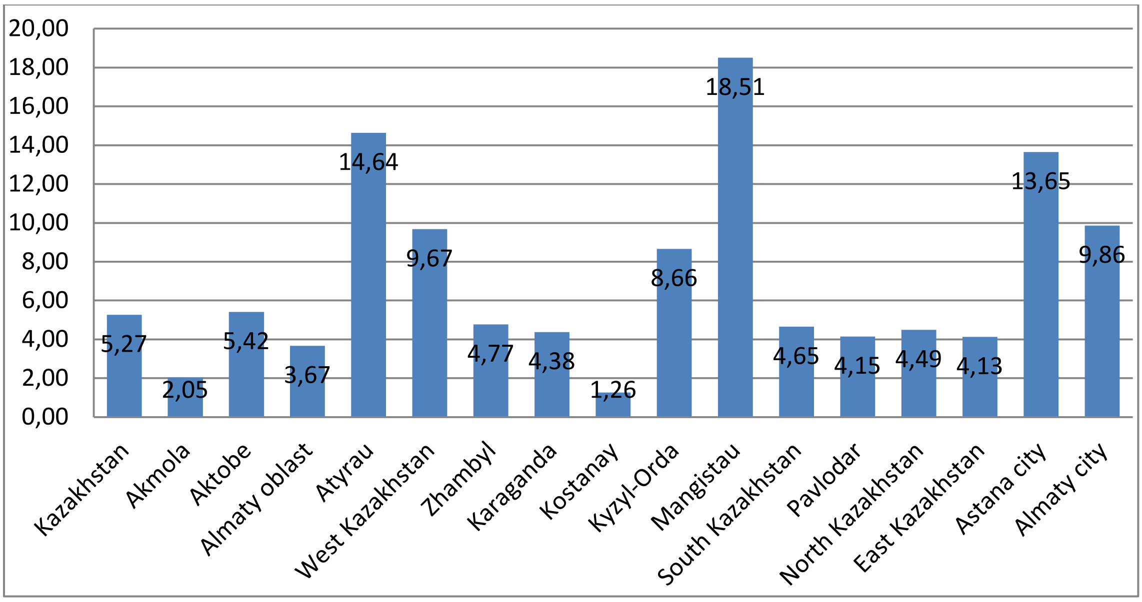

Figure 3: Average growth rates of real per capita GRP of Kazakhstan regions over 1994-2012 (% per year)
Source: Regions of Kazakhstan (1993-2012), author's calculation

4. Sigma Convergence across Kazakhstan Regions

4.1. The Model

In this paper, in order to study σ-convergence across the Kazakhstan regions, we will use standard deviation and coefficient of variation as measures of differentiation. Both these variables are based on the dispersion, which being the second central moment shows the spread of an indicator around an average:

$$D(X) = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

The standard deviation is a square root of the dispersion:

$$\sigma(X) = \sqrt{D(X)} \qquad (1)$$

It has the same dimension as a considered variable. The coefficient of variation is calculated based on the standard deviation and has no dimension. That is, it possesses similar informativity allowing to compare different indicators. In the simplest case the variation coefficient is the ratio of the standard deviation $\sigma(X)$ to the mean $\mu(X)$:

$$C_v = \frac{\sigma(X)}{\mu(X)} \qquad (2)$$

The variation coefficient has an essential advantage with respect to the dispersion and standard deviation, which are of limited use in the analysis of differentiation. Their drawback is the presence of dimension and dependence on a scale that does not allow comparison of indicators having different units of measure.

Islam (2003) distinguishes two methodologies for empirically testing σ-convergence across countries or regions. The first one is a direct approach, which consists of computing the variance of the cross-section distribution of the logarithm of per capita income of the economies included in a sample and plotting it against time (Lee et al. 1997). A similar approach was developed by Danny Quah (1996a, 1996b) which focused not only on the variance of the cross-section distribution, but also on the evolution of the entire shape of distribution.

The second approach is to formulate a statistical test for σ-convergence using the knowledge that the speed of β-convergence and dispersion of the logarithm of per capita income are algebraically related (Lichtenberg 1994, Carree, Klomp 1997).

In this paper, we use a direct approach plotting against the time of the standard deviation of the logarithm of real per capita GRP and coefficient of variation of real per capita GRP of the cross-section distribution of Kazakhstan regions: this method is simple, visual, and demonstrative.

Afterwards, in order to reveal a relationship between σ-convergence and the economic growth of the country, we attempt to discover a link between the level of differentiation across Kazakhstan regions, expressed by either standard deviation or coefficient of variation of the logarithm of real per capita GRP, and an aggregate trend of economic dynamics of the whole country, expressed by the growth rate of the total real per capita GRP. In order to check the statistical relationship between these variables, we use the following regression equation.

$$Dif_t = aI_t + b + u_t,\ t = 1994, \dots, 2012 \qquad (3)$$

where Dif_t is either the standard deviation (σ_t) or coefficient of variation (C_v) of the logarithm of real per capita GRP across Kazakhstan regions in year t, I_t is the growth rate of the total real per capita GDP of the country, b is a constant term u_t is the disturbance term.

4.2. Data

Data of the nominal gross regional product of oblasts since 1993 is taken from the Regions of Kazakhstan statistical issue (1993-2012a). This indicator measures factor incomes derived from production within a region. Barro and Sala-i-Martin (1992a) stress that GRP figures represent the income accruing to factors from the goods and services produced within a region. Then, we deflate the nominal figures by the aggregate GDP deflator available from the Statistical Yearbook of Kazakhstan (1993-2012b). Since we use a common deflator for each region at a point in time, potential measurement errors can occur. After dividing this data with the size of the population of corresponding regions, we obtain a sampling of the real per capita GRP across the Kazakhstan regions (Appendix Table A1).

4.3. Results

At first, we calculate the time-series of the standard deviation of the GRP across Kazakhstan regions over the period of 1993-2012 using equation (1) and plot them against time. Figure 4 shows the time path of the standard deviation of relative gross regional product per capita (defined as a logarithm of per capita GRP measured in deviations from its inter-regional average) of Kazakhstan regions over the period of 1993-2012. The case of the Kazakhstan regions shows a contradiction with what is reported in most available regional samples of developed countries (de la Fuente 2002, Barro, Sala-i-Martin 2003), but conforms to the experience of the regions of transition countries (Petrakos 2001, Iodchin 2007, Skryzhevska 2008).

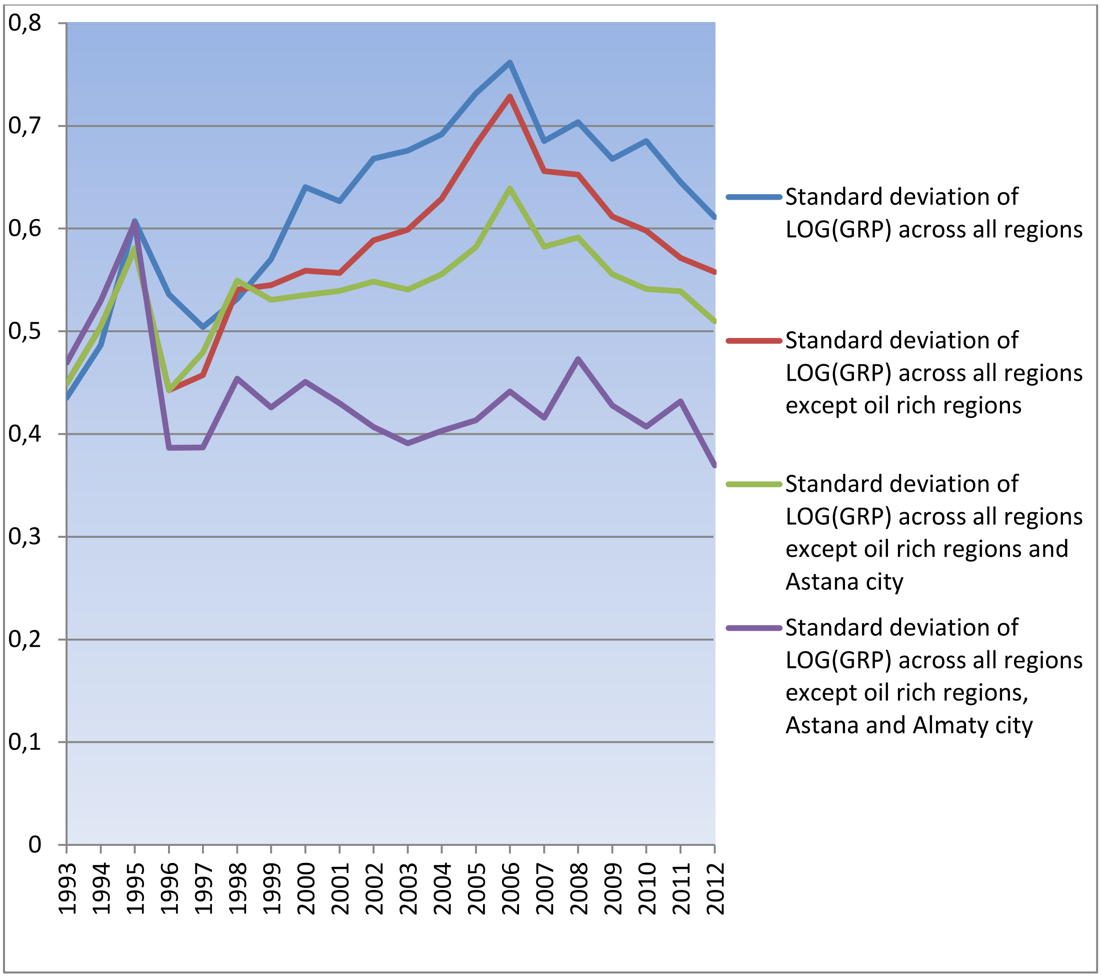

Figure 4: σ-convergence across Kazakhstan regions over the period of 1993-2012 in terms of standard deviation

Over the period as a whole, across all 16 regions, the standard deviation of logarithm of real per capita GRP has grown by approximately 48%. Therefore, the pattern of σ-convergence across Kazakhstan regions rather can be called σ-divergence. However, there were five convergence sub-periods (1995-1997, 2000-2001, 2006-2007, 2008-2009, and 2010-2012), when the level of inequality fell insignificantly (Figure 4, blue curve). Considering general tendencies there are a long period of σ-divergence (1997-2006) and a long period of σ-convergence (2006-2012). The level of inequality of Kazakhstan regions measured as the standard deviation of logarithm of real per capita GRP reaches its maximum in 2006.

The growth of inequality across the Kazakhstan regions can be explained by several reasons. The first is the rise of oil prices over the observed period. If the oil-rich oblasts (Aktobe, Atyrau, Kyzyl-Orda, West Kazakhstan and Mangistau) are excluded from the sample, the curve becomes more flat, but still growing. Despite the exclusion of these untypical regions, the standard deviation has grown approximately by 26.5% (Figure 4, red curve).

The second reason is the shock related to the movement of the capital to the city of Astana. It is an extraordinary case because a huge amount of government resources has been spent on the construction of new administrative, educational, and cultural infrastructures over the last 16 years. If we exclude Astana and the oil rich regions from the sample, the time path of standard deviation expressed by the green line exhibits more moderate growth (13.5%). The inclination of the curve is not so abrupt, but the tendency remains the same as before. The rest of regions of Kazakhstan demonstrate σ-divergence over the period of 1993-2012 ((Figure 4, green curve).

In addition to Astana and the oil-rich regions, the exclusion of Almaty city from consideration, changes the behaviour of a standard deviation of logarithm of real per capita GRP. It now decreases over the period by 21.3% indicating σ-convergence across the remaining eight regions ((Figure 4, purple curve). Almaty city is the former capital of the country, and is still a centre of economic activity for the whole country. Its economy has been characterized by impressive growth over the last 20 years.

There are examples in the literature of similar σ-divergence patterns over periods characterized by external or internal shocks such as oil prices or demand for agriculture production. For example, across US states in the period 1920-1930, or across Spanish regions in the period 1960-1964 and 1980-1983 (de la Fuente 2002).

Another reason of the observed σ-divergence across the regions of Kazakhstan is the transition period from a planned Soviet economy to a market-based one. This σ-divergence behaviour is similar to the behaviour of regions of such transition countries as Poland, Hungary, Romania and Bulgaria (Petrakos 2001), Russia (Iodchin 2007), and Ukraine (Skryzhevska 2008).

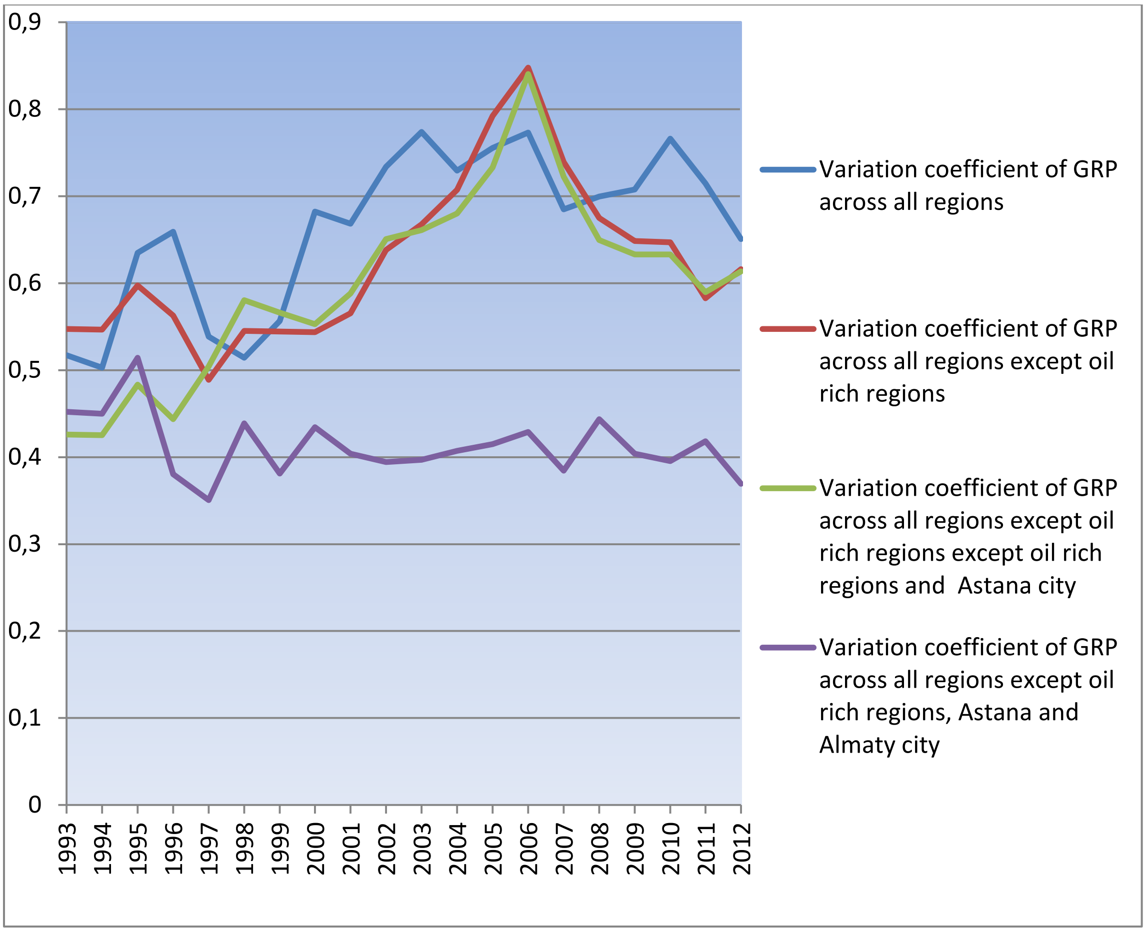

Figure 5: σ-convergence across Kazakhstan regions over the period of 1993-2009 in terms of coefficient of variation

We shall go on to use the coefficient of variation of the real per capita GRP across the Kazakhstan regions as a measure of regional differentiation according to equation (2) in order to study σ-convergence. Plotting it against time, we observe almost the same picture (Figure 5). Again, over the period as a whole and across all regions, the variation coefficient has grown (by 29%). When we exclude oil-rich regions and the city of Astana from the sample, the variation coefficient is still growing (up to 13% and 44% respectively). If we additionally exclude the city of Almaty, the coefficient of variation falls by 18%.

As for the relationship between σ-convergence and the economic growth of the country, the results of the regression of equation (3) are presented in Table 2. As can be seen from the first line of the table, the relationship between the standard deviation of the logarithm of real per capita GRP across Kazakhstan regions and the growth rate of real per capita GRP of the country is positive and significant at 1% confidence level. The similar result is shown in the second row of the table, which presents the results of the regression of the same equation with the coefficient of variation taken as a dependent variable. Again, the estimate of the coefficient of the independent variable is positive and significant at 1% confidence level.

Table 2: Linear regression of the σ-convergence on the growth rate of real per capita GDP of the country

Dependent variable	a				b				
	Estimate	St. error	t-value	Sig.	Estimate	Standard error	t-value	Sig.	Adj R^2
Standard deviation across all regions (1993-2012)	0.009	0.002	4.921	0.000	0.588	0.015	39.234	0.000	0.550
Coefficient of variation across all regions (1993-2012)	0.010	0.002	4.927	0.000	0.646	0.016	40.202	0.000	0.551

This means that higher growth rates of real per capita GDP in the country are associated with higher levels of inequality. A similar result was obtained by Petrakos and Saratsis (2000) for Greek regions over the period of 1970-1995, Petrakos, Rodríguez-Pose, et al. (2003) for European regions of several EU countries over the period of 1981-1997, Shiltcin (2010) for the Russian regions over the period of 1998-2007, and others. This phenomenon is discussed in details by Petrakos, Rodríguez-Pose, et al. (2003) who suggested "... an alternative dynamic framework" (p.1) for the study of convergence across some European regions, using an econometric equation connecting inequality with growth rates, levels of GDP, and the measure of integration into the European Union. They found that both long-term convergence and short-term divergence processes coexist, and described a pro-cyclical pattern of regional inequalities. The reason is that "... dynamic and developed regions grow faster in periods of expansion and slower in periods of recession" (p.1). In other words, growth impulses are realized mainly at the expense of more economically developed and productive regions, which are more capable to exploit their advantages and increase the gap between them and less productive regions. Berry (1988) argues that the deepening or lessening of regional disparities depends on whether a country is in a growing or recession phase of the economic cycle. This opinion that directly links high growth rates with increasing economic disparity is in accordance with Myrdal's (1957) reasoning of the spatially cumulative nature of growth and the argument of the influence of agglomeration economies on the regional allocation of resources (Krugman 1991, 1993). A logical basis for this statement is that a new cycle of economic expansion begins in more developed regions, where the combination of the effects of agglomeration and the size of market promote an advantage over other regions. These effects could be connected to the higher quality of human capital, the R&D activities in a region, the links between science and industry, the inter- and intra- sectoral interactions among firms and so on (Petrakos et al. 2003).

5. Unconditional β-Convergence across Kazakhstan Regions.

5.1. The Model

The next step to study convergence across the Kazakhstan regions is to test the hypothesis of β-convergence. As discussed earlier, the latter can be either unconditional (absolute) or conditional. In this paper we shall study the unconditional β-convergence.

We deal with the neoclassical model of Solow and Swan (Solow 1956, Swan 1956) because, on the one hand, it gives all the necessary theoretical material for the empirical study of convergence, and, on the other hand, it is sufficiently simple to understand and use. This model assumes an exogenous technological progress and considers saving as constant and given exogenously. It should be noticed that Cass (1965) and Koopmans (1965), inspired by the work of Ramsey (1928), introduced the endogenous behaviour of the saving rate into the neoclassical model. However, this model is similar to the Solow-Swan model since it predicts convergence in terms of growth rates, which is conditional on an economy's steady state position determinants.

In order to study convergence across the Kazakhstan regions we assume that the economies submit to the neoclassical growth model of the Cobb-Douglas type with labour augmenting technological progress (Harrod 1942):

$$Y(t) = K(t)^{\alpha}(A(t)L(t))^{1-\alpha},\ \dot{A}(t) \geq 0 \tag{4}$$

where $Y(t)$ is the real output, $K(t)$ is the stock of capital, $L(t)$ is the stock of labour force, α and $(1-\alpha)$ are the elasticities of capital and labour with respect to output $(0 < \alpha < 1)$, and $A(t)$ is the technology term which grows at the constant rate x:

$$A(t) = A_0 e^{xt} \tag{5}$$

The neoclassical model with technical progress allows the possibility of a steady growth in output per worker in the long-term. Moreover, Barro and Sala-i-Martin (2003) present the proof of the result that only labour augmenting technological progress turns out to be compatible with the existence of the steady state (the steady state is by definition a situation when various quantities grow at a constant rate).

In the framework of the neoclassical growth model, we use the equation employed by Barro and Sala-i-Martin (1992a), which produces the following relationship between output per capita $y_{i,t}$ of i-th region at the time $t_0 + T$ and the steady-state value y^*:

$$\frac{1}{T}\log\frac{y_{i,t_0+T}}{y_{i,t_0}} = x + \left(\frac{1-e^{-\beta T}}{T}\right)\log\frac{y^*}{y_{t_0}} + u_{i,t} \tag{6}$$

where x is the rate of technological progress (the model assumes an exogenous labour augmenting technological progress expressed by equation (5)), $u_{i,t}$ is a disturbance term. Here

$$\beta = (1-\alpha)(x+n+\delta) \tag{7}$$

where s is a saving rate, n is a growth rate of population, δ is a capital depreciation rate (Barro, Sala-i-Martin 2003).

The coefficient β determines the speed of convergence of the output to its steady-state position y^*. It gave the common name β*-convergence* to both above-mentioned terms of absolute and conditional convergence (Barro, Sala-i-Martin 1990). This type of convergence takes place if $\beta > 0$. For example, the value $\beta = 0.05$ means that the gap between y and y^* vanishes at the rate of five per cent per year.

Under the assumption of constant values for x and y^* across regions (Barro, Sala-i-Martin 1992a) the average rate of growth of real per capita GRP over the interval between two points in time, t_0 and $t_0 + T$, is given by the equation:

$$\frac{1}{T}\log\frac{y_{i,t_0+T}}{y_{i,t_0}} = A\log y_{i,t_0} + B + u_{i,t_0,t_0+T} \tag{8}$$

where $A = -(\frac{1-e^{-\beta T}}{T})$, $B = x + \left(\frac{1-e^{-\beta T}}{T}\right)(\log y^* + xt_0)$, u_{i,t_0,t_0+T}. is a distributed lag of the error terms $u_{i,t}$ between the dates t_0 and $t_0 + T$. The constant term B, which is assumed to be independent of i, shifts because of the trend in technology with a change in the starting date t_0. The factor A of $\log y_{i,t_0}$ declines in magnitude with the length of the interval T for a given value of β. It means that in the linear regression estimation the coefficient is predicted to be the smaller the longer the time interval over which the growth rate is averaged. This is because the growth rate declines as income increases, i.e. the influence of the initial position of income on the average rate of growth declines as the time interval increases.

Thus, in order to test the hypothesis of unconditional β-convergence it is necessary to estimate the coefficient A in equation (8) in order to check whether the growth rate of the per capita GRP is inversely related to its initial value.

The speed of convergence β can be calculated either directly (Barro, Sala-i-Martin 1992a) from equation (8) using nonlinear least squares regression or indirectly (Paas et al. 2007) getting estimates of A and B from equation (8) by means of the ordinary least squares regressions and calculating the estimates of the rate of convergence β as follows:

$$\beta = -\frac{1}{T}\ln(1 + AT) \tag{9}$$

As the estimation results with respect to values and the significance of the speed of convergence and other coefficients are almost identical in the case of Kazakhstan regions, further, we use linear least squares regression approach and calculate the speed of convergence β from equation (9).

5.2. Data

We use the data of the real per capita gross regional product y_{it} for a cross section of 14 Kazakhstan regions (oblasts) and two node cities (Astana and Almaty) over the period of 1993-2012 (Appendix Table A1). Following Alshanov (2011), Sabden (2011) and others, we divide this time span into two sub periods: 1993-2000 and 2000-2012.

The first sub-period can be called a transition period from the planned to the market-based economy, accompanied by the redistribution of property and structural reorganization. During it, the legislative base for market relations was established, macroeconomic stability was provided, and privatization of the majority of state enterprises was finished. Due to the structural reorganization of the Kazakhstan economy and the Asian financial crisis of 1997-1998, this sub period is characterized by low rates of economic growth both for the country as a whole and in most regions. Seven regions out of sixteen demonstrated negative average growth rates over this period (Table 3). At the same time, such oil-rich regions as Atyrau, West Kazakhstan, and Mangistau showed very high growth rates of real per capita GRP over this period (Mangistau – 42.37%; Atyrau – 26.04%; West Kazakhstan – 7.4%). The two capitals, Astana and Almaty, are also among leaders in economic development (Astana - 31%, Almaty – 11.14%).

The second period of 2000-2012 is much more economically successful for the Kazakhstan regions. It is characterized by stable and rapid economic development in all regions of the country. Average growth rates of regions vary from 5.22% to 13.83% per year (Table 3). The average growth rate of the country is equal to 8% per year. However, due to the world economic crisis of 2008, the growth rate of the country made up 3.3% in 2008 and 1.2% in 2009.

Table 3: Average growth rates of real per capita GRP of Kazakhstan regions

Region	Average growth rate of real per capita GRP over the period of 1993-2000	Average growth rate of real per capita GRP over the period of 2000-2012
Kazakhstan	0.69	8,00
Akmola	-8.99	7,03
Aktobe	-1.40	9,22
Almaty oblast	-2.37	6,84
Atyrau	26.04	11,78
West Kazakhstan	7.40	12,60
Zhambyl	-4.05	8,96
Karaganda	1.59	6,24
Kostanay	-6.51	5,37
Kyzyl-Orda	1.33	13,83
Mangistau	42.37	6,63
South Kazakhstan	1.57	7,16
Pavlodar	-1.33	8,34
North Kazakhstan	-4.35	7,52
East Kazakhstan	0.83	5,22
Astana city	31.00	9,31
Almaty city	11.14	7,92

Source: Regions of Kazakhstan (1993-2012), author's calculation

Thus, we study β-convergence across Kazakhstan regions over three periods: 1993-2012, 1993-2000, and 2000-2012.

5.3. Results

Table 4 contains the results of the linear least squares regressions in the form of equation (8) for the 14 Kazakhstan regions and the cities of Astana and Almaty. The rate of convergence β is computed using equation (9).

Table 4: Absolute β-convergence across Kazakhstan regions

Sample	A				B					
	Estimate	St. error	t-value	Sig.	Estimate	Standard error	t-value	Sig.	Rate of convergence β	Adj R^2
All regions 1993-2012	-.033	.018	-1.839	.087	.289	.131	2.202	.045	.052	.137
All regions 1993-2000	-.088	.056	-1.576	.137	.654	.406	1.610	.130	.137	.090
All regions 2000-2012	-.009	.008	-1.169	.262	.139	.055	2.513	.025	.009	.024

The regression results presented in Table 4 do not confirm the hypothesis of absolute β-convergence across the Kazakhstan regions over any of the three sub-periods under consideration. The coefficient of initial level of per capita GRP is never statistically significantly different from zero, although it is negative in all the regressions.

Thus, the Kazakhstan regions considered altogether do not demonstrate the unconditional β-convergence over the sub-periods of 1993-2012, 1993-2000, and 2000-2012. These results contradict what is observed in the literature concerning absolute β-convergence across regions of the developed countries (Sala-i-Martin 1996), but are similar to the lack of absolute β-convergence across regions of transition countries (Petrakos 2001, Iodchin 2007, Skryzhevska 2008). Moreover, they do not contradict the predictions of the neoclassical growth model, which supposes the convergence of each region towards its own steady state position. The statistical insignificance of regression coefficients could be caused by the considerable differences in steady state positions across the Kazakhstan regions. Therefore, to explain fully the convergence behaviour of the Kazakhstan regions we need to control some variables responsible for these differences, i.e. to study conditional β-convergence across Kazakhstan regions. We leave this to future research.

6. Conclusion

The study of σ-convergence across the Kazakhstan regions showed that, in spite of several short sub-periods of σ-convergence, the regions of Kazakhstan demonstrated divergence in terms of both standard deviation and coefficient of variation of the logarithm of real per capita GRP, over the period of 1993-2012. In addition, the regression analysis revealed a positive and significant relationship between the cross-regional differentiation, expressed by either standard deviation or coefficient of variation, and the growth rate of the real per capita GRP of the country. That means that the higher the growth rates, the higher the differentiation across regions.

This phenomenon has both theoretical and practical implications. From the theoretical point of view, it confirms a hypothesis of Petrakos, Rodríguez-Pose, et al. (2003) that along with the long-term convergence tendency predicted by the neoclassical growth model and realised by the diminishing returns of capital, there is a short-to-medium-term divergence tendency, caused by the agglomeration economies. However, the issue of the relative prevalence of these opposite tendencies is still unclear and needs further research.

The phenomenon is also important from the policy-making point of view. It means that economic growth is not the main driver for decreasing regional disparities, which "have a pro-cyclical character and tend to increase in periods of economic expansion" (p.20). A positive relation between economic growth and regional disparities means that the former will inevitably generate the latter no matter what other factors may influence the evolution of regional inequality. So regional policy directed towards diminishing of regional inequalities should be permanent and be provided with a sufficient budget. It could be said that regional inequality is some sort of "price" for economic growth, which should be paid in the form of regional policy.

As to the absolute β-convergence, the analysis revealed that the Kazakhstan regions considered together do not demonstrate unconditional β-convergence over the sub-periods of 1993-2009, 1993-2000, and 2000-2009.

These results conform to the similar results of σ- and absolute β- divergence across regions of transition countries (Petrakos 2001, Iodchin 2007, Skryzhevska 2008, Shiltcin 2010) and do not contradict the predictions of the neoclassical growth model, which supposes convergence of each region towards its own steady state position.

This behaviour is caused by significant differences in steady state positions that in their turn are determined by differences in saving rate, population growth and other determinants of economic growth. For the government this means that convergence in Kazakhstan is not per se a process that accompanies economic development and that a strong regional policy directed towards the equalization of the steady state positions of the Kazakhstan regions is needed. Due to the revealed positive relationship between economic growth and inequality, this policy should be complicated, in order to reduce economic disparities and preserve high rates of economic growth.

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Appendix

Table A1: Real per Capita GRP of Kazakhstan Regions.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Akmola	2223,76	1915,33	1365,76	1206,61	871,45	774,87	1089,44	975,50	1149,64	1173,05	1225,18	1346,88	1345,60	1609,34	2230,77	2192,57	2312,65	2164,46	2544,62	2404,66
Aktobe	1906,37	1819,55	1545,75	1256,40	1573,53	1662,71	1503,46	1611,42	1802,02	2085,67	2362,77	2705,06	3167,58	3523,93	3959,19	3905,45	3621,12	4088,06	4320,63	4611,66
Almaty oblast	910,52	823,06	688,91	871,73	869,32	771,14	707,27	725,75	849,67	899,81	944,25	992,09	1043,03	1194,98	1375,21	1273,29	1364,01	1442,83	1501,09	1637,32
Atyrau	1390,05	2729,62	3023,49	3296,23	3567,00	2937,28	3473,56	5464,16	6042,99	7267,52	8807,54	8740,11	9168,19	10788,19	10325,96	11980,61	12247,37	14476,53	14596,16	12997,50
West Kazakhstan	1349,27	1158,35	900,17	805,31	1215,99	1209,04	1409,29	1857,44	2193,74	2433,72	2620,54	3688,26	3482,65	3964,43	4119,55	4684,39	4414,95	4669,46	4968,04	6073,31
Zhambyl	853,04	646,69	473,62	745,35	643,30	575,87	529,85	515,98	550,25	616,61	759,12	837,01	865,80	902,68	1073,29	1079,10	1092,50	1155,49	1381,13	1564,77
Karaganda	1943,69	2180,73	2287,31	1582,70	1739,17	1699,86	1838,24	2005,50	2102,52	2145,44	2246,06	2357,84	2667,35	3264,86	3498,82	3699,44	3645,59	3751,11	4059,96	3954,86
Kostanay	3044,78	2294,52	1330,90	1209,59	1725,94	1531,62	1507,63	1512,71	1540,53	1562,65	1736,26	1850,65	1864,95	2039,18	2571,64	2694,90	2654,47	2632,27	2968,82	2879,99
Kyzyl-Orda	854,83	875,74	807,90	937,06	940,28	799,71	709,16	883,30	1007,72	1318,35	1538,58	1812,09	2048,72	2758,39	3243,01	3428,98	3016,20	3321,70	3337,26	3548,43
Mangistau	745,39	2428,09	3591,62	4013,57	3051,97	2386,17	3001,21	3937,80	4032,97	4909,79	4697,92	5173,44	6186,83	7209,52	7620,86	7700,67	7135,66	7671,59	7376,37	6330,88
South Kazakhstan	796,76	636,88	474,79	682,61	686,35	616,55	657,64	760,82	906,52	873,68	907,96	867,87	830,38	879,38	1076,74	1007,15	1193,59	1271,36	1321,85	1530,39
Pavlodar	2550,38	2740,44	2607,12	2219,13	1625,78	2135,12	1666,62	2005,91	2294,72	2273,62	2526,82	2794,95	2710,38	2940,93	3254,16	3940,20	3755,03	3745,69	4700,52	4472,24
North Kazakhstan	1400,89	1664,50	1790,54	1951,25	1511,85	1075,84	1113,83	913,43	1213,72	1170,44	1216,69	1380,31	1424,30	1698,50	2010,63	2287,43	2207,09	2146,04	2631,16	2583,18
East Kazakhstan	1400,58	1514,41	1553,66	1322,65	1463,67	1548,65	1522,09	1449,25	1558,84	1552,07	1579,09	1660,41	1685,08	2046,66	2317,65	2160,84	2279,14	2410,35	2677,63	2861,57
Astana city	0,00	0,00	0,00	0,00	1235,35	1921,62	2465,12	2690,89	2928,86	3669,88	4446,15	5378,63	6737,01	7897,23	7722,48	7237,81	6852,50	6891,94	6471,07	7274,25
Almaty city	1825,90	1661,22	1571,68	2779,52	3224,70	3357,55	3418,16	3199,52	4011,10	4603,84	5016,74	5528,28	6182,96	8368,32	8289,28	7345,14	7395,66	7517,41	7764,54	8511,28

Notes: Tenge in constant prices of 1993.
Source: Regions of Kazakhstan (1993-2009), author's calculatio