The wiiw Balkan Observatory

Working Papers|102| December 2012

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Effects of Crisis on Income and Poverty:
The Case of Kazakhstan

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Final Report

Effects of Crisis on Income and Poverty: The Case of Kazakhstan

Research area: **Microeconomic effects**: Effects of crisis on income and poverty[1]

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Abstract

This study investigates the effects of growth and crisis on poverty and distribution of consumption expenditures in Kazakhstan. Considerations include application and estimation of decomposed changes in poverty on components of growth and distribution. A comparison of the determinants for of vulnerability to impoverished households encompasses of prosperity and financial crisis during 2007 and 2009. This study evaluates the dynamics of changes in consumption patterns of households, along with the effects of Anti-Crisis policies implemented by the government of Kazakhstan.

1. Introduction and motivation

Many researchers analyzed the causes and consequences of the financial crisis of 2007-2009 and compare them with those of other economic crises, such as the Great Depression, the Asian crisis, and the Russian crisis in 1998. Also, the impact of the crisis on poverty and income distribution is a crucial issue for developing countries(Ravallion , 2008).

The majority of developing countries experienced high rates of economic growth in the period, 2001 to 2007 with substantial improvements in indicators of poverty, but with different dynamics for distribution of income. The Commonwealth of Independent States (CIS) represent different influences on economic indicators from crises and various solutions for recovery; therefore, Kazakhstan, and an example, a useful case for study.

After the collapse of the Soviet Union, Kazakhstan transitioned from a planned economy to a market-oriented economy, but due to the dissolution of economic links with other Republics of the former Soviet Union, the economy experienced a deep recession. At that time, the growth rates of real GDP decreased sharply as shown in Figure 1. Subsequently, poverty became an important social issue in Kazakhstan during the transition period in the 1990s. All sectors of the economy experienced a decline in production except domestic trade. All these factors affected poverty and economic inequality of income, which were not equally low prior to the beginning of transition. Headcount indexes, Gini coefficients, and other indicators of poverty and inequality of income rapidly increased. The following Figure1 shows these trends in GDP decline and an increase of poverty rates.

Figure 1 Real GDP Growth Rates and Headcount Indexes for Poverty[2] in Kazakhstan, 1991-2010
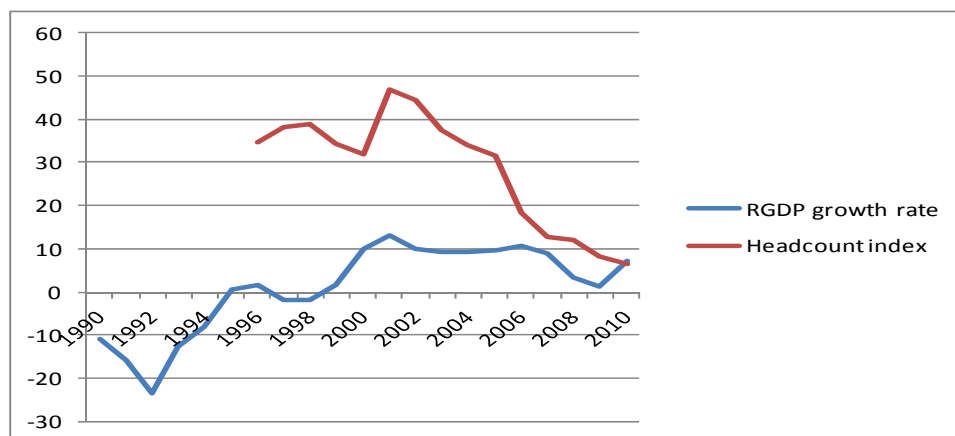
Source: Created from data of the Agency of Statistics of the Republic of Kazakhstan (ASRK)

Tight monetary policy applied by the National Bank of Kazakhstan reduced the inflation rate; reforms in pension system after 1998 decreased arrears for obligations. A rapid devaluation of the national currency in 1999 and favorable increases in world prices for crude oil and wheat, the main exports, improved the economic situation. Real GDP began to grow and in the average growth rates

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[2]   Headcount index of poverty is the share of the population whose income or consumption is below the poverty line, based on a level for minimum subsistence calculated from the cost of a basket of food and expenditures for other basic necessities.

reached 10% of Real GDP and poverty declined (see Figure 1). Beginning in 2000 and through 2005 two State Programs[3] targeted reduction in poverty. The two programs, the State program on struggle against poverty of 2000-2002 and the State program of poverty reduction for 2003-2005, had total expenditures of 610 billion Kazakhstani Tenge[4] (KZT), equivalent to approximately 4.55 billion USD. As a result of these programs the poverty indicators declined sharply during this period.

The dominant economic influence was the rising prices for exported energy in Kazakhstan from 1999 to 2008. The oil exports were especially important for the country whose major Caspian oilfields' production produced large amounts of oil, as a result of opening the first independent pipeline through Russia in 2001(Caspian Pipeline Consortium connecting Kazakhstan oil field Tengiz with oil terminal on the Black Sea near the port Novorossiysk) and construction of a new pipeline from the oil rich western part of Kazakhstan to China in 2010 (Atasu-Alashankou and Kenkiyak-Kumkol pipelines). Also the Trans-Caspian system consists of oil-discharge terminals on the Kazakhstan coast of the Caspian Sea, tankers and vessels, oil-discharge terminals on the Azerbaijan coast of the Caspian Sea, and connecting facilities to the oil pipeline system "Baku-Tbilisi-Ceyhan"(http://www.kmg.kz/en/manufacturing/oil/kkst/).Thus Kazakhstan benefited from both higher quantity, higher prices, and a strengthened position for negotiating transit fees.

The Global Financial Crisis began to affect the economy of Kazakhstan in August 2007, and initially, financial and construction sectors suffered. The banking sector had accumulated large external foreign debt, amount to 44 % of GDP. In contrast external debt of the public sector amounted to only 2% of GDP in 2007 (National Bank of Kazakhstan[5]). The consequences of these problems are substantial decline in lending from commercial banks to non-oil sectors of the economy. The companies in the construction sector depended heavily on loans and inflating prices for real estate, faced stagnation, and bankruptcy. But due to favorable world prices for oil, the decline in growth of real GDP was not as severe in 2007. Later the country experienced much lower rates of growth, 3.3% and 1.8% for 2008 and 2009, respectively, (see Figure 1). Despite the slow rate of real GDP growth poverty indicators declined in this period.

Beginning in 2007, each year the Government of Kazakhstan used transfers from the National Fund of the Republic of Kazakhstan (NFRK)[6] for stabilization. The amounts of transfers from NFRK to the state budget for different developmental and unemployment reduction programs were 2.13 billion in 2007, 8.94 billion in 2008 and 7.41in 2009 (all amounts are USD) (Ministry of Finance of the Republic of Kazakhstan[7]). Among these programs those important for reducing poverty are: State Development program of rural areas of RK, 2004-2010; State Development Program of residential construction in RK,2005-2007 and 2008-2010; State Program of Reforming and Development of Healthcare for 2005-2010 and State Development Program of education in RK for 2005-2010[8]. During three years, from 2009 the wages of public sector employees and pensions increased by 25% each year. Along with lump-sum payments for a child's birth (begun in 2003), additional benefits to families were: child care for one year according to the number of children in a family and allowances for families with children whose per capita income was lower than the cost of an established food basket. The amount for the Fiscal Anti-Crisis Program (ACP) from the

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[3]   The information is available on-line
http://ru.government.kz/site/news/2012/06/24;http://adilet.minjust.kz/rus/docs/P030000296_
[4]   National currency in Kazakhstan , average exchange rate for December2005 is 1 USD=134 KZT the information is available on-line http://www.nationalbank.kz/index.cfm
[5]   The information is available on-line http://www.nationalbank.kz/?docid=346
[6]   The National Fund of the Republic of Kazakhstan, created in 2000, was a fund for stabilization fund to ensure the economy's stability in the event of fluctuating prices for oil, gas, and metals. The National Bank of the Republic of Kazakhstan monitors the assets of the National Fund. At the end of 2010 the assets of the NFRK consisted of 30.57 billion USD.
[7]   The information is available on-line http://www.minfin.kz/index.php?uin=1120634837&lang=rus
[8]   The information is available on-line http://ru.government.kz/documents/govprog

government of Kazakhstan in 2009 was KZT 2.3 trillion (approximately 16 billion USD) or 15 % of GDP ((Jandosov Sabyrova L., Mogilevsky R., 2010). This policy reduced the external debt of Kazakhstan' banking sector. The debt consisted of 12.8 percent of GDP for 9 months of 2010, 11.58 percent of total external debt, and 34.15 percent for first quarter GDP 2012 (National Bank of Kazakhstan). The National Bank of Kazakhstan rapidly devalued the national currency, which helped increase export revenues.

The current study responds to the issues of:

- Effect on poverty indicators and inequality of income from the crisis, based on households' per capita expenditures;
- Differing consumption patterns of households during the crisis compared to previous periods of prosperity;
- Effectiveness and efficiency of the government's stabilization policy for poor households;

- Identity of households vulnerable to poverty during crisis compared to high growth period rates.

This study's structure is: The second section reviews the literature. The next section describes the data employed for empirical analysis. The illustration and description of growth incidence curves appear in Section 4. A discussion of decomposition of the dynamics of poverty into growth and distribution components is the subject of Section 5. Section 6 presents the methodology used for estimations and empirical results for determinants of poverty. Section 7 concludes the study.

2 Literature review

Several previous researchers have made substantial contributions to the study of the effects of crises on poverty, income distribution and inequality of income (Aaberge et al. 2000; Lokshin and Ravallion 2000; Azis 2002; Baldacci et al. 2002; Ravallion 2008; Ajit et al. 2009; Ajwad et al.2009; Chen and Ravallion 2009; Ravallion 2010; Habib et al. 2010a; Habib et al.2010b). Baldacci et al. (2002), based on macro and micro level data, found that the crisis of 1994-1995 in Mexico affected poverty and income distribution. The real GDP decline in Mexico explained one third of the increase in poverty indicators, and the poverty gap widened with 10 per cent of poor becoming poorer. The gap increased more for single parents, single person households, and households headed by elderly and without education. Based on micro-level data, the conclusion was that inequality decreases, despite an increase in poverty's indicators. The estimation results showed greater incidence of poverty in urban households. The same conclusion applies to Russian poverty from analysis of consequences of the 1998 crisis, as Lokshin, Ravallion (2000) demonstrated with results indicating adequate safety nets mediates the consequences of crisis on poverty. Analysis of the effects of the Russian crisis of 1998 used longitudinal Russian Living Standards Measurement Survey (RLSMS) data for 1996 and 1998 (Lokshin, Ravallion 2000) and revealed that poverty indicators increased with an approach considering expenditure than according to income, and inequality decreased despite improving the safety net to reduce poverty.. Ravallion (2008) considered the experiences of past crises and their long-term effects on the impoverished, such as a nutrition and schooling of children. The main idea of Ravallion is to develop safety nets to compensate short-term losses and accelerate long-term recovery.

Four Nordic countries, Sweden, Norway, Finland, and Denmark, produced interesting conclusions (Aaberge et al. 2000), particularly, that the period of rising of unemployment during the late 1980s and early 1990s, economic inequality of income measured by the Gini coefficient does not illustrates a decline. Decomposing the Gini coefficient into components of income showed only

minor proof that unemployment insurance benefits mitigated the rise of inequality and complicated distributional mechanisms are functioning.

The cases the Asian financial crisis of 1998 applied to Indonesia (Azis et al. 2002) using the general equilibrium model with detailed data from the financial sector and endogenously implemented poverty measures analysed the link between economic shocks , such as inflation or unemployment and poverty. The results indicated that incidence of poverty incidence was even lower after implementing the economic shock, suggesting the impact of prices on poverty was not severe.

Recently, research devoted to the last financial crisis' impacts on poverty and income distribution has increased (Ravallion 2008; Ajwad et al.2009; Chen and Ravallion 2009; Ravallion 2010; Habib et al. 2010a; Habib et al. 2010b). Mainly these studies, based on simulation models, incorporated general equilibrium models with indicators of poverty and implementation of shocks, such as unemployment and price increases. Notably some findings from these studies show crises mainly affecting the middle class.

Anderson and Pomfret (2002) found, from analysis of Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan) during the economic recession of the 1990s that significant correlates with poverty exist for factors, such as location, family size, and higher education. Ukraine has the same determinants of poverty, similar to those of economies in transition, but other specific features are present, such as relatively low importance of unemployment and the existence of poverty among households with employment. Also, Murthi et al. (1998) used Kazakhstan's 1996 Living Standards Measurement Survey (LSMS) to analyze the effects of economic transition, from planned economy to a market economy, on per capita consumption expenditures in different quintiles of the distribution of consumption expenditures. Based on descriptive data on household's characteristics at different quintiles, Murthi et al. (1998) suggested that more poor households in South and rural areas, with larger size of household, less educated and unemployed.

Further research explored Kazakhstan's Household Budget Surveys (KHBS) for 2001-2004 (Esanov 2006) for periods of high growth rates and analyzed the impact of growth on poverty. The major conclusions of the Esanov(2006) study are that declining inequality has been a main driving force behind a significant reduction in poverty, the growth factor was enhanced poverty, and the magnitude of the growth factor was smaller compared to the distribution factor.

By using various poverty lines Rhoe et al. (2008) identified a lack of strength for the general determinants of poverty when including non-food expenditures in Kazakhstan's poverty line. Based on data from National Accounts and KHBS for 2001-2005 the Social Accounting Matrix (SAM) and the construction of the General Computable Equilibrium Model (CGEM) simulated an oil price shock for predicting a midterm, average, annual impact on the economy (Hare and Naumov 2008). The results of Hare and Naumov(2008) show that an oil price shock is modestly pro-poor in terms of incomes, but the situation is small but opposite in terms of consumption expenditures . Based on income structure, Hare and Naumov(2008) identified that the poorest 10 percent of household's receive most of their income from social benefits, while the wealthiest derive most income from wages Verme (2006) applied a range of methodologies to evaluate changes in income, poverty, and income distribution between 2001 and 2002 in Kazakhstan, based on KHBS. Verme (2006) found that extraordinary GDP growth translates a very modest growth in mean income of households. Nevertheless, both poverty from income and inequality of income have decreased significantly and growth has been "pro-poor," as explained by changes in distribution. No research has analyzed effects of current crises on poverty, distribution of expenditures for consumption and inequality of income in Kazakhstan, therefore the key contribution of this research is such an analysis.

3 Data

Responses to the issues of the current research use nationally representative Kazakhstan Household Budget Surveys (KHBS) from 2001 to 2009. The KHBS encompasses 12,000 households, it is representsative at the oblasts' (province) levels, and stratifies according to rural, and small, medium and large cities. The questionnaires contained 4 modules: The first module concerns daily expenditures on food and necessities of households, and the second module included quarterly expenditures for clothes, durables, utilities, education, healthcare, transportation, other expenditures, and incomes of households. The third module gathered data for housing conditions, livestock, equipment and machinery, education, and employment. The last module investigated structures of household. For 2002, 2003, and 2005 two additional modules surveyed the health and education of household members.

During 2001-2009, the surveys, completed quarterly, produced estimates from available data; however, from 2006 to 2009, the survey's methodology changed to surveying 3000 households each quarter, leading to construction of annual information for 12,000 households. Kazakhstan Household Budget Survey's (KHBS) structure is a rotating sample, with 25 percent of households surveyed replaced each year, and the data treated as a series of repeated cross-sections.

By tracking the households' unchanged characteristics for all years established that some households followed all the waves since 2001. However a complexity arises from matching data from two different years because a unique ID for new households, during rotation, was absent. Therefore, the dataset uses the module of the survey which shows demographic and other characteristics of each member of a household in order to match by individuals.

Application of different matching techniques has checked the attrition rates and reliability of panel constructed data based on repeated cross-sections. The basis for the *matching technique N1* was ID of households (HHID[9]), year of birth, gender, and first name of each member of households for different years, while the basis for the *matching technique N2* was ID of households, and birth year, month, and gender of each individual of the household, The data for *matching technique N3* was,- household ID, birth year and birth month of each individual in a household, and for *matching technique N4* the household ID of a household and head of household represented data such as birth year, gender and education. The household remained in the panel sample if at least one member of the household or head of the household reflected the same characteristics.

Matching technique N1 merged data for all nine years based on household ID, birth year, gender of each individual; the dataset included 2910 households. The next step involved identifying the first names of each household's members, but doing so is problematic because how differently pronounced or spelled names may belong to the same person. Categories for variations among names include character, spelling, phonetic variations,, and variations caused by compound names, and alternative names. The variations in character may be the result of capitalization, punctuation, spacing, qualifiers and abbreviations. Applying all known name-matching techniques, such as Soundex, Phonex, Phonix, NYSIS, Double-Metaphone, Fuzzy Soundex, Levenshtein, and others in STATA allowed creation of English or German names or name-strings in Latin text. A problem arose from entry of all names in KHBS in Cyrillic text. Afterwards, the data file with 2910 households transcribed to another software, R, allowed the possibility of using all commands for string variables (first name of the member of household) in Cyrillic letters, initially, all name-

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[9] Where **HHID** is 10 a digit number: first two digits indicate **region** (14 oblast 2 cities), second two digits indicate **district**, next two digits indicate type **of settlement (Astana** city, village, large city, average city, small city, Almaty city); the next four digits indicate the **code for a** household.

strings lowercase and all short forms of given names converted to long forms. Hence, all Cyrillic letters became Latin letters by using this special methodology. Thereafter, various name matching techniques became applicable to the dataset. The households with a name of least of one member the same for all nine years remained in the panel. Overall, 2581 households remained in the sample for the 2001-2009 period, based on year of birth, gender, and first name of the member of the household. Checking household size, year of construction of dwelling, birth years and marital statuses of the two oldest members of household is implemented for reliability of the panel.

Full description of robustness check, reliability, representativeness, and attrition of all matching techniques do not appear in this study, are available upon request. Based on the check of robustness and reliability for different matching techniques the reasonable conclusion is that matching technique N1 is more reliable and contains more households and individuals for the panel.

4 Growth and distribution components of poverty

Since 1999 the economy of Kazakhstan has grown in terms of real GDP, the remaining issues are: transformation of these high rates of growth into "pro-poor" growth, the effects of crises on rates of "pro-poor" growth, and the changes arising from decomposition of poverty into growth and distribution components.

"Pro-poor" growth means total growth in income (expenditure) that benefited the poor rather than the non-poor. Ravallion and Chen (2003) measured pro-poor growth as the average growth rate of the poor up to the poverty linel . A "Growth Incidence Curve" (GIC),can plot the growth rate for each percentile of per capita income (or expenditure), with a calculation by:

$$ g_t(p) = \left[\frac{y_t(p)}{y_{t-1}(p)} \right] - 1 \tag{1} $$

The GIC plot permits comparison of the incidence of growth in poorer deciles of the population with that of wealthier percentiles or with the rate of growth of mean income (or expenditure). Also the proposed term, "rate of pro-poor growth," recognizes a positive rate for pro-poor growth. If the rate of pro-poor growth exceeds the growth rate in the mean, distributional effects favor of the poor. Consumption expenditures are the main measurement of welfare measurement for less developed countries; however other measurements of welfare apply to developed countries. So a transition country, such as Kazakhstan, is somewhere in between; and therefore, a comparison is more appropriate using both measures. Moreover the consumption per capita expenditures is a calculation acquired simply by division of total household expenditures by household size. But some researchers argued for considering economies of scale, costs for children, and definition of per adult equivalent expenditures (Deaton and Paxson, 1998; . Deaton and Muellbauer, 1986; Lanjouw and Ravallion, 1995). Further analysis is necessary to exactly define equivalence scales for KHBS, rather than accepting OECD or WHO measurements for equivalence scales. However the distributional changes of income and consumption per capita for KHBS indicate the same tendency for both. Consequently, to calculation of real consumption expenditures includes regional poverty lines.[10] The growth incidence curves for Kazakhstan on a national level for 2001-2002, 2002-2003, 2007-2008, 2008-2009 and for 2009-2010 show that growth pro-poor (see Figures 2-6).

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[10] This research uses the poverty line, represented by the subsistence minimum, as calculated by the Agency of Statistics of the Republic of Kazakhstan. The consumption basket represents nutrition norms developed by the National Nutrition Institute and is the main aspect of the definition of cost of living. Different baskets apply to various regions (5) and various demographic groups

Figure 2 Crowth Incidence Curve on a National Level for 2001-2002
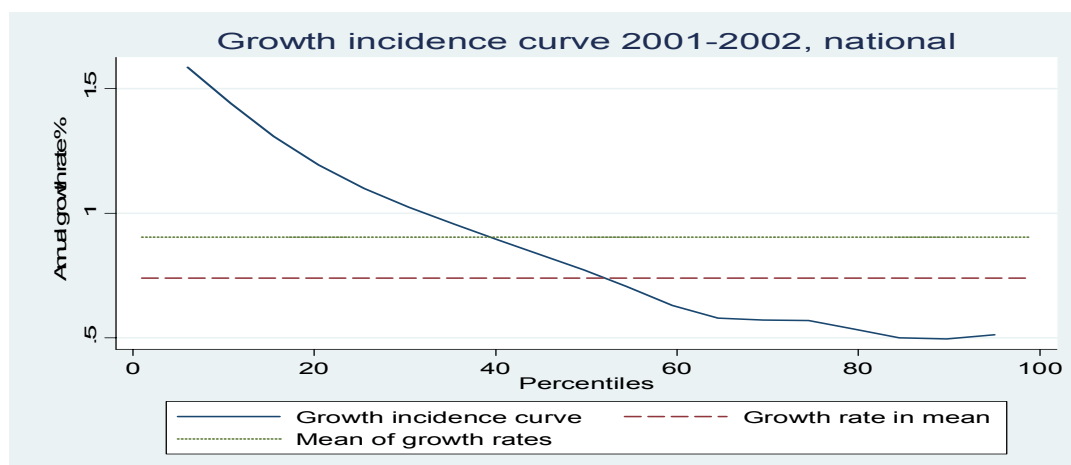
Source: Calculations based on KHBS.

Figure 3 Growth Incidence Curve on National Level for 2002-2003
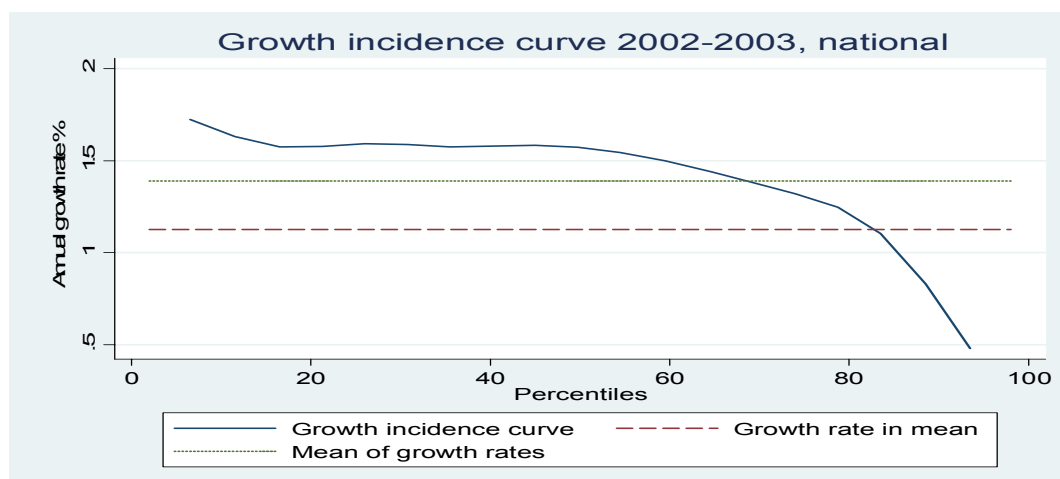
Source: Calculations based on KHBS.

In 2001-2002 growth rates were higher than the mean, up to the 40th percentile (see Figure 2). However, in 2002-2003 the growth rates increased beyond the mean up to the 70th percentile (see Figure 3). This is evidence of creation of, and improvement for, the middle class.

(nine). Moreover, this study evaluates an average national consumption basket. The ASRK estimates the cost of this basket, which form a monthly estimation from local (i.e. regional) prices. The data on prices represent urban and rural areas. To reflect the costs of non-food goods and services the consumption basket includes a special correction. As of today the share of non-food goods and services in an average consumer's basket is 40 %. Since 2006 ASRKapplied a new methodology for calculation of subsistence minimums (SM), before this change, the food basket included only 20 food products; now it consists of 43 products and 2175Kcal per day. The share of expenditures for food in the SM declined from 70 % to 60%. Mainly, the regional subsistence minimums from ASRK have been applied for calculation of poverty level.

Figure 4 Growth Incidence Curve on National Level for 2007-2008

Source: Calculations based on KHBS

Figure 5 Growth Incidence Curve on National Level for 2008-2009
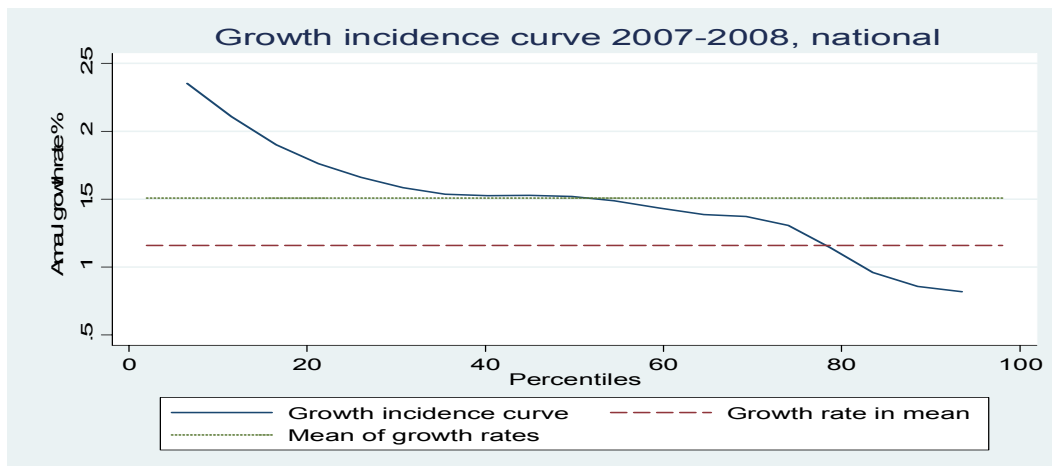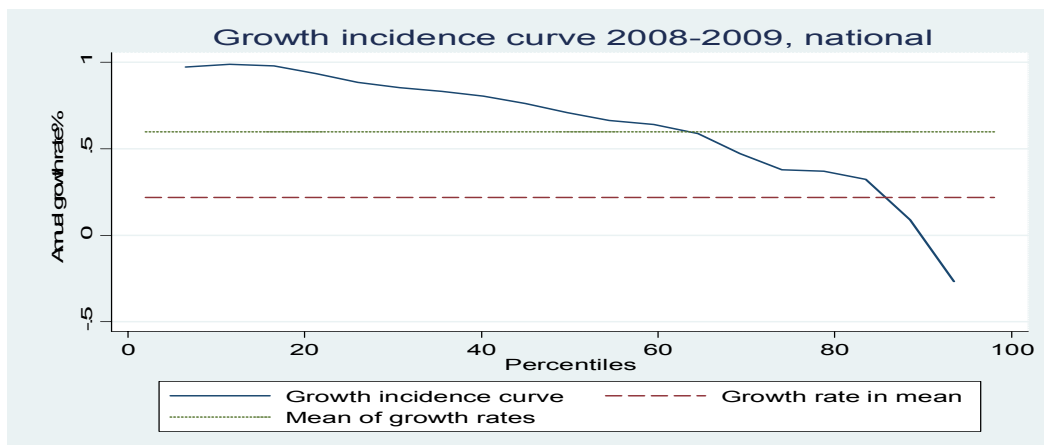

Source: Calculations based on KHBS

For the period of study, 2001-2009, KHBS illustrates positive growth of real consumption expenditures per capita, except for 2008-2009 when the upper 10th percentile of distribution had negative growth (see Figure 5). This explains the worsen influence of the financial crisis for wealthier segment of the population. Growth rates are always higher for the lower portion of distribution, and also favor the middle class. Between 2007-2008 GIC indicated deciles of distribution of the poor gaining more than the middle and top deciles of distribution (see Figure 4). However, for 2009-2010 the GIC indicated growth favored poor and rich households, but those households in the middle of distribution experienced lower rates of growth, which is and important difference when comparing previous years (see Figure 6).

The rates of pro-poor growth were positive for all years of analysis, which reflects that the poor (as defined in the base year) gained in consumption (see Figures 2-6). Also the rates of pro-poor growth exceeded the growth rate at the mean, and this explains that the distributional shifts have favored the poor (see Figures 2-6). During the period of economic expansion, from 2002 to 2007 the growth rates for mean consumption were higher than the one and positive for national, urban and rural levels. Notably interestingly, between 2007 and 2008 (see Figure 4) , when the growth rate of real GDP declined by 2.5 times in comparison to 2007, the pro-poor growth rate was one of

the highest, which the effectiveness of ACP (Anti-Crisis Package) of the Government could explain. Only in 2008-2009 was the growth in mean consumption negative for rural households (see Figure 9), perhaps explained by the lowest growth in real GDP in 2009, only 1.2%, (see Figure 1) in comparison with previous periods.

Figure 6 Growth Incidence Curve on National Level for 2009-2010

Source: Calculations based on KHBS

Comparing the growth incidence curves for rural and urban households shows the same tendency for distribution as the national level; this again proves that the distributional shifts favoured the poor. For all other years the same data for curves for urban and rural growth incidence curves show small exception for the period 2008-2009, when the upper deciles of distribution for rural households had negative growth rates (see Figure 9).

Figure 7 Growth Incidence Curve for Rural Level, 2001-2002
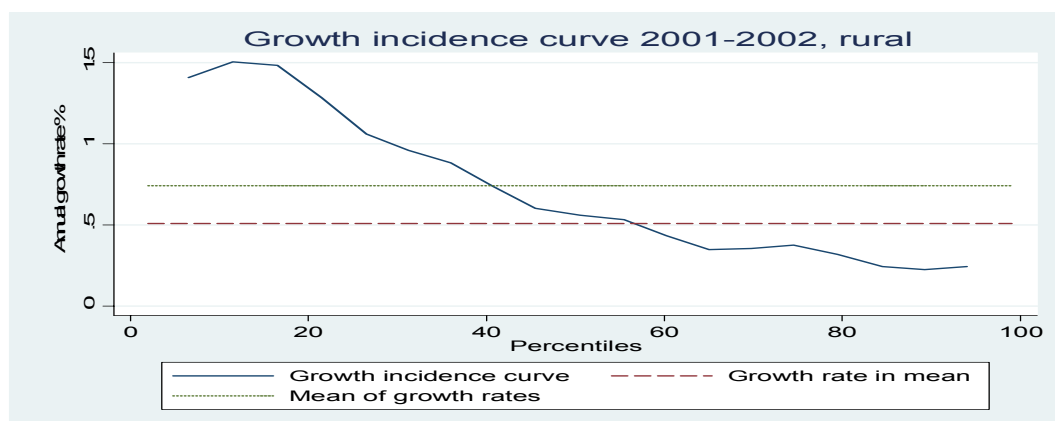
Source: Calculations based on KHBS

Figure 8 Growth Incidence Curve for Urban Level, 2001-2002
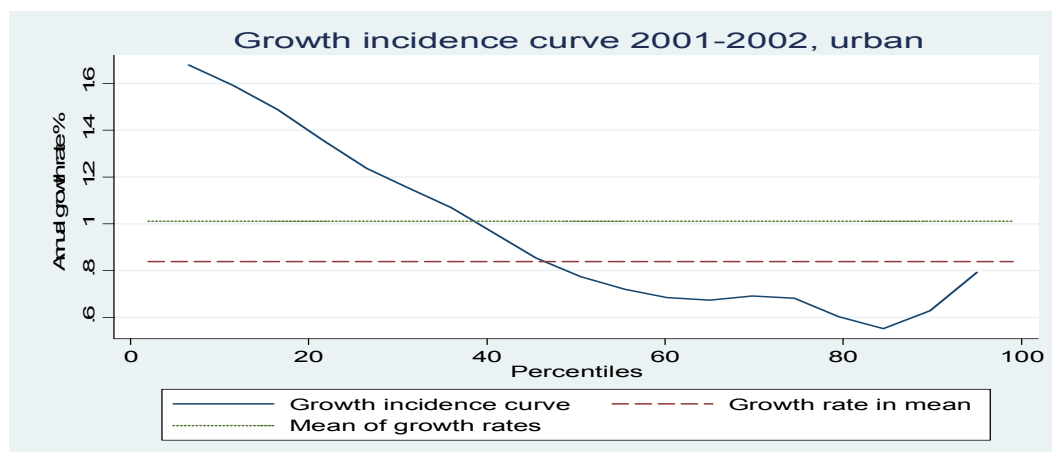
Source: Calculations based on KHBS

Figure 9 Growth Incidence Curve for Rural Level, 2008-2009
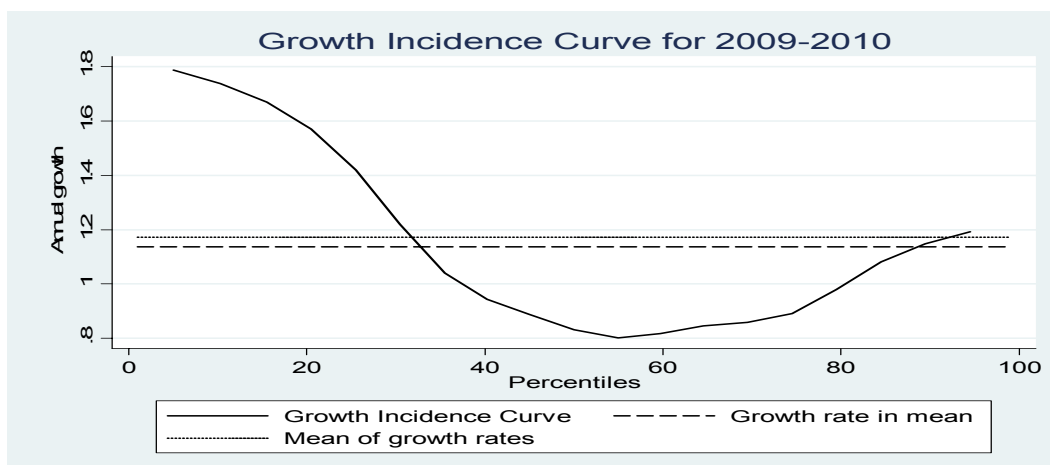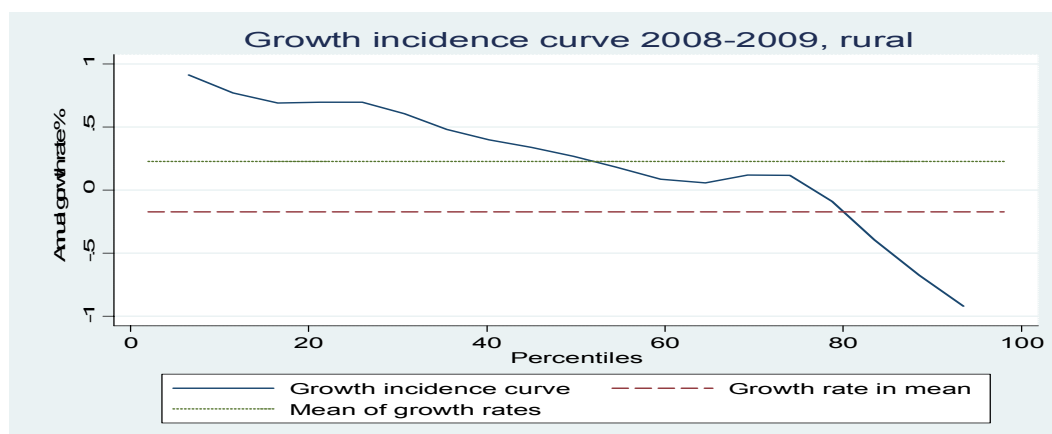

Source: Calculations based on KHBS

Figure 10 Growth Incidence Curve for Urban Level, 2008-2009
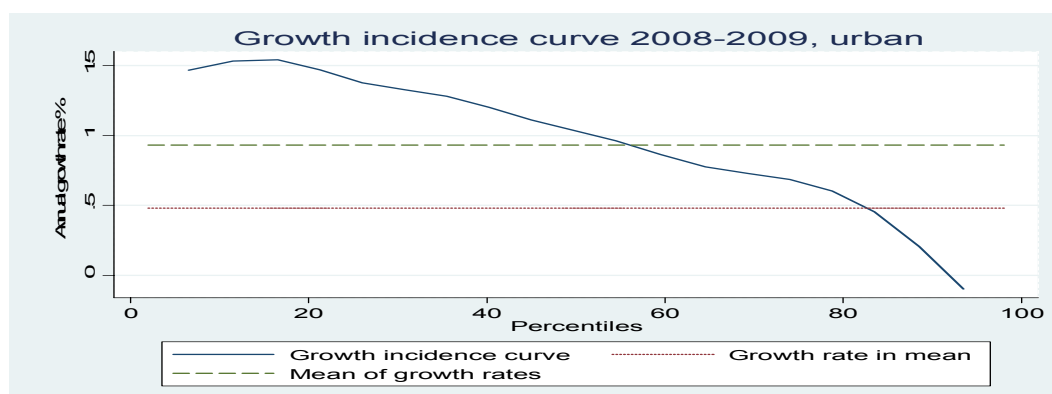
Source: Calculations based on KHBS.

The previous figures illustrating the GIC for 2008-2009 for urban and rural households, reflecting that from the 75th percentile of distribution of expenditures for consumption, rural households had

negative growth rates, but urban areas had better situations; the negative growth rate only reached the 95th percentile of distribution (see Figures 9-10).

5 The decomposition of changes in poverty into growth and inequality

Analysis indicates that the reduction (increase) in poverty may be from either growth (reduction) in income (consumption) or for more equal (more unequal) distribution. Consequently, decomposition of poverty indicators into components of growth and inequality is useful.

Table 1 Poverty and Inequality Indicators in Kazakhstan for 2001-2011

Indicators	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Poverty headcount index , %	46,7	44,5	37,5	33,9	31,6	18,2	12,7	12,1	8,2	6,5	5,3
urban	36,0	33,0	24,7	23,4	20,2	13,6	6,9	8,1	5,6	3,7	2,4
rural	59,4	58,4	53,2	47,1	45,6	24,4	18,1	15,9	12,1	10,1	8,8
The poverty gap[1], %	14,8	13,3	10,2	8,3	7,5	3,9	2,4	2,3	1,3	1,1	0,9
The severity of poverty[1], %	6,5	5,5	3,9	2,9	2,5	1,3	0,8	0,7	0,3	0,3	0,3
Index of income concentration (Gini index)	0,339	0,328	0,315	0,305	0,304	0,31	0,309	0,288	0,267	0,278	0,289

[1]*For the purpose of comparison with data from 2006 submitted data is for 2001-2005, scaled according to the new method of calculation of subsistence level, entered form 1 January 2006. Subsistence level represents 43 titles for foodstuffs and composing 60% of the basket.*

Source: The Agency of Statistics of the Republic of Kazakhstan.

Table 1 demonstrates that the poverty and inequality indicators have been decreasing on national level. However, what lies behind these reductions is the main concern of this section the lower poverty line such as for food poverty line accounts for expenditures for main food products, is not a consideration due to very small levels of poor by this measurement. Estimation of the degree of decline in poverty is due to the growth component and redistribution component applies the methodology of decomposition of poverty into growth and inequality proposed by Datt and Ravallion (1992). This method decomposes the change in poverty measurement (Headcount index, poverty gap, or severity of poverty[11]) into the components of growth, redistribution, and residual. The decomposition of poverty into growth and inequality is given by following formula:

$$\Delta P = [P(\mu_2, L_\pi) - P(\mu_1, L_\pi)] + [P(\mu_\pi, L_2) - P(\mu_\pi, L_1)] + R \qquad (2)$$

where ΔP – the change in poverty, the first component on right side equation indicates growth, the second component illustrates an effect from redistribution, and the third component indicates a residual.

The growth component indicates the change in poverty caused by changes in mean income (expenditure) when holding the relative distribution of the base year constant. The redistribution

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[11] The poverty gap index measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. The sum of these poverty gaps provides the minimum cost of eliminating poverty, if transfers' targets were perfect. The measure does not reflect changes in inequality among the poor. The squared poverty gap ("poverty severity") index averages the squares of the poverty gaps relative to the poverty line.

component indicates the change in poverty caused by change in distribution, holding mean income (expenditure) constant. The residual indicates the effect of concurrent changes in mean income (expenditure) and distribution on poverty, not considered by the other two components. The results of decomposition analysis for national, rural and urban regions appear in Tables 3 to 5.

Table 2 Inflation in Kazakhstan

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Inflation rate by CPI	13.2	8.4	5.9	6.4	6.9	7.6	8.6	10.8	17	6.2	7.8

Source: The Agency of Statistics of the Republic of Kazakhstan.

The decline in indicators for poverty are apparent for whole period, the change in these indicators differs from Table 1. The Agency of Statistics of the Republic of Kazakhstan (ASRK) published the evaluations based on the Lorenz curve rather than from calculations directly from data. Also, one exclusion, for 2007-2008, represents estimation for a small increase in indicators for poverty. The explanation is that the highest inflation rate occurred in 2008 in comparison with the previous 10 years (see Table 2). But for rural areas, for 2007-2008, the poverty gap and severity of poverty declined, perhaps explained by assistance from of government to rural areas and the agriculture sector.

Table 3 Decomposition of change in poverty into growth and distributional components

Period	Growth component	Redistribution component	Residual	Total change in poverty
	Percentage points			
	Headcount index (H)			
2001-2002	-3.192	-0.779	-0.057	-3.914
2002-2003	-5.053	-1.389	0.132	-6.57
2006-2007	-5.252	-2.186	0.642	-6.796
2007-2008	-5.285	5.675	-1.042	1.432
2008-2009	-0.905	-3.189	-0.005	-4.089
2009-2010	-5.72	1.918	-1.088	-4.890
	Poverty gap index (PG)			
2001-2002	-1.583	-1.004	-0.016	-2.571
2002-2003	-2.168	-0.718	0.063	-2.94
2006-2007	-1.411	-0.683	0.097	-1.997
2007-2008	-1.436	1.096	-0.408	0.068
2008-2009	-0.201	-0.778	0.036	-1.015
2009-2010	-1.040	0.326	-0.155	-0.869
	Severity of poverty index(P_2)			
2001-2002	-0.869	-0.766	0.023	-1.657
2002-2003	-1.130	-0.408	0.05	-1.587
2006-2007	-0.536	-0.333	0.054	-0.814
2007-2008	-0.502	0.310	-0.148	-0.044
2008-2009	-0.065	-0.303	0.015	-0.382
2009-2010	-0.295	0.103	-0.048	-0.241

Source: Calculations based on KHBS

Table 4 Decomposition of change in poverty into growth and distributional components for rural Kazakhstan

Period	Growth component	Redistribution component	Residual	Total change in poverty
		Percentage points		
		Headcount index (H)		
2001-2002	-2.001	0.169	-0.129	-1.704
2002-2003	-6.758	-0.436	0.50	-6.69
2006-2007	-10.011	-0.85	1.417	-9.444
2007-2008	-5.937	8.305	-1.337	1.031
2008-2009	1.093	-4.943	0.113	-3.736
		Poverty gap index (PG)		
2001-2002	-1.452	-1.205	-1.176	-2.6
2002-2003	-3.724	0.114	0.021	-3.589
2006-2007	-2.920	0.030	0.017	-2.873
2007-2008	-1.628	2.016	-0.523	-0.135
2008-2009	0.28	-1.457	-0.041	-1.219
		Severity of poverty index(P_2)		
2001-2002	-0.886	-1.122	0.004	-2.012
2002-2003	-2.172	0.040	-0.019	-2.15
2006-2007	-1.139	-0.046	-0.027	-1.212
2007-2008	-0.590	0.656	-0.206	-0.14
2008-2009	0.100	-0.599	-0.021	-0.519

Source: Calculations based on KHBS.

Table 5 Decomposition of change in poverty into growth and distributional components for urban Kazakhstan

Period	Growth component	Redistribution component	Residual	Total change in poverty
		Percentage points		
		Headcount index (H)		
2001-2002	-3.769	-1.378	-0.112	-5.259
2002-2003	-4.340	-2.029	-0.088	-6.456
2006-2007	-4.724	-3.117	0.614	-7.228
2007-2008	-3.094	5.590	-0.747	1.749
2008-2009	-1.465	-3.117	0.109	-4.473
		Poverty gap index (PG)		
2001-2002	-1.465	-1.125	0.016	-2.574
2002-2003	-1.580	-1.052	0.081	-2.552
2006-2007	-1.147	-0.985	0.162	-1.969
2007-2008	-0.600	1.168	-0.338	0.229
2008-2009	-0.334	-0.624	0.084	-0.874
		Severity of poverty index(P_2)		
2001-2002	-0.747	-0.756	0.045	-1.459
2002-2003	-0.741	-0.572	0.067	-1.24
2006-2007	-0.414	-0.432	0.097	-0.749
2007-2008	-0.184	0.330	-0.113	0.033
2008-2009	-0.100	-0.206	0.026	-0.280

Source: Calculations based on KHBS.

Also, as Tables 3 to 5 show, components of decomposition, growth and redistribution, positively contribute to decline of poverty. In all cases the residuals are lower in absolute terms, relative to the component of growth and redistribution. The results show that the effect of growth is greater than

the effect of redistribution for a decline of poverty; this differs from previous research (Verme 2006, Esanov 2006). The explanation could be from using different methodologies for aggregation of consumption expenditures , also Verme (2006) uses aggregate income instead of expenditures for consumption. However for 2008-2009, when the government of the Republic of Kazakhstan spent large amounts for stabilization and social purposes, such as increasing old age pensions, benefits and wages for public sector workers, the redistribution component became the most important. Also, tax policies have improved; each year the VAT declined by one percent, income tax remained flat and equals 10%, and corporate income tax declined from 30 percent to 20 percent. The effect of redistribution, which causes a decline in indicators of poverty, could substantiate the effectiveness of social and stabilization policies of the government.

Comparison of differences in rural and urban decompositions from 2008-2009, shows all indexes of poverty for rural areas declined only due to redistribution. For example, the headcount index would have declined if the change in growth had not been 4.94 percent; the poverty gap index would have declined by 1.457 percent and severity of poverty would have declined by 0.599 percent (see Table 4). An explanation for this result may be the fact that consequences of crises cannot significantly affect rural populations. The evaluations, for 2007-2008 at the national level, for headcount and poverty gap indexes, depict an increase and for urban areas all three indexes including severity of poverty increased, but rural areas displayed only a small upward change for headcount index, but both poverty gap and severity of poverty indexes declined (see Tables 3-5). These results mean that the distance the poor fall below the poverty line, as a proportion of the line, decreases for rural inhabitants.   During the period of expanded spending in Kazakhstan during 2002-2007the explanation for the decline in poverty is mainly from the growth component. High growth rate in mean consumption occurred in rural areas; however, later, beginning in 2008 the redistribution component played an important role in reduction of indicators for poverty,

6 Determinants of poverty during crisis

6.1 Methodology

Application of different models for estimating welfare applies to identifying households vulnerable to poverty. Initially all evaluations have a basis in cross-sectional data for 2001-2009. This study adopts measurement of welfare as the log of per capita consumption expenditures and creates estimations from various correlates poverty and control variables. The estimation model is given by following equation:

$$y_i = \alpha + \beta x_i + \varepsilon_i \tag{3}$$

where y_i =log of per capita household consumption expenditures; x_i = determinates of poverty, such as education, age, marital status, head of household, demographic characteristics of household and geographic variables, and ε_i = error term, assumed no to correlate with explanatory variables.

Based on cross-sectional data, checking robustness uses the Logit mode to define the determinants of poverty. The *Logit* model:

$$Prob\{Poor=1\} = e^{\beta'x}/(1+ e^{\beta'x})=\Lambda(\beta'x) , \tag{4}$$

where x is the characteristics of heads households, such as education, gender, marital status, age, number of children, elderly in household, and others, including regional factors. Evaluation of the differences in determinants for welfare for different parts distribution of welfare apply quantile regressions. For this purpose the conditional distributional function (CDF) at a given quantile, τ, is:

$$Q_\tau(y_i \, / \, x_i) = F_y^{-1}(\tau \, / \, x_i) \tag{5}$$

where $F_y(y \, / \, x_i)$ is the distribution function of y, conditional on x_i. For example, when τ=0.25, CDF describes the distribution of per capita consumption expenditures at the lowest quantile. The evaluation method applies minimizing (weighting) the absolute value of deviations rather than least squares of deviations and follows a linear programming algorithm. The advantages of this evaluation approach are an upper robustness against outliers compared to least-squares regressions and a better steadiness of performance under weaker stochastic assumptions.

Panel data arises from repeated cross-sections of the welfare model, estimated by fixed effects and GMM methodology. Resolution of the problem of endogeneity involves accepting right-hand variables with their lagged values. Arellano and Bond(1991) were the first to use this procedure through a GMM estimator. Lately, the matter of potential persistence in the left-hand variable that leads to a down bias in the Arellano-Bond estimator has gained concern. Therefore, this study chooses the *System GMM* approach proposed by Arellano and Bover(1995) and Blundell and Bond(1998,2000). By using a larger set of instruments, demonstrably, the results of this approach have greater precision for the estimates of autoregressive parameters through combining the difference estimator of Arellano-Bond (1991) and the level estimator of Arellano-Bover (1995), allowing corresponding biases to operate in opposite directions (downwards in the former, upwards in the latter) and the weights adjust the final estimation for the relative difference of the magnitudes of the biases. This is particularly important in the presence of persistent series (Hayakawa, 2007), especially when the time span of the data is small. In addition, with *System GMM*, applying robust standard errors further improves the quality of estimations. The eqaution for estimation of determinants of welfare in dynamic model is given by following equation:

$$y_{it} = \alpha + \beta x_{it} + year2006 + year2007 + year2008 + year2009 + \varepsilon_{it} \tag{6}$$

where y_{it} is the log of per capita real consumption expenditures (or adjusted by regional, subsistence minimum) of the *i*th household in year,t; x_{it} is the ith household characteristics and geographical variables in time, t; *year200t* is a dummy variable for year, t; t=6,7,8,9, and ε_{it} is the unobservable error term for household, *i*, in period, t.

6.2 Results

Appendix Table A1 illustrateS the descriptive data for 2001-2009 based on KHBS. The overall tendency between 2001-2009 illustrates that the poverty head count index for the cases of the when poverty line is subsistence minimum is declining; however since as poverty line a relative measure represents, for example, the 40th percentile of distribution, then the poverty level is almost the same. The changes in ethnicity correspond to demographic tendencies in a country as whole; average age of heads of households becomes younger; a small decline occurs for the share of married heads of households; the share of employed heads of households increases, and average household size declines.

Table 6 illustrates the results of welfare correlates, based on OLS regressions for 2005-2009. The main and significant factors for reduction of the log of per capita consumption expenditures are: size of household (number of children, adults and elderly) and location in rural, northern part, or southern part of the country. The estimation based on per capita expenditures always depends highly on size, because economies of scale are not present. As evident from previous research, the application of an equivalence scale to measurement of welfare can change estimations. Some authors applied an equivalence scale from WHO, recommended by Deaton (1997, pp.241-270). Further research could determine the corresponding equivalence scale, appropriate for Kazakhstan

Household Budget Surveys. More higher education among heads of households, married heads of households, location in Central, Western region and Almaty-Astana positively affect per capita consumption.

Table 6 OLS regressions of log per capita consumption expenditures for 2005-2009

Variables	2005	2006	2007	2008	2009
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Constant	9.201*	9.781*	10.012*	10.169*	10.236*
Household members					
Number of Children	-0.209*	-0.206*	-0.210*	-0.195*	-0.192*
Number of Elderly	-0.089*	-0.118*	-0.135*	-0.129*	-0.102*
Number of Adults	-0.068*	-0.094*	-0.088*	-0.096*	-0.093*
Male head	0.0114	0.0208**	-0.0089	0.028*	0.028*
Education of head					
Higher	0.321*	0.290*	0.296*	0.246*	0.256*
Vocational	0.125*	0.099*	0.120*	0.085*	0.098*
Secondary	0.008	0.0105	0.025	0.0145	0.018
Age of Head	0.000019	-0.0009**	-0.0011*	-0.0002*	0.0002
Head is married	0.0364*	0.053*	0.062*	0.034*	0.034*
Region					
Rural	-0.102*	-0.031*	-0.036*	-0.035*	-0.0811*
Central	0.0096	-0.079*	-0.02	0.049*	0.065*
West	0.135*	0.208*	0.130*	0.120*	0.040*
North	-0.097*	-0.123*	-0.1009*	-0.038*	-0.006
South	-0.224*	-0.122*	-0.088*	-0.114*	-0.073*
AlmatyAstana	0.151*	0.161*	0.171*	0.175*	0.235*
R2	0.417	0.308	0.304	0.325	0.422
Sample Size	11346	11995	11996	11997	11782

*,**,*** indicates that the coefficient is significantly different from 0 at 1%, 5%, 10% significance levels

Establishing robustness uses the logit regressions for probability of being poor for estimations and appears in Table 7. Identification of households as a poor rests on per capita consumption expenditures being less than the regional subsistence minimum. The same correlates are significant for reduction probability of being poor: education of heads of households, but more importantly having higher education in comparison to secondary education, and male heads of households (except for 2007; however the coefficient for male heads of households is not significant) (see Table 7). The size of households and location in rural areas are significant determinants of increasing the probability of being poor for the whole period. Interestingly, during the period of financial crisis, location in main cities of country, such as Almaty and Astana, increased the probability of being poor, although before 2006 and beginning with 2009, a reduction in probability of being poor is evident. Also, the oil rich western region, during 2007 and 2008, shows a decline in probability of being poor (see Table 7). Mainly the crisis affected the middle class, which are mostly located in the two main cities.

Table 8 presents the results for panel data estimations. In order accept the data, adjusted by price levels, the study adopts a dependent variable of per capita consumption expenditures divided by regional subsistence minimum of the corresponding year, thereby considering regional differences

in price levels. These estimations indicate that education of heads of households is an important determinant for an increase in expenditures; primarily, higher education is more significant. Older heads of households provide better indicators of welfare indicators than younger heads of household; married heads of households display no general effect; larger sizes of households indicate more expenditures. Interestingly, the dummy variable for time for 2008 reduces the log of real per capita expenditures.

Table 7 Logit regressions.

Variables	2005	2006	2007	2008	2009
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant	-3.575*	-2.793*	-2.948*	-2.575*	-4.308*
Household members					
Number of Children	0.889*	0.798*	0.787*	0.764*	0.938*
Number of Elderly	0.183*	0.310*	0.281*	0.368*	0.309*
Number of Adults	0.273*	0.415*	0.358*	0.466*	0.470*
Male head	-0.247*	-0.014	0.0252	-0.178*	-0.239*
Education of head					
Higher	-0.597*	-1.085*	-1.339*	-1.060*	-0.552*
Vocational	0.259*	-0.431*	-0.573*	-0.434*	0.189
Secondary	0.802*	-0.002	0.226**	-0.158*	0.637*
Age of Head	0.008*	-0.001	0.0001	-0.006**	-0.002
Head is married	0.178*	-0.322*	0.293*	-0.258*	-0.276*
Region					
Rural	0.511*	0.126**	0.307*	0.221*	0.278*
Central	0.083	0.588*	0.198**	-0.674*	-0.634*
West	0.04	0.132	-0.208***	-0.430*	0.095
North	0.385*	0.471*	0.063	-0.142	-0.115
South	0.619*	-0.003	-0.276*	-0.302*	-0.518*
AlmatyAstana	-0.184*	0.198***	0.522*	0.485*	-0.422*
Pseudo R2	0.2403	0.1769	0.1735	0.18	0.254
LR chi2(15)	3447.71	2250.67	1814.56	1961.27	2124.58
Sample Size	11346	11995	11996	11997	11782

*,**,*** indicates that the coefficient is significantly different from 0 at the 1%, 5%, 10% significance levels

As apparent from the background information for the country, the first effects of financial crisis for the whole economy (except financial and construction sectors) appears in 2008, and the inflation rate was one of the highest among the previous 10 years.

Quantile regressions examine the impact on welfare of other factors for different aspects of distribution of per capita expenditures (see Appendix A2). The number of children, number of elderly, and number of adults are significant determinants for reduction of the log of per capita expenditures for all quantiles since 2006 (see Table 9). However, for top quantile of distribution the effect of children is greater; for example in 2007 an increase by one child caused a reduction of c expenditures per capita by 18.4% in the bottom quantile, and by 22.3% in the top quantile. For male headed households, as in the OLS estimation, for 2007 a reduction in the log of per capita expenditures occurred but is insignificant. Higher and vocational educations of the head of household are significant factors for an increasing welfare. For top quantiles of distribution having just a secondary education is not significant and even negatively affects consumption per capita. Geographical location variables identify location in rural and southern regions significantly decreases the log of per capita expenditures. Location in Almaty-Astana and Western regions significantly increase the log of per capita expenditures.

Table 8 Regression results for panel data 2001-2009. The dependent variable is per capita consumptive expenditures adjusted by regional subsistence minimum for each year

Variables	Fixed Effects	System GMM
Constant	1.534*	2.814
Male head		-6.069
Education of head		
Higher	0.301*	0.453*
Vocational	0.167*	0.209**
Secondary	0.102*	0.119
Age of Head	0.010*	0.024*
Head is married	-0.088***	-0.075
Household size	-0.195*	-0.170*
Year=2007	0.332*	0.114*
Year=2008	0.206*	-0.060*
Arrelano-Bond test for AR(1) in first differences:		
Z=		-5.3214
Pr> Z=		0.0000
Arrelano-Bond test for AR(1) in first differences:		
Z=		1.4453
Pr> Z=		0.1484
Number of instruments		23
Within R^2	0.08	
Sample Size	20920	18326

*,**,*** indicates that the coefficient is significantly different from 0 at the 1%, 5%, 10% significance levels

7 Conclusion

This study analyzes the patterns of consumption of households in Kazakhstan for the period of economic growth and during the financial crisis. The comparison of GIC for different periods illustrates that mainly during the economic expansion and crisis, growth is pro-poor; however growth patterns are different in various sectors of distribution of consumption among households. Households in the bottom deciles of distribution have higher growth rates in comparison to middle and upper sectors of distribution. However, during the financial crisis the growth rates for the middle class declined in comparison to prosperous periods.

The analysis of decomposition of poverty indicates that during periods of high economic growth the reduction in poverty indicators is due to the growth component. But, during the crisis the contribution of the redistribution component becomes more important, which confirms the effectiveness of anti-crises governmental programs, and apply to urban and rural areas.

Welfare models from cross-sectional data and panel data identify and estimate households, more vulnerable to poverty. Therefore, households at risk are families of larger size (more children), less educated heads of households, and location in rural areas. But, during the period of crisis, location in Almaty and Astana, two main cities, increased the probability of being poor and location in the oil rich western region of the country reduced the probability of being poor. Mainly, the middle class and the wealthier reside in these cities. For panel data, including the dummy variable for year, shows that adjusted per capita consumption expenditures declined in 2008. This year was more

difficult for the country exhibiting negative macro-economic indicators, such as the highest rate of inflation and a low rate of economic growth.

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APPENDIX A1 DESCRIPTIVES FOR CROSS-SECTIONS 2001-2009

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Variables					Mean(frequency)				
Headcount ratio by official poverty line	44.94%	43.34%	36.77%	33.97%	32.26%	22.26%	15.77%	16.89%	11.25%
Poor, if income per capita is less than 40th %	28.97%	29.05%	29.33%	29.58%	29.68%	30.45%	30.86%	30.57%	29.67%
Head of HH is male	53.30%	49.99%	48.58%	46.36%	44.38%	45.68%	45.80%	45.58%	44.03%
Years of education of head of HH	10.94	10.95	11.30	11.46	11.58	11.74	11.91	11.97	12.14
Ethnicity of head of HH :									
1-Kazakh	46.06%	45.09%	46.00%	49.99%	47.71%	48.90%	49.26%	49.97%	52.61%
2-Russian	38.23%	38.01%	37.90%	37.70%	37.56%	36.78%	36.61%	36.54%	34.23%
3-Ukranian	5.36%	5.68%	5.53%	5.36%	5.23%	5.15%	4.98%	4.81%	4.52%
4-Uzbek	1.14%	1.50%	1.52%	1.39%	1.33%	1.13%	1.14%	1.05%	1.18%
5- Tatar	2.12%	2.50%	2.43%	2.32%	2.18%	2.21%	2.15%	2.03%	2.03%
6- Uigur	1.09%	1.15%	1.05%	1.02%	0.94%	0.92%	0.88%	0.89%	0.93%
7-German	1.97%	1.87%	1.77%	1.64%	1.58%	1.48%	1.53%	1.53%	1.55%
8-Other	4.03%	4.19%	3.81%	3.59%	3.47%	3.43%	3.45%	3.18%	2.95%
Age of head of HH	50.55	50.43	50.07	50.23	50.26	49.72	49.65	49.84	49.68
Marital status of head of HH:									
1-married	65.70%	64.11%	64.35%	64.02%	63.86%	63.02%	62.43%	62.00%	63.84%
2- never married	4.23%	4.06%	4.05%	4.06%	4.14%	4.84%	5.14%	5.38%	5.79%
3 - divorced	10.00%	10.51%	10.68%	10.93%	11.18%	11.56%	12.21%	12.63%	11.70%
4- widow	20.07%	21.32%	20.92%	20.99%	20.82%	20.58%	20.22%	19.98%	18.66%

APPENDIX A1 CONTINUES

	2001	2002	2003	2004	2005	2006	2007	2008	2009
The status of head of HH:					Mean(frequency)				
0-employed	68.36%	62.36%	65.73%	67.36%	67.87%	75.05%	73.59%	73.95%	74.28%
1-student	0.15%	0.10%	0.03%	0.04%	0.05%	0.07%	0.09%	0.07%	0.13%
2-pensioner	23.51%	28.57%	26.66%	25.76%	24.98%	23.04%	21.75%	21.80%	20.53%
3-housekeeper	2.60%	30.90%	3.04%	2.79%	3.04%	1.81%	2.09%	1.66%	2.30%
4- disabled person	1.72%	2.23%	2.17%	2.14%	2.11%	1.82%	1.58%	1.73%	1.66%
5- unemployed	2.97%	3.31%	2.10%	1.73%	1.74%	1.17%	0.81%	0.72%	1.00%
6- Other	0.68%	0.35%	0.26%	0.17%	0.21%	0.05%	0.09%	0.08%	0.09%
Type of settlement :									
1-Astana city	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	1.99%
2- Rural settlement	36.99%	37.00%	37.00%	37.00%	37.50%	36.50%	44.25%	44.25%	44.59%
3-Large cities	32.00%	32.00%	32.00%	32.00%	32.00%	32.75%	32.75%	32.75%	32.70%
4- meduim size cities	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.47%
5- small towns	12.99%	13.00%	13.00%	13.00%	12.50%	12.75%	5.00%	5.00%	4.53%
6- Almaty city	8.76%	8.75%	8.75%	8.75%	8.75%	8.75%	8.75%	8.75%	8.72%
Household size	3.800	3.680	3.630	3.590	3.550	3.397	3.358	3.348	3.447
Quantity of female in HH	2.017	1.970	1.960	1.940	1.922	1.840	1.828	1.819	1.900
Quantity of male in HH	1.790	1.710	1.680	1.650	1.630	1.550	1.530	1.529	1.590
Quantity of children in HH	1.240	1.170	1.120	1.080	1.030	0.959	0.911	0.881	0.923
Quantity of eldrely in HH	0.430	0.440	0.420	0.410	0.400	0.382	0.370	0.370	0.365
Sample size	11679	11436	11478	11521	11346	11.995	11996	11997	11782

Source: Author calculations based on KHBS
Note: Due to changes in administrative region division, some small cities became belong to rural area

APPENDIX A2 QUINTILE REGRESSIONS

Variables	2006			2007			2008			2009		
	25 quantile	50 quantile	75 quantile	25 quantile	50 quantile	75 quantile	25 quantile	50 quantile	75 quantile	25 quantile	50 quantile	75 quantile
Constant	9.420*	9.753*	10.097*	9.620*	9.977*	10.345*	9.778*	10.141*	10.469*	9.969*	10.204*	10.455*
Household members												
Number of Children	-0.188*	-0.201*	-0.215*	-0.184*	-0.202*	-0.223*	-0.171*	-0.190*	-0.200*	-0.181*	-0.189*	-0.194*
Number of Elderly	-0.103*	-0.117*	-0.132*	-0.098*	-0.128*	-0.147*	-0.098*	-0.118*	-0.124*	-0.088*	-0.109*	-0.108*
Number of Adults	-0.101*	-0.085*	-0.079*	-0.89*	-0.085*	-0.081*	-0.092*	-0.093*	-0.200*	-0.099*	-0.098*	-0.085*
Male head	0.007	0.12	0.004	-0.012	-0.004	-0.02	0.011	0.012	0.021	0.017***	0.023**	0.043*
Education of head												
Higher	0.261*	0.252*	0.268*	0.297*	0.281*	0.285*	0.251*	0.243*	0.223*	0.227*	0.261*	0.261*
Vocational	0.092*	0.079*	0.075*	0.144*	0.123*	0.115*	0.097*	0.083*	0.056*	0.079*	0.105*	0.105*
Secondary	0.019*	-0.002	-0.016	0.066*	0.024	0.004	0.044**	0.018*	-0.017	0.013	0.022	0.012
Age of Head	0.0001	-0.0005	-0.001**	-0.0001	-0.001**	-0.001*	0.0007***	-0.0001	-0.0007	0.0007**	0.0006	0.0004
Head is married	0.047*	0.050*	0.05	0.065*	0.058*	0.055*	0.043*	0.050*	0.029***	0.042*	0.035*	0.016
Region												
Rural	-0.021	-0.037*	-0.028**	-0.061*	-0.031*	-0.033*	-0.035*	-0.044*	-0.041*	-0.071*	-0.081*	-0.103*
Central	-0.113*	-0.068*	-0.056*	-0.051*	-0.035**	-0.01	0.051*	0.026**	0.066*	0.068*	0.059*	0.075*
West	0.189*	0.167*	0.205*	0.117*	0.111*	0.079*	0.112*	0.114*	0.090*	0.036**	0.021	0.023
North	-0.117*	-0.119*	-0.120*	-0.097*	-0.105*	-0.116*	-0.032*	-0.036**	-0.049*	-0.019	0.001	0.008
South	-0.078*	-0.119*	-0.159*	-0.056*	-0.084*	-0.126*	-0.091*	-0.112*	-0.123*	-0.038*	-0.068*	-0.094*
AlmatyAstana	0.106*	0.109*	0.178*	0.095*	0.122*	0.171*	0.105*	0.129*	0.200*	0.212*	0.227*	0.224*
Pseudo R^2	0.1766	0.1765	0.1759	0.1763	0.1775	0.1735	0.1817	0.1869	0.189	0.2588	0.2579	0.2426
Sample Size	11995	11995	11995	11996	11996	11996	11997	11997	11997	11782	11782	11782

*,**,*** indicates that the coefficient is significantly different from 0 at the 1%, 5%, 10% significance levels