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A STRUCTURAL ANALYSIS OF GROWTH AND POVERTY IN THE SHORT-TERM

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ABSTRACT

"Growth is good for the poor" is a ubiquitous statement and one generally backed by theory, research and history. In the long-run, growth reduces poverty. Yet, growth in output - *per se* - is neither a necessary nor a sufficient condition for poverty reduction in the short-term. The paper uses a number of parametric and non-parametric methodologies to assess the relation between growth and poverty in Kazakhstan, a country that experienced rapid growth and poverty reduction in the short-term. Combining macro and micro regional data, we find a very small trickle down effect of output growth on household incomes and no evidence that output growth is correlated with poverty reduction. We find instead that pro-poor growth in household income explains well poverty reduction.

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INTRODUCTION

Most people would recognize that growth is good for the poor. Countries that have been able to reduce poverty significantly during the second half of the twentieth century are those countries that benefited from sustained output growth over prolonged periods of time. More recently the experience of the transitional economies of Eastern Europe and of the Former Soviet Union has shown that the deep recession of the 1990s resulted in a sharp rise in poverty whereas the most recent growth period reversed this trend contributing to reduce poverty. A World Bank study on growth, poverty and inequality in transitional economies concluded that: "*The single most important factor behind the significant decline in poverty in the period in question (1998-2003) is high growth in the CIS, where the bulk of the poor reside.*" (World Bank 2005, p.3).

The question of the relation between growth and poverty is not so much around the 'if' but rather around the 'when' and the 'how' output growth trickles down to the poor. Output growth does not always trickle down to the poor as much or as fast as we would like and this fact has generated a hot debate among economists about whether economic policies should focus simply on growth or on pro-poor growth. Technically, output growth is neither a necessary nor a sufficient condition for poverty reduction. It is not necessary because a country could be in the middle of a recession and still being able to reduce poverty via redistributive economic policies. It is not sufficient because we

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could have exceptional output growth generated by sectors that do not redistribute resources to the poor. Moreover, even if we observe a simple covariance of output growth and poverty reduction at the national level, this is not necessarily evidence of causation and may also hide more complex regional dynamics.

The objective of the paper is not to challenge the 'if' question – whether output growth eventually reaches the poor – but to provide some evidence on the 'when' and the 'how' output growth can reduce poverty. The contribution to the 'when' question is given by focusing on the short-term defined as a one year period. The short term should be of interest for the study of poverty. The poor live shorter lives and they are typically afflicted by problems that require urgent solutions such as hunger, maternal and child mortality or fatal diseases. A rapid impact of growth on poverty can save lives and poverty reduction strategies should give great emphasis to this aspect. The contribution to the 'how' question is given by conducting a cross-regional dynamic analysis of growth and poverty in one country combining macro and micro data to better understand the mechanics that link output growth to poverty reduction.

The country of choice is Kazakhstan between 2001 and 2002. This is a good natural experiment. Between 1999 and 2002, Kazakhstan enjoyed a period of extraordinary growth estimated at 9.8% between 1999 and 2000, 13.5% between 2000 and 2001 and 9.5% between 2001 and 2002. During the same period, poverty (headcount index) declined significantly from 39% to 24% (World Bank 2004). This led observers to conclude that output growth in this country has been responsible for reducing poverty. Findings are surprising and counter intuitive. Despite the strong covariance between output growth and poverty at the national level, we find no evidence of this covariance or a clear causal link between GDP growth and poverty reduction across the regions of Kazakhstan. Output growth has trickled down to households very little with an average growth in household income of only 0.7% between 2001 and 2002. However, the distribution of such growth has been largely pro-poor explaining the observed reduction in poverty. Therefore, the distribution of household income growth rather than output growth explains poverty reduction.

The paper challenges the conventional wisdom that when output growth and poverty reduction coexist there must be a causal relation between the two. This has important implications for economic theory and economic policies. If poverty reduction is considered a worthwhile objective for a society then growth models should emphasise the time dimension and help to better understand the functioning of the entire economic cycle of growth and poverty. On the other hand, economic policies that aim at reducing poverty fast need to look beyond the covariance of growth and poverty at the national level and focus instead on the microeconomic short-term dynamics that characterize these variables.

The paper is organized as follows. First, data, poverty and inequality measures and decomposition methods are discussed including recent contributions to the measurement of pro-poor growth. Second, we look at the sources of growth and decompose GDP growth into its regional and sector components. Third, we turn to poverty and provide a profile and decomposition of this measure into regional factors. Fourth, we focus on inequality and decompose it into intra-regional and inter-regional components. Fifth, we look at poverty changes and decompose these changes into growth and inequality effects to see the degree of each factor contribution. Sixth, we ask the

question of whether growth has been pro-poor in the regions using a pro-poor index recently developed. Seventh, we run a number of multivariate and bivariate OLS regressions to assess covariance between growth, poverty and inequality across regions. Eight, we plot the same variables to derive
some additional insights into short-term dynamics with a non parametric approach. And last, we make an attempt to recompose the complex puzzle emerged and provide a rationale to explain the facts.

DATA

We use macro data on output and micro data on household income in Kazakhstan, both disaggregated by region. Macro data on output are taken from the National Statistical Agency official publications (NSA 2002 and NSA 2003). Micro data on household income are taken from the 2001 and 2002 Kazakhstan Household Budget Survey (HBS) implemented by the National Statistical Agency of Kazakhstan.[1]

The Kazakhstan 2001 and 2002 HBSs are among the best examples of sample surveys in transition economies. The design of these surveys is the result of a process of improvements of household data collection initiated in 1996 and supported by the World Bank and the final product is a survey similar in its structure to the World Bank Living Standards Measurement Surveys.[2] The samples have been extracted from the 1999 population census and sample selection has been conducted with a stratified multi-stage sampling procedure. A total of six strata were used reflecting administrative sub-divisions and rural and urban areas. The two samples are not structured as a panel but as a repeated cross-section survey. Both surveys used the same questionnaire which was administered in both years to a sample of 12,000 households. The sample is nationally and regionally representative and data collected are seasonally adjusted with 3,000 households being interviewed in each quarter. The questionnaire included a diary, a quarterly and an annual questionnaire. The diary registered food consumption, the quarterly questionnaire registered income and other expenditures and the annual questionnaire included sections on housing, utilities, durables, land and livestock.[3]

As a measure of income, we use household annual consumption expenditure per capita (adjusted with regional price indexes). The choice of consumption as a proxy for income is a standard approach for developing and transitional economies alike. It is believed that consumption better measures income because respondents tend to underreport income and because consumption is usually better spread over the year. Consumption is expected to be less vulnerable to measurement errors in any particular point in time. Indeed, our two surveys also collected information on income and this measure is significantly lower than consumption.

MEASURES

We use a number of standard measures of output, poverty and inequality as well as decomposition formulae of changes in these measures and parametric and non parametric estimates of regional covariance. As a measure of output we use GDP and this is first decomposed into its regional and sector components. The decomposition is carried out by dividing changes in output in each region and sector between 2001 and 2002 by the total

change in output at the national level calculated in local currency and in real terms. As measures of poverty, we use the FGT class of poverty measures (Foster, Greer and Thorbecke, 1984) including the Headcount Index P(0), the Poverty Gap Index P(1), and the Severity of Poverty Index P(2). The three indexes can be expressed into one general form as:

$$P(\alpha) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^{\alpha} \quad (1)$$

where n is the number of persons in the sample, y_i is the income of person i with i=1,2,...q, z=poverty line, q= number of poor and α= poverty aversion parameter. The three measures distinguish themselves for the different weights attributed to the distance between income of the poor and the poverty line. P(0) attributes equal weight to all incomes of the poor (α=0) while P(1) and P(2) attribute increasingly more weight to incomes of the poor distant from the poverty line (α=1 and α=2).

One of the advantages of the FGT measures is that they can be additively decomposed into sub-groups (Shorrocks 1980). This is a convenient property for a regional analysis so that we can estimate the poverty 'share' of each region and also the poverty 'risk'. With P representing a poverty measure, decomposition into sub-groups can be described as follows:

$$P = \sum_{k=1}^{K} v_k P_k \quad (2)$$

where k=region, P_k=poverty in region k and v_k=p_k/p, with p=country population and p_k=population of region k. In this way, we can calculate the regional poverty share 'S' as S_k=$(v_k P_k)/P$ and the regional poverty risk 'R' as R_k=P_k/P=S_k/v_k. Note that S_k adds up to one and R_k averages around one.

As measures of inequality we use the Generalized Entropy (GE) class of measures defined as:

$$GE(\alpha) = \frac{1}{\alpha^2 - \alpha}\left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{y^*}\right)^{\alpha} - 1\right] \quad \text{if } \alpha \neq 0 \text{ and } \alpha \neq 1 \quad (3)$$

where n is the number of persons in the sample, y_i is the income of person i with i=*1, 2,...,n,* and y^* is mean income. The GE index ranges from zero to infinitive with zero representing a perfectly equal distribution and higher values representing higher inequality. The parameter α represents the weight given to distances between incomes in different parts of the distribution. For lower and negative values of α, GE is more sensitive to changes in the lower tail of the distribution and for higher and positive values of α GE is more sensitive to changes in the upper tail of the distribution.

We use three of the GE measures, GE(0), GE(1) and GE(2). GE(0) is the limit of GE(α) for α→0, which gives the mean log deviation. GE(1) is the limit of GE(α) for α→1

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which gives the Theil index. And GE(2) is GE(α) with α=2 which gives half of the squared coefficient of variation.

GE measures can be additively decomposed into intra-group inequality (within group - *GEW*) and inter-group inequality (between group - *GEB*) as follows:

$$GE(\alpha) = GEW(\alpha) + GEB(\alpha) \tag{4}$$

In a regional analysis this is a helpful tool to see whether inequality is mostly due to inter-regional differences or intra-regional ones. Maintaining the notations we used for the poverty decompositions in equation (1), within region inequality can be defined as:

$$GEW(\alpha) = \sum_{k=1}^{K} vk^{(1-\alpha)} sk^{\alpha} GEk(\alpha) \tag{5}$$

with v_k=sub-group population share (same as in equation (1)), s_k=sub-group income share and $GE_k(\alpha)$ = sub-group inequality. $GEB(\alpha)$ is instead calculated as in equation (3) assuming that every person within a given group k received mean income (y_j*) of group k as follows:

$$GEB(\alpha) = \frac{1}{\alpha^2 - \alpha}[\sum_{j=1}^{k}(\frac{y_j^*}{y^*})^{\alpha} - 1] \tag{6}$$

We know that changes in poverty can be the result of either changes in mean income or changes in the distribution of income, or both. Although unlikely, poverty could even decrease during a period of negative growth if redistribution has been at work in favour of the poor. This understanding has encouraged researchers to find a way to estimate the different contributions of income growth and distribution on poverty changes. Significant contributions to this particular literature include Jain and Tendulkar (1990), Kakwani and Subbarao (1990), Datt and Ravallion (1992), Kakwani (1997) and Shorrocks (1999).

Datt and Ravallion has been a popular method used in applied research over the 1990s but the decomposition methodology which they proposed included a residual which has been object of debate. Later, Kakwani (1997) and Shorrocks (1999) have proposed exact decompositions. Following two rather different approaches, both authors reached the same decomposition formula.[4] Applying this formula to two time periods and keeping time one as the reference period, the decomposition can be described as follows:

Poverty change= P2 - P1 = Growth + Distribution

$$\begin{aligned} &= \frac{1}{2}[P(\frac{z}{\mu_2}, L_1) - P(\frac{z}{\mu_1}, L_1)] + [P(\frac{z}{\mu_2}, L_2) - P(\frac{z}{\mu_1}, L_2)] \\ &+ \frac{1}{2}[P(\frac{z}{\mu_1}, L_2) - P(\frac{z}{\mu_1}, L_1)] + [P(\frac{z}{\mu_2}, L_2) - P(\frac{z}{\mu_2}, L_1)] \end{aligned} \tag{7}$$

where P_t is the poverty measure at time t, z is the poverty line, μ_t is the mean of income at time t and L_t is a vector of parameters fully describing the Lorenz curve at time t with $t=1,2$.

Using equation (7) and estimating the parameters of the Lorenz curve is possible to additively decompose poverty changes into growth and distribution components. It is necessary first to choose one or more functions proposed in the literature for the Lorenz curve and then derive the formulae for the FGT poverty measures. Here we follow Datt and Ravallion (1992) and Datt (1998) approach and use the General Quadratic (Villasenor and Arnold 1989) and the Beta (Kakwani 1980) models for the specification of the Lorenz curve and choose between the two on the basis of a goodness-of-fit test. This procedure is generally applied to grouped data but it can also be used on unit data considering that each unit in a sample survey represents a group of people in the population.

The literature on poverty changes decompositions has also induced a search for measures of growth that could take into account not only changes in mean income occurred but also whether these changes have been pro-poor or not, i.e. have benefited the poor more than the non poor. Ravallion and Chen (2003) for example proposed the 'pro-poor growth index' (PPG) derived from what they call the 'Growth Incidence Curve' (GIC), which is the curve determined by the growth rate in mean income of each quantile ordered in ascending order of income. More recently, Kakwani, Khandker and Son (2004) proposed a similar index named the Poverty Equivalent Growth Rate (PEGR). The index measures the rate of growth that would have been necessary to change the poverty rate as it actually changed but with inequality kept constant. It can be seen as a measure of pro-poor growth and also as an alternative measure of the impact of inequality changes on poverty.

These two measures have been the object of a recent debate between Kakwani and Ravallion (for details on this debate see the UNDP International Poverty Centre *One Pager* Series, Issues Nos. 1, 4, 6 and 9). The condition that satisfies the pro-poor growth measure put forward by Ravallion and Chen (2003) is that growth in mean income should affect also the poor, not just the rich, whereas the Kakwani, Khandker and Son (2004) measure is more restrictive in that it requires growth to be proportionally greater for the poor than for the rich. This debate is evidently a normative one and the use of one measure over the other will depend on the importance we wish to attribute to the relative growth in mean incomes among the poor and among the rich. As noticed by Kakwani, Khandker and Son (2004), the PPG measure belongs in fact to the same family of pro-poor measures of the PEGR. The difference is that the PPG measure is based only on the Watts Index while the PEGR measure is generalised to a number of poverty indexes, including the Watts index and the FGT poverty measures. In this paper we will report mean income growth of the poor to make sure that the pro-poor condition of the PPG measure is met but we will also test for the more restrictive pro-poor condition of Kakwani, Khandker and Son (2004) by measuring the PEGR. The PEGR is defined as:

$$\gamma^* = \left(\frac{\delta}{\eta}\right)\gamma \qquad (8)$$

where δ is the estimate of total poverty elasticity; η is the estimate of growth elasticity of poverty and γ is the difference of the natural logarithms of mean incomes between the two periods considered. These measures can be estimated as follows:

$$\delta = \frac{1}{\gamma}(Ln(P(z,\mu_2,L_2)) - Ln(P(z,\mu_1,L_1)))$$

$$\eta = \frac{1}{2\gamma}(Ln(P(z,\mu_2,L_1)) - Ln(P(z,\mu_1,L_1)) + Ln(P(z,\mu_2,L_2)) - Ln(P(z,\mu_1,L_2)))$$

$$\gamma = Ln(\mu_2) - Ln(\mu_1)$$

where *P, z,* μ and *L* are the same notations as we used in equation (7).

The paper will also estimate OLS multivariate and bivariate regressions between output, income, poverty and inequality across the regions of Kazakhstan. The purpose of this exercise is the same as for the various decompositions and pro-poor measures we discussed above. We want to pinpoint what are the factors that really explain changes in output (GDP), changes in household income of the population and changes in household income among the poor and see how these factors are interrelated. The regressors we use are the economic sectors, the FGT poverty indices and the inequality measures already described. We will also regress output growth and household income growth on each other. If output growth is really responsible for the growth in household income, especially among the poor, these equations should clearly show it. If instead it is changes in inequality that explain mostly changes in the household income of the poor, then we should be able to observe a significant relation between these two variables. We can also test in this way what are the sectors of the economy that have been more relevant for the growth of household income among the poor.

RESULTS

Regional Output

We start our analysis by identifying the sources of output growth in terms of regions and economic sectors. As already described in the introduction, Kazakhstan experienced exceptional growth between 1999 and 2002. This paper focuses on the third spell of growth between 2001 and 2002 although it should be considered that the country already had two years of very high growth and that this growth should have turned into poverty reduction by 2002. Of the 9.5% growth occurred between 2001 and 2002, 2.4% is accounted for at the national level and could not be attributed to any particular region. The remaining 7.1% can instead be attributed to regions and economic sectors within regions.

Table 1 shows the regional output growth rates by economic sector. The first aspect to note is that there are very large differences across regions and economic sectors. Eight of the fourteen regions evidence remarkable growth rates while the remaining six regions show negative growth rates. The two cities of Almaty and Astana also show opposite signs with Astana growing significantly and Almaty undergoing a moderate recession. The difference in performance between the two largest cities in the country is

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explained by the fact that the nation's capital was being transferred from Almaty to Astana with the consequent loss for the old capital and gain for the new one.

At the national level, the best performing sectors are construction, services and transport and commerce in this order but all sectors evidence positive growth with the exception of industry. At the regional level and among the fourteen regions, services show only one negative sign, agriculture, trade and transport have three negative signs, construction four and industry eight. Overall, services seem to be the best performing sector across the regions.

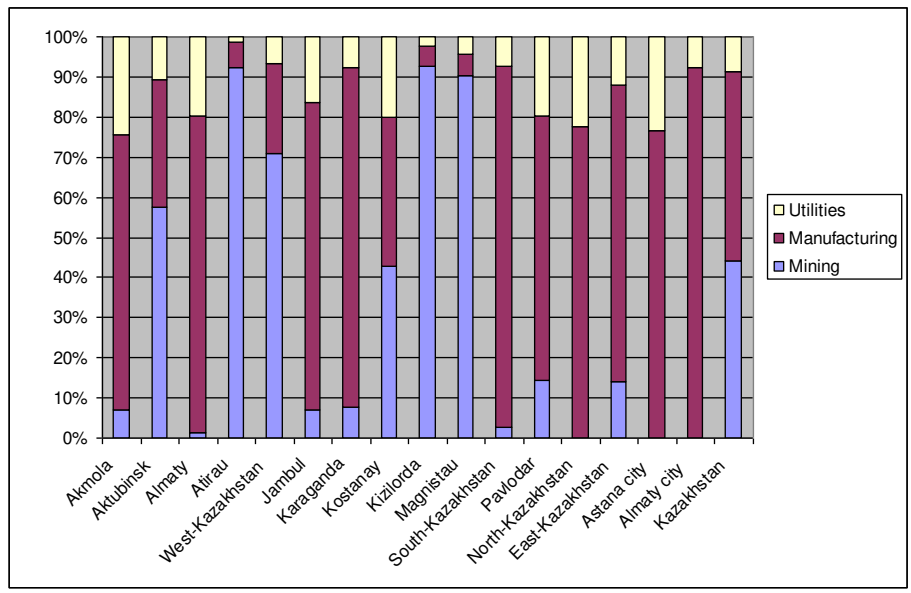
If one looks at the structural distribution of industry in the regions (Figure 1) it is evident that regions with high shares in mining are also the regions with the highest growth rates. Five regions in Kazakhstan have a mining sector that accounts for over 50% of output and these same five regions have been the top performers in terms of regional growth. Kazakhstan is the second largest oil producer after Russia among the former Soviet republics and has also large reserves of gas, gold and other minerals. Not surprisingly, regional growth has been driven by growth in the mining sector. Looking closer at the industrial sector, we observe a two-tier type of growth, which explains the two-tier type of growth in the regions. All sectors have been performing relatively well in most regions while industry had very good performances in the mining sphere and a very poor performance in the non-mining sectors. The only exception to this trend is the region of Akmola that compensated the industrial decline with high growth in the construction sector. This is probably because the region of Akmola hosts the new capital Astana where the construction sector has had a major boost.

TABLE 1. REGIONAL GROWTH BY ECONOMIC SECTOR 2001-2002

Region	Regional Growth	Agric.	Industry	Construct.	Trade and Commun.	Transport and Commerce	Services
Akmola	9.1	2.9	-19.6	96.9	-11.4	27.5	39.7
Aktubinsk	20	-3.7	8.2	79.4	17.7	31.5	34.7
Almaty	8.8	11.6	-1.8	0.2	-31.4	26	38.6
Atirau	18.1	6.7	36	13.2	8.2	25.2	-18
West-Kazakhstan	24	8.9	34.2	50.3	57.7	4.7	4.5
Jambul	26.9	31.4	4.4	156.4	10	36.3	43.8
Karaganda	-3.1	27.4	-14.2	-9.3	19	-13.9	22.2
Kostanay	-4.6	2.1	-39.8	47.7	8.6	14.5	29.7
Kizilorda	50	-3.9	82.1	52.3	28.6	8.4	41.5
Magnistau	35.6	6.3	54.5	61.4	21.8	11.8	0.9
South-Kazakhstan	-3	13.4	-36.3	-1.6	-15.5	13.9	45.8
Pavlodar	-7	16.5	-15.5	-36.5	13	-10.5	15.4
North-Kazakhstan	-3.2	-4.3	-22.5	115.4	-2.5	-2.8	11
East-Kazakhstan	-1.9	7.2	-30.3	-16.6	21.4	26.2	33
Astana city	18	19.3	-24.6	6.9	24.6	-20.2	42.8
Almaty city	-2.8	-19.7	-30.4	51	0.1	12.3	-3.7
Kazakhstan	7.1	7.4	-1.5	23.7	7.4	9.0	14.0

Source: NSA(2003).

FIGURE 1. STRUCTURAL COMPOSITION OF INDUSTRY IN THE REGIONS 2001



Source: NSA (2002).

A growth decomposition exercise clarifies the contribution of each region and each sector to national output growth (Table 2). Almost half of the regional growth is accounted for by the services sector, over 20% by construction, about 30% by trade, communications, transport and commerce together, and 10% by agriculture. Instead, industry contributed negatively to growth at the national level (-7%) despite the fact that the largest single contributors to growth have been the industrial sectors in the mining regions. For example, industry in the region of Atirau (an oil-rich region) contributed alone to about a quarter of national growth. Thus, the very good performance of the mining sector explains growth in the mining regions but is outweighed by the industrial decline in the non mining regions at the national level.

Regional Income, Poverty, and Inequality

Has output growth induced a growth in household income? The trickle down effect has been very modest. Despite the consecutive high levels of output growth in 2000, 2001 and 2002 household income between 2001 and 2002 grew, on average, by only 0.7% (Table 3). This may be explained by a combination of factors. Oil growth is stocked away in an oil fund the resources of which, during the time considered, were not injected into the economy. Industrial restructuring was still underway and employment did not grow during the period while the large reservoir of unemployed and underemployed contributed to maintain low wages. Sign of productivity growth were visible but these

translated into substantial increases in wages only in selected sectors. Whatever the reason and in the short-term, we observe a very low elasticity of household income growth to GDP growth at the national level.

TABLE 2. GROWTH DECOMPOSITION BY REGION AND ECONOMIC SECTOR 2001-2002

Region	Regional Growth	Agric.	Industry	Construct.	Trade and Commun.	Transport and Commerce	Services
Akmola	4.2	0.5	-2.0	1.0	-0.4	1.7	3.4
Aktubinsk	12.7	-0.2	2.2	3.4	1.7	2.1	3.5
Almaty	6.2	2.1	-0.4	0.0	-2.1	2.6	4.0
Atirau	25.7	0.2	27.2	1.7	0.3	2.7	-6.4
West-Kazakhstan	16.7	0.5	4.8	7.1	2.9	0.5	1.0
Jambul	7.8	2.0	0.4	0.5	0.3	1.4	3.2
Karaganda	-4.4	1.5	-10.8	-0.4	3.5	-2.6	4.3
Kostanay	-3.5	0.4	-9.9	0.5	1.0	1.4	3.0
Kizilorda	16.0	-0.1	10.9	1.6	0.5	0.4	2.9
Magnistau	24.8	0.0	20.4	2.5	0.4	1.3	0.1
South-Kazakhstan	-3.0	2.1	-14.0	-0.1	-1.5	1.5	9.1
Pavlodar	-6.3	1.0	-6.3	-1.1	0.7	-2.4	1.7
North-Kazakhstan	-1.4	-0.8	-1.7	0.3	-0.1	-0.1	1.0
East-Kazakhstan	-2.3	1.0	-16.0	-0.8	3.5	3.1	6.9
Astana city	13.8	0.0	-1.9	1.4	3.5	-1.3	12.0
Almaty city	-6.9	0.0	-10.3	3.1	0.1	3.8	-3.5
Kazakhstan	100.0	10.3	-7.3	20.7	14.3	16.0	46.0

Source: NSA (2003).

In Table 3, we can see growth in average household income in nine of the sixteen areas (fourteen regions and two cities). If we compare these results with those of output in Table 1, we can see that in four of these areas the signs of output and household income growth do not concord (Akmola, South-Kazakhstan and the two cities). Therefore, output growth and household income growth do not necessarily move in the same direction. This relation is further weakened if we look at household income of the poor. In half of the sixteen areas output growth and growth in household income of the poor have opposite signs. What happened to poverty during the exceptional growth period? At the national level, poverty has decreased very significantly (Table 3). The poverty headcount index has declined by over 10%, the poverty gap index by almost 20% and the severity of poverty index by more than 24%. Not only the poor have done better than the non poor but the poorest among the poor have done better than the poor as a whole.

However, these national trends hide again a significant regional diversity. Seven of the sixteen regions show a net increase in all poverty indexes. These generally include non-mining regions but there is also Kizilorda which is a region where the mining sector accounts for 90% of industry. In twelve areas, output growth and poverty changes have opposite signs as one would expect but in two other regions and in the cities of Almaty and Astana these two measures have the same sign. A significant cross-regional

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'redistribution' of poverty has also occurred in Kazakhstan as shown by changes in poverty shares and poverty risks between 2001 and 2002 (Table 4). Six of the sixteen areas have seen their poverty share and poverty risk increase in all FGT measures despite the fact that these were regions with positive output growth. Moreover, if we look at the poverty shares and risks in 2001 and 2002 respectively (not in table) we notice that regions that were doing better in 2001 have worsened their positions while regions which were doing worse have bettered their positions. These trends have determined a process of regional convergence in poverty.

TABLE 3. CHANGES IN HOUSEHOLD INCOME AND POVERTY 2001-2002 (%)

Region	HH Income growth	HH Income growth (poor)	HH Income gap (poor)	P0	P1	P2
Akmola	-3.5	2	-7.5	-8.9	-15.7	-21.9
Aktubinsk	15.2	9.9	-25.6	-23.9	-43.5	-56.4
Almaty	12.5	7.9	-32.1	-43.2	-61.5	-72.4
Atirau	4.3	4	-10.7	-1.1	-11.9	-13.9
West-Kazakhstan	4	0.3	-0.3	-28.2	-28.5	-28.7
Jambul	6.8	2.8	-8.7	-20.7	-27.7	-32.4
Karaganda	-12	0.7	-2.9	42	37.9	24.9
Kostanay	-3.1	-2.8	8.8	11.7	21.3	36.9
Kizilorda	0.3	-4.2	19	14.5	36.1	55.8
Magnistau	15.9	14.9	-43	-39.4	-65.4	-78.5
South-Kazakhstan	6.7	4.7	-16.7	-37.2	-47.7	-57.3
Pavlodar	-15.5	9.4	-25.4	91.4	42.3	12.1
North-Kazakhstan	-13.9	2.6	-10.4	71.3	53.5	33.6
East-Kazakhstan	-0.2	0.7	-2.1	14.6	12.1	8.2
Astana city	-3.1	-1.6	6.5	81.2	93.3	194.2
Almaty city	7.2	3.5	-18.2	-50.8	-59.7	-52.5
Kazakhstan	0.7	3.3	-11.7	-10.2	-19.7	-24.3

Source: Kazakhstan Household Budget Surveys 2001 and 2002.

What happened to inequality with such a diverse regional performance? Inequality in Kazakhstan has decreased in all but four of the sixteen areas and for almost all inequality measures considered (Table 5). The mining region of Kizilorda underwent a major surge in inequality but several regions such as Akmola, Aktyubinsk and South-Kazakhstan and the city of Almaty have managed to reduce inequality significantly. Reductions in inequality have occurred in all parts of the income distribution as suggested by the consistent negative signs of GE1, GE2 and GE3. One exception is the region of Karaganda where reduction in inequality occurred in the lower part of the distribution but not in the upper part.

TABLE 4. CHANGES IN POVERTY SHARES AND RISK 2001-2002 (%)

Region	P0share	P1share	P2share	P0risk	P1risk	P2risk
Akmola	4.3	5.9	3.7	4.2	5.9	3.7
Aktubinsk	-15	-30.6	-43.4	-12.9	-28.9	-42.1
Almaty	-35.9	-52.2	-63.8	-35	-51.6	-63.3
Atirau	10.4	8	11.7	13.2	10.8	14.6
West-Kazakhstan	-14.6	-6.5	-1.4	-17.9	-10.1	-5.2
Jambul	-7.9	-7.6	-8.7	-9.3	-9.1	-10.1
Karaganda	63	73.9	66.8	62.5	73.4	66.3
Kostanay	29.9	54.9	85	27.8	52.4	82
Kizilorda	27.6	66.6	101.7	31	71.1	107.2
Magnistau	-27.5	-54.6	-70.1	-30.6	-56.5	-71.4
South-Kazakhstan	-28.1	-34.3	-43.3	-28.1	-34.2	-43.3
Pavlodar	121	80.4	50.4	119	78.9	49.1
North-Kazakhstan	92.5	89.4	74.7	96	92.9	78
East-Kazakhstan	27.3	36.8	39.6	31.1	40.9	43.8
Astana city	120.4	158.7	317.6	107.4	142.6	291.3
Almaty city	-42.4	-48.3	-35.5	-43.7	-49.4	-36.8
Kazakhstan	0.0	0.0	0.0	2.7	1.0	0.6

Source: Kazakhstan Households Budget Surveys 2001 and 2002.

TABLE 5. CHANGES IN INEQUALITY 2001-2002 (%)

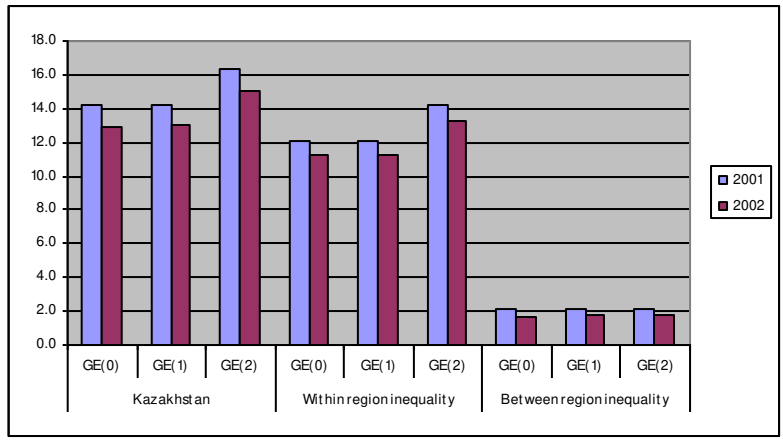
Region	GE0	GE1	GE2	Gini
Akmola	-10.1	-8.9	-8.6	-4.8
Aktubinsk	-11.6	-12.7	-15.7	-5.8
Almaty	-13	-11.3	-10.8	-6.1
Atirau	-1.5	-2.6	-4.3	-1
West-Kazakhstan	-6.3	-3.7	-0.7	-3
Jambul	-4.2	-3.2	-2.3	-2.2
Karaganda	-3.2	1	7.4	-0.9
Kostanay	4.3	1.6	-0.4	0.8
Kizilorda	27.3	27.1	30.1	13
Magnistau	-19	-17.2	-17.1	-9.3
South-Kazakhstan	-26.6	-28.2	-32.7	-13.7
Pavlodar	-6.6	-6.5	-9.9	-1.5
North-Kazakhstan	-4.2	-4.4	-5.5	-1.6
East-Kazakhstan	5.7	4.5	2.7	3
Astana city	9.2	7.1	5.6	3.9
Almaty city	-16	-15.9	-17.7	-8.1
Kazakhstan	-5.3	-5.2	-5.9	-2.5

Source: Kazakhstan Households Budget Surveys 2001 and 2002

Note: The Gini coefficient is estimated as: $G = (1/n^2\mu_y)\sum_{i=1}^{n}\sum_{j=1}^{n}\left|y_i - y_j\right|$.

A decomposition of inequality in within region and between regions inequality adds some insights into the roots of changes in inequality. Within regions inequality explains most of inequality in Kazakhstan in 2001 and 2002 (Figure 2). Both within and between regions inequality have decreased during the period with between regions inequality decreasing more than within regions inequality. What we are seeing is a regional convergence of incomes both within regions and between regions.

FIGURE 2. DECOMPOSITION OF INCOME INEQUALITY IN WITHIN AND BETWEEN REGIONS INEQUALITY 2001-2002



Source: Kazakhstan Households Budget Surveys 2001 and 2002

Explaining Changes in Poverty

A first insight into what may explain changes in poverty can be gathered by decomposing poverty changes into the component determined by growth in household income and the component determined by changes in the distribution of income as discussed in the measures section. Table 6 shows the results of this decomposition for the three FGT poverty measures considered. Note that growth here refers to growth in household incomes (not output) which we said increased by only 0.7% between 2001 and 2002.

As already reported, poverty has declined in eight of the fourteen regions for all FGT poverty measures.[5] In six of these regions, the growth effect explains most of the poverty change and this is true for all FGT measures with the exception of one region and for the poverty gap index. Poverty has increased instead in the remaining six regions where there is no evident trend in terms of growth or inequality dominance or even in terms of sign. In substance, in the regions where poverty has decreased, the growth in household income explains most of the change. Instead, where poverty has increased, it is not clear what effect is dominating. The national figures convey again an average picture which is a combination of negative and positive regional performances.

Pro-poor Growth[6]

Growth in household income has been modest but was it pro-poor? The answer is yes overall but with significant regional differences. In table 7, we report the results for the estimates of the Poverty Equivalent Growth Rates described in the measures section. To interpret the results, the PEGR should be compared with the growth in mean income. Where mean income growth is positive, a PEGR greater than the growth in mean income indicates that growth has been pro-poor. Between 2001 and 2002, this was the case for

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TABLE 6. DECOMPOSITION OF CHANGES IN POVERTY INTO GROWTH AND INEQUALITY COMPONENTS 2001-2002

Region	P0 - Headcount index			P1 - Poverty Gap Index			P2 - Severity of Poverty Index		
	Pov. change	Growth effect	Ineq. effect	Pov. change	Growth effect	Ineq. effect	Pov. change	Growth effect	Ineq. effect
Akmola	-0.3	1.35	-1.65	-0.14	0.35	-0.5	-0.06	0.11	-0.17
Aktubinsk	-6.71	-5.1	-1.61	-2.07	-1.73	-0.34	-0.85	-0.76	-0.09
Almaty	-8.24	-5.7	-2.54	-2.35	-1.47	-0.88	-0.81	-0.48	-0.32
Atirau	-2.35	-2.04	-0.31	-0.81	-0.71	-0.09	-0.37	-0.34	-0.04
West-Kaz.	-4.37	-1.85	-2.52	-0.96	-0.46	-0.5	-0.26	-0.14	-0.12
Jambul	-5.7	-4.63	-1.07	-1.9	-1.34	-0.55	-0.79	-0.53	-0.26
Karaganda	4.69	5.52	-0.83	0.99	1.52	-0.54	0.28	0.53	-0.25
Kostanay	1.32	1.27	0.05	1.2	0.48	0.72	0.84	0.23	0.6
Kizilorda	4.76	-0.23	4.99	1.93	-0.06	1.99	0.77	-0.02	0.79
Magnistau	-12.97	-9.39	-3.58	-5.86	-3.31	-2.55	-2.66	-1.35	-1.3
South-Kaz.	-8.77	-4.6	-4.17	-3.04	-1.22	-1.82	-1.27	-0.44	-0.82
Pavlodar	4.87	5.6	-0.73	0.86	1.39	-0.53	0.21	0.44	-0.23
North-Kaz.	4.29	4.22	0.07	1.03	0.98	0.05	0.31	0.29	0.02
East-Kaz.	1.6	0.07	1.53	0.63	0.02	0.61	0.28	0.01	0.27
Kazakh.*	-2.11	-0.31	-1.8	-0.79	-0.09	-0.7	-0.33	-0.04	-0.3

Source: Kazakhstan Household Budget Surveys 2001 and 2002. (*) Including the cities of Almaty and Astana.

seven regions. For some of these regions, such as Almaty, the ultra-poor have benefited more than the poor as a whole while for other regions, such as Aktubinsk, the opposite is true as witnessed by the PEGRs for the poverty gap and severity of poverty indexes. We also have one region, Kizilorda, where growth in mean income has been positive but the PEGRs are all negative. This is a case where growth has not been pro-poor but pro-rich. In four other regions, growth and PEGRs have been all negative. In all of these regions, poverty has increased and we cannot argue that growth has been pro-poor. There is also one region, Akmola, where changes in inequality have managed to reduce poverty irrespective of the negative growth rate.

In sum, growth in household income has been pro-poor in seven of the eight regions where growth has been positive and in one of the regions with negative growth rates. Growth has been pro-rich in one of the regions with positive growth rates while it cannot be qualified as pro-rich or pro-poor in regions where poverty has increased. Again the analysis splits the regions into two equal sized groups of good and bad performers which make the national indicators reflect poorly the real conditions across the nation.

Parametric Covariance

A regional performance that splits the regions into two blocks of good and bad performers is an indication that national trends do not capture well regional trends but this does not mean that output and poverty do not covariate with a negative sign as one would expect. However, we can estimate correlations between these variables by means of OLS regressions. Table 8 shows the results of this exercise. The dependent variables

TABLE 7. POVERTY EQUIVALENT GROWTH RATES 2001-2002

	Growth in mean income	PEGR P(0)	PEGR P(1)	PEGR P(2)
Akmola	-3.5	0.8	1.5	1.7
Aktubinsk	15.2	18.6	16.9	15.7
Almaty	12.5	17.1	18.9	19.7
Atirau	4.3	4.9	4.8	4.7
West-Kazakhstan	4	9.3	8.1	7.4
Jambul	6.8	8.1	9.3	9.8
Karaganda	-12	-10.8	-8.1	-6.7
Kostanay	-3.1	-3.3	-8	-11.3
Kizilorda	0.3	-5.3	-7.8	-8.7
Magnistau	15.9	20.6	26.2	29
South-Kazakhstan	6.7	12.4	16.2	18.5
Pavlodar	-15.5	-14.2	-9.9	-7.6
North-Kazakhstan	-13.9	-15.3	-15.8	-16
East-Kazakhstan	-0.2	-4.7	-5.7	-6.2
Kazakhstan*	0.7	12.6	16.1	17.6

Source: Kazakhstan Household Budget Surveys 2001 and 2002.
(*) Including the cities of Almaty and Astana.

are regional output growth, growth in regional household mean income and growth in regional household mean income for the poor. In bold are highlighted significant values at the 5% level of significance.

Panel (1) in Table 8 reports the results for the multivariate regressions on economic sectors. This is to test what are the economic sectors that may be most relevant for growth and poverty reduction. Regional growth in industry and services is significantly correlated with regional output growth. These are two sectors that seem to explain better than others regional growth as we had already noticed in previous sections. However, these same sectors are not significantly correlated with household mean income, either for all households or for the poor alone. Only the transport and communication sector shows a positive and significant relation with household mean income. Therefore, those sectors that contributed the most to output growth are not the same sectors that contributed the most to household income growth. This is a further indication of how disjoint the processes of output growth and poverty reduction have been.

In panels (2) and (3) we report the bivariate results for the three FGT measures of poverty and for the four measures of inequality selected. The three poverty indexes do not show any significant relation with output growth. They are instead strongly correlated with growth in household income. Likewise, changes in inequality do not seem to bear any relation with changes in output. They are also unrelated to changes in household income while they are strongly associated with changes in household income of the poor. These results confirm the results of our decomposition of poverty changes into growth and distribution components where we found that growth of household income explained most of the poverty reduction observed in the regions.

Finally, when regressed on each other (panel 4 in Table 8), the three dependent variables used including growth in output, household income and household income of the poor are not significantly correlated. This is surprising, counterintuitive and contrary to the conventional wisdom that growth in output in Kazakhstan has reduced poverty.

TABLE 8. MULTIVARIATE AND BIVARIATE OLS REGRESSIONS

	Dependent Variables								
	Regional Output Growth			**HH Income Growth (All)**			**HH Income Growth (Poor)**		
Regressors	**Coef.**	**Std. Err.**	**t-stat**	**Coef.**	**Std. Err.**	**t-stat**	**Coef.**	**Std. Err.**	**t-stat**
(1) 2001/2002 Changes in Sector Output (Multivariate regression)									
Agricolture	-0.009	0.139	-0.070	-0.071	0.196	-0.360	0.080	0.124	0.650
Industry	**0.414**	**0.054**	**7.650**	0.084	0.076	1.110	0.032	0.048	0.660
Construction	0.060	0.034	1.760	-0.025	0.048	-0.530	-0.008	0.030	-0.260
Trade and Commerci	0.096	0.098	0.980	0.003	0.137	0.020	-0.101	0.087	-1.160
Transp. and Commun.	0.015	0.115	0.130	**0.367**	**0.162**	**2.260**	0.051	0.103	0.500
Services	**0.244**	**0.092**	**2.660**	0.019	0.129	0.150	-0.105	0.082	-1.280
Constant	2.511	3.235	0.780	-1.830	4.557	-0.400	6.127	2.892	2.120
(2) 2001/2002 Changes in Poverty (Bivariate regressions, no constant)									
P(0)	-0.071	0.115	-0.620	**-0.176**	**0.031**	**-5.750**	-0.024	0.034	-0.690
P(1)	-0.071	0.110	-0.650	**-0.166**	**0.030**	**-5.460**	**-0.066**	**0.028**	**-2.320**
P(2)	-0.006	0.080	-0.080	**-0.085**	**0.030**	**-2.800**	**-0.050**	**0.020**	**-2.520**
(3) 2001/2002 Changes in Inequality (Bivariate regressions, no constant)									
GE(0)	0.105	0.393	0.270	-0.290	0.171	-1.700	**-0.341**	**0.078**	**-4.360**
GE(1)	0.147	0.402	0.370	-0.305	0.174	-1.760	**-0.343**	**0.082**	**-4.200**
GE(2)	0.172	0.358	0.480	-0.265	0.156	-1.700	**-0.302**	**0.074**	**-4.070**
Gini coeff.	0.153	0.810	0.190	-0.666	0.342	-1.950	**-0.675**	**0.168**	**-4.020**
(4) 2001/2002 Changes in Output and HH Income (Bivariate regressions, no constant)									
Reg. Output Growth				0.224	0.107	2.080	0.101	0.073	1.390
HH Income Growth/all	1.001	0.481	2.080				0.277	0.147	1.890
HH Income Growth/Poor	1.131	0.815	1.390	0.695	0.367	1.890			

Source: Kazakhstan Household Budget Surveys 2001 and 2002. Values in bold are values significant at the 5% level.

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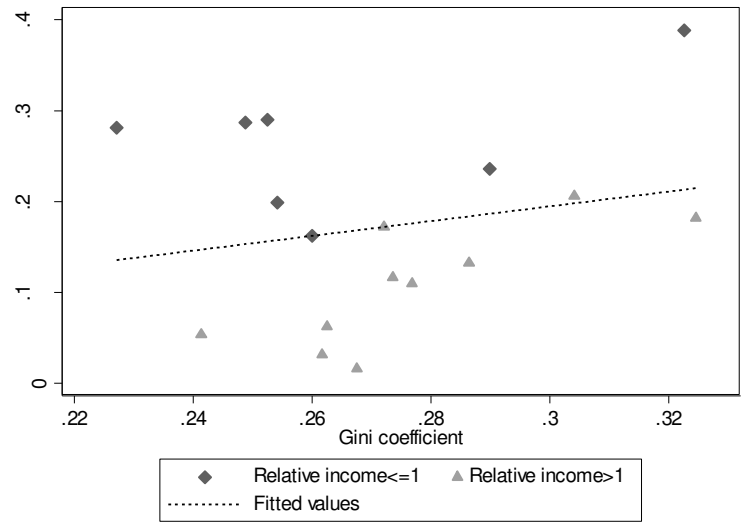
Non Parametric Covariance

A final insight into the relation between income, poverty and inequality is provided by plotting these three variables into one diagram. In Figures 3 and 4, we plot inequality (the Gini coefficient), poverty (the headcount index) and relative mean household income by region in a scatter diagram. The markers represent relative mean household income. Triangles represent regions where this measure has improved and diamonds represent regions where this measure has worsened. On the x-axis we have the Gini coefficient and on the y-axis we have the poverty headcount index.

In 2001 and 2002, we see a positive relationship between inequality and poverty shown by the fitted value lines. Where poverty is higher, inequality also tends to be higher. We can also see that, with one exception in both years, regions are split into two groups. Regions with high relative income are all placed below the fitted line and regions with low relative income are all situated above the fitted line. Regions with higher relative income have lower poverty, inequality being equal. Between 2001 and 2002 (Figure 3 and 4), markers clearly shift downward and leftward and also tend to converge. Downward and leftward shifts indicate a general decrease in within regions poverty and inequality. Vertical and horizontal convergence indicate instead a reduction in between regional poverty and inequality. These diagrams confirm that regional convergence in poverty and inequality has been a major trend during the period.

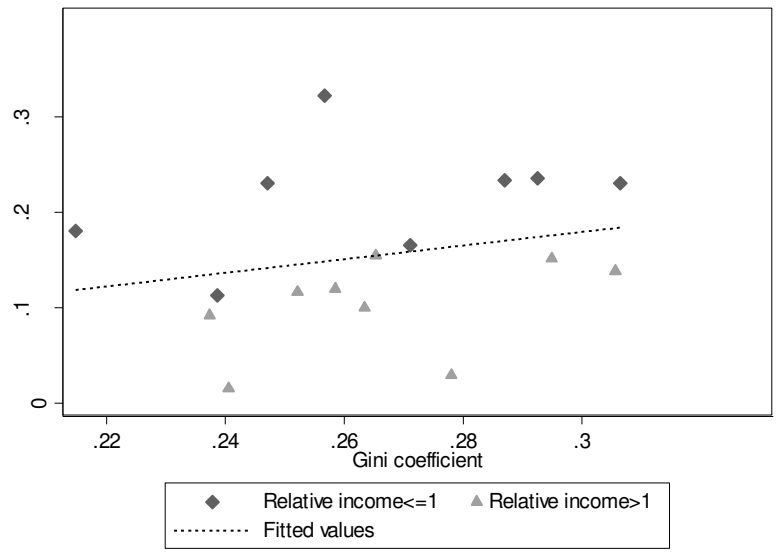
In figure 5, percentage changes of poverty and inequality between 2001 and 2002 are plotted. In this case, triangle markers represent regions that gained positions in relative income over the period and diamonds represent regions that lost positions. We also plotted predicted poverty changes attempting to trace a possible function that could describe our data. In effect, with the exception of the outlier Kizilorda, a quasi-exponential-like function would seem to describe the data well. Where inequality has significantly declined, poverty has also significantly declined while such elasticity weakens toward small declines or increases in inequality. As it can be seen in the figure, there are no regions in the bottom right-hand quadrant, meaning that there are no regions that had simultaneous growth in inequality and fall in poverty. We do have three regions that had moderate reduction in inequality and severe growth in poverty (top left-hand quadrant) and three regions where poverty and inequality have both increased (top right-hand quadrant). We can argue that poverty and inequality show a certain positive association across the regions of Kazakhstan. The declines in within and between regions inequality and poverty have determined a convergence of these measures across regions with an evident split between good performing and bad performing regions.

FIGURE 3. GROWTH, POVERTY AND INEQUALITY 2001



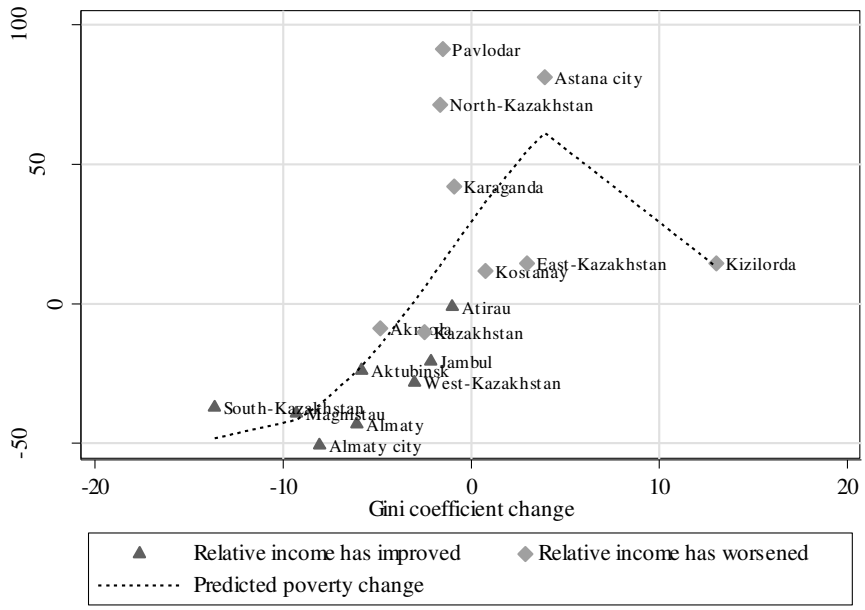
Source: Kazakhstan Household Budget Survey 2001.

FIGURE 4. GROWTH, POVERTY AND INEQUALITY 2002



Source: Kazakhstan Household Budget Survey 2002.

FIGURE 5. GROWTH, POVERTY AND INEQUALITY CHANGES 2001-2002



Source: Kazakhstan Household Budget Survey 2001 and 2002

RECOMPOSING THE PUZZLE

We can finally pull together the findings and judge whether it was really output growth that determined a reduction in poverty in Kazakhstan or some other factor.

At the national level, Kazakhstan enjoyed exceptional output growth by world standards in three consecutive years; 9.8% in 2000, 13.5% in 2001 and 9.5% in 2002 and poverty declined significantly during the period from 39% to 24.2%. During the last spell of this positive period, poverty has decreased very significantly; -10.2% for the poverty headcount index, -19.7% for the poverty gap index and -24.3% for the severity of poverty index. This same finding for Kazakhstan and other transitional economies of the Former Soviet Union has led previous studies to argue that output growth is the main factor explaining poverty reduction.

A regional analysis for Kazakhstan has in fact unveiled a much more complex picture and one where we can exclude that output growth has been the main factor behind poverty reduction. This conclusion is supported by a number of findings. First, national figures hide a sharp regional diversity. Only nine of the sixteen areas considered (fourteen regions and two cities) enjoyed output growth and poverty has increased in seven areas. Second, output growth and poverty reduction do not show any positive and significant correlation across areas. In half of the areas, changes in output and changes in mean income of the poor move in opposite directions. And there are no significant coefficients in bivariate regressions between changes in output and changes in the three

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FGT measures considered. Third, we found that poverty is correlated with changes in household income, not output. Far from being proxies, output and household income are two very different variables in national accounts. In fact, at the national level, the elasticity of household income to output was found to be very low while, at the regional level, we did not find any significant relation between the two variables. Fourth, sectors that explain growth in output are not the same sectors that explain growth in household income. Changes in poverty are explained by changes in household income and by the fact that these changes have been pro-poor. Growth in household income explains most of poverty reduction where this has occurred. And the fact that this growth has been pro-poor, i.e. has been higher for poorer households, explains why poverty has declined and why it has declined more for the poorest among the poor.

Moreover, despite sharp regional diversities, inequality has declined in Kazakhstan and poverty and inequality have also tended to converge across regions. This is explained by the fact that both inter-regional and intra-regional inequality have decreased and that regions initially worse off have performed better than regions initially better off. None of these phenomena could be related to output growth. In the short-term, output growth and changes in poverty and inequality can be two rather disjoint processes. The fact that, at the national level, we can observe exceptional performances in both output growth and poverty reduction is an almost *casual* relation which bears little relation with the *causal* relation of these two variables.

ENDNOTES

[1] I am grateful to the National Statistical Agency of Kazakhstan for granting access to the data. [2] See www.worldbank.org\lsms.

[3] A more comprehensive description of the data is available in World Bank (2004).

[4] Kakwani used an axiomatic method while Shorrocks used the Shapley value, a concept borrowed from game theory. However, when the two decomposition formulae proposed are compared, these are in fact one and the same.

[5] Decompositions for the cities of Astana and Almaty could not be made due to insufficient number of observations.

[6] Note again that this section refers to household income growth, not output growth.

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