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DO THE CHRONICALLY POOR HAVE MORE INTERRUPTED SPELLS OF POVERTY IN TRANSITION ECONOMIES? EVIDENCE FROM KAZAKHSTAN

Given the lack of longitudinal data for transition countries, and specifically for Central Asia, research on poverty has largely ignored the time dimension. This study uses panel data constructed from the rotating cross-sectional Kazakhstan Household Budget Survey for the 2001-2009 period. The panel data provides an opportunity to measure chronic poverty levels and poverty transitions for the first time in Kazakhstan. We find that, despite the rapid and substantial reduction in poverty in the country since the turn of the century, and depending on the measure of chronic poverty employed, as much as a quarter of the population has experienced persistent poverty. However, the majority of chronically poor experience interrupted poverty spells. We apply the multiple-spell hazard model analysis to shed light on factors that impact on poverty exit and re-entry. The results of these estimates confirm that families with children under age six are experiencing higher probability of entry into poverty and lower probability of exit from poverty. Policy interventions are needed to improve the situation by providing an affordable state child care system in Kazakhstan.

Key words: chronic poverty, longitudinal data, multiple-spell hazard model, Kazakhstan.
JEL Classification: I32, C23, C41.

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Есть ли у хронически бедных более прерывающиеся периоды бедности в странах с переходной экономикой? Данные из Казахстана

Ввиду отсутствия панельных данных по странам с переходной экономикой и, в частности, по Центральной Азии, исследования бедности в значительной степени игнорировали временные измерения. В этом исследовании используются панельные данные, полученные на основе ротационного обследования бюджетов домашних хозяйств в Казахстане за период 2001-2009 гг. Панельные данные дают возможность впервые в Казахстане измерить уровни хронической бедности и изменения уровня бедности. Мы находим, что, несмотря на быстрое и существенное сокращение бедности в стране с начала века и в зависимости от показателя хронической бедности, почти четверть населения испытывала постоянную бедность. Тем не менее, большинство хронически бедных имело перерывы в периодах бедности. Мы применяем анализ модели оценки рисков нескольких периодов, чтобы пролить свет на факторы, которые влияют на выход из бедности и возврат. Результаты этих оценок подтверждают, что семьи с детьми в возрасте до шести лет испытывают более высокую вероятность попадания в бедность и более низкую вероятность выхода из бедности. Для улучшения ситуации необходимы политические меры, обеспечивающие доступную государственную систему ухода за детьми в Казахстане.

Ключевые слова: хроническая бедность, панельные данные, модель многократного риска, Казахстан

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Өтпелі экономика елдерінде созылмалы кедейліктің үзілетін кезеңдері бар ма? Қазақстаннан алынған деректер

Өтпелі экономикасы бар елдер үшін, атап айтқанда, Орталық Азия үшін панельдік деректердің жетіспеуіне байланысты, кедейлік өлшеулерінде көбіне уақыт ескерілмеген. Бұл зерттеу Қазақстандағы айналмалы үй шаруашылықтарының бюджетін 2001-2009 жылдарға

арналған зерттеуден алынған панельдік деректерді пайдаланады. Бұл панельдік деректер Қазақстанда алғаш рет созылмалы кедейліктің деңгейі мен кедейліктен шығу және кіру периодтарын өлшеуге мүмкіндік береді. Біз ғасырдың басынан бастап елде кедейліктің тез және айтарлықтай төмендеуіне қарамастан және созылмалы кедейліктің көрсеткішіне байланысты халықтың төрттен бір бөлігі үнемі кедейлікке тап болғанын таптық. Дегенмен, созылмалы кедейлердің басым бөлігі кедейлік кезеңдерінде үзіліс жасады. Біз қайыршылықтан шығу және қайтаруға әсер ететін факторларды жарыққа шығару үшін тәуекелдерді бағалаудың көп кезеңді моделін қолданамыз. Осы бағалаулардың нәтижелері алты жасқа толмаған балалары бар отбасылардың кедейліктің шығу ықтималдығы төмендеу мен кедейлікке түсу ықтималдығы жоғары екендігін растайды. Жағдайды жақсарту үшін Қазақстанда мемлекеттік балаларды күтудің қолжетімді жүйесін қамтамасыз ету үшін саяси шаралар қажет.

Түйін сөздер: созылмалы кедейлік, панельдік деректер, бірнеше кезеңдік тәуекел үлгісі, Қазақстан.

Introduction

Poverty reduction is one of the major economic challenges in developing countries. Recent evidence illustrates a constant reduction in the incidence of absolute poverty in the developing world (Chen & Ravallion, 2012). The overall percentage of the population living below $1.25 a day in 2008 was 22 percent in developing countries, compared to 52 percent in 1981. Moreover, 1.3 billion people in 2008 lived below $1.25 a day, compared to 1.9 billion in 1981. The level of relative poverty also decreased from 63 percent in 1981 to 47 percent in 2008. However, the number of relatively poor increased by about 360 million over the 1981-2008 period (Chen & Ravallion, 2012). This evidence highlights the importance of poverty measurement in determining actual poverty levels. In particular, understanding the factors that lead to changes in poverty over time is essential for the effectiveness of poverty reduction policies. This understanding requires estimating alternative measures of poverty and their persistence over time. From the policy perspective, therefore, it is important not only to identify the poor at one period of time, but also the chronically poor, i.e. those who have experienced poverty for extended periods or possibly all of their lives, and also the transient poor.

The study of conventional poverty measures alone, taken at a point in time, will not provide accurate information regarding the poverty level and number of poor (Biewen, 2006). Firstly, long periods of low-income lead to greater welfare losses and damaging effects on self-perception and self-confidence for the affected people than a one-off poverty spell. Secondly, the presence of long poverty spells means that the burden of poverty is unequally distributed among the population, because it is only a small number of individuals who endure total poverty compared to a larger number of individuals who endure only short poverty spells. Thirdly, those in long-term poverty will consume a large part of the resources devoted to anti-poverty policies.

Until the late 1980s, the key techniques using the role of time in the study of poverty were developed in the form of poverty trends, seasonality, the timing of experiences, and historical accounts of poverty. Poverty trends usually compared headcounts of poverty across a population at two (or more) different times. However, contrasting poverty trends in this way does not describe whether individuals or households are persistently poor or if they typically move into and/or out of poverty over time (see Hulme & Shepherd, 2003; Carter & Barrett, 2006; Addison, Hulme & Kanbur, 2009).

Given the lack of panel data for transition countries, and specifically for Central Asia, very little analysis has been conducted on poverty dynamics and chronic poverty in this region. The few studies that have addressed the dynamics of poverty (Bierbaum & Gassmann, 2012; Commander, Tolstopiatenko, & Yemtsov, 1999) do so without considering the estimation of multiple-spell hazard models that focus on poverty transitions. A recent study on chronic and transient poverty in Russia reveals that the severity of poverty is found to occur largely from transient rather than chronic spells of economic hardship (Mills & Mykerezi, 2009). Further, Mills and Mykerezi (2009) find that a low level of post-secondary education is one of the major correlates of chronic poverty. A study by Okrasa (1999) finds that selling electronic durables is one of the coping strategies for households experiencing long-term poverty, and that savings accounts have a negative effect on being chronically poor in Poland. Bierbaum and Gassmann (2012) identify the main determinants of chronic poverty in Kyrgyzstan, such as location, low

levels of human capital, and poor employment opportunities.

With respect to Kazakhstan, the majority of poverty studies have long been static, based on cross-sectional data (Anderson & Pomfret, 2002; Pomfret, 2006; Rhoe, Babu & Reidhead, 2008). Conventional static analysis in the literature mainly focuses on the poverty headcount ratio, indicating the proportion of the population that has fallen below a given income or expenditure threshold at a particular point in time. It compares the poverty trends at different times and defines the determinants of static poverty (Anderson & Pomfret, 2002; Pomfret, 2006; Rhoe, Babu & Reidhead, 2008). According to the World Bank, the poverty by headcount ratio in Kazakhstan by national standards has fallen since 2001, with 46.7 percent in 2001, dropping to 8.2 percent in 2009, and further reducing to 2.7 percent in 2015 (World Bank, 2016). Reviewing the literature on static poverty in Kazakhstan suggests that the following are significant correlates of poverty: geographic location (Anderson & Pomfret, 2002; Pomfret, 2006), composition of household (Jha & Dang, 2009), and education of the head of household (Anderson & Pomfret, 2002; Pomfret, 2006). One attempt was made to assess the vulnerability of households to future poverty based on cross-sectional data (Jha & Dang, 2009). Due to a lack of panel data, however, to our knowledge there are no studies on chronic poverty and poverty dynamics in Kazakhstan. Thus, the aim of this study is to test the following hypotheses:

1. What is the chronic poverty level in Kazakhstan?

2. Do the chronically poor have more interrupted poverty spells[1]?

3. What are the triggers for poverty exit and re-entry?

In this study, we use panel data[2] for the period of 2001-2009 and, based on various measurements of chronic poverty, we find that almost a quarter of the Kazakh population is chronically poor. However, the majority of individuals are transient poor, due to transitions from poverty spells to non-poverty spells during the nine-year period. The following determinants positively influence poverty exit: head of household has a university degree, location in Almaty and Astana, and having some assets, such as a car or dacha[3]

The remainder of this paper is organised as follows. Section 2 reviews literature and defines chronic poverty measures applied in this study. Section 3 presents a methodology, describes the multiple-spell hazard model and the data. Section 4 examines results and discussion. Section 5 concludes.

Literature Review

Chronic Poverty Measures

Over the last two decades, research devoted to the measurement of poverty dynamics has been growing (Addison, Hulme, & Kanbur, 2009; Bossert, Chakravarty, & D'Ambrosio, 2012; Calvo & Dercon, 2007; Dercon & Porter, 2011; Foster, 2009; Hoy, Thompson, & Zheng, 2011; Hoy & Zheng, 2008; and Jalan & Ravallion, 2000, among others).

The definition of chronic poverty mainly depends on which of the different approaches is used to measure chronic poverty (Chakravarty, 2009; Hulme & Shepherd, 2003; McCulloch & Calandrino, 2003), such as the spells approach (based on duration of poverty spells), the components approach (which considers income or consumption shortfall), and vulnerability (probability of deficient future consumption) (Barrientos, 2007). Following Bane and Ellwood (1986), a poverty spell is identified as the set of consecutive periods during which income falls below the poverty line. In the analysis of chronic poverty, the important difference between the components and spells approaches is that the components approach assumes a compensation between low and high income periods and then the identification of who is poor during each period of time becomes unessential, while in the spells approach no compensation is allowed and one needs to identify who is poor in each period. According to McKay and Lawson (2003), the spells approach is more related to the concept of chronic poverty as

[1] Spell of poverty means one or more consecutive periods below the poverty line.

[2] The analysis makes use of annual cross-section data extracted from the KHBS 2001–2009 and on a panel dataset constructed from these data. The KHBS is a cross-section survey, but the sampling frame remained largely unchanged during the period and a share of households was interviewed throughout the period. The panel dataset was constructed by matching observations across the annual data files (Kudebayeva, 2015).

[3] A small house other than the main dwelling, located near a city. Mainly used for rest and growing vegetables.

persistent poverty, whereas the classification of the chronically poor in the components approach is prejudiced by the depth of poverty, although both offer important tools.

Gradin et al. (2012) introduced a new family of aggregate intertemporal poverty indexes which take into consideration the incidence and the intensity of poverty dimensions in a dynamic framework. This measurement also includes sensitivity to the chain of poverty durations. This measure of chronic poverty is a generalised case of the chronic poverty measures of Foster (2009) and Bossert et al. (2010). The following expression is the aggregate intertemporal chronic poverty index proposed by Gradin et al. (2012):

$$P(Y,z)=\begin{cases}\frac{1}{N}\sum_{i=1}^{N}\left(\frac{1}{T}\sum_{t=1}^{T}\left(\frac{z-y_i^t}{z}\right)^{\gamma}\left(\frac{s_i^t}{T}\right)^{\beta}\right)^{\alpha} \; if\ \alpha>0\\ \frac{q}{N}\; if\ \alpha=0\end{cases}, \quad (1)$$

where N-total number of individuals, T-time period, y_i – well-being indicator (e.g. consumption expenditures), z-poverty line, α is sensitivity of the aggregate intertemporal poverty measure to inequality among the intertemporal poor individuals; β is sensitivity of the individual intertemporal poverty indices to spells duration; γ is sensitivity of the individual intertemporal poverty measure to inequality among the intertemporal poor individuals; s_i^t is the duration in poverty of the individual *i*. One of the advantages of the framework given above is that it involves Foster's (2009) index when β=0 and α=1, which means normalised poverty gaps are not weighted by the poverty spell duration and the aggregate intertemporal poverty measure is simply the average of individual intertemporal indicators over the population, and hence insensitive to the indicators' distribution. When β=1 and α=1, we obtain Bossert et al.'s (2010) measure, which means that normalised poverty gaps are weighted proportionally to spell duration and the aggregation over the population average.

The components approach was proposed by Jalan and Ravallion (hereinafter "J-R") (2000). For identification of the chronically poor, an average or stable component of income is defined, and those individuals who lie below an appropriate poverty line are counted as chronically poor:

$$P_{JRi}=\frac{1}{N}\sum_{i=1}^{N}\left[1-\left(\frac{\bar{y}_i}{z}\right)^{\alpha}\right] \; where\ \bar{y}_i=\frac{1}{T}\sum_{i=1}^{T}y_i^t\ . \quad (2)$$

The components approach for the measurement of chronic and transient poverty has been enlarged by using the equally distributed equivalent (EDE) poverty gaps and has developed a statistical correction for the biases that take place when the number of panel waves available is small (Duclos et al., 2010)[4].

Methodology

Multiple-Spell Hazard Model

The differences in the time spent poor, or in the time spent non-poor, reflect differences in individuals' poverty exit and entry rates. Therefore, a duration analysis based on hazard regressions is an important tool for the in-depth investigation of movements in and out of poverty. This section constructs a model for evaluating the correlates of poverty exit and re-entry and observes the length of poverty spells for individuals who become poor. Thus, the length of time at risk is a fundamental part of the analysis. In this section, the duration dependence in poverty exit and re-entry hazard rates is considered using multivariate regression modelling approaches.

The duration models of Bane and Ellwood (1986) were criticised by Stevens (1999), who pointed out that focusing on single spells systematically underestimates poverty persistence, as the possibility of re-entry is ignored. A number of papers have pointed to the limitations of the implementation of single-spell methodologies in fitting the observed pattern of poverty persistence (Stevens, 1999; Devicienti, 2002; Hansen and Wahlberg, 2009; Biewen, 2006). In addition, Arranz and Canto (2012) studied the effect of spell recurrence on poverty dynamics.

[4] The level of individual ill-fare which, if assigned equally to all individuals and in all periods, would generate the same poverty measure as that produced by the distribution of normalised poverty gaps.

Research on poverty persistence for developed countries has mainly implemented long panels and applied different types of hazard models (Cappellari & Jenkins, 2002; Canto, 2002; Biewen, 2006; Hansen & Wahlberg, 2009; Devicienti, 2011; Jenkins, 2011; Arranz & Canto, 2012). Among developing countries, few researchers have applied such methodologies (for China the discrete-time multi-spell duration model has been applied by You (2011) and Imai & You (2014); and for Ethiopia by Bigsten and Shimeles (2008)).

We conduct a stochastic dominance analysis that illustrates a decline in poverty levels during 2001-2009 in Kazakhstan regardless of the poverty lines used. The results of the estimations for adjusted poverty lines indicate that evaluations of poverty exits and re-entries do not change substantially for small variations of poverty lines. Therefore, we avoid the measurement error in transitions of individuals from non-poverty to poverty status. Moreover, the difficulties of left-censoring data can be solved by excluding the first spell of poverty in the first wave of panel data.[5] Our panel data set contains nine waves, the first (non-) poverty spell starts from the second wave and the maximum duration is seven. However, right-censored data should also be taken into consideration because the individual could be at risk of exiting poverty; even in the last year of the panel he/she could be in poverty because there is no information about the state of the individual after this spell.[6] However, the empirical results illustrate that including the right-censored spells does not create problems in estimations (Devicienti, 2011).

Our approach is based on a joint discrete-time hazard model to estimate the determinants of transition into and out of poverty (Devicienti, 2002; Devicienti, 2011; Jenkins, 2011). This method allows us to implement the evaluations to forecast how long in total a poverty entrant will spend being poor, taking into consideration not only the initial poverty spell, but also possible later spells.

We consider two states between which individuals have moved: poverty and non-poverty. Survivor function $S(t_j)$ gives the probability that a person survives longer than some specified time t. The *survivor function* for poverty exit is defined for discrete time as follows:

$$S(t_j) = \prod_{(j|t_j \le t)} \left(1 - \frac{d_j}{n_j}\right), \qquad (3)$$

where $t_1, t_2, \ldots t_j, \ldots t_k$ is survival time with equal intervals for simplicity, d_j is individuals or households end their poverty spells at t_j, n_j is individuals or households stay poor in at least j waves and are at '*risk*' of moving out of poverty at t_{j+1}. This is the probability of '*surviving*' past time t_j.

Hazard rates (hazard functions) of ending poverty at t_j:[7]

$$h(t_j) = \begin{cases} 1 - S(t_j) \; if \; j = 1 \\ \frac{S(t_j) - S(t_{j-1})}{S(t_j)} \; if \; j > 1 \end{cases}. \qquad (4)$$

The hazard rates of poverty re-entry are estimated similarly.

A multi-spell hazard model can be defined as below. Each individual could experience either a single type of spell (in-poverty or out-of-poverty) or both. For the latter case, an individual could have repeated spells of poverty and/or repeated spells of non-poverty. The probability that an individual *i* leaves the state at duration *d*, given that she/he has survived in the state to *d-1*, is assumed to be a standard *logit* hazard function (Devicienti, 2011; Jenkins, 2011):

$$E(d) = \frac{exp[\alpha_d^P + X_{it}^{P\prime}\beta^P]}{1 + exp[\alpha_d^P + X_{it}^{P\prime}\beta^P]}, \qquad (5)$$

where X_{it} is a set of covariates that differ across individuals and, potentially, also over calendar time, represented by *t*. These covariates can be fixed or time variant. The dependence of the hazard upon duration in the spell *d* is explicitly highlighted by (5), while dependence upon X_{it} and through X_{it} upon calendar time t is left implicit so as to simplify notation. Next, β is a vector of parameters to be estimated, and α_i^P represent interval-specific dummies aimed at capturing the shape of the baseline hazard function with fully flexible non-parametric specification.

Correspondingly, for non-poverty spells a hazard of re-entry is specified:

[5] Left-censoring means that the failure event (poverty exit or entry) occurs prior to the subject's entering the study.

[6] Right-censoring means that one runs a study for a pre-specified length of time, and by the end of that time, the failure event has not yet occurred for some subjects.

[7] The hazard function $h(t_i)$ gives the instantaneous potential per unit time for the event to occur, given that the individual has survived up to time t.

$$R(d) = \frac{exp[\alpha_d^N + X_{it}^{N\prime}\beta^N]}{1+exp[\alpha_d^N + X_{it}^{N\prime}\beta^N]}, \quad (6)$$

where d now shows duration in the present non-poverty spell. Duration dependence for out-of poverty spells is summarised by the interval-specific dummies α_d^N.

Data

The analysis in this paper relies on data from the Kazakhstan Household Budget Survey (KHBS) from 2001 to 2009 provided by the Agency of Statistics of the Republic of Kazakhstan (ASRK). The KHBS is a nationally-representative annual household survey that collects information on 12,000 households. The survey sample is representative down to the *oblast* (province) level, and it is stratified by rural and urban sectors and also by small, medium, and large cities.

The analysis below uses annual cross-sectional data extracted from the KHBS 2001-2009 and on a panel dataset constructed from these data. The panel dataset was constructed by matching observations across the annual data files (Kudebayeva, 2015, Kudebayeva & Barrientos, 2017). The KHBS is a cross-sectional survey (the survey also adopted a rotating sample, with 25 percent of households surveyed replaced every four quarters), but the sampling frame remained largely unchanged during the period, and a share of households was interviewed throughout the period. In total, 2,580 households were found to be present in all waves. Household and individual matching across the annual datasets was based on birth year, gender, and the first name of individuals in the household. Tests of robustness, representativeness, and attrition bias performed on the constructed panel dataset provide confidence regarding its properties.

Focusing on consumption offers two advantages when analysing poverty dynamics. First, income-based measures may over-estimate variations in family economic well-being and the magnitude of poverty (Jorgenson, 1998). Second, expenditures appear to be less susceptible to systematic under-reporting than income, particularly among low-income families (Meyer & Sullivan, 2003). The focus on consumption expenditure better captures living standards among low-income groups. We focus on equivalised per capita consumption expenditures computed by dividing total consumption expenditures by the square root of the household size. Some researchers make a strong case for using adult equivalent expenditures to take account of household economies of scale and the different 'costs' of children (Deaton & Muellbauer, 1986; Deaton & Paxson, 1998; Lanjouw & Ravallion, 1995). Having explored this issue with the data, Kudebayeva (2015) found only marginal differences in poverty estimates using per capita household expenditure and alternative OECD and WHO equivalence scales.

The official poverty lines are set by tracking the value of a minimum subsistence consumption basket reflecting nutrition standards, as developed by the National Nutrition Institute. Different baskets are constructed for the five regions, for nine age groups, and separately for females and males. This information is used to identify a mean national consumption basket. The cost of this consumption basket is calculated monthly, based on regional prices, separately for urban and rural areas. Beginning in 2006, the Agency of Statistics applied a new methodology for the calculation of the subsistence minimum (SM) by expanding the range of goods included from 20 to 43 products, and setting a 2,175 kcal per day as the nutrition benchmark. The adjustment for non-food costs was raised from 30 percent to 40 percent. To enable comparison across regions and across years, gross per capita real consumption expenditures were adjusted with official regional poverty lines.

Moreover, the stochastic dominance analysis shows a reduction in consumption poverty incidence regardless of which poverty lines and measures are used for the period 2001-2009. Therefore, further estimates are based on 40 percent of equivalised per capita consumption expenditures taken as the relative poverty line.

Results and Discussion

Chronic Poverty Estimations

Table 1 illustrates the chronic and transient poverty measures of J-R (2000) and Duclos et al. (2010) for various values of α. In Table 1, the components approach, which defines the chronically poor as those individuals with average intertemporal equivalised consumption expenditures below the intertemporal poverty line (when α=0), shows the smaller share of transient poverty. This can be explained by the use of the relative poverty line as a poverty threshold. The reduction in chronic poverty measures due to the increase in α, illustrates less inequality among intertemporal poor individuals. The normalised poverty gaps are small for both poverty measures

when α =1. The sensitivity of J-R's (2000) chronic poverty measure to the distribution of poverty gaps is low, whereas the sensitivity of Duclos et al.'s (2010) chronic poverty index to the equalised distribution of poverty gaps is larger. Moreover, the estimations from the Chinese Rural Household Survey yield larger transient poverty by J-R's (2000) approach than by Duclos et al.'s (2010) approach when α=2 (Duclos et al., 2010). However, Duclos et al. (2010) applied an absolute poverty line as a poverty threshold. Our estimations depict the same issue when transient poverty comprises about 63 percent of total poverty by J-R's (2000) approach and only 23 percent by Duclos et al.'s (2010) approach (when α=2). This result is explained by the fact that Duclos et al.'s (2010) measure assigns more weight to the poverty gap in each period and then aggregates it over the whole period of nine years for each individual, before then aggregating it over all individuals in the sample. However, J-R's (2000) measure weights the gap between average intertemporal consumption and the poverty line of each individual, and then aggregates it over all individuals in the sample. Thus, Duclos et al.'s measure (2010) indicates more inequality among the chronically poorest individuals.

Table 1 – Chronic and Transient Poverty by Components Approaches

Chronic Poverty Measures	Chronic Poverty	Transient Poverty	Total Poverty
J-R (2000), α=0	0.278	0.079	0.356
J-R (2000), α=1	0.045	0.036	0.080
J-R (2000), α=2	0.009	0.017	0.027
Duclos et al. (2010) α=1	0.080	0.000	0.080
Duclos et al. (2010) α=2	0.125	0.039	0.164
Source: Author's calculations based on KHBS 2001-2009			

The Table 2 illustrates Gradin et al.'s (2012) measure of chronic poverty, which is a more generalised version of the chronic poverty measures by the spells approach, i.e. Foster's (2009) and Bossert et al.'s (2010) poverty indexes.

Table 2 reveals the sensitivity of intertemporal indices to variations in poverty gaps, and their intertemporal distribution for each individual, spell duration, and inequality in individual complete poverty practices over time. The analysis starts with the case in which β=γ=0 permits us to segregate the impact of changes in parameter α. The implication of progressively higher sensitivity to inequality of time spent in poverty across individuals (when α>0) illustrates the decrease in chronic poverty. This means that the intertemporally poor are more equally distributed. Next, the analysis of the sensitivity of the aggregate intertemporal measure implies that larger weights on poverty spells of a long duration require the segregation of the effect on the choice for various values of β, when γ=0 and α=1. The change in β from 0 to 1 shows a decline in chronic poverty measures of 38 percent. This fact confirms the larger experience of short-term periods of poverty among the intertemporally poor, because the penalisation of longer spells of poverty by higher weights caused the decline in indexes. There is further analysis on the effect of including sensitivity to inequality in the chronic poverty measure in a more comprehensive manner (when γ=2 and β=1), which takes into consideration poverty gaps and their intertemporal distribution for each individual along with poverty duration. The increase in α from 1 to 2 illustrates the larger decline in chronic poverty in percentage terms than when β=γ=0. The decrease is almost 88 percent. The results show all poverty-reducing features that are accumulated in the chronic poverty measure for Kazakhstan.

Table 2 – Chronic Poverty Measures by the Spells Approach

α	β=0 γ=0 γ =1 γ=2			β=1 γ=0 γ=1 γ=2		
α=0	0.276	0.276	0.276	0.276	0.276	0.276
α=1	0.253	0.063	0.022	0.157	0.043	0.016
α=2	0.200	0.015	0.002	0.103	0.010	0.002

Source: Author's calculations based on KHBS 2001-2009
Note: Gradin et al.'s (2012) chronic poverty measure, where α is sensitivity of aggregate intertemporal poverty measure to inequality among intertemporal poor individuals; β is sensitivity of individual intertemporal poverty indices to spells duration; γ is sensitivity of individual intertemporal poverty measure to inequality among intertemporal poor individuals. Gradin et al.'s (2012) measure yields Foster's (2007, 2009) chronic poverty measure when α=1 and β=0; when α=1 and β=1, it produces Bossert et al.'s (2010) chronic poverty index.

Thus, both estimates of chronic poverty by the components and spells approaches illustrate the robustness of the results. The percentage of chronically poor when a relative poverty line is applied is 27 percent. However, these measures of chronic poverty do not reflect transitions into and out of poverty.

Poverty Durations

This section analyses spells of poverty, durations of poverty, and poverty transitions. Table 3 below shows the duration of poverty for various categories of households.

Table 3 observes various household structures, such as couples without children, a couple plus one adult and children, couples with children, pensioner couples, singles, and singles with children. Non-poor individuals are mainly from households consisting of couples without children (i.e. 36.9 percent). The percentage of non-poor individuals from households with a couple with one adult and children is 31.51 percent, while for a single adult household with children, the percentage is only 18.73 percent.

With respect to persistently poor people, the proportion of poor individuals in the whole of the nine year period is one of the largest and is equal to 6.93 percent in households headed by a single parent with children, followed by individuals from households which include couples with children (6.11 percent); while for individuals from households consisting of couples without children, the percentage of always-poor is only 1.74 percent.

Table 3 – Proportions of times in poverty for individuals from different types of households

Time poor	Proportion for couples	Proportion for couple+adult+children	Proportion for couples with children	Proportion of pensioner couples	Proportion of singles	Proportion of single with children
0	36.9	31.51	26.79	24.11	26.1	18.73
1	14.62	11.99	12.13	15.6	15.7	9.61
2	10.71	7.19	8.05	14.18	10.62	8.64
3	10.56	9.25	9.1	17.73	11.09	9.37
4	5.07	10.96	8.95	2.84	8.31	8.88
5	5.21	8.9	5.77	4.26	6.93	10.22
6	5.79	4.79	7.31	8.51	6.7	10.83
7	5.21	4.11	7.21	5.67	6	9
8	4.2	6.16	8.6	4.26	4.62	7.79
9	1.74	5.14	6.11	2.84	3.93	6.93

Source: Author's calculations based on KHBS 2001-2009

Transient poverty prevails among pensioner couples, for whom the percentage of poverty in periods of less than four years is one of the highest in comparison with other categories. For other categories of families, except for singles with children, the proportions of poor are higher for shorter periods of less than five years. As indicated in the last column of Table 3, only for singles with children is the percentage of poverty larger for longer periods (i.e. more than five years). Moreover, couples with children experience larger proportions of poverty for periods above five years in comparison with other categories of households. These results reveal the important issue of persistent child poverty in Kazakhstan and suggest that government policy should pay more attention to targeted social assistance programmes for poor families with children.

The estimated survivor and hazard functions in Table 4 indicate strong negative duration-dependence associated with the rates of poverty exit and re-entry. This implies a high probability for individuals to escape from poverty in the shorter term. This fact shows that, for a cohort of individuals just starting a poverty spell, the hazard of leaving after the first year is equal to 16.08 percent; after two years it is 8.1 percent, and drops further to 3.64 percent after four years. The probabilities of poverty exit then fall again after seven years, reaching 1.02 percent.

Table 4 – Survivor and hazard function of spells in and out of poverty

Time since the start of spell	Poverty exit				Poverty re-entry			
	Survivor function	(SE)	Hazard function	(SE)	Survivor function	(SE)	Hazard function	(SE)
1	0.8392	0.0040	0.1608	0.0044	0.8710	0.0035	0.1290	0.0038
2	0.7712	0.0047	0.0810	0.0036	0.8234	0.0041	0.0546	0.0027
3	0.7219	0.0052	0.0639	0.0036	0.7896	0.0045	0.0410	0.0026
4	0.6956	0.0055	0.0364	0.0033	0.7655	0.0048	0.0305	0.0026
5	0.6726	0.0058	0.0331	0.0036	0.7488	0.0051	0.0218	0.0026
6	0.6589	0.0061	0.0203	0.0033	0.7399	0.0052	0.0119	0.0022
7	0.6522	0.0064	0.0102	0.0030	0.7314	0.0055	0.0115	0.0025
Source: Author's calculations based on KHBS 2001-2009								

The analysis of the survivor function for poverty exits illustrates that 83.92 percent of poverty entrants are still in the poverty pool after the first year; 77.12 percent are still in poverty after two years; 69.56 percent are poor after four years, after which the numbers drop further. After seven years, approximately 65.22 percent of the original pool of poverty entrants is still in poverty.

The hazard rates of re-entry are smaller than exit rates and indicate a significant risk for individuals out of poverty to fall back below the poverty threshold, particularly in the years just after an exit from poverty. Approximately 12.9 percent of the individuals ending a poverty spell will again have income below the poverty threshold after the first year; after two years the hazard of re-entry falls to 5.46 percent; and after four years the hazard of re-entry is only 3.05 percent (see Table 4). The survivor function for those who are out of a poverty spell indicates that almost 87.1 percent survive as non-poor after one year; 82.34 percent are non-poor after four years, and 76.55 percent are non-poor after seven years. The estimations illustrate that survival rates are higher for non-poor spells than for poverty spells.

The data on spell lengths and censoring status summarise for each spell an '*event history*'; a sequence of years during which the individual was at risk of leaving poverty (in our case poverty exit is the event). Hence, for someone with a completed spell length of four years (i.e. the individual is not poor in the fifth year), there is a data sequence of four years with no exit event recorded for each of the first three years and one recorded for the final

year. If, instead, the individual's spell is censored, the individual has been at risk of poverty exit for three years, but there is no exit event recorded for any of the years. Thus, the original data set is re-organised such that a person-year indicator of whether a transition occurred between that year and the next is embedded for the relevant individual.

The differences among individuals that are combined in hazard regression models mainly specify the differences in the structure of an individual's household and differences in measures of household labour market additions. For poverty transitions between some year *t-1* and *t,* the value of each explanatory variable used is the value in the base *t-1*. [8] The labour market characteristics are permitted to change by year within a spell. However, age variables are set to be equal to their values at the start of the spell.[9]

Household labour market variables are characterised by the employment status of the head of household. The inclusion of some individual specific variables, such as age and gender, does not show significant results. Therefore, we include dummy variables for the head of household, such as the individual is employed/unemployed, employed in the public sector, employed in the private sector, and self-employed. The age, gender, marital status, education level, and ethnicity of the head of household are also incorporated in the modelling. The demographic structure of the household is characterised by the quantity of adults, the elderly, and children under the age of six years. The variables that describe the demographic structure and the head of household's age and gender help to contrast the experience of single parents with married couples, large families with small families, and elderly people with younger people. The study of poverty duration suggests that individuals from single-parent households and couples with children have relatively long poverty spells.

The following significant assets of the household are also included as dummy variables: the household owns a dacha (a small house other than the main dwelling), owns a car, lives in a separate house or flat, and has access to water in the dwellings.

Thus, the estimation of the model is based on the pattern of poverty transitions for all individuals, although individuals vary in their characteristics. Some studies apply a sample of adults only, thus excluding children from the transition model (Biewen, 2006; Devicienti, 2011). However, as Jenkins (2011) points out, poverty transition models are descriptive rather than behavioural models, therefore, the estimates of the model using only adult samples do not illustrate the substantive change as compared with the model that sample of all individuals, including children.

The data set is created as follows. An exit occurs in the next to the last wave in which the individual is poor (for entry, the same procedure is applied). However, the dummy variable for poverty exit allocates an exit to the same wave in which the individual was last in that state. Therefore, we do not need to create the lagged explanatory variables as we want to link the characteristics at *t-1* to exit in *t*. Due to the exclusion of left-censored observations, the individuals who are poor and non-poor in all nine waves are not observed in our estimations. Table 5 illustrates the results from the estimation of multivariate hazard rates of poverty exit and re-entry from joint multiple-spell regressions by using a *logit* model.

The results of the estimation of the multivariate multi-period joint model of the hazards of poverty exit and re-entry indicate that the negative poverty duration starts after four periods in poverty. The hazard rates of poverty re-entry become negative after five years in non-poverty. A one-year increase in the age of the head of household, other thing being equal, will reduce the hazard rate of poverty exit by 1.4 percent. Female headship compared to male headship will reduce the hazard rate of poverty exit by 0.8 times (exponent (-0.211) = 0.8). The head of household being Russian reduces the hazard rate of poverty exit by 0.84 times compared to other ethnicities; the other characteristics are identical. Only having a university degree positively effects the hazard of poverty exit. Widowed heads of the household decrease the hazard rate of poverty exit by 0.73 compared to single heads of the household, other thing being equal. Employment of the head of the household is not a significant factor for reducing the hazards of poverty exit, other things being equal. The larger the size of the household, the less the decrease in hazard rates of poverty exit, when other characteristics are equal. Living in a separate house or apartment also has a negative influence on the hazard rate of poverty exit because the majority of the households live in separate dwellings. Only households located in Almaty will increase the hazard rate of poverty exit for the individual.

[8] According to Jenkins (2011: 299), '[*t]his is more satisfactory than using year t values because, in that case, there is a greater chance that the values are a consequence of the transition itself*'.

[9] Jenkins (2011: 299) argues that '[*t]his is done in order to avoid collinearities between age and duration dependence: spell length and age each increases by one year as time progresses'.*

Table 5 – Discrete time multiple-spell hazard models

Variables	Poverty exit regressions		Poverty re-entry regressions	
	Coeff.	SE	Coeff.	SE
Duration dummies				
1	2.395*	0.092	2.624*	0.097
2	1.220*	0.096	1.374*	0.102
3	0.642*	0.101	0.891*	0.113
4	0.303**	0.124	0.321*	0.123
5	-0.052	0.138	0.138	0.148
6	-0.802*	0.183	-0.655*	0.203
7	-1.358*	0.300	-0.957*	0.237
Head of household:				
Age of head	-0.014*	0.001	-0.012*	0.002
Female head	-0.211*	0.050	-0.017*	0.053
Ethnicity is Kazakh	-0.083	0.061	-0.270*	0.065
Ethnicity is Russian	-0.170*	0.061	-0.038	0.066
(Omitted category –a head of the household is from an another ethnicity)				
Education of head:				
University	0.054	0.055	-0.392*	0.063
Vocational	-0.053	0.044	-0.179*	0.049
Not compl. second.	0.104	0.074	0.085	0.078
(Omitted category: head of the household has secondary education)				
Head is married	0.001	0.059	-0.238*	0.063
Head is widowed	-0.307*	0.071	-0.040	0.074
(Omitted category: head of the household is unmarried or divorced)				
Unemployed	0.067	0.079	0.136	0.086
Pensioner	0.108	0.083	0.247*	0.085
Public sector employee	0.012	0.048	-0.189*	0.052
Private sector employee	-0.153*	0.050	-0.068	0.055
Self-employed	-0.189*	0.051	-0.194*	0.055
(Omitted category: other category for the head of household, e.g. student, housewife, disabled or other				
Household demographics:				
Quantity of adults	-0.185*	0.018	-0.168*	0.021
Quantity of children 0-5 years aged	-0.172*	0.049	0.137**	0.053
Quantity of elderly	-0.215*	0.051	-0.370*	0.055
(Omitted category: school-age children)				
Assets of the household:				
Household has a separate house or flat	-0.457*	0.060	-0.348*	0.065
Household has a *dacha*	0.130	0.085	-0.169***	0.101
Household has water in the home	-0.211*	0.079	-0.007	0.084
Household has a car	0.038	0.061	-0.053	0.072
Location:				
Central	0.068	0.065	-0.612*	0.072
West	-0.104	0.069	-0.328*	0.070
North	-0.167**	0.074	-0.379*	0.075
East	-0.168**	0.078	-0.289*	0.084
Astana	0.062	0.224	-0.836*	0.268
Almaty	0.399*	0.135	-1.140*	0.181
(Omitted category is South)				
Urban	0.042	0.080	-0.144***	0.083
(Omitted category is rural)				
Log-likelihood	-7307.112			
Number of obs. (person-years)	17203			

Notes: Statistically significant at P<0.01, statistically significant at **P<0.05, statistically significant at ***P<0.1; SE are robust standard errors clustered by household.
Source: Author's calculations based on KHBS 2001-2009

The age of the head of the household, the head of the household being female, the head of the household being ethnic Kazakh, and the head of the household with vocational, university, or higher education negatively affect the hazard rate of poverty re-entry. The head of the household being married compared to being single, the quantity of adults and elderly, living in a separate dwelling, having a dacha, and living in locations except for rural areas and the south will also reduce the hazard rate of poverty re-entry. Only the head of the household being a pensioner, and having children under the age of six will increase the hazard rate of poverty re-entry.

The factor with significant positive influence on poverty exit is a location in Almaty. Many correlates of the model estimation have the same signs for the hazard rate of poverty exit and re-entries. This means that these factors are common for the transitory poor, who are moving in and out poverty in given periods of time. As defined previously, the existence of children under the age of six will increase the hazard rate of poverty re-entry.

Conclusion

We find that, despite the rapid and substantial reduction in poverty in Kazakhstan since the turn of the century, and depending on the measure of chronic poverty employed, as much as a quarter of the Kazakh population has experienced persistent poverty. Moreover, the intertemporally poor are more equally distributed, which means that the shorter durations of poverty spells prevail and per-period poverty is less variable.

Our investigation of poverty duration among various household types indicates that the longest duration of poverty is experienced by single individuals with children and couples with children. The lowest duration of poverty is among adult couples without children and pensioner couples. The risk of poverty re-entry is considerable for individuals from households with children under the age of six. Thus, with respect to policy implications, the improvement in coverage of public child care system should be a priority for Kazakhstan.

In addition, we use multivariate hazard regression models to examine differences in individuals' experience of poverty over time. The results confirm the negative duration dependence of the hazard rates of exits from and re-entries into poverty. Factors that have a positive impact on the probability of poverty exit include location in Almaty, head of household with a university degree, and owning assets such as a car or dacha. Many correlates of the model estimation have the same signs for the hazard rate of poverty exit and re-entry. These factors are common for the transitory poor, who move in and out of poverty in a given period of time. This fact illustrates that the majority of the persistently poor, who were poor for more than a total of 5 years, experienced breaks between poverty spells. Thus, the majority experienced interrupted poverty spells during the whole period of the observation. Moreover, the existence of children under the age of six increases the hazard rate of poverty re-entry and decreases the probability of poverty exit.

This study of poverty transitions concludes that the majority of the population in Kazakhstan is transient poor or vulnerable to poverty. Hence, policies aimed at reducing vulnerability to poverty are required. Greater policy focus is needed on sectors of the economy with the lowest average wage, such as agriculture, education, and health care. Specifically, this problem may be solved by providing targeted social assistance for families with children under school age with per capita income below the official poverty line, but not 40 percent of the official poverty threshold, which was applied to be eligible for targeted social assistance (TSA) in Kazakhstan. Since April 2019, the threshold for those eligible for TSA is increased till 70 percent of the subsistence minimum.

References

Addison T., Hulme D., Kanbur R. (2009) Poverty Dynamics Interdisciplinary Perspectives. Oxford University Press, Oxford.

Anderson K., Pomfret R. (2002) Relative Living Standards in New Market Economies: Evidence from Central Asian Household Surveys. Journal of Comparative Economics, vol. 30, pp. 683-708.

Arranz J. M., Cantó O. (2012) Measuring the effect of spell recurrence on poverty dynamics – evidence from Spain. The Journal of Economic Inequality, vol. 10(2), pp. 191-217.

Bane M., Ellwood D. (1986) Slipping into and out of poverty: The dynamics of spells. The Journal of Human Resources, vol. 11(1), pp. 1-23.

Barrientos A. (2007) Does vulnerability create poverty traps? CPRC Working Paper No 76, BWPI/Chronic Poverty Research Centre, Manchester.

Bierbaum M., Gassmann F. (2012) Chronic and Transitory Poverty in the Kyrgyz Republic: What Can Synthetic Panel Tell Us? UNI-MERIT Working Paper Series. Maastricht University and United Nations University.

Biewen M. (2006) Who are the Chronic Poor? An Econometric Analysis of Chronic Poverty in Germany. Dynamics of Inequality and Poverty Research on Economic Inequality, vol. 13, pp. 31-62.

Bigsten A., Shimeles A. (2008) Poverty transition and persistence in Ethiopia: 1994-2004. World Development, vol. 36, pp. 1559-1584.

Bossert W., Chakravarty S., D'Ambrosio C. (2012) Poverty and time. The Journal of Economic Inequality, vol. 10(2), pp. 145-162.

Calvo C., Dercon S. (2007) Chronic poverty all that: the measurement of poverty over time. Chronic Poverty Research Center WP No 89, Manchester.

Canto O. (2002) Climbing out of poverty, falling back in: Low income stability in Spain. Applied Economics, vol. 34, pp. 1903-1916.

Cappellari L., Jenkins S.P. (2002) Who Stays Poor? Who Becomes Poor? Evidence From The British Household Panel Survey. The Economic Journal, vol. 112(478), pp. 60-67.

Chakravarty S. R. (2009) Inequality, Polarization and Poverty: Advances in Distributional Analysis. (J. Silver, Ed.), Economic Studies in Inequality, Social Exclusion and Well-Being. Springer Science+Business Media.

Chen S., Ravallion M. (2012) More Relatively-Poor People in a Less Absolutely-Poor World. Policy Research Working Paper No6114, Washington DC: World Bank.

Chronic Poverty Research Center (2008) The Chronic Poverty report, 2008-09: Escaping poverty Traps. Chronic Poverty Research Center (CPRC), Manchester, UK.

Commander S., Tolstopiatenko A., Yemtsov R. (1999) Channels of Redistribution Inequlaity and Poverty in the Russian Transition. Economics of Transition, vol. 7(2), pp. 411-447.

Deaton A. (1992) Understanding consumption. Oxford, Clarendon.

Deaton A., Muellbauer J. (1986) On Measuring Child Costs: With Applications to Poor Countries. Journal of Political Economy, vol. 94(4), pp. 720-744.

Deaton A., Paxson, C. (1998) Economies of Scale, Household Size, and the Demand for Food. Journal of Political Economy, vol. 106(5), pp. 897-930.

Dercon S., Porter C. (2011) A poor life? Chronic poverty and downward mobility in rural Ehiopia, 1994 to 2004. In: B. Baulch (Eds.), Why Poverty Persists. Poverty Dynamics in Asia and Africa. Edward Elgar Publishing, Inc., pp. 65-95.

Devicienti F. (2002) Poverty persistence in Britain: A multivariate analysis using the BHPS, 1991–1997. Journal of Economics, vol. 9(0), pp. 307-340.

Devicienti F. (2011) Estimating poverty persistence in Britain. Empirical Economics, vol. 40(3), pp. 657-686.

Foster J.E. (2007) A Class of Chronic Poverty Measures. Working Paper No. 07-W01. Department of Economics Vanderbilt University.

Foster J.E. (2009) A Class of Chronic Poverty Measures. In: T. Addison, D. Hulme, R. Kanbur (Eds.), Poverty Dynamics: Interdisciplinary Perpectives. Oxford University Press, Oxford, pp. 59-76.

Gradin C., Del Rio C., Canto O. (2012) Measuring Poverty Accounting for Time. Review of Income and Wealth, vol. 58(2), pp. 330-354, https://doi.org/10.1111/j.1475-4991.2011.00458.x

Hansen J., Wahlberg Æ.R. (2009) Poverty and its Persistence: a Comparison of Natives and Immigrants in Sweden. Review of Economics of the Household, vol. 7, pp. 105-132.

Heckman J., Singer B. (1984) A Method for Minimising the Impact of Distributional Assumptions in Econometric Models of Duration Data. Econometrica, vol. 52, pp. 271-320.

Hoy M., Thompson B., Zheng B. (2011) Empirical Issues in Lifetime Poverty Measurement. The Journal of Economic Inequality, vol. 10(2), pp. 163-189.

Hoy M., Zheng B. (2008) Measuring Lifetime Poverty. Discussion Paper No. 2008-14 Department of Economics, University of Guelph.

Hulme D., Shepherd A. (2003) Conceptualizing Chronic Poverty. World Development, vol. 31(3), pp. 403-423.

Imai J., You K. (2014) Poverty Dynamics of Households in Rural China. Oxford Journal of Economics and Statistics, vol. 76(6), pp. 898-923.

Jalan J., Ravallion M. (2000) Is Transient Poverty Different? Evidence for Rural China. Journal of Development Studies, vol. 36(6), pp. 82-99.

Jenkins S.P. (2011) Changing Fortunes: Income Mobility and Poverty Dynamics in Britain. Oxford University Press.

Jha R., Dang T. (2009) Vulnerability to Poverty in select Central Asian Countries. The European Journal of Comparative Economics, vol. 6(1), pp. 17-50.

Jorgenson D.W. (1998) Did We Lose the War on Poverty? The Journal of Economic Perspectives, vol. 12(1), pp. 79-96, http://www.jstor.org/stable/2646940

Kudebayeva A. (2015) Chronic Poverty Concepts and Measures: An application to Kazakhstan. PhD Thesis, University of Manchester: Manchester.

Kudebayeva A., Barrientos A. (2017) A Decade of Poverty Reduction in Kazakhstan 2001-2009: Growth and/or Redistribution? Journal of International Development, vol. 29(8), pp. 1166-1186.

Lanjouw P., Ravallion M. (1995) Poverty and Household Size. The Economic Journal, vol. 105(433), pp. 1415-1434.

McCulloch N., Calandrino M. (2003) Vulnerability and Chronic Poverty in Rural Sichuan. World Development, vol. 31(3), pp. 611-628.

McKay A., Lawson D. (2003) Assessing the Extent and Nature of Chronic Poverty in Low Income Countries: Issues and Evidence. World Development, vol. 31(3), pp. 425-439.

Meyer B.D., Sullivan J.X. (2003) Measuring the Well-being of the Poor Using income and Consumption. NBER working paper No.9760.

Mills B.F., Mykerezi E. (2009) Chronic and Transient Poverty in the Russian Federation. Post-Communist Economies, vol. 21(3), pp. 283-306.

Okrasa W. (1999) Who Avoids and Who Escapes from Poverty during the Transition? Evidence from Polish Panel Data, 1993-96. World Bank Policy Research Working Paper No. 2218, http://ssrn.com/abstract=623976.

Pomfret R. (2006) The Central Asian Economies since Independence. New Jersey: Princeton University Press.

Rhoe V., Babu S., Reidhead W. (2008) An Analysis of Food Security and Poverty in Central Asia – Case Study from Kazakhstan. Journal of International Development, vol. 20, pp. 452-465.

Stevens A.H. (1999) Climbing Out of Poverty, Falling Back In: Measuring the Persistence of Poverty over Multiple Spells. Journal of Human Resources, vol. 34, pp. 557-588.

You J. (2011) Evaluating Poverty Duration and Transition: A Spell-Approach to Rural China. Applied Economics Letters, vol. 18, pp. 1377-1382.