Part III

Income Inequality and Labour Market Evolution

9

Is the Kuznets Hypothesis Valid for Transition Countries?

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1. Introduction

The aim of this chapter is to validate the Kuznets hypothesis which states that the inequality in the distribution of income increases at lower levels of income and then decreases once a threshold level of per capita income is reached for the transition countries.

The chapter is organized as follows: Section 1 holds the review of the main literature devoted to testing the Kuznets hypothesis. Section 2 pursues the following objectives: to test the Kuznets hypothesis on the theoretical level; to determine the conditions on which the inverted-U dependence of the Gini index on the mean income might take place; and to give an economic interpretation of the mathematical results. Section 3 contains the empirical results confirming the Kuznets hypothesis for transition countries and Russian regions. The GDP per capita in the majority of transition countries and in the most Russian districts did not reach the corresponding turning point and therefore we expect an increase in the inequality in the distribution of income for these countries and regions. Section 4 concludes the chapter with some policy implication suggested.

2. Review of the main literature

More than 50 years ago S. Kuznets suggested that a relationship existed between income distribution and economic growth as a measure of economic development. The central question of his famous paper (Kuznets, 1955) was: 'Does the inequality in the distribution of income increase or decrease in the course of country's economic growth?' The main idea of the article was: 'In the early phases of industrialization in the undeveloped countries income inequalities will tend to widen before the levelling forces become strong enough first to stabilize and then to reduce income inequalities'. The conclusion he made was later referred to as 'The Kuznets hypothesis'. Graphically, the relationship between the measure of income inequality (usually the Gini index) and the measure of economic development (usually GDP per capita) can be shown as a curve in the form of a letter U turned upside down.

R.A. Godoy et al. (2004) have noted 'the Kuznets hypothesis has been used by economists to explain patterns of inequalities across and within nations'. Many investigators test the Kuznets hypothesis using cross-sectional data (Adelman and Morris, 1973; Paukert, 1973; Ahluwalia, 1976; Lydall, 1977; Loehr, 1981; Papanek and Kyn, 1986; Deininger and Squire, 1998 and so on). Most studies follow the parametric quadratic specification by regressing the Gini index on GDP per capita, its squared term and a set of socio-economic variables.

Findings of a positive coefficient on the GDP per capita variable and a negative coefficient on its squared term are considered supportive of the inverted-U Kuznets hypothesis. But the conformity in models with parametric quadratic (or higher degree) specification estimated by using the cross-sectional data is usually quite low. That is why researchers use the panel data (Barro, 2000; Iradian, 2005; Lee, 2006; Adams, 2008 and so on) or apply nonparametric methods for the data analysis (Mushinski, 2001; Huang, 2004; Huang and Lin, 2007).

Some authors note that the nature of the relationship differs according to a country's level of economic development and divide countries into two groups (developed and less developed) as a prerequisite to testing the Kuznets hypothesis. Savvides and Stengos (2000) used the threshold regression model. Sukiassyan (2007) remarks that the existing literature on the inequality and economic development 'has virtually ignored transition economies' and 'paper fills an important gap on the theme'. The author indicates that the effect of inequality on growth is negative for the transition economies of Central and Eastern Europe and the Commonwealth of Independent States.

This chapter continues the theme of relationship between the measure of income inequality and economic development for transition countries.

3. Theoretical and empirical approach

3.1. Theoretical approach

Suppose the population of a country is organized from high to low per capita incomes and is then divided into n number of equal groups.

Let X_1 be the income per capita of the poorest group, X_n be the income per capita of the richest group,

$$X_1 < \ldots < X_n;$$

$Z = \frac{1}{n}\sum_{i=1}^{n} X_i$ is the mean income;

$p_i = \frac{X_i}{\sum_{j=1}^{n} X_j}$ is the income share of i-th group, $i = 1, \ldots, n$,

The Gini index G is the most often used measure of income inequality. It can be computed as twice the area between the 45-degree line and the Lorenz curve multiplied by 100 per cent. Lorenz curve graphs cumulated income shares versus cumulative population shares.

One can show that

$$G = \left(1 - \frac{1}{n} - 2\frac{n-1}{n^2} \cdot \frac{X_1}{Z} - 2\frac{n-2}{n^2} \cdot \frac{X_2}{Z} - \ldots - \frac{2}{n^2} \cdot \frac{X_{n-1}}{Z}\right) \cdot 100\% \tag{9.1}$$

$$\text{or } G = \left(1 - \frac{1}{n} - 2\frac{n-1}{n} \cdot p_1 - 2\frac{n-2}{n} \cdot p_2 - \ldots - \frac{2}{n} \cdot p_{n-1}\right) \cdot 100\% \tag{9.2}$$

Thus G linearly depends on $X_1, \ldots, X_{n-1}$ and inversely on Z. The Gini index G also linearly depends on the income shares $p_1, \ldots, p_{n-1}$. The coefficients of the income shares $p_1, \ldots, p_{n-1}$ are negative and their absolute values decrease as the number of the income share (and the corresponding income) increases.

Remark 1. For the case of quantile groups ($n = 5$) from formula (9.2) it follows that

$$G = 100\% \cdot (0.8 - 1.6p_1 - 1.2p_2 - 0.8p_3 - 0.4p_4) \tag{9.3}$$

Generally, the Gini index G is a function of n variables: $X_1, X_2, \ldots, X_{n-1}, Z$.

Note that

$$\frac{\partial G}{\partial Z} = 2 \cdot \left(\frac{n-1}{n^2} \cdot X_1 + \frac{n-2}{n^2} \cdot X_2 + \ldots + \frac{1}{n^2} \cdot X_{n-1}\right) \cdot \frac{1}{Z^2} \cdot 100\% > 0,$$

$$\frac{\partial G}{\partial X_i} = -2 \cdot \frac{n-1}{n^2} \cdot \frac{1}{Z} \cdot 100\% < 0, \quad i = 1, \ldots, n-1$$

Hence, the Gini index increases as the mean income increases and decreases as the income of any income group with number 1, ..., n-1 increases provided that other factors remain constant.

In general, the graph of the function G coincides with n – dimensional manifold $\tilde{G}_n$.

Suppose γ is a smooth curve on the manifold $\tilde{G}_n$, γ_{GZ} is the projection of the curve γ onto the plane GOZ, γ_{XZ} is the projection of the curve γ onto

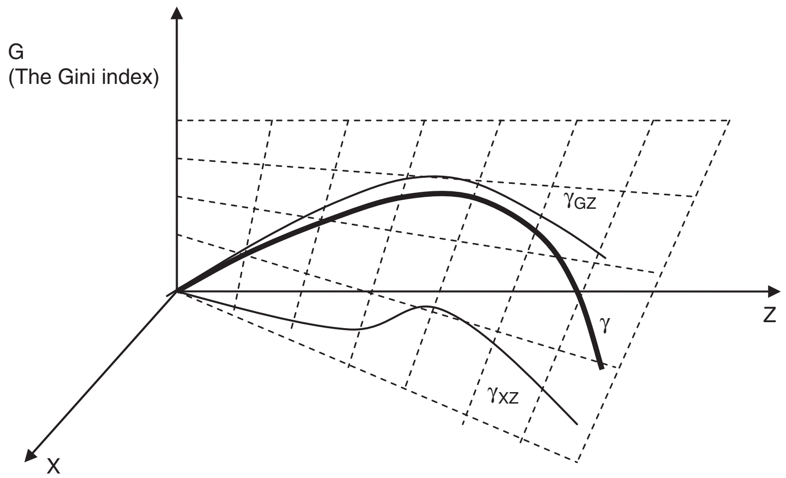

Figure 9.1 The curve on the manifold and its projections

the plane X_1OZ (Figure 9.1) with γ_{GZ} being the inverted U-curve. We keep only variables Z and X_1 for simplicity. It is quite interesting to determine the form of the curve γ_{XZ} in this case.

Let the curve γ_{GZ} be presented as $G = g(Z)$. Suppose that

$$\begin{cases} g'(Z) > 0 \textit{ for } 0 \le Z < Z^*, \\ g'(Z^*) = 0, \\ g'(Z) < 0 \textit{ for } Z > Z^* \\ \textit{and } g''(Z) < 0 \end{cases} \tag{9.4}$$

where Z^* is so called turning point.

Substituting g(Z) for G and zero for $X_2, \ldots, X_{n-1}$ in (9.1), we obtain expression for the curve γ_{XZ}: $X_1 = \varphi(Z)$, where

$$\varphi(Z) = \frac{1}{2} Z \left(n - \frac{n^2}{n-1} g(Z) \right) \tag{9.5}$$

Differentiating both sides (9.5) two times, we obtain

$$\varphi'(Z) = \frac{1}{2} \left(n - \frac{n^2}{n-1} g(Z) \right) - \frac{n^2}{2(n-1)} \cdot Z \cdot g'(Z), \tag{9.6}$$

$$\varphi''(Z) = -\frac{n^2}{2(n-1)} (2g'(Z) + Zg''(Z)) \tag{9.7}$$

Substituting Z* for Z in (9.6) and (9.7) and note that $g'(Z^*) = 0$, we get

$$\varphi'(Z^*) = \frac{1}{2}\left(n - \frac{n^2}{n-1}g(Z^*)\right) \tag{9.8}$$

$$\varphi''(Z^*) = -\frac{n^2}{2(n-1)}Z^*g''(Z^*) \tag{9.9}$$

Using (9.5) for $Z = Z^*$, we get $\varphi(Z^*) = \frac{1}{2}Z^* \cdot \left(n - \frac{n^2}{n-1}g(Z^*)\right)$, hence

$$\varphi'(Z^*) = \frac{\varphi(Z^*)}{Z^*} \tag{9.10}$$

Taking into account (9.6) (9.7) and (9.4), we obtain

$$\varphi'(Z) > 0 \textit{ and } \varphi''(Z) > 0 \textit{ for } Z \geq Z^* \tag{9.11}$$

From (9.9) (9.10) (9.11), we get the following graph for the function $\varphi(Z)$ (Figure 9.2). Function $\varphi(Z)$ is convex for $Z \geq Z^*$.

Remark 2. If g(Z) is a polynomial of degree k then φ(Z) is also a polynomial with degree $k + 1$. For example if g(Z) is a quadratic function then φ(Z) is a cubical function.

Remark 3. If the projection of the curve γ onto the plane GOZ has an inverted-U form, then the projection of this curve onto any plane X_jOZ (j = 2, . . . , n-1) has the same form as function $\varphi(Z)$ (Figure 9.2).

Remark 4. Suppose G = g(Z) where g(Z) has an inverted-U form. Then the relationship between p_i, $i = 1, \ldots, n-1$ and mean income Z is U-shaped. It follows from (9.2).

Let us state the main result of this section. In order for the Gini index to start dropping from a certain level of the mean income Z*, it is essential for the income of low-income groups to increase with the mean income growth. In particular, for the Gini index to decrease quadratically, the income of the most low-income group X_1 must increase cubically.

Remark 5. The main theoretical result remains true in the case of violation of the conditions $g'(Z) > 0$, $g''(Z) < 0$ for$0 \leq Z < Z^*$ in (9.4). In this case the g function graph has a more complicated form than an inverted U-curve.

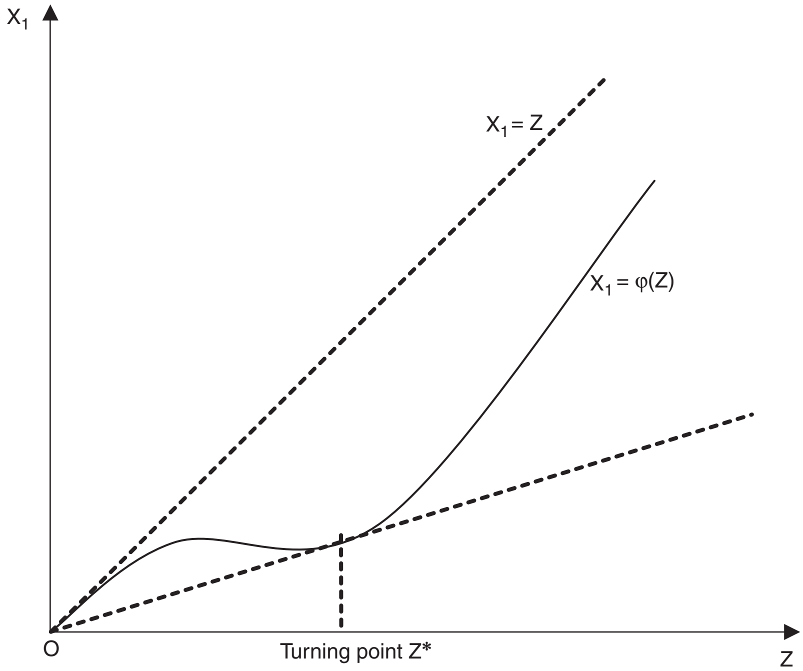

Figure 9.2 Projection on the plane X_1OZ

3.2. Empirical approach

Suppose we have a sample for m countries. Let us denote the set of observations for i – th country by $A_i = (X_1^i, X_2^i, \ldots, X_{n-1}^i, Z^i, G^i)$, $i = 1, \ldots,$ m, where X_j^i is an income per capita of the j – th group in the i – th country, $j = 1, \ldots,$ $n-1$, Z^i is the mean income in the i – th country, G^i is the Gini index for the i – th country. Then points $A_1, \ldots, A_m$ belong to the manifold $\tilde{G}_n$. This set of points is a proxy for the curve γ. Using the projections of the points $A_1, \ldots, A_m$ onto the planes GOZ and X_1OZ we estimate the functions g(Z) and $\varphi(Z)$. First, we would try to estimate the parameters of the functions g(Z) and $\varphi(Z)$ using quadratic and cubical specification correspondingly. If the regression coefficients are insignificant, we can use nonparametric specification.

4. Empirical results

4.1. Data and variables

The first data set used in this study (Appendix, Table 9.A1) is taken from the Human Development Report (2007/2008), CIA World Factbook, World

Development Indicators. Twenty nine transition countries were chosen. 'One attractive feature of this group of countries is that their starting points were remarkably similar. Yet, they subsequently have experienced substantial divergence in growth rates and income inequality' (Sukiassyan, 2007).

For each of the countries, three variables are considered. Those include the Gini index (denoted by GINI, a measure of inequality), the GDP per capita (PPP USD, denoted by GDP, a proxy for the mean income), and the 10 per cent low- income share (denoted by P10_). We also create the new variable X10_ – the income per capita of the low- income 10 per cent share, where $X10_{-} = 0.1 \cdot P10_{-} \cdot GDP$.

The second data set is from a panel of 84 Russian regions during the 2001–2007 periods (www.gks.ru). We use the coefficient of funds (denoted by INEQ, a measure of inequality) as a dependent variable and real income per capita (denoted by INCOME), measured as a ratio of per capita average money income and minimum subsistence level (a value estimate of a consumer basket (approved by the Federal Decree) and compulsory payments and dues). Consumer basket includes a minimum set of food and non-food goods and services, which are necessary for people's health safety and ensure their life activities. Undoubtedly, the data for the regions of the same country are more homogeneous than for different countries and we can obtain more accurate results using these data.

4.2. Parametric models for transition countries

The traditional regressions have been estimated in the following specification:

$$GINI = \beta_0 + \beta_1 GDP + \beta_2 GDP^2 + \varepsilon \tag{9.1}$$

$$P10_{-} = \beta_0 + \beta_1 GDP + \beta_2 GDP^2 + \varepsilon \tag{9.2}$$

$$X10_{-} = \beta_0 + \beta_1 GDP + \beta_2 GDP^2 + \beta_3 GDP^3 + \varepsilon \tag{9.3}$$

We obtain the following estimated equations using the least squares method:

$$\underset{\substack{t \\ p\text{-}value}}{GINI} = \underset{\substack{11.42 \\ 0.000}}{34.83} + \underset{\substack{0.76 \\ 0.457}}{0.00046}\, GDP - \underset{\substack{-1.45 \\ 0.159}}{3.51 \cdot 10^{-8}} GDP^2 \tag{9.4}$$

$$R^2 = 0.227, F = 3.82, \text{ Prob } > \text{F} = 0.035,$$

$$\underset{\substack{t \\ p\text{-}value}}{P10\_} = \underset{\substack{7.33 \\ 0.000}}{3.297} - \underset{\substack{-0.95 \\ 0.35}}{0.00009}\, GDP + \underset{\substack{1.11 \\ 0.276}}{3.97 \cdot 10^{-9}} GDP^2 \tag{9.5}$$

$R^2 = 0.052,\ \mathrm{F} = 0.71,\ \mathrm{Prob} > \mathrm{F} = 0.499,$

$$\underset{\substack{t\\ p\text{-value}}}{X10\_} = \underset{\substack{0.21\\0.839}}{139.47} + \underset{\substack{1.14\\0.263}}{0.27}GDP - \underset{\substack{-0.11\\0.914}}{2.23 \cdot 10^{-6}}\,GDP^2 + \underset{\substack{0.45\\0.653}}{2.31 \cdot 10^{-10}}\,GDP^3 \tag{9.6}$$

$R^2 = 0.88,\ \mathrm{F} = 64.72,\ \mathrm{Prob} > \mathrm{F} = 0.000,$

The outputs indicate that the regressions (9.4) and (9.5) are insignificant (for level of significance 0.01), however the positive sign of $\hat{\beta}_1$ together with the negative sign of $\hat{\beta}_2$ in estimated equation (9.4) and opposite signs of these coefficients in estimated equation (9.5) demonstrate support of the Kuznets hypothesis. Increasing the polynomial degree doesn't change the situation. The coefficients of the nonlinear powers of GDP per capita in estimated equation (9.6) are insignificant, but the positive sign of $\hat{\beta}_3$ supports our theoretical result as shown in the graph of the function φ(Z) in Figure 9.2.

4.3. Non-Parametric models for transition countries

The low conformity and insignificance of the polynomial regressions coefficients was the reason why we estimated the unknown relationship between the Gini index and GDP per capita (and two other relationships) using the following relationship:

$$GINI = m(GDP) + \varepsilon \tag{9.7}$$

$$P20\_ = m(GDP) + \varepsilon \tag{9.8}$$

$$X20\_ = m(GDP) + \varepsilon \tag{9.9}$$

The conditional expectation function, m (...) was estimated using the Nadaraya-Watson estimator and the Gaussian kernel. Figures 9.3–9.5 contain kernel regressions (9.7)–(9.9) results.

As seen from Figures 9.3–9.5, the Kuznets hypothesis is confirmed (with small deviations) for the transition countries. The deviations are the following: the GINI index dependence on GDP per capita is not monotonously increasing before reaching the turning point. In the Figure 9.3, the corresponding function first increases, then decreases, then again increases, reaches the turning point and decreases. The dependence of the 10 per cent low-income share on GDP per capita approaches a U- form, and the dependence of the 10 per cent low- income on GDP per capita looks similar to the graph of the φ function in Figure 9.2.

Some deviation of the practical results from the theoretical ones is observed at the edges, which is typical for kernel regression. This problem

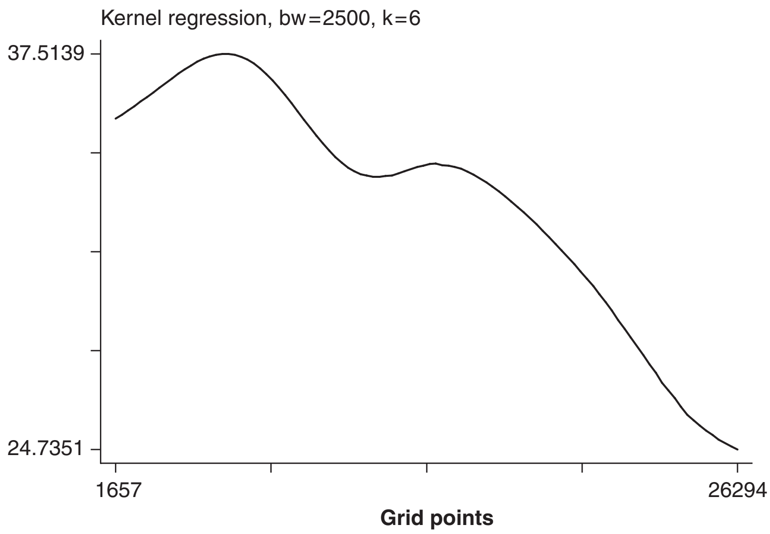

Figure 9.3 The estimated conditional mean of the Gini index on GDP per capita

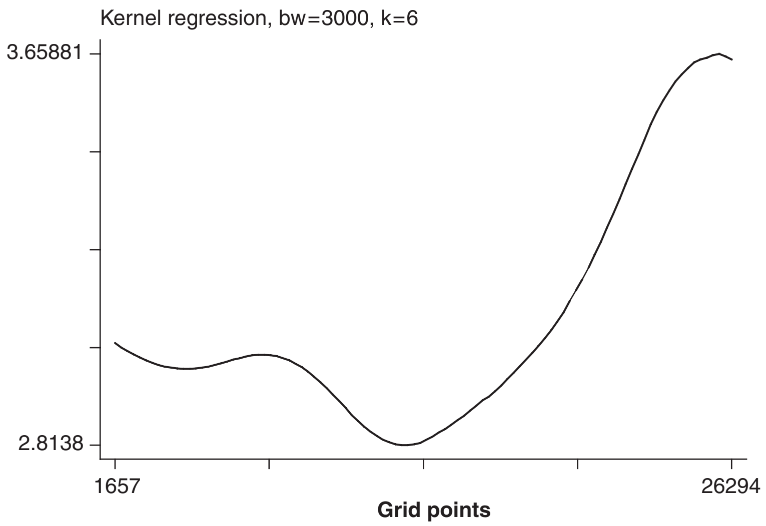

Figure 9.4 The estimated conditional mean of the 10 per cent low-income share on per capita GDP

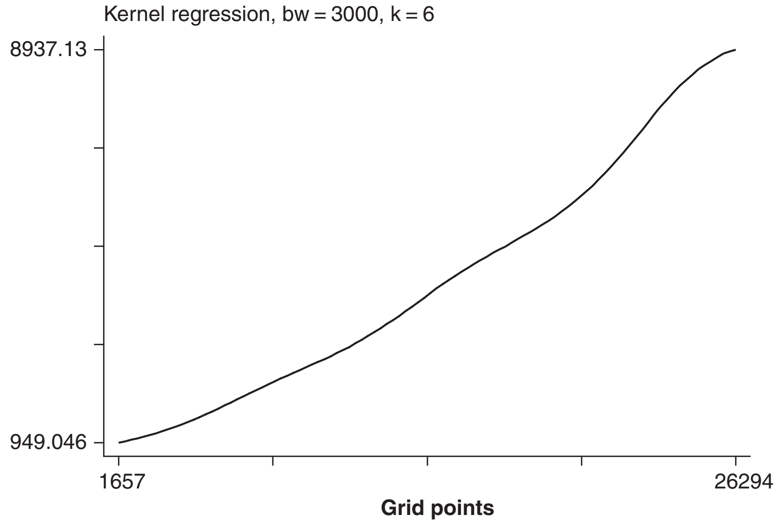

Figure 9.5 The estimated conditional mean of the poorest 10 per cent income per capita on GDP per capita

can be solved by using splines. Figures 9.6 and 9.7 contain the results of the third order spline smoothing.

The results of the spline smoothing and the kernel regression are similar and confirm the Kuznets hypothesis.

Remark 6. We use an alternative measure of income distribution, namely, the ratio of incomes for 20 per cent richest and 20 per cent poorest people; the ratio of incomes for 10 per cent richest and 10 per cent poorest people (coefficient of funds) with the same result.

Remark 7. The dependence of the 20 per cent low-income share on GDP per capita also approaches a U-form. The dependence of the poorest 20 per cent income per capita on GDP per capita curve has the same form as the one for poorest 10 per cent income per capita.

According to Figures 9.3–9.5, the turning point is ca. 14,000 (GDP per capita, PPP constant 2005 international $). Only nine transition countries (Latvia, Croatia, Poland, Lithuania, Estonia, Slovak Republic, Hungary, Czech Republic and Slovenia) have a GDP per capita greater than the turning point. For this reason we can expect an increase in the Gini index for the other 20 tran sitional countries before they reach the turning point. The GDP per capita for Russia equals 13,873 (PPP constant 2005 international $). All countries with a greater GDP per capita have a Gini index smaller than

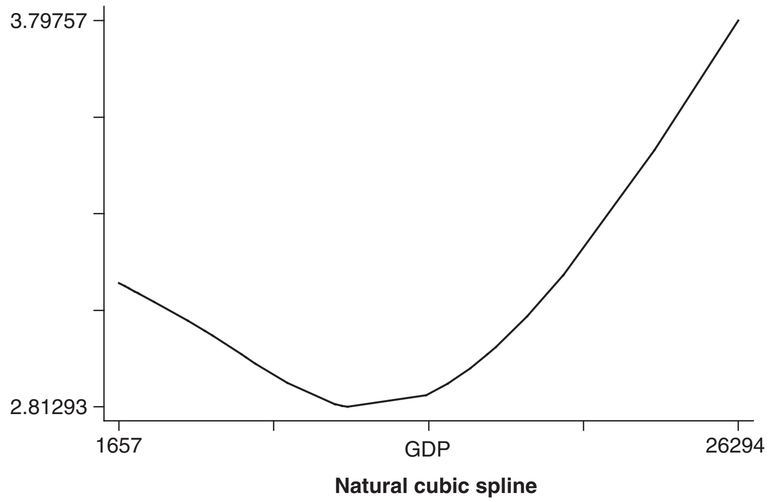

Figure 9.6 The spline smoothing of the 10 per cent low-income share on GDP per capita

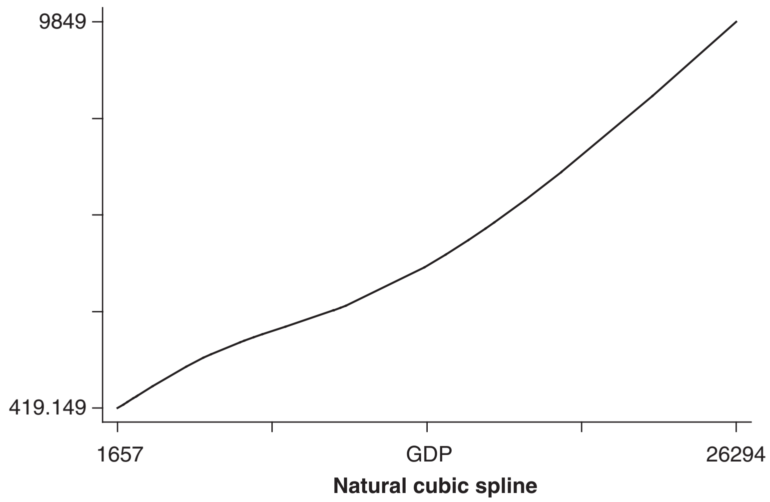

Figure 9.7 The spline smoothing of the poorest 10 per cent income per capita on GDP per capita

Russia. That is why we can expect a reduction of the inequality level in this country with an increasing GDP per capita after some increase. In the next section we will try to check this assumption using the panel data from Russian administrative districts.

4.4. Panel data models for Russian regions

Our basic empirical model is

$$INEQ_{it} = \mu + \beta_1 INCOME_{it} + \beta_2 INCOME_{it}^2 + \alpha_i + \varepsilon_{it} \tag{9.10}$$

where i and t are the number of a region and time, respectively, $i = 1, \ldots, 84$, $t = 2001, \ldots, 2007$, $\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2)$, α_i are constants for the fixed effects model and $\alpha_i \sim IID(0, \sigma_\alpha^2)$ for random effects model.

The estimated equation with fixed effects is:

$$\begin{array}{lllll} INEQ = & 5.397 & +\,4.057\, INCOME_{it} & -\; 0.353\, INCOME_{it}^2 \\ t & 16.18 & 15.56 & -7.35 \\ p\text{-}value & 0.000 & 0.000 & 0.000 \end{array} \tag{9.11}$$

The F statistic for testing the significance of the individual effects is equal to 59.31, p-value = 0.0000, hence the hypothesis about the absence of individual effects is rejected.

The generalized least squares estimated random effects model is:

$$\begin{array}{llll} INEQ_{it} = & 5.544 & +\,3.73\; INCOME_{it} & -\; 0.248\, INCOME_{it}^2 \\ z & 12.44 & 13.43 & -4.91 \\ p\text{-}value & 0.000 & 0.000 & 0.000 \end{array}$$

We perform a Breusch and Pagan Lagrangian multiplier test for choosing the best model between classical regression model with a single constant term and random effects model. The value of χ^2 test statistic is equal to 764.37, p-value = 0.000. We reject the null hypothesis in favour of the random effects model. Finally, for the Hausman test for fixed versus random effects the value of $\chi^2(2)$ test statistic is 173.98, p-value is equal to 0.000. We conclude that the fixed effects model is the preferred specification for the Russian data.

The coefficients of fixed effects model are highly significant and demonstrate support for the Kuznets hypothesis as the linear term is positive and the squared term is negative. 'The fixed effects model concentrates on a difference "within" individuals' (Verbeek, 2005, p. 347).

To reveal possible time effects we included a set of dummy variables for 2002, ..., 2007 years into the model and obtained the following result:

$$\underset{\substack{t\\p\text{-}value}}{INEQ_{it}} = \underset{\substack{9.11\\0.000}}{4.55} + \underset{\substack{12.71\\0.000}}{5.003}\, INCOME_{it} - \underset{\substack{-8.58\\0.000}}{0.459}\, INCOME^2_{it} - \underset{\substack{-2.61\\0.006}}{0.36}$$

$$d2002 - \underset{\substack{-4.48\\0.000}}{0.712}\, d2003 - \underset{\substack{-4.48\\0.000}}{0.653}\, d2004 - \underset{\substack{-4.73\\0.000}}{0.919}\, d2005 - \underset{\substack{-4.27\\0.000}}{0.97}$$

$$d2006 - \underset{\substack{-2.08\\0.000}}{0.515}\, d2007$$

All dummy variables' coefficients are significant and have negative signs. We can conclude that the inequality in Russian incomes decreases with time. At the same time, proceeding from the equation (9.11), we can see that turning point is 5.7 (minimum subsistence levels). But only the richest regions such as Moscow or Tyumenian region have this level of mean income. Consequently, for most Russian regions the growth in income inequality is observed, but the growth rate is decreasing.

Almost all the regions, except for the richest ones, have not yet reached such a level of mean income after which one can expect the decrease of the income distribution inequality.

4.5. Recommendations about inequality reduction in distribution of incomes

For the transition countries, incomes of the fifth quantile exceed incomes of the first quantile on the average in 5.48 times. One of the ways of income inequality reduction is redistribution of a part of incomes of the top quantile in favour of the poorest by means of a progressive scale of taxes for the fifth quantile and transfers to the first quantile.

Considering that $p_1 + p_2 + p_3 + p_4 + p_5 = 1$, from the formula (9.3) it is easy to obtain:

$$G = 100\% \cdot (0.8(p_5 - p_1) + 0.4(p_4 - p_2)) \tag{9.12}$$

If we reduce the incomes of the richest quantile group by θ per cent in favour of the poorest quantile (without changing incomes of the other groups) by means of taxes and transfers, incomes of the first quantile group will increase on $\frac{p_5}{p_1} \cdot \theta\%$. Using the formula (9.12), it is easy to show that in this case the Gini index will decrease by $1.6 \cdot \theta \cdot p_5$ %.

Table 9.1 contains the results of changes in the incomes of the first quantile and the Gini index as result of the reduction of the income by the fifth quantile on 1 per cent, 2 per cent, 3 per cent, 5 per cent, and 10 per cent.

Table 9.1 Results of Income Redistribution

	Reduction of income for richest 20%				
	1%	*2%*	*3%*	*5%*	*10%*
Poland					
increase in income the poorest 20%	6.00	12.00	18.00	30.00	60.00
decrease in Gini index	0.56	1.12	1.68	2.79	5.58
Bosnia and Herzegovina					
increase in income the poorest 20%	6.20	12.41	18.61	31.01	62.03
decrease in Gini index	0.68	1.37	2.05	3.42	6.85
Uzbekistan					
increase in income the poorest 20%	6.23	12.45	18.68	31.13	62.25
decrease in Gini index	0.71	1.41	2.12	3.54	7.07
Latvia					
increase in income the poorest 20%	6.28	12.56	18.84	31.40	62.79
decrease in Gini index	0.68	1.37	2.05	3.42	6.83
Lithuania					
increase in income the poorest 20%	6.29	12.59	18.88	31.47	62.94
decrease in Gini index	0.68	1.37	2.05	3.42	6.85
Estonia					
increase in income the poorest 20%	6.32	12.65	18.97	31.62	63.24
decrease in Gini index	0.69	1.38	2.06	3.44	6.88
Viet Nam					
increase in income the poorest 20%	6.43	12.86	19.29	32.14	64.29
decrease in Gini index	0.72	1.44	2.16	3.60	7.20
Russian Federation					
increase in income the poorest 20%	7.33	14.67	22.00	36.67	73.33
decrease in Gini index	0.70	1.41	2.11	3.52	7.04
Macedonia, TFYR					
increase in income the poorest 20%	7.41	14.82	22.23	37.05	74.10
decrease in Gini index	0.72	1.45	2.17	3.62	7.23
China					
increase in income the poorest 20%	8.00	16.00	24.00	40.00	80.00
decrease in Gini index	0.77	1.54	2.30	3.84	7.68
Georgia					
increase in income the poorest 20%	9.20	18.40	27.60	46.00	92.00
decrease in Gini index	0.74	1.47	2.21	3.68	7.36

We have considered only those countries in which the ratio of incomes for the richest 20 per cent and poorest 20 per cent of people is more than six. Just 1 per cent of the fifth group's income would increase income of the first group by 6–9per cent.

5. Conclusion

In this section the basic theoretical and practical results obtained will be listed briefly. The point of the article is the validation of the Kuznets hypothesis which determines an inverted-U form for the relationship between measure of income distribution inequality and the mean income for transition countries. It has been shown that the Gini index is a function of the mean income and the incomes of all income groups except the richest group.

The proposal of an inverted-U shape for the Gini index on the mean income was formulated using the conditions for the first and second derivatives of certain functions. As a result of these conditions we can show the form of the dependence of the low-income group's income with the mean income. The drop in the Gini index after reaching the turning point is possible only when the low-income groups' income growth rising faster than mean income.

One possible way to increase the income of the poorest quantile group is repartition of the income of the richest quantile group to the first one with the help of progressive tax scale for the fifth quantile and transfers to the first quantile. For example, reduction of incomes by the fifth quantile by 3 per cent will allow to increase the income of the first quantile by 18–27 per cent and to reduce the Gini index more than by 2 per cent.

The cross section data of 29 countries confirm the validity of the Kuznets hypothesis for transition countries. For this group of countries the turning point of ca. 14,000 PPP USD was found. But 20 of 29 countries with transition economy have GDP per capita less than the threshold level after which a reduction in the inequality of the distribution of incomes is expected.

Among the countries with lower GDP per capita, Russia is the closest one to the turning point. We can expect reduction of the inequality level in this country with an increasing GDP per capita. The panel data for Russian regions also confirm the Kuznets hypothesis, but almost all the regions, except for the richest ones, have not yet reached such a level of mean income after which one can expect the decrease of the income distribution inequality.

Appendix

Table 9.A1 Inequality in Income or Expenditure

Country	*Measure of income or consumption*			*Unequality measures*		*GDPpercapita*
	poorest 10% (20%)	*richest 10% (20%)*	*Survey year*	*GINI index*	*Survey year*	*PPP (constant 2005 international \$), 2007[a]*
Albania	3 (8)	26 (41)	2005[a]	33	2005[a]	6707
Armenia	1.6 (9)	41.3 (43)	2003[a]	37	2006[b]	5377
Azerbaijan	6.1 (13)	17.5 (30)	2005[a]	36.5	2001[a,b]	7414
Belarus	3.6 (9)	22 (37)	2005[a]	27.4	2007[c]	10,238
Bosnia and Herzegovina	2.8 (6.9)	27.4 (42.8)	2004[a]	56.2	2007[b]	7088
Bulgaria	3 (8.7)	25.5(38.1)	2007[b]	30.7	2007[b]	10,529
China	2.4 (6)	31.4 (48)	2005[a]	47	2007[b]	5084
Croatia	3.6 (9)	23.1 (38)	2005[a]	29	2008[b]	14,729
Czech Republic	4.3 (10.2)	22.4 (36.2)	1996[b,d]	26	2005[b]	22,953
Estonia	2.7 (6.8)	27.7 (43)	2004[a]	34	2008[b]	19,327
Georgia	1.9 (5)	30.6 (46)	2005[a]	40.8	2005[a]	4403
Hungary	3.5 (8.6)	24.1(38.7)	2004[a]	28	2005[b]	17,894
Kazakhstan	3 (7.4)	25.9 (41.2)	2003[d]	30.9	2007[c]	10,259
Kyrgyz Republic	3.6 (8.1)	25.9 (41.4)	2004[a]	32.9	2004[a]	1894
Lao PDR	3.7 (8.5)	27 (41.4)	2003[a]	33	2003[a]	2044
Latvia	2.7 (6.8)	27.4 (42.7)	2004[a]	36	2005[b]	16,317
Lithuania	2.7 (6.8)	27.4 (42.8)	2004[a]	36	2005[b]	16,659
Macedonia, TFYR	2.4 (6.1)	29.4 (45.2)	2003[a]	39	2003[a]	8350
Moldova	3.2 (7.3)	26.4 (43.1)	2003[b,d]	32.9	2007[c]	2409
Mongolia	2.9 (7)	24.9 (40)	2005[a]	33	2005[a]	3056
Poland	3 (7)	27.2 (42)	2005[a]	34.9	2005[a]	15,634
Romania	1.2 (8)	20.8 (40)	2006[b]	32	2008[b]	10,750
Russian Federation	1.9 (6)	30.4 (44)	2007[b]	42.2	2007[c]	13,873
Slovak Republic	3.1 (8.8)	20.9 (34.8)	1996[b,d]	26	2005[b]	19,342
Slovenia	3.4 (8.2)	24.6 (39.4)	2004[a]	24	2005[b]	26,294
Tajikistan	3.2 (7.7)	26.4 (41.4)	2004[a]	32.6	2006[b]	1657
	3.4 (9)	25.7 (37)	2006[b]	27.3	2007[c]	6529
Uzbekistan	2.8 (7.1)	29.6 (44.2)	2003[b]	36.8	2003[b]	2290
Viet Nam	3.1 (7)	29.8 (45)	2006[a]	37.8	2006[a]	2455

a) *Source*: World Development Indicators, http://82.179.249.32:2391/ext/DDPQQ/report.do?method=showReport
b) *Source*: CIA World Factbook, www.cia.gov/library/publications/the-world-factbook/fields, date 14.05.2009.
c) *Source*: ROSSTAT, www.gks.ru/b gd/regl/B08_39/IssWWW.exe/Stg/05-04.htm
d) Human Development Report 2007/2008.

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