The Journal of Comparative Economic Studies, Vol.7, 2012, pp. 53–87.

Income Inequality and Systemic Transformations: Long-term Trends of Human Capital Private Returns[1]

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Abstract: The article discusses income inequality dynamics, which is assumed to act as a proxy for long-term trends in private returns on human capital. The author's research has found grounds to argue that the wage differential dynamics in Soviet-era Russia did follow international trends while the country failed to extend the knowledge sector share in its national economy. The author compares his empirical findings of the Russian case in an international context with the economic hypothesis usually referred to as the Kuznets curve. The author argues that income inequality tends to increase during the transitional stages of economic and social systemic transformations and subsequently moderates during the evolutionary stages of steady development.

Keywords: economic development, human capital, knowledge sector, wage differentials

JEL Classification Numbers: J24, J31, N30, O15, O43

1. Introduction

The major historical trends of the last centuries have usually been associated with human capital accumulation in major national economies and the expansion of their knowledge sector. Such trends are often discussed in their relationships with various patterns of income inequality and economic growth rates (or development in a broader sense).

This article is related to the literature that developed at the crossroads of empirical studies into income inequality, labour relations and economic growth, with reference to the assumptions, concepts and predictions of the human capital theory. We shall present the cases of leading economies that have experienced major systemic transformations, such as industrial and post-industrial modernizations or transition to an open market economy combined with political system change.

The human capital theory, as it was put forward at the turn of 1950s and 1960s, is based on neoclassical epistemology and explains workers' income inequality as a result of their productivity difference. Therefore, private return on human capital is considered as that part of a worker's income that is attributable to the skill premium for his or her higher qualifications relative to unskilled labour. The qualifications are obtained through the

worker's previous lifelong learning, so that human capital can be accumulated by means of various educational activities.

The statement that income inequality is based on human capital differences is also gaining support in cross-country comparisons, which has revealed positive correlations between educational attainment inequality and income inequality.[2] Based on the comparison of income inequality and the dynamics of knowledge sector indicators, as well as on other scholars' research **we assume that income inequality dynamics acts as a proxy for long-term trends in human capital private returns.**

The results from all lifelong-learning practices are taken into account when the overall outcomes of the influence of human capital on income inequality and economic growth dynamics are examined. In addition, the historical trends of human capital private returns identify themselves most clearly through relative wage dynamics in those branches of an economy that produce intangible knowledge products, since it is the knowledge producing sector of a national economy which utilizes human capital stock to a high degree and simultaneously extends its formation in the learning-by-doing process.

The interrelations between the knowledge sector share in a national economy, its pattern of wage differential and economic growth rates, have previously been examined by scholars with reference to empirical studies of Western-type economies. Soviet-era Russia, one of the two global 'superpowers' for several decades, appeared to be almost a blank space in this respect. This article attempts to fill this void by using official labour statistical data to assess the country's knowledge sector indicators and by combining them with assessments of the similar indicator trends available in the previous literature. Our research into the long-term dynamics of Russian knowledge workers' wages - covering nearly the entire Soviet era (1920-1980s) - provided the opportunity to compare its results with the economic hypothesis usually referred to as the Kuznets curve.

The second contribution of this article is to propose our generalized interpretation of the 'income inequality – economic growth' relationship as a cyclical process of systemic transformations and steady development within the framework of the human capital theory. Using the data from prominent panel country datasets on income inequality and economic growth rates over time it also contributes some empirical findings to the ongoing discussion.

2. The relationships between economic growth and income inequality: key empirical findings in the literature

2.1. Kuznets hypothesis on secular trends in income inequality

Simon Kuznets (1955) identified a very important trend in modern economic development: that income inequality tended to increase in the early phases of industrial

modernization, while it was the reverse trend that was associated with an advanced level of industrial development, when high economic growth rates appeared to be sustained. With his hypothesis, within-country income inequality dynamics was approximated with a trend-fitting inverted U-shaped curve. In mathematical terms, such a trend is expressed by the second-order polynomial function:

$$y=a_1x-a_2x^2-b+\varepsilon \quad (1)$$

where y is an indicator of income inequality, x is an indicator of the development level of a particular country and a_1, a_2, b are constants related to a specified time period in a particular country, ε is error term.

Kuznets used income shares of the population groups (1, 5, 10, 20, and 60%) as an indicator of income inequality. His preference originated in the availability of such data (of higher or lower quality) with long historical coverage in the literature of his time. Later (in 1971) Kuznets was awarded the Nobel Prize for outstanding research into the theory of modern economic growth, and the inequality-growth issue became one of the most significant that he had raised for subsequent generations of scholars.

Later empirical studies did not prove any universal pattern of the inverted U-shaped dynamics in income inequality and cast especially serious doubts on the empirical validity of the rising part of the curve. They also admitted that the latter's predictive power for developing countries had not been particularly significant.[3]

However the Kuznets U-shaped curve found support as a robust and valuable idea applied to global inequality dynamics that would capture both within-country and across-country income inequality. The global inequality dynamics trended upwards for more than a century, but showed signs of reversal in the last decades as more and more people around the world were participating in modern economic growth.[4]

2.2. Contemporary literature findings on inequality and growth relationships

There is a vast literature based on intra- and panel-country data analysis discussing various ways in which changes in income inequality could affect economic growth and development. The feedback between these two phenomena was also examined.

The Gini index is generally used as the most comprehensive indicator to measure inequality. The level of economic development of countries or regions is usually measured by their GDP per capita (GDP p.c.). A natural logarithm of this indicator is widely used to make it closer to normally distributed in econometric models for cross-country comparisons. However, GDP p.c. growth rates are usually used in time series analyses to capture intra-country influences and relations with other macro indicators.

Some scholars[5] came to the conclusion that the links between inequality and growth are not significant. However, the more flexible approach adopted by others allowed them to identify some causal links and different types of relationships between changes in income inequality and economic growth rates in various groups of countries, depending on their GDP or income per capita.

Thus Barro (2000) found that in rich countries (including those in the developing group), some positive effect of income inequality for economic growth could be observed, while in poor countries that effect turned out to be negative. Having used population-weighted lagged income inequality data on developing countries Majid (2003) argued that the underlying relationship between inequality and national income might be growth constraining in low-income countries and growth enhancing in middle-income ones.

As is argued in Banerjee and Duflo (2003) the relation between income inequality and economic growth is non-linear. That is why the countries that have the least and the most inequality in educational attainment do not coincide with those that have the least and the most inequality in income distribution.[6] In this respect, the research literature also pays attention to the negative influence of high levels of income inequality on economic development. It was evidenced by Ferreira and Ravallion (2008) that no country with initially low GDP p.c. and extremely high Gini index levels had managed to succeed in rapid economic development. The probable reason behind this observation is that high levels of income inequality are not only incentives for individual motivation through skill premiums but also act as social obstacles to human capital accumulation through education affordability on imperfect credit markets.[7] Another direction of income inequality's negative influence on economic growth is found in the instability of the latter in countries with high rates of initial inequality.[8]

Other factors relating to the negative impact of income inequality on economic growth are also pointed out in the literature[9]. First of all, a high level of the former may result in social tension and unrest with negative political and economic consequences to follow. They comprise a wide range of external effects such as crimes and riots, and frequent unfavourable changes in the legal environment.

As regards the impact of economic growth on income inequality many researchers argue it depends on the initial level of a particular country's economic development. In a cross-country framework the inverted U-shaped pattern relationship between the Gini index and the log of GDP p.c. is regularly observed, though its statistical significance is in doubt.[10]

Researchers[11] often draw attention to the fact that pro-growth policy implementation in developing countries usually leads to a rise in income inequality. However, empirical studies[12], including those with the World Bank support[13], have tended to include more and more cases in recent years where economic growth led to poverty reduction both globally and in countries with

rising income inequality.

In our view the findings based on within-country data analysis have a more solid basis, primarily because of their better data comparability and relevance. It is also important that the within-country approach allows scholars to avoid certain methodological problems that arise from comparing countries with different economies in terms of both quantity and quality.

It should be noted that many quantitative models based on panel data analysis often consider different countries involved as equally significant. In our view, to make the model outcomes more adequate some reasonable adjustments are needed to their independent variable values (e.g. GDP or population weights).

It should be pointed out as well that it usually takes a longer or shorter period of time before human capital investment decisions are made in response to changes in labour skill and entrepreneurial risk premiums and before their benefits affect a country's GDP. Therefore the models that include lagged independent variables seem to be more consistent with reality.

3. Human capital and income inequality: major historical cases

3.1. Early modern and industrial society cases

The economic history explorations of the last three decades have demonstrated to us that **the inverted U-shaped dynamics of income inequality was identified in the cases of leading economies that appeared to be the driving forces of world development during its various historical stages**.

Jan-Luiten van Zanden (1995) traced the rising part of the Kuznets curve back to the early modern era (sixteenth – early nineteenth centuries) examining the Netherlands (Holland) in comparison with some other urban areas in the Western Europe of that period, when primary accumulation of physical capital was in progress and the urban capitalist social structure was emerging.

Jeffrey Williamson and Peter Lindert highlighted the Kuznets-style dynamics of wage skill differentials in the nineteenth-twentieth century United Kingdom (in its major parts - England and Wales)[14] and the United States[15]. With particular reference to the respective countries' early stages of industrialization, they admitted that highly skilled labour had been better and better paid in relation to the unskilled workforce so that the skill premiums had tended to widen at first (until the mid-nineteenth century for England and Wales, and until the early twentieth century for the US) before narrowing afterwards (from the mid-nineteenth century for England and Wales and from the early twentieth century for the US). The data provided in Williamson (1985) for the long nineteenth century England and Wales exposed the wage dynamics of knowledge-based occupations relative to other employees in the period under review. Its trend fits the inverted U-shaped curve as the Gini index dynamics

does for the same period. The similarity of these trend directions reveals that the rise and decline in income inequality was determined by the respective change in returns on human capital.

The issues concerning wage differentiation trends as a substantial element in overall income distribution dynamics were discussed at the XII International Economic History Congress Session organized by Leonid Borodkin and Peter Lindert (1998) with an emphasis on case studies of particular countries and regional patterns and their underlying factors. The lack of reliable data, their fragmentary appearance and poor quality was also an important issue under consideration. Following Feinstein (1988), some authors criticized the methods of early data processing and interpretation employed by Williamson and Lindert. It was also highlighted that other data should demonstrate various trends in wage differentials in particular regions and branches of industry. As a result, the validity of the rising part of the Kuznets curve in nineteenth century economies remains an open question for economic historians and this issue is far from resolved.

However, the later (and better quality) data obtained from the UNU-WIDER World Income Inequality Database (2008) indicate basically **the same Kuznets-style dynamics for major catch-up economies in the second half of the twentieth century** (Figures 7-9). This most widely used and well documented dataset on income inequality (compiled in the 1990s by the World Bank and extended by the United Nations affiliated institution) spans quite a long period of time (generally the last 50-60 years) and contains references to primary sources (as well as the assessment of their quality). Therefore, it is possible to select those series for a particular country that were developed on the basis of relatively stable methodological approaches. Within-country data for various years are most compatible with each other. As for the cross-country data, their trends are quite comparable, whereas the data compatibility is in serious doubt.

The Gini index is chosen as the most comprehensive and commonly used indicator to measure inequality. For this reason, the Kuznets-style dynamics in income inequality is observed in those East Asian countries that have somehow succeeded in achieving catch-up development. These include twentieth century Japan (which completed the full cycle of the 'Kuznets process' – Figure 8) and modern China (which seems to be only at the early stage of industrial modernization and has so far experienced only an upward part of the Kuznets curve – Figure 9).

Nowadays, it is almost common knowledge that while the accumulation of physical capital was the major factor of economic development in the nineteenth century, human capital played its part in the twentieth century.[16] This led to knowledge sector expansion in those economies that appeared to be the driving forces of world development.

However, during most of the twentieth century income levelling with narrowing

skill-premiums occurred in almost all the developed economies[17] and combined with knowledge sector expansion in terms of both major national accounts indicators and employment.[18] Many scholars ascribed this pattern to the statistical diminution of differences in workers' qualifications after skilled labour expanded in quantity as a result of extensive educational enrolment. The institutional environment factors that were pointed out by Kuznets (1966, pp. 196-197, 214-215, 217-219) are of great importance as well. These comprise government redistribution of incomes through a progressive taxation system and labour relations regulation, and the power and influence of labour unions.[19]

3.2. The case of Soviet-era Russia: data and methodology

The observations and theoretical models referred to above provide us with very powerful analytical tools for applying the Russian case to empirical study in an internationally comparable framework. In the USSR, similar trends in human capital returns dynamics can be discovered, but a different pattern of knowledge sector expansion compared to those of 'first-tier' countries of industrial modernization.

The data used for Soviet-era Russia research are extracted from official statistics on wages (including salaries) and number of workers: a) in knowledge-producing industry and sub-industry branches (KPB)[20] of the Soviet national economy; b) in those industries producing tangible products and low-technology services (non-KPB).[21]

Only the data for 1928-1935[22] and 1960-1990[23] were used, excluding the World War II years and other periods when the data quality was not reliable enough. Source data quality for these two periods also varied substantially. For 1928-1935, only 40-44% of all state-owned enterprise employees could be definitely attributed to one or another sector, whereas for 1960-1990 the attribution rate surged to 91-94%.

Changes in employee grouping by industry branches (on the level of primary data collection) were generally offset within the two major sectors of the economy (KPB and non-KPB). The most significant structural shortcoming of the data available is their lack of an intra-industry dimension. Therefore, it is not possible to study wage differentials on the level of employees' occupations or detailed educational attainment.

In order to avoid the inflation factor, wages and wage bills were calculated in a relative dimension on an annual basis (Table 1).

$$E_r=E_{KPB}/E_{NE} \quad (2)$$

$$W_r=W_{KPB}/W_{NE} \quad (3)$$

$$B_{KPB}=E_{KPB}*W_{KPB} \quad (4)$$

$$B_r=B_{KPB}/B_{NE} \quad (5)$$

where E_r is the relative employment in the knowledge-producing sector, E_{KPB} is the number of workers in the same sector (in absolute terms), E_{NE} is the number of workers in the overall national economy, W_r is the relative wage in the knowledge-producing sector, W_{KPB} is the weighted average wage in the same sector (in absolute terms; the number of workers in each KPB relative to their number in all KPBs were used as weights), B_{KPB} is the total wage bill in the knowledge-producing sector (in absolute terms), B_r is the relative wage bill of the knowledge producing sector, B_{NE} is the wage bill in the overall national economy.

The calculations of the same type were performed for the non-KPB sector.

Such data usage is based on the assumption that the visible and non-visible (i.e. not reflected in official data) income relation was the same for the knowledge producing and other branches of the national economy in any particular year. It was also assumed that in the almost totally regulated economy the wage proportions defined and set by the government were a general reflection of its aims to modernize the national economy and to affect the supply and demand of particular skills on the labour market. On the one hand, the official ideology praised the industrial blue-collar worker as the driving social force able to achieve the predetermined social and economic development goals and targets. On the other hand, the same ideology considered technical progress as well as specific culture production and distribution as important ways to achieve the country's modernization. That is why the relation between the wages of workers in knowledge producing industries and the average wage in the national economy reflected a substantial part of the overall income distribution.

The epistemological framework for national income accounting under Soviet-type socialism was that any new value added would be created in industries that produced tangible products; but those that produced intangibles (i.e. knowledge producing) were classified as intermediate consumption and non-productive. Consequently, any national income (or GNP) would be generated in industries that shaped their knowledge production in a tangible form.

In this situation, official wage statistics are much more valuable than those of the country's national income or other output indicators. Moreover, even under strict centralist planning the labour market appeared to be one that was a market by its very nature. Excluding the period of mass compulsory labour during and some time before and after World War II, the average Soviet worker (whether intellectual or not) had relative freedom of choice as to what education to obtain and what occupation to choose. The government planners had to set the qualification tariffs, and industries' and enterprises' wage bill limits in such a way as to provide greater or lesser incentives for present and prospective employees working in a particular field. During certain periods of time, a great deal of power was delegated by planners to the enterprise management to define the

remuneration of individual employees or groups of employees within defined limits. Therefore, it is possible to argue that wage distribution was the very sector of the Soviet economy (almost totally regulated by government) that experienced the outcome of market forces, i.e. the supply of and demand for labour.

Based on the above, we suggest that: **human capital trends in Soviet-era Russia are assessed through the relative quantity of wages disbursed to the knowledge-producing industries of the national economy (versus overall wage distribution within the national economy). The proportions based on officially stated wage incomes adequately reflect the trends of the human capital returns in a 'centralist-planning-economy' situation. In combination with the proportions in employment they also reflect trends in the development of the knowledge sector.**

In attempting to explain the role of human capital in the economy of Soviet-era Russia, it is methodologically useful to apply Gary Becker's (1983, pp. 33-51) distinction between general and specific human capital. He devised his concept on the basis of an on-the-job training study in which corporate employees acquired their human capital at their workplaces. In our view, this could be expanded to various fields of economic relations and stated as follows: the specific element of human capital could be useful for an individual only in the economic system where it is acquired; while the general element is applicable in some other systems.

3.3. The case of Soviet-era Russia: principal findings

In the period of catching-up industrial modernization (the 1930s) the demand for a highly qualified labour force and its rare skills was growing rapidly. That is why the actual wage structure and dynamics did not fit the ideological values declared by the government, which had to adjust its Marxist-style ideology (flexibly using the vocabulary and quotations from its classic authors) to contemporary social and economic challenges. As a result, human capital returns tended to increase in the 1930s. The rise in the average nominal wage in the knowledge-producing sector outperformed that in the rest of the economy (Table 1, Figure 10).

Intra-industry differentiation in the knowledge-producing sector of the Soviet economy also widened. Thus, the wage and salary level of the senior industrial white-collar workers *(inzhenerno-tekhnicheskie rabotniki - ITR)* exceeded that of the junior ones by a factor of 3.59x in 1931 and 4.23x in 1934.[24] It was acknowledged by Gregory and Stuart (1994, pp. 182-183) that in the 1930s relative wage differentiation in the USSR was comparable with that of the USA while the latter had a higher level of income inequality relative to other developed economies.

The first signs of a break in the trend towards increasing wage differentials appeared in

1946 and the wage structure reforms of the mid-1950s established the opposite trend towards income levelling,[25] which remained in force until the mid-1980s. In the period of steady development of the 'centralist-planning-economy' relative wages in the KPB sector declined and relative wages in the non-KPB sector increased (Table 1, Figure 11). In 1971 the KPB relative wage fell below the average for the national economy. The factors behind such a pattern seem to be both the priorities set out by the official ideology and the supply/demand structure of the quasi-labour market. In the years under review, relative employment in the knowledge sector grew rapidly and exposed divergent dynamics with its relative wage (Figure 1). Such an expansion of KPB employment was largely due to the inflow of young employees who initially lacked high qualifications.

According to Bergson (1989, pp. 66, 73, 75, 95), in the 1970s USSR wage differentiation was comparable with that in some West European countries, especially with those that adopted an economic model with a strong social policy (the Nordic countries, the Labour-government period in the United Kingdom).

Comparing all the above cases with the Kuznets model, it could be suggested that **the wage differential dynamics in twentieth century Russia did indeed follow international trends. And both Soviet and Western-type economies' wage differentiation patterns conformed to the Kuznets curve as regards the industrial stage of economic modernization.**

Soviet-era Russia (like its post-World War II satellites) accumulated a great deal of human capital in terms of quantity. A number of social and economic indicators (those related to the literacy rate, educational enrolment and labour force quality, employment in research and development industry branches, as well as the share of government expenditure on education and R&D) were of a magnitude similar to those of the developed countries.[26]

Having created an intellectual sector comparable in relative size with that of developed economies, the Soviet Union advanced its physical capital gross investment rate (as a share of GDP) to about twice as high (and less efficient) as that in the developed economies. This led to a persistent significant discrepancy in capital structure by the end of 1980s. According to Melyantsev (2004), accumulated human capital investments (expenditures on education, healthcare and R&D) accounted for only 26% of total (both human and physical) capital stock in the USSR, compared to 60% in the developed economies at the same time.

In addition to this, the qualitative aspect of the Soviet knowledge sector is also relevant. As the socialist economy was closed enough for competition (as regards the production of both tangibles and intangibles) much of the human capital accumulated was a system-specific one in economic terms. It was not only ideologically indoctrinated instruction that was included in school curricula, and research practices that mattered, but various incompatible technical standards as well.

This qualitative feature of the human capital of the socialist economy was exacerbated by the quantitative trend towards the contraction of the key financial aspects of the Soviet knowledge sector from 1960 to the mid-1980s. This is evidenced in the relative wage decline in KPBs, which was more rapid than KPB expansion in terms of relative employment. As a result, the KPB share of the overall national economy wage bill continued to decline gradually until 1983, albeit not sharply (Table 1, Figure 2). It is probable that in certain issues the centralist planning failed and the decline of the knowledge sector wage bill share had not been expected by the government planners and decision-makers.

The above data may be interpreted as showing that **late Soviet-era Russia failed to follow the international trend to extend the knowledge sector share in its national economy despite the previous impressive growth of its country-specific human capital stock, and that resource allocation trends were not favourable for human capital formation.**

3.4. Human capital and income inequality under post-industrial modernization

In recent decades, income inequality (both in wages and non-labour incomes) has again been on the rise in the process of the transition from an industrial to a knowledge-based post-industrial (or information) society with a globalizing economy.[27] And it is human capital that is considered to be the prime engine of post-modern economic growth; consequently, overall income distribution is largely based on the difference in returns on human capital.

In major developed (as well as in major industrializing) economies the correlation between their knowledge sector expansion and income inequality has become positive and has tended to become stronger since the mid-1970s. This has been clearly discernible at the industry and sub-industry level of the knowledge sector with inclusion of human-capital-intensive financial services. This trend has not been representative for all developed countries (France is the most notable exception) but for those (English-speaking first of all) that have defined major trends in world economic and cultural development at least over the last 30 years (Figures 4, 6). Of these countries in question, the US and the UK had major global financial centres whose role has significantly increased in the process of financial sector expansion and globalization.

Researchers have recognized the reversal in trend of income levelling and have made references to the new stage of technological progress and the corresponding demand growth for highly skilled labour. IMF staff research (2007) argued that **progress in information and computer technology (requiring adequate human capital) determined the increase in income inequality in recent decades, both in developed and - primarily - in Asian**

developing economies. Globalization has also had its impact, especially on developed economies.[28] According to the IMF (2007), trade openness and integration tended to reduce inequality on the one hand; on the other hand, financial globalization did the opposite and outweighed the effect of the former. Mobility of capital increased demand for skilled labour both in donor and recipient countries. Financial liberalization and deregulation of the expanding financial sector led both to average size increase and to greater polarization of earnings (between executives and other employees primarily).[29]

Another factor which contributed to the rise in income inequality was that governments preferred not to expand their reliance on redistributive tax and benefit policy, but to curtail the influence of trade unions. The latter policy line found support in further shifts in employment structure in favour of knowledge sector industries, freelance and part-time labour. They have led to a weakening of the bargaining power of trade unions which occurred in many countries, but most notably in the US and the UK.[30]

Other authors[31] attributed the increase in income inequality to an upsurge in social mobility. Nonetheless, the latter seems to be a consequence of more fundamental changes in the social and economic structure of industrial societies. This applies especially to countries with transitional economies (Central and Eastern Europe, the CIS) and to Russia as the largest economy among them.

3.5. Human capital and income inequality under transitional modernization

Since the end of the 1980s, all transition economies have experienced the same upward trend that had previously re-emerged in developed economies since the mid-1970s.[32] In addition to the segmental formation of the information society these countries had experienced the transition to an open market economy and pluralistic political system that exacerbated many problems associated with such revolutionary changes. Dismantling of the socialist-era labour market institutions, which were heavily reliant on government regulation of earnings differentials, led to a greater role of free pricing across the entire wage scale.

Many empirical researchers, including those associated with the World Bank[33], came to the conclusion that in these countries **accumulated human capital had a positive impact on the rise of income inequality and that the returns on human capital has tended to increase in the last 20 years**.

In Russia, the trend towards rising income inequality has revealed itself to a greater extent than in other transition countries. Downturn in output appeared to be very deep in Russia and the need for industrial employment restructuring led to more significant labour market shocks. The significant impact of growing private returns on human capital is verified by a number of social and economic indicators in Russia; for example, the number of students and adult learners per capita, private expenditure on education – both from individuals and from employers.[34] In

Russia, private returns to education are estimated in Gimpelson and Kapeliushnikov, eds. (2008, p. 368) at levels close to those of the OECD countries but lower than in other transitional economies.

Hence, in post-Soviet Russia the contribution of human capital to rising income inequality appeared to be weaker than in Central European countries. In their recent empirical studies Russian authors[35] have found out that high Gini index values in Russia are largely due to a relatively large differentiation in the lower end of the distribution (in terms of both income, education and employment position levels). Moreover, Russia's high degree of income inequality is also largely due to factors not directly associated with the quantity and quality of its human capital stock. Other significant contributors to overall income inequality are climatic differences arising from its geographical magnitude that should be compensated in employees' remuneration, as well as extremely various industrial profiles of the Russian regions and low interregional workforce mobility which impedes efficient performance of the labour market. Institutionally income inequality was not dampened due to the relatively weak influence of newly formed independent trade unions and the government's de-facto 'laissez-faire' policy in regulating labour incomes in 1990s, while laying emphasis on limiting unemployment.

However, various sources (Table 2) indicate that **the trend towards rising income inequality has reversed in Russia during the last few years**. **The change occurred after the sharpest and most chaotic stage of the transitional process had been passed.** The results of recent research based on longitudinal surveys (RLMS–HSE)[36] showed that Russian low-income groups had benefited more than high-income brackets from the economic growth of the 2000s.[37] As inequality started to diminish, private returns to education turned down slightly.[38]

As we are not focused on an in-depth exploration of other factors contributing to income inequality in Russia from our research perspective, it is important that the previous findings in the literature confirmed that the direction of trends of human capital private returns over time was in conformity with overall income inequality dynamics, though their indicators fluctuations could be different.

In most transitional economies the process of rising income inequality was protracted over a longer period of time and more modest in magnitude than in Russia. Most likely for this reason, the subsequent inequality moderation appeared to be less discernible in these countries.

4. Cyclical pattern of the modified Kuznets curve

The original Kuznets curve was based on an exploration of the industrial development process at its early and mature stages that led to the formation of modern society. We consider it a particular case of inverted U-shaped income inequality dynamics that both accompanied and followed the process of a historically significant systemic transformation.

That transformation was based on the industrial technological revolution and urbanization as the major social transformation. However, Kuznets - who died in 1985 - was not able to examine another wave of increasing within-country income inequality in the last decades and offer us his explanation for the phenomenon. To summarize the above, the following up-to-date interpretation of income inequality dynamics could be proposed.

The general trend is that income inequality tends to increase in the major transitional stages of social and economic development during large-scale systemic transformations and tends to decrease in periods of steady (gradual) development.

Hence, the second-order polynomial function (1) can describe only one cycle of the relationship between income inequality and development level. If the cycle starts from a rise in income inequality, this relationship could generally be expressed as the *n*-order polynomial function:

$$y=a_1x-a_2x^2+a_3x^3\ldots-a_{n-2}x^{n-2}+a_{n-1}x^{n-1}-a_nx^n-b+\varepsilon \quad (6)$$

where y is an indicator of income inequality, x is an indicator of the development level of a particular country, a and b are constants related to a specified time period in a particular country, n is always an even number and ε is error term. As the complete cycle is described by the second-order polynomial function, the number of completed cycles (N) within this function is:

$$N=n/2 \quad (7)$$

It is important to emphasize that the systemic transformation of a society is considered a much more complex process than the emergence of a new technical or institutional segmental structure. In a social system undergoing a transformation process basic economic and social technologies and institutions do change more rapidly and radically than usual.

The following (not exhaustive) explanation of causal connections that emerge could be proposed.

It appears that in periods of systemic social and economic transformations basic (epochal) social and economic innovations usually emerge unexpectedly and lead to high demand for rare skills that were not of great value before or even did not exist at all.[39] At the same time, rapid changes lead to a less predictable economic environment in which various risk levels tend to increase. This can be measured historically in the increasing volatility of the economic indicators in question. Another factor that exacerbates this trend is of institutional nature. In such periods, traditional institutions that previously managed to mitigate inequality

and its negative social consequences, usually experience diminishing and often shattering effects.

The human capital supply and demand structure shifts more rapidly than education and labour markets (even those totally regulated by the government) are able to respond to growing imbalances and adjust to new patterns. At the same time, the supply of previously valuable skills becomes excessive and they become ordinary. In this way, a substantial proportion of the accumulated human capital appears to be historically specific, and becomes functionally depreciating (or even outdated) for the new demand pattern.

However, a high degree of human capital-based income inequality provides incentives to large investments in adequate (up-to-date) human capital that in certain circumstances usually lead to future high rates of economic growth.[40]

In periods of steady (gradual) development and relatively predictable social and economic innovations, the imbalances on labour markets tend to dampen. In market sectors that have already taken shape, price competition leads to skill premium reduction.

In a more predictable economic environment risk levels tend to decline and economic expectations become more consensual and tend to vary from actual outcomes to a lesser extent. This leads to risk premium reduction in the overall income structure.

As a result of the decrease in income inequality incentives to investment in human capital diminish. Simultaneously, a deceleration in the emergence of opportunities for high economic growth rates could be observed. However, high economic growth rates can be sustained on the basis of an accumulated or extensively enlarging human capital stock.

As demonstrated above, the empirical research literature findings tend to conclude that **income inequality itself has both positive and negative consequences for economic development and their combination may result in different outcomes for growth depending on the influence of various other factors**. Thus, both the initial level of economic development and the institutional environment (understood in a broad sense as rules of economic conduct) do matter aside from income inequality.

In certain circumstances, a national economy can enjoy other growth factors with income inequality decreasing (e.g. the USA in 1950-1960s), although in another environment it may suffer due to other reasons not directly associated with increasing income inequality. And there are frequent cases and probabilities for inequality facilitating growth in middle-income countries in addition to high-income ones.

We have examined the sample of major national economies that presented the Kuznets-style pattern of income inequality at their transitional and steady development stages. In order to make our assessments on the relationships between income inequality and economic growth rates we employed the cross-correlation and distributed lag analysis of the data on these economies.

For economic growth rate estimates widely recognized historical statistics on GDP p.c. were

used. These were developed by Maddison (2008) and might be controversial in absolute figures as it is possible to compare various countries' output only with a significant degree of conditionality. However, the scholar's particular interest in measuring the performance of the USSR economy[41] makes his data highly valuable.

As regards the impact of economic growth on income inequality, our cross-correlation test results (Table 3) and the cross-country ones available in the literature[42] reveal that **as a rule economic growth by itself has a relatively small impact on income distribution even if time lags are introduced.**

Although the above cases of major economies indicate a positive linear correlation between human capital based income inequality and GDP p.c. growth (Figures 3-12) **the quantitative degree of this correlation is not regularly strong** even if time lags are introduced. Linear approximation gives somewhat better results after each of the two within-country series (Gini index and GDP p.c.) are split into 2 periods: one with a Gini index upward trend (Table 4) and the other with a downward one (Table 5). However, in such a case, one has to reduce the number of observations in comparable data. Yet, only in cases involving Russia (1989-2006 – an upward trend in income inequality) and Japan (1970-1982 - a downward trend in income inequality) do the appropriate cross-correlation functions (both of the values themselves and, to a lesser extent, their residuals) and distributed lag models show us a reasonably strong and statistically significant dependence of GDP p.c. growth rate on the respective country's Gini index dynamics.

In the Russian case the lags are 4 years for cross-correlation functions and the distributed lag model (Tables 4, 6). In the case of Japan, the lags are 2 years for cross-correlation functions and the distributed lag model (Tables 5, 7). We suppose that on the Japanese labour market, with its suppressed horizontal mobility, such a short lag is attributable only to the first wave of the income differentiation impact on economic growth. As the comparable Gini index data for the period after 1982 are not available (although the available GDP p.c. data reaffirm the downward trend), we should not consider another cross-correlation function lag (8 years) as statistically significant.

Nor could we affirm the acceleration of economic growth after rising income inequality in China (Figure 9) as a statistically significant case because of the lack of comparable data for this major developing economy which would clearly demonstrate the rising part of the Kuznets curve.

Also debatable is the extent to which cases of economic growth rate acceleration (Russia in 1989-2006 and China in 1985-2004) were due to a rise in income inequality or if they appeared to be primarily the results of some other driving forces that accompanied the respective systemic transformations.

5. Conclusion

Our case studies of the most representative national economies demonstrate that their trends of income inequality during industrial modernizations and thereafter basically fit the inverted U-shaped curve mathematically described as a second-order polynomial function. Such pattern is often referred to as the Kuznets curve following the seminal work by Kuznets (1955).

However, income and wage inequality curves were back on the rise with the transition to a post-industrial society thereafter. In major developed economies, the correlation between knowledge sector extension and wage differential dynamics became positive and has tended to increase since the mid-1970s. This trend was most clearly discernible on the industry and sub-industry level of the knowledge sector. And major transitional economies experienced a significant upswing in income inequality as their transformation was getting under way, with subsequent moderation after the sharpest and most chaotic stage of the transitional process had been passed.

These observations and theoretical models provide us with very interesting results when applied to the empirical study of Russian reality in an internationally comparable framework. Soviet-era Russia failed to follow the international trend to extend the knowledge sector share in its national economy. Nonetheless, the wage differential dynamics in twentieth century Russia did follow international trends. Our principal findings confront the views that the ideology followed by the Soviet ruling elite played a pivotal role in income distribution policy and show that the application of ideology to economic matters could be relatively flexible, in order to reflect the supply and demand shifts in the quasi-labour market, even under central planning. Be that as it may, evidence emerged in later times that the knowledge sector was not managed efficiently and appeared not to be ready to utilize the growing human capital stock.

Our more general observation, based on empirical evidence from the case studies of the most representative national economies, is that the relationship between income inequality and the level of development appears to be a long-term cyclical process. If the cycle starts from a rise in income inequality this process could generally be expressed as an n-order polynomial function.

One part of the cycle is that human capital based income inequality tends to increase during transitional stages of economic and social system transformations such as industrial and post-industrial revolutions, innovative and catching-up modernizations or transitions to an open market economy combined with political system change. At the second part of the cycle, during stages of development under a more or less stable social and economic system, the wage differential tends to decrease.

On the whole, both our analysis outcomes and the cross-country analyses available in the literature provide us with grounds for the following conclusion. As economic development (including GDP growth) has a multiple-factor and non-linear nature it should be pointed out that a change in income inequality is one of its important factors, but one that is neither necessary nor sufficient.

Income inequality rising from relatively low levels provides *opportunities* for economic growth acceleration. Consequently it could be a stimulus for economic growth under certain institutional conditions. But after reaching some critical point its further rise leads to social tension, political instability and impedes social and economic development.

Notes

[1] Thanks are due to Leonid Borodkin for sharing his thoughts and ideas that intellectually encouraged this research. We appreciate helpful comments on an early draft by Grigory Kliucharev. We are indebted to Péter Földvári and Bas van Leeuwen for their review of the following versions. Additionally, we thank Giovanni Federico for his part in the debate at the XVth World Economic History Congress Session "Human capital formation and economic growth since the 19th century" in 2009 and the other participants of the Session for their valuable questions and critical suggestions. We are grateful to Yoshihisa Godo for the following interesting discussion which helped improve the paper. Useful comments from a reviewer are also acknowledged. We naturally accept full responsibility for the contents of the paper, including possible errors and omissions. Research support was provided by the Russian Foundation for Humanities grant № 10-03-0247a.

[2] See, for example, De Gregorio and Lee (2002).

[3] For the literature review see Moran (2005).

[4] Sala-i-Martin (2006), Ferreira and Ravallion (2008).

[5] See, for example, F. H.–G. Ferreira, M. Ravallion (2008).

[6] Castelló and Doménech (2002).

[7] Castelló and Doménech (2002), Deininger and Squire (1997), Galor and Moav (2004).

[8] See, for example, ILO (2008a).

[9] See, for example, Barro (2000, pp. 5-7), Bénabou (1996, pp. 11-73), Deininger and Squire (1997, pp. 40-41).

[10] See, for example, Barro (2000).

[11] See, for example, Eicher and García-Peñalosa (2001).

[12] Eicher and Turnovsky, eds. (2003); Sala-i-Martin (2006).

[13] Ferreira and Ravallion (2008).

[14] Williamson (1985).
[15] Williamson and Lindert (1980).
[16] See, for example, Kendrick (1976), Galor and Moav (2004).
[17] Milanovic (2003).
[18] See, for example, Machlup (1962), Rubin and Huber (1986).
[19] See also in Korzeniewicz and Moran (2005, pp. 282, 302-304).
[20] Agriculture: state-owned farms (white-collar workers); Arts; Banking and finance; Construction: white-collar workers; Culture; Education; Government and public management; Industry (white-collar workers); Medical services; Research and development.
[21] Agriculture: state-owned farms (blue-collar workers); Construction (blue-collar workers) Industry (blue-collar workers); Transportation; Utilities; Wholesale and retail trade.
[22] TsUNKhU (1936).
[23] TsSU/GKS (1971-1991); also available at: Slavic Research Center, Hokkaido University. Soviet Economic Statistical Series (http://src-home.slav.hokudai.ac.jp/database/SESS.html).
[24] TsUNKhU (1935, pp. 190-191).
[25] See in Nove (1982, pp. 347-348), Bergson (1989, pp. 85, 87).
[26] See, for example, Barro and Lee (2001), Bergson (1989, pp. 125-126; 1978, p. 215), Van Leeuwen and Földvári (2008).
[27] See, among recent studies, Corley et al (2005); ILO (2008a and 2008b).
[28] Galor and Moav (2000), ILO (2008a, p. 39-52).
[29] ILO (2008a, p. 14-20, 56-58).
[30] ILO (2008b, pp. 71-73, 81-109).
[31] Higgins and Williamson (2002).
[32] Grimalda et al. (2010).
[33] See, for example, Mitra and Yemtsov (2006), Sabirianova (2002).
[34] Obrazovanie v Rossiiskoi Federatsii (2006, pp. 130-131, 461; 2007, pp. 81, 86-87, 95, 108, 127-130, 363, 420-421, 438-439, 455-456).
[35] Gimpelson and Kapeliushnikov, eds. (2008, pp. 301-304, 513-515, 518-519, 537), Lukiyanova (2008).
[36] Russia Longitudinal Monitoring Survey of HSE — UNC Carolina Population Center (http://www.cpc.unc.edu/projects/rlms-hse).
[37] Gorodnichenko *et al.* (2009, pp. 36, 46, 51).
[38] Gimpelson and Kapeliushnikov, eds. (2008, pp. 531-532, 535).
[39] See, for example, Barro (2000), Galor and Moav (2000), Grimalda and Vivarelli (2010).
[40] See, for example, Galor and Moav (2000).
[41] Maddison (1998).

[42] See, for example, Deininger and Squire (1997).

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Appendix

Table 1 Soviet-era Russia: Indicators for Knowledge-Producing Branches (KPBs) and non-KPBs

	KPBs			Non-KPBs		
Year	Relative Employment	Relative Wage	Relative Wage Bill	Relative Employment	Relative Wage	Relative Wage Bill
1928	21.18%	112.48%	23.83%	18.86%	108.90%	20.54%
1929	21.54%	112.06%	24.14%	19.91%	101.76%	20.26%
1930	20.42%	112.38%	22.95%	21.37%	95.19%	20.34%
1931	18.66%	116.86%	21.81%	22.26%	93.72%	20.87%
1932	17.61%	120.87%	21.29%	23.05%	93.36%	21.52%
1933	18.04%	126.03%	22.74%	24.21%	90.43%	21.89%
1934	17.40%	117.85%	20.51%	24.39%	88.59%	21.61%
1935	17.89%	118.41%	21.18%	25.66%	88.53%	22.72%
1960	24.82%	104.35%	25.90%	68.01%	98.27%	66.83%
1965	26.73%	107.60%	28.76%	66.34%	97.31%	64.56%
1970	28.22%	100.83%	28.46%	64.44%	100.22%	64.58%
1971	28.40%	99.31%	28.20%	65.33%	100.56%	65.70%
1972	28.58%	98.33%	28.10%	63.96%	101.19%	64.72%
1973	28.86%	98.26%	28.36%	63.60%	101.27%	64.41%
1974	29.01%	96.65%	28.04%	63.41%	101.90%	64.62%
1975	28.99%	95.50%	27.69%	63.35%	102.53%	64.96%
1976	29.11%	93.89%	27.34%	63.19%	103.10%	65.15%
1977	29.21%	93.53%	27.32%	63.03%	103.38%	65.16%
1978	29.13%	93.71%	27.30%	62.23%	103.30%	64.28%
1979	29.72%	92.99%	27.64%	62.47%	103.56%	64.69%
1980	29.90%	92.83%	27.76%	62.28%	103.45%	64.43%
1981	30.08%	92.08%	27.70%	62.09%	103.92%	64.52%
1982	30.20%	91.24%	27.55%	61.96%	104.18%	64.55%
1983	30.27%	89.86%	27.20%	61.91%	103.70%	64.20%
1984	30.39%	90.79%	27.59%	61.70%	104.58%	64.53%
1985	30.52%	90.92%	27.75%	61.61%	104.51%	64.38%
1986	30.73%	91.15%	28.01%	61.45%	104.54%	64.24%
1987	30.81%	92.20%	28.41%	62.29%	103.11%	64.23%
1988	31.31%	92.63%	29.00%	61.83%	102.43%	63.33%
1989	31.99%	93.04%	29.76%	61.07%	102.23%	62.44%
1990	32.58%	93.30%	30.40%	60.58%	102.31%	61.98%

Source: calculation based on TsUNKhU (1936), TsSU/GKS (1971-1991).

Note: the sum of Relative Wage Bills for the KPBs and non-KPB sectors is less than 100% as some industry branches not attributed to either sector remained.

Table 2 Income Inequality in Russia (1988-2008): (Gini Index Alternative Estimates).

	UNICEF (Innocenti Centre)	**World Bank**	**Rosstat**		**Lukiyanova - Kapeliushnikov**
1988		23.80%			
1989	27.07%				
1990	26.92%				
1991	32.45%		26.00%	32.50%	
1992	37.09%		28.90%	37.10%	
1993	46.13%	48.34%	39.80%	46.10%	
1994	44.58%		40.90%	43.90%	
1995	47.07%		38.70%	45.40%	
1996	48.25%	46.15%	40.10%	44.50%	
1997			38.10%	44.70%	
1998			39.90%		41.00%
1999		37.48%	40.00%	48.20%	
2000			39.50%	48.30%	44.00%
2001	52.12%	39.60%	39.70%	50.80%	44.00%
2002	49.12%	35.70%	39.70%	47.70%	40.00%
2003			40.30%	48.10%	41.00%
2004	46.90%		40.90%	46.70%	39.00%
2005	44.50%	37.51%	40.90%	45.60%	39.00%
2006	45.10%		41.60%	45.90%	
2007	43.90%		42.30%	44.70%	
2008	42.30%		42.30%		
Notes (income type)	*Personal Unadjusted Gross Earnings.*	*Expenses (1988 - incomes) based on longitudinal survey (RLMS) and official data.*	*Personal monetary incomes after taxes and transfers.*	*Gross wages and salaries.*	*Net wages and salaries based on longitudinal survey (RLMS).*

	UNICEF (Innocenti Centre)	World Bank	Rosstat		Lukiyanova - Kapeliushnikov
Source	*TransMONEE (2010)*	*World Bank (2010)*	*Rosstat (2009, pp. 167, 184), Gimpelson and Kapeliushnikov, eds. (2008, p. 119)*	*Rosstat (2009a, p. 411), Gimpelson and Kapeliushnikov, eds. (2008, pp. 119, 574)*	*Gimpelson and Kapeliushnikov, eds. (2008, p. 503)*

Table 3 Cross-correlations between Gini Index and GDP p.c. Growth Rate

GDP p.c. Growth Rate Lag	USA*	United Kingdom**	Japan***
0	-0.02	0.06	0.39
-1	-0.07	0.06	0.48
-2	-0.06	0.10	**0.55**
-3	-0.10	0.13	0.44
-4	-0.04	0.11	0.20
-5	-0.07	0.09	0.04
-6	-0.09	0.06	-0.06
-7	-0.15	0.00	0.03
-8	-0.09	-0.03	
-9	-0.05	-0.08	
-10	-0.04	-0.10	
-11	-0.06	-0.10	
-12	-0.08	-0.09	
-13	-0.07		
-14	-0.05		
-15	0.03		

Source: calculation based on UNU-WIDER (2008), Maddison (2008).

Note: the number of lags for each country is limited by *n/4*, where *n* is the number of observations.

* 1947-2004.

** 1961-2006.

*** 1954-1982.

Table 4 Cross-correlations between GDP p.c. Growth Rate and Gini Index

Upward trend in Income Inequality

Gini Index Lag	USA*	United Kingdom**	Japan***	Russia****
0	0.05	0.04	0.60	0.37
-1	-0.01	0.01	0.44	0.58
-2	-0.05	0.11	0.46	0.81
-3	-0.02	0.16	0.17	0.89
-4	0.04	0.04	0.04	**0.91**
-5	-0.03	-0.08		
-6	-0.09	-0.06		
-7	-0.09	0.02		
-8	-0.11			
-9	-0.01			

Source: calculation based on UNU-WIDER (2008), Maddison (2008).

Note: the number of lags for each country is limited by *n/4*, where *n* is the number of observations.

* 1980-2004.

** 1977-2006.

*** 1954-1969.

**** 1989-2006.

Table 5 Cross-correlations between GDP p.c. Growth Rate and Gini Index

Downward trend in Income Inequality

Gini Index Lag	USA*	United Kingdom**	Japan***	USSR****
0	-0.20	0.11	0.06	0.44
-1	0.22	0.13	0.52	0.41
-2	0.08	0.07	**0.71**	0.40
-3	0.17	0.09	-0.31	0.43
-4	-0.11	0.23		**0.53**
-5	0.31	0.24		**0.53**
-6	-0.02			0.48
-7				0.45
-8				0.44

Source: calculation based on UNU-WIDER (2008), Maddison (2008), USSR (1971-1991).

Note: the number of lags for each country is limited by *n/4*, where *n* is the number of observations.

* 1947-1982.

** 1961-1981.

*** 1970-1982.

**** 1960-1990; as Gini index data were not available for the USSR the relation of average wages in knowledge-producing and non-knowledge-producing sectors was used as an indicator of within-country income inequality.

Table 6 Distributed Lag Model of the GDP p.c. Growth Rate and Gini Index in Russia (1989-2006)

Multiple R	0.925324861
R-square	0.856226097
Adjusted R-square	**0.766367408**
Standard Error	0.035012209
Observations	14

	df	*SS*	*MS*	*F*	*Significance of F*
Regression	5	0.058403304	0.011680661	**9.528584338**	0.003210755
Residual	8	0.009806838	0.001225855		
Total	13	0.068210142			

Fisher's F-distribution (significance level α=0.05 and degrees of freedom γ_1=5 and γ_2=8): **3.687503636**

	Coefficients	*Standard Error*	*t-statistics*	*P-value*
Y-intercept	0.662829981	0.195818506	3.384920022	0.009571663
Lag Gini Index = 0	0.368706378	0.537230686	0.686309229	0.511915215
Lag Gini Index = -1	-0.571946157	0.573153519	-0.997893475	0.347553439
Lag Gini Index = -2	0.334151467	0.570967161	0.585237627	0.574520122
Lag Gini Index = -3	-0.069303619	0.545375738	-0.127074995	0.902017027
Lag Gini Index = -4	**0.74366554**	0.350065966	**2.124358301**	0.066373379

Student's t-test (significance level α=0,05 and degree of freedom γ=8): **2.306005626**
Student's t-test (significance level α=0,10 and degree of freedom γ=8): **1.85954832**

Table 7 Distributed Lag Model of the GDP p.c. Growth Rate and Gini Index in Japan (1970-1982)

Multiple R	0.873150849
R-square	0.762392406
Adjusted R-square	**0.66056058**
Standard Error	0.01492566
Observations	11

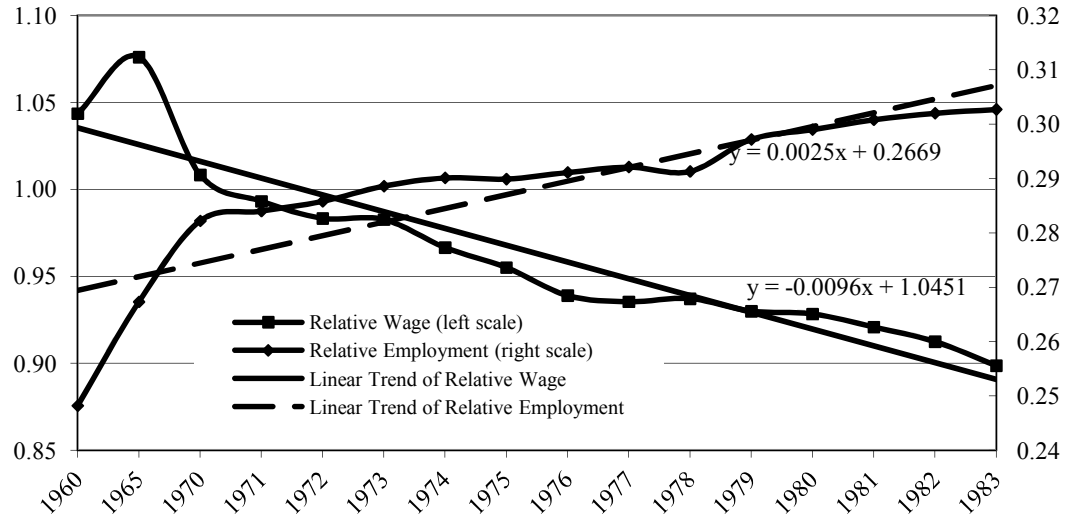
	df	*SS*	*MS*	*F*	*Significance of F*
Regression	3	0.005003609	0.00166787	**7.486779279**	0.013741114
Residual	7	0.001559427	0.000222775		
Total	10	0.006563037			

Fisher's F-distribution (significance level α=0.05 and degrees of freedom γ_1=5 and γ_2=8): **4.346830451**

	Coefficients	*Standard Error*	*t-statistics*	*P-value*
Y- intercept	1.208063871	0.289642132	4,17088448	0,004184528
Lag Gini Index = 0	-0.397454412	0.136253412	-2,917023548	0,022434919
Lag Gini Index = -1	-0.103318788	0.127025156	-0,813372651	0,442787043
Lag Gini Index = -2	**0.323845692**	0.134650211	**2,405088635**	0,047112636

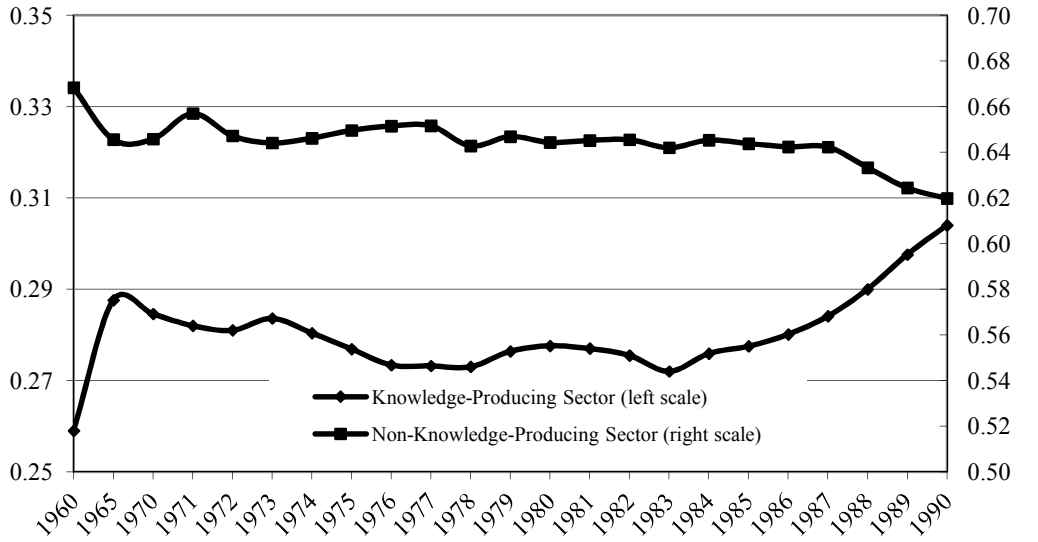
Student's t-test (significance level α=0,05 and degree of freedom γ=8): **2.36462256**

Figure 1 Soviet-era Russia: Knowledge-Producing Sector Indicators (1960-1983)



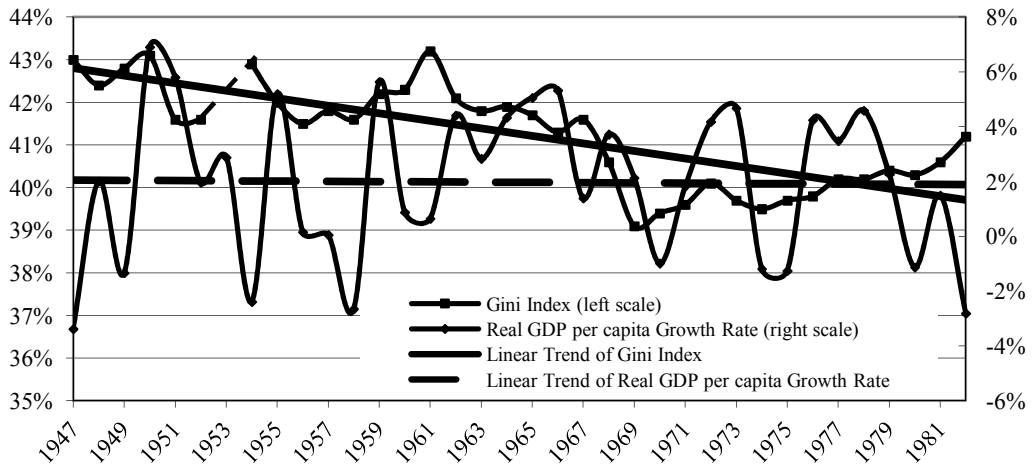
Source: calculation based on TsSU/GKS (1971-1991).

Figure 2 Soviet-era Russia: Relative Wage Bill Dynamics (1960-1990)



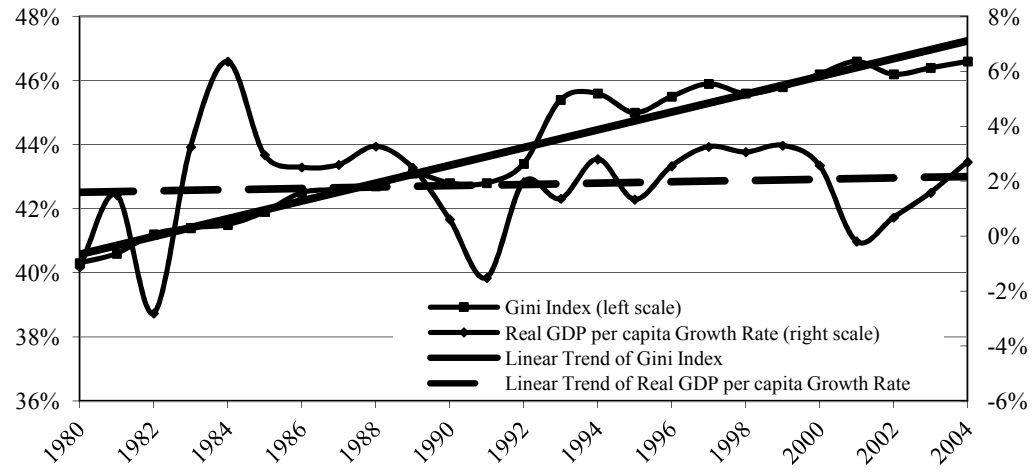
Source: calculation based on TsSU/GKS (1971-1991).

Figure 3 Income Inequality and Economic Growth: USA (1947-1982)



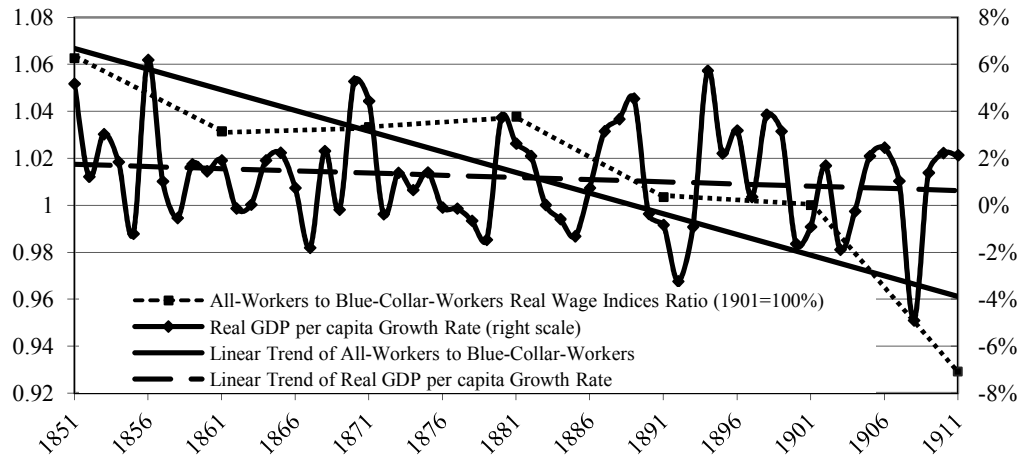
Source: UNU-WIDER World Income Inequality Database with reference to the Current Population Survey (Brandolini 1998), Current Population Survey (US Bureau of the Census), calculation based on Maddison (2008).

Figure 4 Income Inequality and Economic Growth: USA (1980-2004)



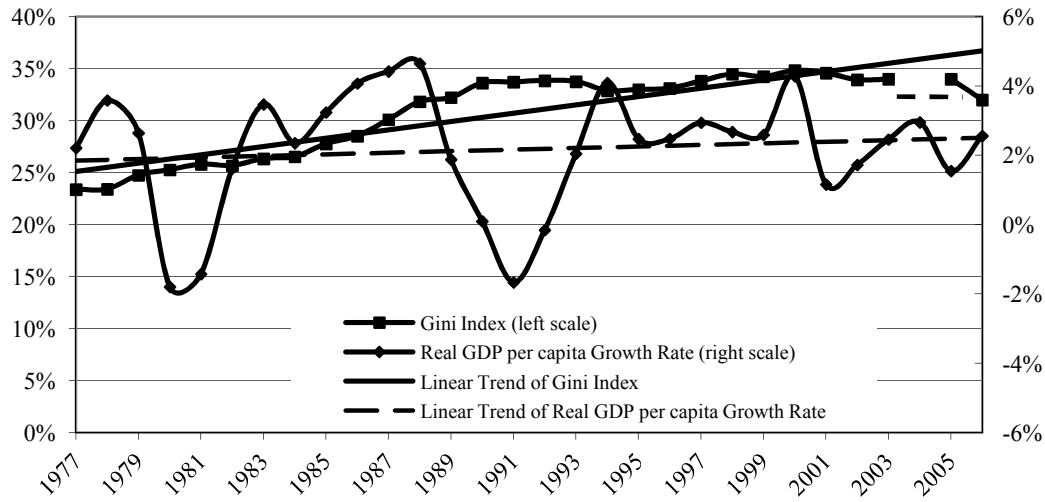
Source: UNU-WIDER World Income Inequality Database with reference to the Current Population Survey (US Bureau of the Census), calculation based on Maddison (2008).

Figure 5 Income Inequality and Economic Growth: England and Wales (1851-1911)



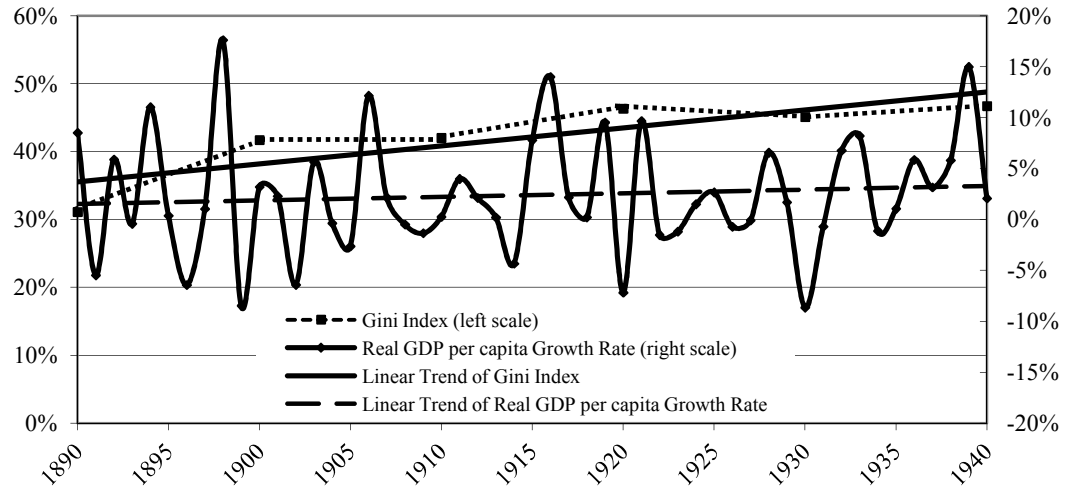
Source: calculation based on Williamson (1985), Maddison (2008).

Figure 6 Income Inequality and Economic Growth: United Kingdom (1977-2006)



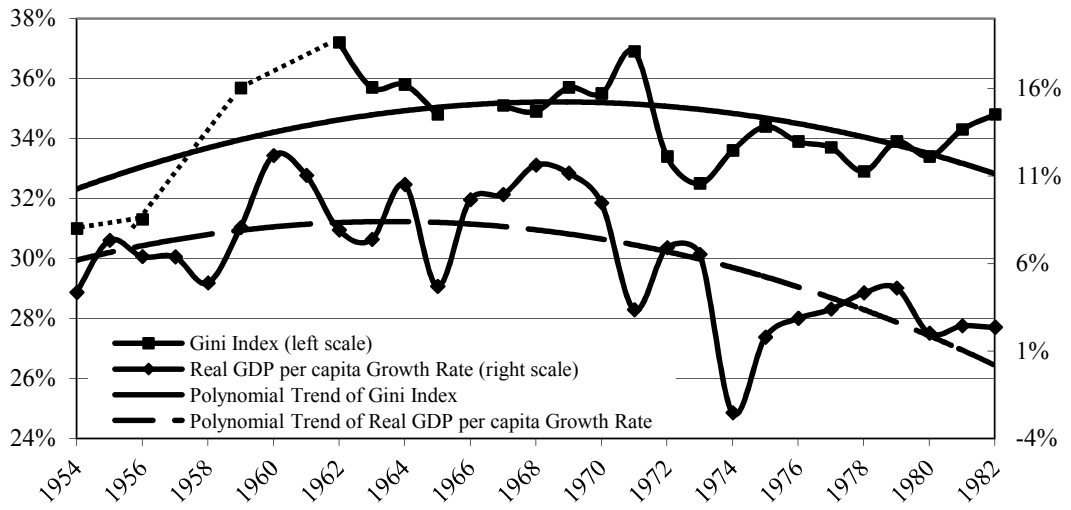
Source: UNU-WIDER World Income Inequality Database with reference to Family Expenditure Survey (Goodman & Spephard 2002), calculation based on Maddison (2008).

Figure 7 Income Inequality and Economic Growth: Japan (1890-1940)



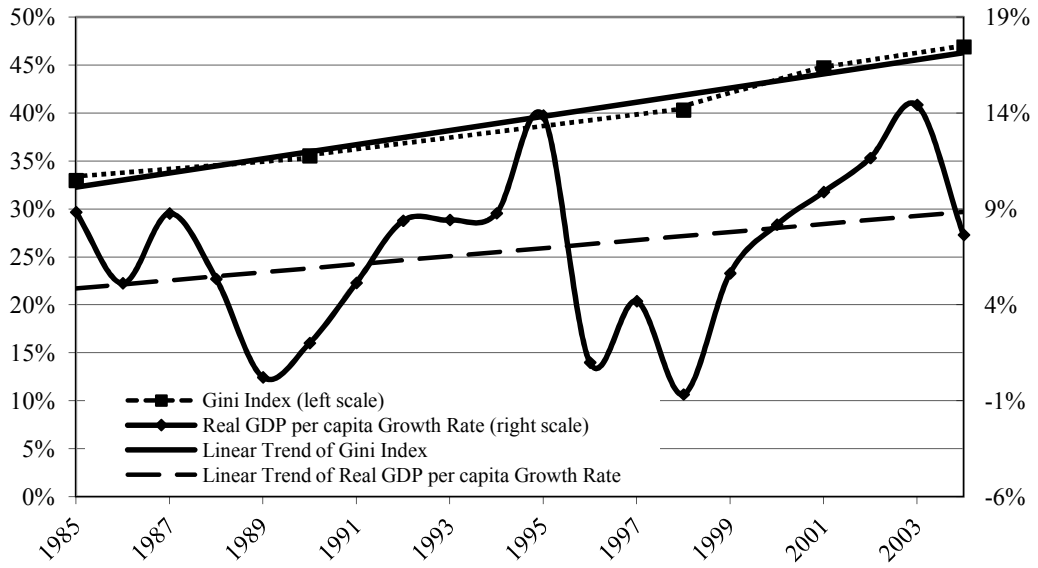
Source: UNU-WIDER World Income Inequality Database with reference to Mizoguchi (1985), calculation based on Maddison (2008).

Figure 8 Income Inequality and Economic Growth: Japan (1954-1982)



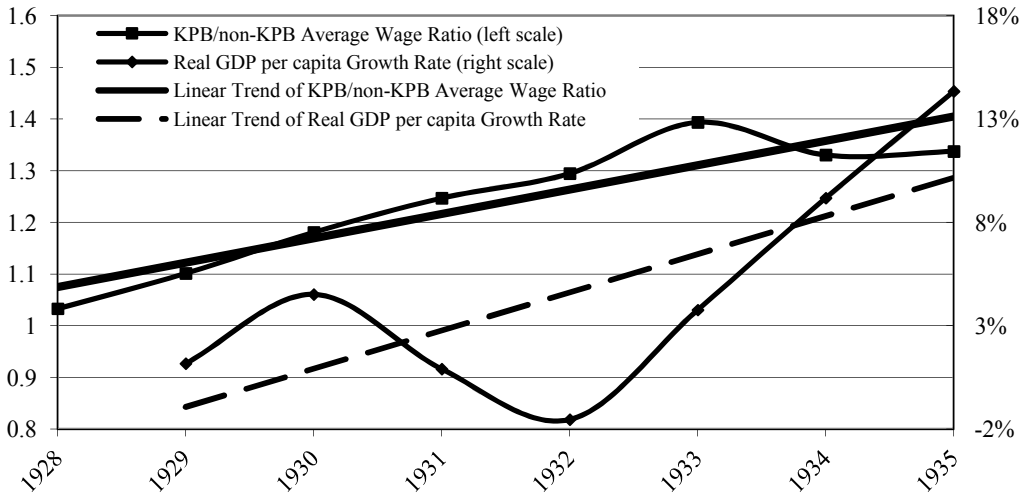
Source: UNU-WIDER World Income Inequality Database with reference to Mizoguchi and Takayama (1984), Podder (1972), Wada (1975), calculation based on Maddison (2008).

Figure 9 Income Inequality and Economic Growth: China (1985-2004)



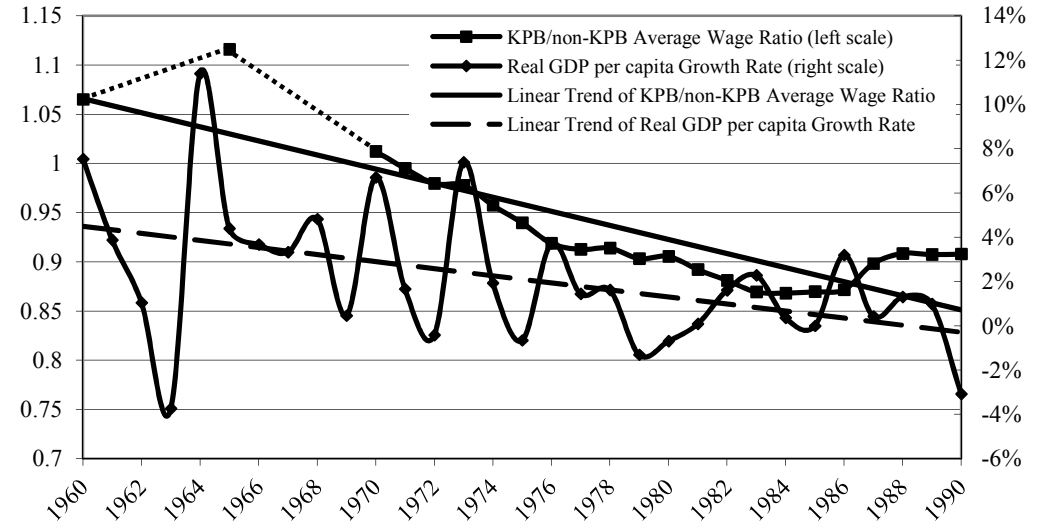
Source: UNU-WIDER World Income Inequality Database with reference to the World Bank (Poverty Monitoring Database 2002, World Development Indicators 2004, 2007), calculation based on Maddison (2008).

Figure 10 Income Inequality and Economic Growth: Soviet-era Russia (1928-1935)



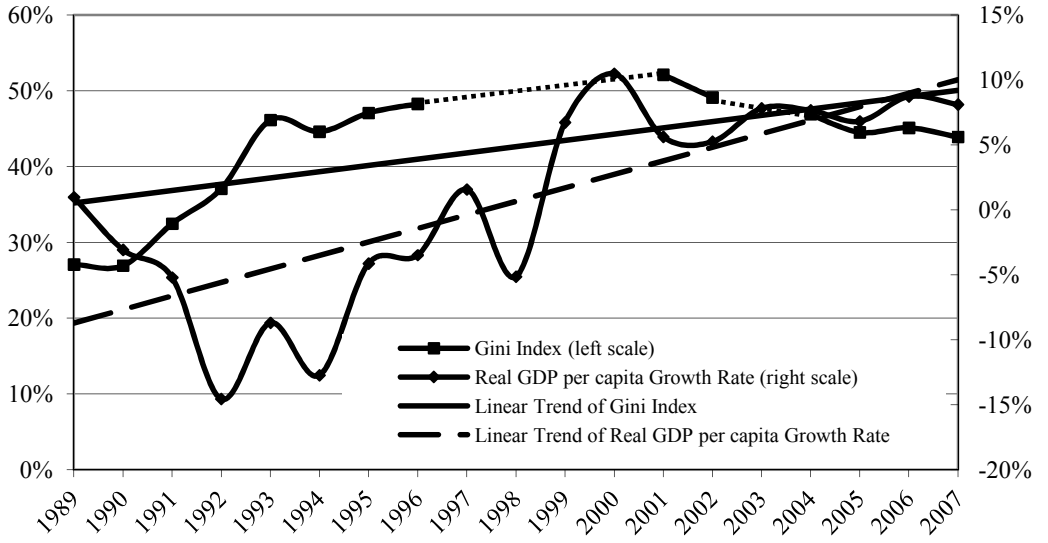
Source: calculation based on Maddison (2008), TsUNKhU (1936).

Figure 11 Income Inequality and Economic Growth: Soviet-era Russia (1960-1990)



Source: calculation based on Maddison (2008), TsSU/GKS (1971-1991).

Figure 12 Income Inequality and Economic Growth: Post-Soviet Russia (1989-2007)



Source: TransMONEE 20109 Database, calculation based on Maddison (2008).