Economic Growth—Human Capital Nexus in Post-Soviet Ukraine, 1989-2009

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This book presents theoretical and empirical investigation of economic growth and the possible impact of human capital on economic growth in transition economies of Ukraine, the Russian Federation, Poland, and Hungary during the period of 1989-2009. This research defines place and role of human capital in the process of transition from the exogenous to the endogenous forms of growth and socio-economic development. Substantial part of the book is devoted to the integrative scholarly synthesis with the special emphasis on theoretical aspects of economic growth. The research presents both exogenous and endogenous models of growth, including Harrod-Domar, Solow, Solow-Swan, Leontief, Mankiw, Barro, and other models.

Key words: economic growth, human capital, transition
JEL Codes: J24, O47, P24

The book is intended for professors, scholars, students, public officials, leaders of NGOs and businesses, all who are interested in issues of economic growth, human capital, and economic transition.

PREFACE

Over the last eight years, Ukraine demonstrates a rapid economic growth. This growth was preceded by the sharp decline in the national production, linked to the exhausting and ill-planned transition from the planned economy to the market economy. Deeper investigation of the potential sources of economic growth in Ukraine is needed. Ukraine, the Russian Federation, Poland, and Hungary have been selected as countries in transition that indicate economic growth. Preference has been given to the endogenous model of economic growth. As a result of the review of a broad spectrum of literature in historical perspective, it has been found that the exogenous models of Solow-Swan and Leontief do not offer complete and adequate reflection of the transition experience. The purpose of this study is to provide a systematic investigation of the human capital--economic growth nexus. The impact of human capital on economic growth is incorporated according to Mankiw et al. (1992) framework. The Kalaitzidakis et al. (2001) model is chosen among the endogenous growth models presented in the literature as the most appropriate for evaluation. This model is developed for cross sectional analysis and shows the influence and importance of human capital for economic growth relative to other key inputs and to differences across countries. A variety of measures of human capital frequently used in applied growth studies are employed. The work also estimates a system of linear equations. While intuition and theories of endogenous growth would point towards a positive effect of human capital on economic growth, empirical evidence on this issue is mixed. The next economic advancement in Ukraine will become possible based on the process of renovation and investment into principal capital. Further institutional and structural changes in the economy are needed. It will increase domestic and foreign investment, further develop domestic market, and sustain already achieved substantial GDP per capita growth.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Economic growth is one of the fundamental issues in economics. The issue of economic growth has been one of the key issues of economic theory and macroeconomics for a long time, tied to the issues of general equilibrium and economic cycles. Process of growth is traditionally considered as a quintessence of an increased scale reproduction, socio-economic development and social progress. Sustainable economic growth within the limits of national systems and regional enclaves is a guarantor of sustainable development.

The ideas of public spending and foreign investment as major engines of economic growth, especially in developing nations, are now replaced with ideas about the importance of reinvestment and development of domestic market. The theories of growth based on the fundamental assumption that a significant influx of the resources is necessary to initiate sustainable growth do not hold. They might work to a certain degree in the developing world, but appear to be insufficient to explain rapid economic growth in Ukraine and other countries of the former Soviet Bloc.

The socio-economic transition in Ukraine may be considered as successful. Political and economic reforms lead to the creation of predominantly market economy. By 2004 Ukraine achieved pre-transition level of GDP per capita. The positive economic growth takes place since 1999. At the same time, the theme of economic growth did not receive much attention in the scholarly literature in the region. Ukrainian and Russian economists has only produced a very insignificant number of works on this issue. As a result, scholarly publications lag behind the economic realities, at best explaining them, but not analyzing them well wnough and not rpesewnting well-grounded forecasts. This may be explained, in part, by the low level of familiarity of the Soviet and post-Soviet economists with the Western literature on economic growth, major concepts

and theories of growth, macroeconomics, and analytical techniques, including statistical and economietric analysis.

Works on the issues and different aspects of economic growth in transition and post-transition economies are presented by such Ukrainian economists as Aleksandrova (2003), Bazhal (2002, 2003), Bolhovitinova (2003), Boreiko (2005), Vahnenko (2000, 2003), Vovkanich (2005), Vozhzhov (2004), Gal'chinski (2004), Heyets (1999, 2000, 2001, 2003, 2004), Hrytsenko (1997, 2001, 2003), Danylishin (2006), Dem'yanenko (2003), Kvasnjuk (2000, 2003), Kendjuhov (2005), Kireyev (2003), Krjuchkova (2000), Kutsenko (2006), Levochkin (2004), Novitskij (2005), Olejnik (2003), Petkova (2005), Pokrytan (1997), Prihod'ko (2003), Sidenko (2003), Skrypnichenko (2003), Suhorukov (2006), Tarasevich (2003), Tochilin (2001), Chuhno (1996), Shubravs'ka (2005), Shchedrina (2003), Yaremenko (2001, 2003), Yatskevich (2006).

Certain contribution to the research of economic growth in transition and post-transition economies was made by Russian economists Balabanova (2004), Bessonov (2005), Veretennikova (2005), Perminov, Egorova, Pjatkovski (2004), Garipova, Gizatulin, Garipov (2005), Golub (2006), Fridmna, Vidjasov, Mel'jantsev (1998), Grushevskaja (2004), Dubjanskaja (2005), Evstigneyeva, Evstigneyev (2005), Zhits (2000), Zas'ko (2004), Zverev (2005), Zamskova, (2005), Ivanter (2006, 2004), Ivlev (2004), Hristenko, Mikul'skij, Nizhegorodtsev (2002), Simkin (2002), Kalinina (2005), Kvashnina (2004), Kosenkov (2005), Koshkin, Shabaev (2004), Kuznetsova (2000), Lashov, Spizharskaja (2004), L'vov (2004), Ovchinnikova (2004), Pavlova (2001), Perepelkin (2001), Ponomarev (2004), Vilenskij, Buhval'd, Runov (2002), Romanova (2002), Savchenko (2005), Saktoev (1999), Salijchuk (2004), Seleznev (2001), Sokolovskij (2001), Solovejkina (2002), Spirjagin (2005), Tolmachev (2005), Tjurina (2005), Ungaeva (2005), Cherednichenko (2004), Chechelev, Ivlev, Kozlov (2001).

The goal of this work is to fill the gap between the rapid economic growth as an objective economic reality of Ukriane and the lack of scholarly literature on the issue. This book presents theoretical and empirical investigation of economic growth and the possible impact of human capital on economic growth in transition economies of Ukraine, Russia, Poland, and Hungary during the period of 1989-2009. It defines place and role of human capital in the process of transition from the exogenous to the endogenous forms of growth and socio-economic development. Substantial part of the book is devoted to the integrative scholarly synthesis of the Western literature on economic growth with the special emphasis on theoretical aspects of growth.

Part I contains an integrative literature synthesis of the major contributions to the theory of economic growth. It presents both exogenous and endogenous theories of economic growth. In this Part, we argue that exogenous economic growth models of Solow-Swan and Leontief do not offer an adequate description of the transition experience. Among the endogenous models, presented in the literature, the Kalaitzidakis et al. (2001) model is chosen as the most appropriate for our evaluation. Part II presents an analysis of the process of transition and points to the exogenous and endogenous components of current economic growth in Ukraine. This Part argues for the neede to move from predominantly exogenous to endogenous type of growth. Part III is focused on the data analysis. It presents a substantial bloc of data on the countries of the former Soviet Bloc, including, first of all, Ukraine and the Russian Federation. Part IV presents description of the model, the data, and empirical results. It also presents the results of estimating a set of eqution and impulse response function. Conclusions and policy recommendations are presented in Conclusion.

PART I

GENESIS OF THE GROWTH THEORIES

This review is a combination of chronological changes and focuses around particular issues in theories of growth. This synthesis allows demonstrating incremental development of the models turned into qualitative transitions and rivalry of exogenous and endogenous concepts of growth. The review is built around the ideas that the economists formulate rather than around the economists themselves. It is not overloaded with the complex mathematical equations and keeps the major ideas and critiques easily understandable for the reader while placing the topic in the broader scholarly literature. Deeper understanding of economic growth requires evaluating the theory of growth in an historical perspective.

1.1. Early Concepts of Growth

Later mercantilists may be considered as founding fathers of the modern theories of growth. At the early stages of development of growth theory economists considered growth as a process of an increase in the national wealth. Theories of economic growth have acquired a major direction during the time of mercantilists' domination in XV – XVII centuries and Physiocrats of XVIII century (Kregel, 1973). Mercantilists considered accumulation of wealth as the major source of economic growth and the major goal of economic activities of merchants and the state (McDermott, 1999).

Representatives of the early mercantilism gave their preference to precious metals and metallic money as materials with perfect liquidity. The late mercantilists considered economic wealth of a nation in terms of total volume of produced commodities and supported positive trade balance.

This tendency can partially be explained by the development of manufacturing and domestic markets.

According to mercantilists opportunities of obtaining profit from commodity production and access to credit resources facilitate multiplication of wealth. Presence of sufficient amount of metal money, i.e. golden and silver coins, gives necessary access to credit and relatively low affordable borrowing interest rate in the country. For this reason mercantilists insisted on limiting gold outflow from the country.

Presence of golden and silver coins in monetary circulation was given a status of the necessary ground for economic growth. The active trade and commerce was considered as a precondition for economic growth. This approach can be considered as historically justified. All the capital in that era was represented by the trade capital, while there was no manufacturing capital in substantial quantity.

Mercantilists favored export since it was a primary source of metal money and at the same time supported restrictions on import of goods in the country. Such a policy was intended to maintain positive trade balance, sufficient amount of money, and hence stable economic growth.

Mercantilist voted for the low wages and thought that high wages will lead to a decrease in productivity, volume of produced goods, and slow down accumulation of wealth. Weakness of systemic approach and absence of sufficient theoretical grounds were characteristics of mercantilism.

Domination of mercantilist doctrines ended in early XVIII century, when mercantilists were replaced by Physiocrats. Physiocrats considered economic life as a natural process that has its own natural laws. They proclaimed a principle of “natural law.” Physiocrats opposed interference of the state in economic processes.

The major principles of Physiocrats were statements about the leading role of agriculture, surplus product, and a unified system of monetary and commodity circulation.

According to Physiocrats, the real product was produced only in agriculture. Other branches of the national economy could only change its form.

Physiocrats also accepted an idea about the existence of surplus as a part of the produced product that was not used in consumption or in production. This surplus was accumulated in the society and created increase in the national wealth. Francois Quesnay was a leading Physiocrat. He developed the system of economic reproduction and distribution of national product on the national scale.

1.2. Classics of Economic Growth

The first economist to write about the correlates of growth was David Hume. Hume (1711-1776) emphasized foreign trade as a primary engine for economic growth saying that both nations get an advantage from international trade (Rostow, 1990).

Adam Smith (1723-1790) focused on the accumulation of capital as crucial for the development of early capitalism. His advice was to accumulate capital and to pay for this accumulation by paying workers minimal wages. Accumulation of capital leads to long-term growth. Competition is in the nature of a contest and the economy is regarded as being propelled forward by technical progress, the driving force of which is the division of labor. The consequences of competition are viewed as equilibrating, with the outcome of the process of equilibration being socially desirable (Reid, 1989).

Thomas Malthus (1766-1834) considered the relationship between the growth of population and the growth of agriculture without technological change. He also supported using tax revenue to fund capital accumulation and investment. He emphasized proportions in development in order to avoid over saving, idle capacity, and unemployment. In his understanding proportions in development means proportional increases in

population, capital, and savings rates, which in turn lead to full capacity utilization and full employment. Malthus suggested that population was affected by economic conditions, and he showed a positive connection between income growth and population growth. However, population was considered a non-economic factor in the production process; he believed that it did not affect economic growth (Rostow, 1990).

David Ricardo (1772-1823) suggested the existence of a natural market wage, and wrote that new technology leads to a decline in the demand for labor assuming a particular form of technological change. He also emphasized proportions, as did Malthus, and diminishing and increasing returns on capital (Rostow, 1990).

John Stuart Mill (1808-1873) supported the general idea that output is a function of labor, capital, and land, and suggested that an increase in output depends on an increase in inputs or their productivity. Mill, therefore, distinguished between the quality and quantity of inputs and between extensive and intensive types of growth. Such progressive ideas are logically explained by the fact that he wrote during the industrial revolution in England. A typical production function is given in (1) below:

$$Y_t = F(K_t, L_t, N_t) \qquad (1)$$

N – land is fixed and exogenous and slowly goes out of the model over time;

K – capital, with its primary accumulation and then reinvestment, is a factor in extensive economic growth;

L – labor comes from the outside, but is not generated within the system of production, without consideration of its quality.

Diminishing returns to capital and labor were assumed.

The capital stock was modeled as (2) below:

$$K_t(i) = (1 - \delta)K_{t-1}(-1) + I_{t-1}(i) \qquad (2)$$

There was a physical capital accumulation rule. The key issue is how the level of investment is determined. According to Smith, investment is related to the level of profit. From the neoclassical point of view, investment is proportional to GNP, assuming that land grows with GNP (Rostow, 1990).

1.3. Schumpeter's Creative Destruction and Beyond

Schumpeter (1883-1950) made a significant contribution to the theory of economic development and business cycles and its historical patterns, in particular. Emphasizing the role of innovator, he supported general equilibrium theory, and at the same time stated clearly that in his view such theory could not cope with innovation. He writes: "But static analysis is not only unable to predict consequences of discretionary changes in the traditional ways of doing things; it can neither explain the occurrence of such productive revolutions nor the phenomena which accompany them. It can only investigate the new equilibrium position after the changes have occurred." (Schumpeter, 1911, p. 62-63)

Nelson notes that Schumpeter was curiously uninterested in where the basic ideas for innovations, be they technological or organizational, come from. "The "entrepreneur" is not viewed by Schumpeter as having anything to do with their generation. It would appear that it is this passage that lies at the root of the argument, often made, that Schumpeter considered invention and innovation very different acts." (Nelson, 1996, p. 90)

Later, however, Schumpeter realized the importance of technological change and that the venue for innovation is the large firm with an attached R&D laboratory that creates new products that the firm introduces. He wrote: "The first thing a modern concern does as soon as it feels it can afford it is to establish a research department every member of which knows

that his bread and butter depends on his success in devising improvements." (Schumpeter, 1947, p. 96)

Aghion and Howitt (1998), drawing implications from their tests for endogenous growth, suggested that the long-run rate of growth should be positively correlated with the flow of patents, the flow of entry of new firms, and the flow of new product introduction. They say:

> The central role in creative destruction in Schumpeterian growth theory can be tested by looking at the correlation between growth and two other variables, the flow of exit of firms and the rate of obsolescence of capital. The former is identical to the flow of entry in a steady-state equilibrium, while the latter is the rate of arrival of new innovations, which we have seen is equal to the rate of growth. Hence, the long-run rate of growth should be positively correlated with the flow of exit of firms and with the rate of obsolescence of capital. (Aghion and Howitt, 1998, p. 429)

1.4. Modern Theories of Growth

Modern growth theory may be traced to the classical article by Ramsey (1928) "A Mathematical Theory of Savings" (Rich, 1994). In this article Ramsey introduced an inter-temporarily separable utility function and derived an optimality condition from it. He points out that if current consumption were reduced in favor of current savings, then future consumption would increase. Therefore, if the marginal product of capital is high, the cost of foregone current consumption is lower than the benefits from increased future consumption.

Writing on the problem of economic growth, Ramsey (1928) suggested the following:

> The first I propose to tackle is this: how much of its income should a nation save? To answer this simple rule is obtained valid under conditions of surprising generality;

> the rule, which will be further elucidated later, runs as follows. The rate of saving multiplied by the marginal utility of money should always be equal to the amount by which the total net rate of enjoyment of utility falls short of the maximum possible rate of enjoyment. (Ramsey, 1991, vol. 2, p. 5)

The main simplifying assumptions made by Ramsey were the following: the community goes on for ever without changing either in size or in its capacity for enjoyment or in its aversion to work; enjoyment and sacrifices at different times can be calculated independently and added together; no new inventions or improvements in organization are introduced without a certain degree of accumulation. Distributional considerations were also ignored. He assumed that the way in which consumption and labor are distributed among the members of the community depends solely on the total amount of consumption and labor. Total satisfaction is a function of total consumption of goods and labor hours.

Ramsey suggested that the rate of interest is governed primarily by the demand price, and may greatly exceed the rate ultimately necessary to induce abstinence. Similarly, in the accounting of a Socialist State, the function of the rate of interest would be to ensure the wisest use of existing capital, not to serve in any direct way as a guide to the proportion of income which should be saved.

After Frank Ramsey, John M. Keynes (1935) pointed out that the savings ordinarily do not equal the amount of investment. As a result, the market economy is naturally unstable.

Sen mentioned that:

> While the classical economists – Marx in particular – were much concerned with growth, its modern revival started with a remarkable paper of Roy Harrod published in 1939. Interest in growth revived at first slowly and then

> by leaps and bounds. This was to a considerable extent the result of an immense practical concern with growth after the Second World War. The war-damaged economies were trying hard to reconstruct fast, the underdeveloped countries were attempting to initiate economic development, the advanced capitalist countries being relatively free from periodic slumps were trying to concentrate on raising the long-run rate of growth, and the socialist countries were determined to overtake the richer capitalist economies by fast economic expansion. Growth was everybody's concern and it is no wonder that in such a milieu growth theory was pampered by the attention of economists. (Sen, 1970, p. 9)

Harrod (1939) and Domar (1946) attempted to integrate Keynesian analysis with elements of economic growth. They used production functions and mathematical analysis to argue that the capitalist system is inherently unstable. The extended model is concerned with the problem of stability-instability in the system.

Harrod noted that:

> The axiomatic basis of the theory which I propose to develop consists of three propositions, namely: (a) that the level of a community's income is the most important determinant of its supply of saving; (b) that the rate of increase of its income is an important determinant of its demand for saving; and (c) that demand is equal to supply. It thus consists in a marriage of the "acceleration principle" and the "multiplier" theory… (Harrod, 1939, p. 14)

Harrod suggested that if investors anticipate more than the warranted rate of growth, the actual growth rate of demand will exceed even the high expected growth rate, and investors may decide that they expected too little from the economy. If

investors anticipate a growth rate lower than the warranted growth rate, then the actual growth rate will fall short of the expected growth rate, and investors may decide that they expected too much rather than too little from the economy. “The market thus seems to give a perverse signal to the investor, and this is the source of Harrod’s problem.” (Sen, 1970, p. 12) Also Sen noted that Harrod’s model of instability is undoubtedly incomplete, but it cannot be denied that he was focusing attention on an immensely important part of growth economics which subsequent preoccupation with growth models with perfect foresight has somewhat tended to obscure (Sen, 1970, p. 14).

Domar (1946) noted that, in the economic literature on the relation between capital accumulation and employment, Marx made a notable contribution. More recently, Keynes (1935) and his followers suggested that labor productivity is not a function of technological progress in the abstract, but technological progress embodied in capital goods, and the amount of capital goods in general. Even without technological progress, capital accumulation increases labor productivity, at least to a certain point, both because more capital is used per worker in each industry and because there is a shift of labor to industries that use more capital and can afford to pay a higher wage. Domar criticized Keynes on the basis that:

> The standard Keynesian system does not provide us with any tools for deriving the equilibrium rate of growth. The problem of growth is entirely absent from it because the explicit assumption can be justified only over short periods of time; it will result in serious errors over a period of a few years. Clearly, a full-employment level of income of five years ago would create considerable unemployment today. We shall assume instead that employment is a function of the ratio of national income to productive capacity. Because investment in the Keynesian system is merely an instrument for generating

> income, the system does not take into account the extremely essential, elementary and well-known fact that investment also increases productive capacity. This dual character of the investment process makes the approach to the equilibrium rate of growth from the investment (capital) point of view more promising: if investment both increases productive capacity and generates income, it provides us with both sides of the equation the solution of which may yield the required rate of growth. (Domar, 1946, p. 140)

Following the principle that the total increase of capital is equal to the total saving in the period, the fundamental equation $G = S/C$ may be modified as (3):

$$G_w = \frac{s - k - (K / x)}{C} \tag{3}$$

where G is growth, s is savings, and C is capital.

The simple Harrod-Domar model assumes that investment is determined entirely by planned savings and there is no independent investment function based on expectations of the future. The Harrod-Domar growth model provides a very simple framework within which the relationships among the aggregate macro variables can be examined. Even though it is simple, Chowdhury and Kirkpatrick noted:

> A host of planning problems and a wide range of possibilities can be analyzed within the H-D framework. In fact, the H-D model or some variant of it is the most widely used quantitative planning technique and, even though many plan documents do not explicitly present the H-D model, elements of it can be found in the way investment requirements and the role of savings are analyzed in the formulation of the economic growth plan. (Chowdhury and Kirkpatrick, 1994, p.12)

The basic Harrod-Domar model (1946) makes the following assumptions. First, savings is proportional to national income. Hence,

$$S = sY \tag{4}$$

where S is savings, Y is national income, and s is the average propensity to save. Second, the amounts of capital and labor required to produce a given amount of output are given. The aggregate production function can be presented in (5):

$$Y = min(K/v, L/u) \tag{5}$$

where $u = L/Y$ is the amount of labor required to produce one unit of output, or the reciprocal of labor productivity, and $v = K/Y$ is the amount of capital required to produce one unit of output, or the reciprocal of capital productivity.

According to this production function, output is determined by the lesser of the available quantity of labor and capital. Capital and labor are not substitutes, but perfect complements. From this assumption Chowdhury and Kirkpatrick conclude that "since the developing countries are usually labor surplus (relative to capital) economies, it follows that capital is the determining factor for the growth of output." (Chowdhury and Kirkpatrick, 1994, p. 13)

Assuming investment (I) is equal to savings, and

$$I = K\Delta K / \Delta t = \dot{K} \tag{6}$$

where t is time, and $\dot{K}$ is capital growth, we get

$$S = \dot{K} \text{ and, } sY = \dot{K} \tag{7}$$

In marginal terms, $v = \Delta K / \Delta Y$,

$$v = \frac{\Delta K / \Delta t}{\Delta Y / \Delta t} = \frac{\dot{K}}{\dot{Y}}. \qquad (8a)$$

$$\dot{K} = v\dot{Y} \qquad (8b)$$

By substituting (7) into (8b), we obtain

$$sY = v\dot{Y}, \qquad (9a)$$

or

$$\dot{Y} / Y = s / v \qquad (9b)$$

The rate of growth of output is determined by the ratio between savings and capital-output ratios. The rate of growth of capital stock is constant and equal to *s/v*. Replacement of *Y* in (9b) by *K/v* in (8b) gives (10a) and (10b) below:

$$\dot{K} = (s / v)K \qquad (10a)$$

Thus

$$\dot{Y} / Y = s / v = \dot{K} / K \qquad (10b)$$

This fundamental equation of the Harrod-Domar model indicates that with historically determined and constant values of *s* and *v*, the maximum rate of growth of the capital stock is determined by the ratio *s/v*. This relation determines the maximum possible rate of growth under the existing economic and other conditions in each country. In many developing countries, the savings rate (*s*) is low, and a function of national income, which is also low, and unequal (in per capita terms). At the same time *v*, that is the capital to output ratio, is high, implying a low level of technology, low productivity, and inefficiency of investment. Therefore, economic growth is *a priory* low and insufficient to absorb a rapidly growing population, i.e. labor force. This results in a high level of

permanent unemployment. From this perspective, in order to absorb a growing labor force, the country has to accelerate economic growth beyond the limit set by the traditional values of *s* and *v*. Growth acceleration requires an increase in savings to generate a rate of growth sufficient to absorb the new labor force. For example, if the population is growing by 2 percent a year and the country wants to achieve a steady state rise in per capita income of 4 percent, GDP must grow at the rate of 6 percent annually. If we assume an aggregate capital-output ratio *v* of four, then *s* must be .24 as demonstrated below:

$$s^* = v(\dot{Y}/Y) = 4 \times 0.06 = 0.24 \qquad (11)$$

Hence, 24 percent of GDP must be saved in order to achieve a 6 percent growth of GDP. Savings is assumed to be equal to investment. This is the basis of Lewis's comment that the key to solving the development problem is to raise the proportion of national income saved from 4-5 percent to 12-15 percent (Lewis, 1984).

Uzava formulates the Equilibrium Theorem as the following: "Let the initial capital stock K^* and labor forces L^* satisfy

$f_k[K^*/A(0)L^*] = \lambda + \mu$,

where λ is the rate of growth in labor, defined by $\dot{L}(t)/L(t) = \lambda > 0$, and μ is the rate of growth in the efficiency of labor, defined by $\dot{A}(t)/A(t) = \mu > 0$. Then, for the solution $[Y^*(t), K^*(t), L^*(t)]$ to the neoclassical growth process (*), the capital-output ratio $x^* = K^*(t)/Y^*(t)$ remains constant, output per worker $y^*(t) = Y^*(t)/L^*(t)$ increases at the same constant rate as the capital-labor ratio $k^* = K^*(t)/L^*(t)$. The capital-output ratio x^* is uniquely determined and may be referred to as the equilibrium capital-output ratio of the process (*)." (Uzava, 1961, p. 123)

Stability Theorem is presented as the following: "Let the growth equilibrium exist. Then the neoclassical growth process (*) is globally stable; namely, for the solution *[Y(t), K(t), L(t)]* to the process (*) with arbitrary initial $K(0)$ and $L(0)$, the capital-output ratio $x(t) = K(t)/Y(t)$ converges to the equilibrium capital-output ratio x^*." (Uzava, 1961, p. 123)

Nicholas Kaldor (1961) summed up the broad facts about the growth of advanced industrial economies that a well-told model must be capable of reproducing six "stylized facts". First, real output per person (or per hour) grows at a more or less constant rate over fairly long periods of time. There are short run fluctuations, of course, and even changes from one quarter-century to another. But at least there is no clear systematic tendency for the rate of increase of productivity in this sense to accelerate or to slow down. If, in addition, labor input grows at a steady rate, aggregate output must also grow, since output is the product of labor input and output per unit of labor, the rate of growth of labor, and labor productivity.

Second, the stock of real capital, crudely measured, grows at a more or less constant rate exceeding the rate of growth of labor. Capital per person can also be said to grow at a more or less steady rate over fairly long periods of time, subject to qualifications about short-run irregularities and occasional breaks in trend.

Third, the rates of growth of real output and the stock of capital tend to be about the same, so that the ratio of capital to output shows no systematic trend.

Fourth, the rate of profit on capital has no long-run trend, apart from occasional violent changes, associated with sharp variations in effective demand.

Fifth, the rate of growth of output per person can vary quite a lot from one country to another.

And, finally, economies with a high share of profit out of total income tend to have a high ratio of investment to output (Kaldor, 1958).

1.5. Solow Model of Exogenous Growth

Solow notes that an economy growing according to the first three (or perhaps four) of the rules listed in the previous section is said to be in a steady state. Its output, employment, and capital stock grow exponentially, and its capital/output ratio is constant. Steady state is normally defined by the requirement that the output and employment be growing at some constant proportional rates and that net saving and investment be a constant fraction of output. Net investment should grow at the same rate as output and the stock of capital, which is the sum of past net investment. The capital/output ratio will therefore be constant. "Most of the modern theory of economic growth is devoted to analyzing the properties of steady states and to finding out whether an economy not initially in a steady state will evolve into one if it proceeds under specified rules of the game." (Solow, 1988, p. 4)

Solow noted that the fourth fact is more controversial than the others for two sets of reasons:

> First, there are problems of definitions and measurement: (a) the ratio of capital to output is very volatile in any fluctuating economy, because the stock of capital is necessarily a sluggish time series, while output is capable of making wide swings in short intervals; (b) we ought really to be interested in the flow of services from the stock of capital, while we actually have measurements of the stock of capital, and the two can diverge not only through changes in the margin of idle capacity (which is really point made under (a)), but also through variations in shift work, "down time", running speed, and the like; (c) although I shall be reasoning in terms of a model with only one commodity, so that relative prices do not enter, our data do not come from such a world. If we think of capital as a factor of production, it is presumably the

> "real" capital stock that matters, but if we think of it as a store of wealth, it is presumably the value of the capital stock in terms of consumer goods that matters, and both capital/output ratios can be constant only if the price of capital goods relative to consumer goods is constant, as it has not in fact always been. Secondly, the data are far from clear about the constancy of the capital-output ratio, however the measurement problems are resolved. (Solow, 1988, p. 3)

Harrod (1937) proposed a new definition of neutral inventions primarily intended for applications to the problem of economic growth. According to Harrod, a technical invention is defined as neutral if at a constant rate of interest it does not disturb the value of the capital coefficient. Harrod's classification was discussed by Robinson who showed graphically that a neutral invention is equivalent to "an all-round increase in the efficiency of labor." (Robinson, 1937, p. 140)

The model presented by Kaldor and Mirrlees (1969) introduces technical progress in the specific form of the rate of improvement of the design and technique of newly produced capital equipment as the main engine of economic growth, determining not only the rate of growth in productivity, but, together with other parameters, rate of obsolescence, the average lifetime of equipment, the share of investment of income, the share of profits, and the relationship between investment and potential output. In fact, it shows future expected capital-output ratio on new capital. Kaldor and Mirrlees suggested that the model is Keynesian in its mode of operation and considers entrepreneurial expenditure decisions as primary and incomes and profits as secondary. Also the model is non-neo-classical in that technological factors, marginal productivities or marginal substitution ratios, play no role in the determination of wages and profits. "A "production function" in the sense of a single-valued relationship between some measure of capital, K_t, the

labor force N_t and of output Y_t (all at the time *t*) clearly does not exist. Everything depends on past history, on how the collection of equipment goods, which comprises *Kt* (as measured by historical cost) if a greater part of the existing capital stock is of more recent creation; this would be the case, for example, if the rate of growth population has been accelerating.

> Whilst 'machines' earn quasi-rents which are all the smaller the older they are (so that, for the oldest surviving machine, the quasi-rents are zero) it would be wrong to say that the position of the marginal 'machine' determines the share of quasi-rent (or gross profits) in total income. For the total profit is determined quite independently of the structure of these 'quasi-rents' … by the factors determining the share of investment in output and the proportion of profits saved and therefore the position of the "marginal" machine is itself fully determined by the other equations of the system. It is the macro-economic condition, and not the age-and-productivity structure of machinery, which will determine what the (aggregate) share of quasi-rents will be. (Kaldor and Mirrlees, 1969, p. 188)

According to this statement, the technical progress function is very consistent with a technological investment function, i.e., a shifting in time functional relationship between investment per worker and output per worker. However, it would not be correct to say that the marginal product of investment in the creation of new capital plays a role in determining the amount per man. Since the profitability of operating the machines and equipment is expected to diminish in time, the marginal addition to the stream of profits, which Kaldor and Mirrlees call the "marginal value productivity," will be something quite different from the marginal product in the technological sense, and it will not be a derivative from a

technological function only, but will depend on the all system of the relationships.

The authors raise the question of to what extent the technical progress function imposes some restraint on the nature of technological change. Every change in the rate of investment per worker implies a change in the extent to which innovations are actually utilized. Since the capital saving innovations, which increase the output-capital ratio and output-labor ratio, are much more profitable to the entrepreneur than the labor saving ones that give the same rate of increase in labor productivity, and the balance of technological change will appear with higher capital consumption the greater the rate of increase in investment per worker.

The main suggestion for economic policy is that any scheme that leads to the accelerated retirement of old machinery and equipment, such as taxes on use of morally and/or physically old equipment, technologies and plants, and environmental pollution, and lower or no taxes on investment funds is bound to accelerate for a short period the rate of increase in output per head y/y since it will increase the number of workers available for the new machines n, and hence investment I, and will involve a reduction in p/y . Kaldor and Mirrlees conclude that "A more permanent cure, however, requires stimulating of the technical dynamism of the economy (raising the technical progress function) which is not only (or perhaps mainly) a matter of more scientific education and more expenditure on research, but of higher quality business management which is more alert in searching for technical improvements and less resistant to their introduction." (Kaldor and Mirrlees, 1969, p. 190)

Behind technological change only, knowledge acquiring by learning and training in the process of production should be also emphasized. Arrow starts his investigation on the economic implications of learning by doing saying:

> It is by now incontrovertible that increases in per capita income cannot be explained simply by increases in the capital-labor ratio. Though doubtless no economist would ever have denied the role of technological change in economic growth, its overwhelming importance relative to capital formation has perhaps only been fully realized with the important empirical studies of Abramovitz (1956) and Solow (1957). These results do not directly contradict the neo-classical view of the production function as an expression of technological knowledge. All that has to be added is the obvious fact that knowledge is growing in time. Nevertheless a view of economic growth that depends so heavily on an exogenous variable, let alone one as difficult to measure as the quantity of knowledge, is hardly intellectually satisfactory. From a quantitative, empirical point of view, we are left with time as an explanatory variable. Now trend projections, however necessary they may be in practice, are basically a confession of ignorance, and, what is worse from a practical viewpoint, are not policy variables. (Arrow, 1991, p. 155)

Arrow suggests that the concept of knowledge which underlies the production function at any moment needs analysis. Knowledge has to be acquired before and during the process of production. Different students with the same educational experiences may have different amount of knowledge and so the different countries, at the same moment of time, have different production functions even with the same natural resource endowment (Arrow, 1991).

Two generalizations of psychologists on learning are emphasized. First, learning is the product of experience. Learning can only take place through attempts to solve a problem. Second, learning associated with repetition of

essentially the same problem is subject to sharply diminishing returns.

Verdoorn (1956) applied the principle of the learning curve to national output. He used the "Horndall effect" in Sweden to motivate this extension to the analysis of growth. Horndall iron works in Sweden had no new investment, and therefore presumably no significant change in its methods of production, for a period of fifteen years, but productivity rose on the average close to two percent per annum. This steadily increasing performance can only be imputed to learning from experience.

Verdoorn (1956) developed a model in which capital and labor are non-linear functions of output, assuming the rate of output a measure of cumulative output including learning. He notes that full employment of capital and labor simultaneously is impossible. Arrow states that another of Vendoorn's conclusions, that the savings ratio must be fixed by some public mechanism at the uniquely determined level which would ensure full employment of both factors, is wrong. Arrow says, that one factor or another will be unemployed (Arrow, 1962, p. 160).

Arrow's model ignores the possibility of capital-labor substitution. Profits are assumed to be a result of technical change. The rate of investment will be less than the optimum. Net investment and the stock of capital become subordinate, with gross investment taking a leading role. The main hypothesis is that technical change in general can be ascribed to experience. Some economic implications can be drawn from the model.

We introduce learning into our historical review of growth models by first examining how exogenous technological change affects output. In the Cobb-Douglas production function (Sen, 1970), output is presented as:

$$Y = L^{1-\alpha} K^{\alpha}, \; 0 < \alpha < 1 \qquad (12)$$

The per capita production function can be written as:

$$Y = f(k) = k^{\alpha} \quad (13)$$
$$y = Y/L$$

The rate at which saving increases, k, is the rate of saving per person, sy, where saving is a function of personal income.

The rate of depreciation of k is the amount of depreciation per person, δk. Population growth causes k to fall at the rate nk. The net rate of increase in k therefore, depends on three factors – the rate of depreciation (δ), the rate of population growth (n), and k - and can be presented in the following equation (14):

$$k = sf(k) - \delta k - nk = sf(k) - (\delta + n)k = sk^{\alpha} - (n + \delta)k \quad (14)$$

Constant returns to scale are assumed, so that the absolute size of the economy or total output is irrelevant to per capita growth.

In the Solow model,

$$Y = TK^{\alpha} L^{\beta} \quad (15)$$
$$0 < \alpha < 1$$
$$Y = Q + \alpha L + (1 - \alpha)K \quad (16)$$
$$Q = a + x + e \quad (17)$$

In the long run, the rate of growth is independent of the rate of investment. Exogenous improvements in technology generate productivity growth. Solow (1957) modeled economic growth using a standard neoclassical production function with decreasing returns to capital. Taking the rates of saving and population growth as exogenous, he showed that these two variables determine the steady-state level of income per capita. If saving and population growth rates vary across countries, different countries reach different steady states. Mankiw, Romer and Weil (1992, p. 1) noted: “Solow’s model gives simple

testable predictions about how these variables influence the steady-state level of income. The higher the rate of saving, the richer the country. The higher the rate of population growth, the poorer the country."

We start by considering some of the theoretical approaches to exogenous economic growth. The Solow model is our starting point for detailed consideration of exogenous models and their implications.

Assume the following production function for national output, *Y*.

$$Y = A + \alpha L + (1 - \alpha)K \qquad (18)$$

Where: *Y* is output, *L* is labor, *K* is capital, α is labor's share in total product, $(1 - \alpha)$ is capital's share in total product, *A* denotes technical progress. All variables are in logs. Economic growth could be achieved in the short run by increasing capacity utilization, and, in the long run, by changing capacity (*k*) itself.

$$Y = Q + \alpha L + (1 - \alpha)K \qquad (19)$$

$$Q = a + x + e$$

Where x is capacity utilization, *e* is efficiency in the allocation of resources (allocative efficiency) (Solow, 1970).

1.6. Leontief's Poverty Trap

Leontief (1958) emphasized the role of savings in economic growth: "Among the many factors which determine the growth or stagnation – as the case may be – of a national economy, its rate of saving out of current income and the subsequent increase in income resulting from the investment of these savings play an important role." (Leontief, 1958) The key point here is that preferences of a given national economy

between present and future levels of consumption in terms of a conventional set of social indifference curves affect growth. Of course, the problem of maximizing utility – by planning the allocation of income between consumption and investment – over long intervals of time is certainly of considerable interest itself, despite the fact that it was first brought up by Frank Ramsey 70 years ago.

In the study of linear programming, Dorfman, Samuelson, and Solow (1958) analyze, among other things, efficient programs of capital accumulation on the assumption of Leontief-type (fixed coefficient) technologies. Except for the fact that their model of capital accumulation permits nonzero consumption, its characteristics are basically the same as those defining the situation with savings presented by Leontief.

Dornbush (1996) expanded the growth equation to include these insights on savings and growth. Domestic saving and current account deficit are determinants of growth through capital investment:

$$Y = Q + \alpha n + r(S + \lambda) \qquad (20)$$

where S is the national saving rate, λ is no interest current account deficit expressed as a fraction of GDP, r is the marginal return on capital formation, n is labor. This equation highlights the role of domestic savings. Higher saving rates (S) finance capital accumulation and growth. However, the equation makes the important point that the immediate impact of saving on growth is minor. Assume that the return to capital is 10 percent. Raising the saving rate by 5 percentage points of GDP will then raise the growth rate of output by only 0.5 percentage points. Of course, the compound growth effects of an extra 0.5 percent growth are considerable, but only in the long run.

Michael Carlberg (1997) examined the effects of savings, labor, and the interest rate on international economic growth and obtained the following results: “An increase in the saving rate

does affect neither capital per head nor output per head. It reduces foreign debt per head. And it improves consumption per head. An increase in the rate of labor growth leaves no impact on capital per head and output per head. It increases foreign debt per head and worsens consumption per head. An increase in foreign interest rate depresses both capital per head and output per head. Besides, it brings down foreign debt per head. As long as the foreign interest rate is low, the shock deteriorates consumption per head. But as soon as the foreign interest rate is sufficiently high, the shock improves consumption per head." (Carlberg, 1997, p. 5)

Foreign credits and saving were introduced into growth models by Leontief (1966).

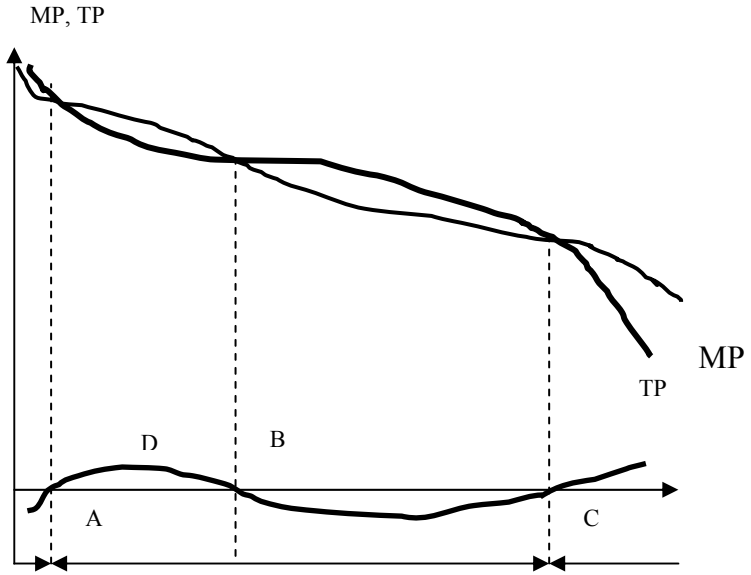

Figure 1.1. Leontief's poverty trap

The Leontief model is presented graphically in Figure 1.1. *TP* measures the marginal time-preference (slope of indifference curves). Starting with a very small stock of capital and income below the lowest equilibrium point, *A*, the system expands toward *A*. If its initial position in the economy were located some place between *A* and *B*, equilibrium also moves toward *A*. In this case, the process is a regressive one characterized by gradual diminishing of the stock of productive capital, reduction in the rate of output (income) and incidentally – as the *MP* (marginal productivity of capital, slope of the capital-output line) curve shows – an increase in the real rate of interest.

Once *A* is reached, the system "stagnates" at that low but stable equilibrium position. When pushed to the left by the action of some outside force, such as an accidental loss of productive capital, it would move back again toward *A* but not beyond.

If, as beneficiary of a foreign loan or gift, this country finds itself in the possession of some additional capital and correspondingly increased income, our country at once proceeds to "live above its means," that is, consume its capital and gradually reduce its output until the stationary state at *A* is again reached. Even a constant flow of foreign aid could, in such a case, do no more than help the system to maintain its income and consumption at some point between *A* and *B*, without, however, releasing any tendency toward further growth. Robert Barro and Xavier Sala-I-Martin point out: "We can think of a poverty trap as a stable steady state with low levels of per capita output and capital stock. This outcome is a trap because, if agents attempt to break out of it, then the economy has a tendency to return to the low-level steady state." (Barro and Sala-I-Martin, 1999)

These observations apply, however, only to gifts or loans not large enough to push the rate of output beyond *B*. Once on the other side of that unstable equilibrium position, *B*, the

economy begins to save, accumulate, and increase its revenue; in short, it proceeds to develop under its own power.

According to the graph, the new stable equilibrium is approached from the much higher income level, *C*. Had the structural conditions been such as to keep *MP* above *TP*, and thus the *D* – curve below the zero line throughout its entire stretch to the right of *B*, the process of economic growth – once that threshold has been passed – would go on indefinitely until high income level, *C* (Leontief, 1966).

The entire scheme assumes that all complementary factors except capital are held constant. Later Leontief notes that changes in the basic structural conditions of the economy shift the equilibrium positions *A*, *B*, and *C*. He even assumes that "some of these positions of stationary state might even disappear or new ones might be created" (Leontief, 1966).

Some of the most recent studies that consider impact of foreign financial aid on economic growth are by Boon (1996), Lensink and Morrissey (1999), Barro and Sala-I-Martin (1999), Burnside and Dollar (2000), and Hansen and Tarp (2001). The authors examine the interaction between foreign financial assistance and growth. During the recent decades unilateral and multilateral donors provide a substantial amount of financial assistance to the developing countries. The stated goals of this aid are often formulated as poverty alleviation and promotion of economic growth. The results of such projects are not satisfactory in many cases. This necessitates further research of the issue.

Peter Boon (1996) investigates possible correlation between foreign aid effectiveness and government macroeconomic policy. He studies mechanisms through which foreign aid helps to alleviate poverty and initiates economic growth. He uses Barro's model of endogenous growth according to which foreign aid has a significant impact on growth because aid inflow contributes to an increase in investments and growth. Boon finds that a positive impact of foreign aid on investment

and growth is conditional on government policy. Government policy, in its turn, can be represented with the three different approaches: elitist, egalitarian, or "laissez-faire." Boon states that elitist governments are concerned only with the welfare of a rich group in the population that supports the political elite. Egalitarian governments attempt to maximize the welfare of the poor.

The "laissez-faire" approach in governmental policy is characterized by minimal government intrusion into the market-based system of distribution of wealth. In this case government attempts to maximize only the welfare of the most economically and socially vulnerable stratum of the population. Boon concludes that the best condition for foreign aid effectiveness is the elitist regime. Foreign aid in this case does not have significant effect on investments and growth, but substantially increases government size, government consumption and the welfare of the political elite (Boon, 1996). Boon established that foreign aid "does not promote economic development for two reasons: Poverty is not caused by capital shortage, and it is not optimal for politicians to adjust distortionary policies when they receive aid flows." (Boon, 1996, p. 322)

Lensink and Morrissey (1999) assume that foreign aid does have an impact on growth, and there are government policies that make aid more effective. They argue that "…the principal factor determining the impact of aid on growth appears, in many results, to be investment" (Lensink and Morrissey, 1999, p. 3) The authors point out that macroeconomic performance determines country vulnerability to shocks and aid instability and thus the lack of aid efficiency with regard to its impact on growth. Using cross-country growth regressions Lensink and Morrissey (1999) conclude that aid has a positive impact on investment and a significant effect on growth if to control for aid inflow uncertainty.

Leontief does not give broad explanation for the meaning of the zero line in his model. However, Barro and Sala-I-Martin

(1999), using the neoclassical model of Solow (1957) and Swan (1969) and the golden rule of capital accumulation and dynamic efficiency, derived this line.

The fundamental differential equation of the Swan-Solow model is:

$$\dot{k} = sf(k) - (n + \delta)k_0 \qquad (21)$$

Where $n + \delta$ is the effective depreciation rate for the capital-labor ratio, $k = K/L$. If the saving rate, s, were 0, then k would decline partly due to depreciation of k at the rate δ and partly due to growth of L at the rate n. In fact, $(n + \delta)$ is Leontief's zero line.

Barro and Sala-I-Martin noted the following: "We define a steady-state as a situation in which the various quantities grow at constant rates. In the Solow-Swan model, the steady-state corresponds to $k= 0$, that is, to the intersection of the $s f(k)$ curve with the $(n + \delta)$ k line. The corresponding value of k is denoted k*. Algebraically,

$$s f(k^*)= (n + \delta) k^* \qquad (22)$$

"Since k is the steady state, y and c are also constant at the values $y^*=f(k)$ and $c^*=(1-s) f(k)$, respectively. Hence, in the neoclassical model, the per capita quantities k, y, and c do not grow in the steady state. The constancy of the per capita magnitudes means that the levels of variables – K, Y, and C – grow in the steady state at the rate of population growth, n." (Barro and Sala-I-Martin, 1999, p. 19)

Development of the production forces in society, changes in technique within firms, and technical progress lead to changes in the skills of workers, income and consumption. With the increasing importance of human capital in development, the shifts along the horizontal axis in Figure 1.1 should be

considered with the new current rate of savings and accumulation of capital.

These ideas are more clearly presented in Figure 1.2:

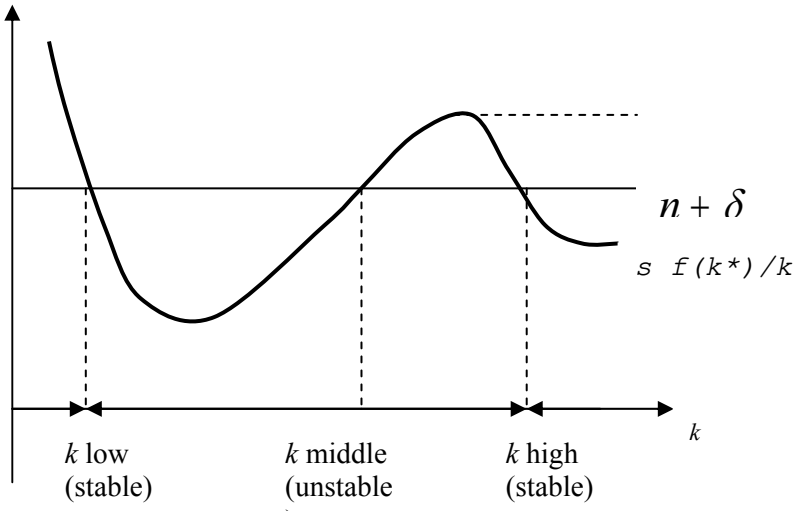

Figure 1.2. Poverty trap according to the modern interpretation by Barro and Sala-I-Martin

A sufficiently large donation would place the economy on a path that leads eventually to a high level of the steady state or possibly to endogenous steady-state growth. Thus, a relatively large quantity of foreign aid might allow an escape from the poverty trap. Note that the policy of high saving can help a country escape the poverty trap even if the high saving is only temporary. It will also work if the economy's temporary high ratio of domestic investment to GDP is financed by international loans, rather than from domestic saving (Barro, and Sala-I-Martin, 1999). It is important to note, however, that technological change, the utilization of new production

technologies, and quality and productivity of labor force would shift the system to the left.

Burnside and Dollar (2000) analyzed the relationships among foreign aid, economic policies and economic growth using neoclassical growth theory as a theoretical framework for their study. According to the theory poor countries have a higher marginal rate of return on capital than rich countries and, therefore, a faster growth towards the steady-state. The theory also suggests that foreign aid has a positive impact on growth when a recipient country is in transition to its steady-state and there is a negative correlation between tax distortion and growth.

Burnside and Dollar (2000) suggest that unsuccessful government economic policy might decrease the rate of return on capital and slow down the rate of growth. The authors state that the aid impact on growth depends on such macroeconomic factors and processes as budget surplus, inflation, and other measures of monetary policy and trade openness can have a positive or negative impact on growth, depending on the level of inflation and the budget deficit. If inflation is relatively low and manageable and the budget deficit is insignificant, the policy indicator is positive. Burnside and Dollar (2000) conclude that there are diminishing returns to foreign aid, a small, on average, impact of aid on growth, but a positive impact of aid on growth in the "good" policy environment that busts macroeconomic performance.

Hansen and Tarp (2001) disagree with the empirical results obtained by Burnside and Dollar and argue that relationships between foreign aid and growth are not conditional on recipient country economic policy. The authors take into consideration the fact that aid affects growth via capital investments, both physical and human. Inclusion of human capital and investment in the model may be considered as an innovative step toward investigating the relationship between foreign aid and growth.

1.7. Growth Reconsidered: Endogeneity of Human Capital

Paul Romer, in his 1990 paper entitled "Endogenous Technological Change" includes technological changes into the model of growth (Barro, 1995, and Jones, 1998). He considers technology as the method used in a production process that transforms inputs into output and specifies research and development as sources for technological changes. He emphasized ideas that drive progress are specific types of goods considering them as non-rival in contrast to other goods. According to Romer non-rivalry nature of ideas implies increasing returns to scale (Barro, 1995, Jones, 1998).

The implications of the Romer's model might be found to be very similar to the neoclassical ideas. His model can be viewed as a "semi-endogenous" model because it predicts sustainable growth only in the case of endogenous technological progress and exogenous population growth. The labor force participates in the production process making capital productive and produces ideas which drive technological progress and, therefore, economic growth. Hence, investments in human capital are necessary in order to increase the productivity of labor and capital. For Romer, education is the main source for knowledge and a guide for the implementation of this knowledge in the production process. Health care development is another way to increase labor force productivity (Pomfret, 2000).

Mankiw, Romer and Weil (1992) developed an Augmented-Solow type model. They conclude: "We have suggested that international differences in income per capita are best understood using an augmented Solow growth model. In this model output is produced from physical capital, human capital, and labor, and is used for investment in physical capital, investment in human capital, and consumption." (Mankiw,

Romer, and Weil, 1992, p. 432) The production function that is consistent with the empirical results is:

$$Y = K^{\frac{1}{3}} H^{\frac{1}{3}} L^{\frac{1}{3}} \qquad (23)$$

The model has several implications. First, the elasticity of income with respect to physical capital is not substantially different from capital's share in income. This conclusion indicates that capital receives approximately its social return. There are no substantial externalities to the accumulation of physical capital.

Second, the accumulation of physical capital has a larger impact on income per capita than the Solow model implies. A higher saving rate leads to higher income in the steady state, which in turn leads to a higher level of human capital.

Third, population growth also has a larger impact on income per capita than the Solow model indicates. In the augmented model, human capital must be spread more thinly over the population of workers as well as capital because the higher population growth lowers measured total factor productivity.

Fourth, the model has implications for the dynamics of the economy when the economy is not in the steady state. In contrast to endogenous-growth models, this model predicts that countries with similar technologies and rates of accumulation and population growth should converge in income per capita. "More generally, our results indicate that the Solow model is consistent with the international evidence if one acknowledges the importance of human as well as physical capital. The augmented Solow model says that differences in saving, education, and population growth should explain cross-country differences in income per capita. Our examination of the data indicates that these three variables do explain most of the

international variation." (Mankiw, Romer and Weil, 1992, p. 433)

There is research on low-development traps within the endogenous growth theories as well. Aghion and Howitt (1998 b) consider the model, based on Acemoglu (1994, 1997) and developed by Redding (1996). The model concludes that complementarity between workers' education decisions and firms' R&D decisions surprisingly will not open the possibility for multiple steady-state growth paths, including a low-development trap. The more workers invest in education, the more will entrepreneurs invest in R&D. This can be formalized as the following:

$$\mu^* = 1 \text{ if } \alpha < \rho(\lambda - 1)(1+\gamma\upsilon^{\theta})(1-\beta), 0 \text{ otherwise,} \quad (24)$$

Thus, the more workers invest in education, i.e., the higher υ, the more will entrepreneurs invest in R&D.

Such a trap will involve $\mu = 0$ and therefore $\upsilon^* = \underline{\upsilon} = \left(\beta\rho\theta\gamma\right)^{\frac{1}{1-\theta}}$. For it to exist we simply need

$$\alpha > \delta\left(1-\beta\right)(\lambda - 1)\left(1+\gamma\left(\beta\rho\theta\gamma\right)^{\frac{1}{1-\theta}}\right) \quad (25)$$

Conversely, in order to a high growth steady-state path to exist, we need

$$\alpha < \delta\left(1-\beta\right)(\lambda - 1)\left(1+\gamma\left(\beta\rho\theta\gamma\right)^{\frac{1}{1-\theta}}\right) \quad (26)$$

The corresponding growth rates will be $g = \underline{g} = \ln\lambda$ in the high-growth equilibrium and $g = \underline{g} = 0$ in the low-development trap (Aghion and Howitt, 1998, p. 342).

Aghion and Howitt conclude that: "Because of the strategic complementarity between R&D and education, we did

not have to introduce threshold externalities in the accumulation of human capital in order to generate multiple equilibria and low-development traps. Second, targeted education policies and R&D subsidies appear as substitutable instruments for moving the economy away from a low-development trap. In practice, however, education subsidies may be easier to monitor than R&D subsidies to industries (the scope for diversion and manipulation being presumably larger in the latter case)." (Aghion and Howitt, 1998, p. 342)

In summary, we find from our review of the literature that historically economic growth was considered indivisibly from industrial capital. However, empirical evidence indicates that the primary accumulation of capital was not confined to the industrial sector. Technological changes before the industrial revolution were exogenous to the production process.

With technological maturity (Rostow, 1990), industry became the engine of production, and the accumulation of capital occurred within manufacturing and was followed by reinvestment. However, technological change was still assumed to be exogenous to production, and the theory of exogenous economic growth dominated until 1970s.

Beginning in the 1980s economists began to conceptualize technological changes from within production. Emphasis was placed on R&D, and the problem of the accumulation of capital was transferred into the problem of investment and the balance between saving and consumption. Labor was an input that could be developed by investing in human capital, and growth was stimulated by improvements in labor quality. The quality of labor was considered as accumulated capital, and firms faced new choices among physical capital and human capital investments. The endogenous theory of economic growth currently dominates the literature on economic growth.

As Valdes (1999) points out:

Ever since the new wave of research on growth theory began in the late 1980s, proponents of the two theories have been (on and off) arguing over which of the two approaches is better. One (possibly the first) round of the dispute was fought in the empirical arena. To meet the empirical finding that $\lambda = -0.022$, (α) the parameter in the aggregate production function $Y_t = K_t^{\alpha}\left(A_t L_t\right)^{1-\alpha}$ has to be approximately to 0.7 (consequently, $1-\alpha = 0.3$). In the Solow-Swan (S&S) model factor inputs are paid their marginal products, thus in this model α is the share of K (and 1- α is the share of L) in national income. So the model predicted (this was the interpretation at the time) that K must receive about 70 percent of the national income and L about 30 percent of it. However, the national income accounts were indicating the opposite: a 30 percent share for K and a 70 percent for L. The proponents of the new theory took it for certain that it was the S&S model which failed.

Specifically, it assumed that K and L were paid their marginal products but in reality K is paid less and L more than that. Why? Because each new bit of K generates an externality for which it is not compensated.

The important point is that the new theory, by means of this externality effect, could explain the observed discrepancy between each factor's marginal product and their actual redistributions.

Then, as it often happens in intellectual disputes, the old theory had its turn on the issue and the human capital augmented S&S model came to its rescue.

Another round in the debate between the two theories seems to have been constructed over their (as-of-today-known) implications for economic policy. (Valdes, 1999, pp. 168-169)

The literature on growth has examined other issues that are important to the understanding of the growth process. It is useful to highlight some of this research. First, within the broad discussion of exogenous versus endogenous growth, we find the following research particularly noteworthy: Von Neumann (1946), Johansen (1959), Vanek (1968), Kendrick (1976), Morgan and Hageman (1999), and Grafts (1995), who reconsiders the British industrial revolution in historical perspective staying on both positions of exogenous and endogenous growth theories (Grafts, 1995); effects of inequality on growth (Barro, 2000; Sokoloff and Engerman, 2000; Easterly, 2001; Gould et al., 2001); institutional structure and economic growth (Barro, 1996, 1997; Durham, 1999; Ghost, 1999; Benhabib and Spiegel, 2000; Lal, 2000; Lensink and Kuper, 2000; Bleaney et al. 2002); human capital and economic growth (Black, 1962; Schultz, 1963, 1970, 1981, 1990, 1993; Romer, 1986, 1989, 1990, 1994; Scott, 1989; Aghion and Howitt, 1996; Mincer, 1996; Galor and Tsiddon, 1997; Ruth, 1998; McDermott, 1999; Zagler, 1999; Berthelemy, Pissarides, and Varoudakis, 2000; Kalaitzidakis et. al., 2001); growth in the CIS (Havrilishin, 1999). These issues are briefly discussed below.

1.8. Major Directions in Research of Economic Growth

1.8.1. Inequality and growth

Barro examined data from a broad panel of countries and found little overall relation between income inequality and rates of growth and investment, but he did find a negative relationship in low-income countries. “For growth, there is an indication that inequality retards growth in poor countries but encourages growth in richer places. Growth tends to fall with greater inequality when per capita GDP is below around $2000 and to rise with inequality when per capita GDP is above $2000.” (Barro, 2000) However, Sokoloff and Engerman (2000) found, using a broader historical perspective and starting from the 19th

century worldwide, that countries with greater income inequality had lower growth (Argentina, for instance), but countries with lower initial inequality grew faster over time.

1.8.2. Institutional structure and growth

Jones and Williams (2000) consider research and development as a key determinant of long run productivity and welfare. They develop an endogenous growth model that incorporates parametrically important distortions in R&D: the surplus appropriability problem, knowledge spillovers, creative destruction, and duplication externalities. The authors assert: "Calibrating the model, we find that the decentralized economy typically underinvests in R&D relatively to what is socially optimal." (Jones and Williams, 2000)

Aghion and Howitt (1996) examined heterogeneity in the structure of innovative activity by making a distinction between research and development. They pointed out: "One advantage that Schumpeterian's growth models is their greater specificity concerning how knowledge is used, how it is generated, and how it creates losses as well as gains… There are many kinds of innovative activity, generating many different kinds of knowledge. An aggregate theory that fails to distinguish between these different activities is potentially misleading if the distinction matters." (Aghion and Howitt, 1996) They concluded that the level of research tends to covary positively with the rate of growth, even in the extreme case where the general knowledge that underlies long-run growth is created by secondary innovations arising from the development process. R&D effects on long-run growth were researched by Segerstorm (2000) and Sorensen (1999).

1.8.3. Measurement of human capital and issues of allocation

Measurement of human capital and issues of allocation are presented by Mincer (1996), Ruth (1998), Barro (1999),

Mulligan and Sala-i-Martin (2000). Emphasis on measurement of human capital and its implication for economic growth are made by Kalaitzidakis et al. (2001). Based on cross country growth regressions and measures of human capital, presented in studies by Mankiw, Romer, and Weil (1992), Benhabib and Spiegel (2000), Barro and Sala-i-Martin (1999), Pritchett (1996), Barro (1997), Krueger and Lindahl (2000), they argue that a semiparametric, partially linear regression model specification of the cross country growth regression function is a particularly useful way of studying the contribution of human capital to economic growth. The semiparametric partially linear regression model is written as:

$$Y_{it} = x_{it}^{T}\gamma + q\left(Z_{it}\right) + U_{it} \qquad (27)$$

Where x_{it} is a variable of dimension q, γ is $q \times 1$ vector of unknown parameters, Z_{it} is a continuous variable of dimension p and $g()$ is an unknown function. Z_{it} refers to various measures of human capital. Human capital is measured by the level of education and gender. They conclude that the effect of human capital accumulation on growth is nonlinear and that there are threshold levels of human capital and growth for each country.

Shioji (2001) incorporates human capital into his conception of public capital, and he estimates dynamic effects of public capital on output per capita. The other components of public capital are: infrastructure, conservation of national land, and agriculture and fishery. Based on an open economy growth model, he derives an income convergence equation augmented with public capital (*PUP*). The relationship between steady state output per unit (*Y*) of labor and public capital (*PUP*) is presented by following equation:

$$Y_{it}^{*} = \sum_{j=1}^{J} \phi_j \times PUP_{jit-\tau} + Y_i, \qquad (28)$$

where $\phi_i = C_i / (1 - a)$.

ϕ_i represents the long-run elasticity of output with respect to public capital per capita, and *C* is a short-run elasticity.

Shioji found that each component of *PUP* had positive effects on *Y*, but infrastructure was more important to growth than education and had a more significant positive effect on productivity than education. These results can be interpreted as support for endogenous growth.

1.8.4. Economic growth in the works of Ukrainian and Russian economists

The major directions of research on economic growth conducted by the Ukrainian and Russian economists may be formulated as follows:

The role of innovations, intellectual capital and human resources, presented in the works of Aleksandrova (2003), Bazhal (2002), Bazhal and Odotjuk (2003), Brydun (2003), Vovkanich (2005), Garipova Gizatulin, and Garipov (2004), Heyets, (2000, 2001, 2003), Golikova, (2003), Danilishin and Kotsenko (2006), Dem'janenko (2003), Dubjanskaja (2005), Zhits (2000), Ivlev (2004), Kendjuhov (2003, 2005), Kireyev and Shnypko (2003), Lapko (2003), Oleynik (2003), Onyshko (2003), Pavlova (2001), Perminov, Egorova, and Pyatkovski (2004), Revenko (2003), Simkina (2002), Suhorukov (2006), Cherevko and Lukash (1998), Chechelev, Ivlev, and Kozlov (2001), Hristenko, Mikul'skij, and Nizhegorodtsev (2002), Shchedrina (2003);

Investment and investment resources for growth, as reflected in the works of Bolhovitinova (2003), Bolhovitinova and Mar'enko (2003), Gal'chins'kyj (2004), Kvashnina (2004), Levochkin (2004), Ovchinnikova (2004), Romanova (2002);

Institutions, institutional reforms, and institutional environment, including works of Dan'ko (2003) Golikov and Fedorenko (2003), Hrytsenko (2001, 2003), Grushevskaja (2004), Koshkin and Shabaev (2004), Novitskij (2005), Tarasevich (2003), Ungaeva (2005), Chechelev, Ivlev, and Kozlov (2001), Shnypko (2003), Yaremenko (2001, 2003);

Macroeconomic modeling, economic growth models, measurements and estimations, macroeconomic dynamics, and economic forecasting, including works of Heyets (1999, 2000, 2001, 2003), Zverev (2005), Ivanter (2006, 2004), Kosenkov (2005), Krjuchkova (2001), Ovchinnikova (2004), Samojlov (2005);

Finance, stock market, and monetary policy, as presented in Vozhzhov (2004), Golub (2006), Kvasnjuk (2000, 2003), Krichevskaja (2003), Lunina (2000, 2003), Prihod'ko (2003), Snigir' and Shumskaja (2003), Fedorenko (2003);

The role of the state, state regulations, governance, fiscal policy, and the state budget, presented by Balabanova (2004), Bazhal (2002), Vahnenko (2000, 2003), Kalinina (2005), Kvasnjuk (2000, 2003), Prihod'ko (2003), Fridman, Vidjasov, and Mel'jantsev (1998) Perepelkin (2001);

Theories of transformation and economic growth, presented in the works of Veretennikova (2005), Vilenskij, Buhvald, and Runov (2002), Heyets (2000, 2001), Hrytsenko (1997, 1999), Evstigneeva and Evstigneev (2005), Zemskova (2005), Kvasnjuk (2000, 2003), Kuznetsova (2000), Lavrov and Kapoguzov (2006), L'vov (2004), Perepelkin (2001), Petkova (2005), Pokrytan (1997), Ponomarev (2004), Rokochaja and Moroz (1998), Savchenko (2005), Saktoev (1999), Salijchuk (2004), Seleznev (2001), Sokolovskij (2001), Solovejkina (2002), Spirjagin (2005), Tochilin (2001), Tjurina (2005), Cherednichenko (2004), Chuhno (1996), Shubravskaja (2005), Yatskevich (2006);

Economic integration, competitiveness of the national products in the open market, and growth, presented by Heyets

and Shumskaja (2003), Zas'ko (2004), Kireev (2003), Kireev and Shnypko (2003), Krjuchkova (2000), Lavshov and Spizharskaja (2004), Lir and Podolets (2003), Sidenko (2003), Tolmachev (2005), Shnypko (2003).

The strong features of the research on economic growth, conducted by the Ukrainian economists, lie primarily in the domains of the theory of transformation, vision of economic growth in line with transition from predominantly exogenous to endogenous forms of growth, institutional aspects of growth, and the role of innovations and intellectual capital in economic growth. Works of the Russian economists, devoted to economic growth, are presented first of all in such sub-fields, as theories of transformation, analysis of the basic Western concepts and theories of economic growth, including issues of the macroeconomic dynamics and general equilibrium, models of economic growth, and impact of macroeconomic variables on economic growth.

The common feature of the research done by both the Ukrainian and the Russian economists is the popularity of studying the role of investment and finance for economic growth. For us, the structuralist approach has certain advantages along with the neo-liberal approach. It might be beneficial to pay more attention to such aspects of economic growth, as methodology and categorization, structural reorganization of the national economies in the post-transition societies, national accounts and macroeconomic balance, macroeconomic modeling, and long-run economic forecasting, rather than to the issues of foreign direct investments, currency exchange rate fluctuations, and alike.

1.9. Concluding remarks

Theories of transition were loosely tied to the theories of growth. While the Western theorists of economic transition focus on such neo-liberal concepts and aspects of transition, as

privatization, inflation, free pricing, supply and demand, economists in the Russian Federation and Ukraine continue using Marxist and post-Marxist conceptual frameworks for analysis of transition. In their view these frames seem to be more appropriate for understanding of the current events and phenomena that take place in the former Soviet Bloc.

Different approaches highlight different aspects of transition and post-transition development. In this sense all variety of approaches and positions may be considered as beneficial. At the same time exogenous models of growth often specifically designed for the developing economies in the third world countries are not sufficient in theorizing growth and development in transition economies. Nor are aging concepts borrowed from Marxism up to this task. The economists in transition economies have to familiarize themselves with the different concepts of growth, including both exogenous and endogenous models of growth and learn to synthesize ideas of neo-liberalism and post-structuralism.

In our view, the prioritization of the structuralists' approach to the post-transition economies and structuralism overall has an objective ground. Economic growth in the post-transition societies is based on the development of the domestic market. Accordingly, sustainability and rate of growth will be based on the total volume of the domestic market and dynamics of its development. Structuralism as applied to post-transition societies can accommodate institutionalism and studies of institutional transformation, and contain macroeconomic modeling, statistical analysis, stability of the national economies and points of equilibrium, as well as economic cycle and the theory of long waves.

PART II

ENDOGENOUS ECONOMIC GROWTH IN UKRAINE

2.1. Possibility of Endogenous Growth in Ukraine

Sustainable GDP growth in Ukraine of 5.9 percent in 2000, 9.4 percent in 2003, and 12.1 percent in 2004 with predicted growth of around 5 percent for 2005 is impressive, indeed, especially as it happens along with the stable and continuing decline in population. While in the year 2000 Gross National Income per capita was only $690, it constituted $970 in 2003, and has risen to $1260 in 2004 with predicted increase in 2005. These numbers are in nominal USD. Same trends characterize recent economic development in the Russian Federation and other countries of the former Soviet Bloc (see Appendices II and III).

Economic growth in the former Soviet Union was mostly extensive, and always required new injections of capital and labor. Volume of capital and labor increased over time. Human capital development as expressed by the level of educational attainment of population was among the highest in the world for the last five decades (see Appendix VIII). Technical progress was also very impressive. At the same time, capacity utilization was very poor for all factors of production. For instance, products of research were utilized mostly in the military industry. In addition, allocative efficiency was low because the allocation mechanisms were based on plan and directives or orders.

Retrospective analysis shows that by the year 1999 Ukraine was in the deep transition. This transition was multidimensional and had deep roots. It was a change in economic, social and political life, ideology, religion, and so forth. Indeed, by 1999 Ukraine was undergoing a deep socio-economic transformation. This transformation found its

reflection not only in the economy, but in changing ideology, religion, culture, and other non-economic spheres of human activities. At the same time problems that appeared during the transition period were not caused by transition. Nor they were creations of the reform. These problems accumulated well before the reform and made the transition more complex than it would be otherwise.

According to the official statistics that does not take into account shadow economy, GDP per capita in Ukraine was only $850 in 1998 and $750 in 1999. It had a 50 percent decline from 1991 to 1997. Industrial production declined 63 percent while output in agriculture decreased 40 percent. Depreciation rates of fixed capital stock in the manufacturing industries were around 35-40 percent during 1991-1995. Many plants did not invest in fixed capital. Machinery, equipment, and other facilities were deteriorating. This caused decline in productivity and manufacturing capacities. National income per worker decreased 50 percent during 1990-1995. The average rate of decline in productivity was calculated at 8.6 percent per annum.

Social conditions and living conditions of population were deteriorating as well. Approximately 40 percent of the population were below the poverty line. Food expenses were around 78 percent of the family budget in Ukraine, around 54 percent in the Russian Federation, and 34 percent in Poland. Minimum wage in the Ukraine in 1990 was twice as high as the living wage. Minimum wage declined to the level of living wage in 1992 and was five times less than living wage by 1995. The official statistics does not reflect two major things: undeclared incomes from the shadow economy and illegal activities and housing cost. While food expenses in Ukraine and the Russian Federation were above 50 percent of the family budget, housing expenses were minimal. Many families did not pay for housing and utilities for months and even years. The payments themselves were incredibly small as compared to Eastern European countries and even more so Western Europe.

Inequality in income distribution increased during the 1990s. In Ukraine in 1995, income of the richest decile was equal to 30 percent of the total income of population while income of the poorest decile was equal to 2.3 percent only, i.e. income of the richest decile was 14 times higher than of the poorest decile. The minimum wage in the Russian Federation in 1990 exceeded twice the living wage, but in 1992 they were equal, and in 1995 the living wage was five times larger than the minimum wage. The minimum wage situation in Ukraine was similar to the situation in the Russian Federation. The richest 10 percent of the population in Ukraine in 1995 received 30 percent of aggregate income, and the poorest 10 percent received 2.3 percent. The Gini coefficient in 1996 was 0.382 for Russia, and 0.386 for Ukraine. In 1997, there was little change in the Gini coefficient in either country (Osipian, 2001).

Assuming that access to undeclared income was much higher among the families that belonged to the richest decile we can think that the real difference was even higher than 14 times. Inequality in income distribution increased 1.6 times from 1991 to 1997. The Gini coefficient was calculated from data on the declared income only, and thus the measure of inequality likely increased more than 1.6 times during the six-year period of 1991-1997.

Such a sharp increase in inequalities and deterioration of living conditions, reported based on the official statistics, necessitates an explanation to the presence of potential resources for future sustainable growth. Indeed, change of sharp decline with sharp increase in GDP requires a conceptual explanation. This worsening in socio-economic conditions of the population in Ukraine motivates research on the causes and consequences of this disruption so that effective policy can be developed and implemented to assist those most in need, to maintain economic stability and sustainable growth.

The question one should address is to what extent was it possible to predict the growth of 2000s in the mid- and late 1990s? Did it seem possible to have economic growth in Ukraine at that time? The IMF addressed this issue in 1995, and its analysis and proposed forecasts were based on discussions with the Ukrainian authorities. These projections are presented in Table 2.1.

TABLE 2.1

IMF macroeconomic forecasts for Ukraine, 1995-2000

Indicator	1995	1996	1997	1998	1999	2000
Average wage per month, in USD	49	76	103	126	155	155
(percentage change over previous period)						
Real GDP	-12	-8	3	4	6	6
(Percentage change within period)						
Consumer prices	182	43	24	12	10	10
Producer prices	172	27	21	12	10	10
Real exchange rate (producer prices, against USD)	60	23	19	8	7	-
(in percent of GDP)						
Consumption	83.4	83.8	83.6	82.3	81.3	80.7
Private consumption	61.3	63.6	65.4	64.8	63.6	63.0
Public consumption	22.1	20.2	18.2	17.5	17.7	17.7
Gross fixed asset accumulation	16.0	16.8	18.4	19.5	19.9	20.3
Private gross	13.4	15.7	16.4	16.5	16.9	17.3

fixed asset accumulation						
Public gross fixed asset accumulation	2.6	1.1	2.0	3.0	3.0	3.0
Net exports	-3.4	-2.6	-1.9	-1.2	-0.9	-0.6
Exports of goods and nonfactor services	45.7	42.9	36.3	33.1	30.4	29.5
Imports of goods and nonfactor services	49.1	45.5	38.2	34.4	31.1	30.1
Domestic saving	16.6	16.2	16.4	17.7	18.7	19.3
Private	18.6	18.0	16.3	16.7	17.7	18.3
Public	-2.0	-1.8	0.1	1.0	1.0	1.0
National saving	15.8	15.9	15.4	16.8	17.9	18.5
Current account	-4.2	-3.0	-2.8	-2.1	-1.7	-1.4
Memorandum items						
Consolidated budget balance	-4.6	-3.0	-2.0	-2.0	-2.0	-2.0
Revenue	38.9	36.3	35.2	35.1	35.1	35.1
Expenditure	43.5	39.2	37.1	37.1	37.1	37.1
Total external liabilities	22.6	21	19.3	18.7	17.2	15.4
Debt-service ratio (percent of exports)	9.3	6.6	8.3	9.7	12.0	11.2

Source: IMF staff projections based on discussions with the Ukrainian authorities. *Ukraine: Recent Economic Developments*. IMF Staff Country Report #96/21. Washington, D.C.: IMF, 1996.

As follows from the data presented in Table 2.1, positive growth in real GDP was projected to be 3 percent in 1997 and

increased to 6 percent in 2000. The projected average wage per month, expressed in US dollars, increased threefold during the period of 1995-2000. The percentage changes in both consumer prices and producer prices were projected to decrease from 182 and 172 in 1995, respectively, to 10 percent in 2000. Domestic saving was projected to slightly increase from 16.6 percent of GDP in 1995 to 19.3 percent in 2000. Finally, projected total external liabilities decreased from 22.6 percent of GDP in 1995 to 15.4 percent of GDP in 2000. These projections were too optimistic, as shown in Table 2.2, and some of them were not realized. Table 2.2 is based on IMF estimates derived from information provided by the Ukrainian authorities.

Under Article IV of the IMF Articles of Agreement, the IMF holds bilateral discussions with members, usually every year. A staff team visits the country, collects economic and financial information, and discusses with officials the country's economic developments and policies. On return to headquarters, the staff prepares a report, which forms the basis for discussion by the Executive Board. At the conclusion of the discussion, the Managing Director, as Chairman of the Board, summarizes the views of Executive Directors, and this summary is transmitted to the country's authorities. This PIN summarizes the views of the Executive Board as expressed during the December 19, 2000 Executive Board discussion based on the staff report. Selected macroeconomic indicators in Ukraine for the period of 1997-2000 are presented in Table 2.2.

According to Table 2.2, real GDP growth in 2000 was 4.2 percent, which was below the 6 percent growth rate projected. In addition, as mentioned in the IMF report of 2001: “The economic situation in 2000 has been encouraging. Following the gradual stabilization of the economy in 1999 in the aftermath of the Russia crisis, real GDP growth in 2000 turned positive for the first time since independence, and was expected under the program to reach some 4 percent for the year as a whole. The nominal exchange rate remained broadly stable in 2000.

TABLE 2.2

Selected macroeconomic indicators in Ukraine, 1997-2000,

	1997	1998	1999	2000 Program Projections 1
	(Percent change, unless indicated otherwise)			
Production and prices				
Nominal GDP (in millions of hryvnia)	93,36	102,59	127,13	165,959
Real GDP growth	-3.0	-1.9	-0.4	4.2
Consumer price index (period average)	15.9	10.5	22.7	28.4
Consumer price index (end of period)	10.1	20.0	19.2	27.1
	(In percent of GDP)			
Public finance				
Consolidated government budget balance, cash basis	-5.4	-2.8	-2.4	-1.5
Of which: Primary balance	-3.6	-0.4	0.0	1.5
Revenue	38.8	36.0	34.7	34.4
Expenditure	44.2	38.7	37.1	35.9
	(Annual change in percent, unless indicated otherwise)			
Money and credit				
Base money	44.6	21.9	39.2	30.3
Broad money	33.9	25.3	40.4	35.8
Net domestic assets of the banking system	32.0	117.9	37.7	0.1

Velocity (annual GDP divided by period-average broad money)	8.5	7.3	6.7	6.4
External sector				
Current account balance (in percent of GDP)	-2.7	-3.1	2.7	4.8
External public debt (in percent of GDP)	23.4	27.4	39.0	36.2
Debt service ratio, after rescheduling (in percent of exports of goods and nonfactor services)	7.5	13.5	18.5	13.4
Terms of trade (annual change in percent)	-4.7	3.6	11.4	-8.2
Gross reserves (end of period; in weeks of current year imports of goods and nonfactor services)	5.6	2.2	3.7	3.0

Sources: Ukrainian authorities and IMF staff estimates and projections. Data for 2000 are staff estimates and program projections. Since the Board discussion, official estimates for 2000 have been updated; these indicate, in particular, GDP growth of 6 percent, a budget deficit of 0.8 percent of GDP, and end of period inflation of 25.8 percent.

Arrears in the social sectors were reduced by 1.1 percent of GDP, with pension fund arrears eliminated by end-September. Some payments arrears, however, were accumulated in the energy and utility sectors.

Some progress has been made on structural reform. Executive Directors welcomed the recent improvements in economic policy implementation, and endorsed Ukraine's overall economic strategy based on a sound budget, tight monetary policy, and supportive structural reforms. Directors

were encouraged by the recent economic performance, noting that real GDP growth in 2000 is expected to be positive… and approach 5 percent." (IMF, 2001, p. 7)

We do not discuss all aspects of these positive achievements, but we note that if real pensions and other social transfers would be reduced to an anecdotal $1 per month, arrears would disappear immediately. We focus on economic growth, and our task is to test whether the accumulation of human capital has a positive impact on GDP per capita growth in transition economies.

In Ukraine and the Russian Federation of 1990s output growth was negative. This can be clearly seen from the data, presented in Table 2.3.

TABLE 2.3

Selected indicators of economic growth in Ukraine and the Russian Federation, 1991-1997

Year	Ukraine	Russia
1991	-11.9	-5.0
1992	-17.0	-14.5
1993	-14.2	-8.7
1994	-22.9	-12.6
1995	-12.2	-4.0
1996	-10.0	-2.8
1997	-3.2	0.4

Source: Havrylyshyn, O., Izvorski, I., and Rooden, R. (1999). Growth in Transition Economies 1990-1997: An Econometric Analysis with Application to Ukraine. In A. Siedenberg and L. Hoffman (Eds.). *Ukraine at the Crossroads: Economic Reforms in International Perspective*. Berlin: Physica-Verlag.

There was always a large amount of available labor force present in the economy, because of high real and hidden unemployment in the country. At the same time Ukraine had a very high rate of capital accumulation, possibly even higher than during the Soviet times. However, accumulated capital has been leaving the country. There was no process of reinvestment taking place. Low capacity utilization (underemployment, for instance), low allocative efficiency as a consequence of the corporate-monopolistic type of allocation, depreciation of principal capital, human capital outflow, slowdown in technical progress, and the lost time and missed opportunities for timely changes made the problem of initiating growth even more difficult. At the same time, the authorities in Ukraine emphasized the development of the domestic market rather than steering the economy towards export orientation at the beginning of transition. They requested more foreign credits and foreign direct investments (FDI) without creating welcoming conditions for businesses in the country.

Unemployment was around 1 million people in 1998, with the official rate of unemployment of around 5 percent for the year 2000 (Kravchuk, 2002). These indicators did not account for latent unemployment, underemployment, long-term leaves, and arrays in salaries and other compensatory payments. As Kravchuk (2002) points out: "Wages tend to bear little relationship to labor productivity level, which vary broadly. In any case, labor productivity rates in Ukrainian industry have been falling since 1991, and by 1997 were but 70-75 percent of their 1990 levels. As such, Ukraine has not been able to take advantage of its relatively low-cost, well-educated work force." (p. 28)

Intensive human capital outflow, the so-called "brain drain," along with intensive "capital flight" that took place in Ukraine, Russia, and other CIS countries, was especially significant during the period of 1993-1999. The primary venue for capital outsourcing was import-export operations, when

profits were deposited in foreign banks instead of being returned to the country and reinvested. By some estimates, the amount of Ukrainian capital abroad constituted somewhere around $25 to $50 billion in 1996 (Kravchuk, 2002, p. 32). This outflow of capital had a negative economic impact on growth.

The implication for Ukraine was that a very large inflow of foreign capital was needed to compensate for this drain of the nation's own capital resources, but this was not likely to happen soon. Ukraine had "to live above its means" and depend upon the foreign credit it received. Alesina and Rodrik (1994) conclude that foreign aid is, at best, only partially successful at promoting growth and reducing poverty. The reasons are poor institutional development, corruption, inefficiency and bureaucratic failures in developing countries (Alesina and Rodrik, 1994). Moreover, the situation becomes more difficult with the necessity to service foreign debt, which, in contrast to domestic debt in wages and social payments (pensions, stipends), is always serviced on time. Some of the chief vehicles for debt reduction are debt-equity swaps and debt-debt swaps, which are going to take place particularly between the Russian Federation and Germany and are described by Dornbush (1996). Dornbush concludes that these swaps rarely serve the interests of the creditor. In addition, Brazil and other countries recognized in the 1990s that their interests were poorly served by swaps.

Ukraine's positions on the international credit markets were very favorable at the beginning of the reform. As the Russian Federation took over all financial obligations of the USSR, Ukraine was considered quite credible by potential creditors and at the same time did not have any foreign debt. In this regard Kravchuk (2002) notes the following: "In 1992, Ukraine had no foreign debt outstanding. This provided the country's most significant inherited economic resource: an enormous amount of debt capacity. As might be expected,

Ukraine's foreign debts steadily increased over the 1990s. From an estimated $1.4 billion in late 1992, Ukraine's indebtedness grew to over $12.1 billion by early 2000. The debt-to-GDP ratio stood at between 15 to 20 percent in 1998 but rose to over 40 percent in 1999." (p. 33) Servicing foreign debt becomes more and more of a burden.

The financial system in Ukraine was supposed to accumulate savings and convert them into investments, but it was not up to this task: it was poorly developed and mismanaged. According to the research on the role of financial development in growth and investment by Benhabib and Spiegel (2000), such a financial system could not support economic growth.

The detailed studies of particular areas of economic activities and industries in Ukraine, including foreign trade, institutional reform, modern growth trends, finance, fiscal regulation, investment, infrastructure, state regulation, restructuring, role of natural resources and regional aspects of development are presented in works of Akimova (2002), Gavrilenkov (2002), Gylfason (2002), Dabrowski (2002), Dodonov, Hirschhausen, Opitz and Sugolov (2002), Eremenko (2002), Hejets (2002), Havrylyshyn, Lissovolik, and Shadman-Valavi (2002), Jahnke (2002), Kobzev (2002), Kravchuk (2002), Mankovska and Dean (2002), Ogutcu (2002), Scherbakov (2002), Thiel (2002), Volosovych (2002), and others.

Indicators of economic development presented in Table 2.4 are useful for seeing whether, on the basis of exogenous variables included in economic growth models, it was possible to predict or explain economic growth in Ukraine. As one can see, all the indicators in Table 2.4 indicate that the initiation of economic growth was quite problematic.

Barro (2000) suggests that inequality retards growth in poor countries but encourages growth in richer places. Growth tends to fall with greater inequality when per capita GDP is

below around $2000 in 1985 US dollars and to rise with inequality when per capita GNP is above $2000.

TABLE 2.4

Selected indicators of economic development in Ukraine, 1996 and 1998

Indicator	Ukraine
GDP per capita	$ 750 as for 1998
productivity of labor	60-70 percent of 1991
depreciation of capital	immeasurable
foreign credits	$12.5 billion as for 1998
foreign credits per capita	$250 as for 1998
total debt services	$2 billion as for 1998
debt services per capita	$40 as for 1998
FDI net inflows	$743 million as for 1998
FDI per capita	$15.5 as for 1998
aid per capita	$7.6 as for 1998
National capital outflow	Varies, $20 to $60 billion
savings of population	$12 billion for 1996
Gini coefficient	0.38672 in 1996
invested savings of population	less than $1 billion for 1996

Source: www.worldbank.org

We would like to notice the following:

(1) In Ukraine in 1997, per capita GDP was $1040, and per capita GNP calculated based on the basis of purchasing power parity was $2170. According to the estimates, presented by the World Bank, per capita GDP in 1997 was $850 and in 1998 it was about $750, and income inequality, indicated by the Gini coefficient, continues to grow.

(2) According to some commonly accepted estimates, Ukraine needed approximately $60 billion in long term investments and credits for restructuring. During the period from

1992 to 2000 it received only $12.5 billion in the form of credits, less than $1 billion in FDI, and a small amount of portfolio investments.

For comparison, Mexico received $40 billion in 1989 during its crisis; Republic of Korea received approximately $50 billion in 1998 to support its national currency. These were short-term credits from the currency stabilization funds. Poland received $60 billion in foreign credits and FDI at the beginning of transition in the early 1990s for restructuring and renewal of its principal capital in the industry.

(3) The significant capital outflow along with the personal savings not being converted into investment caused negative economic growth in Ukraine. Diminishing population, depletion of resources, depreciation of principal capital, low productivity of labor, structural problems, poor management, and absence of a well-developed state economic policy all contributed to the long run negative economic growth in Ukraine.

Inequality is likely to have a negative impact on growth in low-income countries (Barro, 2000). The low level of foreign capital can keep growth at a low rate (Leontief, 1958). From this discussion, one might conclude that Ukraine would not grow rapidly without large initial infusions of capital. We, therefore, seek some other "engine of growth"- in addition to the accumulation of capital. Solow proposed technological change, a steady flow of new ideas. The neoclassical growth model focuses on the capital accumulation decision, but it is growth in ideas – not merely in capital – that drives the system. A shift in emphasis from physical to human capital accumulation is needed, as well as a focus on decisions – such as the allocation of time among activities – that affect the rate of learning and the rate of accumulation of skills and ideas. In Ukraine human capital constitutes 6 percent of the overall world potential, with population 0.1 percent in 1993. Nevertheless, this capital was used in the system of the planned economy, and now the new system does not use this capital effectively in production.

Dobrowski (2002) points out on two groups of hypotheses of the recent economic growth in Ukraine:

> The first one refers to various temporary factors such as the low statistical base and presence of free production capacities after many years of output decline. Other 'windfall' factor can be connected with effects of 1998-1999 devaluation of Hryvnia, and strong external demand, particularly for the metallurgy products in year 2000. The second approach believes that long-term structural factors such as effects of privatization and restructuring carried out so far, and moving a part from the shadow sector into the official one created a favorable environment for economic growth. While the latter leads to conclusion that the current growth may be sustainable in longer term, the former suggests a gradually decreasing growth trend. (p. 77)

Havrylyshyn, (1999), Shen (1996), Fisher, Sahay, and Vegh (1996), and Blanchard (1997) examined the following key measures of the reform in transition economies:

- macroeconomic stabilization;
- price and market liberalization;
- liberalization of the exchange and trade system;
- privatization of state-owned firms;
- establishing a competitive environment with few obstacles to market entry and exit;
- redefining the role of the state as the provider of macro stability, a stable legal framework, enforceable property rights, and occasionally as a corrector of market imperfections.

Based on such concepts the authors anticipate the following implications for growth that differentiate the transition economies from developed market economies: "First, output will necessarily decline initially. Second, growth of the new will not occur until the new incentives are in place and made credible. Third, the proximate mechanisms in the early recovery period are most likely a variety of efficiency improvements rather than

expansion of factor inputs such as investment and labor." (Blanchard, 1997)

As Mankiw, Romer, and Weil (1992) point out, future research should be directed at explaining why the variables taken to be exogenous in the Solow model vary so much from country to country. They expect that differences in tax policies, education policies, tastes for children, and political stability will end up among the ultimate determinants of cross-country differences.

By 2004, Ukraine achieved pre-reform level of per capita income. This indicates that the economic crisis is over. Nevertheless, overcoming the crisis along does not present necessary grounds for a suggestion that the national economy is now a pure market economy. Ukraine can rather be characterized as a predominantly market-type mixed economy, where a substantial public sector coexists with the dominating private sector. The private sector functions based on the market mechanisms, while there are also transitional forms and mechanisms of economic organization present in the country. These transitional forms continue to exist since early 1990s and slowly disappear, giving way to the market ones.

Economy of Ukraine in 2007 can still be characterized with a certain level of mosaics. This level of mosaics, or mixed forms of economic activities and mechanisms, is less significant and not as noticeable as it was during the transition of 1990s. Characterization of Ukraine's economy as a predominantly market-type mixed economy should not be considered as an indicator of the economy's insufficiency for at least three reasons. First, pure market economy is non-existent and cannot be found anywhere in the world. Even in the US economy, probably the nearest approximation to what is known as a pure market economy, there are such features as the high degree of monopolization of the national economy, the large state sector, the growing public sector, including non-governmental organizations, and numerous non-economic restrictions and

regulations. All of those utilize non-market mechanisms and prevent from achieving a highest possible degree of economic effectiveness and efficiency. Second, Ukraine's economy is still encounters a presence of some elements of transition economy, distinct from both planned economy and market economy. Third, Ukraine will likely preserve a substantial public sector, including healthcare, education, transport, and infrastructure. Ukraine has the European mentality with its welfare state, rather than the US mentality. This anticipates broad access to medical services and quality education.

In order to identify the nature of economic growth and the role of human capital in the initiation of sustainable growth in the post-transition economies of market type it is necessary to use the following estimation criteria:

volume, density, and structure of external inflows to the national economy, including foreign direct and portfolio investments, capital outflow, external debt volume and service;

level of socialization of the economy, and presence or absence of the social trajectory in the current development;

level of socio-economic development and presence of economic environment that favors involvement of human capital in production, including development of the labor market and the stock market;

level of involvement of human capital in the national production for each national economy;

scale of reproduction of human capital (increased, stable, reduced);

forms of connecting workers with the means of production, the system of production relations, and the trajectory of its development;

vectors of economic transition;

level of development of socio-economic and organization-economic relations in the system;

rate of economic growth and macroeconomic dynamics overall;

degree of prioritization of innovative development and its structure;

presence of positive correlation between human capital and economic growth and its estimates;

presence of the necessary conditions for an increased scale reproduction of human capital;

presence of the conditions necessary for transition from predominantly exogenous to endogenous economic growth and socio-economic development.

2.2. Place of Growth in the Transition Economy

The recent calls for innovative development are numerous. The new terms and economic categories are being developed in support of the claims for innovations in the economy. Unfortunately, modern economic thought in Ukraine and in the Russian Federation does not go far beyond the general discussion of the advantages of innovative path of economic development. It remains within the limits of pseudo-theorization and rarely attempts empirical research.

The necessity of creation of the conditions favorable for the innovation-based economic development requires determining whether such process is possible and what is the degree of such possibility. This can be done based on the study of the major determinants of transformation and finding the place of such a process within the market transition and development of the post-transition economy.

After the disintegration of the USSR, Ukraine and other newly independent states were in the process of deep socio-economic transformation. The transition of the national systems from one major condition to another was not linear, smooth, and gradual. While the general vector of transition was defined as moving toward the market, the reality presented former republics with a mixture of forms and mechanisms of economic development, including recession, crises, and social and

economic disintegration. Local crises turned into simplification of the economic mechanism and lead to shortages in entire industries. Well-developed market mechanisms coexisted with the primitive form of economic organization in countryside. There was a rapid increase in the differential between the center and the periphery.

The system was initially reformed from the emerging market economy with agriculture dominating the entire economy into the centralized and bureaucratized system of planned economy with the substantial process of militarization. Domination of the defense industry and a large military complex are characteristics of centralized systems.

The transition had an immense attention from the economists. We will briefly characterize major points of the scholarly discussion of economic transition that took place in 1990s and continues today.

Lisovitsky points out that the reform of 1990 led to the inversion of the previous system, while the degree of inversion was predetermined by the degree of its involution (Lisovitsky, 1994, p. 20). Pokrytan characterizes market transition in Ukraine as a move to capitalism (Pokrytan, 1997, p. 18). Buzgalin says that the transition is a change of economic relations, including allocation of the resources, property rights, mode of production, incentives, goals and means of economic development, institutions, and legal conditions (Buzgalin, 1995, p. 40). Buzgalin sees non-economic determinants as dominant in transition and points out the mosaics of the transition economy that consists of many pieces of the new and the old.

Economic development is influenced by non-economic processes and events, including political, geopolitical, socio-cultural, ideological, military, and other factors. Accordingly, the transition economy is predetermined to be unstable.

Market transition faces harsh critiques as well. Gosh sees process of transition as a process of emerging financial oligarchy and its alliance with the state (Gosh, 1998, p. 59).

Both political events and inertia of the past system influenced the process of market transition. Gosh supports gradual transition as the only possible productive form of market transition and relies on the examples of China and Vietnam. He also points out that the destructive character of the reform is directly connected to the degree of the reform. In his view, the Ukrainian economy suffered much more, than did the economy of Belarus, because economic and political reforms in Belarus were less significant and more gradual, than in Ukraine (Gosh, 1998, p. 22).

Buzgalin marks three major trends in the transition economies, including the gradual death of the mutant socialism, the emergence of the modern capitalism, and the humanization and socialization of socio-economic life (Buzgalin, 1997, p. 41). He gives priority to the last trend that includes innovative development and priority of human capital (Buzgalin, 1997, p. 43).

Chukhno delineates two major possible models of the economic transition and the future system. The first one is the way of classic capitalism that slowly evolves to the developed forms. It includes unavoidable formation of the army of workforce, alienation of workers from the means of production, high level of economic exploitation along with some elements of non-economic methods or forced labor, slow development of social partnership and humanization of labor (Chukhno, 1996, p. 18). The second model is way more idealistic and relies on plurality of property rights, profit-sharing, worker participation, social partnership, and the move toward post-industrial society (Chukhno, 1996, p. 19).

Kolganov makes emphasis on institutional diffusion as a characteristic of the transition economy (Kolganov, 1995, p. 57). This includes legal vacuum, unclear and changing property rights, and broken connections between different civil, economic, and regulatory institutions. The continuous redistribution of property rights takes place along with the process of legalization

of criminal capital and shadow or unofficial economy, and money laundering. Redistribution of property rights during the exogenous transformation is influenced by the local and corporate regulation and non-economic determinants.

Forms of property and property rights embedded in the legislation are often inadequate to the realities of transition. Around 70 percent of large privatized enterprises were open-membership joint-stock companies under the control of the state and the workers. This meant *de facto* concentration of the property rights in hands of the plant administration and the state bureaucrats. Zadorozhny points out that the existing forms of property are not supported by the necessary legal mechanisms (Zadorozhny, 1996, p. 134).

The process of distribution and redistribution of property rights is often oversimplified and viewed as a development of private property. For instance, Sachs says that former state property is distributed for free among workers and population (Sachs, 1994, p. 48). This view is based exclusively on the legislation and does not take into account real processes in the economy.

In soviet times alienation of workers from the means of production was hidden behind the fact of virtually absent unemployment and so-called state and collective forms of property. Private property did not exist, at least in legal terms. Economic transition included the process of conversion of the state property into monopolistic property of newly emerged corporations, where private capital shared property rights with the state *nomenklatura*, i.e. former and present state bureaucrats. Alienation of workers from the means of productions on both levels--process of production and property rights—lead to a dramatic increase in unemployment. Gritsenko points out that under the inversion-type transition alienation of workers from the means of production was formalized in legal terms (Gritsenko, 1997, p. 7).

The state started introducing the new system of economic relations and mechanisms of functioning in the old soviet system that had yet to use all of its resources and potential for the development. This process defined economic transformation as exogenous, made under the influence of external non-economic forces, such as the state (Gritsenko and Kim, 1993, p. 127). Exogenous transition led to the mixture of different forms and mechanisms of economic activities in the newly independent states, including the remnants of the soviet economy and the new emerging elements of the market economy. Mixed character of the market transition is different from the mixed economy. The mixed economy is a stable form of the national production that exists in all developed societies.

In distinction of the classic historical way of development where market relations preceded industrial revolution and later industrialization, in the former USSR market relations were introduced in the industrialized system of production. As a result, the state property was transformed into the private property, planned prices were replaced with the free pricing mechanisms, and full obligatory employment gave way to the slowly emerging labor market. Under the classical type of transition from non-market economy to the market economy workers are alienated from land. At that time land along with labor was major factor of production. A good historical example would be the primary capital accumulation and early stages of capitalism in England. Under the inversion-type transition from the centralized system to the market system workers are alienated from the means of production, created by the previous generations of workers. These are primarily machinery, equipment, and buildings, i.e. products of industrialization. This process is described by Gritsenko along with the processes of socialization of primary capital accumulation during the market transition (Gritsenko, 1997, p. 6).

The economic transition influenced forms of socialization as well. In the planned economy people were

guaranteed workplace, certain level of consumption, free access to elementary, secondary, higher, and graduate education, free access to healthcare, distribution of housing, and a well-developed social security system. This system is to be replaced with the new system of social guarantees, typical for a market economy. However, the market system is only at the stage of its formation and not development. Such a mismatch led to the weakening of the system of social guarantees without its immediate replacement by the new system.

Vorobyev, Gritsenko, and Kim see the contradiction between the old and the new system of social guarantees as one of the major characteristics of the inversion-type transition. The growing income inequality and distribution of property create incentives for economic growth (Vorobyev, Gritsenko, and Kim, 1997, p. 70) Gosh suggests that the total volume of production in Ukraine declined 58.9 percent over the 1990s and that this proves the destructive character of market transition (Gosh, 1997, p. 59). Rokochaya and Moroz argue the opposite, suggesting that economic transformation in which exogenous factors dominate is an effective way of evolutionary development (Rokochaya and Moroz, 1998, p. 59).

The disintegration of the USSR led to the partial disintegration of the unified monolithic national economy with all of its ties. Only 20 percent of all the production in Ukraine was so-called full-cycle production. In most of the instances resources and parts were brought from the other republics and the final product was exported outside the republic. Despite the process of disintegration and other negative processes for the economy, the decline in production never reached 59 percent. It was less significant.

The capitalization of the economy is also a positive process. The national economy will likely preserve a substantial public sector with the guaranteed access to healthcare and education. This will be to a certain extent a product of the Ukrainian mentality. In Ukraine, as well as in Russia, access to

medical services and quality education is traditionally considered as a human right. This is not typical for many countries. In the US in 2006 over 50 million people did not have health insurance and hence did not have access to healthcare. The share of workers who have health coverage through their employers declined from 73 percent in 1975 to 60 percent in 2006. This means that one out of every six people in the US effectively does not have access to medical services. And this is in the most advanced nation where healthcare industry constituted in 2006 sixteen percent of GDP. It seems necessary for every developed nation to have universally accessible healthcare. In fact, the US might be the only exception in this sense. All of the developed countries, including Western Europe, Canada, Japan, Australia, Eastern Europe, and the RF, have systems of universal health coverage.

A successful process of socialization is characterized by the sustainable and increased reproduction of human capital. Continuous process of reproduction of human capital necessitated a significant presence of the state in the national economy during the market transition. The leading role of the state for the initial stage of the transition was clear from the very beginning. Mocherny pointed out the necessary evolution of the state's functions due to the fact that so-called market failures will be unavoidable (Mocherny, 1993, p. 18).

We can name the following major characteristics of the process of market transition in Ukraine:

property redistribution and alienation of workers from the means of production;

economic restructuring;

creation of market institutions;

integration of the national economy into the world economy;

partial dismantling of the socialist system of social guarantees and creation of the new system, based on the predominantly market economy.

In 1990s the economists expressed both pessimistic and optimistic views on the transition and the future of the nation. Gosh pointed out that there are no technologies, natural resources, human resources, and other socio-economic factors in Ukraine that would allow for transition from industrial to post-industrial production (Gosh, 1998, p. 57). This opinion appears to be quite pessimistic. Ukraine as well as the Russian Federation is an industrially developed society with a significant amount of human capital. It needs structural and institutional changes in order to sustain technological advancements and increase productivity. Abalkin sees the opportunity for a significant technological advancement during the transition (Abalkin, 1997, p. 622).

A specific feature of human capital as a factor of production is that its total amount can increase even when the total population declines. While such factors of productions as labor and capital can increase thanks to an increase in the total labor force and capital accumulation, respectively, human capital can reproduce on an increasing scale even when the total work force declines and the productive capital is constant. This lays down the first principle that establishes possibility of future sustainable growth and socio-economic development in Ukraine even under the conditions of relatively slow capital accumulation and negative growth in population in the long run. This principle points to insufficiency of the exogenous theories of growth as applied to Ukraine.

The second principle that comes out of the first one is that the endogenous growth model connected to human capital may be the only perspective option for the future development in Ukraine in the long run, especially when the resources of the exogenous growth will be depleted.

The third principle establishes that human capital is capable to grow based on its internal potential and already accumulated human capital. Such process is based on the human nature to produce and accumulate new knowledge.

The fourth principle says that the process of human capital reproduction on an increased scale expressed in the usage of human capital in the societal production as a major factor of production lays in the basis of the total factor productivity increase.

Human capital as a factor of production makes service industry specific. If earlier consumption was traditionally divided on personal consumption and production consumption, now a certain part of consumption becomes personal and at the same time productive. Consumption facilitates reproduction of work force and accumulation of human capital. The process of development of each individual is of value to the society because it means accumulation of human capital, development of certain characteristics and skills that are in demand in the economy. A substantial part of the basis for an increased reproduction of human capital consists of the systems of healthcare and education.

Healthcare and education industries in Ukraine as well as in the Russian Federation and countries of Eastern Europe in many instances continue to operate on the same basis and with the same mechanisms as they did during the soviet times. The national systems of higher education experience slow, but significant changes, while secondary education and health care preserved most of their old features.

Until recently, the high level of medical services and education in the countries of the former Soviet Bloc allowed them a luxury of not changing much in these industries. One might expect that universal access to healthcare will be preserved as it is in the Western European welfare states. The same will be true for the secondary education, as the access to it will likely remain universal, compulsory, and free for immediate consumers. However, higher education industry faces dramatic changes in the near future, including its further decentralization, deregulation, privatization, marketization, and commercialization. Such changes will make the industry more

effective and efficient in creation of new knowledge and human capital accumulation. This includes higher level of flexibility and responsiveness to the market demand.

Some of the industries that traditionally belonged to the public sector should be rebuilt on the basis of shared responsibility between the state and the public, including businesses and individuals. In higher education this will include introduction of the concepts of plurality of forms of organization and property rights, and cost-sharing in education funding.

In addition to the essence of transition, it is important to consider views about the major stages of the process. Chukhno sees three major stages in transition. The first stage includes an overcoming the crisis, economic stabilization, and initiation of growth. The second stage includes privatization, demonopolization, and effective functioning of the enterprises. The third stage includes restructuring of the national economy and technological advancements. Chukhno anticipates the third stage to take at least two to three decades (Chukhno, 1996, p. 20).

The major stages of transition according to Sachs and Pivovarsky include: stabilization or critical phase, when the government fights inflation and other negative consequences of the disintegration; phase of market-building, when market institutions are developed; and phase of the structural adjustments, when the character of production and employment change (Sachs and Pivovarsky, 1996, p. 54).

Major stages of social transition include a compensatory socialization during the privatization and restructuring; a reduction of unemployment; socialization of property through joint-stock companies; and technological innovations. Economists discuss the opportunities for socially-oriented transition and see among the major characteristics of the socially-oriented mixed economy are social stability and increasing social welfare (Sidorovich, 1997, p. 594; Cherevko and Lukash, 1998, p. 48-49).

2.3. Growth Forecasts and Their Explanation

Long-run forecasts of economic growth in Ukraine and their interpretation will be presented in addition to the macroeconomic indicators considered earlier in this chapter. Long-run forecasts for the key macroeconomic indicators till 2030 are presented in Tables 2.5-2.9. They include a variety of indicators for GDP, GDP growth, contribution to GDP by expenditures, demographics, labor, and productivity. Dynamics of the macroeconomic indicators are presented in Figures 1-4 of Appendix XII.

Selected statistics for GDP in Ukraine for the period of 1989-2006 and in the forecasts till 2030 are presented in Tables 2.5 and 2.6.

TABLE 2.5

GDP indicators for Ukraine, 1989-2030

Year	GDP (% real change per annum)	GDP per head, USD	GDP per head (USD at PPP)	Real GDP growth per head, % per annum
1989	...	...	7,250.00	...
1990	-4.0	...	7,241.60	-4.241
1991	-8.7	...	6,823.80	-8.954
1992	-9.9	...	6,267.00	-10.225
1993	-14.2	638.20	5,515.00	-13.985
1994	-22.9	711.80	4,375.00	-22.322
1995	-12.2	724.30	3,950.10	-11.522
1996	-10.0	879.90	3,654.00	-9.217
1997	-3.0	998.10	3,631.60	-2.240
1998	-1.9	840.20	3,630.60	-1.124
1999	-0.2	638.60	3,705.10	0.597
2000	5.9	637.50	4,043.50	6.806

2001	9.2	787.90	4,596.00	11.001
2002	5.2	887.10	4,961.50	6.198
2003	9.6	1,056.70	5,566.00	10.398
2004	12.1	1,377.50	6,386.90	12.913
2005	2.6	1,772.90	6,786.50	3.371
2006	5.5	1,980.00	7,400.00	6.100
2007	5.8	2,100.00	8,120.00	6.400
2008	6.0	2,430.00	8,930.00	6.500
2009	6.2	2,770.00	9,810.00	6.700
2010	5.8	3,190.00	10,720.00	6.300
2011	5.2	3,610.00	11,620.00	5.700
2012	4.8	4,070.00	12,540.00	5.200
2013	4.5	4,580.00	13,490.00	4.900
2014	4.2	5,140.00	14,490.00	4.600
2015	4.0	5,750.00	15,520.00	4.400
2016	3.9	6,420.00	16,610.00	4.200
2017	3.7	7,160.00	17,760.00	4.100
2018	3.6	7,970.00	18,980.00	4.000
2019	3.6	8,860.00	20,270.00	4.000
2020	3.5	9,830.00	21,650.00	3.900
2021	3.5	10,890.00	23,120.00	3.900
2022	3.5	12,030.00	24,670.00	3.900
2023	3.5	13,260.00	26,320.00	3.900
2024	3.5	14,590.00	28,080.00	3.900
2025	3.5	16,030.00	29,950.00	4.000
2026	3.6	17,560.00	31,940.00	4.000
2027	3.6	19,210.00	34,060.00	4.000
2028	3.6	20,990.00	36,320.00	4.000
2029	3.6	22,900.00	38,720.00	4.000
2030	3.6	24,960.00	41,280.00	4.000

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

Selected statistics for GDP in Ukraine in constant 1996 prices are presented in Table 3.40.

TABLE 2.6

GDP indicators for Ukraine, 1989-2030

Year	Real GDP (billion USD at 1996 prices)	Real GDP (PPP billion USD at 1996 prices)	GDP deflator, 1996=100; average	GDP deflator, % change; average
1989	107.942	448.236	...	...
1990	103.624	430.307	...	...
1991	94.609	392.870	...	...
1992	85.242	353.976	...	...
1993	73.138	303.711	1.12	...
1994	56.389	234.161	11.63	937.613
1995	49.510	205.594	60.17	417.274
1996	44.559	185.034	100.00	66.196
1997	43.222	179.483	118.07	18.074
1998	42.401	176.073	132.25	12.012
1999	42.316	175.721	168.49	27.400
2000	44.813	186.088	207.44	23.116
2001	48.936	203.209	228.08	9.947
2002	51.480	213.775	239.76	5.122
2003	56.422	234.298	258.99	8.023
2004	63.249	262.648	298.25	15.156
2005	64.894	269.477	357.76	19.954
2006	68.463	284.298	371.20	3.700
2007	72.434	300.787	371.80	0.200
2008	76.780	318.834	407.00	9.500
2009	81.540	338.601	438.20	7.700
2010	86.269	358.239	478.20	9.100
2011	90.748	376.838	512.60	7.200
2012	95.089	394.864	547.70	6.900
2013	99.328	412.466	583.60	6.600
2014	103.517	429.864	620.20	6.300
2015	107.686	447.174	657.50	6.000
2016	111.838	464.418	695.30	5.800

2017	115.996	481.684	733.70	5.500
2018	120.192	499.105	772.60	5.300
2019	124.464	516.846	812.10	5.100
2020	128.844	535.035	852.30	5.000
2021	133.349	553.742	894.00	4.900
2022	138.002	573.065	937.10	4.800
2023	142.824	593.087	981.80	4.800
2024	147.836	613.900	1,028.30	4.700
2025	153.061	635.600	1,076.50	4.700
2026	158.513	658.236	1,126.40	4.600
2027	164.190	681.813	1,178.00	4.600
2028	170.109	706.393	1,231.40	4.500
2029	176.270	731.977	1,286.30	4.500
2030	182.671	758.555	1,342.90	4.400

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

There is a significant difference between the values of GDP in billions of dollars expressed in constant 1996 prices and GDP in billions of dollars expressed in constant 1996 prices in purchasing power parity. Such a significant and consistent difference of almost four times can not be attributed exclusively to the deviations of exchange rates from the purchasing power parity or volatility in the national currencies. The Ukrainian national currency always was and still is much stronger in respect to the US dollar than expressed in the currency exchange rates. This bias affects statistics as well as the technical and country reports.

Another significant characteristic of the data used in the statistical analysis is that the dynamics of GDP in Ukraine are presented in billions of dollars expressed in constant 1996 prices while it is a well-known fact that the Ukrainian national currency was relatively strong in relation to the US dollar at that time. This preceded the currency crisis of 1998 when exchange

rate of the Ukrainian national currency in relation to the US dollar declined from around 2:1 to 4:1 within a six-month period. Accordingly, if the dynamics of GDP in Ukraine were presented in billion dollars expressed in constant 1998 prices, then the difference between the values of GDP and GDP in purchasing power parity would be even more significant.

Dynamics of the components of GDP in Ukraine for the period of 1989-2006 and in the forecasts till 2030 are presented in Table 2.7. Dynamics of the components of GDP in Ukraine, including government consumption and import and export, are also presented in Figures 5-9 of Appendix XII.

TABLE 2.7

GDP by expenditures in Ukraine (billion UAH), 1989-2030

Year	Real government consumption, billion UAH	Real gross fixed investment, billion UAH	Real private consumption, billion UAH	Real imports of G&S, billion UAH	Real exports of G&S, billion UAH	Growth of real capital stock (%)
1989	...	...	...	...	...	...
1990	12.841	...	55.216	...	...	-7.0
1991	13.792	49.847	50.039	...	...	23.1
1992	14.323	43.352	45.406	...	...	14.3
1993	14.339	28.341	33.618	23.093	30.151	5.2
1994	12.596	14.096	30.639	30.007	22.251	-1.2
1995	11.595	12.692	30.055	27.380	25.700	-1.7
1996	10.964	10.149	27.199	28.893	26.959	-2.7
1997	10.715	10.518	26.754	29.414	27.364	-2.4
1998	10.341	10.972	27.111	29.474	27.856	-2.1
1999	9.524	11.051	26.526	22.165	23.204	-2.0
2000	9.343	12.449	27.894	26.364	26.871	-1.2
2001	9.539	13.613	29.426	30.334	31.439	-0.6
2002	8.900	14.076	32.221	31.456	34.301	-0.4

2003	10.217	16.300	36.217	36.827	37.837	0.7
2004	10.401	19.641	41.106	42.107	43.985	2.2
2005	10.682	19.582	47.930	42.989	39.067	2.0
2006	10.895	20.561	52.255	48.157	39.770	2.3
2007	11.331	22.412	56.697	53.344	42.582	2.9
2008	12.011	24.653	61.799	59.474	45.453	3.6
2009	12.852	26.502	68.288	67.845	49.908	4.0
2010	13.752	28.755	74.776	78.256	55.866	4.4
2011	14.574	30.678	80.612	87.032	60.979	4.6
2012	15.333	32.339	85.981	94.508	65.428	4.7
2013	16.042	33.798	90.999	100.997	69.378	4.6
2014	16.713	35.113	95.793	106.795	72.987	4.5
2015	17.359	36.337	100.459	112.177	76.401	4.3
2016	17.989	37.515	105.066	117.398	79.755	4.2
2017	18.613	38.692	109.695	122.695	83.176	4.0
2018	19.241	39.904	114.439	128.285	86.777	3.9
2019	19.880	41.185	119.393	134.367	90.662	3.8
2020	20.538	42.562	124.641	141.118	94.924	3.7
2021	21.221	44.058	130.250	148.698	99.645	4.0
2022	21.934	45.693	136.288	157.246	104.899	4.3
2023	22.683	47.480	142.818	166.882	110.745	4.6
2024	23.471	49.427	149.902	177.707	117.235	4.9
2025	24.300	51.538	157.600	189.803	124.409	5.2
2026	25.174	53.814	165.957	203.232	132.295	5.5
2027	26.092	56.247	175.001	218.037	140.913	5.7
2028	27.056	58.827	184.774	234.240	150.271	6.0
2029	28.066	61.540	195.300	251.845	160.366	6.2
2030	29.118	64.365	206.594	270.838	171.185	6.4

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

TABLE 2.8

GDP by expenditures in Ukraine (billion USD), 1989-2030

Year	Real government consumption (billion USD at 1996 prices)	Real gross fixed investment (billion USD at 1996 prices)	Real private consumption (billion USD at 1996 prices)	Real imports of G&S (billion USD at 1996 prices)	Real exports of G&S (billion USD at 1996 prices)	Growth of real capital stock (%)
1989	...	...	...	...	...	...
1990	4.545	...	64.360	...	...	-7.0
1991	4.882	30.811	58.326	...	...	23.1
1992	5.070	26.350	52.925	...	...	14.3
1993	5.076	20.133	39.185	17.169	22.741	5.2
1994	4.459	20.977	35.713	22.310	16.783	-1.2
1995	4.104	11.481	35.032	20.357	19.384	-1.7
1996	3.881	10.112	31.703	21.482	20.334	-2.7
1997	3.793	9.594	31.185	21.869	20.639	-2.4
1998	3.660	8.536	31.601	21.914	21.010	-2.1
1999	3.371	7.472	30.919	16.479	17.502	-2.0
2000	3.307	9.088	32.513	19.601	20.267	-1.2
2001	3.377	10.829	34.299	22.552	23.712	-0.6
2002	3.150	11.189	37.557	23.387	25.871	-0.4
2003	3.617	12.944	42.215	27.380	28.538	0.7
2004	3.682	15.660	47.914	31.306	33.175	2.2
2005	3.781	15.495	55.867	31.962	29.466	2.0
2006	3.857	16.276	60.908	35.804	29.996	2.3
2007	4.011	17.752	66.086	39.660	32.117	2.9
2008	4.252	19.537	72.033	44.218	34.283	3.6
2009	4.549	20.981	79.597	50.442	37.642	4.0
2010	4.868	22.775	87.159	58.182	42.136	4.4
2011	5.159	24.302	93.961	64.707	45.993	4.6
2012	5.427	25.628	100.219	70.265	49.348	4.7
2013	5.678	26.796	106.068	75.090	52.327	4.6

2014	5.916	27.851	111.657	79.400	55.049	4.5
2015	6.144	28.834	117.096	83.401	57.624	4.3
2016	6.367	29.783	122.465	87.283	60.155	4.2
2017	6.589	30.731	127.861	91.222	62.735	4.0
2018	6.811	31.708	133.390	95.378	65.451	3.9
2019	7.037	32.740	139.165	99.900	68.381	3.8
2020	7.270	33.850	145.282	104.919	71.595	3.7
2021	7.512	35.055	151.820	110.554	75.157	4.0
2022	7.764	36.370	158.858	116.910	79.119	4.3
2023	8.029	37.807	166.469	124.074	83.529	4.6
2024	8.308	39.372	174.726	132.122	88.424	4.9
2025	8.602	41.068	183.699	141.116	93.834	5.2
2026	8.911	42.895	193.439	151.100	99.782	5.5
2027	9.236	44.849	203.981	162.106	106.282	5.7
2028	9.577	46.921	215.373	174.153	113.340	6.0
2029	9.934	49.099	227.642	187.243	120.955	6.2
2030	10.307	51.368	240.806	201.364	129.115	6.4

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

Dynamics of the selected indicators in Ukraine, including demographics, labor, and productivity, for the period of 1989-2006 and in the forecasts till 2030 are presented in Table 3.43.

Dynamics of population growth, workforce, and growth in productivity in Ukraine for the period of 1989-2006 and in the forecasts till 2030 are presented in Figures 9 and 10 of Appendix XII.

The Economist Intelligence Unit utilise a supply side framework for long term forecasting. In this framework, output is determined by the availability of labour and capital equipment, and the growth in productivity.

TABLE 2.9

Demographic, labor and productivity indicators for Ukraine, 1989-2030

Year	Population, million	Population, % change per annum)	Labor force, million	Recorded unemployment (%)	Labor productivity growth (%)	Total factor productivity growth (%)
1989	51.528	...	...	...	...	...
1990	51.658	0.252	...	...	-2.1	-0.3
1991	51.802	0.279	...	...	-7.2	-15.8
1992	51.989	0.362	...	...	-8.4	-13.9
1993	51.860	-0.249	...	...	-12.1	-14.4
1994	51.474	-0.744	23.193	...	-19.9	-20.0
1995	51.079	-0.766	23.795	...	-14.4	-13.3
1996	50.639	-0.863	23.436	1.3	-8.1	-7.7
1997	50.245	-0.777	23.128	2.3	-0.4	-0.5
1998	49.851	-0.785	23.125	3.7	-0.6	-0.3
1999	49.456	-0.792	22.907	4.2	2.1	2.0
2000	49.037	-0.848	21.353	4.1	14.4	11.2
2001	48.241	-1.622	21.029	3.6	10.3	10.1
2002	47.787	-0.940	21.120	3.7	4.6	4.9
2003	47.442	-0.722	21.186	3.5	9.2	9.3
2004	47.101	-0.720	21.271	3.5	11.4	10.9
2005	46.749	-0.746	21.568	3.1	0.7	0.8
2006	46.477	-0.600	21.689	3.5	4.8	4.3
2007	46.235	-0.500	21.827	3.8	5.5	4.6
2008	46.020	-0.500	21.979	4.1	5.4	4.4
2009	45.808	-0.500	22.132	4.4	5.8	4.6
2010	45.598	-0.500	22.286	4.8	5.5	4.1
2011	45.377	-0.500	22.280	5.1	5.2	3.6
2012	45.178	-0.400	22.145	5.1	5.4	3.5
2013	44.992	-0.400	21.909	5.1	5.6	3.5
2014	44.823	-0.400	21.597	5.1	5.7	3.6
2015	44.664	-0.400	21.234	5.1	5.8	3.6

2016	44.502	-0.400	20.840	5.1	5.8	3.6
2017	44.332	-0.400	20.434	5.1	5.8	3.6
2018	44.155	-0.400	20.033	5.1	5.7	3.5
2019	43.977	-0.400	19.651	5.1	5.6	3.5
2020	43.798	-0.400	19.300	5.1	5.4	3.4
2021	43.618	-0.400	18.991	5.1	5.2	3.1
2022	43.436	-0.400	18.730	5.1	4.9	2.9
2023	43.254	-0.400	18.523	5.1	4.7	2.6
2024	43.073	-0.400	18.373	5.1	4.4	2.3
2025	42.896	-0.400	18.279	5.1	4.1	2.0
2026	42.723	-0.400	18.242	5.1	3.8	1.8
2027	42.550	-0.400	18.255	5.1	3.5	1.5
2028	42.381	-0.400	18.314	5.1	3.3	1.3
2029	42.213	-0.400	18.410	5.1	3.1	1.1
2030	42.045	-0.400	18.532	5.1	3.0	1.0

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

The forecasts completed by the Economist Intelligence Unit and presented above are not perfect, as is the case with any other economic forecasts. One of the major problems with such forecasts is that they do not account for economic cycles. A business cycle is the predominant form of economic development in market economies in the long run. It would be reasonable to expect that the economy of Ukraine, as well as of the Russian Federation and countries of CEE will reach the stage of cyclical development in a decade or so.

The process of economic changes can be divided into stages depending on the rate of growth of real GDP. The data above indicate an initial decline in the rate of growth of real GDP in Ukraine in 1989 that later turned into the negative rate of growth. This negative growth continued according to the most pessimistic estimates from 1990 to 1999. The period of 2000 to 2004 is characterized by a significant increase in

business activities and positive economic growth that reached 12.1 percent in 2004. The period of 2005-2010 will most likely be characterized as a period of slow-down in the rate of GDP growth, fluctuating around 6 percent per annum. Further slow-down in economic growth is expected in 2011-2015 with the rate of growth declining from 6 to 4 percent. Real GDP in Ukraine during the period of 2015 to 2030 is expected to increase at the rate of around 3.6 percent annually.

Based on the forecasts the stages of GDP growth can be presented as follows:

Decline in the rate of growth (till 1989);

Negative economic growth (from 1990 to 1999);

Significant economic growth along with a significant increase in business activities in the country (from 2000 to 2004);

Slow-down in the rate of growth (from 2005 to 2010);

Further decline in the rate of growth (from 2011 to 2015);

Stabilization of the rate of growth at the moderate level (from 2015 to 2030).

The above stages can be presented as follows:

Low rate of economic growth;

Negative rate of growth;

Significant growth;

Significant but declining rate of growth;

Average and declining rate of growth;

Moderate economic growth.

The prognoses are based on average and moderate values. This strategy is normally used to ensure that possible significant deviations will not occur. At the same time such a strategy is not necessarily the best at reflecting the economic future and thus it is not always appropriate.

The stages of economic growth presented above are not the phases of economic cycle. First of all, economic cycle is typical for market economies, while the presented stages of

growth were initiated by the exogenous impact and were stages of the process of transition. Secondly, the phases of growth characterize the transition economy. Thirdly, economic growth that takes place in Ukraine is a sustainable growth, not a part of economic cycle. Finally, the very understanding of the economic cycles and possible future cyclic development of the nation's economy is missing in the presented forecasts.

Another problem of long run forecasts is that they freely interpret the term long run. In economics long run is a period sufficient enough to renovate principal capital, if such necessity exists and is supported by the major structural changes in a particular firm, industry, or national economy. The reaction of the businesses on the major shifts in demand in the long run is expressed in the changing capital structure or an increase in production capacities.

In macroeconomics, long run should be interpreted as a period of time sufficient for a substantial renovation of principal capital in the national economy. Such a renovation would be quite normal in a post-transition economy. Nevertheless, in the forecasts, the term long run normally means a significant period of time and very often a period of twenty years, yet unrelated to its economic meaning.

The two comments on the long run forecasts presented above that address the necessity of taking into consideration economic cycles and considering long run as it is intended in economics are closely linked, because every economic cycle has in its fundament a renovation of principal capital.

The long run forecasts for Ukraine, as well as the Russian Federation, Poland, Hungary, and other post-transition economies should be linked to the concepts of economic cycles and cyclic development as well as the time when these economies will reach the stage of cyclic development. It is hard to point an exact date when Ukraine's economy will enter its first economic cycle. Moreover, unclear phases of modern economic cycles make the task even more challenging.

Nevertheless, it is possible to present most likely scenarios in the country's development that will eventually lead to the cycle.

Undoubtedly, the first economic cycle will start after the massive renovation of the principal capital. The slowdown in the accumulation of amortization funds during 1990s along with the growing depreciation of principal capital was considered as a time bomb for the industry. Now it becomes obvious that a significant renovation of principal capital is necessary and almost unavoidable. One can say with a high degree of certainty that Ukraine during the next decade, i.e. from 2007 to 2017, will have to renovate at least third of its principal capital.

If a massive technical renovation and incremental growth in production capacities will take place right after the period of significant growth of 2004-2006, then the national economy will enter the stage of cyclical development earlier. If, however, the massive renovation of principal capital will be preceded by the period of economic growth slow down, predicted for 2007-2010, then the nation's economy will enter the cycle later.

We tend to consider the second scenario as more viable and likely to take place in Ukraine. The slow down in economic growth will indicate stabilization of the system. Later, based on this already achieved stabilization, renovation of principal capital will began. This renovation will start from the most viable, economically effective and profitable industries, which are, nevertheless, were utilizing old and morally outdated machinery and equipment. Here technological changes will be accompanied with the incremental increase in principal capital based on reinvestment of profits, earned in these industries over the last decade.

Economic integration is another argument for the irreversibility of the process of transition to the cyclic development and the necessity to account for it in the long run forecasts. The process of economic integration of Ukraine, the RF, and countries of Eastern Europe in the world economy, participation in the global socio-economic processes, are to be

considered in the forecasts. Economic forecasts presented by the Economist Intelligence Unit indicate all the significance of export and import in the Ukraine's economy that will be achieved by 2030.

An increase in the openness of the national economy and its integration in the international system of the division of labor are obvious. Certain difficulties faced by Ukraine while entering the World trade Organizations appear to be somewhat ungrounded. Same may be fair to say for the RF. Economic stability and market reforms in Ukraine and the Russian Federation are obvious while the membership in the WTO is granted to numerous developing nations with unstable economies, unclear paths in socio-economic development, and unstable political regimes. The list of the WTO member-countries is presented in the Appendix XIII (see Tables 1 and 2).

While making forecasts for economic growth in Ukraine, one should not be overly optimistic. It might not be a good idea to compare growth rates in China and in Ukraine. Chinese economic miracle becomes a charismatic example of successful rapid economic growth in modern times, as it was earlier with Japan. High rate of growth in Ukraine in the first half of 2000s was at par with the rate of growth in China. However, the essence of growth and its grounds were different in the two cases.

The stable and high annual rate of growth of the average of 9.7 percent in China over the last fifteen years is nothing but an indication of a fundamental process of industrialization, the transition from pre-industrial to industrial mode of production. Also, in China population growth continues, while in Ukraine there is a stable and continuous population decline. Accordingly, while calculating GDP per capita, this indicator for China decreases, and for Ukraine it increases in time.

The continuing boom in the Chinese economy is somewhat analogous to the US roaring twenties at the beginning of the 20th century, or the period of industrialization and the

post-war reconstruction in the USSR. At the same time there are such rudiments of pre-industrial mode of production, as high but declining illiteracy rate, especially in the rural areas, undeveloped social sphere, lagging behind agriculture that often has a form of primitive production, and state property in the heavy industry, especially mining and machine building. All of these are characteristics of the Chinese economy.

Until recently, over 70 percent of population in China resided in rural areas, while for the developed countries this indicator rarely goes higher than 30 percent. Statistics on the share of urban population in Ukraine, Russia, China, Poland, Hungary, France, Germany, and the US are presented in Table 2.5.

TABLE 2.10

Share of urban population in selected countries, percent, 2004

Country	Urban population, percent	Country	Urban population, percent
Ukraine	68.0	China	36.7
Russia	72.9	France	75.5
Poland	62.5	Germany	87.7
Hungary	64.8	USA	77.4

Source: World in Figures, Washington, DC: The Economist, 2005

Social and economic transformation of the Chinese society occurs along with the process of industrialization and growing inequality in the development of different regions and industries. Economic transition in the post-socialist world occurred on the basis of already formed and sustainable industrialized economy. Therefore, in Ukraine, Russia, and other Newly Independent States capital accumulation was replaced

with the processes of concentration and centralization of capital. Such processes found their expression in the active redistribution of property rights, changes of the system of property rights itself, and specifically alienation of workers from the means of production and *de facto* and *de jure* concentration of the property rights on principal capital in the hands of few. This served as a ground for the famous postulate that on the post-soviet territories economic transformation turned into the redistribution of already accumulated wealth and property through the process of privatization, while in China the economic reform has a creative character and takes place under the guidance and oversight of the existing political regime.

In China, processes of industrialization and initial capital accumulation meant an increase in production capacities and gradual changes in economic relations, including introduction of market mechanisms, typical for mixed economies. The economic transition in the post-soviet states took place without an increase in production capacities. It included major changes in the system of economic relations and preservation of production capacities, some of which were even abandoned and did not find new owners.

Realization of the large economic projects, such as construction of hydroelectric power stations as well as the fact that China is now the largest consumer of raw materials in the world confirm the suggestion that China's rapid growth is extensive in its nature. The initial capital accumulation in the Chinese model was based on the export increase. The massive increase in production and export of consumer goods was possible thanks to the significant amount of readily available and cheap labor in the country. The high rate of capital turnover and high rates of profit made it possible to invest in other industries.

By the end of the transition to the industrialized economy the rate of growth in China will decrease significantly. There are already estimates that the Chinese economy is

overheated. The official forecasts place the growth rate in 2008 at 8 percent as compared to 10.7 percent for the previous year.

It is obvious that the Ukrainian society and the national economy are at the level of development different from that of China. The processes that take place in China now occurred in Ukraine several decades ago. One would not expect significant construction projects and more so massive import of raw materials in Ukraine. This is a fundamental distinction between the Ukraine's economy and economies of China and Russia.

Ukraine can afford neither the luxury of economic development at the expense of exporting raw materials, as does Russia, nor the significant import of raw materials, as in China. The ground for sustainable growth in Ukraine is seen in the development of high-tech industries and, more importantly, in an increasing organizational and economic effectiveness of already existing and well established industries. These industries include first of all metallurgy and heavy machine building. Development of the knowledge based or high-tech industries does not necessarily mean hypothetical attempts to transfer to production of computers, software, and biotechnologies. Rather, as applied to Ukraine, it means introduction of new technologies in already existing industries with the goal of increasing their effectiveness and efficiency. These technologies should guarantee resource-saving and be environmentally friendly. Technological innovations are much needed in the agricultural complex as well. It seems irrational to import agricultural products to the country with the largest stock of rich and fertile soil in the world.

Ukraine, Russia, and China share common problems as well, including those created by the rapid economic growth. China already faces ecological problems, including environmental pollution due to the loosely controlled economic activities and old ecologically unfriendly technologies. The similar problems exist in the Russian Federation and Ukraine for

decades. The economic decline during 1990s led to the slow down in environmental pollution and even improvements in ecological situation.

Slow down in economic growth in Ukraine starting 2006 appears to be logical. Certain role here is played by non-economic factors, including political instability, public distrust in the government, absence of market mentality, pessimism, disbelief in the future success, and corruption.

Economic forecasts for Ukraine are quite optimistic. The population decline leads to the real DGP per capita growth rate being higher than GDP growth. At the same time the predicted annual growth rate equals to 5 to 6 percent for the period of 2006-2014 and then continuous real GDP per capita growth of around 4 percent per year. These are very optimistic predictions. Ukraine will not be able to keep the pace of Chinese growth due to the reasons, presented earlier. Even real GDP per capita annual growth of 2-3 percent is a good indicator. In the countries of the European Union annual growth rate of 1.2 to 2 percent is considered as a good indicator.

2.3. Transition from Exogenous to Endogenous Economic Growth

As we pointed out earlier, there was a reproduction of human capital on an increased scale along with the exogenous forms of growth and the extensive model of development of the national economy in the USSR. Human capital accumulation was done through the development of education, science, and healthcare. The extensive growth was based on utilization of additional resources, including labor, capital, and natural resources. The richness in natural resources allowed for economic expansion, relatively high standards of living, and the large military complex. Finally, the demographic situation was also favorable for extensive growth.

The disintegration of the Soviet Union and fundamental economic transition make extensive forms of growth less viable while urging to turn to intensification of economic development. While in the Russian Federation the unfavorable demographic situation may be partially compensated by the huge natural resources, in Ukraine declining population and limited natural resources necessitate technological changes and an increased reproduction of human capital.

The transition from exogenous to endogenous growth will occur while there still is a potential for exogenous growth, mainly thanks to the economic decline of 1990s. When the resources for exogenous growth will be depleted, endogenous growth will become dominant and reproduction of human capital on an increased scale will become of primary importance, especially due to the continuing decline in population. The process is not expected to be linear. It will depend on external impacts as well, including political reforms, formation of civil society, changes in the world economy, globalization, local crises, and such.

The economic transition has been completed by 2006. It will be fair to say that the presence of the mixed and predominantly market-based economy in Ukraine is a fact. Major features of the newly formed market economy in the country include:

supply and demand based on the market mechanisms;

free pricing. Prices are defined as a result of achieving an equilibrium of supply and demand;

the economy of deficit had disappeared. The market has enough goods and services to satisfy consumer demand both in terms of quantity and in terms of quality;

the state monopoly in production is gone. The major part of goods and services is produced by the independent producers;

the competition is growing. Improvements in the competitive environment make products more competitive on domestic and foreign markets;

the process of creation of market institutions is completed;

the national economy is characterized with the high degree of openness. This is confirmed by the growing volume of foreign trade. The structure of the national economy is to a certain extent determined by the volume of potential import and export, with the growing demand on the national goods from abroad;

hyperinflation of the mid-90s is tackled and replaced with the regulated inflation with the annual rate of around 10-12 percent;

well-functioning monetary system is characterized by the stabilized national currency and stable exchange rate. The value of the national currency grew from 6UAH per $1 to 5UAH per $1.

There is a new balance of different forms of property in the transition economies. Heyets points out that in 1999 there were only 54 percent of all the production facilities left in the state property in Ukraine, while at the beginning of the reform in 1991 almost all of the principal capital belonged to the state. The share of private businesses in principal capital in 1999 was around 2.2 percent, the share of collective property was equal to 44 percent. Foreign entities owned only 0.1 percent of the production facilities in Ukraine (Heyets, 2001, p. 9).

Categories of economic growth and economic development are not identical. Economic growth can take place along with the temporary decline in the living standards and weakening of social ties. For instance, the significant temporary and seasonal labor migration from Ukraine abroad, especially intensive in 1990s, can be interpreted as a phenomenon that has negative impact on the social welfare, social capital, and social ties. It includes breaking or weakening of family ties, social

connections, absence of the adequate legislative base, insufficiency of the state regulation and oversight for the processes of labor migration that already take place, hard working conditions, lack of access to medical services, visa problems, and such. At the same time from the purely economic standpoint, the process of labor migration abroad clearly had a positive impact on the national economy. First, it eased the problem of unemployment. Second, it helped to avoid much of the social payments and dole to unemployed individuals from the state. Third, a significant part of the earnings of the labor migrants came to the national economy through the money remittances, mostly made in hard currencies.

An alternative to the labor migration abroad would be high level of unemployment, large social payments and subsidies, high taxes, expensive labor, and low efficiency of the national economy. The arguments against the extensive labor migration abroad include rebuilding "other" economy. As a result, there are such stereotypes as "Ukrainian construction worker," "Polish plumber," etc. Another argument against the migration is the rapidly rising real estate prices. It is assumed that labor migrants return home and buy housing for themselves and their families. However, since not much was built in the country, prices go up. By estimates, share of labor migrants abroad in Ukraine was higher than in Russia, but much lower than in Moldova. The major destinations were member countries of the European Union and Israel.

In East Germany, labor migration did not grow to a large scale. As a result, the level of unemployment was equal to 18 percent during the entire period of transition. Of course such situation could be interpreted as socially positive, but it had negative impact on the economy and economic growth.

The examples above are presented in order to delineate terms of economic growth and socio-economic development. Economic development includes access of population to education, healthcare, ecological and environmental programs,

stable energy supply, well-functioning governmental institutions, and such. All of these may lead to an increase in labor productivity. Success of the economic transition should be measured in terms of all of these factors and indicators, based on the complex strategy of development.

Ukraine needs to redefine its balance between the manufacturing and the services industry. In our view, a hyper-inflated service industry will not do well in the country. Employment in the service industry of around 50 percent of the total employment in the national economy may be a good indicator for Ukraine. This is accounting for the low level of automation in the service industry and the large amount of manual labor needed. As compared to the other developed nations, manufacturing's share in the total GDP in Ukraine is the highest.

Statistics on the structure of GDP based on the sources and structure of employment in the industry in Ukraine, the Russian Federation, Poland, Hungary, China, France, Germany, and the US for 2004 are presented in Table 2.6.

As shown in Table 2.6, service industry in Ukraine is characterized by the low level of productivity, possibly because of the low labor productivity and traditionally large amount of the manual labor utilized. The share of employed in the service industry constitutes 48 percent of all the employed in the national economy, while the share of the industry in GDP equals only 35 percent.

Intensive use of manual and often low skill labor is common for service industry in every country. Millions of seasonal labor migrants and illegal aliens are employed in agriculture and service industries in all developed countries in Europe. Official statistics does not count this type of workers. Migrant labor helps cover a substantial part of the demand for low skilled labor in such industries as agriculture, hospitality industry, and retail. This means that that the actual share of employees occupied in these industries is higher than is

normally indicated in statistical reports. The share of workforce employed in agriculture and service industry in the US, France, and Germany is higher than is presented in Table 2.11. The same situation is true for Hungary and Poland.

TABLE 2.11

Origins of GDP and structure of employment in selected countries, percent, 2004

Country	Origins of GDP, percent		
	Agriculture	Industry	Services
Ukraine	23.4	41.5	35.1
Russia	7.2	39.4	53.4
Poland	3.8	31.4	64.8
Hungary	4.1	33.8	62.1
China	16.4	51.1	32.5
France	3.3	25.7	71.0
Germany	1.2	30.2	68.6
USA	1.4	20.3	78.3
Country	Structure of employment, percent		
	Agriculture	Industry	Services
Ukraine	26	26	48
Russia	12	29	59
Poland	19	31	50
Hungary	6	35	59
China	50	23	27
France	1	25	74
Germany	3	33	65
USA	2	23	75

Source: World in Figures, Washington, DC: The Economist, 2005

Using the cheap unskilled labor of migrants that come from the outside of the system slows down the process of

implementation of latest technological achievements and innovations. It is cheaper for the businesses to hire unskilled laborers, including illegal aliens, than to modernize production process in agriculture, services, and other labor intensive or seasonal industries. The demand on high-tech solutions remains low. This, in turn, slows down technological progress. As a result, labor intensive industries do not transform into capital intensive industries.

Mechanization and automation of manufacturing and agriculture should be followed by the mechanization and introduction of new technologies in the service industry. The structure of the service industry is even more important than its mechanization. The future development of the service industry in Ukraine, Russia, and other NIS is seen in further development of education industry and healthcare industry rather than retail sales. If service industry takes up two-thirds of the entire workforce in the country, this can only be justified by the highly developed high-tech industries that provide educational services and medical services. In distinction from the traditional service industries, such as tourism and hospitality industry, education and healthcare industries utilize high-skilled labor and advanced technologies.

In the foreseen future Ukraine will have to learn balancing export promotion with import substitution, structural reforms and development of the domestic market. The initial stages of the reform in China were focused on export increase while now this country's major goal is a development of its domestic market. Foreign investment alone cannot move the system far enough to achieve a new higher level equilibrium. The reliance on the public spending and foreign capital inflow gives way to the emphasis of domestic investment and reinvestment.

Heyets points out that firms owned by foreign investors in Ukraine have the share of around 0.6-0.8 percent of all the capital investment, while their revenues from owning properties

constitute around 2.6 percent. The share of profit of the foreign-owned businesses amounts to 2.1 percent of all the nation's profits. This indicates that the foreign investors are interested first of all not in the principal capital accumulation, but in the exploitation of already exiting production facilities and properties they own. According to the data for the end of 1998 the revenues from property were exceeding volumes of capital investments several times (Heyets, 2001, p. 11).

One of Ukraine's major concerns is the complicated demographics. Despite the slow down in the population decline, the process of decline in absolute terms continues and appears to be irreversible at least in the near future. It is expected that the total population will decline with the annual rate of 0.5 percent during the period of 2007-2011, and then with the rate of 0.4 percent starting 2012. The low level of birth rate does not make Ukraine an exception. Such trend is common for all developed nations, including the Russian Federation and European countries. The only exception is the US. However, even in the US population growth occurs thanks to two major factors: continuing immigration and high birth rate among the immigrant families. In 2006, when the population of the US reached the benchmark of 300 million, half of all the population growth was based on the immigration from Mexico and children born in the families of immigrants from Mexico.

Population in the countries of Western Europe increases very modestly thanks only to the intensive immigration from the developing countries. Birth rates in such traditionally catholic societies known for the strong family values, as Italy and Spain, barely reach 1.2 children per family. In France and Germany the situation is not much better, with the birth rate of around 1.58. Even simple scale reproduction with zero increase in population requires the birth rate of 2.1. Demographic situation in the Russian Federation is even more complex than in Ukraine. While the birth rates in both countries are about the same,

around 1.14, and are the lowest in Europe, the life expectancy at birth in Russia is lower than in Ukraine.

In distinction from Russia, Ukraine does not have a substantial migration into the country. Instead, it has labor migration abroad. In the future, repatriation of the labor migrants back to the country will become one of the priorities in the state's economic policy. Declining population allows preservation and conservation of natural resources. This might be the only positive characteristic of the process of population decline.

The unemployment level of 5 percent per annum offered in the forecasts appears to be quite moderate. Such a low level of unemployment can be found only in such developed countries as the US and Japan. In the US it is explained in part by the relatively liberal market model and the low minimum wage while in Japan unemployment traditionally is taken very seriously by the government planning agencies. In the Western European countries the level of unemployment varies within the limits of 8 to 18 percent depending on the country and the business cycle.

Unemployment forecasts for Ukraine do not account for the business cycle and the possibility of cyclic development. There is no doubt that the level of unemployment in Ukraine will not remain stable at 5 percent. Rather, it will change depending on the stage of the business cycle. Fluctuations in the level of business activities will influence the emerging labor market and lead to fluctuations in the level of unemployment.

Types of unemployment are also of great concern. It is preferable to have frictional and cyclical unemployment rather than stable and institutional unemployment. With an increase in labor productivity and the complexity of work in the future, the periods of high unemployment can be used for retraining.

Labor productivity forecasts for Ukraine are also quite optimistic. A stable increase in labor productivity was present starting in 1999 and reached 14.4 percent in 2000. Remarkably,

a high increase in the rate of level of labor productivity continued till 2006. According to the forecasts this indicator will be at the level of 6 percent per annum till 2017 and then decline to 5 percent per year.

As was pointed out earlier, the resources for exogenous transition are near their depletion, while the resources for exogenous growth are still significant. Ukraine still has reserves of labor and capital that can move the economy forward if involved in production.

The labor reserves exist in the following forms: presence of unemployment, labor migration abroad, and limited working time. Accordingly, the measures that can lead to an increase in the total amount of labor used in production and to the exogenous growth will be reduction of unemployment, return of the labor migrants from abroad back to the national economy, and an increase in the working time.

The reduction in unemployment is achieved with the help of standard measures, including: stimulating demand based on an increase in the final consumption; reduction in the frictional unemployment through the development of information networks and an improved access to this information for employees and employers; reduction in institutional and structural unemployment through the reorganization of social and welfare programs and professional retraining.

Return of the labor migrants back to the national economy can be done through the development of domestic labor market and an increase in wages and salaries, balancing the level of wages with the level of prices.

The increase of the working time can be done by an increase in the working day and/or working week. The economy will have to present stimuli for additional employment and working overtime while preserving the same level of labor intensity.

The algorithm of an increase in labor as the factor of exogenous growth is fairly simple and may be presented as follows:

reduction in domestic unemployment and achievement of the level of full employment;

attracting labor migrants back to the national economy;

attracting labor migrants non-citizens from abroad;

increasing the working time;

increasing the labor intensity.

All the measures listed above are parts of the process of increase of production and exogenous growth.

The capital reserves exist in the following forms: undeveloped stock market, shadow economy, national capital outflow, unused production capacities, and unfinished construction projects. Accordingly, the measures to increase the volume of capital involved in production and to support exogenous growth will include creation and development of the stock market, reversing the capital flight from the country and repatriation of capital, legalization of capital, full production capacity utilization, and completion of the construction projects.

The algorithm of an increase in capital as the factor of exogenous growth may be presented as follows:

creation of the stock market in order to attract capital and channel it to production;

repatriation of national capital back to the national economy;

legalization of capital used in the shadow economy, amnesty of capital;

full capacity utilization of earlier unused production capacities;

completion and exploitation of the production facilities that are currently under construction.

The possible ways of an increase in the rate of exogenous growth with both labor and capital are presented in

Table 2.12. Potential for exogenous growth in Ukraine and other post-transition economies is presented in Figures 2.1 and 2.2.

Creation of the open labor market will facilitate more effective distribution of the workforce within the national economy and create an opportunity for attracting foreign work force to the country if necessary. Creation of the stock market will facilitate development of the capital market, possible attraction of capital from abroad, more investments in manufacturing and service industries and an increase in the effectiveness of capital investments.

Heyets points out that "As far as the state securities market is concerned, it had in fact been frozen for a while after a failed start. The stock market situation is causing a lot of concern, since this extremely important sphere of the market economy does not meet the needs of today, let alone the future. Everywhere in the world, the stock market is a financial instrument which helps to allocate, distribute, and direct investment capital into various spheres of the economy, primarily into the real sector. The Ukrainian stock market has not compensated for the lack of governmental planning and administrative levers. The underdeveloped stock market is impeding the investment process, thus hampering economic restructuring without which it is impossible to increase competitiveness. There is a lack of transparency and of stock market liquidity; there are high systematic risks. The current system regarding taxation of investment funds and security profits discourages investment. The rights of investors and shareholders (founders, partners) of joint-stock companies and other businesses remain unprotected" (Heyets, 2002, p. 87).

TABLE 2.12
Potential for exogenous growth by factor of production

	Resource	Phenomenon	Measure	Task
LABOR	Labor force	Unemployment	Decrease in unemployment	Full employment
		Labor migration	Repatriation	Labor force increase
		Working time	Working time increase	Working time max
CAPITAL	Stock market	Undeveloped stock market	Creation of the stock market	Development of the stock market
	Capital flow	Capital flight	Capital repatriation	Complete capital return
	Shadow economy	Shadow capital	Capital legalization	Complete capital legalization
	Production capacities	Unused production capacities	Increase in capacity utilization	Full capacity utilization
	Facilities	Incomplete construction	Construction completion	Full capacity utilization

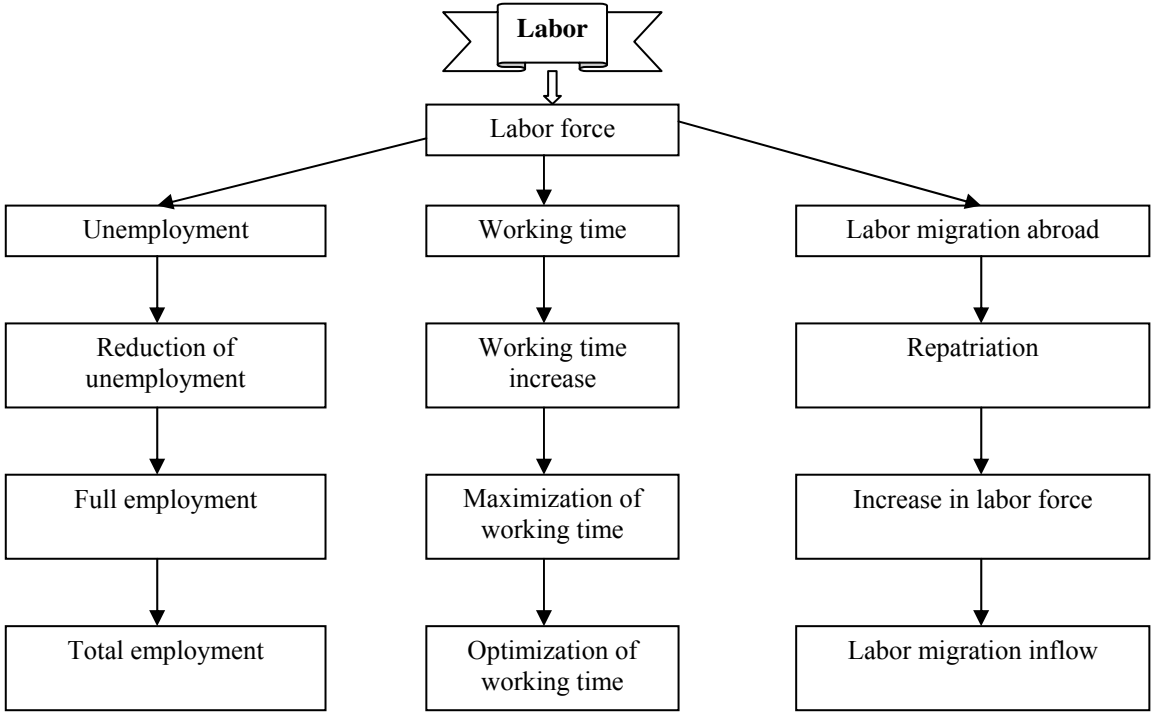

Figure 1. Potential for exogenous growth in factors of production: labor

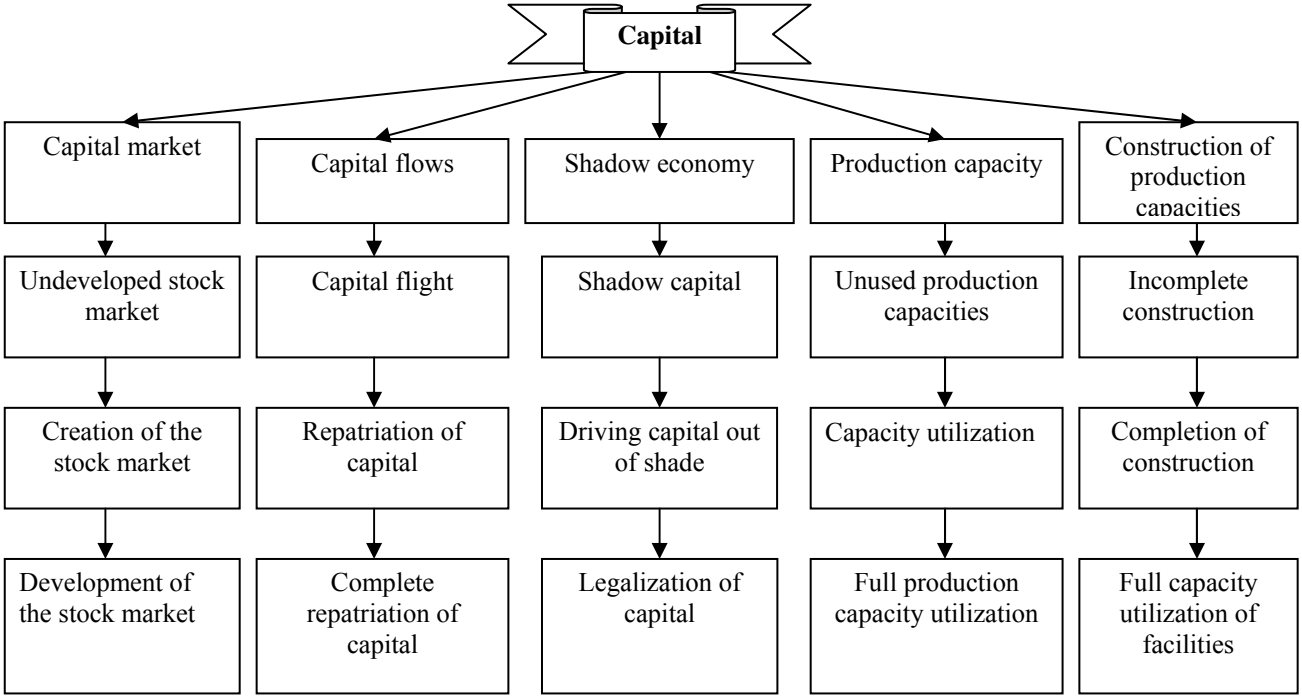

Figure 2. Potential for exogenous growth in factors of production: capital

Ukraine faces continuing capital flight and labor migration, while further capital accumulation is needed. The process of continuing exogenous growth may be supported by the following steps:

using the present internal resources in the process of production at full capacity;

repatriation of labor and capital from abroad back to the national economy;

attracting additional resources from abroad.

In the future exogenous resources of growth will be depleted. The limited quantity of labor, working time, and capital along with the continuing population decline predetermine the necessity of moving to the endogenous model of growth. This may be done based on the development of labor market and stock market on one hand and further development of education and healthcare industries on the other hand.

Labor market, normally underdeveloped even in the well-established market economies with strong traditions of competitiveness, is very weak in Ukraine and other post-transition economies. Personal connections and corruption are still major means of gaining a job placement. In this sense the pseudo-labor market that exists now has even less market features than it had during the soviet times. As a result, bankers do not know how to do banking, managers do not know how to lead the businesses, and economists have a very vague idea of how to optimize production and maximize profit. This situation becomes even worse when it comes to the state bureaucrats who are still influential in the economy. At the same time highly skilled professionals cannot occupy the work places they are qualified for.

Heyets notes in this respect the following: “First of all, we do not have a real labor market since this most important resource has not been truly valued so far. This substantially restricts the effective use of labor, because other resource prices have reached world levels long ago. This fact is a serious

obstacle on the way to economic growth, especially taking into account the present skill level of labor. As a result, the motivation to work efficiently diminishes. Moreover, taxation does not provide incentives; on the contrary, it hinders the economic activity of people, thus limiting long-term economic growth." (Heyets, 2002, p. 87)

One of the major misleading assumptions often made about the pace of the reforms, and privatization in particular, is that the soon the reforms are done, the mo successful the process of transition will be. Privatization from this position is seen as a move from one static condition to the other and from one stationary equilibrium to the other. The stationary position is then considered as an absolution, a necessary precondition for a smooth and sustainable development, a goal by itself. The system dynamics in this logic is missing. Transition systems are inherently unstable and characterized by non-linear dynamics.

Shleifer points out that "The need to gain support for reform is the political argument for privatizing rapidly. If privatization is slow, the benefits to the population are by definition small, and hence the political capital they buy the reformers is small as well. Fast privatization is privatization that offers large political benefits from the start, which is exactly what a reformist government needs. Critics of fast privatization have argued that it creates fast unemployment and thus drains the government budget (Aghion and Blanchard, 1993). This can produce both political opposition and economic problems for further privatization. This argument overlooks two essential points. First, privatization in Eastern Europe is inherently very slow. Slowing it down further beyond what internal political forces accomplish will stop it altogether. Second, and more important, rapid privatization buys political benefits and thus allows reforms to deepen." (Shleifer, 2005, p. 36)

In our view, privatization should be relatively slow. In Ukraine process of privatization took longer than it did in Russia. Privatization should be considered not only as a process of

property distribution, including the change of ownership of the production facilities, but as a process of investment. Ukraine still has a significant potential for privatization. The state property should no longer be distributed for free or through the fictitious voucher privatization, notorious for its corruption and pointlessness. Instead, it should be sold at the market prices to those who are able and willing to pay. This will guarantee at least the effective exploitation of the privatized production facilities in the future.

One of the fundamental problems of the economic mechanisms, incentives for productive labor, and the national economies in general is a rent-seeking behavior. The rent-seeking behavior is best seen in Russia, especially with the ever high energy prices. Other post-soviet economies can also be characterized as infected with the rent-seeking behavior. Since the resources are controlled territorially and the territories are confined within the national borders, the state is always a major player in the distribution of access to the resources and allocation of the benefits, derived from the resources, if not the major one. In the Russian Federation, one can see the growing involvement of the state in the oil and gas industry. The earlier total privatization of the industry is now reversed with the processes of *de facto* partial deprivatization, nationalization, and centralization of control over the access to the resources and revenue flows, strengthening the vertical axis of power and increasing participation of the state in the economy.

Ukraine cannot repeat the path of the Russian Federation simply because Russia has the richest natural resources in the world. The Russian economy will always be distinct by the inefficient use of the natural resources and the society will remain under the influence of rent-seeking behavior for quite sometime. In addition, Russia, and Moscow in particular, remains a regional center. In distinction of Ukraine, it did not suffer a significant labor migration abroad that lasted for

at least 15 years. Instead, the Russian Federation experiences a significant influx of labor migrants into the country, some of whom come from Ukraine.

The exogenous transition was not very successful not only in Ukraine, but in the Eastern European countries as well, despite the inflow of foreign capital in these economies was much more significant. Examples of Poland, Hungary, and other countries of the region make it possible to believe that the "honey moon" of the Eastern European reforms is over.

In Hungary, $40 billion in foreign direct investment coexist with the $40 billion foreign debt with the state budget deficit of $10 billion. This in part is a result of the over-reliance on the foreign help during transition. The external help was intended to prevent the significant economic decline, facilitate economic stabilization, and initiate growth. What happened in the reality can be characterized as Leontieff's "living above the means."

Political instability, trade union protests in Poland, violent demonstrations in autumn of 2006 in Hungary, dissatisfaction with the results of the reforms in East Germany prove the insufficiency of the exogenous model of transition, growth, and socio-economic development.

The rapid economic growth that can be observed in Ukraine in the short run may be explained in part by such factors as statistical errors, legalization of a part of the shadow economy, utilization of already existing production capacities that were not in use during the transition, and reduction in unemployment. However, these factors alone cannot explain the rapid growth in the country that started in 1999 and continues for the last eight years. The presence of the sustainable real per capita GDP growth is unquestionable.

Utilization of unused production capacities and workforce is not enough to achieve sustainable economic growth. Sustainable economic growth can only be based on the continuous technological improvements and innovations,

including management and organization of production, as well as accumulation of human capital and an increase in the effectiveness of its utilization in production. Therefore, major tasks for Ukraine become the renovation of principal capital, maintaining a high rate of technical progress, utilization of new technologies in the process of production, human capital accumulation, and organizational innovations.

Human capital exists indivisibly from each individual and from the societal production. Human capital is personified, as it is embedded in an individual, and is accumulated, as any other form of capital. Human capital has value only in the process of production. Human capital is created, accumulated, and realized only within the process of societal production. The components of human capital, such as knowledge, special skills, experiences, are utilized in production. Endogeneity of human capital is explained by the fact that human capital is produced within the system, by the system, and for the system.

2.5. Concluding remarks

The ideas of public spending and foreign investment as the major engines for potential growth, especially in developing nations, are replaced with the ideas about the importance of reinvestment and domestic market development. The theories of growth based on the fundamental assumption that a significant influx of the resources is necessary to initiate sustainable growth do not hold. They might work to a certain degree in the developing world, but appear to be insufficient to explain rapid economic growth in Ukraine and other countries of the former Soviet Bloc.

Despite the difficulties and local crises, the socio-economic transition in Ukraine may be considered as successful. Political and economic reforms lead to the creation of predominantly market economy. By 2004 Ukraine achieved pre-

transition level of GDP per capita. The positive economic growth takes place since 1999.

Based on the data available and long run forecasts, the stages of GDP growth can be presented as follows: the decline in the rate of growth (till 1989); the negative economic growth (from 1990 to 1999); the significant economic growth along with a significant increase in business activities in the country (from 2000 to 2004); the slow down in the rate of growth (from 2005 to 2010); further decline in the rate of growth (from 2011 to 2015); and stabilization of the rate of growth at the moderate level.

While the exogenous resource of economic transition is depleted and the exogenous-type forms of transition are no longer effective, the exogenous growth still has a certain potential in Ukraine. This is explained by the fact that there are still unused labor resources as well as labor migration abroad and capital flight. Repatriation and legalization of capital, return of the labor migrants, and full employment will support economic growth in the short run. However, the sustainable growth will only be possible thanks to technological advancements and innovations. This anticipates endogenous growth.

Among the major tasks of post-transition development in Ukraine are strengthening of the labor market and creation of the stock market. Such developments will facilitate better distribution of property and lead to an increase in labor productivity. This will eventually bring higher rate of GDP per capita growth and higher living standards of the population.

PART III

ECONOMIC GROWTH IN THE NIS

3.1. Recession: Myth and Reality

The logic of this chapter can be presented as follows. First, statistical data is introduced for the transition economies. The data was previously used to substantiate claims about significant economic decline and the existence of a crisis situation in the national economies of the countries of the former Soviet Bloc during the period of 1990-2000. We consider the scale and the continuity of economic decline in transition economies, the level of corruption, the influence of corruption on GDP growth, the shadow sector or unofficial economy and its size in transition economies, energy consumption as a measurement of real volume of production, and the structure of energy production as a measurement of the level of economic development. An attempt is made to determine the extent to which the alleged existence of significant economic decline or an economic crisis was a real or mythical.

Second, we present and analyze macroeconomic indicators of the national economies of the former Soviet Bloc, including member countries of the CIS. GDP growth rates in the countries of Eastern Europe and the former USSR are considered here along with the structure of GDP growth by expenditures in Ukraine. The fact of sustainable economic growth in Ukraine is supported by the statistical findings.

Third, we further analyze statistical data used to determine whether economic growth in Ukraine was initiated by external forces or an external shock. For this we consider in detail such processes and indicators as volume of foreign direct investments and portfolio investments as well as capital flight from Ukraine, the Russian Federation, Poland, and Hungary. We also consider indicators of foreign debt and debt service in

Ukraine and the Russian Federation. In this chapter such characteristics as unemployment and the labor market in Ukraine, the Russian Federation, and other CIS countries are considered not as social indicators, but as factors that could possibly influence the initiation of economic growth. Macroeconomic indicators that confirm growth and indicators of external influence on the national economies are followed by selected macroeconomic and social indicators of the countries of the former Soviet Bloc. This is done for the purpose of substantiating the argument about the presence of sustainable economic growth in these countries. In this part of the chapter we analyze such indicators as income and the dynamics of private consumption and prices in Ukraine, the Russian Federation, Poland, and Hungary, and productivity and wages in Ukraine. Examination of the indicators of labor productivity and the average wage will serve as a transition to the analysis of the factors that made possible initiation of sustainable economic growth. Specifically, we consider such internal systemic factors as human capital and conditions for its accumulation and use. We analyze data on the population's access to higher education and medical services, living conditions, life expectancy at birth in the CIS countries, as well as numerous indicators of socio-economic progress of the Ukrainian society, including its openness and well-being. R&D is considered as one of the moving forces of growth in the future. Finally, we consider long-run forecasts of economic growth in Ukraine and interpret them. Concluding remarks are focused on generalization of the results of the statistical analysis and confirmation of theoretical statements and hypotheses presented in Part II.

3.1.1. Cumulative Output Decline and Period of Recovery

Data about the cumulative output decline and time to recovery in individual transition countries for the period of 1990-1999 is presented in Table 3.1.

TABLE 3.1
Cumulative output decline and recovery in individual transition countries, 1990-1999

Country	Consecutive years of output decline	Cumulative output decline	Index of 1999 Real GDP (1990=100)
Central and Eastern Europe and Baltics	3.8	22.6	103.1
Albania	3	33	102
Bulgaria	4	16	78
Croatia	4	36	84
Czech Republic	3	12	97
Estonia	5	35	80
Hungary	4	15	105
Latvia	6	51	58
Lithuania	5	44	66
Poland	2	6	141
Romania	3	21	80
Slovak Republic	4	23	104
Slovenia	3	14	113
NIS	6.5	50.5	57.7
Armenia	4	63	50
Azerbaijan	6	60	53
Belarus	6	35	82
Georgia	5	78	29
Kazakhstan	6	41	60
Kyrgyz Republic	6	50	62
Moldova	7	63	34
Russia	7	40	59
Tajikistan	7	50	56
Turkmenistan	8	48	63
Ukraine	10	59	41
Uzbekistan	6	18	93

Source: Dabrowski, M. (2002). Is the Economic Growth in Ukraine Sustainable? In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag, p. 73.

According to the data presented in Table 3.1, the average period of continuous output decline in the countries of Central and Eastern Europe and Baltic states, including Albania, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia, is equal to 3.8 years. The average period of continuous output decline in the CIS countries, including Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, is equal to 6.5 years, and hence lasted much longer than in the countries of Central and Eastern Europe and Baltic states.

The total volume of output decline in the CIS countries is also significantly larger than in the countries of Central and Eastern Europe and Baltic states—50.5 percent and 22.6 percent, respectively. Moreover, total volume of output decline in the Baltic states was highest in the group, with 51 percent in Latvia, 44 percent in Lithuania, and 35 percent in Estonia. Unlike other countries in the group, Baltic states were part of the USSR.

According to the data, the longest period of continuous output decline occurred in Ukraine, where it lasted 10 years. Nevertheless, the output decline was not the most significant among the countries examined. The official output decline in Ukraine was equal to 59 percent, but in Azerbaijan it was 60 percent, in Armenia and in Moldova it was 63 percent, and in Georgia it was 59 percent. Based on its continuous output decline and the slow pace of the reforms, Ukraine has been often referred to in the economic literature as a “national park” of transition, by which is meant a site of preservation, a place where transition takes place very slowly.

Cumulative output decline does not correlate with the period of decline. In Georgia, total output decline was equal to 78 percent during a period of decline that lasted for 5 years, whereas in the Russian Federation output decline was equal to 40 percent with the period of decline being 7 years. The

correlation of cumulative output decline and the total number of consecutive years of output decline in the NIS in 1990-1999 is presented in Figure 3.1.

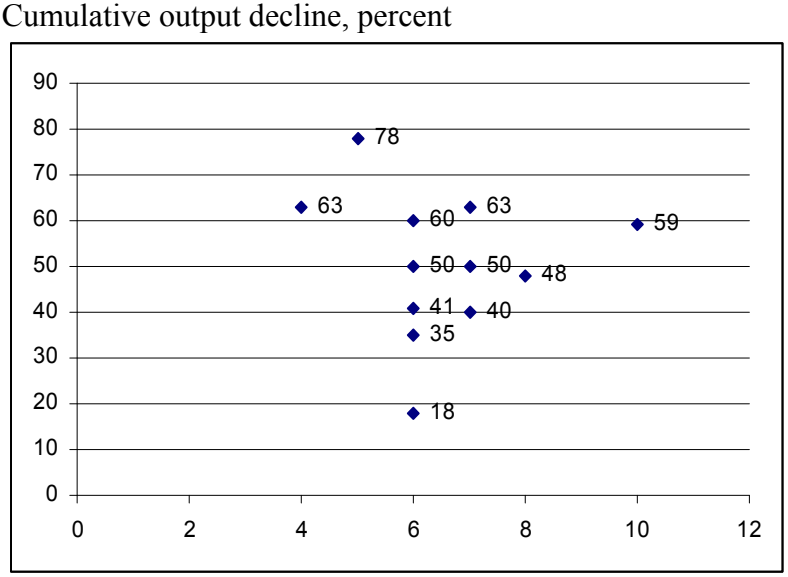

Figure 3.1. Correlation of cumulative output decline and total number of consecutive years of output decline in the NIS, 1990-1999

The above diagram points to the absence of a positive correlation between cumulative output decline and the number of consecutive years of output decline in the NIS.

Official data about cumulative output decline and its continuity should be approached critically. In our view, consecutive output decline in Ukraine continued for no more than 6 years and the decline itself was significantly smaller than 59 percent of GDP. This statement will be proven statistically further in the chapter.

The output decline of 59 percent during the period of 1990 to 1999 can be combined with the reported share of the unofficial economy, which constituted 48.9 percent in 1995. Accordingly, the claimed output decline of 59 percent is the product of narrowly considering only the dynamics of official GDP. The decline started in 1992 and continued to 1998, making the whole period of continuous decline equal to 7 years or so.

Economic transition in the Russian Federation has similar characteristics. The output decline of 40 percent during the period of 1990 to 1999 can be combined with the reported share of the unofficial economy, which constituted 41.6 percent in 1995. Accordingly, the claimed output decline of 59 percent is again the product of narrowly focusing only on the dynamics of official GDP. The decline started in 1992 and continued till 1998, being significantly less than the officially registered 40 percent.

Correlation of cumulative output decline and total number of consecutive years of output decline in the Central and Eastern Europe and the Baltic states in 1990-1999 is depicted in Figure 3.2.

As follows from the correlation diagram presented in Figure 3.2, there was a certain correlation between the cumulative output decline and the total number of consecutive years of output decline in Central and Eastern Europe and in the Baltic states during the period of 1990-1999. The presence of a positive correlation in this group of countries makes it distinct from the NIS. However, even here deviations from the correlation line are quite significant. The value of output decline for the countries with the three-year period of decline varies within the limits of 12 to 33 percent, while for the countries with the four-year period of decline it varies within the limits of 15 to 36 percent.

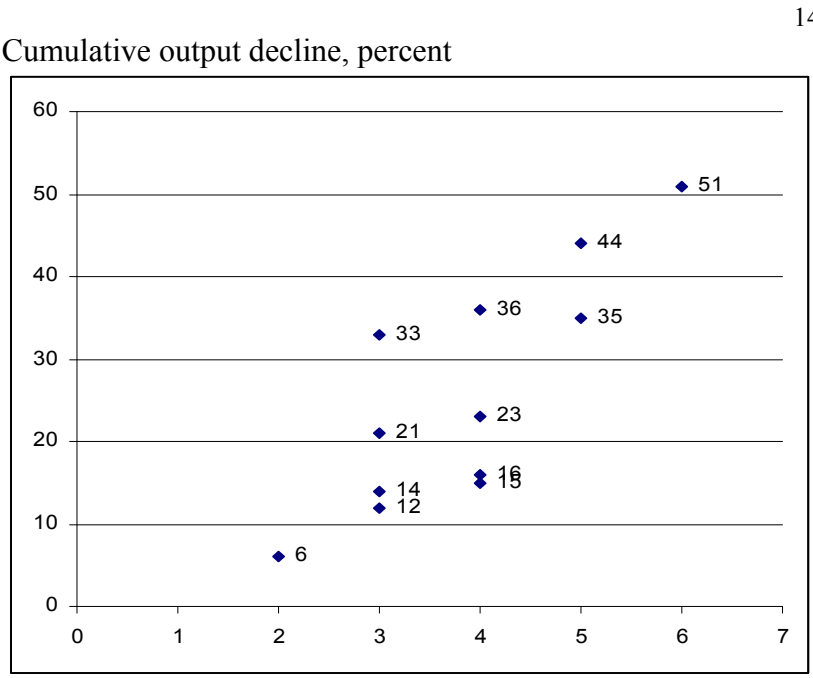

Figure 3.2. Correlation of cumulative output decline and total number of consecutive years of output decline in the Central and Eastern Europe and the Baltic states, 1990-1999

3.1.2. Corruption and Its Impact on Economic Growth

One of the arguments used to support the idea of sharp and significant output decline in the countries of the former Soviet Bloc is that the high level of corruption in transition economies has a negative impact on production. We will turn to statistical data to test such a statement. The level of business-related corruption in the Commonwealth of Independent States and Central and Eastern Europe in 2002 is presented in Table 3.2. The percent of managers who consider corruption the major obstacle for the business and entrepreneurial activities is considered an indicator of the negative impact of corruption on

production. The data is obtained during the survey conducted in the NIS and CEE in 2003.

TABLE 3.2

An indicator of business-related corruption (percent of managers surveyed ranking this as a major business constraint) in NIS and CEE, 2002*

Country	Indicator	Country	Indicator
Armenia	13.5	Lithuania	15.6
Azerbaijan	19.5	Moldova	40.2
Belarus	17.9	Poland	27.6
Bulgaria	25.4	Romania	34.9
Croatia	22.5	Russia	13.7
Czech Republic	12.5	Serbia	16.3
Estonia	5.4	Slovak Republic	27.5
Georgia	35.1	Slovenia	6.1
Hungary	8.8	Tajikistan	21.0
Kazakhstan	14.2	Ukraine	27.8
Kyrgyz Republic	31.4	Uzbekistan	8.7
Latvia	11.7		

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

* Data for Kyrgyz Republic, Moldova, Poland, Tajikistan, and Uzbekistan are for 2003.

According to the data presented in Table 3.2, the level of corruption in business and the relationship between business and state in Ukraine is average for the region overall, while in the Russian Federation the level of corruption is at the lower end of the scale. Moldova is a leader in corruption, while in Estonia, Slovenia, and Hungary the level of corruption is relatively low as compared to the region's average. Needless to say, data on corruption are always to a large extent subjective, partial, and

biased. Nevertheless, they should be taken into consideration when there is a lack of better sources of information.

The issue of slowing down economic growth due to an increase in corruption is still open. While a positive correlation between the high level of corruption and output decline has been proven theoretically, strong systematic empirical evidence has yet to be shown. Correlation of the GDP per capita growth and estimates of corruption made by the businessmen in the NIS and CEE countries of the former socialist bloc in 2002 is presented as a diagram in Figure 3.3.

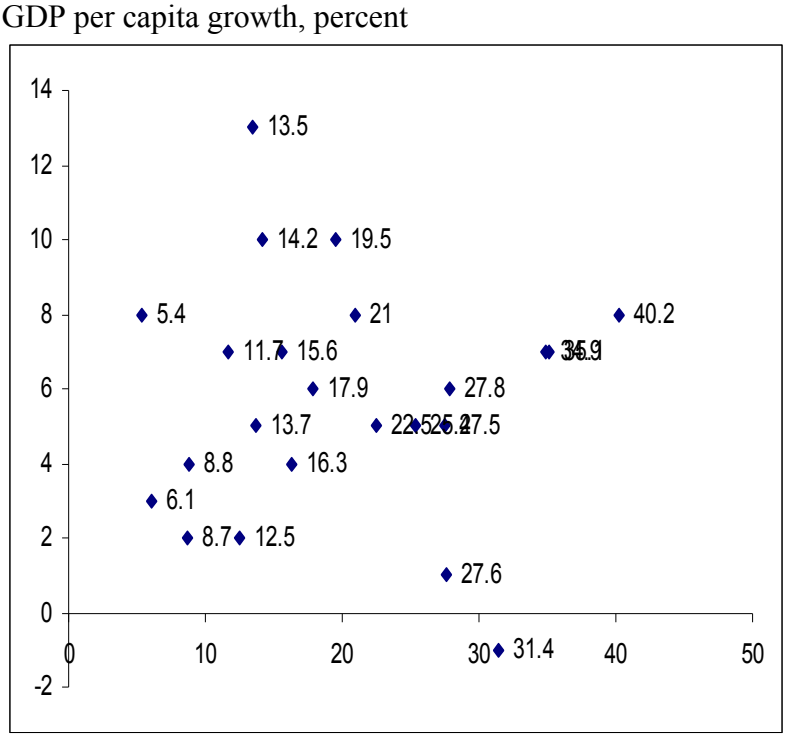

Figure 3.3. Correlation of the GDP per capita growth and estimates of corruption made by the businessmen in the NIS and CEE countries of the former socialist bloc, 2002.

The diagram shows that there is no clear evidence of a positive correlation between the level of corruption and output decline or GDP growth slowdown. In Moldova GDP per capita growth of 8 percent in 2002 was possible, with the level of corruption marked at 40.2. In Slovenia during the same year GDP per capita growth was only 3 percent, with the level of corruption at 6.1. In Ukraine GDP per capita growth of around 5 percent in 2002 coexisted, with the level of corruption of 27.5 on the offered scale. The diagram is but a one year snapshot of the correlation between corruption and GDP growth. We could expect that this correlation would change over time and for that reason we should consider possible links between corruption and growth should be considered in dynamics over time. Further consideration of a possible negative correlation between the level of corruption and GDP growth should be based on the time series data.

3.1.3. Shadow Sector, Unofficial Economy and its Size

Data for unofficial GDP in Eastern Europe and former USSR for the period of 1989 -1995 are presented in Table 3.3. More detailed data are presented in Tables 1 and 2 of Appendix I. A sharp increase in growth of the shadow economy in the early 1990s was observed in all the countries of the former USSR, except Estonia and Uzbekistan. A critical approach to such data should acknowledge that the controlling, estimating, and reporting bases in these countries are insufficient for reflecting the size of the shadow economy. The accuracy of reports on national levels of corruption is always a matter of some concern.

TABLE 3.3.

Unofficial GDP in Eastern Europe and former USSR, 1989 -1995

Country	Share of unofficial DGP in the total GDP (percent)						
	1989	1990	1991	1992	1993	1994	1995
Eastern Europe							
Bulgaria	22.8	25.1	23.9	25.0	29.9	29.1	36.2
Czech Rep	6.0	6.7	12.9	16.9	16.9	17.6	11.3
Hungary	27.0	28.0	32.9	30.6	28.5	27.7	29.0
Poland	15.7	19.6	23.5	19.7	18.5	15.2	12.6
Romania	22.3	13.7	15.7	18.0	16.4	17.4	19.1
Slovak Rep	6.0	7.7	15.1	17.6	16.2	14.6	5.8
USSR							
Armenia	12.0	16.1	20.2	22.0	23.0	27.0	31.6
Azerbaijan	12.0	21.9	22.7	39.2	51.2	58.0	60.6
Belarus	12.0	15.4	16.6	13.2	11.0	18.9	19.3
Estonia	12.0	19.9	26.2	25.4	24.1	25.1	11.8
Georgia	12.0	24.9	36.0	52.3	61.0	63.5	62.6
Kazakhstan	12.0	17.0	19.7	24.9	27.2	34.1	34.3
Latvia	12.0	12.8	19.0	34.3	31.0	34.2	35.3
Lithuania	12.0	11.3	21.8	39.2	31.7	28.7	21.6
Moldova	12.0	18.1	27.1	37.3	34.0	39.7	35.7
Russia	12.0	14.7	23.5	32.8	36.7	40.3	41.6
Ukraine	12.0	16.3	25.6	33.6	38.0	45.7	48.9
Uzbekistan	12.0	11.4	7.8	11.7	10.1	9.5	6.5

Source: Kaufmann and Kaliberda (1996), Gjourgyan and Mirzoyan (2000), Shleifer (2005).

Azerbaijan and Georgia were leaders in the share of shadow economy in the national economies, and, accordingly, in the share of unofficial GDP in the total GDP. The share of unofficial GDP in Azerbaijan in 1995 constituted 60.6 percent of the total GDP, while in Georgia it was equal to 62.6 percent. The share of unofficial GDP in Ukraine in 1995 was reported at 48.9 percent of the total GDP, while in the Russian Federation it was estimated at 41.6 percent.

Data for the former USSR in 1989 are presented as an average for all of the former republics, indicating the same level of unofficial GDP of 12 percent. In the former socialist countries of Central and Eastern Europe, economic transitions have started earlier than in the USSR, and by 1989 the share of unofficial GDP had reached significant value. The share of unofficial GDP in Bulgaria was equal to 22.8 percent, in Romania it was 22.3 percent, and in Hungary 27 percent.

By the end of 1995 Bulgaria, Hungary, and Romania remained the leaders in terms of share of unofficial GDP among the countries of Central and Eastern Europe. The share of unofficial GDP in 1995 in Bulgaria was equal to 36.2 percent. Dynamics of the share of unofficial GDP in the Eastern European countries in 1989-1995 are presented in Figure3.4.

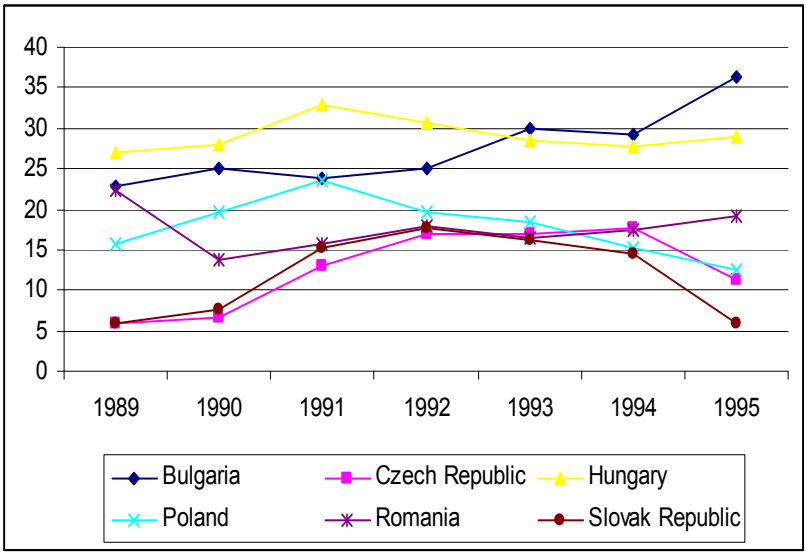

Figure 3.4. Unofficial GDP in the Eastern European countries, 1989-1995

Graphs of the share of unofficial GDP in the Eastern European countries in 1989-1995 demonstrate relatively smooth distribution in time almost without sharp increases.

Dynamics of the share of unofficial GDP in the countries of the former USSR in 1989-1995 are presented in Figure3.5.

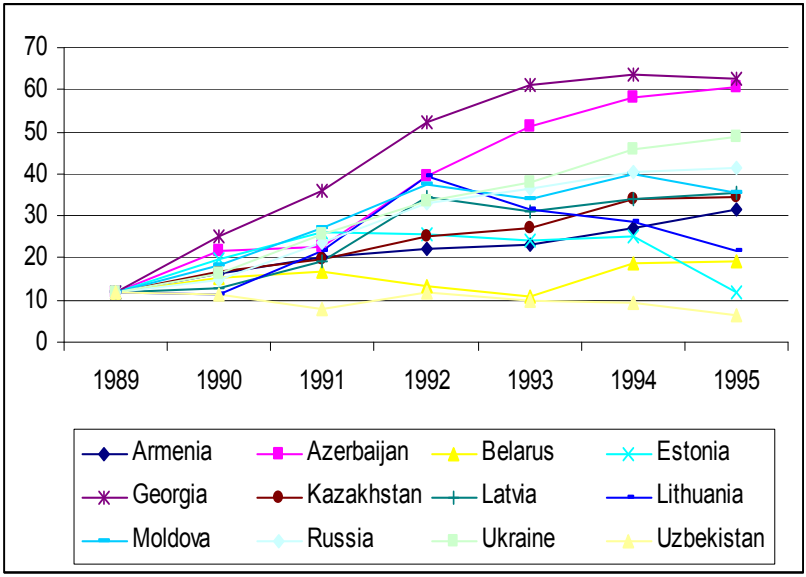

Figure 3.5. Unofficial GDP in the former USSR, 1989-1995

Graphs of the share of unofficial GDP in the countries of the former USSR in 1989-1995 demonstrate very sporadic distribution in time, with a significant increase in some countries.

Dynamics of the share of unofficial GDP in Ukraine in 1989-1995 are presented in Figure3.6.

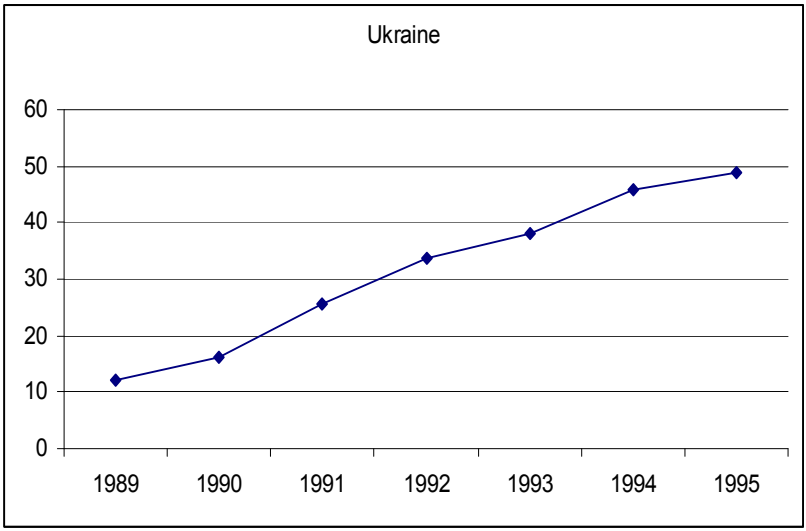

Figure 3.6. Unofficial GDP in Ukraine, 1989-1995

According to the graph, the share of unofficial GDP in Ukraine continuously and steadily increased during the period of 1989-1995. However, such an increase was not linear, and it accelerated in 1990-1992 and again in 1993-1994. Moreover, an increase in the share of unofficial GDP in Ukraine was taking place when the total GDP was steadily declining. Therefore, an increase in the share of unofficial GDP in Ukraine was not as dramatic, as the graphic presentation might make it seem.

The share of unofficial GDP in total GDP in the countries of Central and Eastern Europe in the early 2000s is not much higher than the analogous indicator in the countries of Western Europe, USA, Canada, and Australia.

Data of the share of the unofficial GDP in the total GDP in the countries of Western Europe, USA, Canada, Japan, and Australia in 1990 are presented in Table 3.4.

TABLE 3.4

Share of the unofficial DGP in the total GDP (percent), in Western Europe, USA, Canada, Japan, and Australia, 1990

Country	Percent	Country	Percent
Spain	22.9	Netherlands	13.4
Greece	21.8	Finland	13.3
Ireland	20.6	Japan	13.2
Belgium	19.8	UK	13.1
Italy	19.6	France	12.3
Denmark	16.9	Canada	11.7
Austria	15.5	Sweden	11.0
Australia	15.1	USA	10.5
Germany	14.6	Switzerland	10.2
Portugal	13.8	Norway	9.3

Source: Lackó, M. (1998). The Hidden Economies of Visegrád Countries in International Comparison: A Household Electricity Approach. In L. Halpern and C. Wyplosz (Eds.): *Hungary: Towards a Market Economy*. Cambridge: Cambridge University Press.

As is clear from the data, the share of unofficial GDP in Spain and Greece is highest among the developed capitalist countries, comprising 22.9 percent and 21.8 percent, respectively. The relatively stable economic situation in the countries of Western Europe, USA, Canada, Japan, and Australia points toward an unchanged share of unofficial GDP. Of the member countries of the European Union Spain and Greece have the lowest levels of per capita income. It is not surprising that rapid economic reforms and relatively low levels of per capita income lead to an increase in the size of the shadow economy in transition societies.

In the USSR in 1989 the share of unofficial GDP in total GDP was more or less the same as it was in the US, France, and Canada. In 1990 it had achieved the level of Germany and Austria. Within the next few years, the share of unofficial GDP in total GDP in the former soviet republics went above those of the developed capitalist economies. In considering the share of unofficial GDP in total GDP, we ought to give preference to the weighted average values and focus predominantly on the indicators of the Russian Federation and Ukraine where total GDP was much higher than in the other former soviet republics.

It is possible that the size of the shadow economy in Ukraine and the Russian Federation will be reduced thanks to diligent fiscal policy, with the result that the share of unofficial GDP in total GDP will decrease to the level of the EU countries.

3.1.4. Energy Production and Consumption

One can find quite surprising the fact that the leading international organizations and programs, including the International Monetary Fund (IMF), the World Bank (IBRD), and the United Nations Development Program (UNDP) not only designated Ukraine as a country with a transition economy, but also placed it, all along with the transition economies, on the list of developing countries. This was done with a certain degree of enthusiasm.

We ought to consider such categorizations as incorrect. For instance, in his works in 1970s and 1980s, Leontieff rightly groups the USSR and socialist countries of Central and Eastern Europe along with capitalist economies of Western Europe and North America, categorizing all of them as developed industrialized nations. In our view, the fact that such a large share of Ukraine's electric energy is produced by nuclear power stations is itself an indication that Ukraine should be listed as an industrialized rather than a developing nation. The country should not be regarded as a developing nation just because of the temporary negative aspects of the transition.

When energy import and decline in energy production are accounted for, the electric energy produced by the nuclear power stations as a share of the total electric energy produced in the country increases as does the weight of nuclear power in general, even if the volume of its production is constant.

On the other hand, the presence of a well-developed technologically complex system of energy production by nuclear power plants on an industrial scale indicates that the country cannot be a developing one by definition. Moreover, as shown in Table 3.5, the electric energy produced by the nuclear power stations as a share of the total electric energy produced in the country, has reached 43 percent in 2003 and is at par with the level of developed capitalist countries.

In France, the share of electric energy produced by nuclear power stations in the total electric energy produced is approximately 80 percent, but France is something of an exception. According to the data, presented in Table 3.5 and in Figure 3.7, the share of electric energy produced by nuclear power stations in the total electric energy produced in Ukraine increased consistently during the entire period of 1992 to 2003.

Selected indicators for electricity and energy production and consumption in Ukraine in 1992-2003 are presented in Table 3.5. More detailed data of energy production and energy consumption in Ukraine in 1992-2003, including electric energy indicators, are presented in Tables 3 and 4 of Appendix I.

The data for energy production and energy consumption in Ukraine in 1992-2003, including electric energy production and consumption, support our statement that economic decline in Ukraine during the period of 1991 to 1999 was not as significant as it is presented in numerous sources and should not be considered a deep economic crisis.

Electric energy does not dominate the national economy and does not dictate trends in future economic development of the country. In Ukraine in 2002, 5.9 percent of managers surveyed ranked the price of electric energy as a major business

constraint. In 2005 this figure declined to 4.9 percent, contrary to expectations.

TABLE 3.5

Selected indicators for electricity and energy production and consumption in Ukraine, 1992-2003

Year	Electric power consumption (kWh per capita)	Electric power transmission losses, %	Electricity production from nuclear sources, %	Energy imports, net (% of energy use)	Energy use (kg of oil equivalent per capita)
1992	4307.974	9.01973	29.19802	49.55032	4187.438
1993	3947.971	9.73453	32.75594	48.57830	3735.357
1994	3469.518	10.72403	33.96329	47.42668	3182.409
1995	3343.571	9.71566	36.38564	49.84413	3213.291
1996	3163.629	13.67508	43.53585	52.00154	2894.519
1997	2960.385	15.97460	44.66895	49.19622	2779.948
1998	2772.917	17.36642	43.53554	46.33653	2642.613
1999	2787.189	17.56333	41.86905	45.47789	2649.489
2000	2773.435	18.20409	45.08735	44.36479	2643.656
2001	2790.534	19.70996	44.07903	44.67668	2673.062
2002	2843.537	19.29596	44.93288	44.86455	2737.304
2003	2997.873	17.80189	45.17536	43.01460	2772.388

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

Dynamics of electricity production from nuclear sources as percent of total electricity production in Ukraine in 1998-2003 is presented in Figure 3.7.

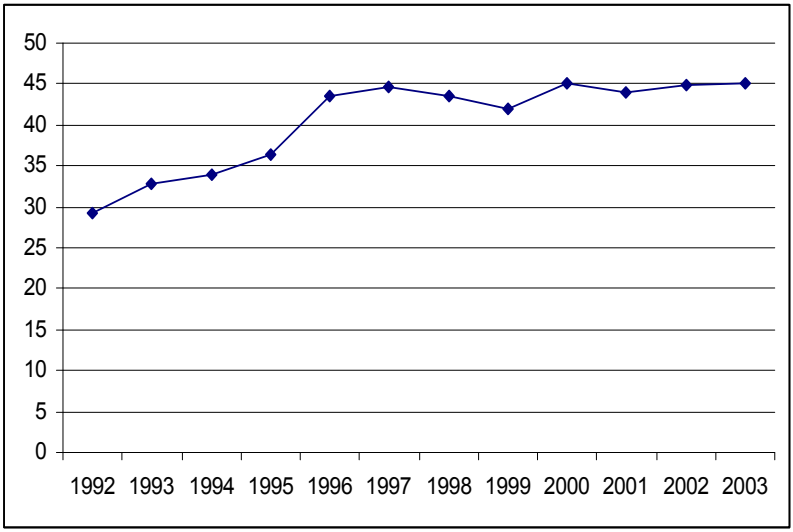

Figure 3.7. Electricity production from nuclear sources (percent of total) in Ukraine, 1998-2003

Energy-efficient technologies in energy-intensive production in metallurgy and machine building are necessary to reduce the national economy's energy dependency. This supports our statement that future development should focus on increasing the effectiveness and efficiency of already existing well-established branches of the national economy. Technological innovations and energy efficiency will protect the national economy from potential shocks caused by energy price fluctuations and energy market volatilities. This, in turn, necessitates a further increase in investment in principal capital, including machines and equipment. Modernization of the nation's basic industries is linked to the creation and development of the stock market, which would facilitate channeling resources into the branches. Human capital accumulation will also be necessary to serve new production technologies.

3.2. Macroeconomic Indicators of the Former Soviet Bloc

Selected macroeconomic and demographic indicators in Ukraine, the Russian Federation, Poland, and Hungary for the period of 2000-2004 are presented in Tables 3.6 – 3.9.

TABLE 3.6

Selected macroeconomic indicators in Ukraine, 2000-2004

Indicator	2000	2003	2004
National income, billion USD	34.4	46.9	60.3
National income per capita, billion USD	690.0	970.0	1260.0
GDP, billion USD	31.3	50.1	65.1
Annual GDP growth, percent	5.9	9.4	12.1
Population, million	49.5	48.4	48.0
Population growth, percent	-0.8	-0.7	-0.7

Source: World Development Indicators Database, Retrieved in November 12, 2005.

TABLE 3.7

Selected macroeconomic indicators in the Russian Federation, 2000-2004

Indicator	2000	2003	2004
National income, billion USD	250.3	373.9	487.3
National income per capita, billion USD	1720.0	2610.0	3410.0
GDP, billion USD	259.7	430.1	582.4
Annual GDP growth, percent	10.0	7.3	7.2
Population, million	145.6	143.4	142.8
Population growth, percent	-0.5	-0.4	-0.4

Source: World Development Indicators Database, Retrieved in November 12, 2005.

TABLE 3.8

Selected macroeconomic indicators in Poland, 2000-2004

Indicator	2000	2003	2004
National income, billion USD	171.0	201.7	232.4
National income per capita, billion USD	4430.0	5280.0	6090.0
GDP, billion USD	166.5	209.6	241.8
Annual GDP growth, percent	4.0	3.7	5.3
Population, million	38.6	38.2	38.2
Population growth, percent	-0.0	-0.1	-0.1

Source: World Development Indicators Database, Retrieved in November 12, 2005.

TABLE 3.9

Selected macroeconomic indicators in Hungary, 2000-2004

Indicator	2000	2003	2004
National income, billion USD	46.6	64.4	83.3
National income per capita, billion USD	4650.0	6360.0	8270.0
GDP, billion USD	46.7	82.8	99.7
Annual GDP growth, percent	5.2	3.0	4.0
Population, million	10.0	10.1	10.1
Population growth, percent	-0.4	-0.3	-0.4

Source: World Development Indicators Database, Retrieved in November 12, 2005.

Major macroeconomic and demographic indicators in Ukraine, the Russian Federation, Poland, and Hungary for the period of 2000-2004, presented in Tables 3.6 – 3.9, are useful as a basic informative resource.

3.2.1. GDP Growth in Eastern Europe and the FSU

Data for GDP per capita growth in the CEE and the former USSR for the period of 1991 to 2004 according to the World Development Indicators database are presented in Table 3.10. Data for GDP per capita growth in the former USSR for the period of 1995 to 2000 calculated according to the Penn World Tables methodology are presented in Table 3.11. Data for GDP per capita growth in the CEE and the former USSR for selected years are presented in Table 3.10.

TABLE 3.10

GDP per capita growth in the CEE and the former USSR, 1991, 1994, 1997, 2000, 2004

Country	1991	1994	1997	2000	2004
Armenia	-10.8891	7.9238	4.4708	6.6208	7.3926
Azerbaijan	-2.2295	-20.7781	4.7876	10.1953	9.2241
Belarus	-1.2484	-11.5964	11.8734	6.1172	11.5991
Georgia	-20.4077	-8.5790	12.0380	2.9995	7.2972
Hungary	-11.7302	3.2782	4.9591	6.4682	4.8808
Kazakhstan	-11.5545	-11.3227	3.3195	10.1307	8.7831
Kyrgyzstan	-9.3270	-20.0324	8.3333	4.3556	5.9374
Latvia	-12.3096	3.7139	10.0948	7.7027	8.9068
Lithuania	-5.8284	-9.1493	7.7551	4.8524	7.2476
Moldova	-16.1394	-30.7228	1.8901	2.4333	7.6402
Poland	-7.3054	4.9691	6.7115	3.9779	5.4800
Russia	-5.2591	-12.4613	1.6994	10.0045	7.7022
Tajikistan	-9.0744	-22.4399	0.3185	7.0313	9.3894
Turkmenistan	-7.3638	-19.4063	-12.6153	17.0833	...
Ukraine	-8.6016	-22.5508	-2.1121	6.9713	12.9534
Uzbekistan	-2.8285	-7.1970	3.5656	2.3365	6.1338

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

Data for GDP per capita growth in the former USSR in 1995-2000 are presented in Table 3.11.

TABLE 3.11

GDP per capita growth in the former USSR, 1995-2000*

Country	1995	1996	1997	1998	1999	2000
Armenia	9.19	4.58	-1.7	7.34	4.73	5.57
Azerbaijan	-14.46	-5.80	2.14	14.39	5.96	10.40
Belarus	-8.12	2.59	15.55	7.18	7.87	11.19
Georgia	6.42	0.08	9.60	4.88	4.63	6.16
Kazakhstan	…	…	11.64	-3.71	17.43	-13.22
Kyrgyzstan	-1.85	2.31	1.23	-4.15	20.05	7.87
Latvia	-10.72	2.27	7.43	2.24	0.88	4.80
Lithuania	-2.17	4.21	5.09	6.72	-5.29	5.13
Moldova	1.91	3.61	8.14	2.34	3.69	7.67
Russia	…	-4.82	3.56	-8.49	-4.52	1.81
Tajikistan	-6.75	-0.96	0.60	-2.82	3.48	11.40
Turkmenistan	…	…	25.35	-2.25	2.60	6.56
Ukraine	-10.95	-9.19	-1.02	1.17	1.45	3.35
Uzbekistan	-2.54	10.24	…	…	…	…

Source: Heston, A., Summers, R., and B. Aten, Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP), October 2002. Retrieved from: http://pwt.econ.upenn.edu/php_site/pwt61_form.php Accessed in August 12, 2006.

* In Penn World Table data Real GDP means GDP measured in PPP (purchasing power parity), not in constant prices (adjusted for inflation) as it is normally the case for term "real" in economic literature.

Real GDP per capita growth in Ukraine according to the calculations of Penn World Table Version 6.1 for the period of 1991-2000 is presented in Figure 3.8.

Figure 3.8. Real GDP per capita growth in Ukraine according to the calculations of Penn World Table Version 6.1, 1991-2000 (annual percent change)

More detailed annual indicators of GDP per capita growth in the CEE and the former USSR for the period of 1991 to 2004, according to the World Development Indicators database as well as GDP per capita growth in the former USSR for the period of 1991 to 2000 calculated according to the Penn World Tables methodology, are presented in Tables 1-3 of Appendix II.

Major macroeconomic indicators in Ukraine, the Russian Federation, Poland, and Hungary including nominal GDP (USD PPP), real GDP in national currencies, real GDP (USD PPP) in constant prices of 1996, real GDP in USD in constant prices of 1996, nominal GDP in national currencies, nominal GDP in

USD, and real GDP in factor costs in national currencies for the period of 1989 to 2010 are presented in Tables 1-4 of Appendix III. These data clearly support our suggestion that the output decline have started before the Soviet Union disintegration and indicate stable growth that takes place in the national economies of the former soviet republics now and in perspective to 2010.

3.2.2. Structure of GDP Growth by Expenditures in Ukraine

Statistical data on the contribution of stock building, private consumption, government consumption, gross fixed investment, and external balance to real GDP growth in Ukraine for the period of 1991-2010 are presented in Table 3.12.

The data shows that the major emphasis is made on private consumption. The literature on growth in Ukraine also points toward increasing private consumption. At the same time role of government consumption declines. External balance has negative effect on growth. This trend will likely continue in the future. Role of investment will continue to grow while investment share will become significantly higher than government consumption. Investment had positive effect on growth starting 1997. It is expected that in the future role of the stock building will be minimal.

Dynamics of the real GDP growth by expenditure components in Ukraine for the period of 1991 to 2010 is presented in detail in Appendix IV.

Dynamics of the real GDP growth by expenditure components in Ukraine for the period of 1991 to 2010 is presented in Figures 3.9-3.13.

TABLE 3.12

Contribution to real GDP growth in Ukraine, percentage points, 1991-2010

Year	Stock Building	Private consumption	Government consumption	Gross fixed investment	External balance
1991	0.994	-4.537	0.833	…	…
1992	0.809	-4.447	0.510	-6.235	…
1993	7.601	-12.559	0.017	-15.993	…
1994	19.016	-3.699	-2.164	-17.688	-18.395
1995	-17.115	-0.941	-1.612	-2.261	9.786
1996	1.484	-5.239	-1.157	-4.665	-0.466
1997	-2.089	-0.907	-0.507	0.752	-0.236
1998	-3.772	0.750	-0.786	0.954	0.908
1999	-3.056	-1.253	-1.750	0.169	5.691
2000	1.393	2.936	-0.388	3.000	-1.142
2001	2.112	3.105	0.397	2.359	1.212
2002	0	5.200	-1.200	0.900	3.200
2003	0	7.000	2.300	3.900	-3.200
2004	0.200	7.900	0.300	5.400	1.400
2005	-0.200	9.800	0.400	-0.100	-8.300
2006	0	6.100	0.300	1.400	-6.200
2007	0	5.900	0.600	2.500	-3.200
2008	0	6.400	0.900	2.800	-4.100
2009	0	7.700	1.000	2.200	-4.600
2010	0	7.200	1.000	2.500	-5.000

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, and UNDP.

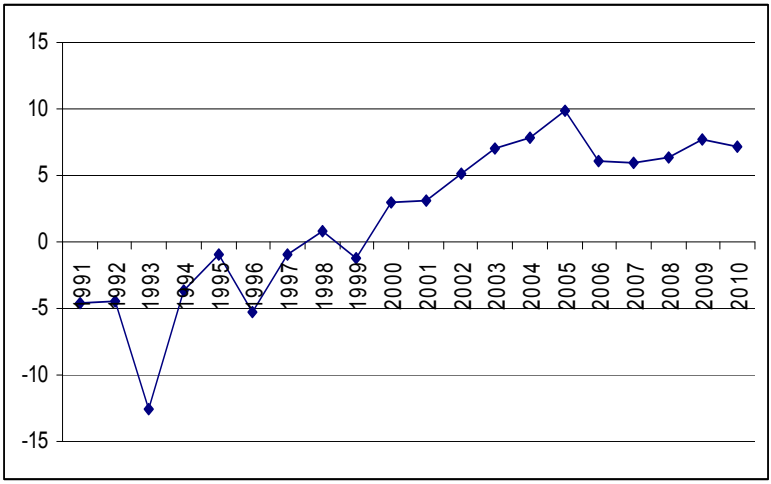

Figure 3.9. Contribution of private consumption to real GDP growth in Ukraine, percentage points, 1991-2010

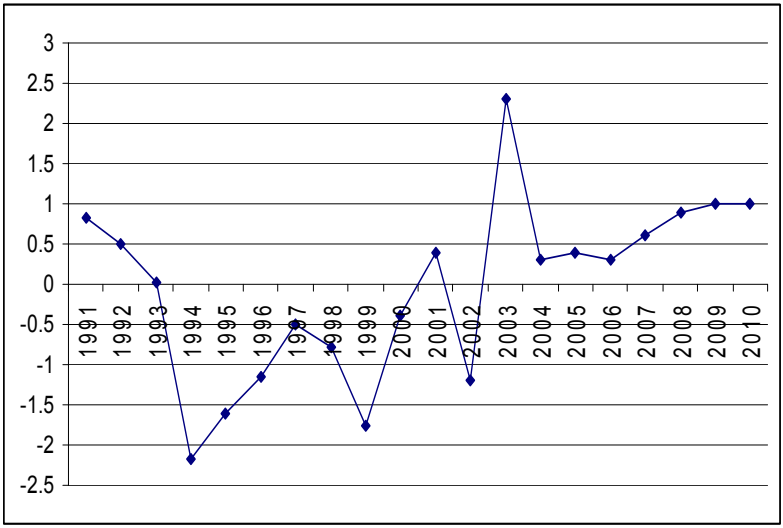

Figure 3.10. Contribution of government consumption to real GDP growth in Ukraine, percentage points, 1991-2010

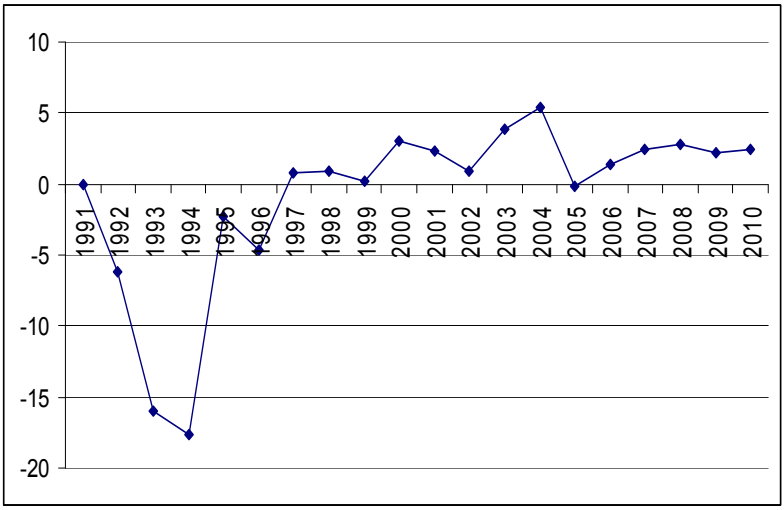

Figure 3.11. Contribution of gross fixed investment to real GDP growth in Ukraine, percentage points, 1991-2010

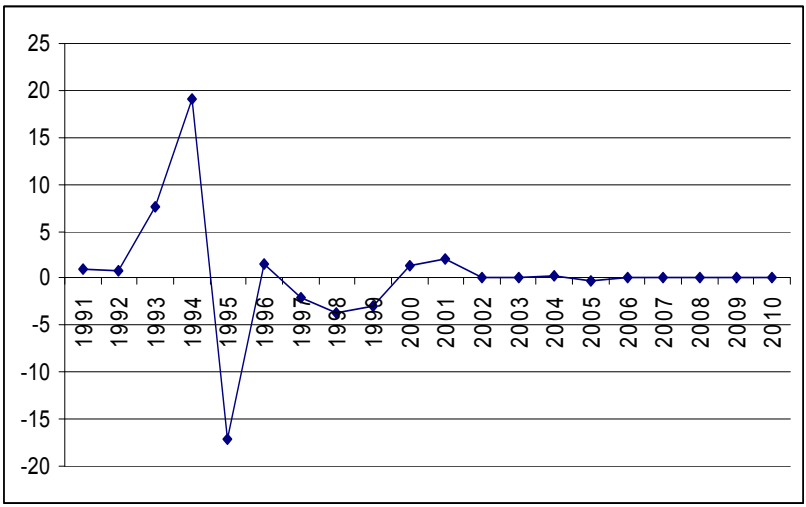

Figure 3.12. Contribution of stockbuilding to real GDP growth in Ukraine, percentage points, 1991-2010

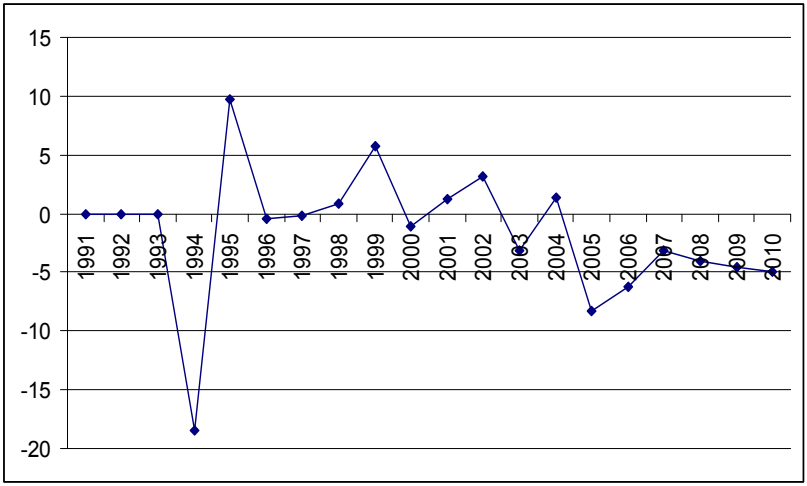

Figure 3.13. Contribution of external balance to real GDP growth in Ukraine, percentage points, 1991-2010

Statistical data on the contribution of stock building, private consumption, government consumption, gross fixed investment, and external balance to real GDP in Ukraine for the period of 1993-2010 are presented in Table 3.13.

Statistical data on the structure of contribution of stock building, private consumption, government consumption, gross fixed investment, and external balance to real GDP in Ukraine for the period of 1993-2010 shows that the share of private consumption in GDP was continuously increasing, beginning in 1993. It increased from 46.667 percent in 1993 to 72.9 percent in 1998. Such an increase was followed by an insignificant decrease to the level of 64.4 percent in 2004. In 2005 the share of private consumption in GDP was equal to 69.336 percent.

Increase in private consumption is considered a major engine for sustaining present economic growth. It is expected that the share of private consumption in total GDP will fluctuate within a range of 80 to 88 percent during the period of 2006-2010. This prediction is in line with the predictions made earlier in the literature on economic growth forecasts in Ukraine.

TABLE 3.13

Contribution to real GDP in Ukraine, percent, 1993-2010

Year	Private consumption	Government consumption	Gross fixed investment	Stock building
1993	46.667	13.333	26.667	13.333
1994	48.333	19.167	24.167	11.667
1995	55.229	21.284	23.486	3.303
1996	71.149	8.710	20.854	1.840
1997	71.868	9.747	20.029	1.392
1998	72.909	8.578	19.689	1.072
1999	69.839	7.206	19.396	-1.917
2000	68.148	7.115	19.757	0.000
2001	68.564	8.032	19.737	2.057
2002	68.022	7.396	19.220	0.974
2003	67.591	7.818	20.648	1.384
2004	64.414	6.896	22.601	-1.420
2005	69.336	7.628	22.013	0.141
2006	79.400	7.700	20.500	0.500
2007	87.100	8.200	22.600	0.700
2008	87.600	8.000	22.800	0.800
2009	87.600	8.000	22.800	-0.500
2010	85.900	7.900	22.600	-0.400

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, and UNDP.

The share of government consumption is expected to remain unchanged during the period of 2005-2010, fluctuating around 8 percent of GDP. The share of government consumption in total GDP increased from 13.3 percent in 1993 to 21.28 percent in 1995. It has since declined. One factor in

such a decline is the shrinking of the public sector due to massive privatization as well as to legalization of a significant part of the shadow economy after 2000. The share of the external trade balance in GDP has declined steadily since 1993. The share of investments is expected to grow further.

The contribution of private consumption, government consumption, gross fixed investment and stockbuilding to real GDP in Ukraine for the period of 1993 to 2010 is presented in Figure 3.14.

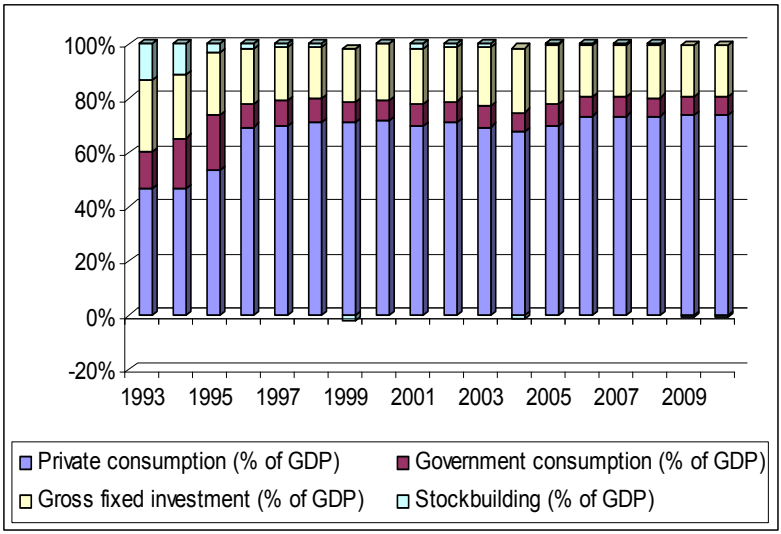

Figure 3.14. Contribution of private consumption, government consumption, gross fixed investment and stockbuilding to real GDP in Ukraine, percent, 1993-2010

3.2.3. Volume of Direct and Portfolio Investments in Ukraine

Selected indicators for the foreign direct investment and portfolio investment flows in Ukraine for the period of 1994 to 2009 are presented in Table 3.14.

TABLE 3.14

Selected indicators for the Foreign Direct Investment and Portfolio Investments flows in Ukraine, 1994-2009*

Year	Net flow of FDI, million USD	Inward portfolio investments, million USD	Inward FDI as a percentage of GDP	Inward FDI as a percentage of gross fixed investment
1994	159	0	0.434	1.796
1995	267	16	0.722	3.073
1996	521	199	1.169	5.607
1997	623	1605	1.242	6.202
1998	743	-2801	1.774	9.010
1999	496	-75	1.571	8.098
2000	595	-197	1.903	9.634
2001	792	-867	2.084	10.558
2002	693	-2117	1.635	8.505
2003	1424	-1923	2.840	13.757
2004	1715	615	2.643	11.695
2005	7808	484	9.421	42.795
2006	4200	600	4.600	22.300
2007	4500	650	4.600	20.500
2008	4200	750	3.800	16.500
2009	4000	650	3.200	13.900

Source: Economist Intelligence Unit. Retrieved in August 12, 2006.

* Data for 2006-2009 are based on prognosis made by the IMF in cooperation with the State Committee of Statistics of Ukraine.

Selected indicators for the foreign direct investment and portfolio investment stock in Ukraine for the period of 1994 to 2009 are presented in Table 3.15.

TABLE 3.15

Selected indicators for the Foreign Direct Investment and Portfolio Investment stock in Ukraine, 1994-2009*

Year	Stock of inward FDI, million USD	Stock of inward FDI per capita, USD	Stock of inward FDI as a percentage of GDP	Stock of outward FDI as a percentage of GDP
1994	483.5	9.393	1.320	0.055
1995	896.9	17.559	2.424	0.227
1996	2063.6	40.751	4.631	0.219
1997	2810.7	55.940	5.604	0.254
1998	3553.7	71.287	8.485	0.233
1999	3281.8	66.358	10.392	0.312
2000	3875.0	79.023	12.395	0.545
2001	4555.3	94.428	11.985	0.410
2002	5339.0	111.720	12.594	0.339
2003	6657.0	140.330	13.280	0.326
2004	8353.0	177.360	12.876	0.271
2005	16375.0	350.270	19.757	0.263
2006	20575.0	442.700	22.400	0.400
2007	25075.0	542.300	25.900	0.500
2008	29275.0	636.100	26.200	0.600
2009	33275.0	726.400	26.300	0.700

Source: Economist Intelligence Unit. Retrieved in August 12, 2006.

* Data for 2006-2009 are based on prognosis made by the IMF in cooperation with the State Committee of Statistics of Ukraine.

Dynamics of the selected indicators for the foreign direct investment and portfolio investment stock and flows in Ukraine for the period of 1994 to 2009 are presented in Figure 3.15.

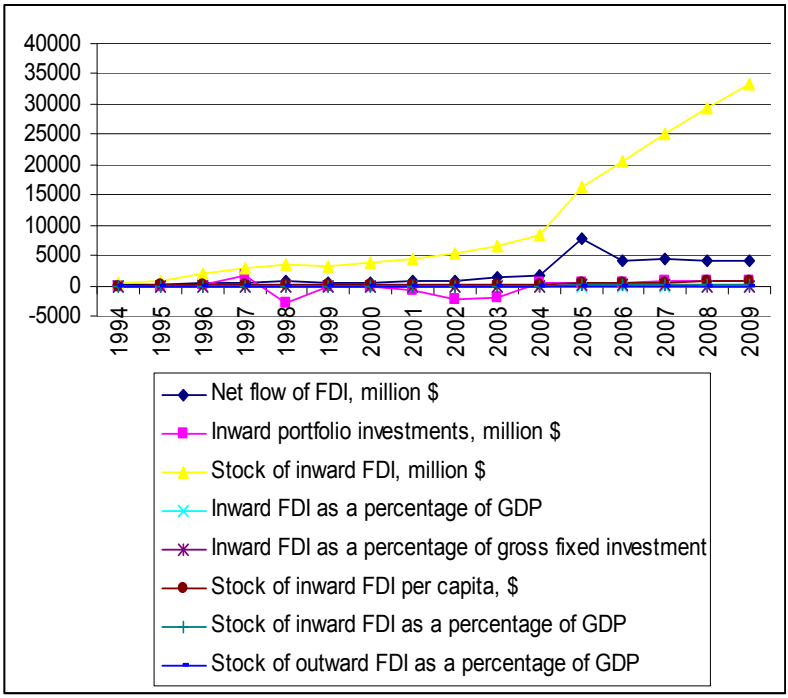

Figure 3.15. Selected indicators for the foreign direct investments and portfolio investments stock and flows in Ukraine, 1994-2009

Statistics presented in Tables 3.14 and 3.15 and Figure 3.15 show that FDI flow in Ukraine increased from 159 million USD in 1994 to 496 million USD in 1999. The high rate of investment flow in Ukraine continued through 2004. Investment flow increased from 595 million USD in 2000 to 1715 million USD in 2004. The phenomenal growth of FDI flow in Ukraine took place in 2005, when it reached 7808 million USD,

indicating a four-and-a-half-fold increase in one year. Annual FDI flow in Ukraine during the period of 2006 to 2009 is expected to be within the limits of 400 to 450 million USD a year.

Portfolio investment flow in Ukraine was positive from 1994 to 1997, reaching 1605 million USD. During the period of 1998 to 2003 it was negative. Portfolio investment outflow was most significant in 2002, reaching 2177 million USD. Starting in 2004 Ukraine experienced an inflow of portfolio investment, which is expected to last through 2009. Annual portfolio investment is expected to be within the limits of 500 to 750 million USD a year.

FDI stock in Ukraine increased tenfold from 1994 to 2001, starting from 483.5 million USD and reaching 455.3 million USD. Total volume of FDI in 2006 was equal to 20775 million USD. According to the forecasts, FDI stock in Ukraine is to reach 33275 million USD by 2009.

Despite the increase in FDI, its share in GDP was insignificant over the entire period. The share of FDI in GDP grew from 0.434 percent in 1994 to 1.903 percent in 2000 and then to 2.084 percent in 2001 and 2.643 percent in 2004. FDI flow as a share of GDP reached 9.421 percent in 2005 and is expected to fluctuate within the limits of 3.2 to 4.6 percent per annum.

The data presented in Table 3.14 and in Figure 3.15 indicate that FDI flow as a share of total investment in Ukraine increased from 1.796 percent in 1994 to 9.634 in 2000, i.e. more than five times, and reached 42.795 percent in 2005. It is expected that FDI flow as a share of total investment will decline to 13.9 percent in 2009.

FDI stock as a share of GDP in Ukraine grew continuously from 1.32 percent in 1994 to 12.395 percent in 2000 and 19.757 percent in 2005 and is expected to reach 26.3 percent in 2009.

External capital flows in Ukraine were not limited to FDI and portfolio investment inflow. Capital outflow was taking place as well. FDI flow as a share of GDP invested abroad increased from 0.055 percent in 1994 to 0.263 percent in 2005 and could reach 0.7 percent in 2009. FDI outflow is insignificant compared to FDI inflow. The proportion was 1 to 7 in 1994, 1 to 3.5 in 2000, and 1 to 36.2 in 2005, and it is expected to be 1 to 4.57 in 2009. The relation of FDI stock in Ukraine to FDI stock abroad as a share of GDP was equal to 37 to 1 in 1994, 23 to 1 in 2000, and 76 to 1 in 2005. According to Economist Intelligence Unit forecasts, the share of FDI stock to GDP in Ukraine will be 38 times higher than FDI stock as a share of GDP outside Ukraine by 2009.

Despite the optimistic trends in FDI investment and its balance in Ukraine, one should admit that there is no good reason to accept Leontieff's external shock scenario in Ukraine. Theories of exogenous growth based on external shock that comes in the form of massive capital influx in a short period of time are not valid. Total FDI stock and portfolio investment placed in the country constituted only 10 percent of GDP in 1999. Such volume of external investment was unlikely to initiate sustainable and significant economic growth in Ukraine.

To demonstrate insignificant volume of the total external investment inflow and stock we will present some statistics on per capita investment. FDI per capita in Ukraine was equal to 1.32 USD in 1994. This indicator grew to 66.36 USD by 1999. Despite the rapid increase in FDI, the total volume of it remained absolutely insignificant. In 2005 FDI per capita in Ukraine reached 350.27 USD and is expected to grow to 726.4 USD in 2009. Total FDI stock of over 700 USD would possibly be considered significant in early 1990s, but certainly not in 2009. We will continue considering the issue of possible external shock as an initiator of substantial economic growth in Ukraine by addressing trends in statistical data on capital flight and external debt.

3.2.4. Capital Flight from Ukraine, the Russian Federation, Poland, and Hungary

Statistics on capital flight from Ukraine, the Russian Federation, Poland, and Hungary for the period of 1991 to 2010 are presented in Table 3.16.

TABLE 3.16

Capital flight in Ukraine, the Russian Federation, Poland and Hungary (million USD), 1991-2010*

Year	Hungary	Poland	Russia	Ukraine
1991	...	1,978.40	...	...
1992	...	5,207.50	...	...
1993	1,958.10	4,661.20	...	...
1994	1,387.00	2,887.40	-14,001.50	551.40
1995	-640.90	4,128.40	-3,434.60	132.30
1996	-1,789.70	1,043.10	-23,186.70	279.20
1997	-1,579.40	-262.30	-2,044.50	-591.60
1998	-1,479.90	3,343.80	-35,205.10	-2,592.50
1999	344.90	-594.50	-23,324.50	-1,631.70
2000	1,605.60	-56.00	-25,939.00	-510.20
2001	-2,486.60	-3,726.30	-22,305.80	-1,356.10
2002	1,048.80	785.00	-14,247.30	-2,625.10
2003	1,988.30	-3,238.40	-21,781.00	-3,779.00
2004	-6,305.30	3,462.90	-27,872.80	-11,378.80
2005	-8,575.00	-2,966.00	-44,816.00	-1,938.00
2006	-2,904.71	-2,293.97	-24,452.41	-4,686.40
2007	4,087.46	-5,872.74	-64,619.74	-1,307.43
2008	4,058.88	-3,203.13	-23,644.70	734.17
2009	7,240.88	-1,701.62	5,475.94	-795.79
2010	6,028.46	-310.44	2,136.88	-3,125.72

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU

calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, and UNDP (as derived from IMF, International Financial Statistics; World Bank, Global Development Finance)

* Current-account balance with the sign reversed plus the change in international reserves, minus the change in total external debt stock (not adjusted for the effects of cross-currency valuation changes), minus net direct investment. It represents the degree of over/under funding of the current account deficit. A negative number represents capital leaving the country.

Dynamics of capital flight from Ukraine, the Russian Federation, Poland and Hungary for the period of 1991 to 2010 are presented in Figures 3.16 – 3.19.

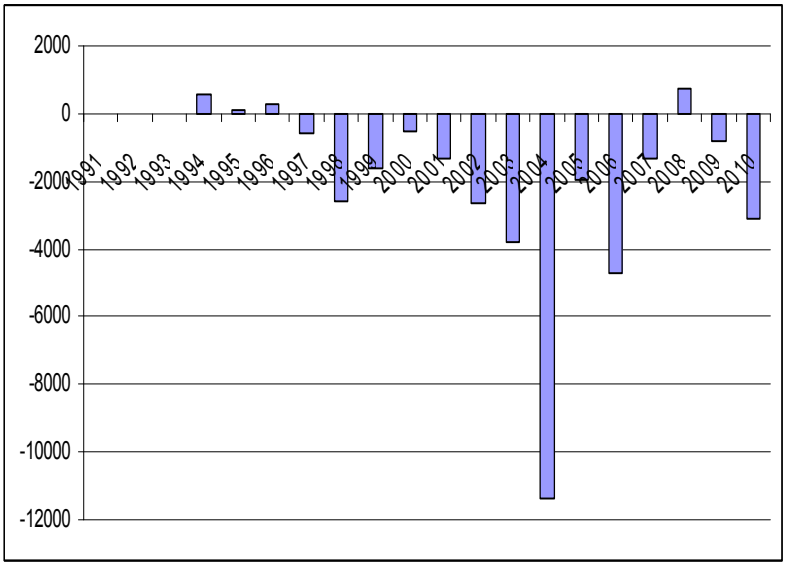

Figure 3.16. Capital flight in Ukraine (million USD), 1991-2010

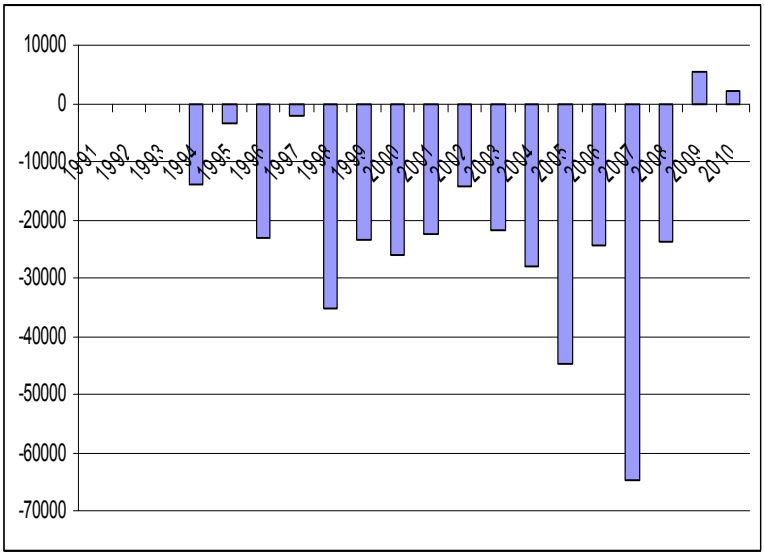

Figure 3.17. Capital flight in the Russian Federation (million USD), 1991-2010

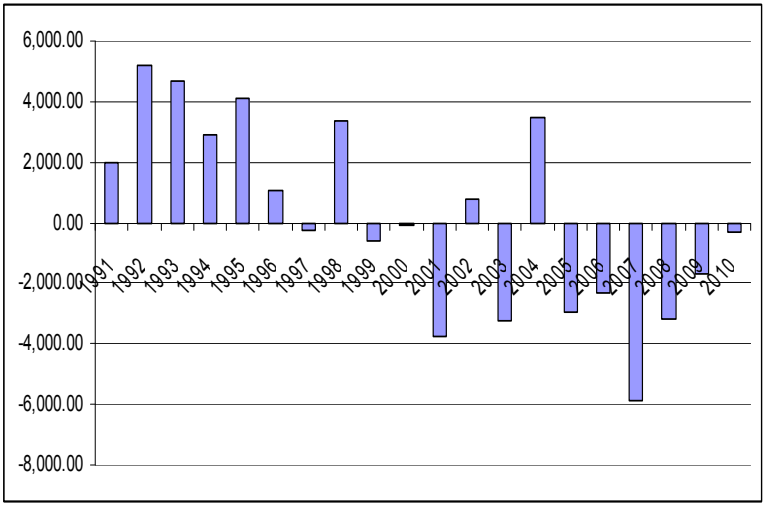

Figure 3.18. Capital flight in Poland (million USD), 1991-2010

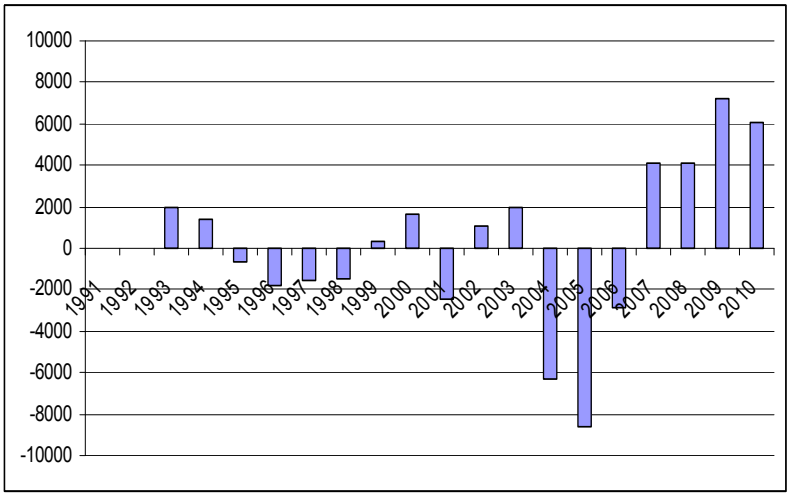

Figure 3.19. Capital flight in Hungary (million USD), 1991-2010

Capital outflow from Ukraine was equal to 2592.5 million USD in 1998 and then declined to 2625.1 million USD in 2002. Capital flight from Ukraine increased to a new high of 11378.8 million USD in 2004. This indicator is expected to decline in the future. Similar to Ukraine, in the Russian Federation capital flight in 1998 peaked at 35205.1 million USD. The peak it reached in 2005 was 44816 million USD. Continuing capital flight from the Russian Federation is expected to reach 64619.74 million USD in 2009. It is also expected that starting in 2009 volumes of capital outflow will decline. In Poland, capital outflow started only in 1997, while before 1997 there was capital inflow. Capital outflow also took place from 1999 to 2001. There was a frequent interchange between net capital inflow and net capital outflow in Poland were changing each other quite frequently. Hence, it is difficult to identify any sustainable trends in the capital flight. Insignificant net capital outflow is expected starting in 2005. In Hungary, net capital outflow took place from 1995 to 1998, in

2001, and from 2004 to 2006. The most significant capital flight of 8575 million USD was observed in 2005.

3.2.5. Foreign Debt and Debt Service in Ukraine and the Russian Federation

Major indicators of foreign debt and debt service in Ukraine for the period of 1992 to 2010 are presented in Table 3.17.

TABLE 3.17

Selected indicators of the foreign debt and debt service in Ukraine, 1992-2010

Year	Total foreign debt, mln. USD	Total debt per head, USD	Total debt to export of G&S, %	Total debt to GDP, %	Debt-service paid to GDP, %
1992	550.8	10.6	...	...	...
1993	3,854.8	74.3	...	11.648	0.611
1994	5,636.1	109.5	33.755	15.383	0.896
1995	8,429.4	165.0	48.621	22.784	3.073
1996	9,538.0	188.4	46.645	21.405	2.821
1997	11,133.3	221.6	54.274	22.199	2.704
1998	13,076.6	262.3	73.700	31.222	4.830
1999	13,950.6	282.1	81.316	44.175	8.871
2000	12,190.3	248.6	61.990	38.995	11.710
2001	12,713.1	263.5	59.818	33.448	6.032
2002	13,478.4	282.0	57.316	31.794	7.652
2003	16,206.8	341.6	55.489	32.328	7.357
2004	21,651.7	459.7	51.947	33.371	6.629
2005	23,273.0	498.0	51.600	28.100	7.200
2006	26,143.1	562.0	49.600	28.400	6.300
2007	30,019.4	649.0	51.200	30.900	6.200

2008	32,659.2	710.0	53.300	29.200	5.400
2009	34,886.3	762.0	50.500	27.500	6.100
2010	37,714.1	827.0	46.600	25.900	5.600

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, UNDP

At the moment of its independence, Ukraine had excellent opportunities for receiving international loans, since all the foreign obligations of the just disintegrated USSR were accepted by the Russian Federation. Foreign debt in Ukraine grew steadily from 550.8 million USD in 1992 to 13950.6 million USD in 1999 and to 26143.07 million USD in 2006. It is expected that foreign debt in Ukraine will move beyond 30 billion USD by the end of 2007, comprising around 30019.44 million USD. Dynamics of the total foreign debt in Ukraine for the period of 1992-2010 are presented in Figure 3.20.

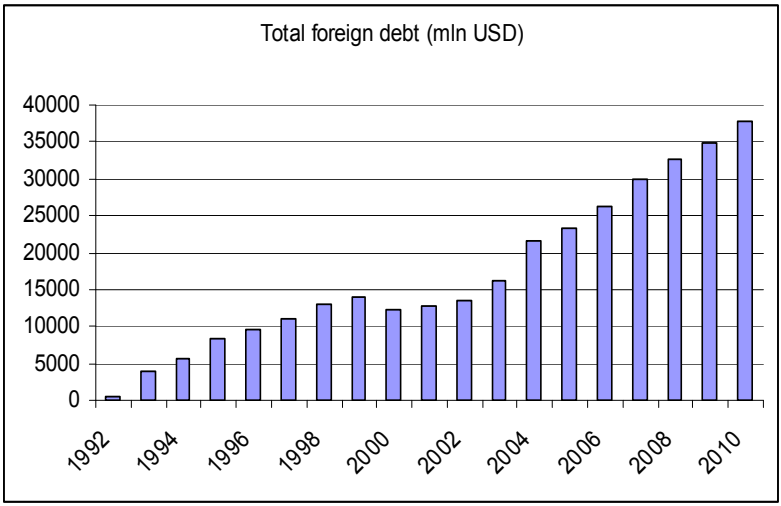

Figure 3.20. Dynamics of total foreign debt (million USD) in Ukraine, 1992-2010

Data in diagram 3.20 indicate that foreign debt in Ukraine declined slightly only in 2000 and otherwise grew continuously.

Dynamics of the total debt per head in Ukraine for the period of 1992-2010 are presented in Figure 3.21.

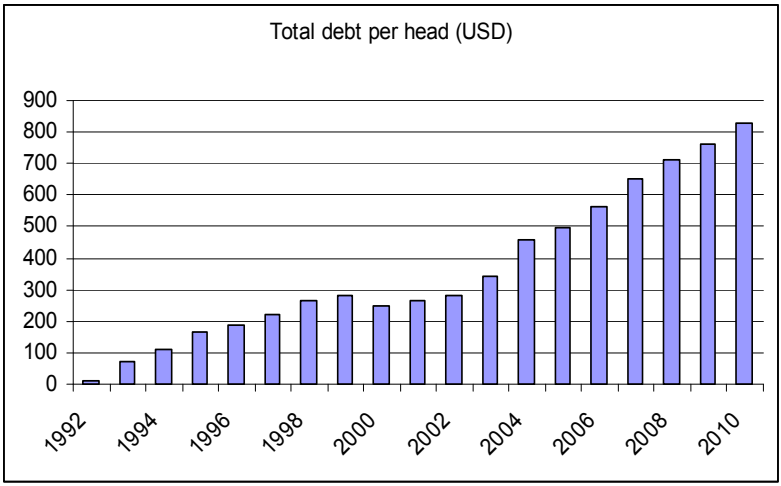

Figure 3.21. Dynamics of total debt per head (USD) in Ukraine, 1992-2010

Foreign debt in Ukraine increases consistently, but its total volume is still insignificant. Indicator of per capita foreign debt grew from 10.6 USD in 1992 to 282.1 USD in 1999 and reached 498 USD only by the end of 2005. According to the Economist Intelligence Unit forecasts, foreign debt per capita in Ukraine will reach 827 USD in 2010 and will not rise above even the relatively low threshold of 1000 USD per capita.

It seems obvious that such insignificant amounts of foreign capital inflows in the form of international loans indicated as foreign debt were unlikely to move the industrialized nation of fifty million population toward substantial economic growth. Moreover, the effectiveness of

utilizing of international loans is always of great concern. One should admit that international loans in Ukraine and in the Russian Federation were rarely utilized with maximum effectiveness and efficiency.

Dynamics of the proportion of the total debt to exports of goods and services in Ukraine for the period of 1992-2010 are presented in Figure 3.22.

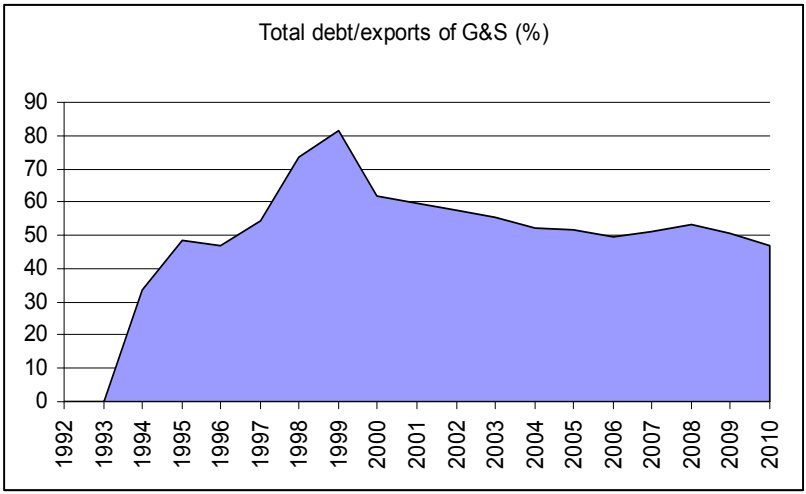

Figure 3.22. Dynamics of the proportion of the total debt to exports of goods and services (percent) in Ukraine, 1992-2010

Size of the foreign debt in Ukraine is significant in respect to total export. Foreign debt was equal to 33.755 percent of export in 1994 and reached its peak of 81.3 percent in 1999. After 1999 the size of foreign debt in respect to total export declined and comprised 49.6 percent in 2006. It is expected that value of this indicator will stay within the limits of 46 to 53 percent till 2010.

The indicator of foreign debt to GDP grew continuously starting in 1993 and reached 44.2 percent in 1999. After 1999

one could observe a decline in this indicator to 28.1 percent in 2005. It is expected that the value of this indicator will be around 30 percent till 2010.

Dynamics of the proportion of the total debt to GDP in Ukraine for the period of 1992-2010 are presented in Figure 3.23.

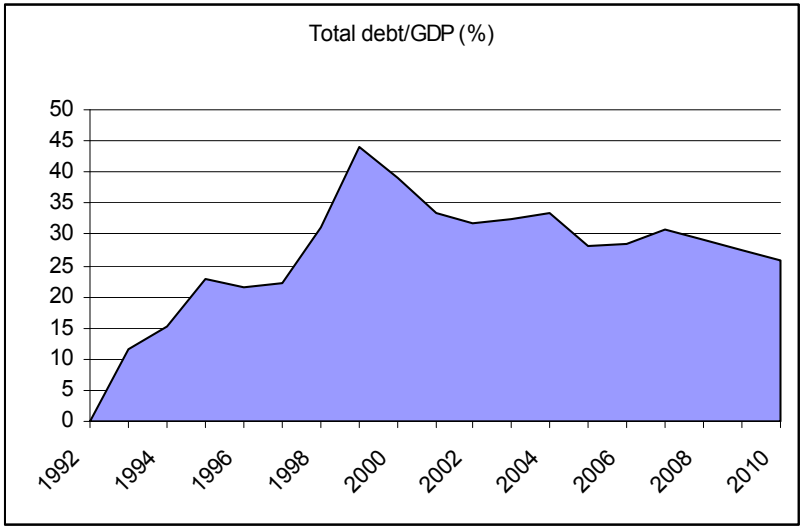

Figure 3.23. Dynamics of the proportion of the total debt to GDP (percent) in Ukraine, 1992-2010

Debt service was a growing burden for the country and increased from 0.6 percent of GDP in 1993 to 11.7 percent of GDP in 2000. This indicator later declined to 6.3 percent in 2006 and is expected to stay within the limits of 6 percent of GDP till 2010.

Dynamics of the proportion of the total debt-service paid to GDP in Ukraine for the period of 1992-2010 are presented in Figure 3.24.

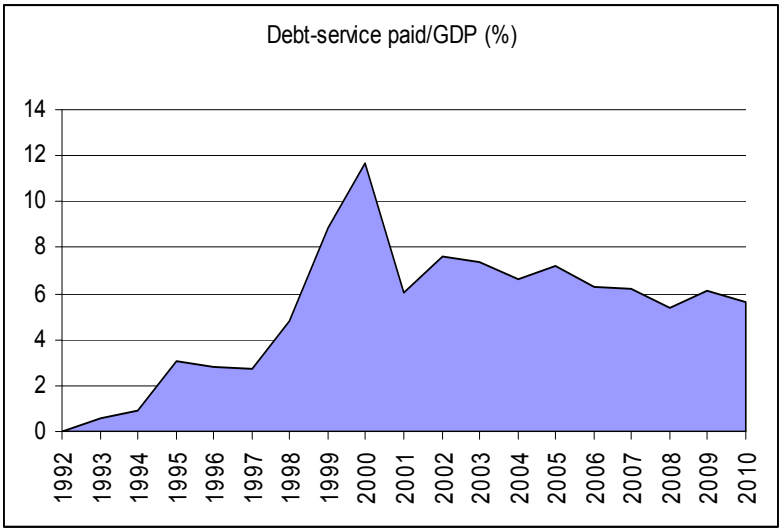

Figure 3.24. Dynamics of the proportion of the total debt-service paid to GDP (percent) in Ukraine, 1992-2010

Selected indicators of foreign debt and debt service in the Russian Federation for the period of 1992 to 2010 are presented in Table 3.18.

Foreign debt in the Russian Federation experienced a consistent increase from 78210.7 million USD in 1992 to 177798.3 million USD in 1998. This increase was followed by a decline to 147426.9 million USD in 2002 and then by an increase to 257497.9 million USD in 2005. The Russian Federation adopted a course of early repayment of its foreign debt, which was made possible by the rapid increase in the oil and gas prices on the world market. Otherwise the debt could potentially have grown to 307281.95 million USD by the end of 2010.

Dynamics of the total foreign debt in the Russian Federation for the period of 1992 to 2010 are presented in Figure 3.25.

TABLE 3.18

Selected indicators of the foreign debt and debt service in the Russian Federation, 1992-2010

Year	Total foreign debt, mln. USD	Total debt per head, USD	Total debt to export of G&S, %	Total debt to GDP, %	Debt-service paid to GDP, %
1992	78,210.70	526.50	157.185	64.000	1.200
1993	111,958.00	753.90	168.176	64.740	1.270
1994	121,775.40	820.40	145.202	43.685	1.245
1995	121,400.80	818.20	121.679	38.746	1.966
1996	126,374.60	853.00	114.809	32.231	1.866
1997	127,579.30	861.60	118.558	31.506	1.737
1998	177,798.30	1,202.70	191.095	65.620	4.021
1999	174,753.70	1,185.80	194.625	89.203	6.171
2000	160,022.90	1,090.60	132.660	61.615	4.553
2001	152,487.90	1,044.30	125.476	49.732	5.632
2002	147,426.90	1,014.90	115.224	42.723	4.106
2003	175,522.40	1,214.00	106.591	40.679	4.449
2004	197,335.20	1,370.60	91.026	33.513	3.597
2005	214,367.00	1,490.00	74.300	28.100	4.800
2006	257,497.92	1,800.00	69.100	26.500	4.500
2007	274,443.36	1,930.00	64.600	24.400	3.700
2008	285,168.08	2,010.00	64.100	23.500	3.600
2009	296,017.41	2,090.00	61.300	22.600	3.300
2010	307,281.95	2,180.00	56.000	21.800	3.000

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, National Bank of Ukraine, State Committee of Statistics, and UNDP

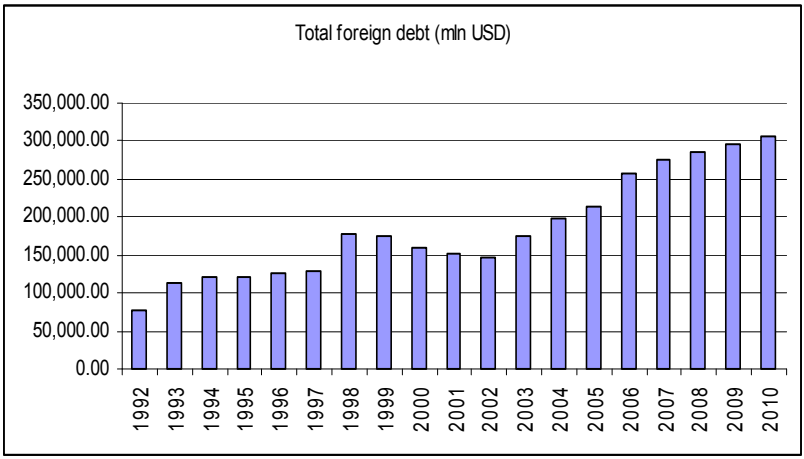

Figure 3.25. Dynamics of the total foreign debt (million USD) in the Russian Federation, 1992-2010

Figure 3.25 demonstrates that foreign debt in the Russian Federation experienced a decline only during 2000-2002. Dynamics of the total debt per head in the Russian Federation for the period of 1992-2010 are presented in Figure 3.26.

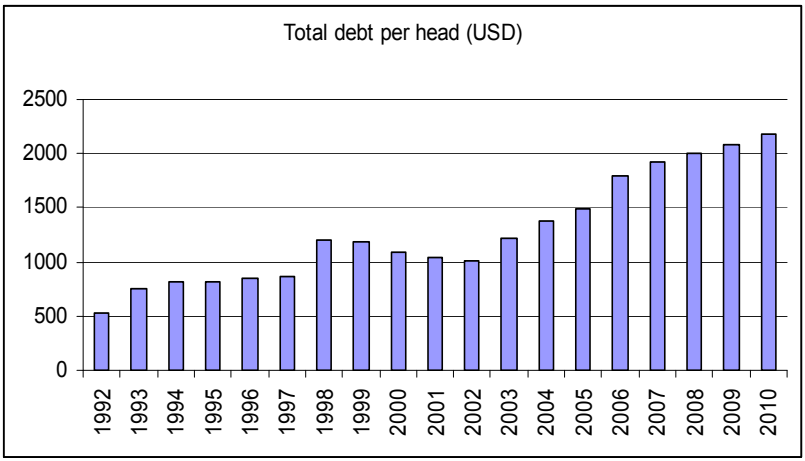

Figure 3.26. Dynamics of the total debt per head (USD) in the Russian Federation, 1992-2010

The Russian Federation is quite distinct from Ukraine in terms of total debt per head. While in Ukraine total debt per head is insignificant, in the Russian Federation this indicator grew from 526.5 USD in 1992 to 1202.7 in 1998 and reached 1490 by the end of 2005. Earlier it was expected that total debt per head would continue to grow and reach 2180 USD by the end of 2010. However, taking into consideration Russia's commitment to repay its debt and the government's strategy to utilize high world prices on oil and gas to repay the debt, one could expect that this indicator would much lower than has been predicted. During this substantial period of time, the indicator of foreign debt as a percent of export in the Russian Federation was much higher than in Ukraine. This indicator was equal to 157.185 percent in 1992 and reached its peak of 194.625 in 1999. The value of the indicator has since declined. It declined to 74.3 percent in 2005 and is expected to decline further. Dynamics of the proportion of the total debt to exports of goods and services in the Russian Federation for the period of 1992 to 2010 are presented in Figure 3.27.

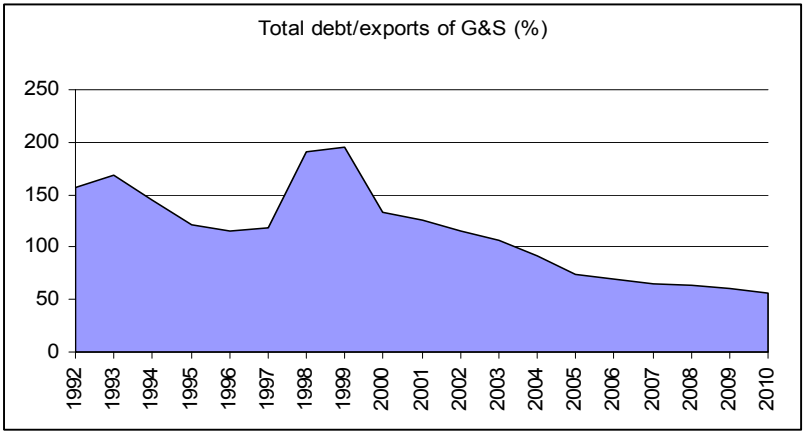

Figure 3.27. Dynamics of the proportion of the total debt to exports of goods and services (percent) in the Russian Federation, 1992-2010

The proportion of total debt to exports of goods and services in the Russian Federation was more significant than in Ukraine and increased from 157.185 percent in 1992 to 194.625 in 1999. After 1999 the value of this indicator declined to 74.3 percent in 2005 and will likely continue to decline.

Dynamics of the proportion of the total debt to GDP in the Russian Federation for the period of 1992 to 2010 are presented in Figure 3.28.

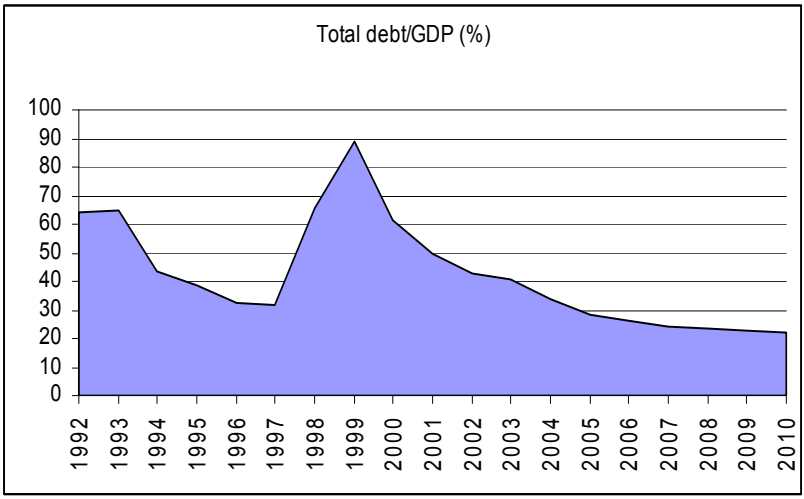

Figure 3.28. Dynamics of the proportion of the total debt to GDP (percent) in the Russian Federation, 1992-2010

The proportion of total debt to GDP in the Russian Federation grew continuously since 1993 and reached 89.2 percent in 1999. This indicator in the Russian Federation was two times higher than in Ukraine. After 1999 there was a decline in the value of the indicator to 28.1 percent in 2005.

Dynamics of the proportion of total debt-service paid to GDP in the Russian Federation for the period of 1992-2010 are presented in Figure 3.29.

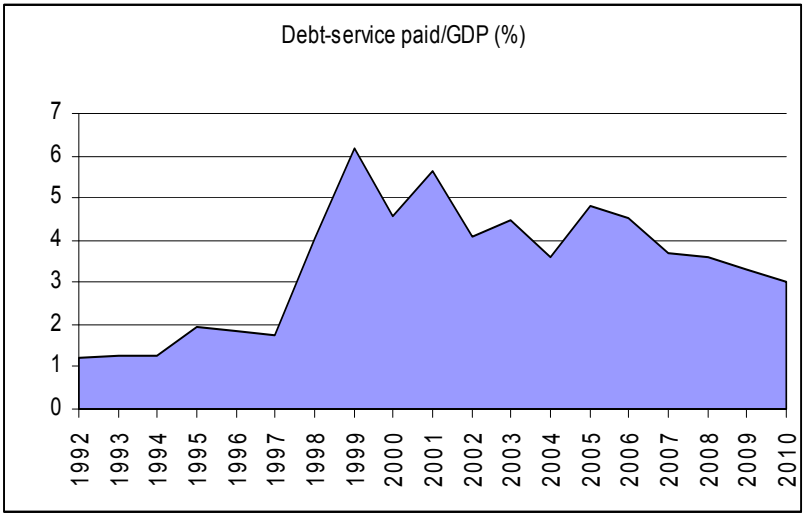

Figure 3.29. Dynamics of the proportion of the total debt-service paid to GDP (percent) in the Russian Federation, 1992-2010

Selected data on foreign debt, total stock of foreign direct investment, and capital flight in Ukraine for the period of 1992-2010 are presented in Table 3.19. These data visualize relations of such values and allow for easy comparisons.

As follows from the data presented in Table 3.19, the size of the foreign debt in any given year was higher than the FDI inflow in the country. Accordingly, per capita foreign debt was always higher than per capita FDI during the entire period. This means that if foreign debt is to be repaid at any given time during the period of transition, the positive effects of FDI would be nullified.

Dynamics in the values of foreign debt, total stock of foreign direct investment, and capital flight in Ukraine for the period of 1994-2009 are presented in Figure 3.30.

TABLE 3.19

Selected data on foreign debt, total stock of foreign direct investment, and capital flight in Ukraine, 1992-2010

Year	Stock of inward FDI per capita, USD	Total debt per head, USD	Stock of inward FDI, million USD	Total foreign debt, mln. USD	Capital flight, mln. USD
1992	…	10.60	…	550.80	...
1993	…	74.30	…	3854.80	...
1994	9.39	109.50	483.5	5636.10	551.4
1995	17.56	165.00	896.9	8429.40	132.3
1996	40.75	188.40	2063.6	9538.00	279.2
1997	55.94	221.60	2810.7	11133.30	-591.6
1998	71.29	262.30	3553.7	13076.60	-2592.5
1999	66.36	282.10	3281.8	13950.60	-1631.7
2000	79.02	248.60	3875.0	12190.30	-510.2
2001	94.43	263.50	4555.3	12713.10	-1356.1
2002	111.72	282.00	5339.0	13478.40	-2625.1
2003	140.33	341.60	6657.0	16206.80	-3779.0
2004	177.36	459.70	8353.0	21651.70	-11378.8
2005	350.27	498.00	16375.0	23273.00	-1938.0
2006	442.70	562.00	20575.0	26143.07	-4686.4
2007	542.30	649.00	25075.0	30019.44	-1307.4
2008	636.10	710.00	29275.0	32659.17	734.2
2009	726.40	762.00	33275.0	34886.29	-795.8
2010	…	827.00	…	37714.10	-3125.7

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, and UNDP

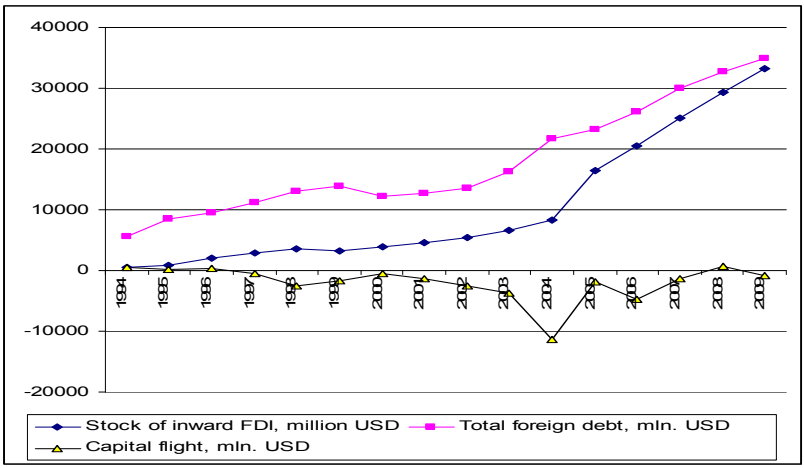

Figure 3.30. Dynamics in the values of foreign debt, total stock of foreign direct investment, and capital flight in Ukraine, 1994-2009

Capital flight from the country was insignificant during the entire period of 1994-2007. It was insignificant compared to foreign debt and FDI. Even in 2005, capital flight did not rise above FDI. Nevertheless, the values of FDI and international credit are not high enough to initiate significant and sustainable growth. The major role of internal resources is obvious.

3.2.6. Unemployment and the Labor Market in Ukraine, the Russian Federation and other NIS

Indicators of employment, unemployment, the labor market, and workforce dynamics may serve as a link between analyses of the external sources and dynamics of GDP, on the one hand, and data on personal income and income structure of GDP, on the other. In accordance with the logic of this chapter, we present the dynamics of external sources that could potentially be a basis and a moving force for growth and analyze whether they were sufficient for such a task and whether they had a decisive impact on initiation of positive and sustainable

economic growth. Indicators of per capita income, personal consumption, etc. are presented to prove that an increase in the population's well-being was the result of economic growth. Indicators of employment and the labor market then serve two purposes. First, they are intended as a link between the two parts listed above. Second, dynamics in workforce development and the labor market may reveal not only the potential for growth in the national economies but also the potential sources of that growth. Detailed statistics of labor force, including indicators of productivity, labor productivity, workforce, and wages in Ukraine for the period of 1991 to 2010 are presented in Tables 1-4 and Figure 1 of Appendix V. Number of officially unemployed individuals who received unemployment benefits in the CIS for the period of 1991-1999 is presented in Table 3.20.

TABLE 3.20

Number of unemployed persons in the CIS, received benefits at the end of year (thousands) 1991-1999

Country	1991	1993	1995	1997	1999
Azerbaijan	…	4.4	4.0	3.2	2.3
Armenia	…	33.1	41.6	20.6	30.5
Belarus	1.5	34.5	68.7	49.4	35.6
Georgia	…	…	…	5.0	1.8
Kazakhstan	1.0	15.4	73.5	176.7	25.7
Kyrgyzstan	0.1	1.7	28.9	20.3	5.4
Moldova	…	4.1	8.0	7.5	11.4
Russia	11.9	550.4	2025.9	1771.1	1090.2
Tajikistan	…	5.0	19.9	37.1	34.7
Turkmenistan	…	…	…	…	…
Uzbekistan	…	7.6	12.5	16.9	21.8
Ukraine	5.5	40.0	74.4	361.6	620.6

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database August 8, 2006.

Dynamics of the number of officially unemployed individuals who received unemployment benefits in the CIS for the period of 1991-1999 is presented in Figure 3.31.

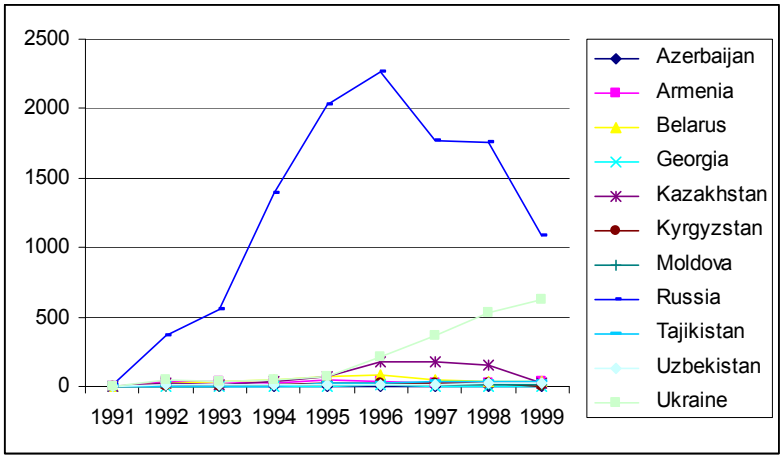

Figure 3.31. Number of unemployed persons in the CIS, received benefits at the end of year (thousands) 1991-1999

The number of officially unemployed individuals who received unemployment benefits in Ukraine for the period of 1991-1999 is presented in Figure 3.32.

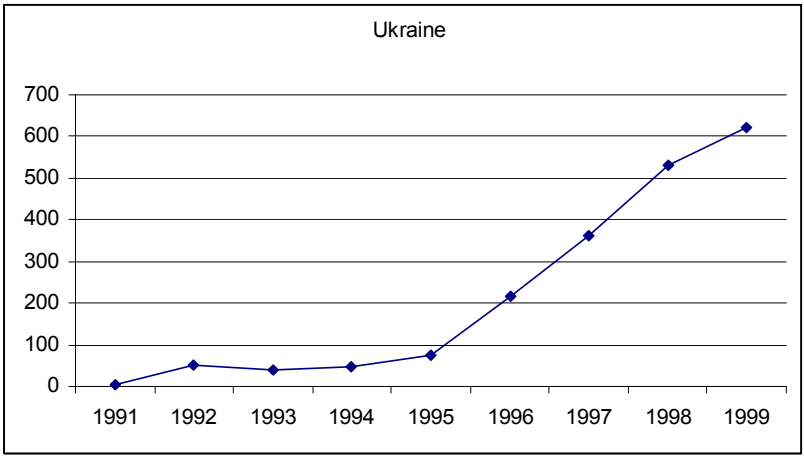

Figure 3.32. Number of unemployed persons in Ukraine, received benefits at the end of year (thousands) 1991-1999

Data presented in Table 3.20 and in Figures 3.31 and 3.32 demonstrate dramatic growth in the number of registered unemployed individuals in Ukraine during the period of 1990-1999. The explanation for such a dramatic increase in registered unemployment is obvious. First of all, there was no registered or officially recognized unemployment in the USSR. At the same time there was hidden unemployment that became obvious once market reforms advanced and enterprises strived for higher efficiency in operation. More importantly, region-wide restructuring on both macro- and micro-level and breaks in the well-established economic ties between the enterprises have led to reduction in production or even closures and lockouts in virtually every enterprise. This process in turn led to rapid growth of unemployment in the former Soviet Bloc.

Dynamics of economically active population in the CIS for the period of 1990-1999 are presented in Table 3.21. Dynamics of economically active population in the Russian Federation and Ukraine for the period of 1990-1999 are presented in Table 3.22.

TABLE 3.21

Economically active population in the CIS (thousands), 1990-1999

Country	1990	1993	1996	1999
Azerbaijan	3703	3734	3719	3748
Armenia	1630	1628	1584	1484
Belarus	5151	4882	4537	4542
Georgia	2763	1920	2085	…
Kazakhstan	7806	7004	7490	7055
Kyrgyzstan	1748	1710	1792	1901
Moldova	2071	1700	1686	1682
Russia	75325	75170	72962	73227
Tajikistan	1938	1876	1777	1780
Uzbekistan	7941	8288	8595	8930
Ukraine	25419	24029	25229	24523

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

TABLE 3.22

Economically active population in the Russian Federation and Ukraine (millions), 1990-1999

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Russia	75	73	76	75	73	72	72	72	72	73
Ukraine	25	25	24	24	23	25	25	24	25	24

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

Dynamics in the economically active population in the Russian Federation and Ukraine for the period of 1990-1999 are presented in Figures 3.33 and 3.34.

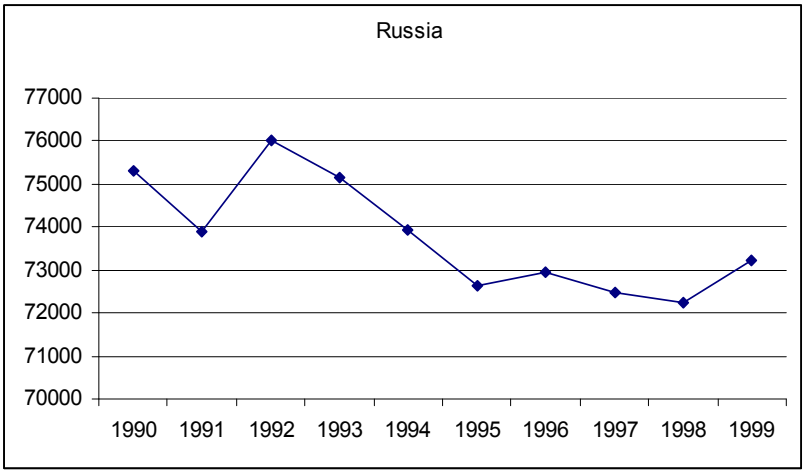

Figure 3.33. Economically active population in the Russian Federation (thousand), 1990-1999

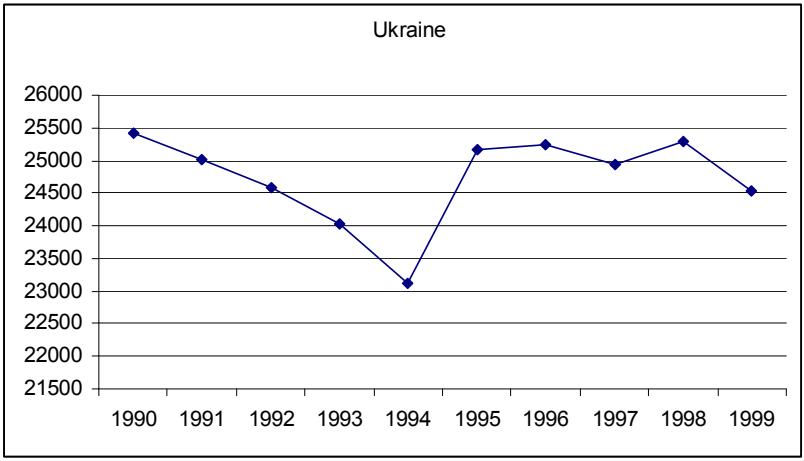

Figure 3.34. Economically active population in Ukraine (thousand), 1990-1999

Indicators of changes in the size of the economically active population in the Russian Federation and Ukraine for the period of 1990-1999 point to the fact that during the second part of the period the number of those who were economically active in both countries had stabilized. Nevertheless, in the Russian Federation it had stabilized at a significantly lower level than it was at the beginning of the reform in 1990 while in Ukraine the economically active population almost reached its initial size.

Statistics on the recorded official unemployment as a percentage of total labor force in Hungary, Poland, the Russian Federation and Ukraine for the period of 1991-2010 are presented in Table 3.23.

Based on the Economist Intelligence Unit forecast, it is expected that the level of recorded official unemployment in 2010 in Hungary will be equal to 6.4 percent; in Poland, 13.7 percent; in the Russian Federation, 6.1 percent; and in Ukraine, 4.8 percent. This shows that the official level of unemployment in Ukraine in the future will be equal to the level of unemployment in the US, which has always been traditionally low, and will be significantly lower than the analogous indicator in the Western European countries.

An increase in unemployment negatively impacts the population's personal income and accelerates socio-economic stratification. Along with redistribution of wealth during the quite contradictory process of privatization, an increase in unemployment led to an increase in socio-economic inequalities, including inequalities in income distribution, as reflected in the values of the Gini coefficient.

Statistics on the Gini coefficient are presented in Table 1 of Appendix IX. According to the data for 2003, the Gini coefficient for the CIS and Baltic states varied within the limits of 0.27 to 0.4; for the countries of Central and Eastern Europe, from 0.26 to 0.39; and for the countries of Western Europe, from 0.25 to 0.36.

TABLE 3.23

Recorded official unemployment as a percentage of total labor force in Hungary, Poland, the Russian Federation, and Ukraine, 1991-2010

Year	Hungary	Poland	Russia	Ukraine
1991	...	8.975	...	...
1992	9.941	12.925	...	...
1993	12.098	14.992	...	...
1994	10.982	16.492	7.017	...
1995	10.432	15.208	8.300	...
1996	10.109	14.292	9.258	1.300
1997	8.912	11.492	10.808	2.300
1998	7.926	9.975	11.875	3.700
1999	7.057	11.992	12.617	4.200
2000	6.440	14.008	10.492	4.100
2001	5.765	18.000	9.033	3.600
2002	5.870	19.700	8.133	3.700
2003	5.932	19.900	8.625	3.500
2004	6.084	19.600	8.175	3.500
2005	7.278	18.200	7.583	3.100
2006	7.200	16.900	7.000	3.500
2007	7.700	16.000	6.600	3.800
2008	7.400	15.200	6.400	4.100
2009	6.800	14.600	6.300	4.400
2010	6.400	13.700	6.100	4.800

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

Values of the Gini coefficient indicate that inequality in income distribution among different socio-economic strata of population in the CIS and Baltic states was analogous to income

inequalities in the countries of Central and Eastern Europe and was slightly higher than in the countries of Western Europe.

The Gini coefficient in Ukraine was equal to the Gini coefficient in Germany and was lower than the average for the CIS countries as well as EU member countries. Hence, by the time Ukraine had successfully formed a predominantly market economy, inequality in income distribution was at a socially acceptable level and at par with the leading world economies.

3.3. Macroeconomic and Social Indicators of the Former Soviet Bloc

An analysis of the Gini coefficient is useful in making a transition to an analysis of statistical data on population's income and well-being in Ukraine, the Russian Federation, Poland, and Hungary.

3.3.1. Population Income in Ukraine, the Russian Federation, Poland, and Hungary

Statistics on personal disposable income in Ukraine, the Russian Federation, Poland and Hungary for the period of 1991-2010 are presented in tables 3.24-3.27. Personal disposable income in Poland and Hungary increased continuously during the period of 1991-2006 and according to forecasts will continue to do so at least till 2010. Personal disposable income in Ukraine has increased steadily since 2000 and in the Russian Federation—since 1999. Personal disposable income in Ukraine experienced a decline in 1998-1999 and bottomed out at 15.127 billion USD in 2000. However, even this minimum was higher than the level of 1993, which was equivalent to 15.127 billion USD. Personal disposable income in the Russian Federation experienced a decline in 1998-1999, reaching a low of 114.180 billion USD in 1999. As was the case with Ukraine, the minimum of 1999 in the Russian Federation was higher than the level of 1993, which was equivalent to 88.190 billion USD.

TABLE 3.24

Personal disposable income, billion USD, in Ukraine, the Russian Federation, Poland and Hungary, 1991-2010

Year	Hungary	Poland	Russia	Ukraine
1991	26.972	50.260	…	…
1992	31.277	59.409	…	…
1993	31.266	60.121	88,190.800	15.127
1994	33.536	65.897	147,103.100	17.916
1995	34.116	85.986	188,855.500	19.864
1996	34.479	97.799	246,190.300	30.812
1997	34.101	99.861	283,778.200	34.235
1998	35.655	110.099	180,462.100	27.460
1999	35.707	109.915	114,180.000	18.062
2000	34.406	114.829	135,613.700	17.216
2001	39.487	132.043	170,262.300	22.160
2002	50.754	134.270	201,126.200	26.539
2003	67.128	146.006	262,608.900	30.487
2004	80.500	163.890	337,685.900	38.839
2005	89.695	197.188	426,308.800	54.322
2006	91.500	219.900	539,735.900	69.600
2007	112.600	251.700	646,821.900	80.600
2008	120.100	261.200	714,170.700	93.600
2009	128.500	274.100	782,416.400	106.300
2010	135.300	288.000	855,000.800	119.700

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006.

Contrary to common belief, personal disposable income in Ukraine during the period of 1993 to 1996 was increasing, not decreasing. It more than doubled, growing from 15.127 billion USD to 34.235 billion USD. The same can be said about the Russian Federation, where personal disposable income has

tripled, increasing from 88.190 billion USD in 1993 to 273.666 billion USD in 1996.

TABLE 3.25

Real personal disposable income (USD at 1996 prices) billion USD, in Ukraine, the Russian Federation, Poland and Hungary, 1991-2010

Year	Hungary	Poland	Russia	Ukraine
1991	33.557	83.995	…	…
1992	31.718	88.501	…	…
1993	32.868	91.495	295,092.800	38.382
1994	34.400	94.689	266,419.800	36.130
1995	34.177	91.777	240,806.800	34.057
1996	34.479	97.799	246,190.300	30.812
1997	35.338	105.842	273,666.800	29.620
1998	37.229	112.325	239,651.200	28.417
1999	37.396	119.740	218,659.100	25.320
2000	39.244	124.736	243,289.200	26.275
2001	42.256	130.244	264,439.600	29.166
2002	46.436	127.748	290,107.800	34.566
2003	50.458	131.912	329,192.900	37.981
2004	52.403	135.052	355,966.900	44.528
2005	54.434	141.089	391,612.000	52.810
2006	56.300	149.900	435,599.600	58.000
2007	57.900	157.100	481,819.300	63.100
2008	59.100	164.100	527,411.600	68.900
2009	61.700	171.200	575,480.000	76.200
2010	63.500	178.300	625,769.300	83.500

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006.

According to the data and forecasts presented in Table 3.25, real personal disposable income in Ukraine can double

during the period of 2004-2010 and reach 83.5 billion USD. Real personal disposable income in the Russian Federation can double as well, perhaps reaching as much as 625.769 billion USD in 2010.

TABLE 3.26

Real personal disposable income (percent change per annum) in Ukraine, the Russian Federation, Poland and Hungary, 1991-2010

Year	Hungary	Poland	Russia	Ukraine
1991	...	...	…	…
1992	-5.478	5.365	…	…
1993	3.623	3.382	...	...
1994	4.661	3.492	-9.717	-5.866
1995	-0.648	-3.075	-9.614	-5.740
1996	0.885	6.561	2.236	-9.526
1997	2.492	8.224	11.161	-3.868
1998	5.351	6.125	-12.430	-4.062
1999	0.448	6.601	-8.759	-10.901
2000	4.940	4.173	11.264	3.771
2001	7.677	4.415	8.694	11.004
2002	9.892	-1.916	9.707	18.514
2003	8.661	3.260	13.473	9.880
2004	3.855	2.381	8.133	17.239
2005	3.876	4.470	10.014	18.599
2006	3.500	6.300	11.200	9.900
2007	2.700	4.800	10.600	8.700
2008	2.200	4.500	9.500	9.200
2009	4.300	4.300	9.100	10.600
2010	3.000	4.100	8.700	9.600

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006.

Data in Table 3.26 indicate significant and sustainable growth in real personal disposable income in Ukraine since 2000. Real personal disposable income in the Russian Federation has also increased steadily since 2000. An increase in real personal disposable income in Poland and Hungary has occurred since 1996, but the rate of increase in these countries is significantly lower than in Ukraine and the Russian Federation.

Dynamics of real personal disposable income in constant prices in Ukraine for the period of 1993-2010 is presented in Figure 3.35.

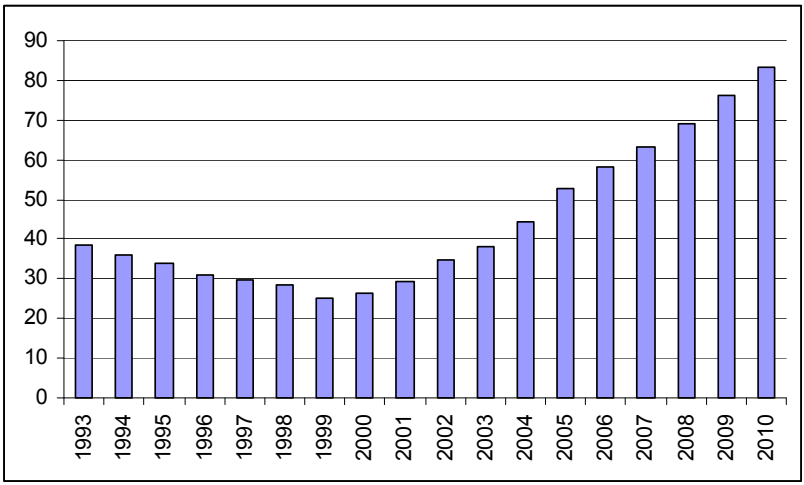

Figure 3.35. Real personal disposable income (USD at 1996 prices), bln USD, in Ukraine, 1993-2010

Dynamics of real personal disposable income in Ukraine for the period of 1993-2010 is presented in Figure 3.36.

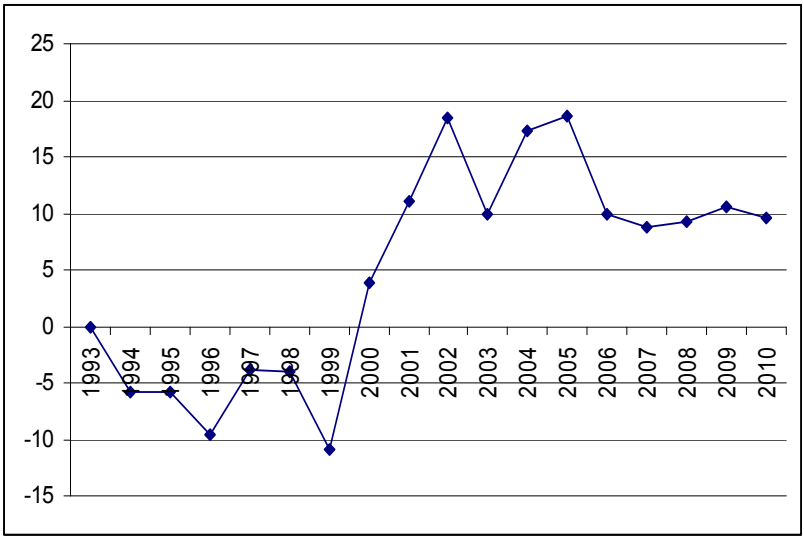

Figure 3.36. Real personal disposable income (percent change pa) in Ukraine, 1993-2010

The high rate of increase in real personal disposable income in Ukraine that started in 2000 reached a phenomenal 18.5 percent in 2002. This indicator is expected to stay at the average of 10 percent till 2010.

Dynamics of real personal disposable income in constant prices in the Russian Federation for the period of 1993-2010 are presented in Figure 3.37.

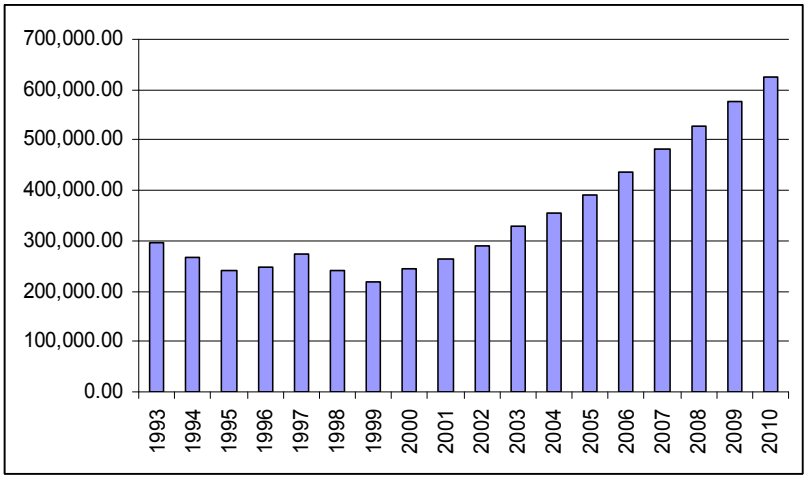

Figure 3.37. Real personal disposable income (USD at 1996 prices), bln USD, in the Russian Federation, 1993-2010

Dynamics of real personal disposable income in the Russian Federation for the period of 1993-2010 are presented in Figure 3.38.

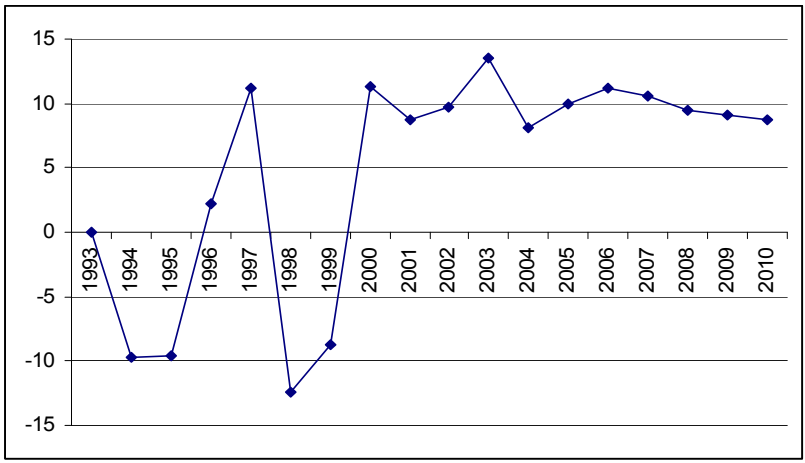

Figure 3.38. Real personal disposable income (percent change pa) in the Russian Federation, 1993-2010

The high rate of increase in real personal disposable income in the Russian Federation that started in 2000 reached 13.5 percent in 2003. This indicator is expected to stay at an average of 10 percent till 2010. The financial and currency crisis of 1998 in the Russian Federation is well-reflected as a percentage change in the dynamics of the real personal disposable income. The dramatic decline in real personal disposable income in the country was followed by a no less dramatic increase of 11.3 percent in 2000.

The rate of increase in real personal disposable income in the Russian Federation was negative during the periods of 1993 to 1995 and from 1998 to 1999. The latter period of decline is explained by the currency crisis, when the Russian economy experienced a more significant negative impact than did the Ukrainian economy. Dynamics of real personal disposable income in constant prices in Poland for the period of 1993-2010 are presented in Figure 3.39.

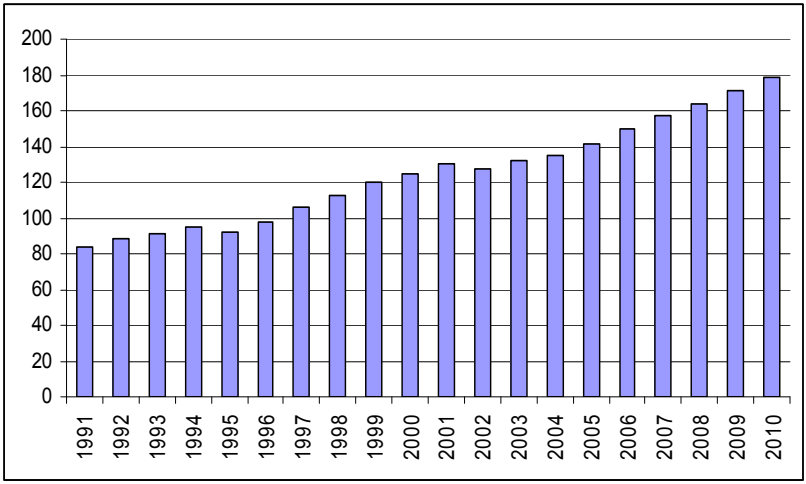

Figure 3.39. Real personal disposable income (USD at 1996 prices), bln USD, in Poland, 1991-2010

Real personal disposable income in Poland experienced a stable increase since 1991, with only two short-term periods of decline, specifically a decline of 3 percent in 1995 and another decline of 2 percent in 2002.

Dynamics of real personal disposable income in Poland for the period of 1993-2010 are presented in Figure 3.40.

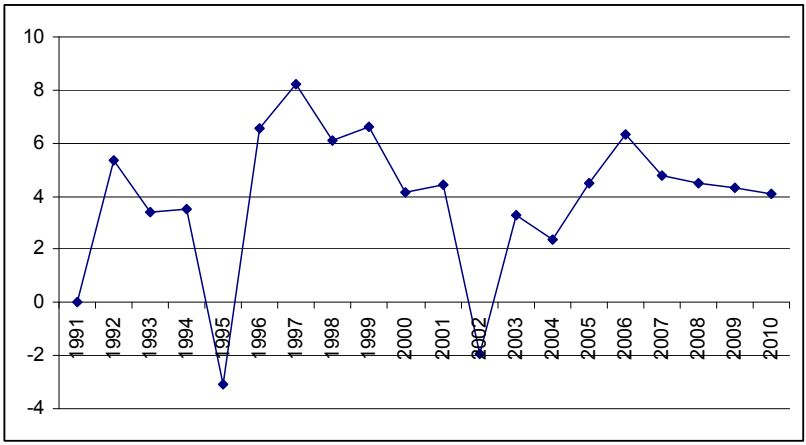

Figure 3.40. Real personal disposable income (percent change pa) in Poland, 1991-2010

The rate of increase in real personal disposable income in Poland did not fluctuate as much as it did in Ukraine. The peak here was in 1997 and constituted an increase of 8 percent. Forecasts for the real personal disposable income in Poland are also much more modest than in Ukraine and the Russian Federation, with the annual rate of increase predicted to be around 4.5 percent. Dynamics of real personal disposable income in constant prices in Hungary for the period of 1993-2010 are presented in Figure 3.41. Real personal disposable income in Hungary has experienced a stable increase since 1991, with only two short-term periods of negative growth, specifically a decline of 6 percent in 1992 and later a decline of less than 1 percent in 1995.

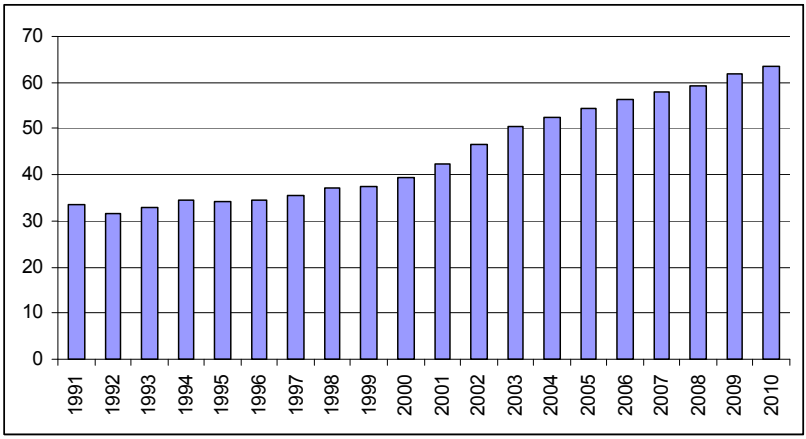

Figure 3.41. Real personal disposable income (USD at 1996 prices), bln USD, in Hungary, 1991-2010

Dynamics of real personal disposable income in Hungary for the period of 1993-2010 are presented in Figure 3.42.

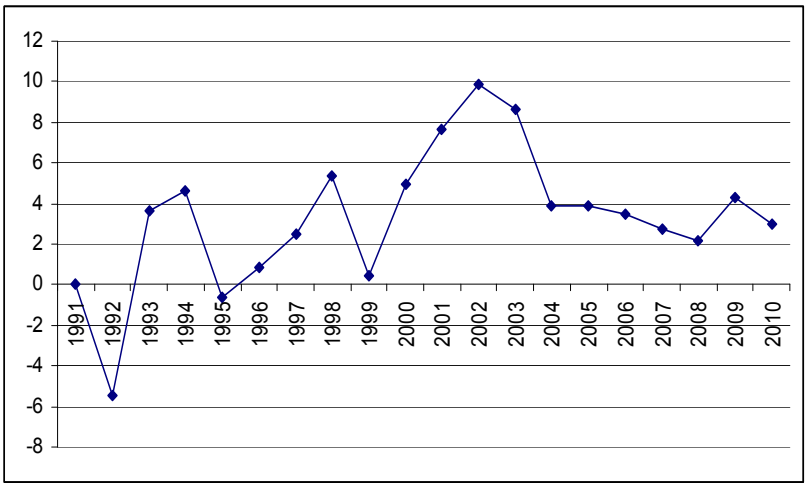

Figure 3.42. Real personal disposable income (percent change pa) in Hungary, 1993-2010

The rate of increase in real personal disposable income in Hungary was at its highest in 1997 when it reached 10 percent. Forecasts for the real personal disposable income in Hungary show an annual rate of increase of 2 to 4 percent.

3.3.2. Dynamics of Personal Income and CPI in Ukraine, the Russian Federation, Poland, and Hungary

Selected indicators of private consumption in Ukraine for the period of 1991-2010 are presented in Table 3.27.

Private consumption in Ukraine experienced an increase during the entire period of 1993-2006, except for 1998 and 1999, when it declined to 30.536 billion USD and 22.056 billion USD, respectively. Starting from 21.304 billion USD in 2000, private consumption grew to 57.47 billion USD in 2005. Increase in private consumption in the country is expected to reach 124.87 billion USD by 2010.

Real private consumption in constant prices of 1996 in Ukraine was equal to 58.326 billion USD in 1991. The recovery was achieved only in 2005 with 55.867 billion USD. This trend is expected to continue with real private consumption reaching 87.159 billion USD in 2010, i.e. 1.5 times higher than in 1991.

Dynamics of real private consumption in constant prices in Ukraine for the period of 1991-2010 are presented in Figure 3.43.

TABLE 3.27

Selected indicators of private consumption in Ukraine, 1991-2010

Year	Real private consumption (USD at 1996 prices)	Private consumption (% real change pa)	Private consumption , contribution to real GDP growth (%)	Private consumption per head
1991	58.326	-9.376	-4.537	...
1992	52.925	-9.259	-4.447	...
1993	39.185	-25.961	-12.559	297.80
1994	35.713	-8.861	-3.699	344.00
1995	35.032	-1.906	-0.941	400.00
1996	31.703	-9.503	-5.239	626.10
1997	31.185	-1.636	-0.907	717.30
1998	31.601	1.334	0.750	612.60
1999	30.919	-2.158	-1.253	446.00
2000	32.513	5.157	2.936	434.50
2001	34.299	5.492	3.105	540.20
2002	37.557	9.500	5.200	603.40
2003	42.215	12.400	7.000	714.20
2004	47.914	13.500	7.900	887.30
2005	55.867	16.600	9.800	1,229.30
2006	60.908	9.000	6.100	1,570.00
2007	66.086	8.500	5.900	1,830.00
2008	72.033	9.000	6.400	2,130.00
2009	79.597	10.500	7.700	2,420.00
2010	87.159	9.500	7.200	2,740.00

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics, IMF, International Financial Statistics.

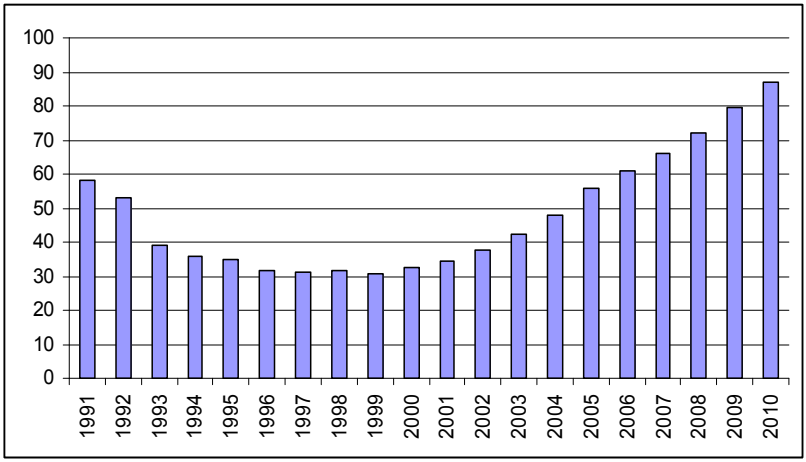

Figure 3.43. Real private consumption (USD at 1996 prices), bln USD, in Ukraine, 1991-2010

Dynamics of real private consumption in Ukraine for the period of 1991-2010 are presented in Figure 3.44.

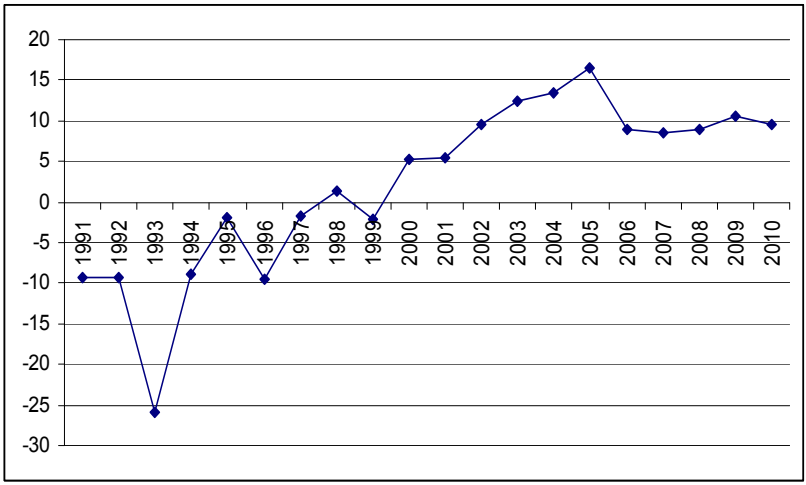

Figure 3.44. Private consumption (percent real change per annum) in Ukraine, 1991-2010

The rate of growth of private consumption in Ukraine experienced a dramatic decline of 25.9 percent in 1993 but then increased continuing increase starting in 2000 with highs of 12.4, 13.5, and 16.6 percent in 2004, 2005, and 2006, respectively. It is expected to be positive and vary within the limits of 9 to 10 percent per annum till 2010.

Dynamics of private consumption per head in Ukraine for the period of 1991-2010 are presented in Figure 3.45.

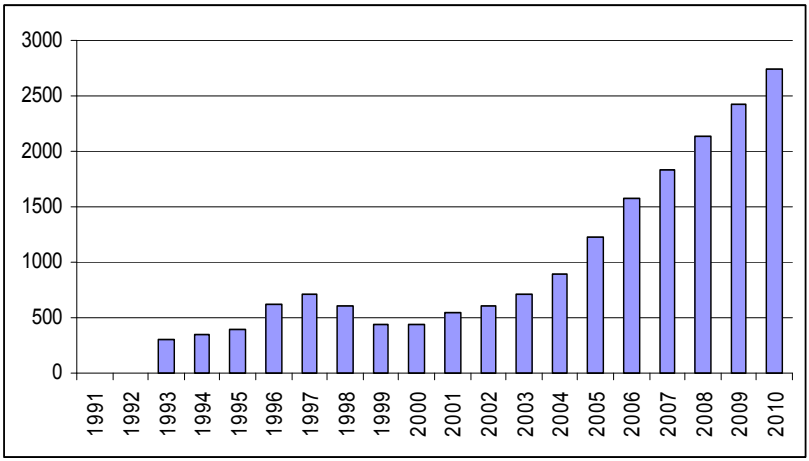

Figure 3.45. Private consumption per head, USD, in Ukraine, 1991-2010

Private consumption always played a significant role in the structure of GDP growth. Negative trends in private consumption in 1991-1999 should be correlated with the negative GDP growth. The impact of private consumption on GDP growth was less significant during its decline and more significant during its increase. It is expected that future GDP growth will rely heavily on an increase in private consumption.

The contribution of private consumption to real GDP growth in Ukraine for the period of 1991-2010 is presented in Figure 3.46.

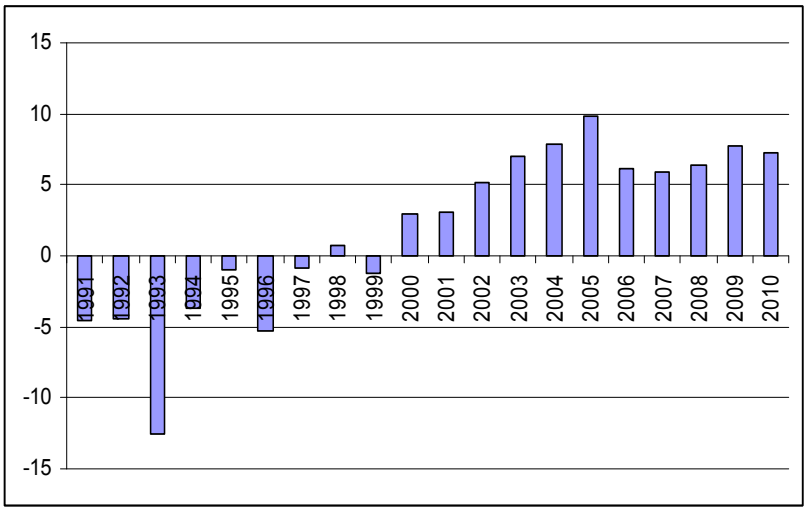

Figure 3.46. Private consumption, contribution to real GDP growth (percentage points), in Ukraine, 1991-2010

Private consumption per capita in Ukraine increased from 297.8 USD in 1993 to 717.3 USD in 1997 and then declined to 434.5 USD in 2000. This decline was followed by an increase to 1229.3 USD in 2005. Private consumption per capita is expected to reach 2740 USD by 2010.

Selected indicators of private consumption in the Russian Federation for the period of 1991-2010 are presented in Table 3.28.

TABLE 3.28

Selected indicators of private consumption in the Russian Federation, 1991-2010

Year	Real private consumption (USD at 1996 prices)	Private consumption (% real change pa)	Private consumption , contribution to real GDP growth (%)	Private consumption per head
1991	294.536	-2.761	-1.227	...
1992	274.961	-6.646	-3.024	...
1993	259.804	-5.512	-2.739	522.90
1994	235.854	-9.218	-4.740	877.40
1995	208.105	-11.766	-6.291	1,100.00
1996	203.972	-1.986	-0.977	1,376.70
1997	213.819	4.828	2.415	1,497.30
1998	206.784	-3.290	-1.701	1,053.30
1999	200.878	-2.856	-1.508	711.80
2000	215.202	7.131	3.438	817.50
2001	235.186	9.286	4.360	1,037.00
2002	254.701	8.298	4.052	1,215.60
2003	273.406	7.344	3.709	1,508.50
2004	304.123	11.235	5.679	2,003.90
2005	337.205	10.878	5.708	2,559.50
2006	376.924	11.800	6.400	3,270.00
2007	419.063	11.200	6.400	3,950.00
2008	460.890	10.000	6.000	4,400.00
2009	505.051	9.600	6.100	4,860.00
2010	550.407	9.000	6.000	5,340.00

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics, IMF, International Financial Statistics.

Nominal private consumption in the Russian Federation has increased continuously since 1993, except for the crisis years of 1998 and 1999. It is expected that nominal private consumption in 2010 will be equal to 752.03 billion USD, i.e. ten times higher than it was in 1993.

Real private consumption in 1996 prices in the Russian Federation was declining from 294.536 billion USD in 1991 to 200.878 billion USD in 1999. After 1999 there was a steady increase in real private consumption. The level of private consumption in 1991 was achieved in 2003. It is expected that real private consumption in 2010 will be equal to 550.407 billion USD, i.e. two times higher than it was in 1991.

Dynamics of real private consumption in 1996 prices in the Russian Federation for the period of 1991-2010 are presented in Figure 3.47.

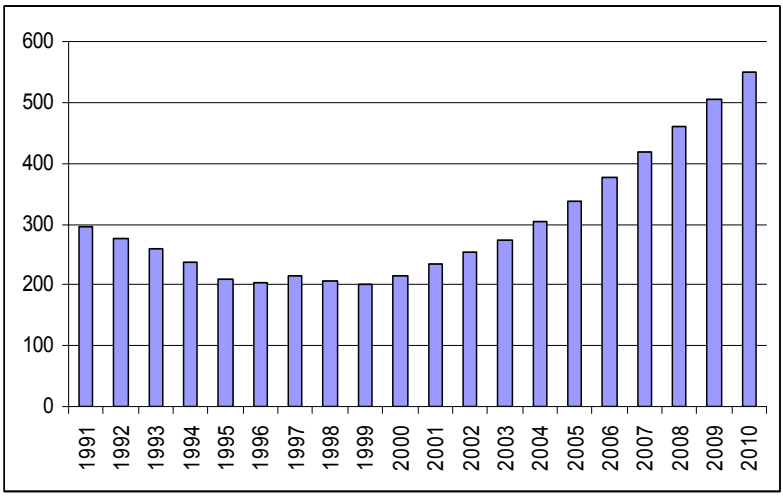

Figure 3.47. Real private consumption (USD at 1996 prices), bln USD, in the Russian Federation, 1991-2010

Dynamics of percent change in private consumption in the Russian Federation for the period of 1991-2010 are presented in Figure 3.48.

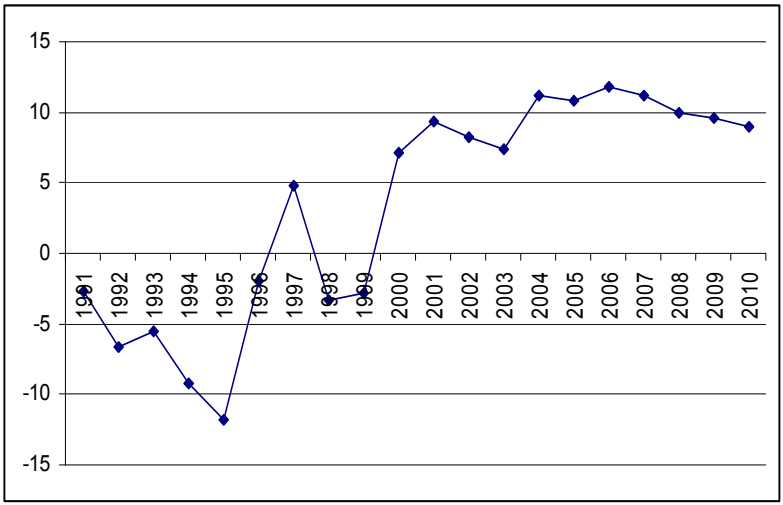

Figure 3.48. Private consumption (percent real change per annum) in the Russian Federation, 1991-2010

Private consumption in the Russian Federation declined starting in 1991, with its most significant decline of 11.766 percent in 1995 and declines of 3.29 percent in 1998 and 2.856 percent in 1999. Starting in 2000, however, there was an increase in private consumption, which reached an annual level of 11 to 12 percent in 2004-2007.

Dynamics of private consumption per capita in the Russian Federation for the period of 1991-2010 are presented in Figure 3.49.

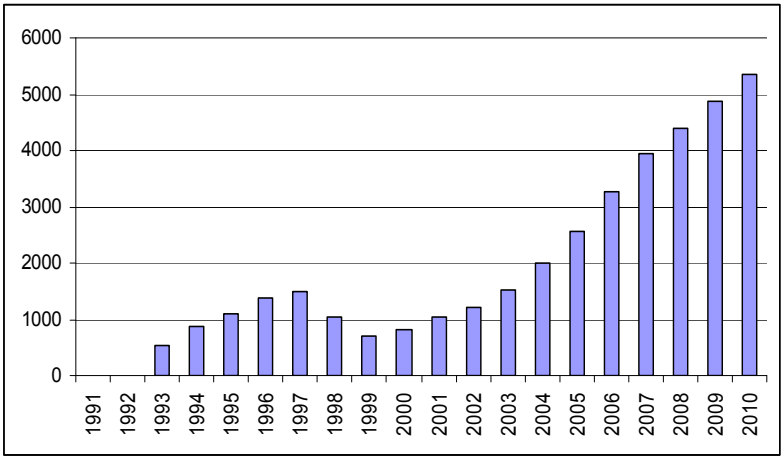

Figure 3.49. Private consumption per head, USD, in the Russian Federation, 1991-2010

As is the case with Ukriane, in the Russian Federation private consumption has always played a significant role in the structure of GDP growth. Negative trends in private consumption in 1991-1999 should be correlated with the negative GDP growth. The impact of private consumption on GDP growth was less significant during its decline and more significant during its increase. It is expected that future GDP growth will rely heavily on an increase in private consumption. An increase of 6.4 percent in private consumption in 2006 coincides with the highest level of GDP growth.

Dynamics of contribution of private consumption to real GDP growth in the Russian Federation for the period of 1991-2010 are presented in Figure 3.50.

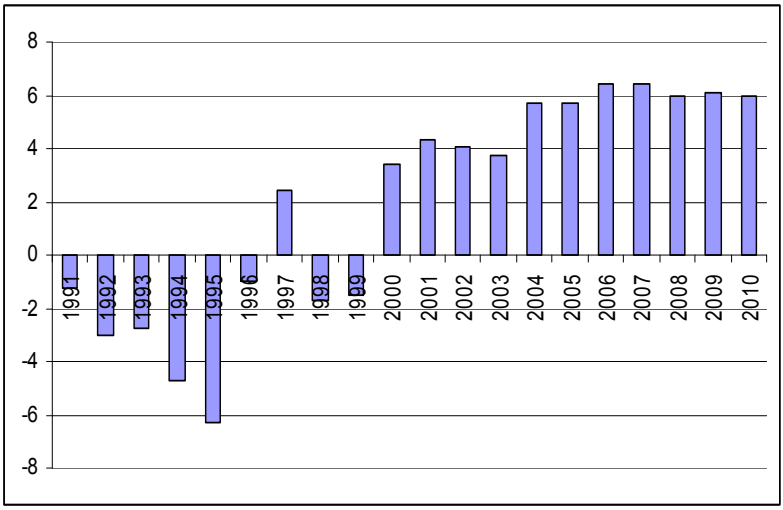

Figure 3.50. Private consumption, contribution to real GDP growth (percentage points), in the Russian Federation, 1991-2010

Personal consumption per capita in the Russian Federation has reached 2559.5 USD in 2005 and is expected to grow to 5340 USD in 2010.

Selected indicators of private consumption in Poland for the period of 1991-2010 are presented in Table 3.29.

Except for the crisis year of 1998, when there was a slight decline from 105.8 billion USD to 104.5 billion USD, nominal personal consumption has increased continuously since 1991, and reached 187.6 billion USD in 2005. It is expected that nominal private consumption in 2010 will be equal to 267.3 billion USD, i.e. six times higher than it was in 1991.

Real private consumption in 1996 prices in Poland was equal to 75.738 billion USD in 1991. A relatively slow but steady increase in real private consumption resulted in a total of 146.467 billion USD in 2007. It is expected that real private consumption in 2010 will be equal to 165.522 billion USD, i.e. two times higher than it was in 1991.

TABLE 3.29

Selected indicators of private consumption in Poland, 1991-2010

Year	Real private consumption (USD at 1996 prices)	Private consumption (% real change pa)	Private consumption, contribution to real GDP growth (%)	Private consumption per head
1991	75.738	6.636	3.639	1,185.70
1992	77.674	2.556	1.607	1,361.40
1993	82.490	6.200	3.895	1,413.10
1994	85.608	3.780	2.430	1,551.30
1995	88.347	3.200	2.029	2,155.30
1996	96.059	8.729	5.338	2,501.20
1997	102.860	7.080	4.433	2,527.50
1998	107.992	4.990	3.124	2,758.40
1999	113.836	5.411	3.387	2,726.10
2000	117.318	3.059	1.931	2,820.40
2001	119.850	2.158	1.348	3,176.60
2002	123.843	3.332	2.102	3,404.80
2003	126.191	1.896	1.219	3,655.90
2004	131.597	4.284	2.704	4,182.40
2005	134.248	2.015	1.259	4,916.10
2006	140.210	4.400	2.700	5,390.00
2007	146.467	4.500	2.700	6,160.00
2008	152.535	4.100	2.500	6,380.00
2009	158.785	4.100	2.500	6,690.00
2010	165.522	4.200	2.600	7,040.00

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics, IMF, International Financial Statistics.

Dynamics of real private consumption in 1996 prices in Poland for the period of 1991-2010 are presented in Figure 3.51.

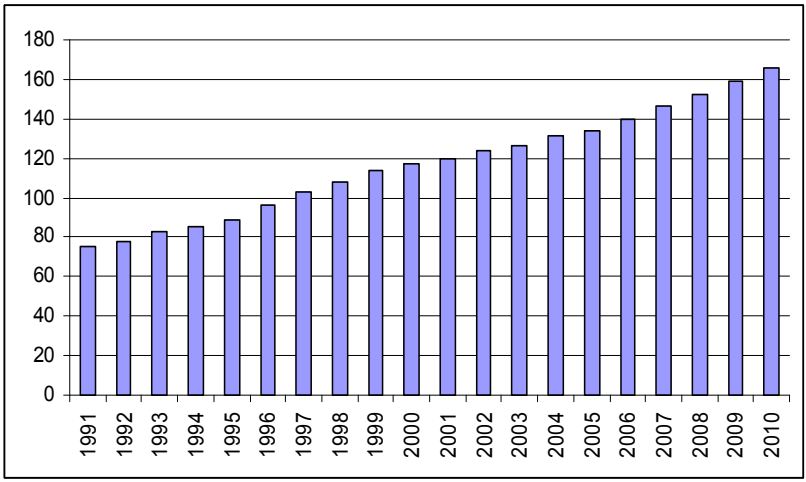

Figure 3.51. Real private consumption (USD at 1996 prices), bln USD, in Poland, 1991-2010

The most significant percentage increase of 8.729 percent in real private consumption in Poland took place in 1996. The increase in personal consumption in Poland is uniform and not as rapid as in Ukraine and the Russian Federation. Personal consumption in Poland is expected to grow at a rate of 4 to 4.5 percent per annum starting in 2006.

Dynamics of percent change in private consumption in Poland for the period of 1991-2010 are presented in Figure 3.52.

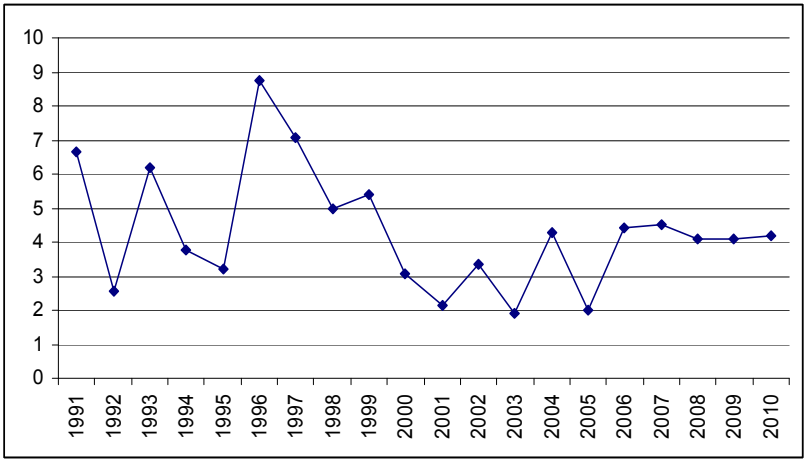

Figure 3.52. Private consumption (percent real change per annum) in Poland, 1991-2010

Dynamics of private consumption per capita in Poland for the period of 1991-2010 are presented in Figure 3.53.

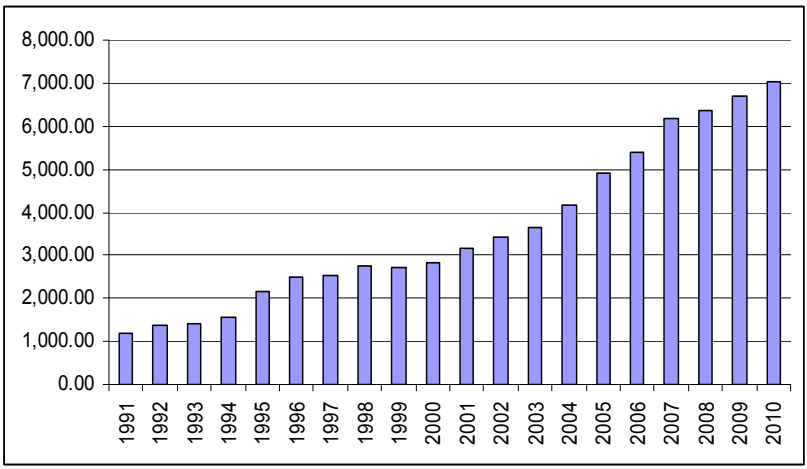

Figure 3.53. Private consumption per head, USD, in Poland, 1991-2010

Personal consumption per capita in Poland has doubled during the period of 1991-1996, increasing from 1185.7 USD to 2501.2 USD, and has continued to grow, reaching 5390 USD in 2006. Growth in per capita personal consumption is expected to continue till 2010 when it will reach 7040 USD.

The contribution of private consumption was significant during the entire period of transition. Dynamics of contribution of private consumption to GDP growth in Poland for the period of 1991-2010 are presented in Figure 3.54.

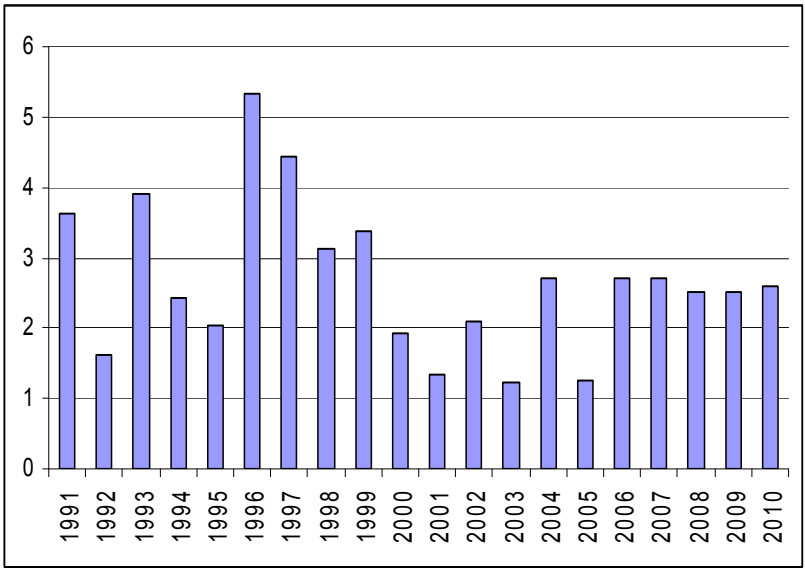

Figure 3.54. Private consumption, contribution to real GDP growth (percentage points), in Poland, 1991-2010

Selected indicators of private consumption in Hungary for the period of 1991-2010 are presented in Table 3.30.

TABLE 3.30

Selected indicators of private consumption in Hungary, 1991-2010

Year	Real private consumption (USD at 1996 prices)	Private consumption (% real change pa)	Private consumption , contribution to real GDP growth (%)	Private consumption per head
1991	29.082	-10.060	-6.598	2,255.20
1992	27.489	-5.478	-3.668	2,619.30
1993	30.186	9.812	6.406	2,780.00
1994	30.754	1.882	1.357	2,907.20
1995	29.725	-3.347	-2.388	2,882.00
1996	28.827	-3.022	-2.053	2,805.90
1997	29.310	1.676	1.090	2,760.80
1998	30.668	4.635	2.932	2,876.40
1999	32.125	4.750	2.998	3,015.30
2000	34.316	6.820	4.329	2,967.80
2001	36.321	5.844	3.738	3,357.40
2002	39.835	9.675	6.278	4,318.00
2003	42.947	7.813	5.356	5,680.80
2004	44.261	3.059	2.187	6,777.40
2005	45.198	2.116	1.482	7,440.00
2006	46.188	2.200	1.500	7,520.00
2007	46.865	1.500	1.000	9,160.00
2008	47.594	1.600	1.000	9,730.00
2009	48.724	2.400	1.500	10,250.00
2010	50.166	3.000	1.900	10,820.00

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics, IMF, International Financial Statistics.

Nominal personal consumption has increased continuously since 1991, except for the crisis years of 1995, 1996, and 1997, when there was a slight decline from 29.981 billion USD in 1994 to 28.283 billion USD in 1997. Starting from 29.371 billion USD in 1998, nominal personal consumption reached 74.47 billion USD in 2005, i.e. almost tripled. It is expected that nominal private consumption in 2010 will be equal to 106.92 billion USD, i.e. four times higher than it was in 1991. Real private consumption in 1996 prices in Hungary was equal to 29.082 billion USD in 1991. Growth in real private consumption was interrupted slightly in 1992, 1995, and 1996. A relatively slow but steady increase in real private consumption resulted in a total of 46.865 billion USD in 2007. It is expected that real private consumption in 2010 will be equal to 50.166 billion USD, i.e. 1.7 times higher than it was in 1991.

Dynamics of real private consumption in 1996 prices in Poland for the period of 1991-2010 are presented in Figure 3.55.

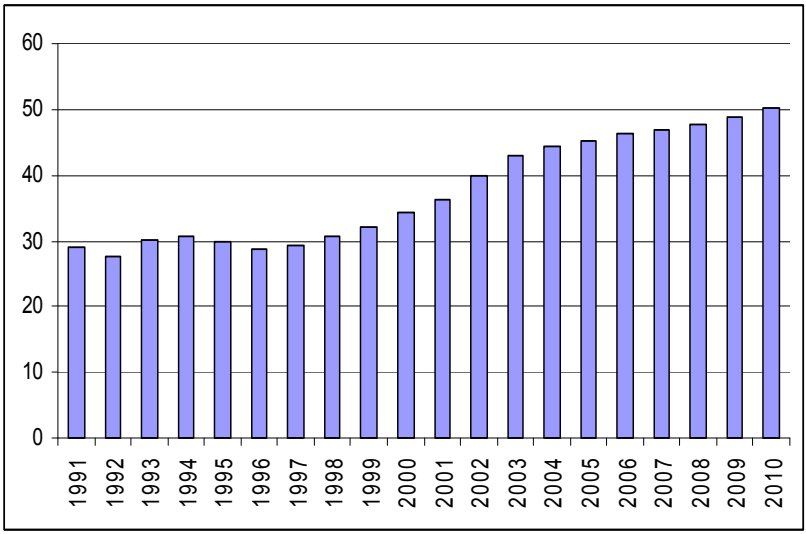

Figure 3.55. Real private consumption (USD at 1996 prices), bln USD, in Hungary, 1991-2010

The most significant percentage decrease of 10.06 percent in real private consumption in Hungary took place in 1991. A significant percentage increase in personal consumption in Hungary started in 1993 with 9.8 percent. Declines in 1995 and 1996 were followed by an especially high annual increase of 6 to 9.7 percent during 2000-2003. Starting in 2006 the percentage increase in personal consumption is expected to vary within the limits of 1.5 to 3 percent per annum.

Dynamics of percent change in private consumption in Poland for the period of 1991-2010 are presented in Figure 3.56.

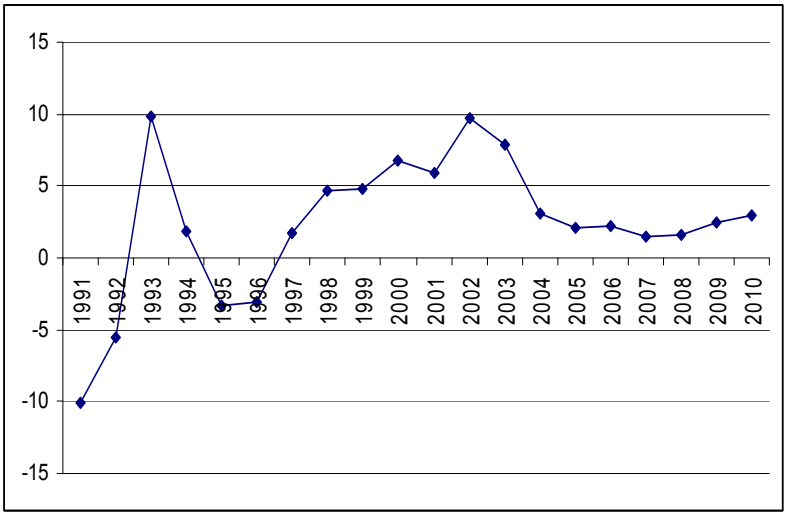

Figure 3.56. Private consumption (percent real change per annum) in Hungary, 1991-2010

Dynamics of private consumption per capita in Poland for the period of 1991-2010 are presented in Figure 3.57.

Personal consumption per capita in Hungary increased from 2255.20 USD in 1991 to 7520 USD in 2006. Growth in per capita personal consumption is expected to continue till 2010 when it will reach 10820 USD.

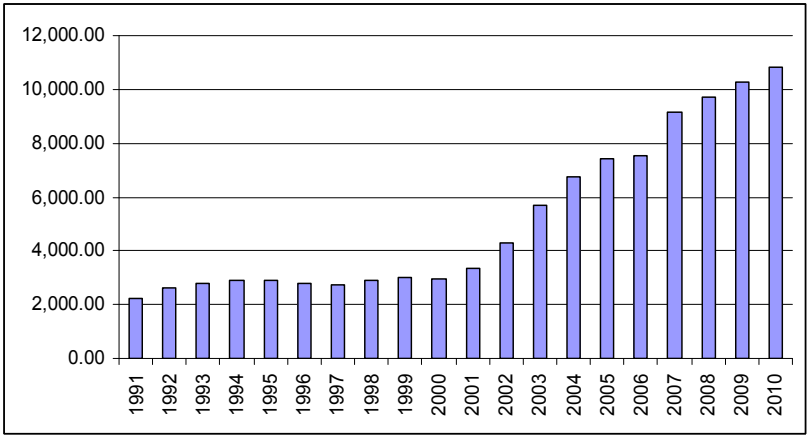

Figure 3.57. Private consumption per head, USD, in Hungary, 1991-2010

The contribution of private consumption to GDP growth was significant during the entire period of transition. Dynamics of contribution of private consumption to GDP growth in Hungary for the period of 1991-2010 are presented in Figure 3.58.

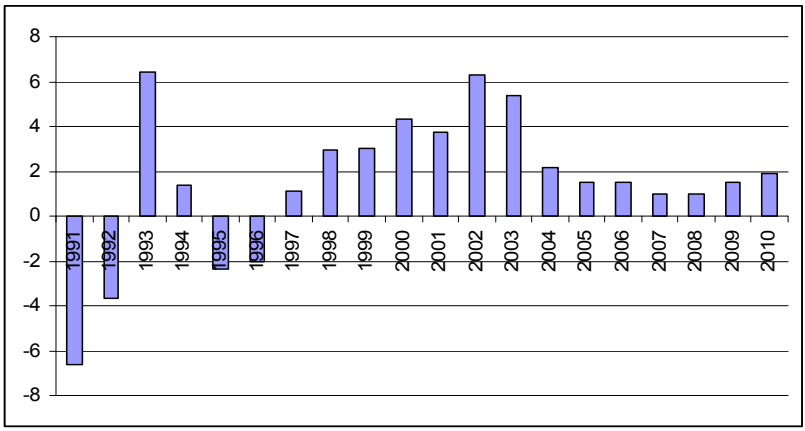

Figure 3.58. Private consumption, contribution to real GDP growth (percentage points), in Hungary, 1991-2010

The rate of increase in nominal private consumption in Ukraine and the Russian Federation is expected to be significantly higher than in Poland and Hungary. There is a certain degree of bias in inter-country statistics on private consumption as well as in other indicators.

The bias in statistical data in inter-country analysis is commonplace and is normally checked based on purchasing power parity indicators as well as other specific comparisons. This makes inter-country comparisons difficult and somewhat biased. Hence, we focus on intra-country dynamics of countries in transition and not on absolute values of certain national macroeconomic indicators. Then we analyze inter-country dynamics of the previously defined macroeconomic indicators.

Simple inter-country comparisons are less accurate and therefore less useful in the case of transition economies than in the case of Western European economies. Personal consumption per capita in Hungary in 1993 was equal to 2780 USD, i.e. nine times higher than in Ukraine. This demonstrates the partiality of simple comparisons.

Problems with simple comparisons are not limited to transition economies and not unique. Such problems exist to a lesser degree in EU countries. For instance according to statistics per capita GDP in Luxemburg is 1.5 times higher than in Germany. GDP per capita in Japan in nominal USD is equal to 34000 USD in 2005 and is 1.5 times higher than in Canada (around 23000 USD). At the same time per capita GDP in terms of PPP in Japan and Canada are about the same and constitute around 77 percent of the US's per capita GDP.

Dynamics of the Consumer price index in Ukraine for the period of 1992 to 2010 are presented in Table 3.31.

TABLE 3.31

Consumer Price Index in Ukraine, 1992-2010

Year	Consumer price index (1996=100; average)	Consumer price index (end-period)	Consumer prices (% change pa; end-period)
1992	0.024	0.018	...
1993	1.173	1.875	10111.100
1994	11.626	9.395	401.190
1995	55.432	26.485	181.900
1996	100.000	37.000	39.700
1997	115.889	40.800	10.270
1998	128.103	48.900	19.853
1999	157.217	58.400	19.427
2000	201.579	73.400	25.685
2001	225.660	77.900	6.131
2002	227.338	77.500	-0.513
2003	239.181	83.900	8.258
2004	260.794	94.200	12.277
2005	296.126	103.900	10.297
2006	319.900	112.700	8.500
2007	348.700	121.800	8.000
2008	373.100	130.000	6.800
2009	397.400	138.200	6.300
2010	421.200	146.200	5.800

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

The Consumer Price Index in Ukraine has grown during the entire period of 1992 to 2010. The most significant increase in consumer prices in terms of constant 1996 prices took place

in the early 1990s. The Consumer Price Index percentage change was especially significant during the period of high inflation in 1992-1996. It has declined from 10111 percent in 1993 to 10 percent in 1997. Starting in 2001, when the CPI was equal to 6 percent, it has crossed the 10 percent threshold twice, amounting to 12.3 percent in 2004 and 10.3 percent in 2005. It is expected that the CPI will stay around 6 percent till 2010, which indicates stabilization in consumer prices.

Dynamics of the Consumer Price Index in Ukraine for the period of 1992-2010 are presented in Figure 3.59.

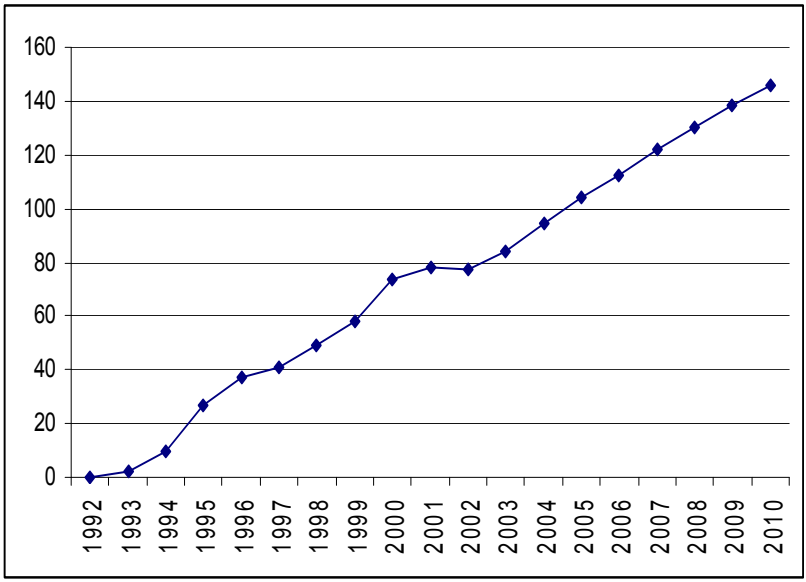

Figure 3.59. Dynamics of the Consumer Price Index in Ukraine, 1992-2010

Dynamics of the Consumer Price Index in the Russian Federation for the period of 1992 to 2010 are presented in Table 3.32.

TABLE 3.32

Consumer Price Index in the Russian Federation, 1992-2010

Year	Consumer price index (1996=100; average)	Consumer price index (end-period)	Consumer prices (% change pa; end-period)
1991	0.034	...	...
1992	0.572	...	...
1993	5.577	1.800	...
1994	22.727	5.700	216.667
1995	67.603	13.300	133.333
1996	100.000	16.200	21.805
1997	114.706	18.000	11.111
1998	146.478	33.200	84.444
1999	271.994	45.300	36.446
2000	328.558	54.400	20.088
2001	399.091	64.700	18.934
2002	462.119	74.500	15.147
2003	525.203	83.400	11.946
2004	582.509	93.100	11.631
2005	656.488	103.248	10.900
2006	720.700	113.100	9.500
2007	787.200	123.300	9.000
2008	850.600	133.100	8.000
2009	914.400	143.100	7.500
2010	979.900	153.200	7.000

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration, State Committee of Statistics.

Dynamics of the Consumer Price Index in the Russian Federation for the period of 1992-2010 are presented in Figure 3.59.

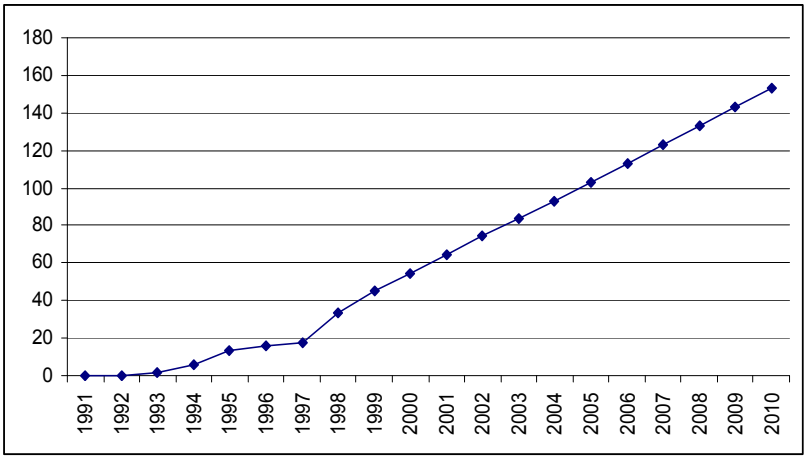

Figure 3.60. Dynamics of the Consumer Price Index in the Russian Federation, 1992-2010

The CPI in the Russian Federation appears to have been less affected by inflation during the first half of the 1990s and to have grown more rapidly starting in 1997.

3.3.3. Labor Productivity and Wages in Ukraine

Selected indicators of productivity in Ukraine, including labor productivity and labor costs for the period of 1992-2010, are presented in Table 3.33.

Annual indicators of average nominal and real wage in Ukraine for the period of 1992-2010 are presented in Tables 1 and 2 of Appendix VI. Dynamics of the average nominal and real wage index in Ukraine for the period of 1992-2010 are presented in Figures 3.61-3.63.

TABLE 3.33

Selected indicators of productivity in Ukraine, including labor productivity and labor costs, 1992-2010

Year	Labor productivity growth (%)	Labor costs per hour (USD)	Annual change in average real wage (%)	Index of average wage (1996=100)
1991	-7.2	…	…	…
1992	-8.4	0.69	…	261.063
1993	-12.1	0.35	-46.539	139.567
1994	-19.9	0.40	-16.547	116.473
1995	-14.4	0.46	9.223	127.215
1996	-8.1	0.51	-21.393	100.000
1997	-0.4	0.59	-1.855	98.145
1998	-0.6	0.47	-2.986	95.215
1999	2.1	0.33	-5.762	89.728
2000	14.4	0.32	1.107	90.721
2001	10.3	0.44	20.751	109.500
2002	4.6	0.54	20.098	131.500
2003	9.2	0.66	16.739	153.600
2004	11.4	0.85	16.980	179.600
2005	0.7	1.20	20.413	216.300
2006	4.8	1.50	13.900	246.300
2007	5.5	1.70	4.600	257.600
2008	5.4	1.92	6.500	274.500
2009	5.8	2.14	5.200	288.600
2010	5.5	2.38	5.700	305.000

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, and UNDP.

Statistics indicate that the average wage index has stabilized in 1996 and increased significantly since 2000. A continuous increase in real wages is expected till 2010.

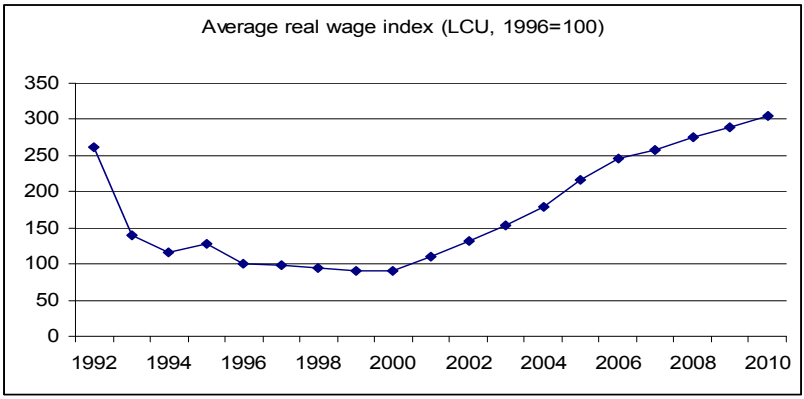

Figure 3.61. Average real wage index (LCU, 1996=100) in Ukraine, 1992-2010

The rate of growth in average real wages varies year by year. Variation in the rate of growth of average real wages in Ukraine is presented in Figure 3.62.

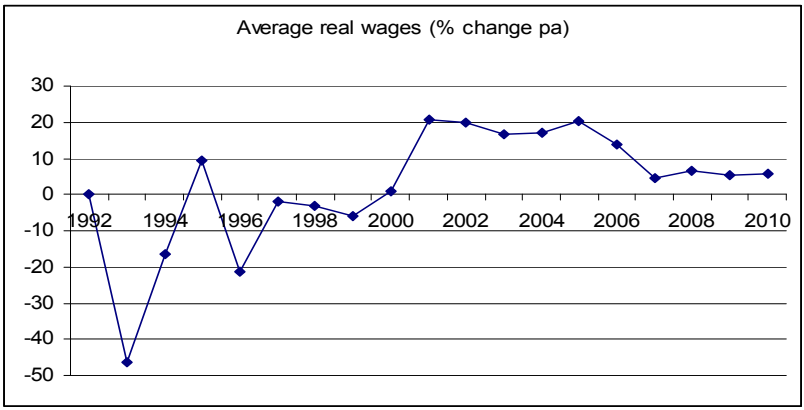

Figure 3.62. Average real wages (percent change per annum) in Ukraine, 1992-2010

Dynamics of the unit labor cost index in Ukraine are presented in Figure 3.63.

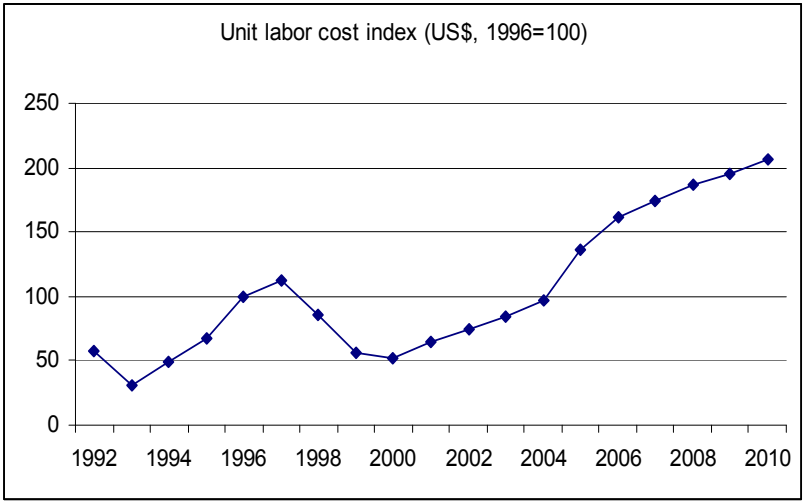

Figure 3.63. Unit labor cost index (USD, 1996=100) in Ukraine, 1992-2010

The trend in labor costs shows that labor becomes more expensive for businesses. We tend to consider such a trend as highly positive for the economy.

3.4. Human Capital

An analysis of macroeconomic indicators often underestimates qualitative characteristics. Macroeconomic indicators are aggregates that focus on the quantitative characteristics of national production. Arriving at more precise estimates of the economic situation in Ukraine as well as other transition economies, with their vectors and level of development over the last two decades, requires consideration of such fundamental socio-economic characteristics as education

and healthcare. Access to education and medical services is crucially important in characterizing living standards and the populaiton's level of personal consumption. It is equally important in an analysis of the reproduction of human capital.

Higher education and medical services are two technologically complex branches of the economy that characterize developed nations. Their complexity serves as an indicator of the level of economic development as well as the presence of conditions necessary for economic growth.

3.4.1. Access to Education, Healthcare, and Housing

The number of students in higher education institutions per 10000 population is chosen to analyze the population's access to higher education. This indicator reflects the level or stock of human capital in the countries as well as the dynamics of reproduction of human capital during significant periods of time. The numbers of students in higher education institutions per 10000 population in the NIS for the selected years during the period of 1980-1999 are presented in Table 3.34. Detailed annual statistics for the NIS are presented in tables 1 and 2 of Appendix VII.

Contrary to beliefs about the crisis situation in Ukraine, statistics point to continuous growth in the number of students in higher education institutions per 10000 population. While during independence and the beginning of market reforms in 1991 this indicator in Ukraine was equal to 168, by the year 1999 number of students enrolled in higher education institutions per 10000 population had reached 259. This indicator is slightly lower than in the Russian Federation, where the number of students per 10000 population grew from 186 in 1991 to 280 in 1999 (see also Table 2 of Appendix VII).

Dynamics of the number of students in higher education institutions per 10000 population in the NIS for the period of 1980-1989 are presented in Figure 3.64.

TABLE 3.34

Number of students in higher education institutions per 10000 population in NIS, 1980-1999

Country	1980	1985	1990	1995	1999
Azerbaijan	172	158	146	128	147
Armenia	189	163	191	97	160
Belarus	183	181	184	191	258
Georgia	168	167	190	231	248
Kazakhstan	173	172	171	165	245
Kyrgyzstan	151	144	133	142	325
Moldova	127	126	125	149	212
Russia	219	206	190	188	280
Tajikistan	142	119	128	126	130
Turkmenistan	124	119	113	70	…
Uzbekistan	172	155	165	84	68
Ukraine	176	167	170	180	259

Source: Commonwealth of Independent States (CIS) – Official Statistics, retrieved from the database in August 8, 2006.

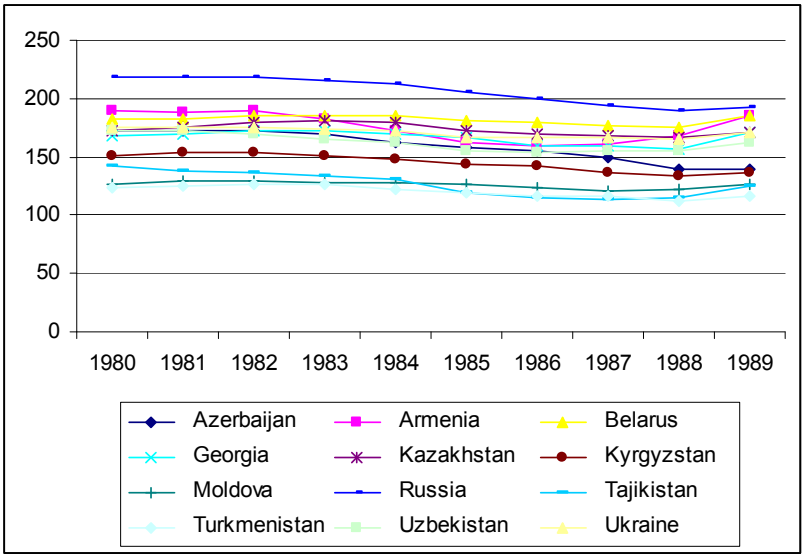

Figure 3.64. Number of students in higher education institutions per 10000 population in NIS, 1980-1989

Dynamics of the number of students in higher education institutions per 10000 population in Ukraine for the period of 1980-1989 are presented in Figure 3.65.

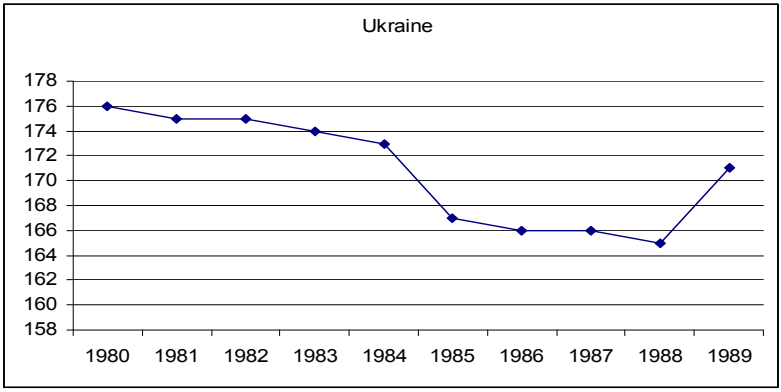

Figure 3.65. Number of students in higher education institutions per 10000 population in Ukraine, 1980-1989

Dynamics of the number of students in higher education institutions per 10000 population in the NIS for the period of 1990-1999 are presented in Figure 3.66.

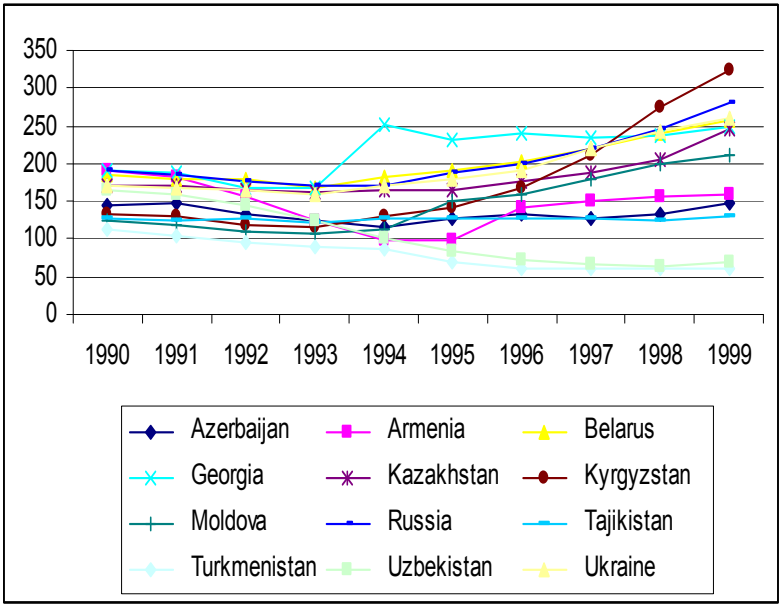

Figure 3.66. Number of students in higher education institutions per 10000 population in NIS, 1990-1999

Dynamics of the number of students in higher education institutions per 10000 population in Ukraine for the period of 1990-1999 are presented in Figure 3.67.

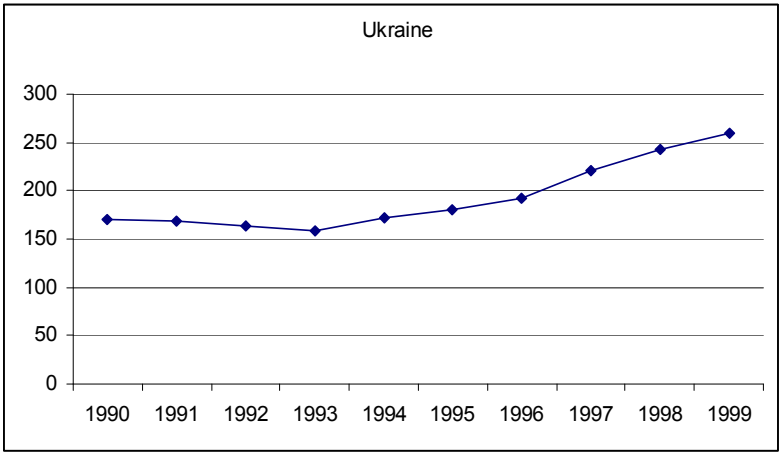

Figure 3.67. Number of students in higher education institutions per 10000 population in Ukraine, 1990-1999

Data for Ukraine indicate that during the transition the total number of students in higher education institutions per every ten thousand in the population was increasing consistently since 1993 despite the decline in some other economic indicators. This not only proves the continuous presence of positive developments in the national system of higher education based on the market reforms, but also shows continuous growth in accumulation and concentration of human capital in the national economy.

Positive trends in the development of higher education industry and increasing access of population to higher education characterize such countries as Ukraine, the Russian Federation, and Belarus, but are not necessarily characteristics of all the former soviet republics. For instance, in Azerbaijan the number of students in higher education institutions per every ten thousand in the population as an indicator of access to higher education declined till 1995 and returned to its 1991 level of 147 students only in 1999. This indicator is almost twice lower than in the Russian Federation and Ukraine. In Armenia the value of

this indicator declined from 191 in 1990 to 97 in 1995 and then increased to 160 in 1999.

In terms of access to higher education some other former republics were not able to attain their 1991 levels. The indicator of the number of students in higher education institutions per every ten thousand in the population declined in Uzbekistan from 170 in 1990 to 68 in 1999, and in Turkmenistan from 113 in 1990 to 62 in 1996. These statistics should always be correlated with demographic and migratory processes in the NIS. One should also account for students who receive their education in other countries, predominantly in other member countries of the NIS.

The high degree of development of education industry and the educational level of the population in the former USSR is confirmed by the data on literacy, educational attainment, and educational levels presented in Tables 1-8 of Appendix VIII.

The data indicate that despite economic difficulties during the transition period, the number of students in higher education institutions per every ten thousand of the population has increased consistently since 1993. This confirms not only continuous and consistent development of the education industry, but also a stable increase in the total volume and concentration of human capital in the country.

The healthcare industry or the provision of medical services is, along with the education industry, considered one of the fundamental branches of the social sphere. The healthcare industry is one of the key industries that help accumulate and preserve human capital.

One of the major international indicators of a country's socio-economic development in general and people's access to medical services is the number of physicians per ten thousand population. We offer this indicator as one of the major descriptive sources for the estimation of human capital stock and dynamics of its accumulation.

Dynamics of the number of physicians per ten thousand population in the CIS for the selected years during the period of 1980-1999 are presented in Table 3.35. Detailed annual statistics are presented in Tables 3 and 4 of Appendix VII.

TABLE 3.35

Number of physicians per 10000 population in the CIS, 1980-1999

Country	1980	1985	1990	1995	1999
Azerbaijan	33.4	37.8	38.7	37.8	35.5
Armenia	35.3	37.9	40.5	33.6	33.2
Belarus	33.8	37.8	40.5	43.6	47.8
Georgia	47.9	53.5	57.9	42	…
Kazakhstan	31.9	37.6	42.1	39.7	34.6
Kyrgyzstan	29.1	33.5	36.7	33.2	30.3
Moldova	31.1	36.8	40.0	39.6	36.7
Russia	40.4	45.1	46.9	46.0	46.9
Tajikistan	23.6	26.7	27.1	21.4	21.2
Turkmenistan	28.4	32.6	34.6	31.4	…
Uzbekistan	28.5	33.7	35.8	33.2	…
Ukraine	36.5	41.3	44.0	45.1	46.0

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

Contrary to beliefs about the critical economic situation in Ukraine, statistics point to the continuous growth in the number of physicians per 10000 population. While on the eve of independence and the beginning of market reforms in 1990 this indicator in Ukraine was equal to 44, by the year 1999 it had increased 5 percentage points, thus reaching 46. This indicator in Ukraine is slightly lower than in the Russian Federation and Belarus, where the number of physicians per 10000 thousand

population in 1999 was equal to 46.9 and 47.8, respectively. In contrast to Ukraine, in the Russian Federation this indicator did not increase since 1990, when it was equal to 46.9. Moreover, there was a slight decline in the value of this indicator during the period of 1991-1998 (see also Table 4 of Appendix VII).

Dynamics of the number of students in higher education institutions per 10000 population in Ukraine for the period of 1980-1989 are presented in Figure 3.68.

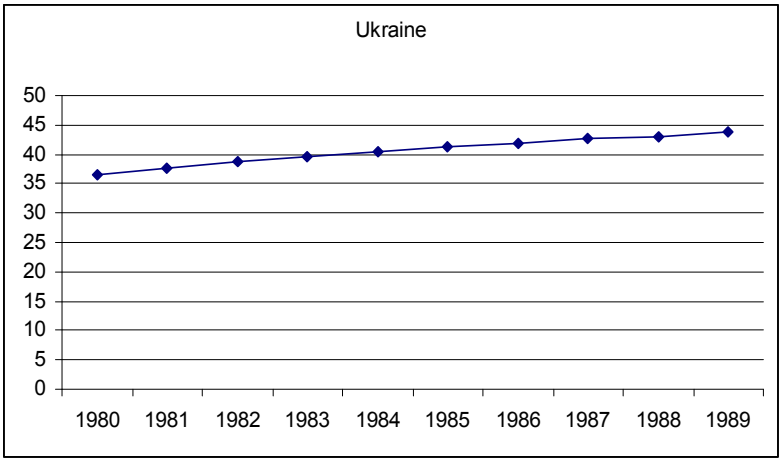

Figure 3.68. Number of physicians per 10000 population in Ukraine, 1980-1989

Dynamics of the number of students in higher education institutions per 10000 population in Ukraine for the period of 1990-1999 are presented in Figure 3.69.

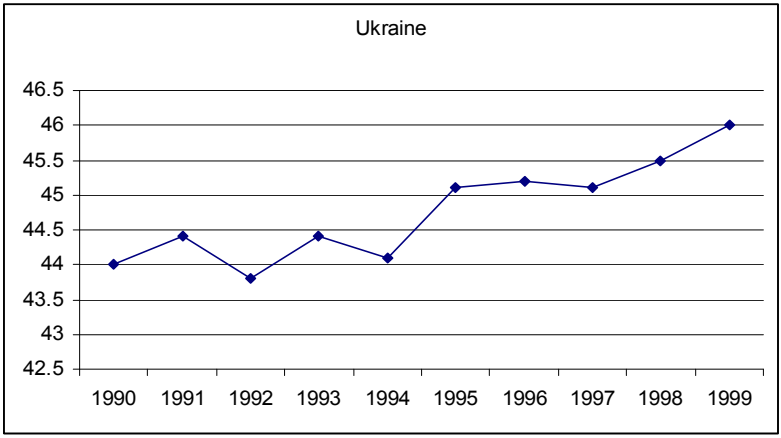

Figure 3.69. Number of physicians per 10000 population in Ukraine, 1990-1999

Data for Ukraine indicate that during the transition the total number of physicians per every ten thousand population increased consistently since 1994 despite the decline in some other economic indicators. The above diagram points to an insignificant decline in the indicator in 1992 and 1994. This insignificant decline could potentially be interpreted as a decrease in the capacities of the nation's medical schools. However, that is not so. First, this decline may well be within the limits of statistical error. More importantly, the educational training of a physician takes at least six years. Accounting for the time lag suggests that the significant increase in the number of doctors per ten thousand population since 1997 was a result of an educational process that took place in the early 1990s.

We should also doubt the claim that the decrease in total population was the major cause of the indicator's growth. Indeed, the number of physicians per ten thousand population is a relative value that relates the number of physicians to the total population. However, one would reasonably expect the total number of physicians to decline proportionately to the decline in total population. The consistent increase in the number of

physicians per ten thousand population as a measure of access of the public to the medical services in Ukraine is evident.

Continuous and persistent growth of the number of physicians per ten thousand population in Ukraine during the periods of 1980-1989 and 1990-1999 clearly indicates not only the presence of consistent and sufficient supply of medical services to the population and development of the national system of healthcare, but also stability in the functioning of medical higher education institutions, including first of all traditionally strong medical schools, as a part of the system of higher education. This demonstrates the presence of continuous positive developments in the national healthcare during the period of the market reforms, and it also shows continuous growth in accumulation and concentration of human capital in the national economy.

Positive trends in the development of the healthcare industry and increasing the population's access to medical services characterize such countries as Ukraine, the Russian Federation, and Belarus, but are not necessarily characteristics of all the former soviet republics. In some other former republics situation with access to medical services did not regain its positions of 1991. For instance, in Azerbaijan the number of physicians per every ten thousand of the population as an indicator of access to healthcare has declined from 38.7 in 1991 to 35.5 in 1999. In Uzbekistan the decline was from 35.8 in 1990 to 34.3 in 1997, in Turkmenistan, from 34.6 in 1990 to 29.8 in 1996, and in Tajikistan, from 27.1 in 1990 to 21.2 in 1999. Similar negative trends characterize many other former republics, including Georgia, Kazakhstan, Kyrgyzstan, and Moldova. These statistics should always be correlated with demographic and migratory processes in the NIS. There is a trend toward the increasing migration of medical professionals from Central Asian states to certain regions in the Russian Federation. While such a trend may be of benefit to the under-populated regions and rural areas in the Russian Federation,

where medical personnel are lacking, it is detrimental to the Asian republics and negatively affects the prospects of their future development.

The data indicate that despite economic difficulties during the transition period, the number of physicians per ten thousand population increased consistently since 1994. This confirms the presence continuous and consistent development of the healthcare industry, increasing access to the medical services, development of medical education, and a stable increase in the total volume and concentration of human capital in the country.

Statistics on the housing space in the CIS for the selected years during the period of 1990-1999 are presented in Table 3.36. Detailed annual statistics on the housing space in the CIS are presented in Table 2 of Appendix IX.

TABLE 3.36

Average total housing space per inhabitant in the CIS, 1990-1999 (square meters)

Country	1990	1993	1996	1999
Azerbaijan	12.5	12.0	12.2	12.0
Armenia	15.0	15.2	15.5	…
Belarus	17.9	19.3	19.7	20.8
Georgia	18.8	19.1	20.0	…
Kazakhstan	14.2	14.6	15.6	16.4
Kyrgyzstan	12.1	12.8	12.6	12.5
Moldova	17.9	18.4	20.1	20.7
Russia	16.4	17.2	18.3	19.1
Tajikistan	9.3	9.2	9.1	9.0
Turkmenistan	11.1	11.5	11.1	…
Uzbekistan	12.1	12.4	13.0	13.6
Ukraine	17.8	18.5	19.2	…

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database August 8, 2006.

Access to housing in Ukraine expressed in terms of square meters per capita was probably the highest among all the CIS countries in 1999. In Ukraine this indicator was equal to 20.4 square meters per capita, and in the Russian Federation it was equal to 19.1 square meters per capita.

Dynamics of the average total housing space per inhabitant in the CIS for the period of 1990-1999 are presented in Figure 3.70.

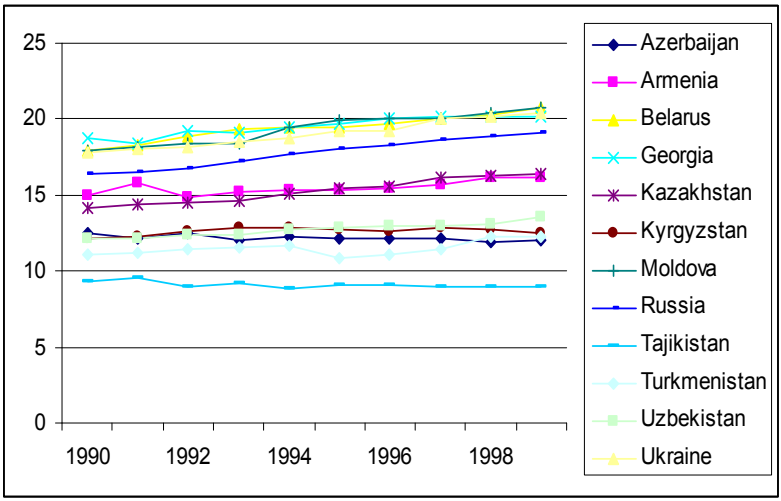

Figure 3.70. Average total housing space per inhabitant in the CIS, 1990-1999 (square meters)

Dynamics of the average total housing space per inhabitant in Ukraine for the period of 1990-1999 are presented in Figure 3.71.

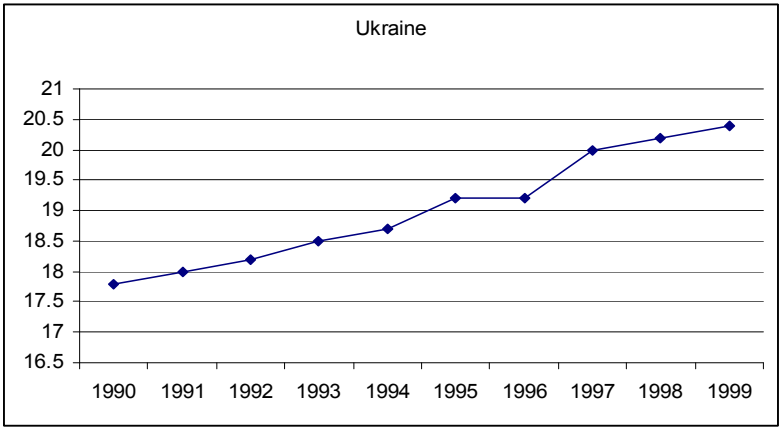

Figure 3.71. Average total housing space per inhabitant in Ukraine, 1990-1999 (square meters)

Dynamics of the average total housing space per inhabitant in Ukraine were positive during the entire period of 1990-1999, with an increase from 17.8 to 20.4 square meters per capita. Growth of this indicator in Ukraine continues thanks to an increase in construction capacities, growing demand for real estate, and an expanding real estate market.

Access to education, healthcare, and housing facilitate accumulation and preservation of human capital. The quality of these services and the level of access to them are the key factors for the population's life expectancy and quality of life.

3.4.2. Life Expectancy

One of the key socio-economic indicators is average life expectancy at birth. This indicator is to a large extent a function of the population's well-being, including access to education, healthcare, housing, and personal consumption. At the same time, average life expectancy defines such economic determinants as economically active age, retirement age, and total labor force, as well as the country's overall demographic situation.

Statistics on life expectancy at birth for the female populations in the NIS and selected CEE countries for the period of 1990-2004 are presented in Table 3.37. Detailed statistics are presented in Table 3 of Appendix IX.

TABLE 3.37

Life expectancy at birth for female population in NIS and selected CEE countries, 1990-2004, (years)

Country	1990	1995	1997	2000	2001	2002	2003	2004
Armenia	71.5	73.0	73.7	74.3	-	74.6	74.7	74.8
Azerbaijan	74.8	72.9	74.6	75.1	75.2	75.0	75.1	75.2
Belarus	75.6	74.3	74.3	74.0	-	74.2	74.3	74.3
Georgia	74.2	74.3	74.3	74.3	-	74.3	74.4	74.5
Hungary	73.7	74.6	75.2	75.6	76.5	76.6	76.7	76.9
Kazakhstan	73.1	70.4	70.2	71.2	71.3	71.5	71.5	71.1
Kyrgyz Rep.	72.6	70.4	71.4	72.4	72.6	72.0	72.2	72.2
Latvia	74.6	73.1	75.1	76.0	75.8	76.0	75.9	77.7
Lithuania	76.2	75.1	76.6	77.4	77.5	77.5	77.7	77.8
Moldova	71.8	69.7	70.3	71.7	71.8	71.1	71.5	71.9
Poland	75.5	76.4	77.0	78.0	78.4	78.8	78.9	79.2
Russia	74.3	72.5	73.2	72.0	72.3	72.0	72.0	72.0
Tajikistan	65.9	65.9	66.0	66.2	-	66.3	66.4	66.6
Turkmenistan	67.1	67.4	67.2	66.9	-	66.7	66.9	67.1
Ukraine	74.9	72.7	73.0	73.6	74.1	74.1	74.1	74.1
Uzbekistan	72.4	-	72.4	71.1	-	70.3	70.3	70.3

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

Life expectancy at birth for the female population in Ukraine stabilized by 1996 and has grown in a stable manner since 1997. Nevertheless, by the year 2007 Ukraine has not reached the level of 1989, when life expectancy at birth for the female population was equal to 75.2 years.

Dynamics of life expectancy at birth for the female population in Ukraine, the Russian Federation, Hungary and Poland are presented in Figure 3.72.

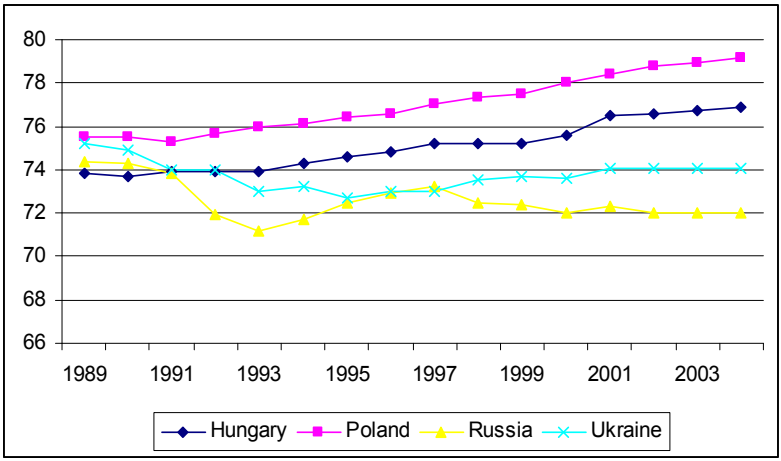

Figure 3.72. Life expectancy at birth for female population in Hungary, Poland, the Russian Federation and Ukraine, 1989-2004, (years)

Dynamics of life expectancy at birth for the female populations in Ukraine, the Russian Federation, Hungary, and Poland are rather complex. In Poland and Hungary this indicator shows a slow but continuing increase. At the same time this indicator for Poland was always higher than in Hungary. In Ukraine and the Russian Federation the situation was more difficult. Contrary to some perceptions about a rapid decrease in life expectancy at birth for the female population in Ukraine, this indicator had its slight declines and slight increases during the whole period of transition and had stabilized by the end of 2000.

Statistics on life expectancy at birth for the male populations in the NIS and selected CEE countries for the period

of 1990-2004 are presented in Table 3.38. Detailed statistics are presented in Table 4 of Appendix IX.

TABLE 3.38

Life expectancy at birth for male population in NIS and selected CEE countries, 1989-2004, (years)

Country	1990	1995	1997	2000	2001	2002	2003	2004
Armenia	65.6	66.3	66.9	67.5	-	67.9	68.0	68.1
Azerbaijan	67.0	65.2	67.4	68.6	68.6	69.4	69.5	69.6
Belarus	66.3	62.9	62.9	62.3	-	62.5	62.6	62.7
Georgia	66.5	66.5	66.5	66.5	-	66.5	66.6	66.7
Hungary	65.1	65.3	66.4	67.1	68.1	68.3	68.4	68.6
Kazakhstan	63.8	59.7	59.0	60.4	60.5	60.7	60.5	60.1
Kyrgyz Rep.	64.2	61.4	62.6	64.9	65.0	64.4	64.5	64.3
Latvia	64.2	60.0	63.9	64.8	64.7	65.1	65.5	65.5
Lithuania	66.4	63.3	65.5	66.8	66.0	66.3	66.3	66.4
Moldova	65.0	61.8	62.9	64.4	64.5	64.4	64.5	64.9
Poland	66.5	67.6	68.5	69.7	70.2	70.4	70.5	70.0
Russia	63.8	58.3	61.0	59.0	59.0	58.5	58.8	58.8
Tajikistan	60.7	60.6	60.7	60.9	-	61.0	61.1	61.3
Turkmenistan	59.2	59.0	58.8	58.5	-	58.2	58.4	58.6
Ukraine	65.6	61.8	61.9	62.4	62.8	62.7	62.6	62.6
Uzbekistan	66.1	66.1	66.1	64.7	-	63.8	63.8	63.9

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

Dynamics of life expectancy at birth for the male population in Ukraine, the Russian Federation, Hungary, and Poland are presented in Figure 3.73.

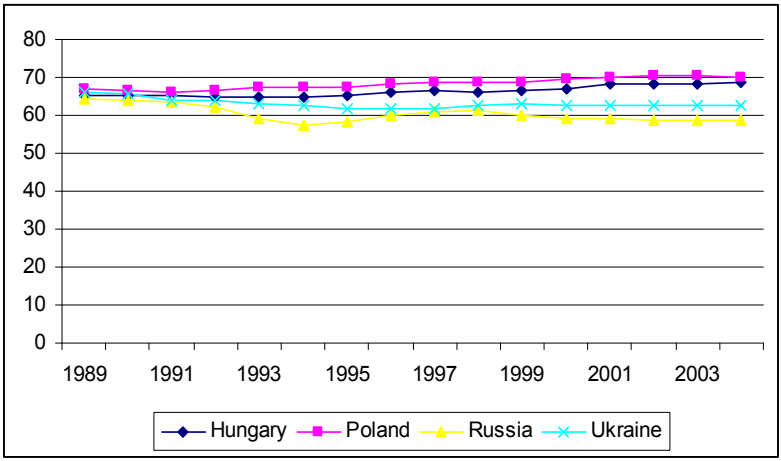

Figure 3.73. Life expectancy at birth for male population in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2004, (years)

Dynamics of life expectancy at birth for the male population in Ukraine, the Russian Federation, Hungary, and Poland are rather complex. In Poland and Hungary this indicator shows a slow but continuing increase during the entire period of transition. Specifically, in Hungary the value of this indicator grew from 65.3 years in 1989 to 68.6 years in 2004, and in Poland it went from 66.8 years in 1989 to 70 years in 2004. In Ukraine and the Russian Federation situation was more complex as was the case with the female population. Despite some people's beliefs about a rapid decrease in life expectancy at birth for the male population in Ukraine and Russia, this indicator declined and increased only slightly during the whole period of transition and had stabilized by the end of 2000. However, in distinction from the analogous indicator for the female population, stabilization of life expectancy at birth for the male population occurred on a lower level than the one achieved before the transition.

In the Russian Federation life expectancy at birth for the male population declined from 64.2 years in 1989 to its lowest level of 57.6 years in 1994 and then stabilized at a level of around 59 years, settling at 58.8 years in 2004. In Ukraine life expectancy at birth for the male population declined from 66.1 years in 1989 to its lowest of 61.8 years in 1995 and then stabilized at a level of around 63 years, settling at 62.6 years in 2004. Life expectancy at birth for Ukraine's male population was higher than life expectancy at birth for the Russian Federation's male population during the entire period of transition.

Despite continuing growth in access to education, healthcare, and housing, as well as phenomenal growth in the service industries, Ukraine and the Russian Federation experienced negative trends in demographics, including birth rate and life expectancy for the female and male populations. Such negative trends may be explained to a large extent by social problems, including alcohol drinking, increased use of drugs, an unhealthy lifestyle, psychological stress, economic instability during the transition period, increased work loads, an increase in traffic accidences (including fatal ones), etc.

Life expectancy at birth appears to be at an unsatisfactory level for both Ukraine and the Russian Federation. A life expectancy at birth of 59 years for the male population in the Russian Federation is alarming and certainly below the value of the same indicators for other developed nations. It is socially and economically unacceptable. While the positive trends are present, the pace of positive changes is slow.

3.4.3. Socio-Economic Progress: Openness and Well-Being

Dynamics of an increase in openness of Ukrainian society and the population's well-being will help us better understand progress in the social and economic life of the country during transition and post-transition development.

Primary attention will be paid to an increase in consumption of technologically sophisticated or hi-tech products and services.

Indicators of the openness of Ukrainian society—including access to newspapers, the internet, and phone communications—for the period of 1993-2004 are presented in Tables 1 and 2 of Appendix X. The number of internet users increased from 400 in 1993 to 3750000 in 2004, reaching a level of 79 users per thousand population. International Internet bandwidth increased from 15.3 Mbps to 814 Mbps. International tourism and international voice traffic have also increased dramatically. The umber of newspapers per thousand population increased from 68.66 in 1997 to 174.75 in 2000.

The number of mobile phone subscribers reached 13700000 in 2004, comprising 289.5 mobile phone subscribers per thousand population. The market of mobile communication has experienced a real boom since 2000. The number of phone lines increased from 6684200 in 1989 to 12100000 in 2004. The indicator for the number of phone lines per thousand population grew from 129 in 1989 to 256 in 2004.

The number of personal computers in the country increased from 100000 in 1990 to 1327000 in 2004. The indicator for the number of personal computers per thousand population grew from 1.9 in 1989 to 28 in 2004. The number of personal computers used by businesses and individuals increased consistently at a constant rate during the entire period of transition. This indicates that the economic transformation in Ukraine was a productive one.

The number of passenger cars increased from 63 per thousand population in 1990 to 114 in 2003 and practically doubled during the period of 1990 to 2004.

Selected indicators of the increasing well-being of Ukrainian society, including consumption of hi-tech products and services for the period of 1989-2004, are presented in Figures 3.74-3.77.

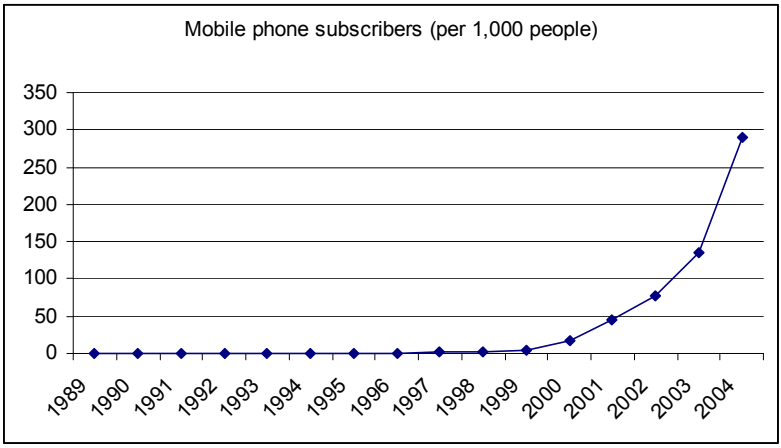

Figure 3.74. Selected indicators of the increasing well-being of the Ukrainian society, including consumption of hi-tech products and services (mobile phone subscribers per 1000 people), 1989-2004

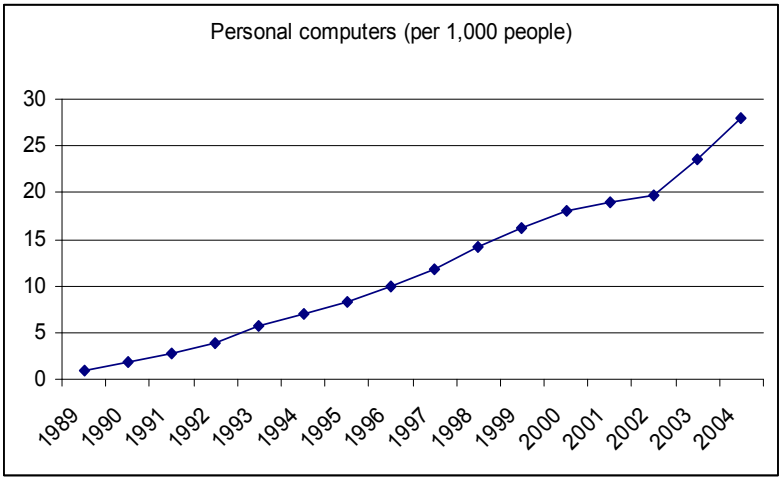

Figure 3.75. Selected indicators of the increasing well-being of Ukrainian society, including consumption of hi-tech products and services (personal computers per 1000 people), 1989-2004

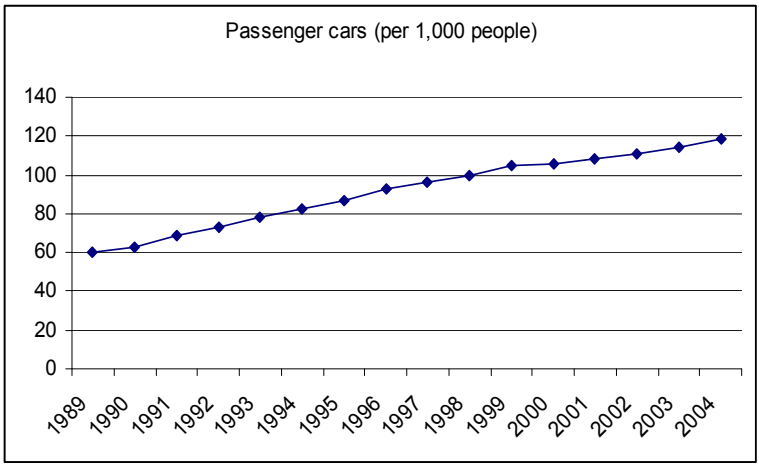

Figure 3.76. Selected indicators of the increasing well-being of Ukrainian society, including consumption of hi-tech products and services (passenger cars per 1000), 1989-2004

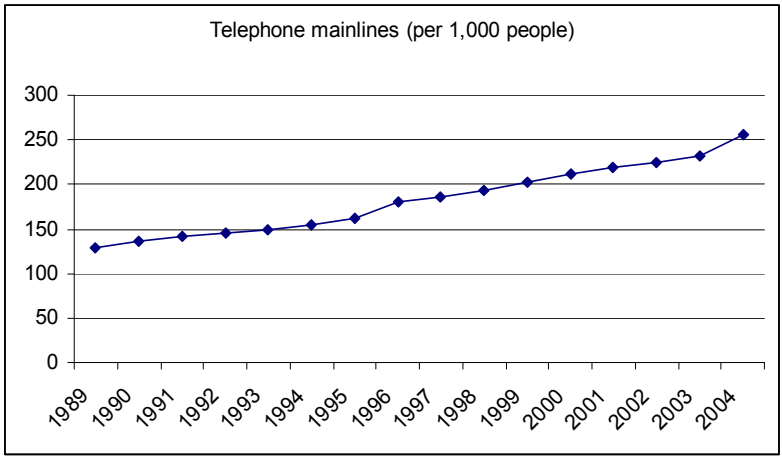

Figure 3.77. Selected indicators of the increasing well-being of Ukrainian society, including consumption of hi-tech products and services (telephone lines per 1000 people), 1989-2004

The data presented point to revolutionary changes in the sphere of telecommunications, the society's openness, and consumption of hi-tech goods and services. Traffic congestion, information security, and other such problems, previously unknown to the country, are insignificant as compared to the level of openness the society achieved during the period of transition.

The idea of following the dynamics of consumption of certain goods and services in order to demonstrate that positive changes have occurred in the society is not new. It has been widely used before. Shleifer says of the 1990s in Russia:

> Average living standards fell little during the decade, and, in some important respects, improved. Retail trade (in constant prices) rose 16 percent between 1990 and 2002… Goskomstat's figures for final consumption of households (in constant prices) rose by about 3 percent during 1990-2002. Average living space increased from 16 square meters per person in 1990 to 19 in 2000, and the share of this living space owned by citizens doubled during the decade, from 26 to 58 percent (Goskomstat Rossii, 2001, p. 200). The number of Russians traveling abroad as tourists rose from 1.6 million in 1993 to 4.3 million in 2000. The shares of households with radios, televisions, tape recorders, refrigerators, washing machines, and electric vacuum cleaners all increased between 1991 and 2000. Private ownership of cars doubled, rising from 14 cars per 100 households in 1991 to 27 in 2000, with large increases occurring in almost all regions (Goskomstat Rossii, 2001, p. 193-194). (Shleifer, 2005, p. 159)

Shleifer also comments on the population's health, life expectancy, and other social indicators:

> In 1992-93, as the death rate jumped sharply, the Russian Longitudinal Monitoring Survey found no evidence of

> serious malnutrition in Russia. In fact, the proportion of people whose body weight increased during these years exceeded the share that lost weight (Shkolnikov et al., 1998)… The number of doctors per capita, already one of the highest in the world, rose still higher in the 1990s (Goskomstat Rossii, 2001, p. 242). Infant mortality—one indicator of the effectiveness of basic health care—although rising a little initially, fell during the decade, from 17.4 per 1,000 live births in 1990 to 15.3 in 2000 (Goskomstat Rossii, 2001, p. 127). (Shleifer, 2005, p. 161)

Shleifer concludes that "considering the distorted demand, inflated accounting, and uselessness of much of the pre-reform output, Russians today are probably on average better off than they were in 1990." (Shleifer, 2005, p. 163)

One might argue that radios, televisions, and tape recorders are no longer good indicators of a population's well-being and that weight loss is rather healthy while gaining weight may be the result of a poor diet, but the point in general is well taken—the crisis was not as harsh as it might have appeared to some in 1990s.

3.4.4. R&D in Ukraine

The provision of quality higher education services was on the rise during the entire period of transition and continues to grow after 2005, but the situation in the R&D sector in Ukraine was more complex. Heyets notes: "Science and education are traditionally assigned the role of facilitators for the high-tech industries; their development moves at a slow pace, one can feel the loss of personnel with high level qualifications." (Heyets, 2001, p. 1) The R&D sector in Ukraine as well as in other former soviet republics lost some of its high-skilled employees. One should admit that during the transition the industrial model has experienced certain difficulties, even exhibiting trends

toward deindustrialization in some regions and branches of the economy, including the reemergence of primitive forms of production in rural areas.

Dynamics of the R&D situation in Ukraine by categories of employees and academics for the period of 1989-1999 are presented in Figure 3.78. Detailed statistics on employment in R&D are presented in Table 1 and Figures 1 and 2 of Appendix XI.

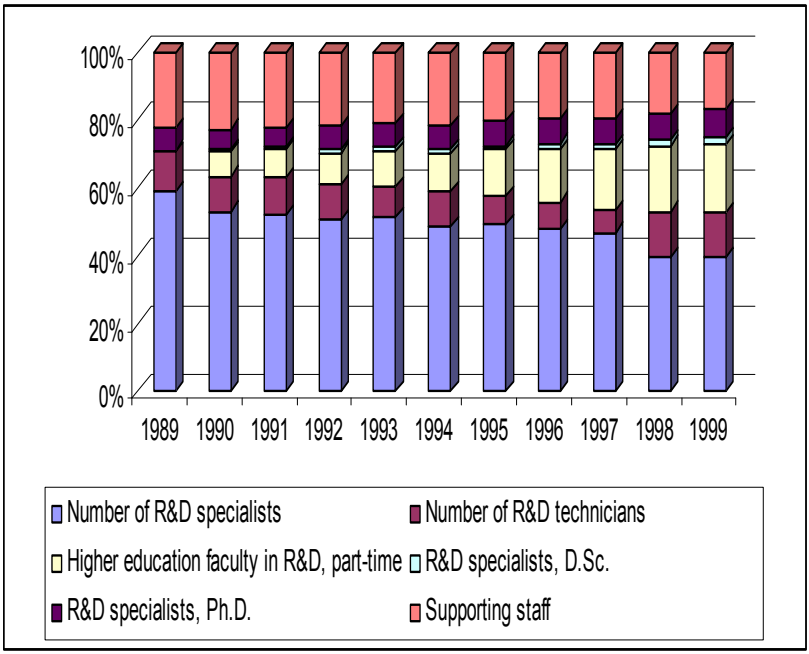

Figure 3.78. R&D situation in Ukraine by categories of employees and academics, 1989-1999

The above diagram points to a decrease in the total number of R&D employees in Ukraine during the period of transition. The decline was from 348645 employees in 1989 to 126045 employees in 1999. This significant decline was not proportionate for all of the categories of employees. The number

of specialists declined from 292840 to 94726, and the number of staff declined from 111165 to 40552. The number of technical personnel experienced a less significant decline, from 55805 employees to 31273 employees.

The total number of R&D employees has decreased, but this decrease was partially compensated for by the new category of employees, namely, higher education faculty working part-time in R&D. The number of employees in this category grew from 35995 in 1990 to 48414 in 1999. The explanation for this growth is that with the demand for R&D declining sharply during the 1990s, many R&D specialists with doctoral degrees moved into the rapidly growing industry of higher education services. Moreover, they have retained their work places in the research institutes.

The decline in the number of Ph.D. holders working in R&D, from 31819 in 1989 to 19720 in 1999, is explained by their employment in educational institutions and private businesses. At the same time the number of R&D employees with a D.Sc. degree (which is a second doctorate, the highest doctoral degree in the country) has increased from 3299 in 1989 to 4610 in 1999.

The diagrams presented in Appendix XI show that contrary to commonly held opinions, changes in the number of R&D employees in different categories were smooth rather than sharp and unexpected. Dynamics within each category of R&D employees points toward a general decline in the total number of employees with a simultaneous increase in the quality of the total body in proportion to the different categories. This process is still incomplete. Further development of the market economy and market-based relations will lead to an increase in the effectiveness and efficiency of the national research institutes. Positive trends that take place in science and education in Ukraine may be sufficient to maintain the pace of reforms and facilitate industrial development.

3.6. Concluding remarks

In this chapter, we have proven statistically, that the output decline in Ukraine was not as dramatic, as it often appears on the official reports, including those presented by the IMF, the World Bank, and such, and lasted for a lesser period than is normally perceived. Official data about cumulative output decline and its continuity should be approached critically. In our view, consecutive output decline in Ukraine continued for no more than six years and the decline itself was significantly smaller than 59 percent of GDP. This statement is proven statistically, when the output decline of 59 percent during the period of 1990 to 1999 is combined with the reported share of the unofficial or shadow economy, which constituted 48.9 percent in 1995.

Based on the extended analysis of statistical data for Ukraine and other NIS, it is possible to conclude that the so-called economic crisis in Ukraine was to a large extent a myth rather than an adequate description of the economic reality. Indeed, the large scale economic restructuring, privatization, and institutional changes do not offer enough evidence to conclude that the process of transition has resulted in a full-scale continuous economic crisis. Data on electricity consumption and energy consumption confirm our statement that the output decline in Ukraine during the 1990s was not as significant, as it is presented in the literature.

The dynamics in the structure of the real GDP during the period of 1991 to 2007 points to the increasing role of personal consumption and investments in the GDP growth. Growing volumes of personal consumption and investments have positive influence on the GDP per capita growth, while the role of the state spending is less significant and declining. Investments played the positive role starting 1997. The trade balance may have a negative impact on the GDP per capita growth. Further development of the domestic market along with the process of

reinvestment will slowly replace government spending as determinants of future economic growth in Ukraine. The data points to the sustainability of economic growth in Ukraine. In the Russian Federation, the rapid GDP per capita growth over the last eight years takes place thanks, in part, to the high prices on carbohydrates. In Ukraine, the rapid economic growth is a result of the endogenous economic change.

The national economy is still experiencing a certain dis-balance between the rate of increase in consumer prices and the rate of increase in salaries and wages. Such a dis-balance confirms our thesis about the mismatch in pace of economic reforms and commoditization of labor. Formation of the labor market lags behind the commodity market.

The higher education sector in Ukraine undergoes a rapid development since 1991 and points to the continuous process of accumulation of human capital in the national economy. The reduction in unemployment helps involve the accumulated human capital in the process of production. The high tech industries of higher education and healthcare indicate stable growth in the total social welfare. The increasing openness of the economy and the society, development of the mass media, mobile communications, housing market, and such are all indicators of sustainable economic growth.

Among the remaining problems, we would like to underline the decline in population that Ukraine experiences since independence. While the life expectancy at birth for female and male population has stabilized and continues to increase, the birthrate remains one of the lowest in the world. Unless this trend is reversed, there will be an inevitable demographic problem in the foreseen future. The proportion of people who reached the retirement age increases. The demographic problem will eventually impact the growth rate.

PART IV

EMPIRICAL STUDY

This study analyses the role and impact of human capital on per capita economic growth in transition economies in Hungary, Poland, the Russian Federation, and Ukraine. The factors that are associated with the human capital in terms of education levels are analyzed in order to measure this impact. Our approach is to estimate the significance of educational levels for initiating substantial economic growth. The model tests empirically the hypothesis that human capital has a positive impact on per capita economic growth in transition economies. We also estimate a system of linear and log-linear equations accounting for different time lags in the possible impact of human capital on economic growth.

4.1. The Endogenous Model of Economic Growth

For deeper investigation of the potential sources of economic growth in Ukraine and other post-transition economies, we choose an endogenous model of economic growth because the exogenous models of Solow-Swan and Leontief do not adequately describe the transition experience. The debate on whether the accumulation of human capital contributes positively towards raising per capita income growth has reemerged along with the renewed emphasis on the determinants of long-term economic growth.

An endogenous model of economic growth appears to be the most appropriate for our evaluation. First, such model may be applied for cross sectional analysis, which is probably the best way to analyze economic growth in the countries in transition. Second, the model shows the influence and importance of human capital relative to other key inputs on economic growth and to differences across countries.

Kalaitzidakis et al. (2001) note that, while both intuition and several theories of endogenous growth point towards a positive effect of human capital on economic growth, empirical evidence on this issue has been mixed (Kalaitzidakis et al., 2001). The purpose of the study is to provide a systematic investigation of the human capital--economic growth nexus. The impact of human capital on economic growth is incorporated according to the Mankiw et al. (1992) framework.

Mankiw et al. assume a production function of the form given below:

$$Y = K_t^{\alpha} - H_t^{\beta}\left(A_t L_t\right)^{1-\alpha-\beta} \qquad (29)$$

where Y, K, H, and L represent total output, physical capital stock, human capital stock and labor, respectively. A is a technological parameter. Technology is assumed to grow exponentially at the rate ϕ.

Kalaitzidakis et al. model is in some sense a continuation of the Durlauf and Johnson (1995) work but extends their work in one significant direction. Durlauf and Johnson focus on identifying homogenous subgroups of countries, and they assume that the contribution of human capital to economic growth is the same for all countries within each subgroup. Kalaitzidakis et al. allow the effect of human capital to differ both across countries and also across time. A variety of measures of human capital frequently used in applied growth studies is employed.

Kalaitzidakis et al. (2001) estimate the unrestricted growth model as follows (30):

$$y_{it} = a_0 + a_1 D_t + a_2 D_j + a_3 \ln S_{it}^k + a_4 \ln\left(n_{it} + \alpha + \delta + \gamma\right) + a_5 \ln X_{it} + a_6 \ln h_{it} + \varepsilon_{it}$$

Where y_{it} refers to the growth rate of income per capita during each period, S^k is the share of output devoted to physical capital accumulation, n_{it} is the rate of growth of the labor force, α is the rate of technical exogenous progress that is constant for all countries in all periods, δ is the depreciation rate of human capital, γ is the depreciation rate of physical capital, X_{it} is per capita income at the beginning of each period, h_{it} is human capital measured either as a stock or as a flow. D_t and D_j are dummy variables for each period and country, i.e. Hungary, Poland, the Russian Federation, and Ukraine, respectively.

The model considers a wide variety of measures of education capital; health and other forms of human capital are not measured. The first measure of education human capital presented by the authors is mean years of schooling for the whole population. This measure is used most frequently in the modern literature on growth. They also examine educational attainment of males and females at the primary, secondary, and post-secondary or tertiary levels. They include educational achievement at the secondary and tertiary level for a number of reasons: "(i) a number of countries have very low or zero values for educational achievement at the tertiary level; (ii) to limit the number of measures of human capital; and (iii) the theoretical mechanisms that link human capital of different educational levels to economic growth draw a distinction between basic education (primary) and education that enables the diffusion of ideas (post primary). Finally, for the purposes of comparison with the early literature on human capital, we consider enrollment rates both at the primary and secondary level and by gender." (Kalaitzidakis et al., 2001, p. 234)

Human capital in the model is expressed in terms of education only. The rate of depreciation of human capital can be interpreted as a function of healthcare expenditures. It is not an objective of the model to suggest whether the rate of human

capital depreciation is linearly related to healthcare expenditures, but the model assumes that higher per capita health care expenditures lead to lower rates of human capital depreciation.

4.2. Calculations without the time lag

4.2.1. The Data

The data used in the empirical study are for Hungary, Poland, Russia, and Ukraine and cover the period of 1990-1999. Selected macroeconomic indicators for Hungary used in the research are presented in Table 4.1.

TABLE 4.1

Selected macroeconomic indicators in Hungary, 1990-1999

Year	GDP per capita growth, %	GNI per capita, USD	Savings as % of GDP	Labor force, people	Rate of unemployment	People employed	Rate of growth of labor force (employed), %
1990	-2.788720	2880	27.99973	4736805	1.7	4656279	…
1991	-11.365300	2790	19.48406	4748814	8.5	4345165	0.933184
1992	-2.194320	3180	15.80715	4769688	9.8	4302259	0.990126
1993	0.007814	3510	11.75122	4776416	11.9	4208023	0.978096
1994	2.923398	3880	15.71617	4791887	10.7	4279155	1.016904
1995	1.085993	4140	22.66437	4808100	10.2	4317674	1.009001
1996	2.571891	4350	26.11790	4800903	9.9	4325614	1.001839
1997	5.060354	4510	27.74745	4803268	8.7	4385383	1.013818
1998	4.297205	4480	27.55985	4804150	7.8	4429426	1.010043
1999	5.635093	4640	26.33028	4802436	...	…	…

Source: Economist Intelligence Unit and World Development Database

The trend in GDP per capita growth in Hungary is presented in Figure 4.1.

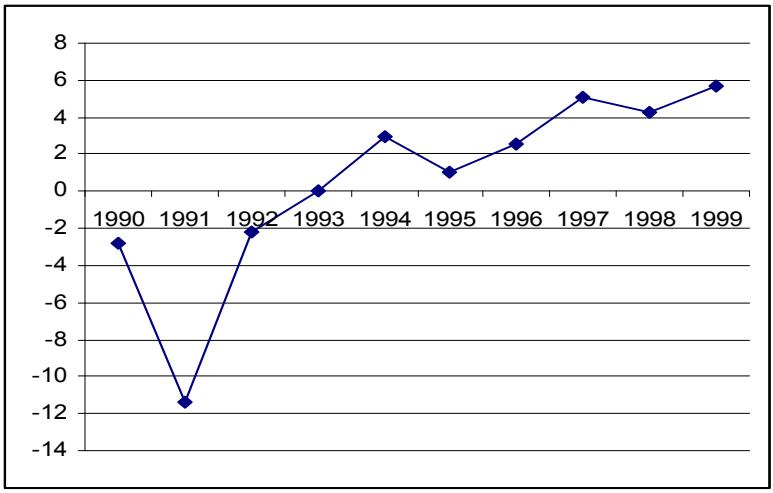

Figure 4.1. GDP per capita growth in Hungary in 1990-1999

The data presented in Figure 4.1 demonstrate negative GDP per capita growth in Hungary for the period of 1990-1993 and then substantial per capita economic growth up to 5.635 percent in 1999.

Selected macroeconomic indicators for Poland used in the research are presented in Table 4.2.

TABLE 4.2

Selected macroeconomic indicators in Poland, 1990-1999

Year	GDP per capita growth, %	GNI per capita, USD	Savings as % of GDP	Labor force, people	Rate of unemployment	People employed	Rate of growth of labor force (employed), %
1990	...	...	31.56716	18716330	6.5	17499769	…
1991	-3.901430	...	17.05243	18854490	11.8	16629660	0.950279
1992	2.688715	1900	15.75936	18952162	13.6	16374668	0.984666
1993	3.977723	2260	16.52728	19075664	14.0	16405071	1.001857
1994	-2.519590	2370	19.87484	19156170	14.4	16397682	0.999550
1995	10.195640	2770	22.05144	19255212	13.3	16694269	1.018087
1996	11.575260	3330	20.31483	19386236	12.3	17001729	1.018417
1997	6.486091	3610	20.24529	19518250	11.2	17332206	1.019438
1998	7.517256	3920	20.95529	19642404	10.5	17579952	1.014294
1999	3.432484	4070	20.00919	19752194	...	…	…

Source: Economist Intelligence Unit and World Development Database

The trend in GDP per capita growth in Poland is presented in Figure 4.2.

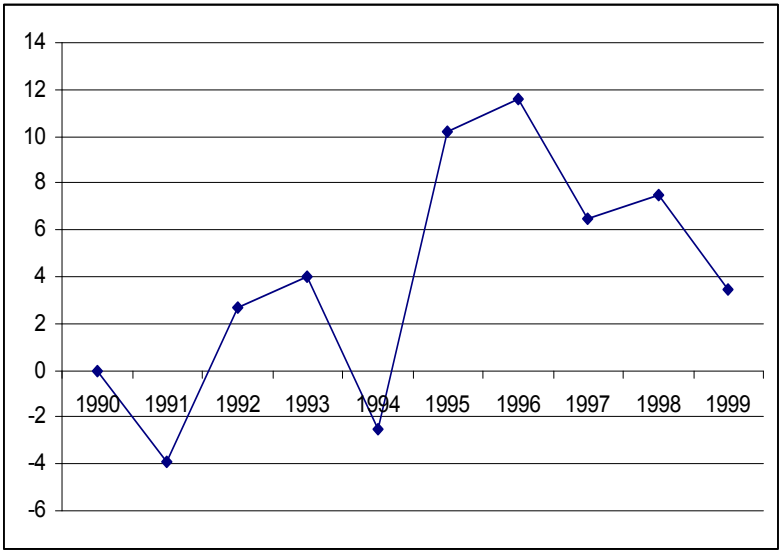

Figure 4.2. GDP per capita growth in Poland in 1991-1999

Data presented in Figure 4.2 demonstrate definite fluctuations in GDP per capita growth in Poland. Within the observation period, GDP per capita growth is negative in 1991 and 1994. It is positive for the periods of 1992-1993 and 1995-1999. However, in contrast to Hungary, GDP per capita growth in Poland is not very substantial since it increases from 10.1956 percent in 1995 to 11.575 percent in 1996 and then decreases to 3.4324 percent in 1999. Projected GDP growth in Poland for 2001 is 4.0 percent.

Selected macroeconomic indicators for the Russian Federation used in the research are presented in Table 4.3.

TABLE 4.3

Selected macroeconomic indicators in the Russian Federation, 1990-1999

Year	GDP per capita growth, %	GNI per capita, USD	Savings as % of GDP	Labor force, people	Rate of unemployment	People employed	Rate of growth of labor force (employed), %
1990	-3.49759	..	30.34711	77111840	..	-	-
1991	-5.46733	3830	36.55293	77284480	0.08	77222652	-
1992	-15.34420	3150	39.74930	77318280	5.20	73297730	0.949174
1993	-8.35636	2770	30.88723	77230400	5.90	72673806	0.991488
1994	-12.53670	2310	29.49503	77134720	8.10	70886807	0.975411
1995	-4.36170	2250	28.77231	77033320	9.50	69715155	0.983471
1996	-3.46114	2350	28.89521	77267496	9.70	69772549	1.000823
1997	0.71743	2600	25.47482	77481904	11.80	68339039	0.979455
1998	-6.49414	2250	20.43118	77510400	13.30	67201517	0.983355
1999	0.63349	2250	32.99949	77632200	..	-	-

Source: Economist Intelligence Unit and World Development Database

The trend in GDP per capita growth in the Russian Federation is presented in Figure 4.3.

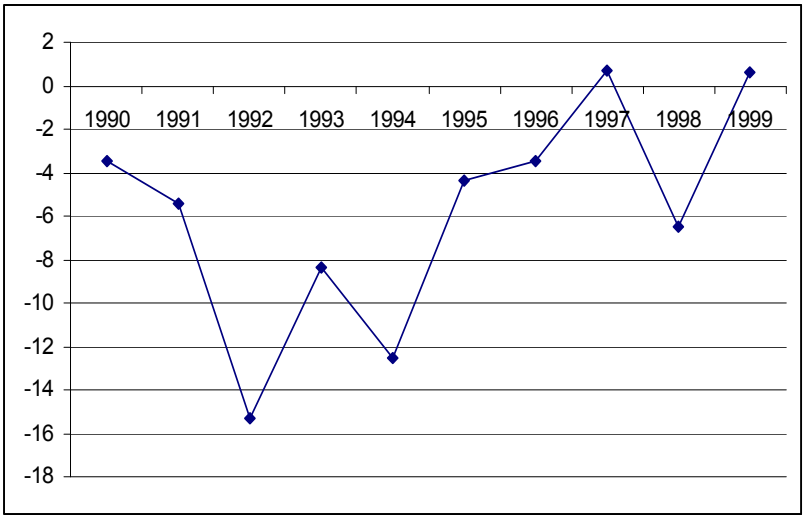

Figure 4.3. GDP per capita growth in the Russian Federation in 1990-1999

The trend in GDP per capita growth for the Russian Federation is almost always below the zero line that indicates negative per capita economic growth for the period of 1990-1999. The only two exceptions are 1997 and 1999 with positive GDP per capita growth of 0.717 and 0.633, respectively. The negative trend until 1996 may be explained by the transition crisis and negative GDP per capita growth in 1998 is a consequence of the world currency crisis of 1997-1998. Since 1999 the Russian Federation indicates substantial economic growth of up to 6.4 percent in 2001.

Selected macroeconomic indicators for Ukraine used in the research are presented in Table 8.

TABLE 4.4

Selected macroeconomic indicators in Ukraine, 1990-1999

Year	GDP per capita growth, %	GNI per capita, USD	Savings as % of GDP	Labor force, people	Rate of unemployment	People employed	Rate of growth of labor force (employed), %
1990	-4.46342	1610	26.38680	26049784	..	…	…
1991	-9.00188	1580	28.52009	26052500	..	…	…
1992	-12.14400	1600	36.44327	26127652	..	…	…
1993	-16.13570	1370	35.97958	26089500	..	…	…
1994	-21.28000	1100	32.16514	25960500	..	…	…
1995	-12.38860	950	23.60001	25713968	5.6	24273986	…
1996	-9.00166	960	20.11801	25608114	7.6	23661897	0.974784
1997	-2.20390	1010	18.38698	25450396	8.9	23185311	0.979858
1998	-1.94956	970	18.54317	25348680	11.3	22484279	0.969764
1999	-0.61219	840	20.86513	25274700	..	…	…

Source: Economist Intelligence Unit and World Development Database

The trend in GDP per capita growth in Ukraine is presented in Figure 4.4.

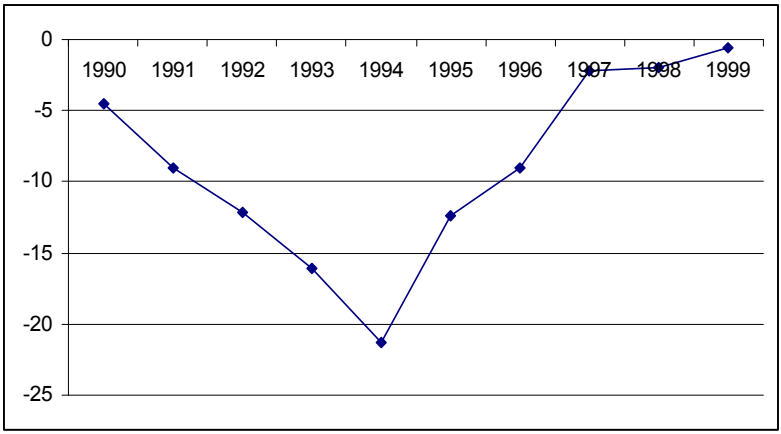

Figure 4.4. GDP per capita growth in Ukraine in 1990-1999

As shown in Figure 4.4, GDP per capita growth in Ukraine remained negative for the period of 1990-1999. It starts from –4.463 percent in 1990 to –0.612 percent in 1999 with the lowest of –21.28 in 1994. Starting in 2000 the economy of Ukraine demonstrates positive real GDP growth of 4.2 percent in 2000, with projected 6.2 percent in 2001, and projected 4.0 to 6.2 percent for 2002 (IMF, 2001). Assuming constant population decrease, it demonstrates substantial GDP per capita growth.

All the data for human capital are from Barro (2000), Barro and Lee (1996) databases, UNESCO, and countries' Ministries of Education databases. Indicators for human capital are measured as the average number of schooling years per person 25 years old and older, and the average number of schooling years per person 15 years old and older. Human capital is also measured as the share of workers with completed secondary education in the labor force.

4.2.2. Empirical results

This section details the findings from the estimation of the model. The empirical results are summarized in Table 4.5.

Unlike Kalaitzidakis et al., we include savings as a percent of GDP instead of the share of output devoted to physical capital accumulation, (the ratio of investment to GDP). The model is estimated using Pooled Least Squares for the growth equation. First, we present results for the model including the share of workers with completed secondary education in the total labor force as our measure of human capital. The regression results for Hungary, Poland, and the Russian Federation are presented in Table 4.5, column (1).

The coefficient of the human capital variable is negative but statistically insignificant. Savings as a share of GDP has a negative correlation with GDP per capita growth. Increase in savings by one percent leads to a decrease in GDP per capita of 2.282 percent. However, the coefficient is statistically insignificant.

A one percent increase in the gross national income per capita increases GDP per capita growth by 3.372 percent. The coefficient for gross national income per capita is positive but statistically insignificant.

The coefficient for the logarithm of the sum of the rate of growth of the labor force, the rate of technical exogenous progress, and the depreciation rate for human and physical capital is positive and statistically significant at the five percent level of significance. The rate of growth of the labor force is presented as growth of employment only. The rate of technical exogenous progress that is constant for all countries is taken as $\alpha = 1$. The depreciation rate for human and physical capital is taken as $\delta = 0.1$. The coefficient size of 211.7 shows a large effect of growth through employment growths, technical progress, and depreciation on GDP per capita growth. Fixed country effects are negative.

Table 4.5
Regression results for Hungary, Poland, and the Russian Federation

Dependent Variable: GNP per capita growth
Method: Pooled Least Squares

Variable	(1)	(2)	(3)	(4)
log(GDP)	-2.281950	-4.130292	-3.049124	-1.898404
log(n+a+delta)	211.7075	284.1125	324.8825	468.8184
log(GNIPC)	3.372103	10.60201	8.409283	21.52700
log(SecEd)	-2.432554	-	-	-
log(Ed15)	-	-92.03441	-87.10878	-
log(Ed25)	-	-	-	0.586599
Y1993	-	-	1.150828	-
Y1997	-	-	1.323753	-
HungaryY1993	-	-	-	5.921217
PolandY1993	-	-	-	7.003009
RussiaY1993	-	-	-	-6.587396
HungaryY1997	-	-	-	0.435318
PolandY1997	-	-	-	-6.885087
RussiaY1997	-	-	-	1.095112
Fixed Effects				
Hungary	-30.12454	-90.42709	-118.2021	-534.4805
Poland	-25.88381	-76.90207	-105.8910	-522.5860
Russia	-33.83000	-78.51058	-107.8946	-525.3103
Ukraine	-	-69.59642	-100.5148	-
R-squared	0.883036	0.868996	0.874926	0.933623
Adjusted R-squared	0.824554	0.815053	0.799882	0.800869
S.E. of regression	3.040127	3.001439	3.122116	3.238834
Log likelihood	-43.72036	-58.12998	-44.66185	-23.35189
Durbin-Watson stat	2.735736	2.437320	2.459151	3.042483
Mean dependent var	-0.062002	-0.827354	-0.827354	-0.062002
S.D. dependent var	7.258046	6.979211	6.979211	7.258046
Sum squared resid	110.9085	153.1468	146.2141	62.94029
F-statistic	30.19851	37.58905	20.98589	9.376994
Prob(F-statistic)	0.000007	0.000000	0.000003	0.006563

Average years of schooling per person 15 years old and older is the measure of human capital in the GDP per capita growth model for Hungary, Poland, Russia, and Ukraine presented in Table 4.5, column (2).

The coefficient on average years of schooling per person 15 years old and older is negative and insignificant at the five percent level of significance. Savings as a share of GDP demonstrates a negative correlation with GDP per capita growth. Increasing savings by one percent leads to a decrease in GDP per capita of 4.13 percent. However, the coefficient is statistically insignificant.

A one percent increase in the gross national income per capita increases GDP per capita growth by 10.6 percent. The coefficient of gross national income per capita is positive and statistically significant at the six percent level.

The coefficient for the logarithm of the sum of the rate of growth of the labor force, rate of technical exogenous progress, and the depreciation rate for human and physical capital is positive and statistically significant at the five percent level of significance. The coefficient size of 211.7 shows a large effect of labor growth on GDP per capita growth.

Fixed country effects are negative.

The regression with the average years of schooling per person 25 years old and older as the measure of human capital gives similar results. For the regressions presented in Tables 4.7 and 4.8, we include two dummy variables in the model to test for shifts in growth over time. Year 1993 is equal to years one for the 1993 and earlier and is equal to 0 for other years. Year 1997 is equal to one for the years 1997 and later and is equal to 0 for other years.

We estimate the impact of average years of schooling per person 15 years old and older as the measure of human capital on the GDP per capita growth in the regression model for Hungary, Poland, Russia, and Ukraine. The results are presented in Table 4.5, column (3).

The coefficient of average years of schooling per person 15 years old and older measure of human capital is negative and insignificant at the five percent level of significance. Coefficients for both dummy variables are insignificant at the five percent level of significance. This indicates that there is no significant difference for these countries between the periods of time before 1993, from 1993 till 1997, and after 1997 in the GDP per capita growth model.

Regression results for Hungary, Poland, Russia, and Ukraine using the share of workers with completed secondary education in the total labor force as our measure of human capital are presented in Table 4.5, column (4). In addition, we test interaction of the countries' fixed effects with the time variables. The coefficient for the share of workers with completed secondary education in the total labor force is negative and insignificant at the five percent level of significance. Coefficients for both dummy variables are insignificant at the five percent level of significance. This indicates that there is no significant difference for each country between the periods of time before 1993, from 1993 till 1997, and after 1997 in the GDP per capita growth model. Regressions with average years of schooling per person 25 years old and older measure of human capital give similar results.

4.3. Calculations with the time lag

4.3.1. The Data

The data used in the empirical study are selected macroeconomic indicators for Hungary, Poland, the Russian Federation, and Ukraine and cover the period of 1989-2010. Selected macroeconomic indicators for Hungary used in the research are presented in Tables 4.6 – 4.9. GDP per capita growth for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Table 4.6.

TABLE 4.6

Real GDP growth per head (percent per annum) in Hungary, Poland, the Russian Federation and Ukraine, 1989-2010

Year	Hungary	Poland	Russia	Ukraine
1989	0.999	-	-	-
1990	-2.893	-11.900	-	-4.241
1991	-11.831	-7.200	-5.267	-8.954
1992	-2.914	2.400	-14.586	-10.225
1993	-0.387	3.600	-8.669	-13.985
1994	3.110	5.100	-12.659	-22.322
1995	1.654	7.001	-4.065	-11.522
1996	1.539	6.198	-3.460	-9.217
1997	4.863	7.124	1.457	-2.240
1998	5.204	5.061	-5.139	-1.124
1999	4.546	4.616	6.730	0.597
2000	6.371	4.305	10.478	6.806
2001	4.619	1.210	5.613	11.001
2002	4.086	1.455	5.242	6.198
2003	3.645	3.869	7.757	10.398
2004	5.484	5.360	7.611	12.913
2005	4.400	3.447	6.823	3.371
2006	4.200	5.100	6.700	6.100
2007	3.800	4.800	6.100	6.400
2008	4.000	4.400	5.400	6.500
2009	4.200	4.100	4.900	6.700
2010	4.200	4.100	4.600	6.300

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, US Census Bureau, Ministry of Economy and European Integration, Hungarian Central Statistical Office, State Committee of Statistics, RosStat, Poland Quarterly Statistics, Statistical Yearbook, UN, IMF, International Financial Statistics.

Trajectories of the indicators overtime taken as logs are presented in Figures 4.6, 4.8, 4.10, and 4.12. Dynamics of the GDP per capita growth for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Figure 4.5.

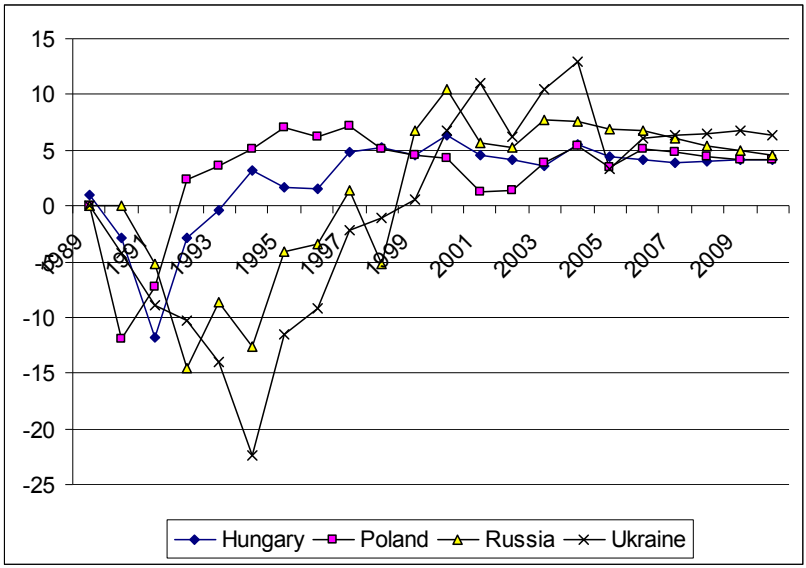

Figure 4.5. Real GDP per capita growth in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2010

Dynamics of the GDP per capita growth for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 that accounts for the log trajectories is presented in Figure 4.6.

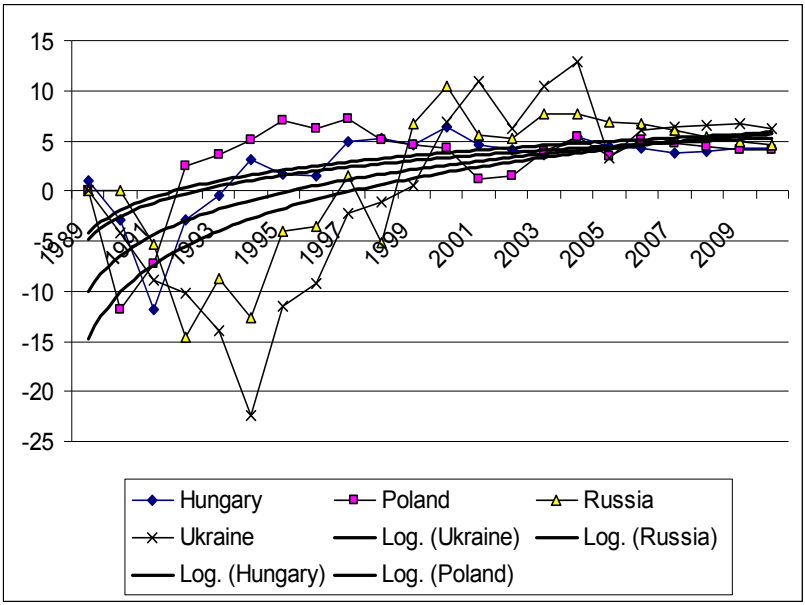

Figure 4.6. Real GDP per capita growth in Hungary, Poland, the Russian Federation, and Ukraine (with the log trajectories), 1989-2010

As shown in Figure 4.6, that uses trajectories of the logs, GDP per capita growth in Hungary, Poland, the Russian Federation, and Ukraine was in the different initial position in each country, The convergence of the GDP per capita growth rate in these countries occurs during the period of 1989-2010.

Gross fixed investment annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Table 4.7.

TABLE 4.7

Gross fixed investment (percent real change per annum) in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2010

Year	Hungary	Poland	Russia	Ukraine
1989	6.990	-2.145	-	-
1990	-7.136	-9.776	-	-
1991	-10.427	-4.404	-15.600	-
1992	-2.639	2.326	-41.500	-13.030
1993	2.031	2.900	-25.800	-34.626
1994	12.470	9.201	-26.000	-50.263
1995	-6.753	16.500	-15.267	-9.960
1996	6.747	19.700	-21.200	-20.036
1997	9.158	21.800	-7.900	3.636
1998	13.234	14.000	-12.400	4.316
1999	5.893	6.600	6.400	0.720
2000	7.665	2.700	18.100	12.650
2001	5.929	-9.700	10.200	9.350
2002	9.294	-6.300	2.800	3.400
2003	2.450	-0.100	12.800	15.800
2004	8.400	6.400	11.290	20.500
2005	6.558	6.500	10.499	-0.300
2006	5.500	8.000	10.200	5.000
2007	5.200	8.000	11.000	9.000
2008	5.000	7.000	10.600	10.000
2009	5.500	7.000	10.900	7.500
2010	6.000	7.000	10.000	8.500

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, US Census Bureau, Ministry of Economy and European Integration, Hungarian Central Statistical Office, State Committee of Statistics, RosStat, Poland Quarterly Statistics, Statistical Yearbook, UN, IMF, International Financial Statistics.

Dynamics of the gross fixed investment annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Figure 4.7.

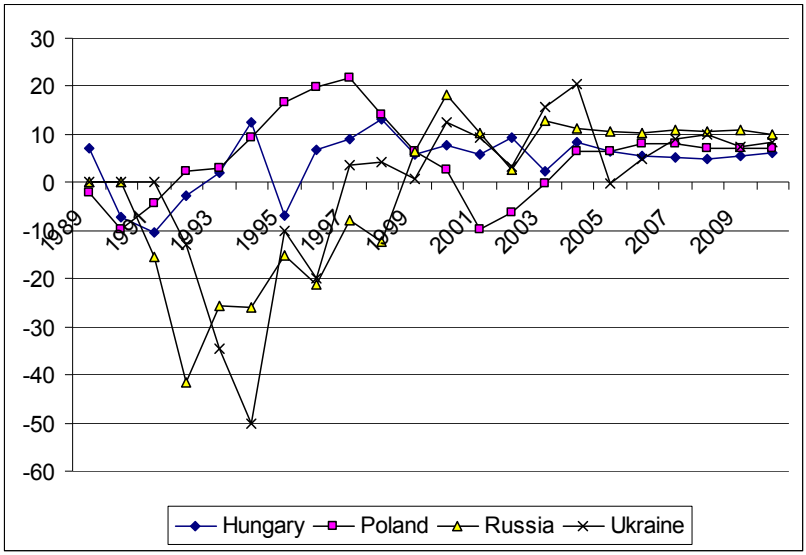

Figure 4.7. Investment in constant capital in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2010

Dynamics of the gross fixed investment annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 that accounts for the log trajectories is presented in Figure 4.8.

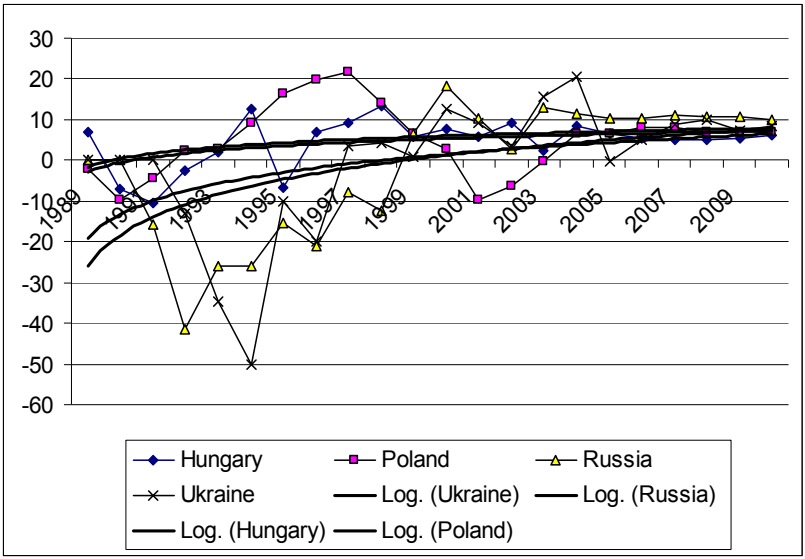

Figure 4.8. Investment in constant capital in Hungary, Poland, the Russian Federation, and Ukraine (with the log trajectories), 1989-2010

As shown in Figure 4.8 that uses trajectories of the logs, levels of the gross fixed investment in Hungary, Poland, the Russian Federation, and Ukraine were in the different initial positions in each country. However, gross fixed investment rates converge. The convergence of the gross fixed investment rates in these countries occurs during the period of 1989-2010. Gross fixed investment rates in Poland and Hungary were higher than in the Russian Federation and Ukraine. The process of convergence of the growth gross fixed investment rate coincides with the convergence of the GDP per capita growth in these countries that occurs during the period of 1989-2010. This confirms significant and positive effect of the investment on growth.

Savings rate annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Table 4.8.

TABLE 4.8

Gross national savings rate (percent) in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2010

Year	Hungary	Poland	Russia	Ukraine
1989	26.971	44.082	-	-
1990	26.537	30.219	-	-
1991	21.662	17.380	-	-
1992	17.021	12.030	-	-
1993	8.910	10.237	31.334	-
1994	12.427	14.014	28.358	32.659
1995	18.908	19.307	27.662	23.675
1996	21.591	18.772	26.434	20.037
1997	22.022	19.753	21.957	18.759
1998	21.644	21.030	15.044	17.667
1999	20.867	17.786	27.393	22.729
2000	21.378	19.003	36.729	24.494
2001	20.308	17.937	32.972	25.482
2002	17.877	16.087	28.502	27.700
2003	15.739	16.642	29.010	27.800
2004	16.787	15.931	30.997	31.800
2005	16.384	17.629	31.833	25.200
2006	17.600	18.600	31.400	20.000
2007	18.400	19.100	30.200	19.600
2008	18.000	19.500	27.400	19.500
2009	18.300	19.800	26.100	19.600
2010	19.100	19.700	26.300	21.700

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, US Census Bureau, Ministry of Economy and European Integration, Hungarian Central Statistical Office, State Committee of Statistics RosStat, Poland Quarterly Statistics, Statistical Yearbook, UN, IMF, International Financial Statistics.

Dynamics of the savings rate annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Figure 4.9.

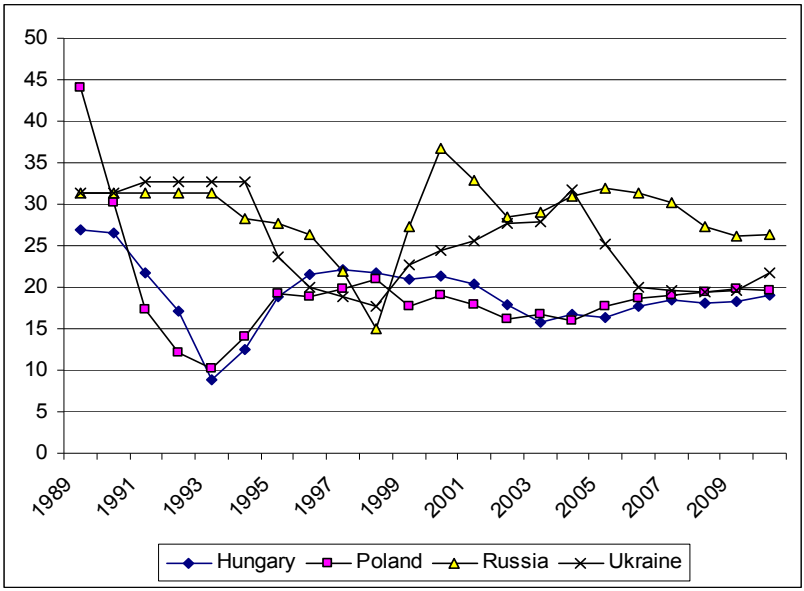

Figure 4.9. Savings rate in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2010

Dynamics of the savings rate annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 that accounts for the log trajectories is presented in Figure 4.10.

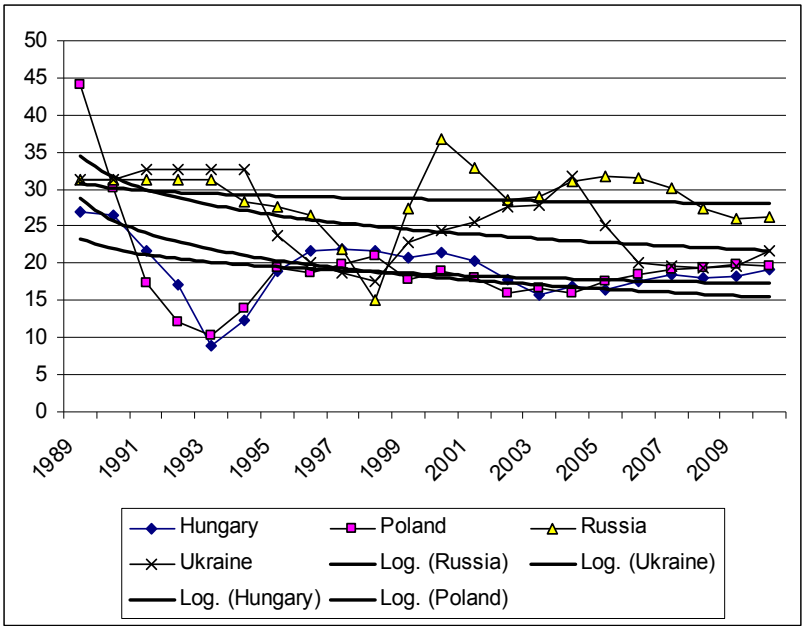

Figure 4.10. Savings rate in Hungary, Poland, the Russian Federation, and Ukraine (with the log trajectories), 1989-2010

As shown in the Figure 4.10 that uses trajectories of the logs, levels of the savings rate in Hungary, Poland, the Russian Federation, and Ukraine have not changed significantly during the period of 1989-2010. Sharp decline of the savings rate in the Russian Federation and Ukraine in 1999 can possibly be explained by the world financial crisis of 1997-1998.

Official rate of unemployment annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Table 4.9.

TABLE 4.9

Recorded unemployment (percent) in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2010

Year	Hungary	Poland	Russia	Ukraine
1989	-	-	-	-
1990	-	3.433	-	-
1991	-	8.975	-	-
1992	9.941	12.925	-	-
1993	12.098	14.992	-	-
1994	10.982	16.492	7.017	-
1995	10.432	15.208	8.300	-
1996	10.109	14.292	9.258	1.300
1997	8.912	11.492	10.808	2.300
1998	7.926	9.975	11.875	3.700
1999	7.057	11.992	12.617	4.200
2000	6.440	14.008	10.492	4.100
2001	5.765	18.000	9.033	3.600
2002	5.870	19.700	8.133	3.700
2003	5.932	19.900	8.625	3.500
2004	6.084	19.600	8.175	3.500
2005	7.278	18.200	7.583	3.100
2006	7.200	16.900	7.000	3.500
2007	7.700	16.000	6.600	3.800
2008	7.400	15.200	6.400	4.100
2009	6.800	14.600	6.300	4.400
2010	6.400	13.700	6.100	4.800

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, US Census Bureau, Ministry of Economy and European Integration, Hungarian Central Statistical Office, State Committee of Statistics RosStat, Poland Quarterly Statistics, Statistical Yearbook, UN, IMF, International Financial Statistics.

Dynamics of the official rate of unemployment annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 is presented in Figure 4.11.

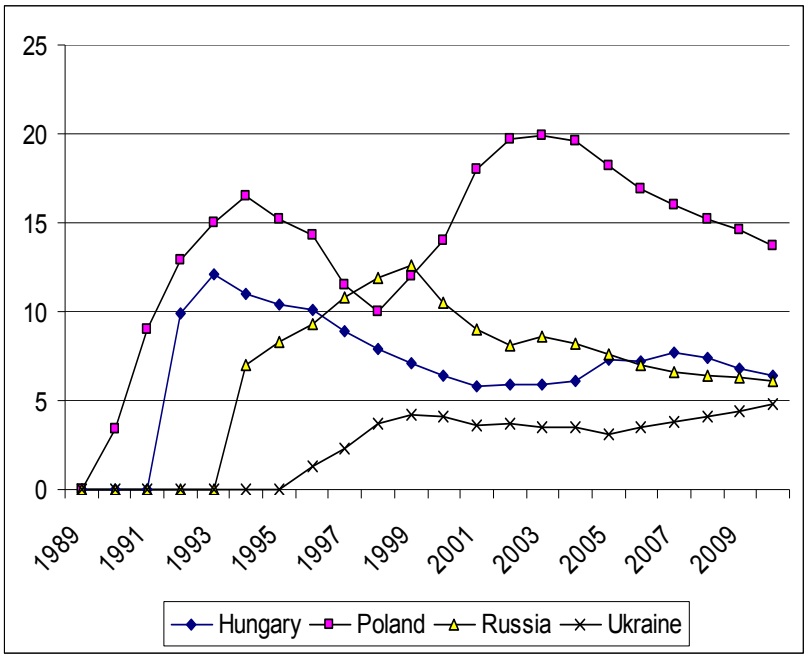

Figure 4.11. Registered level of unemployment in Hungary, Poland, the Russian Federation, and Ukraine, 1989-2010

Dynamics of the official rate of unemployment annual change for Hungary, Poland, the Russian Federation, and Ukraine for the period of 1989-2010 that accounts for the log trajectories is presented in Figure 4.12.

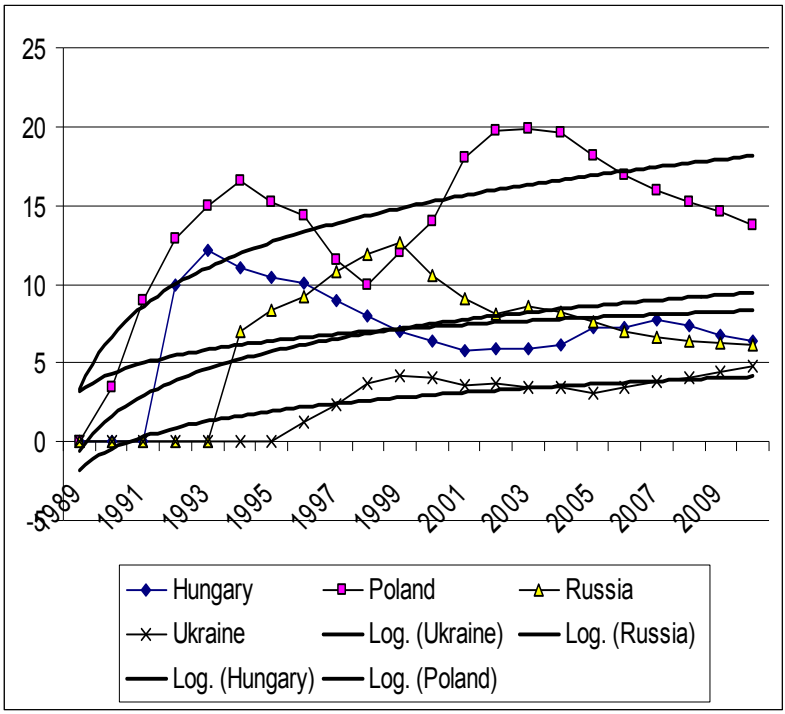

Figure 4.12. Registered level of unemployment in Hungary, Poland, the Russian Federation, and Ukraine (with the log trajectories), 1989-2010

As shown in the Figure 4.12 that uses trajectories of the logs, levels of the official unemployment rate in Hungary, Poland, the Russian Federation, and Ukraine have risen dramatically in early 1990s and have stabilized later. Such a sharp increase in unemployment may be explained in part by the absence of the official unemployment in the USSR and Eastern Europe. Relatively low level of the registered unemployment in the Russian Federation and Ukraine in 1990s should be considered critically as it appears to be much lower than the real unemployment rate.

4.3.2. Empirical results

The presented calculations are based on the estimation of the system of linear and log-linear equations that account for changes in investment, savings, unemployment, education, and medical services. The independent variables were dropped consequently and the time lags were taken as five-, six, seven, and ten-year time lags. We comment only on the coefficients with 5 percent level of significance. Regression results of GDP per capita growth to investment, savings, and unemployment for Hungary, Poland, the Russian Federation and Ukraine, for the period of 1990-2010 are presented in Table 4.10.

Regression results indicate positive effects of investments on the GDP per capita growth rate. Contribution of investments to the GDP per capita growth in the Russian Federation is more significant than in Hungary and Poland. Positive effect of investment on per capita GDP growth in Ukraine is more significant than that in the Russian Federation, Poland, and Hungary.

The results support theoretical statement made earlier that in transition and post-transition economies savings are not analogous to investments. This means that savings are not necessarily invested in the national economy at full scale. Process of reinvestment is weak. This finding makes obvious underdevelopment of the national stock markets and proves necessity for further development of the capital market, including institutional reform and strengthening of the national banking sector.

Regression results of GDP per capita growth to investment, savings, and unemployment for Hungary, Poland, the Russian Federation and Ukraine, for the period of 1990-2010 with the constant coefficient are presented in Table 4.11.

TABLE 4.10

Regression results of GDP growth to investment, savings, and unemployment for Hungary, Poland, the Russian Federation and Ukraine, 1990-2010

Hungary	Coefficient	Std. Error	t-Statistic	Prob.
Investment	0.244502	0.068874	3.549997	0.0027
Savings	0.256641	0.055916	4.589727	0.0003
Unemployment	-0.324814	0.111661	-2.908932	0.0102
R-squared	0.669189	Mean dependent var		3.506316
Adjusted R-sq	0.627837	S.D. dependent var		2.184843
Poland	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Investment	0.370721	0.045376	8.169967	0.0000
Savings	-0.290290	0.051233	-5.666129	0.0000
Unemployment	0.435232	0.063468	6.857488	0.0000
R-squared	0.866775	Mean dependent var		3.054571
Adjusted R-sq	0.851973	S.D. dependent var		4.511474
Russia	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Investment	0.435921	0.036696	11.87911	0.0000
Savings	-0.014688	0.055328	-0.265479	0.7945
Unemployment	0.303229	0.176305	1.719908	0.1075
R-squared	0.923170	Mean dependent var		3.181647
Adjusted R-sq	0.912194	S.D. dependent var		6.022545
Ukraine	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Investment	0.537728	0.089562	6.003988	0.0001
Savings	0.112958	0.113220	0.997691	0.3381
Unemployment	-0.265566	0.755503	-0.351509	0.7313
R-squared	0.805419	Mean dependent var		4.713533
Adjusted R-sq	0.772989	S.D. dependent var		5.702856

TABLE 4.11
Regression results of GDP growth to investment, savings, and unemployment for Hungary, Poland, the Russian Federation and Ukraine, 1990-2010

Hungary	Coefficient	Std. Error	t-Statistic	Prob.
Investment	0.218044	0.065923	3.307547	0.0048
Savings	0.102020	0.099344	1.026938	0.3207
Unemployment	-0.579068	0.173741	-3.332936	0.0045
C	5.009459	2.738086	1.829548	0.0873
R-squared	0.729541	Mean dependent var		3.506316
Adjusted R-sq	0.675450	S.D. dependent var		2.184843

Poland	Coefficient	Std. Error	t-Statistic	Prob.
Investment	0.377018	0.044253	8.519573	0.0000
Savings	-0.130255	0.120908	-1.077306	0.2964
Unemployment	0.580495	0.117482	4.941147	0.0001
C	-5.103586	3.514660	-1.452085	0.1647
R-squared	0.881476	Mean dependent var		3.054571
Adjusted R-sq	0.860560	S.D. dependent var		4.511474

Russia	Coefficient	Std. Error	t-Statistic	Prob.
Investment	0.418878	0.038128	10.98601	0.0000
Savings	0.113487	0.112216	1.011325	0.3303
Unemployment	0.504945	0.231460	2.181564	0.0481
C	-5.333275	4.093082	-1.302997	0.2152
R-squared	0.932045	Mean dependent var		3.181647
Adjusted R-sq	0.916363	S.D. dependent var		6.022545

Ukraine	Coefficient	Std. Error	t-Statistic	Prob.
Investment	0.375891	0.106429	3.531853	0.0047
Savings	0.449317	0.180289	2.492201	0.0299
Unemployment	1.454577	1.013559	1.435119	0.1791
C	-12.98688	5.837625	-2.224685	0.0480
R-squared	0.865800	Mean dependent var		4.713533
Adjusted R-sq	0.829200	S.D. dependent var		5.702856

Regression results presented in Table 4.11 indicate positive effects of investments on the GDP per capita growth rate. Contribution of investments to the GDP per capita growth in Ukraine is somewhat lower than in the Russian Federation and is on the same level as in Poland. Increases in savings and investment have positive effect on per capita GDP growth in Ukraine. One percent increase in investment leads to GDP per capita growth of 0.38 percent. One percent increase in savings rate leads to GDP per capita growth of 0.45 percent. The results present empirical evidence in support of the theoretical findings about the necessity of continuing increase of investment in production. This will lead to sustainable economic growth.

Regression results of GDP per capita growth to investment, savings, unemployment, education and healthcare for the Russian Federation and Ukraine for the period of 1990-2010 with the constant coefficient (1) and without the constant coefficient (2) are presented in Table 4.12. Indicators of the level of access to higher education and medical services are taken with the five year time lag.

Regression results of GDP per capita growth to investment, savings, education, and healthcare for the Russian Federation and Ukraine for the period of 1990-2010 with the constant coefficient (1) and without the constant coefficient (2) are presented in Table 4.14. Indicators of the level of access to higher education and medical services are taken with the six year time lag.

Regression results of GDP per capita growth to investment, savings, and education for the Russian Federation and Ukraine for the period of 1990-2010 with the constant coefficient (1) and without the constant coefficient (2) are presented in Table 4.15. Indicators of the level of access to higher education are taken with the five year time lag.

TABLE 4.12
Regression results of GDP growth to investment, savings, unemployment, education and healthcare for the Russian Federation and Ukraine, 1990-2010

Country	Russian Federation		Ukraine	
	(1)	(2)	(1)	(2)
Estimation method	OLS	OLS	OLS	OLS
Independent variable				
Investment	0.544219**	0.349321*	0.341820**	0.384583**
	(0.151921)	(0.088695)	(0.153252)	(0.142531)
	[3.582251]	[3.938462]	[2.230438]	[2.698245]
Savings	-0.038764	0.226039	0.901649	1.196193
	(0.260842)	(0.213105)	(0.728499)	(0.637364)
	[-0.148611]	[1.060695]	[1.237682]	[1.876784]
Unemployment	-1.156294	1.021889	0.410878	0.130104
	(1.554713)	(0.645762)	(1.675531)	(1.609592)
	[-0.743735]	[1.582455]	[0.245223]	[0.080831]
Education	-0.014755	0.041590	-0.066783	-0.060944
	(0.050371)	(0.037368)	(0.089199)	(0.086963)
	[-0.292917]	[1.112996]	[-0.748699]	[-0.700799]
Healthcare	-2.180633	-0.474601	2.500816	-0.346361
	(1.176011)	(0.366858)	(3.148024)	(0.212904)
	[-1.854263]	[-1.29369]	[0.794408]	[-1.626842]
R-squared	0.959353	0.941654	0.954202	0.941654
Adjusted R-squared	0.918707	0.883307	0.877871	0.883307
Mean dependent var	1.778636	1.778636	3.925778	3.925778
S.D. dependent var	7.173865	7.173865	7.361281	7.361281

Notes: each column is a separate regression of the growth rate on investment, savings, unemployment, education, and healthcare.
Standard errors are reported in parentheses. t-statistics are reported in square brackets.
Asterisk * indicates statistical significance at the 1-percent level, ** at the 5-percent level, and *** at the 10-percent level.

TABLE 4.13

Regression results of GDP growth to investment, savings, unemployment, education and healthcare for the Russian Federation and Ukraine, 1990-2010

Country	Russian Federation		Ukraine	
	(1)	(2)	(1)	(2)
Estimation method	OLS	OLS	OLS	OLS
Independent variable				
Investment	0.430864*	0.448183*	0.416201*	0.516480*
	(0.042274)	(0.052814)	(0.042274)	(0.105189)
	[10.19206]	[8.486119]	[3.862983]	[4.910021]
Savings	0.133635	0.015774	0.200090	0.394320
	(0.128833)	(0.151186)	(0.128833)	(0.488916)
	[1.037277]	[0.104332]	[0.453996]	[0.806520]
Education	0.017864	-0.001487	-0.040690	0.021822
	(0.022262)	(0.026335)	(0.022262)	(0.083934)
	[0.802457]	[-0.056456]	[-0.500659]	[0.259988]
Healthcare	-1.484476***	0.053926	5.761747	-0.298297
	(0.645769)	(0.143247)	(0.645769)	(0.186454)
	[0.05510]	[0.376454]	[1.692321]	[-1.599844]
R-squared	0.961679	0.929628	0.950381	0.924120
Adjusted R-squared	0.939781	0.903239	0.917301	0.891600
Mean dependent var	0.908000	0.908000	0.135273	0.135273
S.D. dependent var	7.475416	7.475416	10.96832	10.96832

Notes: each column is a separate regression of the growth rate on investment, savings, education, and healthcare.
Standard errors are reported in parentheses. t-statistics are reported in square brackets.
Asterisk * indicates statistical significance at the 1-percent level, ** at the 5-percent level, and *** at the 10-percent level.

TABLE 4.14
Regression results of GDP growth to investment, savings, and education and healthcare for the Russian Federation and Ukraine, 1990-2010

Country	Russian Federation		Ukraine	
	(1)	(2)	(1)	(2)
Estimation method	OLS	OLS	OLS	OLS
Independent variable				
Investment	0.452827*	0.454333*	0.430281*	0.523992*
	(0.053285)	(0.046954)	(0.066924)	(0.065638)
	[8.498240]	[9.676147]	[6.429377]	[7.983083]
Savings	-0.014128	-0.018440	0.472994*	0.420083
	(0.155924)	(0.137815)	(0.222495)	(0.273993)
	[-0.090609]	[-0.133805]	[2.125865]	[1.533188]
Education	-0.004705	-0.005694	-0.076373	0.021073
	(0.027358)	(0.022957)	(0.055225)	(0.043700)
	[-0.171966]	[-0.248051]	[-1.382946]	[-0.248051]
Healthcare	0.029059	0.092991	5.349698***	-0.303923***
	(0.818807)	(0.131469)	(2.468013)	(0.168933)
	[0.035490]	[0.707324]	[2.167614]	[0.109700]
R-squared	0.935410	0.935359	0.953802	0.919064
Adjusted R-squared	0.903115	0.913812	0.927403	0.888713
Mean dependent var	1.363000	1.363000	0.404917	0.404917
S.D. dependent var	7.342776	7.342776	10.49951	10.49951

Notes: each column is a separate regression of the growth rate on investment, savings, education, and healthcare.
Standard errors are reported in parentheses. t-statistics are reported in square brackets.
Asterisk * indicates statistical significance at the 1-percent level, ** at the 5-percent level, and *** at the 10-percent level.

TABLE 4.15

Regression results of GDP growth to investment, savings, and education for the Russian Federation and Ukraine, 1990-2010

Country	Russian Federation		Ukraine	
	(1)	(2)	(1)	(2)
Estimation method	OLS	OLS	OLS	OLS
Independent variable				
Investment	0.456769*	0.436670*	0.507771*	0.596913*
	(0.050490)	(0.040954)	(0.104841)	(0.101002)
	[9.046741]	[10.66238]	[4.843235]	[5.909940]
Savings	-0.004268	0.048580	0.376908	0.562421
	(0.141282)	(0.117505)	(0.481814)	(0.521962)
	[-0.030207]	[0.413427]	[0.782269]	[1.077514]
Education	-0.006527	0.005975	0.022592	-0.068311
	(0.024251)	(0.016493)	(0.081200)	(0.068011)
	[-0.269131]	[0.362271]	[0.278230]	[-1.004410]
R-squared	0.932750	0.928382	0.926696	0.896375
Adjusted R-squared	0.907531	0.912466	0.895280	0.870469
Mean dependent var	0.908000	0.908000	0.135273	0.135273
S.D. dependent var	7.475416	7.475416	10.968320	10.96832

Notes: each column is a separate regression of the growth rate on investment, savings, and education.
Standard errors are reported in parentheses. t-statistics are reported in square brackets.
Asterisk * indicates statistical significance at the 1-percent level, ** at the 5-percent level, and *** at the 10-percent level.

Regression results of GDP per capita growth to investment, savings, and education for the Russian Federation and Ukraine for the period of 1990-2010 with the constant

coefficient are presented in Table 4.16. Indicators of the level of access to higher education are taken with the six year time lag (1) and with the seven year time lag (2).

TABLE 4.16

Regression results of GDP growth to investment, savings, and education for the Russian Federation and Ukraine, 1990-2010

Country	Russian Federation		Ukraine	
	(1)	(2)	(1)	(2)
Estimation method	OLS	OLS	OLS	OLS
Independent variable				
Investment	0.451999*	0.449635*	0.517551*	0.513473*
	(0.045165)	(0.041511)	(0.064646)	(0.054756)
	[10.00766]	[10.83167]	[8.005908]	[9.377552]
Savings	-0.011663	-0.014491	0.431738	0.384124***
	(0.131625)	(0.124123)	(0.268069)	(0.204437)
	[-0.088608]	[-0.116749]	[1.610548]	[1.878933]
Education	-0.004157	-0.004167	0.018197	0.042449
	(0.021306)	(0.019454)	(0.040943)	(0.030395)
	[-0.195124]	[-0.214207]	[0.444446]	[1.396600]
R-squared	0.935400	0.935400	0.922793	0.922793
Adjusted R-squared	0.913866	0.913866	0.893841	0.893841
Mean dependent var	1.363000	1.363000	0.404917	0.404917
S.D. dependent var	7.342776	7.342776	10.499510	10.499510

Notes: each column is a separate regression of the growth rate on investment, savings, and education.
Standard errors are reported in parentheses. t-statistics are reported in square brackets.
Asterisk * indicates statistical significance at the 1-percent level, ** at the 5-percent level, and *** at the 10-percent level.

Regression results indicate positive effects of investments on the GDP per capita growth rate. An increase in investment leads to an increase in per capita GDP growth in all the countries. Other variables are not statistically significant. Effects of the variables that represent access of population to higher education and medical services are within the limits of statistical error. This statement holds when indicators of the level of access to higher education and medical services are taken with the five, six, and seven year time lags.

Positive effects of investment in fixed capital in the Russian Federation and Ukraine are higher than in Poland and Hungary. One percent increase in investments in the Russian Federation and Ukraine leads to an increase of the per capita GDP within the limits of 0.37 to 0.55 percent. While in Poland and Hungary this indicator stays within the limits of 0.22 to 0.37 percent.

The dependency between the per capita GDP growth and the independent variables we use in the regressions may be nonlinear. We test system of log-linear equations, where all independent variables are taken as logarithms. Initially, we estimate an equation that includes logarithms of all independent variables, including investment, savings, unemployment, education, and health. Then variables of unemployment and health are consequently taken out from the equations. Indicators of the level of access of population to higher education and medical services are taken consequently with the five, six, seven, and ten year time lags for all the equations. All combinations of log-linear equations are estimated with and without the constant coefficient.

Regression results indicate positive effects of an increase in investment on the per capita GDP growth in the Russian Federation and Ukraine. Investment coefficients are positive and statistically significant in all of the equations with the goodness of fit within the limits of 0.8 to 0.95. The complete records of

the regression results can be obtained from the author. We will consider the most interesting results.

Regression results of per capita GDP growth to logarithms of investment, savings, and education with the constant coefficient in the Russian Federation and Ukraine, for the period of 1990-2010, presented in Table 9, indicate positive effect of an increase in investment in fixed capital, savings, and access to education on the per capita GDP growth. All coefficients of the independent variables are statistically significant. Indicators of the level of access of population to higher education are taken with the ten year time lag.

Regression results of GDP per capita growth to investment, savings, and education for the Russian Federation and Ukraine for the period of 1990-2010 with the constant coefficient (1) and without the constant coefficient (2) are presented in Table 4.17. Indicators of the level of access to higher education are taken with the ten year time lag.

Estimation of the equations that consider indicators of access to higher education and medical services with the seven year time lag does not bring statistically significant results. This supports our suggestion that an increase in access of population to higher education does not bring positive results for the per capita GDP growth in the short term. Moreover, enrollment in a higher education institution equates to temporary withdrawal from the work force. Both the level of unemployment and the opportunity costs of obtaining education are of certain concern here. However, an increase in access of population to higher education brings positive results for the per capita GDP growth in the long term. Increasing number of college-educated specialists leads to sustainable economic growth. Apparently, background for the 2000-2005 rapid economic growth in Ukraine and in the Russian Federation was laid down in early 1990s. This contradicts commonly accepted perception about the crisis decade of 1990s.

TABLE 4.17

Regression results of GDP growth to investment, savings, and education in Ukraine, 1990-2010

Country	Russian Federation	Ukraine	
	(2)	(1)	(2)
Estimation method	OLS	OLS	OLS
Independent variable			
Investment	1.461792***	2.141293**	3.389514*
	(0.708749)	(0.698971)	(1.035916)
	[2.062496]	[3.063492]	[3.271996]
Savings	6.209534**	19.06934*	6.853271***
	(1.937277)	(3.728733)	(3.637917)
	[3.205291]	[5.114161]	[1.883845]
Education	-3.356831**	11.31633**	-4.170212***
	(1.194651)	(4.021590)	(2.113641)
	[-2.809885]	[2.813894]	[-1.972999]
R-squared	0.674533	0.893438	0.673608
Adjusted R-squared	0.593166	0.853477	0.601077
Mean dependent var	6.668545	5.854083	5.854083
S.D. dependent var	1.575530	4.683886	4.683886

Notes: each column is a separate regression of the growth rate on investment, savings, and education.
Standard errors are reported in parentheses. t-statistics are reported in square brackets.
Asterisk * indicates statistical significance at the 1-percent level, ** at the 5-percent level, and *** at the 10-percent level.

Estimation of the system of equations, where all the variables—dependent and independent—were presented in the form of logarithms, confirms positive effect of an increase in investment and per capita GDP growth. For instance, one

percent increase in investment in fixed capital in Ukraine leads to 0.639 percent increase in per capita GDP growth.

Results of the Vector Autoregression Estimates (VAR), and Impulse Response Function indicate generally positive effects of investment on per capita GDP growth in the short run. In the long run a most significant positive influence of investment in fixed capital on per capita GDP growth occurs during the first two years and then diminishes.

4.4. Concluding remarks

As follows from the regression results, presented in this chapter, investments in fixed capital have positive effect on the GDP per capita growth rate. Contribution of investments to the GDP per capita growth in the Russian Federation is more significant than in Hungary and Poland. Positive effect of investment on per capita GDP growth in Ukraine is more significant than that in the Russian Federation, Poland, and Hungary. Regressions that use average number of schooling years per person 25 years old and older or the average number of schooling years per person 15 years old and older as the human capital measure demonstrate a positive correlation in Poland but a negative correlation in Hungary, even though Hungary has the most sustainable GNP per capita growth. We also show that there is no significant difference in the basic growth model over time. These trend effects did not differ across countries.

Coefficients for total savings as a share of GDP in the regressions indicate a negative but insignificant effect on GNP per capita growth. It confirms our prediction that savings of the population are not invested in production and cannot be considered as a share of output devoted to physical capital accumulation. This reflects the problem of underinvestment in production in Ukraine and the Russian Federation.

Gross national income per capita has a positive and significant effect on per capita GNP growth. An increase in income per capita leads to a higher level of growth. This contrasts to the convergence hypothesis presented in the reviewed literature. The empirical model did not examine threshold levels of human capital, but the growth experience of a country may well differ according to which side of the threshold of human capital it is on. This should be examined in the future.

The results support theoretical statement made earlier that in transition and post-transition economies savings are not analogous to investments. This means that savings are not necessarily invested in the national economy at full scale. Process of reinvestment is weak. This finding makes obvious underdevelopment of the national stock markets and proves necessity for further development of the capital market, including institutional reform and strengthening of the national banking sector.

Regression results of per capita GDP growth to logarithms of investment, savings, and education with the constant coefficient in the Russian Federation and Ukraine for the period of 1990-2010 indicate positive effect of an increase in investment in fixed capital, savings, and access to education on the per capita GDP growth when indicators of the level of access of population to higher education are taken with the ten year time lag. An increase in access of population to higher education brings positive results for the per capita GDP growth in the long term. Increasing number of college-educated specialists leads to sustainable economic growth. Apparently, background for the 2000-2005 rapid economic growth in Ukraine and in the Russian Federation was laid down in early 1990s. This contradicts commonly accepted perception about the crisis decade of 1990s.

Results of the Vector Autoregression Estimates (VAR), and Impulse Response Function indicate generally positive effects of investment on per capita GDP growth in the short run. In the long run a most significant positive influence of

investment in fixed capital on per capita GDP growth occurs during the first two years and then diminishes. The regression results present strong empirical evidence in support of continuing investment in fixed capital in order to sustain economic growth. Investments in fixed capital are backed by the growing education quality of the work force.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The impact of human capital accumulation on economic growth remains controversial. In different research, conclusions reached depend on the definition of human capital, the methodology used and the time period and set of countries over which the model is estimated. Our objective in this research is to present a study of the possible link between human capital accumulation and GDP per capita growth in Ukriane and other countries in transition, by using an extended set of macroeconomic indicators and alternative definitions of human capital. As anticipated, parametric estimates reveal no link between the two variables: for different measures of human capital, there is no significant growth effect. The empirical results are supportive of the predictions from the original growth models (Kalaitzidakis et al., 2001): an increase in human capital does not correlate with per capita economic growth in countries with a high level of human capital.

Substantial GDP per capita growth in Hungary and Poland in the late 1990s may well be explained by the success in economic restructuring and institutional reform. The slow initial process of restructuring and institutional changes in the Russian Federaiton and Ukraine led to a low level of GDP per capita growth. Nevertheless, positive changes in the economy and the society overall are the result of the structural changes in the economy, institutional reforms, development of the market type of behavior among population, development of market infrastructure, improved management, regional diversification, stabilization of the national currency, slowdown in both “brain drain” and capital outflow, and high level of human capital that served as a ground for economic growth. The consecutive output decline in Ukraine continued for no more than six years and the decline itself was significantly smaller than often stated. The so-called economic crisis in Ukraine was to a large extent a myth.

The state did not hold the initiative in the process of transition, including the social sphere. Poor people, amny of who were poor in Soviet times, were left aside and failed to integrate in the newly emerging market economic. Hidden poverty came to the surfice. As a result, there was an impression about the deep socio-economic crisis in the nation. Income differentiation and growing corruption in public sector led to an increase in the number of poor families. This process was unavoidable due to the transition to the market. However, the social consequences of the reform could have been mitigated, if the government would have a well-developed economic program.

The state has concentrated on such aspects of the reform, as privatization and investments, as well as a fundamental political reform. Such a prioritization led to the high social price of the reform. In part, the exogenous type of transformation, i.e. an attempt to rebuild the system from the outside, by using external forces, was responsible for economic difficulties that were experienced by the large part of population. Continuing political instability in Ukraine is a natural aprt of the process of democratization. Corruption, however, may be a challenge. The shift from exogenous to endogenous forms of transformation will lead to the weakening role of the state in the economy. As a result, political instability will have a lesser impact on the development of the antionla economy.

As indicated by the data in Tables 1 through 8 of the Appendix VIII, educational level of population in the former Soviet Union was higher than in Poland and Hungary. Educational attainment in Ukraine, the Russian Federation, and other countries of Eastern Europe was among the highest in the world for decades, being on par and sometimes even higher than in such developed Western democracies as France, Switzerland, and the United Kingdom and way above educational level of population in such developing countries as Brazil and China (see Appendix VIII).

An increase in access of population to higher education brings positive results for the per capita GDP growth in the long term. Increasing number of college-educated specialists employed in the industry leads to sustainable economic growth. Apparently, background for the 2000-2005 rapid economic growth in Ukraine and in the Russian Federation was laid down in early 1990s. This contradicts commonly accepted perception about the crisis decade of 1990s.

Overall, results of the study offer policy directions for Ukraine and other transition economies. High level of human capital in Hungary, Poland, Russia, and Ukraine needs to be reproduced on an increasing scale. The process of accumulation of human capital will have a positive impact on GDP per capita growth in the long run.

While the exogenous resource of economic transition is depleted and the exogenous-type forms of transition are no longer effective, the exogenous growth still has a certain potential in Ukraine. This is explained by the fact that there are still unused labor resources as well as labor migration abroad and capital flight. Repatriation and legalization of capital, return of the labor migrants, and full employment will support economic growth in the short run. However, the sustainable growth will only be possible thanks to technological advancements and innovations. This anticipates endogenous growth.

Among the major tasks of post-transition development in Ukraine are strengthening of the labor market and creation of the stock market. Such developments will facilitate better distribution of property and lead to an increase in labor productivity. This will eventually bring higher rate of GDP per capita growth and higher living standards of the population.

The slowdown in the accumulation of amortization funds during 1990s along with the growing depreciation of principal capital was considered as a time bomb for the industry. A significant renovation of principal capital is necessary. During

the next decade, i.e. from 2007 to 2017, Ukraine will have to renovate at least third of its principal capital.

If a massive technical renovation and incremental growth in production capacities will take place right after the period of significant growth of 2004-2006, then the national economy will enter the stage of cyclical development earlier. If, however, the massive renovation of principal capital will be preceded by the period of economic growth slowdown, predicted for 2007-2010, then the nation's economy will enter the cycle later.

We tend to consider the second scenario as more viable and likely to take place in Ukraine. The slowdown in economic growth will indicate stabilization of the system. Later, based on this already achieved stabilization, renovation of principal capital will began. This renovation will start from the most viable, economically effective and profitable industries, which are, nevertheless, were utilizing old and morally outdated machinery and equipment. Technological changes will be accompanied with the incremental increase in principal capital based on reinvestment of profits, earned in these industries over the last decade.

We believe that the next advancement will become possible based on the process of renovation and investment into principal capital. The process of renovation itself will result in the continuation of strong economic growth. After the renovation, the economy will continue to grow on the basis of new production capacities, technological advancements, and further accumulation of human capital to serve new equipment and technologies. From this perspective, we suggest further institutional and structural changes in the economies. It will increase domestic and foreign investment, further develop domestic market, and sustain already achieved substantial GDP per capita growth.

APPENDICES

Appendix I

Unofficial GDP in the Eastern European countries and the former USSR for 1989-1995, as well as selected indicators for electricity and energy production and consumption in Ukraine for 1992-2003

TABLE 1

Unofficial GDP in the Eastern European countries, 1989-1995

Country	Share of unofficial GDP in total GDP, percent							Index GDP, 1994		Index GDP, 1995	
	1989	1990	1991	1992	1993	1994	1995	Official	Total	Official	Total
Eastern Europe											
Bulgaria	22.8	25.1	23.9	25.0	29.9	29.1	36.2	72.3	78.7	73.7	89.2
Czech Republic	6.0	6.7	12.9	16.9	16.9	17.6	11.3	81.0	92.4	84.3	89.3
Hungary	27.0	28.0	32.9	30.6	28.5	27.7	29.0	83.4	84.3	84.7	87.1
Poland	15.7	19.6	23.5	19.7	18.5	15.2	12.6	92.0	91.4	98.3	94.9
Romania	22.3	13.7	15.7	18.0	16.4	17.4	19.1	72.7	68.4	77.7	74.7
Slovak Repub.	6.0	7.7	15.1	17.6	16.2	14.6	5.8	77.9	85.8	83.1	82.9

Source: Kaufmann and Kaliberda (1996), Gjourgyan and Mirzoyan (2000), Shleifer (2005).

TABLE 2

Unofficial GDP in the former USSR, 1989-1995

Country	Share of unofficial GDP in total GDP, percent							Index GDP, 1994		Index GDP, 1995	
	1989	1990	1991	1992	1993	1994	1995	Official	Total	Official	Total
USSR											
Armenia	12.0	16.1	20.2	22.0	23.0	27.0	31.6	60.1		61.2	
Azerbaijan	12.0	21.9	22.7	39.2	51.2	58.0	60.6	30.1	71.5	31.4	70.1
Belarus	12.0	15.4	16.6	13.2	11.0	18.9	19.3	62.5	67.8	56.1	61.2
Estonia	12.0	19.9	26.2	25.4	24.1	25.1	11.8	67.1	78.8	69.1	68.9
Georgia	12.0	24.9	36.0	52.3	61.0	63.5	62.6	15.6	37.6	16.0	37.6
Kazakhstan	12.0	17.0	19.7	24.9	27.2	34.1	34.3	51.0	68.2	46.5	62.3
Latvia	12.0	12.8	19.0	34.3	31.0	34.2	35.3	48.1	64.3	47.3	62.3
Lithuania	12.0	11.3	21.8	39.2	31.7	28.7	21.6	43.9	54.1	45.1	50.6
Moldova	12.0	18.1	27.1	37.3	34.0	39.7	35.7	41.7	60.9	43.0	58.8
Russia	12.0	14.7	23.5	32.8	36.7	40.3	41.6	51.3	75.5	49.1	74.0
Ukraine	12.0	16.3	25.6	33.6	38.0	45.7	48.9	44.2	71.6	39.0	67.0
Uzbekistan	12.0	11.4	7.8	11.7	10.1	9.5	6.5	85.0	82.6	84.0	79.0

Source: Kaufmann and Kaliberda (1996), Gjourgyan and Mirzoyan (2000), Shleifer (2005).

TABLE 3

Selected indicators for electricity and energy production and consumption in Ukraine, 1992-1997

Indicator	1992	1993	1994	1995	1996	1997
Electric power consumption (kWh per capita)	4307.974	3947.971	3469.518	3343.571	3163.629	2960.385
Electric power consumption (kWh)	2.25E+11	2.06E+11	1.80E+11	1.72E+11	1.62E+11	1.50E+11
Electric power transmission and distribution losses (% of output)	9.019736	9.734532	10.72403	9.715665	13.67508	15.97460
Electricity production (kWh)	2.53E+11	2.30E+11	2.03E+11	1.94E+11	1.83E+11	1.78E+11
Electricity production from nuclear sources (% of total)	29.19802	32.75594	33.96329	36.38564	43.53585	44.66895
Energy imports, net (% of energy use)	49.55032	48.5783	47.42668	49.84413	52.00154	49.19622
Energy production (kt of oil equivalent)	110170	100225	86869	83020	70935	71455
Energy use (kg of oil equivalent per capita)	4187.438	3735.357	3182.409	3213.291	2894.519	2779.948
Energy use (kt of oil equivalent)	218376	194908	165234	165524	147786	140649

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

TABLE 4

Selected indicators for electricity and energy production and consumption in Ukraine, 1998-2003

Indicator	1998	1999	2000	2001	2002	2003
Electric power consumption (kWh per capita)	2772.917	2787.189	2773.435	2790.534	2843.537	2997.873
Electric power consumption (kWh)	1.39E+11	1.38E+11	1.36E+11	1.36E+11	1.37E+11	1.43E+11
Electric power transmission and distribution losses (% of output)	17.36642	17.56333	18.20409	19.70996	19.29596	17.80189
Electricity production (kWh)	1.73E+11	1.72E+11	1.71E+11	1.73E+11	1.74E+11	1.80E+11
Electricity production from nuclear sources (% of total)	43.53554	41.86905	45.08735	44.07903	44.93288	45.17536
Energy imports, net (% of energy use)	46.33653	45.47789	44.36479	44.67668	44.86455	43.0146
Energy production (kt of oil equivalent)	71110	71756	72328	71995	72781	75537
Energy use (kg of oil equivalent per capita)	2642.613	2649.489	2643.656	2673.062	2737.304	2772.388
Energy use (kt of oil equivalent)	132511	131609	130004	130135	132004	132555

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

Appendix II

GDP per capita growth in the in the Central and Eastern European countries and the former USSR for 1989-2004 according to World Development Indicators methodology, as well as real GDP per capita growth in the in the countries of the former USSR for 1991-2000 according to Penn World Tables methodology

TABLE 1

GDP per capita growth in the NIS and CEE countries, 1989-1996 (annual percent change)

Country	1989	1990	1991	1992	1993	1994	1995	1996
Armenia	..	..	-10.88910	-40.75950	-6.66407	7.92383	9.08475	7.49574
Azerbaijan	..	..	-2.22959	-23.76380	-24.25940	-20.77810	-12.81000	0.28217
Belarus	..	..	-1.24847	-9.79468	-7.80756	-11.59640	-10.11000	3.14401
Georgia	-7.60712	-14.64490	-20.40770	-44.06640	-27.92940	-8.57907	4.51016	12.97227
Hungary	1.17239	-3.18942	-11.73020	-2.85762	-0.28636	3.27824	1.80702	1.67659
Kazakhstan	..	..	-11.55450	-5.23430	-8.59574	-11.32270	-6.57726	2.03372
Kyrgyz Rep.	0.84764	3.71923	-9.32709	-14.85480	-15.40350	-20.03240	-6.45203	5.54159
Latvia	5.05549	-7.48512	-12.30960	-31.34490	-3.29281	3.71394	0.35498	4.79089
Lithuania	..	..	-5.82846	-21.17390	-15.84020	-9.14936	4.02949	5.46120
Moldova	4.42051	-2.77460	-16.13940	-29.07700	-1.02120	-30.72280	-1.12771	-4.93707
Poland	..	..	-7.30543	2.27828	3.54549	4.96910	6.87799	5.91654
Russia	..	-3.37349	-5.25906	-14.56840	-8.56461	-12.46130	-4.01735	-3.33770
Tajikistan	-9.16156	-3.08362	-9.07438	-30.28300	-17.71330	-22.43990	-13.63280	-17.85890
Turkmenistan	-6.71076	-1.94781	-7.36389	-8.01543	-12.51560	-19.40630	-9.23495	-8.38468
Ukraine	3.36751	-6.56001	-8.60169	-9.95838	-14.27370	-22.55080	-11.50330	-9.19777
Uzbekistan	0.65818	-0.78637	-2.82857	-13.26720	-4.50021	-7.19708	-2.80287	-5.09000

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

TABLE 2

GDP per capita growth in the NIS and CEE countries, 1997-2004 (annual percent change)

Country	1997	1998	1999	2000	2001	2002	2003	2004
Armenia	4.47080	8.16901	3.93089	6.62080	10.17418	13.40822	14.37812	7.39263
Azerbaijan	4.78763	8.95741	6.45825	10.19537	9.05170	9.77781	10.36072	9.22415
Belarus	11.87348	8.91675	3.75033	6.11723	5.09021	5.52430	7.59642	11.59918
Georgia	12.03807	4.34428	4.04866	2.99955	6.00316	6.68616	12.30461	7.29727
Hungary	4.95918	5.28451	4.62847	6.46820	2.66074	4.10215	3.69470	4.88081
Kazakhstan	3.31959	-0.19201	3.68290	10.13077	13.69281	9.79520	8.93349	8.78317
Kyrgyz Rep.	8.33332	0.58905	2.21536	4.35562	4.48742	-0.78627	6.06591	5.93741
Latvia	10.09487	6.46092	4.15124	7.70275	8.60470	7.40345	7.79689	8.90686
Lithuania	7.75511	8.03369	-1.02755	4.85244	6.93392	7.13757	10.16636	7.24767
Moldova	1.89016	-6.22572	-3.10236	2.43334	6.46148	8.17064	6.95878	7.64027
Poland	6.71159	4.75625	4.12193	3.97790	2.06496	1.42045	3.93548	5.48004
Russia	1.69944	-5.03891	6.82906	10.00451	5.34647	5.21216	7.86771	7.70229
Tajikistan	0.31857	3.91586	2.40589	7.03137	8.99007	7.95287	9.04633	9.38949
Turkmenistan	-12.61530	5.63697	15.07709	17.08336	18.75855	..	..	..
Ukraine	-2.11217	-1.01931	0.74547	6.97137	10.30354	6.20298	10.34161	12.95349
Uzbekistan	3.56561	2.79826	2.84094	2.33658	2.70548	2.49454	2.68234	6.13382

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

TABLE 3
Real GDP per capita growth in the NIS, 1991-2000 (annual percent change)*

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Armenia	…	…	-1.34	-6.16	9.19	4.58	-1.7	7.34	4.73	5.57
Azerbaijan	…	…	…	…	-14.46	-5.80	2.14	14.39	5.96	10.40
Belarus	-3.58	-9.59	-14.95	-9.80	-8.12	2.59	15.55	7.18	7.87	11.19
Estonia	…	…	2.25	0.03	6.42	0.08	9.60	4.88	4.63	6.16
Georgia	…	…	…	…	…	…	11.64	-3.71	17.43	-13.22
Kazakhstan	…	…	…	…	-1.85	2.31	1.23	-4.15	20.05	7.87
Kyrgyz Republic	…	…	…	…	-10.72	2.27	7.43	2.24	0.88	4.80
Latvia	…	…	…	-4.59	-2.17	4.21	5.09	6.72	-5.29	5.13
Lithuania	-8.52	-32.05	-6.75	1.81	1.91	3.61	8.14	2.34	3.69	7.67
Moldova	…	…	…	…	…	-4.82	3.56	-8.49	-4.52	1.81
Russia	…	-5.75	0.10	-11.27	-6.75	-0.96	0.60	-2.82	3.48	11.40
Tajikistan	…	…	…	…	…	…	25.35	-2.25	2.60	6.56
Turkmenistan	…	…	…	…	…	…	…	…	…	…
Ukraine	-8.32	-9.66	-13.17	-23.54	-10.95	-9.19	-1.02	1.17	1.45	3.35
Uzbekistan	…	…	…	…	-2.54	10.24	…	…	…	…

Source: Heston, A., Summers, R., and B. Aten, Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP), October 2002. Retrieved from the database: http://pwt.econ.upenn.edu/php_site/pwt61_form.php Accessed in August 12, 2006.
* In Penn World Table data Real GDP means GDP measured in PPP (purchasing power parity), not in constant prices (adjusted for inflation) as it is normally the case for term “real” in economic literature.

Appendix III

Major GDP indicators in Ukraine, the Russian Federation, Poland, and Hungary for 1989-2006 and in the forecasts till 2010

TABLE 1

Selected indicators of GDP in Ukraine, 1989-2010

Year	Nominal GDP (US$ at PPP) bln USD	Real GDP bln UAH	Real GDP (PPP US$ at 1996 prices) bln USD	Real GDP (US$ at 1996 prices) bln USD	Nominal GDP bln UAH	Nominal GDP (US$) bln USD	Real GDP at factor cost bln UAH
1989	373.629	118.856	448.236	107.942	...	...	...
1990	374.084	114.102	430.307	103.624	...	...	...
1991	353.486	104.175	392.870	94.609	...	...	2.001
1992	325.816	93.861	353.976	85.242	...	...	1.729
1993	286.006	80.533	303.711	73.138	1.500	33.094	1.482
1994	225.197	62.091	234.161	56.389	12.000	36.639	1.142

1995	201.768	54.516	205.594	49.510	54.500	36.997	1.002
1996	185.034	49.064	185.034	44.559	81.519	44.559	0.903
1997	182.470	47.592	179.483	43.222	93.365	50.151	0.875
1998	180.988	46.688	176.073	42.401	102.593	41.883	0.859
1999	183.240	46.594	175.721	42.316	130.442	31.581	0.856
2000	198.279	49.344	186.088	44.813	170.070	31.261	0.797
2001	221.716	53.884	203.209	48.936	204.190	38.009	0.867
2002	237.098	56.686	213.775	51.480	225.810	42.393	0.937
2003	264.061	62.127	234.298	56.422	267.344	50.133	1.020
2004	300.825	69.645	262.648	63.249	345.113	64.881	1.146
2005	317.266	71.455	269.477	64.894	424.741	82.881	1.187
2006	343.948	75.386	284.298	68.463	464.876	92.055	1.265
2007	375.248	79.758	300.787	72.434	492.751	96.998	1.351
2008	410.882	84.543	318.834	76.780	571.732	111.666	1.445
2009	449.150	89.785	338.601	81.540	653.722	126.690	1.549
2010	488.671	94.992	358.239	86.269	754.717	145.418	1.655

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations.

TABLE 2

Selected indicators of GDP in the Russian Federation, 1989-2010

Year	Nominal GDP (US$ at PPP) bln USD	Real GDP bln UAH	Real GDP (PPP US$ at 1996 prices) bln USD	Real GDP (US$ at 1996 prices) bln USD	Nominal GDP bln UAH	Nominal GDP (US$) bln USD	Real GDP at factor cost bln UAH
1989	1,269.07	...	...	...	...	...	...
1990	1,265.35	16,681.84	1,454.93	655.11	...	...	...
1991	1,244.13	15,847.75	1,382.19	622.35	...	...	...
1992	1,088.20	13,549.83	1,181.77	532.11	...	...	...
1993	1,016.47	12,370.99	1,078.95	485.82	171.50	172.93	...
1994	906.23	10,799.88	941.93	424.12	610.70	278.76	...
1995	888.19	10,357.08	903.31	406.73	1,428.50	313.32	9,292.34
1996	870.78	9,984.23	870.79	392.09	2,007.80	392.09	9,034.82
1997	899.11	10,124.01	882.98	397.58	2,342.50	404.94	9,162.19
1998	859.57	9,587.43	836.18	376.50	2,629.60	270.95	8,694.47

1999	926.10	10,201.03	889.70	400.60	4,823.20	195.91	9,187.24
2000	1,045.21	11,221.13	978.67	440.66	7,305.60	259.71	9,638.14
2001	1,124.78	11,793.41	1,028.58	463.13	8,943.60	306.62	10,089.17
2002	1,196.83	12,347.70	1,076.92	484.90	10,817.50	345.07	10,847.60
2003	1,308.33	13,243.20	1,155.03	520.07	13,243.20	431.49	11,654.80
2004	1,419.07	14,190.80	1,237.67	557.28	16,966.40	588.83	12,445.60
2005	1,552.22	15,100.70	1,317.03	593.01	21,598.00	763.60	13,223.20
2006	1,696.93	16,048.02	1,399.65	630.22	26,746.91	972.61	14,052.74
2007	1,846.57	16,971.21	1,480.17	666.47	30,729.27	1,123.56	14,861.15
2008	1,999.85	17,817.83	1,554.01	699.72	34,642.23	1,215.52	15,602.51
2009	2,149.39	18,614.87	1,623.53	731.02	38,590.52	1,312.60	16,300.46
2010	2,301.73	19,398.82	1,691.90	761.80	42,640.25	1,411.93	16,986.96

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations.

TABLE 3

Selected indicators of GDP in Poland, 1989-2010

Year	Nominal GDP (US$ at PPP) bln USD	Real GDP bln UAH	Real GDP (PPP US$ at 1996 prices) bln USD	Real GDP (US$ at 1996 prices) bln USD	Nominal GDP bln UAH	Nominal GDP (US$) bln USD	Real GDP at factor cost bln UAH
1989	234.514	312.451	279.647	149.618	11.830	82.36730	...
1990	215.315	276.208	247.209	132.263	56.027	58.9759	...
1991	207.308	256.949	229.972	123.041	80.883	76.3647	...
1992	217.646	263.698	236.012	126.273	114.944	84.4660	...
1993	231.131	273.715	244.977	131.069	155.780	85.9871	...
1994	248.318	287.948	257.716	137.885	210.407	92.5885	...
1995	271.136	308.104	275.756	147.537	337.222	139.0893	297.295
1996	292.853	327.206	292.853	156.684	422.436	156.6840	313.052
1997	317.972	350.438	313.646	167.809	515.353	157.1834	334.026

1998	336.930	367.960	329.328	176.199	600.902	172.0496	350.059
1999	355.820	384.518	344.148	184.128	666.308	167.9441	365.112
2000	378.116	400.668	358.602	191.861	744.622	171.3580	379.351
2001	391.059	405.075	362.547	193.972	779.205	190.1899	383.903
2002	403.084	410.746	367.622	196.687	807.859	197.9963	388.894
2003	426.069	426.355	381.592	204.162	842.120	216.5349	402.894
2004	456.867	448.952	401.816	214.982	923.248	252.5986	423.442
2005	485.592	464.216	415.478	222.292	980.334	303.1507	436.992
2006	524.279	487.219	436.066	233.307	1,040.010	334.4080	458.646
2007	564.603	509.912	456.376	244.173	1,108.830	382.3550	480.008
2008	607.218	531.628	475.813	254.572	1,182.160	396.6990	500.451
2009	649.704	552.923	494.872	264.769	1,257.100	414.8850	520.498
2010	694.327	575.029	514.657	275.355	1,331.060	433.5710	541.307

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations.

TABLE 4

Selected indicators of GDP in Hungary, 1989-2010

Year	Nominal GDP (US$ at PPP) bln USD	Real GDP bln UAH	Real GDP (PPP US$ at 1996 prices) bln USD	Real GDP (US$ at 1996 prices) bln USD	Nominal GDP bln UAH	Nominal GDP (US$) bln USD	Real GDP at factor cost bln UAH
1989	92.3327	12,638.99	110.311	52.065	1,722.83	29.1676	...
1990	92.5411	12,196.63	106.450	50.243	2,089.31	33.0561	...
1991	84.3881	10,746.20	93.791	44.268	2,498.32	33.4290	...
1992	83.6838	10,416.92	90.917	42.912	2,942.67	37.2545	...
1993	85.1231	10,356.91	90.393	42.664	3,548.26	38.5957	...
1994	89.4943	10,662.14	93.057	43.922	4,364.81	41.5215	4,941.95
1995	92.6839	10,820.80	94.442	44.575	5,614.00	44.6560	9,393.54
1996	95.6877	10,963.50	95.688	45.163	6,894.00	45.1631	9,600.32
1997	101.7220	11,464.30	100.059	47.226	8,540.70	45.7237	10,049.48
1998	107.8486	12,021.40	104.921	49.521	10,087.50	47.0495	10,519.46

1999	113.9537	12,520.60	109.278	51.577	11,393.60	48.0447	10,955.68
2000	122.4963	13,272.17	115.837	54.673	13,272.10	47.0343	11,306.11
2001	130.2635	13,846.89	120.853	57.041	14,989.80	52.3222	11,829.46
2002	137.0482	14,375.37	125.466	59.218	16,915.30	65.5920	12,238.56
2003	143.8156	14,861.64	129.710	61.221	18,650.70	83.1482	12,568.41
2004	152.3315	15,637.07	136.478	64.415	20,429.40	100.7636	13,265.48
2005	163.0302	16,280.67	142.095	67.067	21,802.20	109.2390	13,824.96
2006	174.2670	16,917.40	147.652	69.690	23,212.88	109.7550	14,394.29
2007	185.6010	17,510.09	152.825	72.131	25,154.43	136.6230	14,967.40
2008	198.5480	18,158.74	158.487	74.803	26,420.79	144.1630	15,498.68
2009	212.2360	18,867.93	164.676	77.725	28,355.98	154.2330	16,000.48
2010	226.6840	19,611.16	171.163	80.786	30,470.65	163.0090	16,503.75

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations.

Appendix IV

Contribution to real GDP growth in Ukraine for 1991-2010

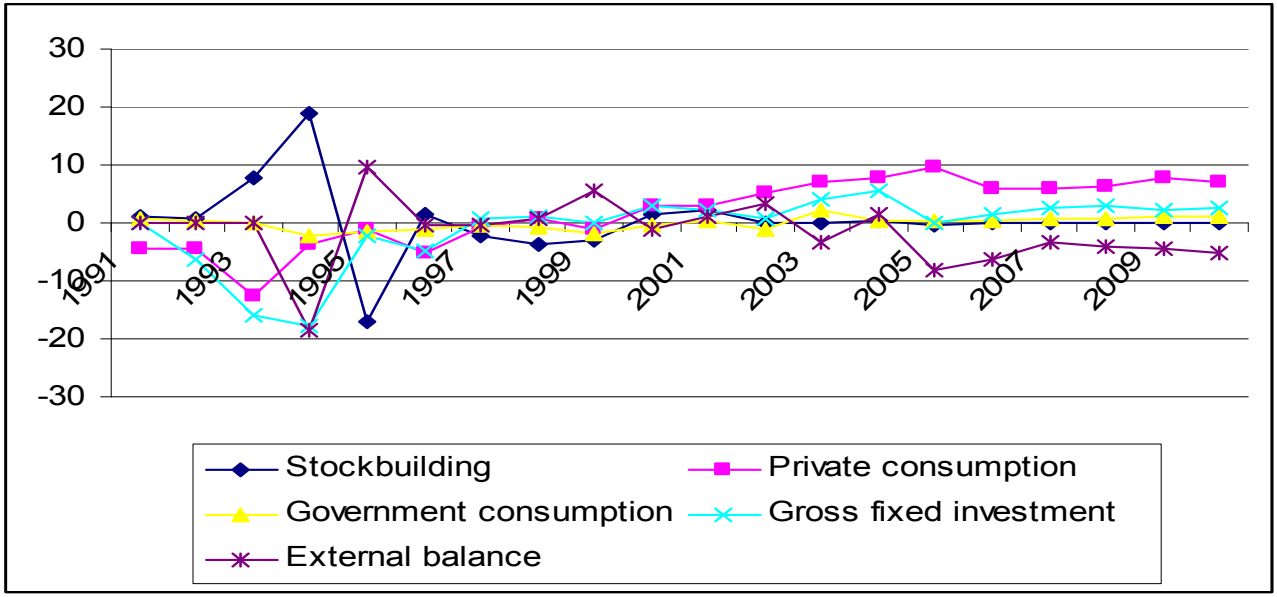

Figure 1. Contribution to real GDP growth in Ukraine, percentage points, 1991-2010

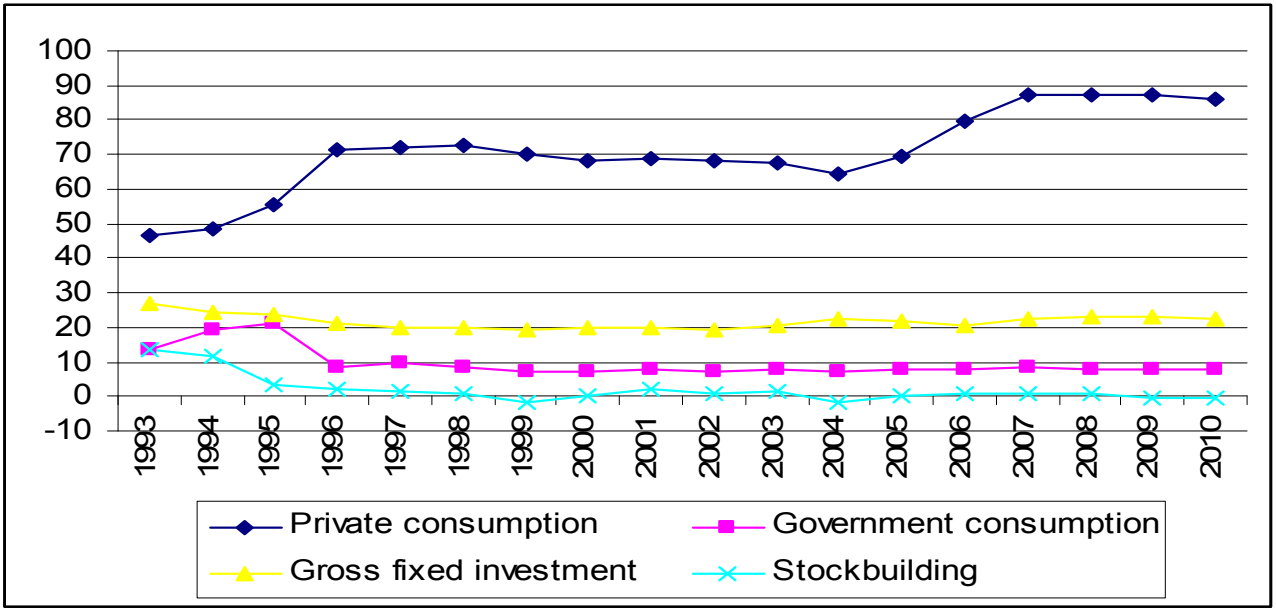

Figure 2. Contribution to real GDP in Ukraine, percent, 1993-2010

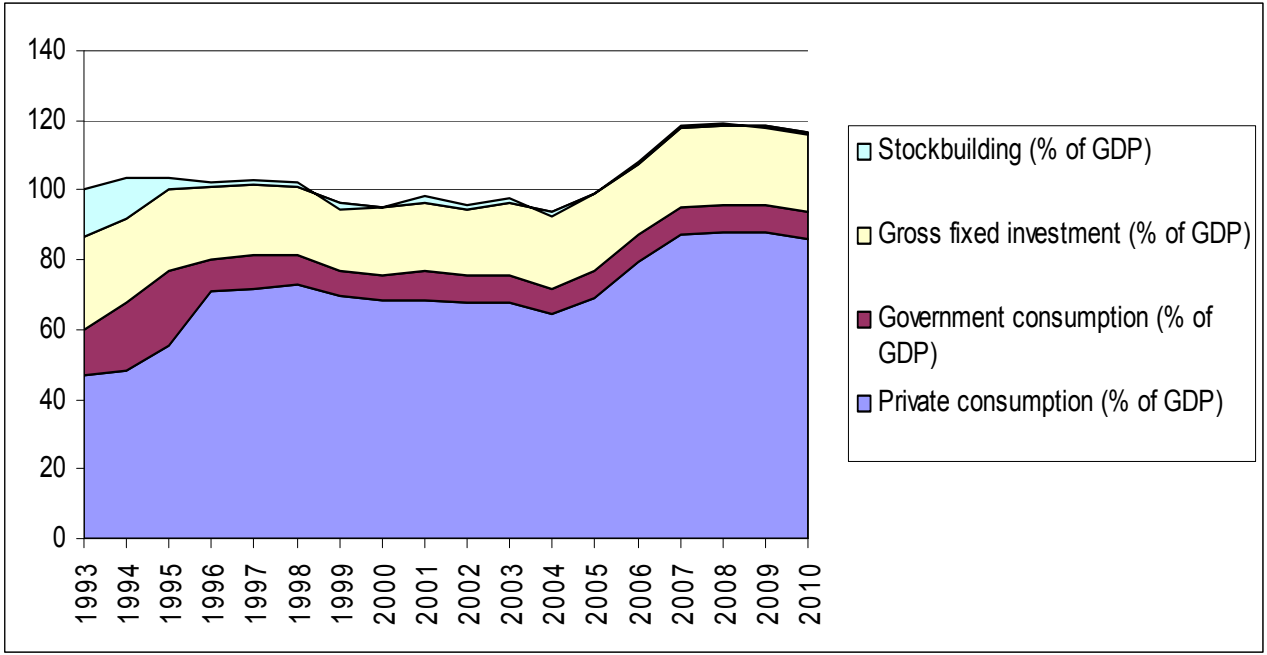

Figure 3. Contribution of private consumption, government consumption, gross fixed investment and stockbuilding to real GDP in Ukraine, percent, 1993-2010

Appendix V

Selected indicators of the forming labor market in the NIS for 1991-1999, including level of unemployment, as well as indicators for the average wages in Ukraine for 1992-2010

TABLE 1

Number of unemployed persons in the CIS, received benefits at the end of year (thousands) 1991-1999

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999
Azerbaijan	…	6.2	4.4	3.5	4.0	3.3	3.2	2.3	2.3
Armenia	…	35.3	33.1	22.9	41.6	40.8	20.6	20.6	30.5
Belarus	1.5	19.9	34.5	52.2	68.7	84.7	49.4	40.9	35.6
Georgia	…	…	…	…	…	8.0	5.0	3.0	1.8
Kazakhstan	1.0	18.2	15.4	33.2	73.5	172.8	176.7	149.2	25.7
Kyrgyzstan	0.1	1.5	1.7	7.9	28.9	25.2	20.3	19.7	5.4
Moldova	…	4.0	4.1	6.3	8.0	7.0	7.5	8.1	11.4
Russia	11.9	371.3	550.4	1395.5	2025.9	2264.7	1771.1	1756.4	1090.2
Tajikistan	…	4.7	5.0	3.8	19.9	27.1	37.1	41.0	34.7
Turkmenistan	…	…	…	…	…	…	…	…	…
Uzbekistan	…	7.1	7.6	12.3	12.5	13.9	16.9	20.6	21.8
Ukraine	5.5	52.5	40.0	47.7	74.4	214.6	361.6	532.8	620.6

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

TABLE 2

Economically active population in the CIS (thousands), 1990-1999

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Azerbaijan	3703	3736	3728	3734	3655	3641	3719	3732	3744	3748
Armenia	1630	1671	1634	1628	1593	1582	1584	1538	1476	1484
Belarus	5151	5025	4901	4882	4790	4524	4537	4528	4528	4542
Georgia	2763	2524	2032	1920	1814	1794	2085	2351	2373	…
Kazakhstan	7806	7720	7606	7004	7118	7360	7490	7440	7053	7055
Kyrgyzstan	1748	1731	1838	1710	1716	1742	1792	1792	1811	1901
Moldova	2071	2070	2058	1700	1699	1696	1686	1671	1809	1682
Russia	75325	73910	76008	75170	73952	72639	72962	72482	72229	73227
Tajikistan	1938	1970	1915	1876	1887	1890	1777	1842	1850	1780
Uzbekistan	7941	8255	8291	8288	8408	8480	8595	8715	8840	8930
Ukraine	25419	25002	24576	24029	23107	25162	25229	24928	25286	24523

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

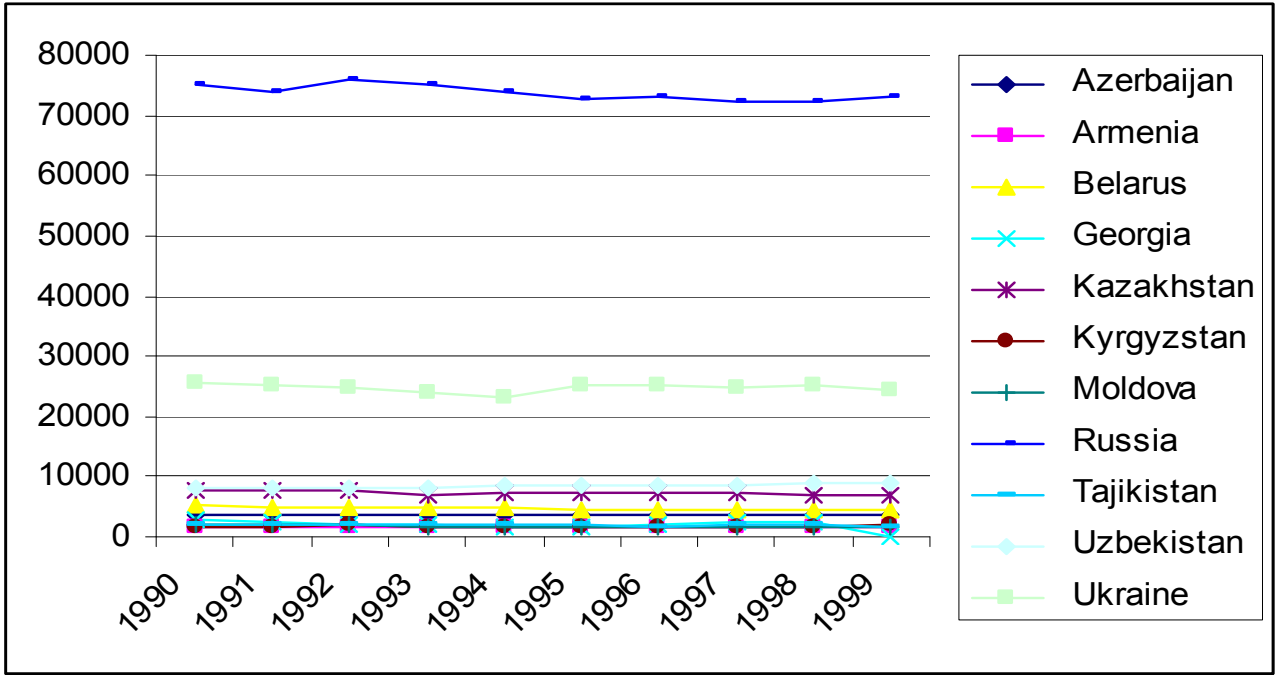

Figure 1. Economically active population in the CIS (thousands), 1990-1999

TABLE 3

Selected indicators for the average wages in Ukraine, 1992-2000

Year	Average nominal wage index (LCU, 1996=100)	Average nominal wages (% change pa)	Average real wage index (LCU, 1996=100)	Average real wages (% change pa)	Unit labor cost index (US$, 1996=100)
1992	0.064	700.00	261.063	…	…
1993	1.637	2475.00	139.567	-46.539	31.417
1994	13.541	727.18	116.473	-16.547	48.646
1995	70.518	420.77	127.215	9.223	66.730
1996	100.000	41.81	100.000	-21.393	100.000
1997	113.740	13.74	98.145	-1.855	111.847
1998	121.972	7.24	95.215	-2.986	85.851
1999	141.068	15.66	89.728	-5.762	56.432
2000	182.875	29.64	90.721	1.107	51.535

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006.

TABLE 4

Selected indicators for the average wages in Ukraine, 2001-2010*

Year	Average nominal wage index (LCU, 1996=100)	Average nominal wages (% change pa)	Average real wage index (LCU, 1996=100)	Average real wages (% change pa)	Unit labor cost index (US$, 1996=100)
2001	247	35.176	109.5	20.751	64.0
2002	299	20.991	131.5	20.098	74.6
2003	367	22.820	153.6	16.739	83.8
2004	469	27.551	179.6	16.980	96.3
2005	641	36.726	216.3	20.413	135.7
2006	788	23.000	246.3	13.900	161.6
2007	898	14.000	257.6	4.600	173.6
2008	1024	14.000	274.5	6.500	186.4
2009	1147	12.000	288.6	5.200	195.8
2010	1285	12.000	305.0	5.700	206.7

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006.

*Data for 2006-2010 are based on prognosis made by the IMF in cooperation with the National Bank of Ukraine.

Appendix VI

Selected indicators of productivity in Ukraine, including total factor productivity, labor productivity, as well as labor force and labor cost per hour, for 1991-2010

TABLE 1

Selected indicators of productivity in Ukraine, including labor productivity and labor cost, 1991-2000

Year	Labor productivity growth (%)	Total factor productivity growth (%)	Labor costs per hour (USD)	Labor force (million)
1991	-7.2	-15.8	…	…
1992	-8.4	-13.9	0.69	…
1993	-12.1	-14.4	0.35	…
1994	-19.9	-20	0.4	23.193
1995	-14.4	-13.3	0.46	23.795
1996	-8.1	-7.7	0.51	23.436
1997	-0.4	-0.5	0.59	23.128
1998	-0.6	-0.3	0.47	23.125
1999	2.1	2	0.33	22.907
2000	14.4	11.2	0.32	21.353

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, and UNDP

Longer definitions for the indicators:

Efficiency of labor measured in terms of output per worker (real GDP per person employed);

Total factor productivity (TFP* or multifactor productivity) is the part of economic output growth not accounted for by the growth in inputs (labor and capital);

Average cost of labor per hour (pay and non pay costs);

Economically active population;

* TFP growth cannot be measured directly. It is calculated by dividing GDP growth by employment growth and estimated growth in the capital stock.

TABLE 2

Selected indicators of productivity in Ukraine, including labor productivity and labor cost, 2001-2010

Year	Labor productivity growth (%)	Total factor productivity growth (%)	Labor costs per hour (USD)	Labor force (million)
1991	10.3	10.1	0.44	21.029
1992	4.6	4.9	0.54	21.120
1993	9.2	9.3	0.66	21.186
1994	11.4	10.9	0.85	21.271
1995	0.7	0.8	1.20	21.568
1996	4.8	4.3	1.50	21.689
1997	5.5	4.6	1.70	21.827
1998	5.4	4.4	1.92	21.979
1999	5.8	4.6	2.14	22.132
2000	5.5	4.1	2.38	22.286

Source: Economist Intelligence Unit. Retrieved from the database in August 12, 2006. Composed based on EIU calculations, Ministry of Economy and European Integration; National Bank of Ukraine, State Committee of Statistics, and UNDP

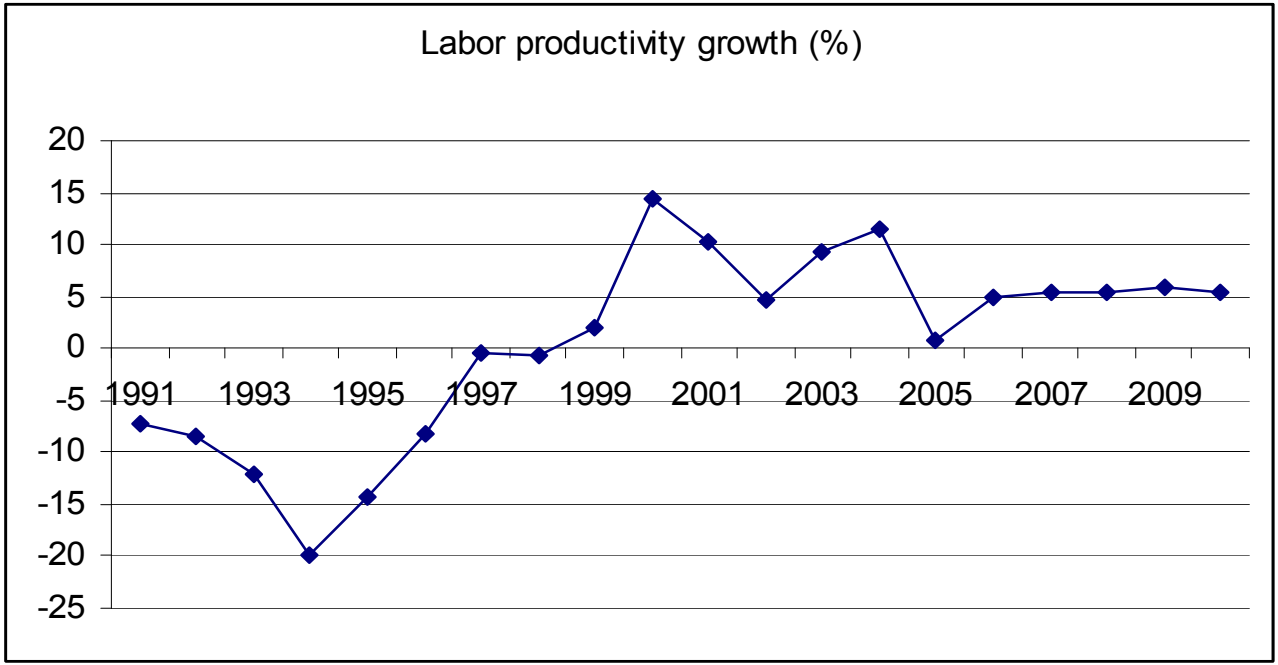

Figure 1. Labor productivity growth in Ukraine, percent, 1991-2010

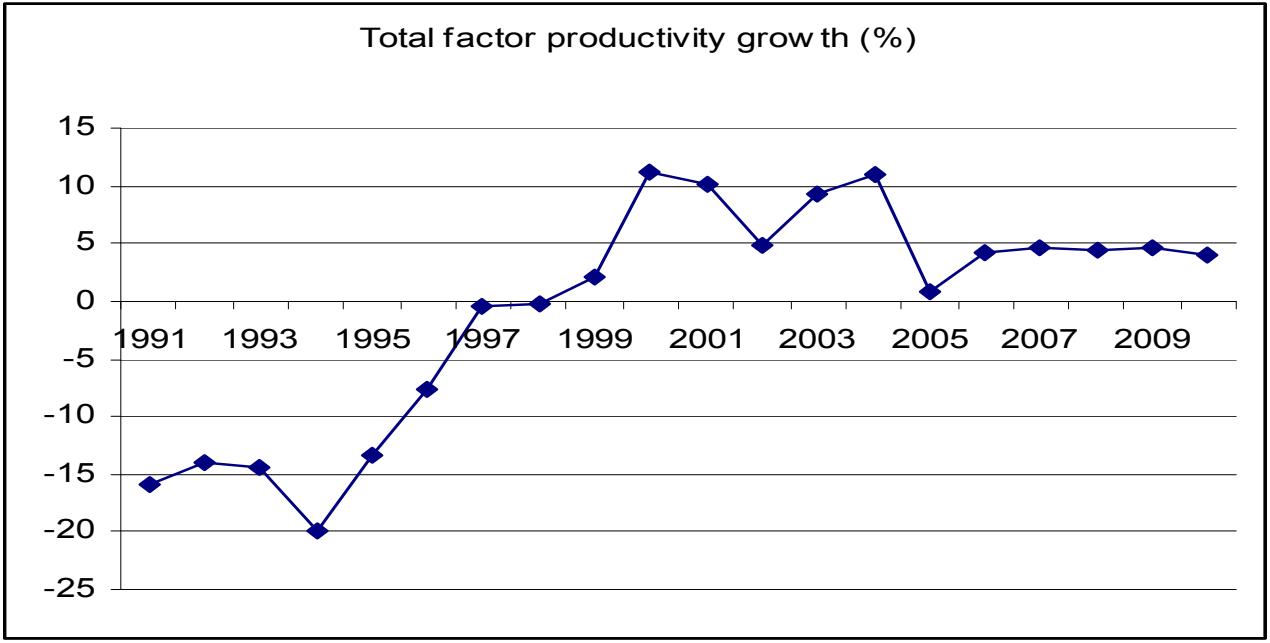

Figure 2. Total factor productivity growth in Ukraine, percent, 1991-2010

Figure 3. Labor cost per hour (USD) in Ukraine, 1991-2010

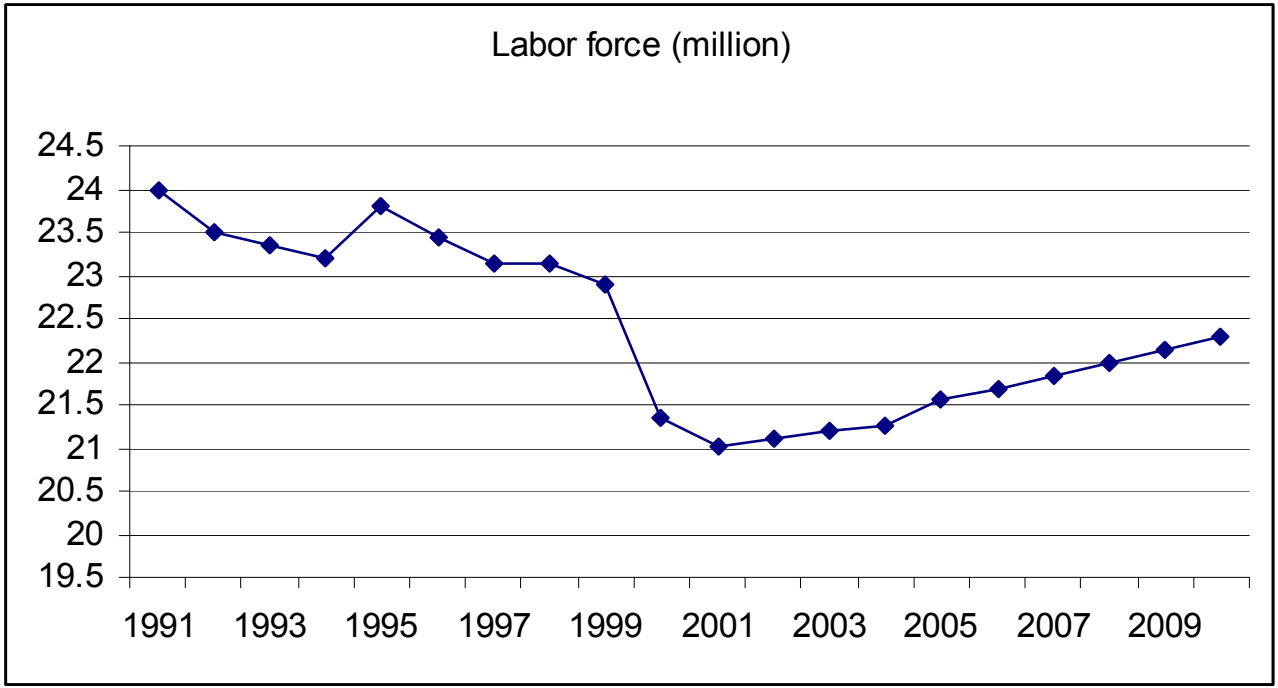

Figure 4. Total labor force in Ukraine, (million), 1991-2010

Appendix VII

Selected indicators of reproduction of human capital in the USSR and the NIS, including access to higher education and health services for 1980-1999

TABLE 1

Number of students in higher education institutions per 10000 population in NIS, 1980-1989

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Azerbaijan	172	172	172	169	163	158	155	149	140	140
Armenia	189	188	189	183	173	163	160	161	168	186
Belarus	183	183	185	185	186	181	179	177	175	185
Georgia	168	170	172	172	169	167	160	160	157	171
Kazakhstan	173	176	179	181	180	172	170	168	167	171
Kyrgyzstan	151	154	154	151	148	144	142	136	133	136
Moldova	127	129	130	128	128	126	123	121	122	127
Russia	219	219	218	216	213	206	200	194	190	193
Tajikistan	142	138	137	133	131	119	115	114	115	125
Turkmenistan	124	125	127	126	122	119	117	117	112	116
Uzbekistan	172	172	170	165	162	155	154	155	155	163
Ukraine	176	175	175	174	173	167	166	166	165	171

Source: Commonwealth of Independent States (CIS) - Official Statistics, retrieved from the database in August 8, 2006.

TABLE 2

Number of students in higher education institutions per 10000 population in NIS, 1990-1999

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Azerbaijan	146	147	134	125	117	128	132	127	134	147
Armenia	191	181	156	124	97	97	142	149	157	160
Belarus	184	180	179	169	181	191	203	219	239	258
Georgia	190	188	167	168	251	231	239	234	236	248
Kazakhstan	171	170	165	163	165	165	176	188	206	245
Kyrgyzstan	133	129	119	117	129	142	169	210	274	325
Moldova	125	120	109	108	114	149	159	180	199	212
Russia	190	186	177	171	171	188	201	221	245	280
Tajikistan	128	124	127	121	127	126	127	126	123	130
Turkmenistan	113	104	96	90	86	70	62	…	…	…
Uzbekistan	165	159	146	123	102	84	71	66	65	68
Ukraine	170	168	164	159	172	180	192	220	242	259

Source: Commonwealth of Independent States (CIS) - Official Statistics, retrieved from the database in August 8, 2006.

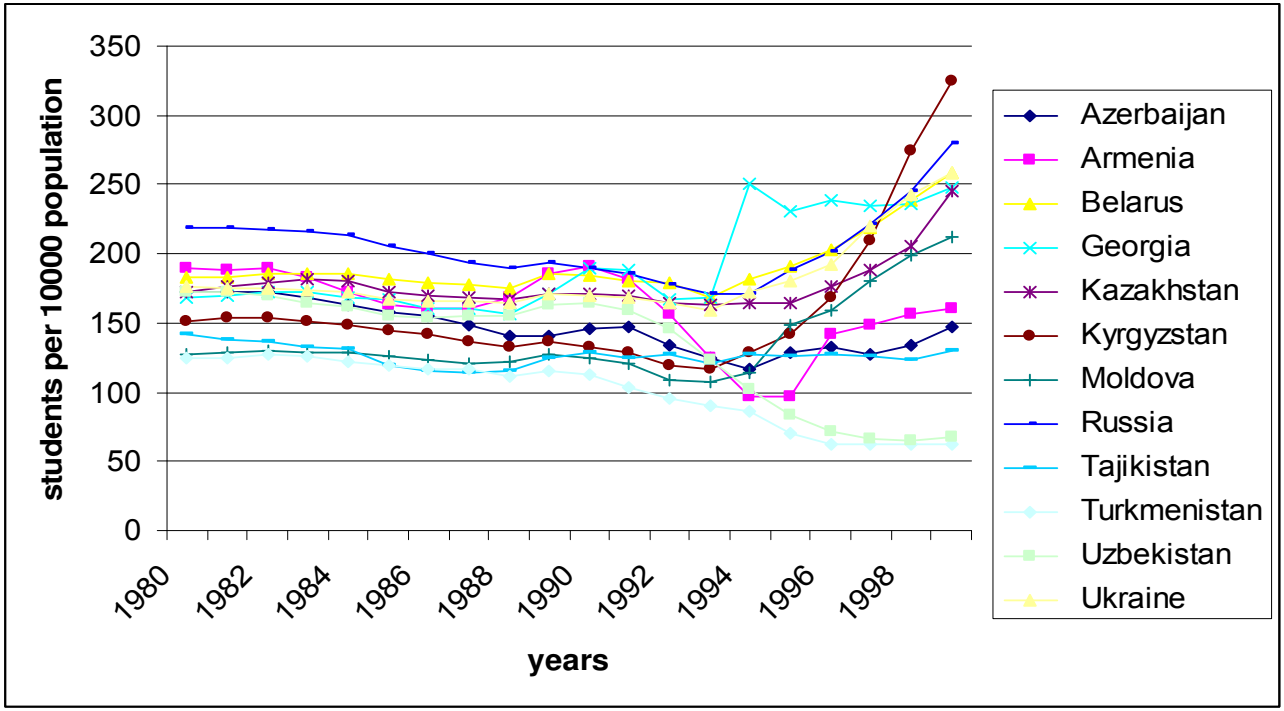

Figure 1. Number of students in higher education institutions per 10000 population in NIS, 1980-1999

TABLE 3

Number of physicians per 10000 population in the CIS, 1980-1989

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Azerbaijan	33.4	33.9	35.9	36.1	36.9	37.8	38.4	38.8	39.4	39.0
Armenia	35.3	35.5	36.8	37.8	38.3	37.9	38.6	39.2	39.9	40.3
Belarus	33.8	34.4	35.3	36.0	36.6	37.8	38.4	39.2	39.9	40.6
Georgia	47.9	49.3	50.5	50.9	52.0	53.5	54.6	55.8	56.9	58.5
Kazakhstan	31.9	32.9	33.9	35.4	36.6	37.6	38.5	39.2	40.0	40.9
Kyrgyzstan	29.1	30.0	30.9	31.7	32.5	33.5	34.5	35.5	36.2	36.6
Moldova	31.1	32.2	33.4	34.6	35.6	36.8	37.6	38.6	39.4	40.1
Russia	40.4	41.5	42.6	43.4	44.3	45.1	45.8	46.4	46.8	47.3
Tajikistan	23.6	24.3	25.2	25.6	26.1	26.7	27.1	27.4	28.6	28.5
Turkmenistan	28.4	28.7	29.2	30.4	31.2	32.6	33.9	34.9	35.1	35.5
Uzbekistan	28.5	29.8	30.8	31.9	32.9	33.7	34.4	35.1	35.5	35.8
Ukraine	36.5	37.7	38.8	39.6	40.4	41.3	41.8	42.6	43.1	43.9

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

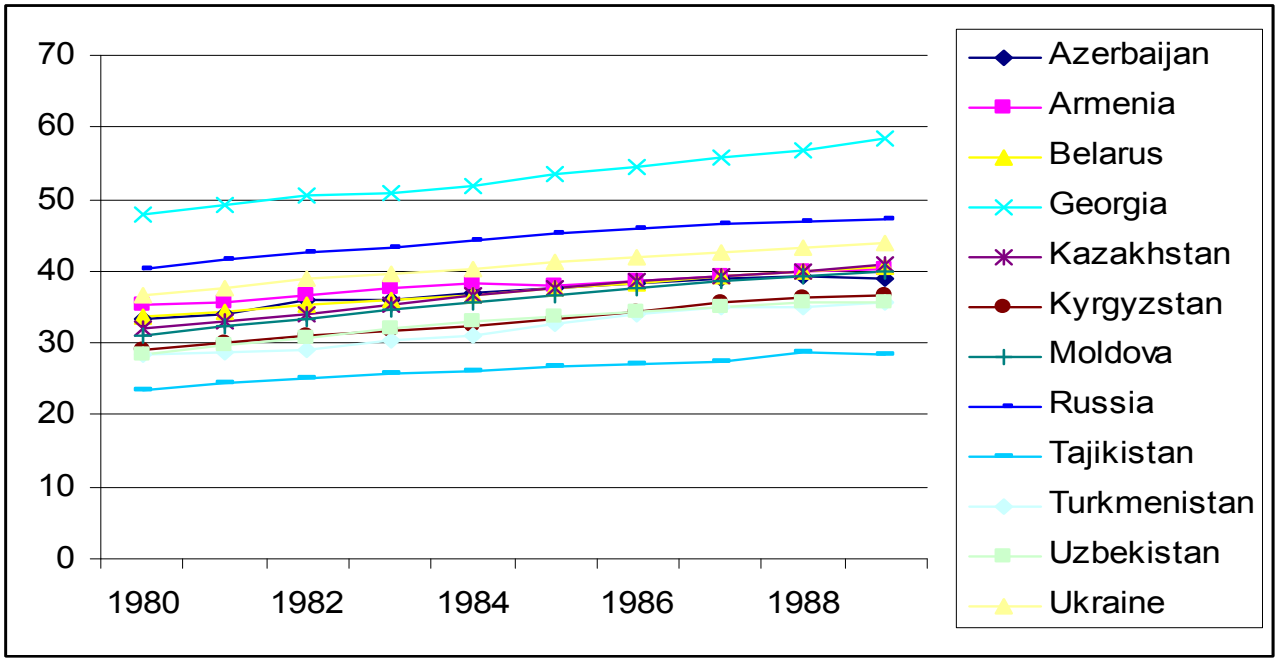

Figure 2. Number of physicians per 10000 population in the CIS, 1980-1989

TABLE 4

Number of physicians per 10000 population in the CIS, 1990-1999

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Azerbaijan	38.7	38.4	39.2	38.2	37.7	37.8	37.4	36.7	35.8	35.5
Armenia	40.5	40.5	39.3	36.9	34.5	33.6	34.0	34.4	34.3	33.2
Belarus	40.5	40.7	41.4	42.5	43.3	43.6	44.8	45.6	46.3	47.8
Georgia	57.9	39.4	46.2	42.4	38.2	42	41.0	40.5	38.5	…
Kazakhstan	42.1	41.1	41.8	41.0	39.1	39.7	38.5	36.7	36.3	34.6
Kyrgyzstan	36.7	36.8	34.9	33.4	33.0	33.2	34.3	32.7	32.1	30.3
Moldova	40.0	39.2	39.6	39.9	40.1	39.6	39.9	40.2	40.6	36.7
Russia	46.9	44.3	44.7	45.2	45.1	46.0	47.4	47.6	46.7	46.9
Tajikistan	27.1	25.5	24.3	23.3	22.7	21.4	20.9	20.1	20.6	21.2
Turkmenistan	34.6	34.7	33.5	32.9	32.2	31.4	30.2	29.8	…	…
Uzbekistan	35.8	35.5	35.5	35.2	33.8	33.2	33.4	34.3	…	…
Ukraine	44.0	44.4	43.8	44.4	44.1	45.1	45.2	45.1	45.5	46.0

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

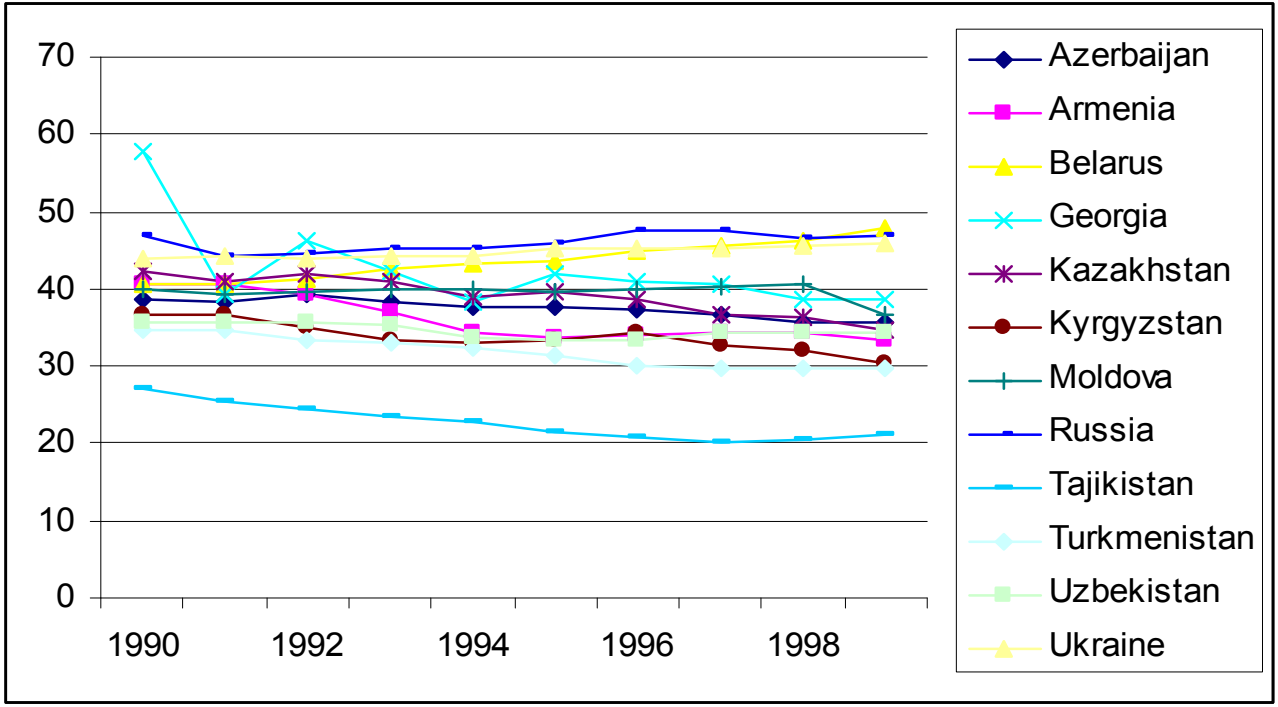

Figure 3. Number of physicians per 10000 population in the CIS, 1990-1999

Appendix VIII

Major indicators of literacy and educational attainment of the total population aged 25 and over in the USSR, Poland, Hungary, United Kingdom, France, Switzerland, Brazil, and China for 1960-2000

TABLE 1

Educational Attainment of the Total Population Aged 25 and Over in the USSR

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
			percentage of the population aged 25 and over						
1960	113705	1.5	68.8	35.4	25.6	10.1	4.2	3.6	7.59
1965	128811	1.5	58.2	30.0	35.0	13.8	5.3	4.6	8.14
1970	132128	0.5	47.9	24.8	44.4	17.5	7.2	6.2	8.83
1975	141265	1.4	45.9	23.9	43.4	17.1	9.3	8.1	8.94
1980	151526	1.6	45.8	24.4	43.5	17.1	9.1	7.9	8.93
1985	163255	1.4	40.1	22.7	47.6	18.7	10.9	9.4	9.36
1990	172997	0.0	22.8	14.9	63.3	24.9	13.9	12.0	10.52
1995	95210	0.0	33.9	22.2	48.6	19.1	17.5	15.1	10.24
2000	96348	0.0	31.0	20.3	48.9	19.2	20.1	17.4	10.49

Source: UNESCO, 2004. Retrieved from: www.unesco.org

For years 1995 and 2000 the data is for the Russian Federation only.

TABLE 2

Educational Attainment of the Total Population Aged 25 and Over in Poland

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
		percentage of the population aged 25 and over							
1960	15500	8.6	71.7	38.0	16.6	9.3	3.2	2.8	6.74
1965	16889	7.5	69.9	38.9	18.9	7.4	3.7	3.2	6.97
1970	17470	5.2	68.7	43.2	20.7	8.2	5.4	4.7	7.56
1975	19000	5.6	62.2	43.1	25.5	10.0	6.7	5.8	8.02
1980	20834	2.8	57.6	44.9	33.9	13.3	5.7	4.9	8.65
1985	22445	3.0	52.8	38.7	36.7	14.5	7.5	6.4	8.80
1990	23226	1.5	42.8	37.2	47.8	18.8	7.9	6.8	9.60
1995	23582	1.7	40.5	35.2	48.5	19.1	9.3	8.0	9.73
2000	24307	1.7	37.7	32.8	49.5	19.5	11.1	9.6	9.90

Source: UNESCO, 2004. Retrieved from: www.unesco.org

TABLE 3

Educational Attainment of the Total Population Aged 25 and Over in Hungary

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
		percentage of the population aged 25 and over							
1960	6022	3.7	86.4	47.7	6.5	2.6	3.4	3.3	6.65
1965	6244	3.0	85.6	52.7	7.9	3.1	3.5	3.4	6.99
1970	6462	2.4	81.8	64.6	10.8	4.3	5.1	4.9	7.90
1975	6676	2.5	76.4	55.0	15.4	6.1	5.7	5.5	7.91
1980	6930	1.3	68.2	57.0	23.6	9.3	7.0	6.8	8.81
1985	6962	1.9	63.9	35.0	26.5	10.4	7.7	7.4	8.20
1990	6789	1.3	59.6	35.3	29.0	11.4	10.1	9.7	8.71
1995	6681	1.7	56.0	24.5	31.8	12.5	10.5	10.1	8.52
2000	6702	2.0	51.3	22.4	34.7	13.6	12.0	11.6	8.81

Source: UNESCO, 2004. Retrieved from: www.unesco.org

TABLE 4

Educational Attainment of the Total Population Aged 25 and Over in the UK

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
		percentage of the population aged 25 and over							
1955	32427	0.0	78.9	65.6	19.5	1.7	1.6	0.9	7.32
1960	33228	2.0	71.7	67.1	24.5	2.3	1.8	1.0	7.67
1965	33784	1.8	69.2	44.5	26.5	4.5	2.5	1.4	7.17
1970	33964	1.6	61.6	32.7	28.9	6.4	7.9	4.5	7.66
1975	35054	2.4	55.6	27.1	31.0	8.0	11.0	6.2	8.01
1980	35838	3.0	52.3	24.6	32.9	9.3	11.8	6.7	8.17
1985	36435	2.9	48.7	22.6	35.7	10.7	12.8	7.2	8.44
1990	38018	2.8	44.9	20.7	38.5	12.1	13.9	7.9	8.74
1995	39299	2.9	41.4	19.1	39.9	12.5	15.8	9.0	9.03
2000	40211	2.9	38.9	17.9	39.1	12.3	19.1	10.8	9.35

Source: UNESCO, 2004. Retrieved from: www.unesco.org

TABLE 5

Educational Attainment of the Total Population Aged 25 and Over in France

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
		percentage of the population aged 25 and over							
1955	26838	.	.	.	10.3	2.6	1.8	0.9	.
1960	27972	0.0	72.3	42.0	25.7	9.6	2.1	1.1	5.78
1965	29210	0.0	71.6	41.3	25.8	10.4	2.7	1.4	5.86
1970	29849	0.5	70.5	39.7	26.0	10.6	3.0	1.5	5.86
1975	31622	0.9	67.2	35.4	26.8	11.0	5.2	2.7	6.08
1980	33347	1.0	56.0	24.0	34.5	12.9	8.5	4.4	6.77
1985	34911	1.1	52.1	23.3	36.3	19.1	10.5	5.4	7.31
1990	36721	0.6	51.1	23.2	36.9	22.1	11.4	5.8	7.56
1995	38509	0.5	47.6	21.7	37.3	22.4	14.5	7.4	7.94
2000	40157	0.7	43.7	19.8	37.3	22.4	18.4	9.4	8.37

Source: UNESCO. 2004. Retrieved from: www.unesco.org

TABLE 6

Educational Attainment of the Total Population Aged 25 and Over in Switzerland

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
		percentage of the population aged 25 and over							
1960	3271	0.2	68.6	37.9	21.8	9.5	9.4	5.3	7.30
1965	3479	0.2	68.4	37.8	22.3	10.7	9.1	5.1	7.32
1970	3762	5.1	47.9	26.4	38.0	20.8	9.0	5.1	8.28
1975	3989	4.4	50.0	27.6	36.4	23.4	9.1	5.2	8.27
1980	4101	3.0	31.7	17.5	54.3	42.5	11.0	6.2	10.07
1985	4381	4.6	30.0	16.6	53.6	35.0	11.8	6.7	9.90
1990	4724	5.2	28.0	15.5	53.8	30.2	13.0	7.4	9.92
1995	5081	4.9	25.9	14.3	54.8	30.8	14.5	8.2	10.18
2000	5304	4.6	24.4	13.5	55.0	30.8	16.0	9.1	10.39

Source: UNESCO, 2004. Retrieved from: www.unesco.org

TABLE 7

Educational Attainment of the Total Population Aged 25 and Over in Brazil

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
		percentage of the population aged 25 and over							
1960	27799	43.2	43.5	11.8	11.3	4.0	2.0	1.4	2.83
1965	32009	43.5	44.4	13.8	10.1	3.7	2.0	1.3	2.78
1970	36675	42.6	46.1	19.4	9.6	3.7	2.0	1.4	2.92
1975	42610	32.7	57.3	4.3	5.7	2.2	4.3	2.9	2.78
1980	49980	32.9	55.3	4.9	6.9	2.7	5.0	3.4	2.98
1985	58632	32.2	55.3	9.4	6.1	2.5	6.4	4.3	3.22
1990	68736	22.4	61.3	12.4	9.1	3.7	7.2	4.9	3.76
1995	78620	22.1	58.8	11.9	11.2	4.5	7.9	5.3	4.17
2000	89021	21.2	56.8	11.5	13.5	5.4	8.4	5.7	4.56

Source: UNESCO. 2004. Retrieved from: www.unesco.org

TABLE 8

Educational Attainment of the Total Population Aged 25 and Over in China

Year	Population over age 25, thousands	Highest Level Attained							Average years of school
		No schooling	First level		Second level		Post-secondary		
			total	complete	total	complete	total	complete	
		percentage of the population aged 25 and over							
1960	296043	.	.	.	.	.	1.1	0.9	.
1965	315192	.	.	.	.	.	1.0	0.9	.
1970	342432	.	.	.	.	.	1.0	0.8	.
1975	383910	52.0	25.5	9.6	21.5	8.5	1.0	0.8	3.40
1980	447766	44.9	32.3	12.2	21.7	5.6	1.0	0.9	3.61
1985	508245	40.0	33.3	12.6	25.6	10.1	1.1	0.9	4.15
1990	584658	29.3	34.3	12.9	34.4	13.5	2.0	1.7	5.23
1995	677734	24.0	39.3	14.8	34.6	13.6	2.2	1.9	5.48
2000	761566	20.9	40.7	15.3	35.7	14.1	2.7	2.3	5.74

Source: UNESCO, 2004. Retrieved from: www.unesco.org

Appendix IX

Selected indicators of socio-economic development in the countries of the former Soviet Bloc, including the Gini coefficient in the NIS, CEE and selected Western European countries in 2003, average total housing space per inhabitant in the CIS for 1990-1999, and life expectancy at birth for male and female population in the NIS and selected CEE countries, for 1989-2004

TABLE 1
GINI coefficient in the NIS, CEE and selected Western European countries, 2003*

Country	GINI	Country	GINI	Country	GINI
Armenia	34	Albania	28	Austria	29
Azerbaijan	37	Bosnia and Herzegovina	26	Belgium	33
Belarus	30	Bulgaria	29	UK	36
Estonia	36	Hungary	27	Denmark	30
Georgia	40	Macedonia	39	Finland	27
Kazakhstan	34	Poland	34	France	27
Kyrgyz Republic	30	Romania	31	Germany	28
Latvia	38	Slovenia	28	Greece	34
Lithuania	36	Croatia	29	Ireland	34
Moldova	33	Czech Republic	26	Spain	35
Russian Federation	40			Italy	36
Tajikistan	33			Netherlands	31
Turkmenistan	40			Norway	26
Ukraine	28			Portugal	32
Uzbekistan	27			Sweden	25
				Switzerland	34

Source: World Development Indicators. Retrieved from the database in August 10, 2006.
* The data is available within the period of 2000-2003 with most of the data for 2003.

TABLE 2

Average total housing space per inhabitant in the CIS, 1990-1999 (square meters)

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Azerbaijan	12.5	12.2	12.5	12.0	12.3	12.1	12.2	12.2	11.9	12.0
Armenia	15.0	15.8	14.9	15.2	15.3	15.3	15.5	15.7	16.1	…
Belarus	17.9	18.3	18.9	19.3	19.5	19.5	19.7	20.0	20.3	20.8
Georgia	18.8	18.4	19.2	19.1	19.4	19.7	20.0	20.2	20.2	…
Kazakhstan	14.2	14.4	14.5	14.6	15.1	15.4	15.6	16.2	16.3	16.4
Kyrgyzstan	12.1	12.3	12.6	12.8	12.9	12.7	12.6	12.8	12.7	12.5
Moldova	17.9	18.2	18.4	18.4	19.5	19.9	20.1	20.0	20.4	20.7
Russia	16.4	16.5	16.8	17.2	17.7	18.1	18.3	18.6	18.9	19.1
Tajikistan	9.3	9.5	9.0	9.2	8.9	9.1	9.1	9.0	9.0	9.0
Turkmenistan	11.1	11.2	11.4	11.5	11.7	10.8	11.1	11.4	12.3	…
Uzbekistan	12.1	12.2	12.4	12.4	12.7	12.8	13.0	13.0	13.1	13.6
Ukraine	17.8	18.0	18.2	18.5	18.7	19.2	19.2	20.0	20.2	20.4

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

TABLE 3

Life expectancy at birth for female population in NIS and selected CEE countries, 1989-2004, (years)

Country	1989	1990	1991	1992	1993	1994	1995	1996
Armenia	-	71.5	-	72.1	-	-	73.0	-
Azerbaijan	74.2	74.8	74.5	73.9	73.9	73.9	72.9	73.8
Belarus	76.3	75.6	75.5	75.4	74.4	74.3	74.3	74.4
Georgia	-	74.2	-	74.3	-	-	74.3	-
Hungary	73.8	73.7	73.9	73.9	73.9	74.3	74.6	74.8
Kazakhstan	72.9	73.1	72.9	72.7	71.9	71.0	70.4	70.0
Kyrgyz Rep.	71.8	72.6	72.7	72.2	71.7	70.7	70.4	71.0
Latvia	75.2	74.6	74.6	74.4	73.3	72.6	73.1	74.8
Lithuania	76.2	76.2	75.9	75.9	74.9	74.8	75.1	75.9
Moldova	72.3	71.8	71	71.9	71.0	69.8	69.7	70.4
Poland	75.5	75.5	75.3	75.7	76.0	76.1	76.4	76.6
Russia	74.4	74.3	73.8	71.9	71.2	71.7	72.5	72.9
Tajikistan	-	65.9	-	65.7	-	-	65.9	-
Turkmenistan	-	67.1	-	67.6	-	-	67.4	-
Ukraine	75.2	74.9	74.0	74.0	73.0	73.2	72.7	73.0
Uzbekistan	72.1	72.4	-	-	-	-	-	-

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Country	1997	1998	1999	2000	2001	2002	2003	2004
Armenia	73.7	..	..	74.3	..	74.6	74.7	74.8
Azerbaijan	74.6	75.0	75.1	75.1	75.2	75.0	75.1	75.2
Belarus	74.3	74.4	73.9	74.0	..	74.2	74.3	74.3
Georgia	74.3	..	..	74.3	..	74.3	74.4	74.5
Hungary	75.2	75.2	75.2	75.6	76.5	76.6	76.7	76.9
Kazakhstan	70.2	70.4	71.0	71.2	71.3	71.5	71.5	71.1
Kyrgyz Rep.	71.4	71.2	71.1	72.4	72.6	72.0	72.2	72.2
Latvia	75.1	74.8	75.3	76.0	75.8	76.0	75.9	77.7
Lithuania	76.6	76.6	77.0	77.4	77.5	77.5	77.7	77.8
Moldova	70.3	70.3	71.5	71.7	71.8	71.1	71.5	71.9
Poland	77.0	77.3	77.5	78.0	78.4	78.8	78.9	79.2
Russia	73.2	72.5	72.4	72.0	72.3	72.0	72.0	72.0
Tajikistan	66.0	..	..	66.2	..	66.3	66.4	66.6
Turkmenistan	67.2	..	..	66.9	..	66.7	66.9	67.1
Ukraine	73.0	73.5	73.7	73.6	74.1	74.1	74.1	74.1
Uzbekistan	72.4	..	..	71.1	..	70.3	70.3	70.3

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

TABLE 4

Life expectancy at birth for male population in NIS and selected CEE countries, 1989-2004, (years)

Country	1989	1990	1991	1992	1993	1994	1995	1996
Armenia	-	65.6	-	65.3	-	-	66.3	-
Azerbaijan	66.6	67.0	66.3	65.4	65.2	65.2	65.2	66.3
Belarus	67.1	66.3	65.5	64.9	63.8	63.5	62.9	63.1
Georgia	-	66.5	-	66.5	-	-	66.5	-
Hungary	65.3	65.1	65.1	64.6	64.6	64.9	65.3	66.1
Kazakhstan	63.9	63.8	63.3	63.0	61.8	60.6	59.7	58.5
Kyrgyz Rep.	64.2	64.2	64.6	64.2	62.9	61.6	61.4	62.3
Latvia	65.4	64.2	63.7	62.6	60.4	59.0	60.0	63.0
Lithuania	66.8	66.4	65.1	64.8	63.1	62.5	63.3	64.6
Moldova	65.5	65.0	64.3	63.9	64.0	62.3	61.8	62.9
Poland	66.8	66.5	66.1	66.7	67.4	67.5	67.6	68.1
Russia	64.2	63.8	63.5	62.0	59.0	57.6	58.3	59.8
Tajikistan	-	60.7	-	60.5	-	-	60.6	-
Turkmenistan	-	59.2	-	59.2	-	-	59.0	-
Ukraine	66.1	65.6	64.0	64.0	63.0	62.8	61.8	61.9
Uzbekistan	66.0	66.1	-	66.1	-	-	66.1	-

Continues on the next page

Country	1997	1998	1999	2000	2001	2002	2003	2004
Armenia	66.9	-	-	67.5	-	67.9	68.0	68.1
Azerbaijan	67.4	67.9	68.1	68.6	68.6	69.4	69.5	69.6
Belarus	62.9	62.7	62.2	62.3	-	62.5	62.6	62.7
Georgia	66.5	-	-	66.5	-	66.5	66.6	66.7
Hungary	66.4	66.2	66.4	67.1	68.1	68.3	68.4	68.6
Kazakhstan	59.0	59.0	60.3	60.4	60.5	60.7	60.5	60.1
Kyrgyz Rep.	62.6	63.1	63.1	64.9	65.0	64.4	64.5	64.3
Latvia	63.9	63.5	64.5	64.8	64.7	65.1	65.5	65.5
Lithuania	65.5	66.0	66.4	66.8	66.0	66.3	66.3	66.4
Moldova	62.9	62.9	64.2	64.4	64.5	64.4	64.5	64.9
Poland	68.5	68.9	68.8	69.7	70.2	70.4	70.5	70.0
Russia	61.0	61.3	60.0	59.0	59.0	58.5	58.8	58.8
Tajikistan	60.7	-	-	60.9	-	61.0	61.1	61.3
Turkmenistan	58.8	-	-	58.5	-	58.2	58.4	58.6
Ukraine	61.9	62.7	63.0	62.4	62.8	62.7	62.6	62.6
Uzbekistan	66.1	-	-	64.7	-	63.8	63.8	63.9

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

Appendix X

Selected indicators of openness of the Ukrainian society, including access to newspapers, internet and phone lines, as well as selected indicators of the increasing well-being of the population, including consumption of hi-tech products and services, for 1989-2004

TABLE 1

Selected indicators of openness of the Ukrainian society, including access to newspapers, 1993-1998

Indicators	1993	1994	1995
Broadband subscribers	..	..	..
Daily newspapers (per 1,000 people)	..	..	..
International Internet bandwidth (bits per person)	..	..	..
International Internet bandwidth (Mbps)	..	..	..
International tourism, number of departures (thousand)	..	..	6552000
International voice traffic (minutes per person)	..	..	..
International voice traffic (out and in, minutes)	..	..	..
Internet users	400	7000	22000
Internet users (per 1,000 people)	7.67E-03	0.13482	0.427083
Indicators	1996	1997	1998
Broadband subscribers	..	..	..
Daily newspapers (per 1,000 people)	..	68.66	100.16
International Internet bandwidth (bits per person)	..	..	..
International Internet bandwidth (Mbps)	..	..	..
International tourism, number of departures (thousand)	6004000	9632000	7773000
International voice traffic (minutes per person)	..	..	..
International voice traffic (out and in, minutes)	..	..	..
Internet users	50000	100000	150000
Internet users (per 1,000 people)	0.979294	1.976515	2.991389

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

TABLE 2

Selected indicators of openness of the Ukrainian society, including access to newspapers, 1999-2004

Indicators	1999	2000	2001
Broadband subscribers	..	0	0
Daily newspapers (per 1,000 people)	121.91	174.75	..
International Internet bandwidth (bits per person)	0.308012	0.599888	4.457329
International Internet bandwidth (Mbps)	15.3	29.5	217
International tourism, number of departures (thousand)	7399000	1.34E+07	1.48E+07
International voice traffic (minutes per person)	..	13.26871	26.01696
International voice traffic (out and in, minutes)	..	6.53E+08	1.27E+09
Internet users	200000	350000	600000
Internet users (per 1,000 people)	4.026304	7.117315	12.32441
Indicators	2002	2003	2004
Broadband subscribers	0	..	..
Daily newspapers (per 1,000 people)	..	..	..
International Internet bandwidth (bits per person)	6.513342	10.81306	17.15443
International Internet bandwidth (Mbps)	314.1	517	814
International tourism, number of departures (thousand)	1.47E+07	1.48E+07	1.51E+07
International voice traffic (minutes per person)	28.65769	35.88549	..
International voice traffic (out and in, minutes)	1.38E+09	1.72E+09	..
Internet users	900000	2500000	3750000
Internet users (per 1,000 people)	18.66287	52.28751	79.0284

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

TABLE 3
Selected indicators of the increasing well-being of the Ukrainian society, 1989-1996

Indicator	1989	1990	1991	1992
International tourism, number of departures	..	..	..	..
Mobile phone subscribers	0	0	0	0
Mobile phone subscribers (per 1,000 people)	0	0	0	0
Passenger cars (per 1,000 people)	..	63.05	68.65	72.62
Personal computers	..	100000	140000	200000
Personal computers (per 1,000 people)	..	1.927079	2.692283	3.835072
Telephone mainlines	6684200	7028300	7344100	7577900
Telephone mainlines (per 1,000 people)	129.1059	135.4409	141.2314	145.3089
Indicator	1993	1994	1995	1996
International tourism, number of departures	..	..	6552000	6004000
Mobile phone subscribers	65	5000	14000	30000
Mobile phone subscribers (per 1,000 people)	1.25E-03	9.63E-02	0.27178	0.587576
Passenger cars (per 1,000 people)	77.84	82.05	86.72	92.66
Personal computers	300000	360000	430000	510000
Personal computers (per 1,000 people)	5.749416	6.933605	8.347521	9.988799
Telephone mainlines	7820400	8066000	8311000	9241000
Telephone mainlines (per 1,000 people)	149.8758	155.3513	161.3401	180.9931

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

TABLE 4
Selected indicators of the increasing well-being of the Ukrainian society, 1997-2004

Indicator	1997	1998	1999	2000
International tourism, number of departures	9632000	7773000	7399000	1.34E+07
Mobile phone subscribers	57200	115500	216567	818524
Mobile phone subscribers (per 1,000 people)	1.130566	2.303369	4.359823	16.64484
Passenger cars (per 1,000 people)	96	100	104.4118	106.0611
Personal computers	600000	710000	800000	890000
Personal computers (per 1,000 people)	11.85909	14.15924	16.10522	18.09832
Telephone mainlines	9410000	9698200	1.01E+07	1.04E+07
Telephone mainlines (per 1,000 people)	185.9901	193.4072	202.8049	211.8316
Indicator	2001	2002	2003	2004
International tourism, number of departures	1.48E+07	1.47E+07	1.48E+07	…
Mobile phone subscribers	2224600	3692700	6498423	1.37E+07
Mobile phone subscribers (per 1,000 people)	45.69481	76.57376	135.9145	289.4547
Passenger cars (per 1,000 people)	108.2153	110.8436	114.2463	118,4235
Personal computers	920000	951000	1123220	1327000
Personal computers (per 1,000 people)	18.89743	19.72043	23.49215	27.96552
Telephone mainlines	1.07E+07	1.08E+07	1.11E+07	1.21E+07
Telephone mainlines (per 1,000 people)	219.1609	224.645	232.3552	255.8825

Source: World Development Indicators. Retrieved from the database in August 10, 2006.

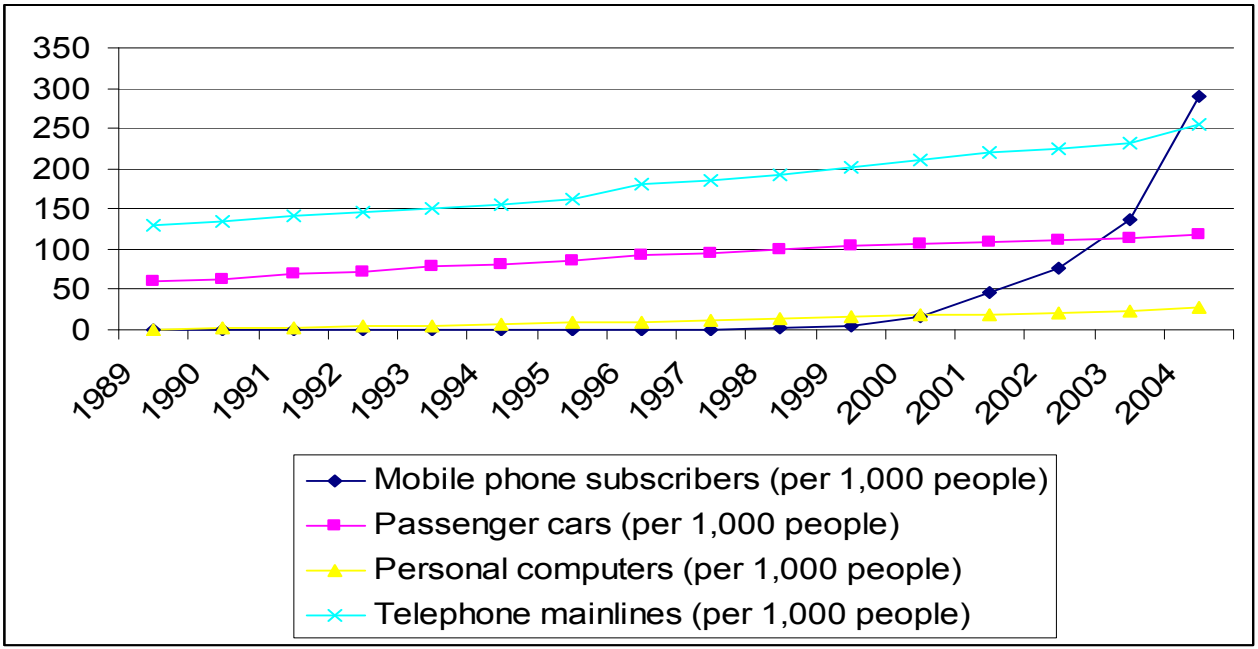

Figure 1. Selected indicators of the increasing well-being of the Ukrainian society, including consumption of hi-tech products and services, 1989-2004

Appendix XI

Situation in R&D in Ukraine by categories of employees, scientists and academics, for 1989-1999 as one of the major indicators of utilization of human capital in production

TABLE 1

Situation in R&D in Ukraine by categories of employees, scientists and academics, 1989-1999

Indicator	1989	1990	1991	1992	1993	1994
Total number of specialists in R&D	348645	313079	295010	248445	222127	207436
Number of R&D specialists	292840	262134	243019	208058	189445	171926
Number of R&D technicians	55805	50945	51991	40397	32682	35510
Higher education faculty in R&D, part-time	…	35995	36098	39012	39201	40034
R&D specialists, D.Sc.	3299	3192	3432	3843	4023	3995
R&D specialists, Ph.D.	31819	29320	27843	27410	25960	24277
Supporting staff	111165	111924	103068	89563	76876	76325
Indicator	1995	1996	1997	1998	1999	
Total number of specialists in R&D	179799	160103	142532	134413	126045	
Number of R&D specialists	154253	137497	124340	100912	94726	
Number of R&D technicians	25546	22606	17841	33501	31273	
Higher education faculty in R&D, part-time	41677	45395	46801	48760	48414	
R&D specialists, D.Sc.	4099	4151	4309	4510	4610	
R&D specialists, Ph.D.	22860	21357	20637	19824	19720	
Supporting staff	62765	55681	51345	45422	40552	

Source: Commonwealth of Independent States (CIS) - Official Statistics. Retrieved from the database in August 8, 2006.

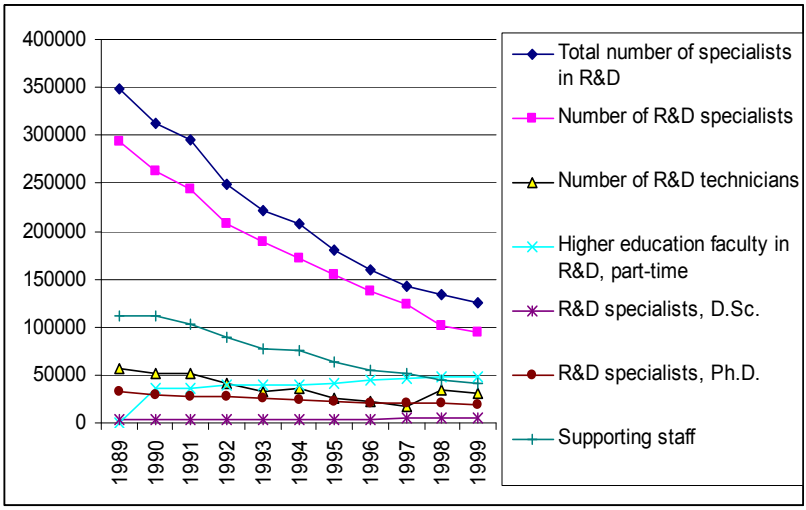

Figure 1. Situation in R&D in Ukraine by categories of employees, scientists and academics, 1989-1999

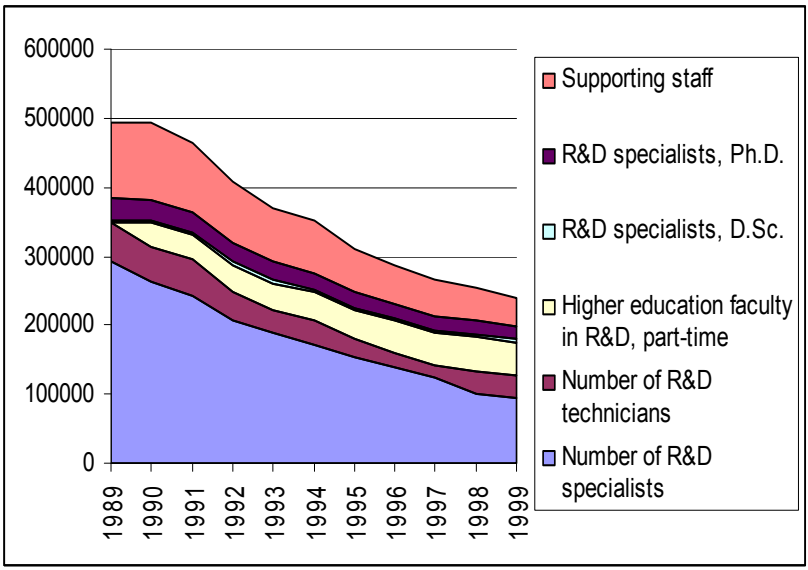

Figure 2. Situation in R&D in Ukraine by categories of employees, scientists and academics, 1989-1999

Appendix XII

Major macroeconomic and demographic indicators in Ukraine in 1989-2006 and in the long run forecasts till 2030, including GDP growth, components of GDP, expenditures, foreign trade, dynamics of population, labor force and labor productivity

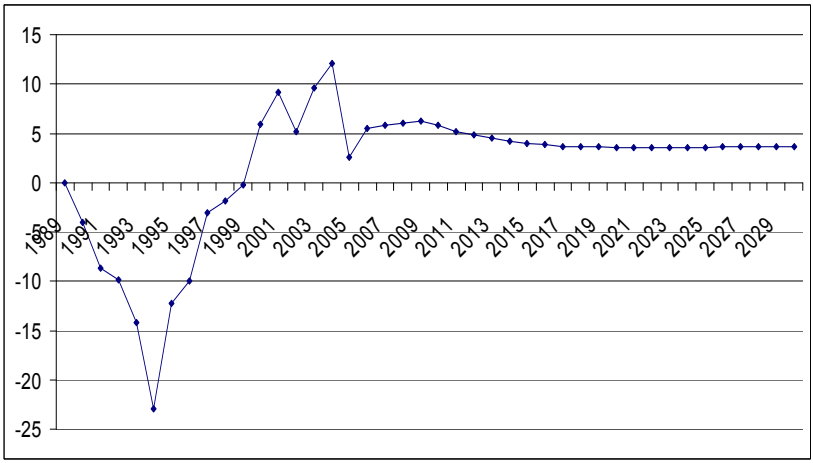

Figure 1. Dynamics of GDP (percent real change per annum) in Ukraine in 1989-2006 and in the long run forecasts till 2030

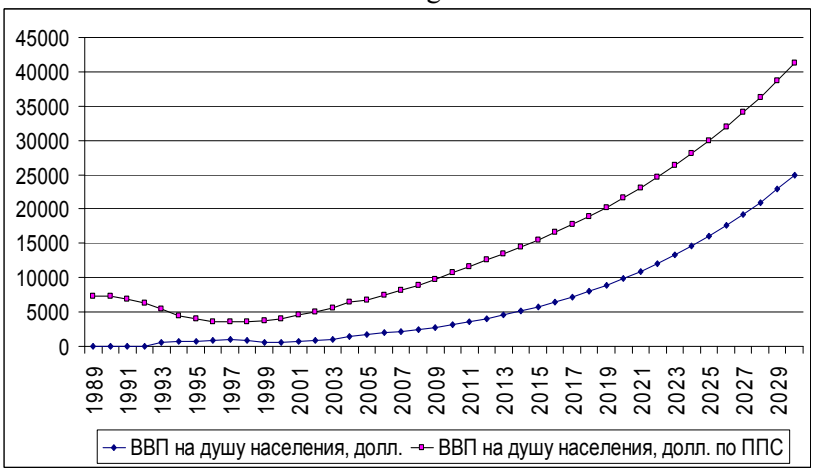

Figure 2. Dynamics of GDP per head in USD and GDP per head in USD at PPP in Ukraine in 1989-2006 and in the long run forecasts till 2030

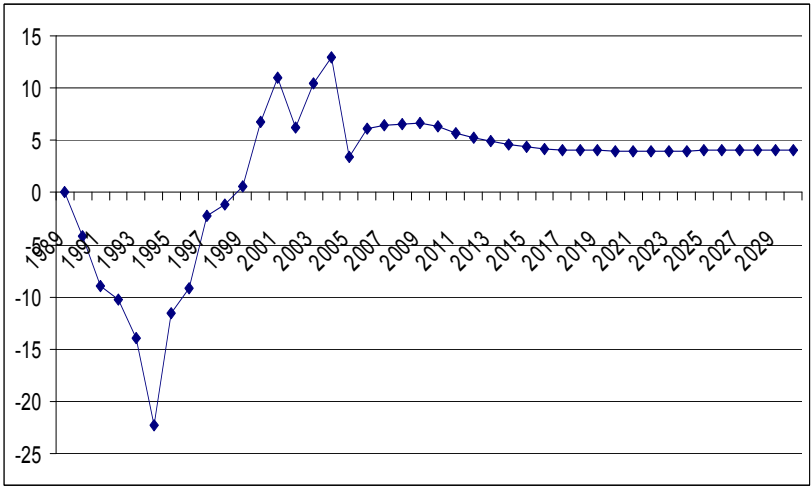

Figure 3. Dynamics of real GDP growth per head, (percent change per annum) in Ukraine in 1989-2006 and in the long run forecasts till 2030

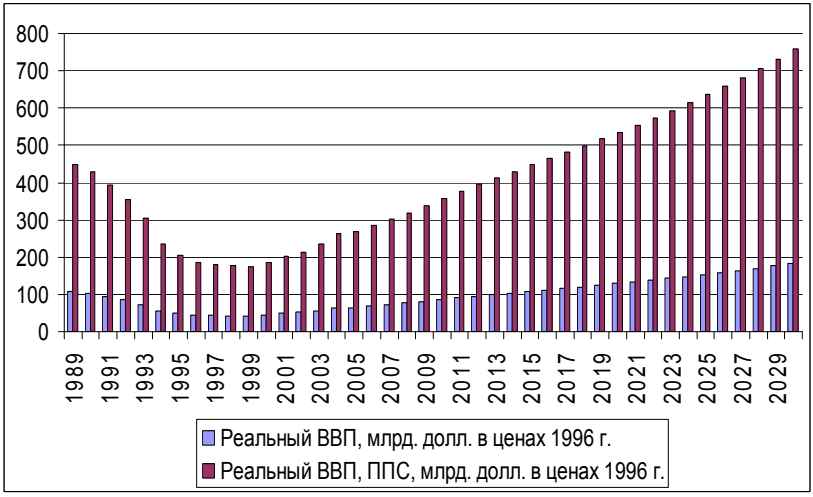

Figure 4. Dynamics of real GDP (billion USD at 1996 prices) and real GDP (PPP billion USD at 1996 prices) in Ukraine in 1989-2006 and in the long run forecasts till 2030

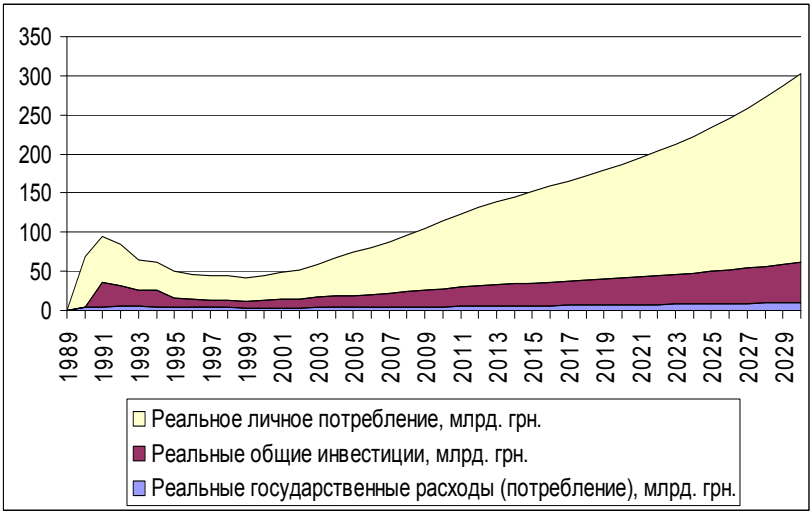

Figure 5. Dynamics of real GDP by its structural components, including real private consumption (billion UAH) real gross fixed investment (billion UAH), and real government consumption (billion UAH), in Ukraine in 1989-2006 and in the long run forecasts till 2030

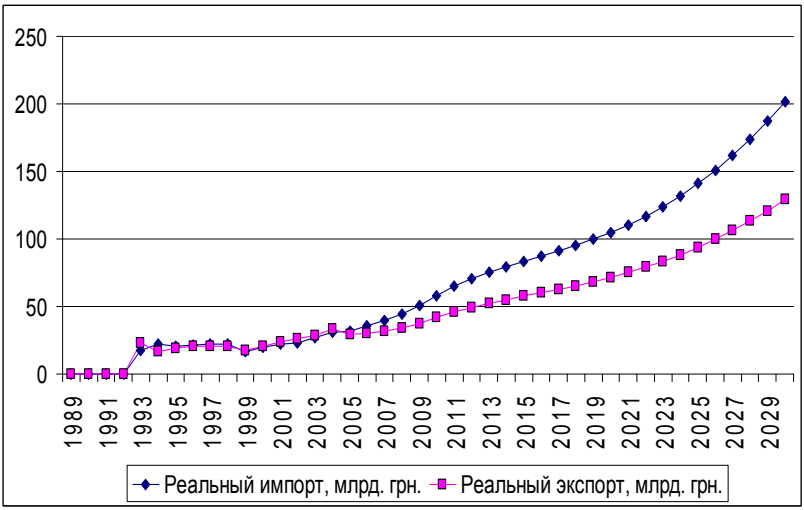

Figure 6. Dynamics of foreign trade, including real imports and exports of G&S, (billion UAH), in Ukraine in 1989-2006 and in the long run forecasts till 2030

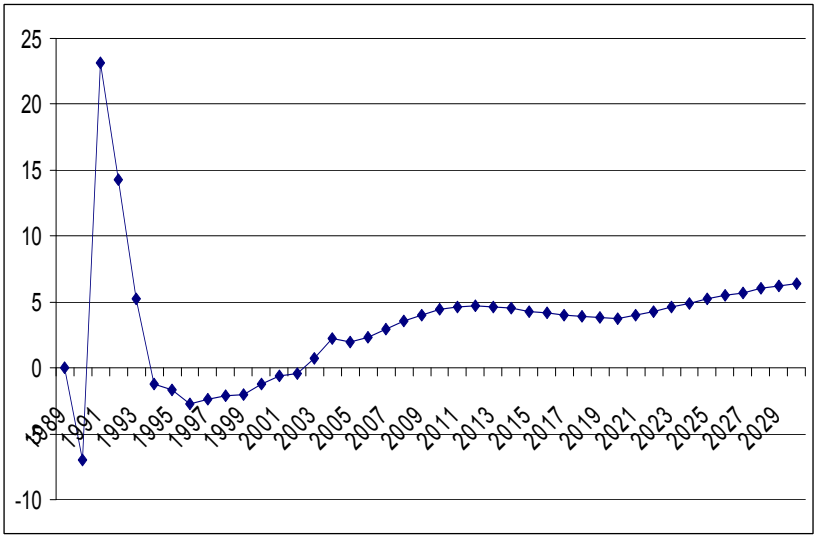

Figure 7. Dynamics of growth of real capital stock (percent change) in Ukraine in 1989-2006 and in the long run forecasts till 2030

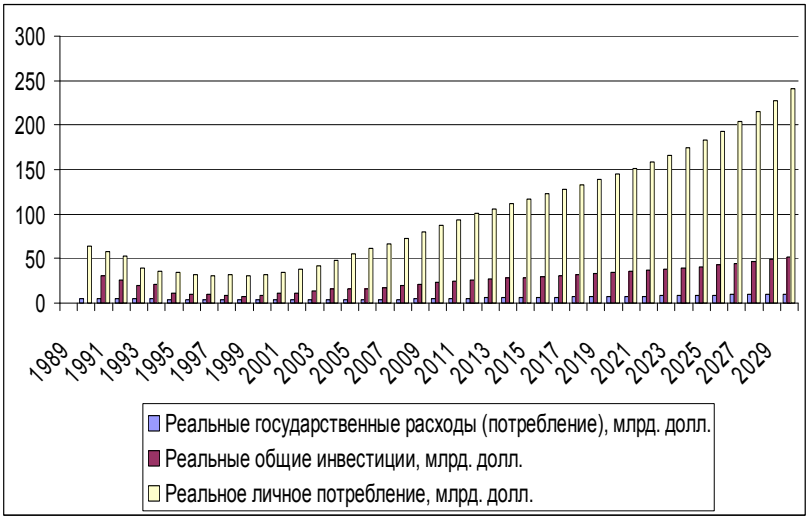

Figure 8. Dynamics of real GDP by its structural components, including real government consumption (billion USD), real gross fixed investment (billion USD), and real private consumption (billion USD) in Ukraine in 1989-2006 and in the long run forecasts till 2030

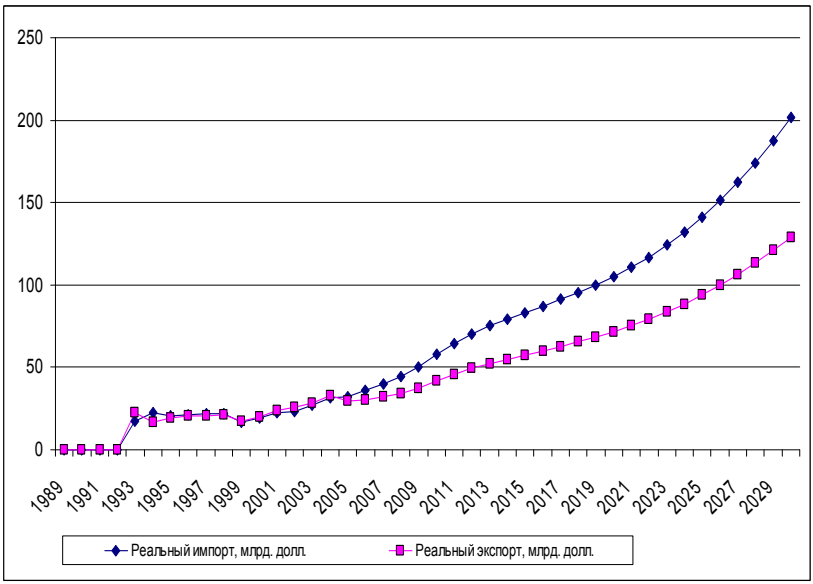

Figure 9. Dynamics of foreign trade, including real exports and imports of G&S, (billion USD), in Ukraine in 1989-2006 and in the long run forecasts till 2030

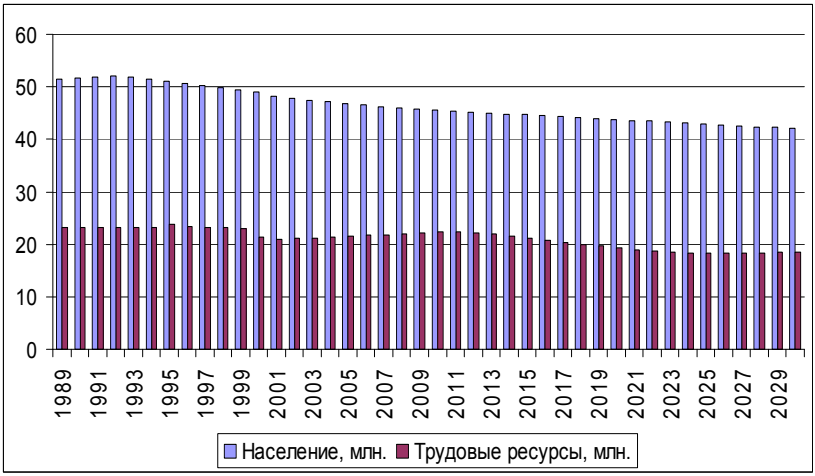

Figure 10. Dynamics of population (million) and total labor force (million) in Ukraine in 1989-2006 and in the long run forecasts till 2030

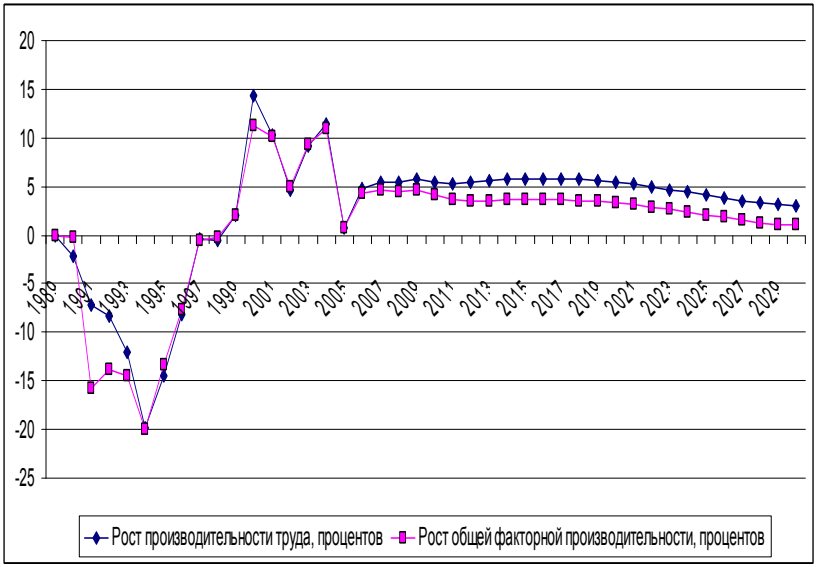

Figure 11. Dynamics of labor productivity growth (percent change) and total factor productivity growth (percent change) in Ukraine in 1989-2006 and in the long run forecasts till 2030

Appendix XIII

Understanding WTO: The Organization Members and Observers

The WTO has 149 members as of December 11, 2005

TABLE 1

The WTO countries-members and dates of membership

Albania 2000	Kuwait 1995
Angola 1996	Kyrgyz Republic 1998
Antigua and Barbuda 1995	Latvia 1999
Argentina 1995	Lesotho 1995
Armenia 2003	Liechtenstein 1995
Australia 1995	Lithuania 2001
Austria 1995	Luxembourg 1995
Bahrain, Kingdom of 1995	Macao, China 1995
Bangladesh 1995	Madagascar 1995
Barbados 1995	Malawi 1995
Belgium 1995	Malaysia 1995
Belize 1995	Maldives 1995
Benin 1996	Mali 1995
Bolivia 1995	Malta 1995
Botswana 1995	Mauritania 1995
Brazil 1995	Mauritius 1995
Brunei Darussalam 1995	Mexico 1995
Bulgaria 1996	Moldova 2001
Burkina Faso 1995	Mongolia 1997
Burundi 1995	Morocco 1995
Cambodia 2004	Mozambique 1995
Cameroon 1995	Myanmar 1995
Canada 1995	Namibia 1995
Central African Republic 1995	Nepal 2004
Chad 1996	Netherlands 1995
Chile 1995	New Zealand 1995
China 2001	Nicaragua 1995
Colombia 1995	Niger 1996
Congo 1997	Nigeria 1995

Costa Rica 1995	Norway 1995
Côte d'Ivoire 1995	Oman 2000
Croatia 2000	Pakistan 1995
Cuba 1995	Panama 1997
Cyprus 1995	Papua New Guinea 1996
Czech Republic 1995	Paraguay 1995
Democratic Republic of the Congo 1997	Peru 1995
Denmark 1995	Philippines 1995
Djibouti 1995	Poland 1995
Dominica 1995	Portugal 1995
Dominican Republic 1995	Qatar 1996
Ecuador 1996	Romania 1995
Egypt 1995	Rwanda 1996
El Salvador 1995	Saint Kitts and Nevis 1996
Estonia 1999	Saint Lucia 1995
European Communities 1995	Saint Vincent & the Grenadines 1995
Fiji 1996	Saudi Arabia 2005
Finland 1995	Senegal 1995
Former Yugoslav Republic of Macedonia (FYROM) 2003	Sierra Leone 1995
France 1995	Singapore 1995
Gabon 1995	Slovak Republic 1995
The Gambia 1996	Slovenia 1995
Georgia 2000	Solomon Islands 1996
Germany 1995	South Africa 1995
Ghana 1995	Spain 1995
Greece 1995	Sri Lanka 1995
Grenada 1996	Suriname 1995
Guatemala 1995	Swaziland 1995
Guinea 1995	Sweden 1995
Guinea Bissau 1995	Switzerland 1995
Guyana 1995	Chinese Taipei 2002
Haiti 1996	Tanzania 1995
Honduras 1995	Thailand 1995
	Togo 1995

Hong Kong, China 1995	Trinidad and Tobago 1995
Hungary 1995	Tunisia 1995
Iceland 1995	Turkey 1995
India 1995	Uganda 1995
Indonesia 1995	United Arab Emirates 1996
Ireland 1995	United Kingdom 1995
Israel 1995	United States of America 1995
Italy 1995	Uruguay 1995
Jamaica 1995	Venezuela (Bolivarian Republic of) 1995
Japan 1995	Zambia 1995
Jordan 2000	Zimbabwe 1995
Kenya 1995	
Korea, Republic of 1995	

Source: Understanding WTO: The Organization Members and Observers. Retrieved from www.wto.org Accessed in August 15, 2006

TABLE 2
The WTO members: Least-developed countries

Angola	Guinea	Myanmar
Bangladesh	Guinea Bissau	Nepal
Benin	Haiti	Niger
Burkina Faso	Lesotho	Rwanda
Burundi	Madagascar	Senegal
Cambodia	Malawi	Sierra Leone
Central African Rep	Maldives	Solomon Islands
Chad	Mali	Tanzania
Congo	Mauritania	Togo
Djibouti	Mozambique	Uganda
Gambia		Zambia

Retrieved from www.wto.org Accessed in August 15, 2006

REFERENCES

Ukrainian and Russian sources

Abalkin, L.I. (Ed.). (1997). Kurs perehodnoj ekonomiki. Uchebnik dlja vuzov [Transition economics: textbook]. M.: Finstatinform.

Aleksandrova, V.P. (2003). Perspektivi finansuvannja NTR. [Perspectives of R&D funding]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 417-423). Kyiv: IEP, Feniks.

Aleksandrova, V.P. (2003). Strategija finansuvannja innovacijnoï dijal'nosti jak zasib upravlinnja ïï naprjamkami. [The strategy of funding innovations as a tool of managing directions for development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 391-416). Kyiv: IEP, Feniks.

Arhangel'skij, U., Radzievskij, A., and Alekseev, A. (2006). Bednost', nalogi i ekonomicheskij rost [Poverty, taxes, and economic growth]. *Ekonomika Ukrainy*, 5, pp. 63-71.

Arkhiyereyev, S. (1998). Institucional'nye preobrazovanija i transakcionnye izderzhki [Institutional reforms and transaction costs]. *Biznes Inform*, 11, pp. 20-22.

Balabanova, A.V. (2004). Upravlenie ekonomicheskim rostom: modeli i strategii [Managing economic growth: models and strategies]. M.: Ros. akad. predprinimatel'stva.

Baranovs'kij, O.I. (2003). Reformuvannja bankivs'koï sistemi Ukrainy [Banking system reform in Ukraine]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 629-640). Kyiv: IEP, Feniks.

Bazhal, U.M. (Ed.). (2002). Ekonomichna ocinka derzhavnih prioritetiv tehnologichnogo rozvitku [Economic

estimates of the state priorities in technological development]. Kyiv: IEP.

Bazhal, U.M., and Odotjuk, I.V. (2003). Investicijni resursi ta prioritetni naprjami innovacijnogo rozvitku [Investment resources and the primary directions of innovative development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 684-694). Kyiv: IEP, Feniks.

Bessonov, V.A. (2005). Problemy analiza rossijskoj makroekonomicheskoj dinamiki perehodnogo perioda [The problems of analysis of macroeconomic dynamics during the transition in Russia]. M.: MAKS Press.

Bliznjuk, V.V. (2003). Trudovi vidnosini ta rinok praci. [Labor relations and the labor market] In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 298-313). Kyiv: IEP, Feniks.

Bolhovitinova, O.U. (2003). Investicijnij potencial amortizacijnoï politiki. [Investment potential of the reinvestment policy] In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 668-683). Kyiv: IEP, Feniks.

Bolhovitinova, O.U., and Mar'enko, A.V. Renovacijni prioriteti investicijnoï politiki Ukrainy [Renovation priorities of the investment policy in Ukraine]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 659-667). Kyiv: IEP, Feniks.

Bondarenko, M.I., and Hrytsenko, A.A. (1993). Ekonomicheskaja teorija: V 5 [Economic theory, Vol. 5. Introduction]. Kharkov: HGU.

Borejko, V. (2005). Ob obespechenii uskorennogo razvitija ekonomiki Ukrainy [Facilitating rapid economic development in Ukraine]. *Ekonomika Ukrainy*, 8, pp. 20-24.

Bridun, E.V. (2003). Innovacijnij rozvitok ta perspektivi vnutrishn'ogo rinku mashinobudivnoï produkciï. [Innovative development and perspectives of the domestic market for machine building]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 809-826). Kyiv: IEP, Feniks.

Buzgalin, A. (1995). Zakonomernosti perehodnoj ekonomiki: teorija i metodologija [Laws of the transition economy: theory and methodology]. *Voprosy ekonomiki*, 2, pp. 32-44.

Chechelev, T.V., Ivlev, G.U., Kozlov, V.A., et al. (2001). Effektivnyj ekonomicheskij rost: teorija i praktika: Investicii. Rost. Effektivnost'. Social'noe razvitie. Intellektual'nyj kapital. Rossija v mirovom hozjajstve [Effective economic growth: theory and practice. Investment. Growth. Effectiveness. Russia in the global economy]. M.: Finansovaja akad. pri Pravitel'stve RF.

Cherednichenko, L.G. (2004). Konceptual'nye osnovanija ekonomicheskogo rosta v transformiruemoj hozjajstvennoj sisteme [Conceptual grounds of economic growth in the changing economy] Dis. ... d-ra ekon. nauk: 08.00.01 Rossijskaja ekonomicheskaja akademija im. G.V. Plehanova. M.

Cherevko, G., Lukash, V. (1998). Chelovecheskij aspekt social'no-ekonomicheskoj effektivnosti [Human aspect of socio-economic effectiveness]. *Ekonomika Ukrainy*, 3, pp. 47-51.

Chuhno, A. (1996). Problemy teorii perehodnogo perioda: ot komandnoj k rynochnoj ekonomike [Theory of transition: from the command economy to the market economy]. *Ekonomika Ukrainy*, 4, pp. 4-21.

Danilishin, B., and Kucenko, V. (2006). Intellektual'nye resursy v ekonomicheskom roste: puti uluchshenija ih ispol'zovanija [Intellectual resources in economic growth:

ways of increasing effectiveness of their utilization]. *Ekonomika Ukrainy*, 1, pp. 71-79.

Dan'ko, M.S. (2003). Perspektivi institucijnogo zabezpechennja innovacijnogo rozvitku [Istitutional grounds for the innovative development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 448-462). Kyiv: IEP, Feniks.

Dem'janenko V.V. (2003). Ljuds'kij kapital v Ukraïni v konteksti postindustrial'nogo rozvitku [Human capital in Ukraine in the context of postindustrial development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 250-263). Kyiv: IEP, Feniks.

Dem'janenko V.V. (2003). Strategichni cili rozvitku ljuds'kogo potencialu ta zasobi ïh dosjagnennja v Ukraïni [Strategic goals for the human capital development and the means for their realization in Ukraine]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 233-249). Kyiv: IEP, Feniks.

Dem'janenko V.V., Timenko N.M. (2003). Strategichni naprjamki rozvitku osviti [Strategic directions for educational development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 276-297). Kyiv: IEP, Feniks.

Dubjanskaja, G.U. (2005). Ekonomika razvitija, osnovannaja na znanijah: idejno-konceptual'nye osnovy [Economics of development for a knowledge-based economy; conceptual grounds]. M.: MAKS Press.

Evstigneeva, R.P., and Evstigneev, L.N. (2005). Ekonomicheskij rost = Economic growth: liberal'naja al'ternativa [Economic growth=Economic growth: the liberal alternative]. M.: Nauka.

Fedorenko, A.V. (2003). Fondovij rinok [Stock market]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 566-576). Kyiv: IEP, Feniks.

Fridman, L.A., Vidjasov, M.V., and Mel'jancev, V.A. (1998). Gosudarstvennye rashody (potreblenie) i ekonomicheskij rost [Public expenditures (consumption) and economic growth]. M.: Ros. ekon. shk.

Gal'chinskij, A., and Levochkin, S. (2004). Stanovlenie investicionnoj modeli ekonomicheskogo rosta Ukrainy [Making the investment model of economic growth in Ukraine]. *Ekonomika Ukrainy*, 6, pp. 4-11.

Gal'chins'kij, A.S., Heyets, V.M. et al. (2004). Strategija ekonomichnogo i social'nogo rozvitku Ukraïni (2004-2015) "Shljahom evropejs'koï integraciï" [The strategy of economic and social development in Ukraine (2004-2015) "On the road to European integration"]. Kyiv: IVC Derzhkomstatu Ukraïni.

Garipova, Z.F., Gizatulin H.N., and Garipov, F.N. (2005). Trudovoj potencial i ekonomicheskij rost [Labor force and economic growth]. Ekaterinburg: In-t ekonomiki UrO RAN.

Golub, K.U. (2006). Stabilizacija finansovogo sektora kak sredstvo obespechenija ustojchivogo ekonomicheskogo rosta [Financial sector stabilization as a tool for sustainable economic growth]. Saratov: Sarat. gos. soc.-ekon. un-t.

Golikov, V.I., and Fedorenko, A.V. (2003). Zahist prav vlasnosti jak skladova institucijnoï arhitektoniki [Protection of property rights as a basis for institutional development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 190-203). Kyiv: IEP, Feniks.

Golikova, N.V. (2003). Rozvitok osviti - shljah do ekonomiki znan' [Development of education as a way to the

knowledge-based economy]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 264-275). Kyiv: IEP, Feniks.

Gosh, A. (1997). Uchebnaja koncepcija "obshecivilizacionnogo processa" [The concept of "global process"]. *Ekonomika Ukrainy*, 10, pp. 91-93.

Gosh, A. (1998). Ob ob'ektivnom ekonomicheskom stroe postsocialisticheskoj Ukrainy [Economic formation in the post-socialist Ukraine]. *Ekonomika Ukrainy*, 6, pp. 57-64.

Grushevskaja, L.S. (2004). Problemy formirovanija institucional'noj sredy kak faktora ekonomicheskogo rosta v sovremennoj Rossii [The problems of creation of the institutional environment for economic growth in the modern Russia]. Dis. ... kand. ekon. nauk : 08.00.01 Novosibirsk.

Heyets, V., and Kvasnjuk, B. (2003). Transformacijni peretvorennja (pereosmisljujuchi projdene) [Transformational changes (rethinking the past)]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 39-70). Kyiv: IEP, Feniks.

Heyets, V.M. (2000). Nestabil'nist' ta ekonomichne zrostannja [Instability and economic growth]. Kyiv: IEP, Feniks.

Heyets, V.M. (2001). Rinkova transformacija v 1991-2000 rokah: zdobutki, trudnoshi, uroki [The market transformation of 1991-2000: the results, the difficulties, and the lessons]. *Visnik NAN Ukrainy*, 2, pp. 1-17.

Heyets, V.M. (2003). Nacional'na innovacijna sistema ta innovacijno-investicijna dijal'nist' [The national innovative system and innovations and investments activities]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 351-372). Kyiv: IEP, Feniks.

Heyets, V.M. (2003). Paradigma strategiï dovgostrokovogo rozvitku [The paradigm of long run development strategy]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 71-86). Kyiv: IEP, Feniks.

Heyets, V.M. (2003). Scenarii ta prognozi dovgostrokovogo rozvitku ekonomiki Ukraïni. [Scenarios and forecasts of the long run economic development in Ukraine]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 120-135). Kyiv: IEP, Feniks.

Heyets, V.M. (2003). Strategichni skladovi ekonomichnogo rozvitku [Strategic components of economic development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 87-94). Kyiv: IEP, Feniks.

Heyets, V.M. (Ed.). (1999). Sektoral'ni modeli prognozuvannja ekonomiki Ukraïni [The sector models of economic forecasting in Ukraine]. Kyiv: Feniks.

Heyets, V.M. (Ed.). (2000). Ekonomika Ukraïny: pidsumki peretvoren' ta perspektivi zrostannja [Economy of Ukraine: summary of changes and perspectives for growth] H.: Fort.

Heyets, V.M. (Ed.). (2003). Ekonomika Ukraïny: strategija i politika dovgostrokovogo rozvitku [Economy of Ukraine: strategy and policy for the long run development]. Kyiv: IEP, Feniks.

Heyets, V.M. (Ed.). (2003). Transformacijni procesi ta ekonomichne zrostannja v Ukraïni [Transformation and economic growth in Ukriane]. Kharkiv: Fort.

Heyets, V.M. (2003). Innovativno-innovacijnij shljah rozvitku - modernizacijnij proekt strategiï rozvitku ekonomiki i suspil'stva. [Innovation-innovative way of development: project of modernization for the economic and social development strategy]. In V.M. Heyets (Ed.). *Ekonomika*

Ukrainy: strategija i politika dovgostrokovogo rozvitku (pp. 337-350). Kyiv: IEP, Feniks.

Heyets, V.M., and Kireev S.I. (2003). Zagrozi rozvitku nacional'noï ekonomiki ta ïh vidvernennja [Threats to the national economy and their prevention]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 135-154). Kyiv: IEP, Feniks.

Heyets, V.M., and Shums'ka S.S. (2003). Valjutno-kursova politika Ukraïni v seredn'ostrokovij perspektivi [Currency exchange rate policy in Ukraine in the long run]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 615-628). Kyiv: IEP, Feniks.

Heyets, V.M., and Skripnichenko M.I. (2003). Vid ekzogenno zalezhnoï do endogenno orientovanoï strategiï rozvitku ekonomiki [From exogenously dependent to endogenous strategy of economic development]. *Ekonomika i prognozuvannja*, 1, pp. 34-46.

Hristenko, V., Mikul'skij, K., Nizhegorodcev, R., et al. (2002). Innovacii i ekonomicheskij rost [Innovations and economic growth]. M.: Nauka, 2002.

Hrytsenko, A.A. (1997). Struktura rynochnoj transformacii inversionnogo tipa [The structure of the inversion-type market transformation]. *Ekonomika Ukrainy*, 1, pp. 4-10.

Hrytsenko, A.A. (2003). Osoblivosti institucijnoï arhitektoniki ukraïns'kogo suspil'stva XXI stolittja [Essential features of the institutional development in Ukrainian society in the 21st century]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 155-171). Kyiv: IEP, Feniks.

Ivanter, V.V. (2004). Prognozy ekonomicheskogo rosta v Rossii [Economic growth forecasts in Russia]. Tsikl publichnyh lekcij "Akademiki RAN-studentam GUU" M.: GUU, 2004.

Ivanter, V.V. (2006). Problemy ekonomicheskogo rosta Rossii [Problems of economic growth in Russia]. M.: GOUVPO "GUU".

Ivlev, A.F. (2004). Teorija oplaty naemnogo truda kak ekonomicheskoj kategorii, otvetstvennoj za ekonomicheskij rost [The theory of wage as an economic category that contributes to economic growth]. SPb.: Info-da.

Kalinina, I.L. (2005). Formirovanie i realizacija effektivnoj fiskal'noj politiki, stimulirujuwej ekonomicheskij rost [Development of the fiscal policy that stimulates economic growth]. Dis. ... kand. ekon. nauk : 08.00.05 M.

Kendjuhov, A. (2005). Motivacija tvorcheskogo intellektual'nogo truda: issledovanie osnovnyh podhodov [Motivation for the creative intellectual work: study of the major approaches]. *Ekonomika Ukrainy*, 3, pp. 49-55.

Kolganov, A. (1995). Zakonomernosti perehodnoj ekonomiki: ekonomicheskie tendencii i modeli [Laws of the transition economy: economic tendencies and models]. *Voprosy ekonomiki*, 2.-pp. 50-60.

Koropec'kij, I.S. (1995). Deshcho pro minule, nedavne minule ta suchasne ukraïns'koï ekonomiki [Something about the past, resent past, and the present of the Ukrainian economy]. Kyiv: Libid'.

Kosenkov, R.A. (2005). Sistemnyj analiz i prognozirovanie faz innovacionnogo rosta ekonomiki: informacionnaja tehnologija SAPFIR [Systemic analysis and forecasting of the stages of economic growth: information technology package SAPFIR]. M.: Finansy i statistika.

Koshkin, A.V., and Shabaev, V.A. (2004). Institucional'nye faktory ekonomicheskogo rosta [Institutional determinants of economic growth]. Kemerovo: Kuzbassvuzizdat.

Krichevs'ka, T.O. (2003). Groshovi instituti v arhitektonici ukraïns'kogo suspil'stva [Monetary institutions in the

structure of the Ukrainian society]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 204-220). Kyiv: IEP, Feniks.

Krjuchkova, I.V. (2000). Makroekonomichne modeljuvannja ta korotkostrokove prognozuvannja [Macroeconomic modeling and the short run forecasting]. Harkiv: Fort.

Krjuchkova, I.V. (2003). Tsinova konkurentospromozhnist' ekonomiki Ukrainy [Price competitiveness of the Ukrainian economy]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 914-921). Kyiv: IEP, Feniks.

Kushlin, V.I. (2005). Kachestvo ekonomicheskogo rosta: nauchnye razrabotki i rossijskaja praktika: materialy nauch.-prakt. konf., 21 sent. 2004 g. [Quality of economic growth: research and practice in Russia. Collection of works]. M.: Izd-vo RAGS.

Kuznecova, N.P. (2000). Ekonomicheskij rost: istorija i sovremennost' [Economic growth: past and present]. SPb.: Sentjabr'.

Kvashnina, N.A. (2004). Ekonomicheskij rost i investicionnyj process: voprosy metodologii, teorii i praktiki: Regional'nyj aspekt [Economic growth and investment process: issues of methodology, theory, and practice. Regional aspect]. Dis. ... d-ra ekon. nauk : 08.00.01, 08.00.05. Ivanovo.

Kvasnjuk, B.E. (2000). Nacional'ni zaoshchadzhennja ta ekonomichne zrostannja [National savings and economic growth]. Kyiv: MP Lesja.

Kvasnjuk, B.E. (2003). Derzhava i strategija ekonomichnogo ta social'nogo progresu [The state and the strategy of economic and social progress]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 107-119). Kyiv: IEP, Feniks.

Kvasnjuk, B.E. (2003). Rol' derzhavi u dovgostrokovomu ekonomichnomu zrostanni [Role of the state in the long run growth]. Kyiv: IEP; Kharkiv: Fort.

Kireev, S.I. (2003). Ukraïna v sistemi єvropejs'kih ta єvroaziats'kih procesiv integraciї: problema viboru optimal'nogo vektora [Ukraine in the system of European and Euro-Asian processes of integration: the problem of choosing the optimal vector]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 835-843). Kyiv: IEP, Feniks.

Kireev, S.I., and Shnipko, O.S. (2003). Mizhnarodna konkurentospromozhnist' Ukraïni u XXI stolitti: peredumovi, chinniki ta skladovi formuvannja [International competitiveness of Ukraine in the 21st century: preconditions, factors, and components]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 867-883). Kyiv: IEP, Feniks.

Kireev, S.I., and Shnipko, O.S. (2003). Innovacijna komponenta zabezpechennja konkurentospromozhnosti kraïni [Innovations in the competitiveness of the national economy]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 921-941). Kyiv: IEP, Feniks.

Lapko, O.O., and Aleksandrova, V.P. (2003). Naukovo-tehnichnij potencial ta jogo rozvitok [Scientific and technical potential and its development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 373-390). Kyiv: IEP, Feniks.

Lashov, B.V., and Spizharskaja, L.S. (2004). Sovokupnyj spros i ekonomicheskij rost v Rossii [Aggregate demand and economic growth in Russia]. SPb.: Leningrad. gos. un-t im. A.S. Pushkina.

Lavrov, E.I., and Kapoguzov, E.A. (2006). Ekonomicheskij rost. Teorii i problemy: ucheb. posobie [Economic growth: theories and problems. Textbook]. Feder. agentstvo po obrazovaniju, Om. gos. un-t im. F.M. Dostoevskogo.

Ljuds'kij rozvitok regioniv Ukraïny: metodika ocinki ta suchasnij stan [Human development in the regions of Ukraine: present situation and methodology of evaluation]. (2002). Kyiv: RVPS NANU.

Lunina, I.O. (2000). Derzhavni finansi Ukraïni v perehidnij period [Public finance in Ukraine during the transition]. Harkiv: Fort.

Lunina, I.O. (2003). Reformuvannja mizhbjudzhetnih vidnosin ta rozvitok regioniv [The reform of the budgetary relations and regional development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 510-525). Kyiv: IEP, Feniks.

L'vov, D.S. (2004). Ekonomicheskij rost i kachestvo ekonomiki [Economic growth and quality of the economy]. M.: Russkaja kniga.

Lir, V.E., Podolets', R.Z. (2003). Strukturni zmini na rinkah energoresursiv ta perspektivnij energetichnij balans Ukraïny [Structural changes in the energy market and the future energy balance in Ukraine]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 771-793). Kyiv: IEP, Feniks.

Makarkin, N.P. (2005). Aktual'nye problemy kachestvennogo ekonomicheskogo rosta: materialy Vseros. nauch.-prakt. konf. (Saransk, 20-21 okt. 2005) [Modern problems of economic growth quality. Collection of works]. Saransk: Krasnyj Oktjabr.

Mar'enko, A.V. (2003). Konceptual'ni osoblivosti investicijnoï politiki [Conceptual specifics of the investment policy].

In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 641-658). Kyiv: IEP, Feniks.

Mocherny, S.V. (1993). Osnovy ekonomichnoï teoriï [Economics]. Ternopil': AT Tarneks, 1993.

Mudrak, R. (2005). Prodovol'stvennye rashody v kontekste ekonomicheskogo rosta Ukrainy [Food expenditures in the context of economic growth]. *Ekonomika Ukrainy*, 6, pp. 73-78.

Mudrak, R. (2006). Derzhavna reguljatorna politika jak skladova ekonomichnogo rozvitku [The state regulatory policy as a component of economic development]. *Ekonomika Ukraïni*, 7, pp. 34-40.

Novitskij, V. (2005). Institucionalizm v dialektike sovremennogo ekonomicheskogo razvitija [Institutionalism in the dialectics of the modern economic development]. *Ekonomika Ukrainy*, 7, pp. 49-57.

Olijnik, O.S. (2003). Rozvitok rinku intelektual'noï vlasnosti [Intelelctual property market development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 482-493). Kyiv: IEP, Feniks.

Onishko, S.V. (2003). Ekonomichne stimuljuvannja innovacijnogo rozvitku [Economic stimuli of innovation-based development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 463-481). Kyiv: IEP, Feniks.

Osadchaja, I. (2005). Ekonomicheskij rost i raspredelenie dohodov: prjamaja i obratnaja svijaz' [Economic growth and income distribution: direct and reverse links]. *Chelovek i trud*, 6, pp 12-22.

Osipian, A. (2001). Ekonomika gosudarstva blagososto janija: osnovy i formirovanie v uslovijah rynochnoj transformacii [Economy of the welfare state: foundations

and creation under the conditions of market transformation]. Donetsk: Lebed'.

Ostashko, T.O., and Mishchenko, N.M. (2003). Strukturni zmini v agrarnomu sektori i rozvitok agrarnogo rinku [Structural changes in the agricultural production and development of the market of agricultural products]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 755-771). Kyiv: IEP, Feniks.

Ovchinnikova, N.V. (2004). Ekonomiko-matematicheskoe modelirovanie vlijanija prjamyh inostrannyh investicij na ekonomicheskij rost v razvivajushihsja stranah [Mathematical models to study effects of foreign direct investment on economic growth in developing countries]. Dis. ... kand. ekon. nauk : 08.00.13 M.

Panova, E.I. (1998). "Tenevoj" sektor i ekonomicheskij rost [Shadow economy and economic growth]. M.: RESH.

Pavlenko, U.V. (2003). Sociokul'turni zasadi integracijnih procesiv Ukraïni [Socio-cultural grounds of the integrational processes in Ukraine]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 829-835). Kyiv: IEP, Feniks.

Pavlov, O. (2006). Paradigma sil's'kogo rozvitku [Paradigm of agricultural development]. *Ekonomika Ukraïny,* 7, pp. 41-48.

Pavlova, N.A. (2001). Modelirovanie vlijanija obrazovanija na ekonomicheskij rost [Modeling effects of education in economic growth]. Dis. ... kand. ekon. nauk : 08.00.13 M.

Perepelkin, V.A. (2001). Teorija i politika ekonomicheskogo rosta [Theory and politics of economic growth]. Samara : Samar. un-t.

Perminov, S.B., Egorova, E.N., and Pjatkovski, M. (Eds.) (2004). Vlijanie sovremennyh informacionnyh tehnologij na ekonomicheskij rost v Rossii i stranah Vostochnoj

Evropy v 1990-2001 godah. [Impact of the modern information technologies on economic growth in Russia and Eastern Europe in 1990-2001]. M.: Centr. ekon.-mat. in-t Ros. akad. nauk.

Petkova, L. (2005). K voprosu o kachestve ekonomicheskogo rosta Ukrainy [Issues of the quality of economic growth in Ukraine]. *Ekonomika Ukrainy*, 6, pp. 45-49.

Pokrytan, A. (1997). Rynochnaja transformacija i problemy prioritetov v ekonomike Ukrainy [Market transformation and problem of priorities in the economy of Ukraine]. *Ekonomika Ukrainy*, 12, pp. 18-27.

Ponomarev, V.M. (2004). Makroekonomicheskie zakonomernosti i tendencii formirovanija struktury ekonomicheskogo rosta [Macroeconomics and tendencies of the structural changes in economic growth]. Dis. ... d-ra ekon. nauk : 08.00.01 Saratov.

Popova, V., and Popov, V. (2005). Realii i perspektivy ekonomicheskogo rosta v Ukraine [Realities and perspectives of economic growth in Ukraine]. *Ekonomika Ukrainy*, 6, pp. 23-29.

Prihod'ko, T.I. (2003). Posilennja diï zovnishnih faktoriv ekonomichnogo rozvitku ta nakopichuvannja deformacij u strukturi zovnishn'otorgovel'nogo oborotu [Increasing influence of the exogenous factors of economic development and accumulation of the structural problems in foreign trade]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 726-731). Kyiv: IEP, Feniks.

Prihod'ko, T.I. (2003). Spad virobnictva ta jogo vidnovlennja jak strukturoformujuchij chinnik [Decrease in production and industrial renovations as a factor that shapes structure of the economy]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika*

dovgostrokovogo rozvitku (pp. 706-710). Kyiv: IEP, Feniks.

Prihod'ko, T.I. (2003). Strategija i politika racional'nih strukturnih zmin u 2003-2012 rr. [Strategy and policy of the rational structural changes in 2003-2012]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 732-754). Kyiv: IEP, Feniks.

Prihod'ko, T.I. (2003). Strukturoutvorjujuchi faktori v ekonomici Ukraïni u 1991-2002 rr. [Factors that determine structure of the national economy in Ukraine in 1991-2002]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 706-716). Kyiv: IEP, Feniks.

Prihod'ko, T.I. (2003). Vpliv zmini tsin ta inshih faktoriv na strukturni zrushennja u virobnictvi [Influence of price changes and other changes on the structural changes in the industry]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 710-717). Kyiv: IEP, Feniks.

Prihod'ko, T.I. (2003). Inertsijnist' strukturnih peretvoren' za umov pasivnoï roli derzhavi [Inertia of the structural changes and the passive role of the state]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 718-725). Kyiv: IEP, Feniks.

Revenko, A.P. (2003). Ljuds'kij rozvitok i cili novogo tisjacholittja [Human development and the goals of the new millenium]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 221-232). Kyiv: IEP, Feniks.

Rokochaja, V., and Moroz, D. (1998). K voprosu o vybore optimal'nogo puti rynochnoj transformacii [The issue of choosing the optimal path for the market transformation]. *Ekonomika Ukrainy*, 9, pp. 53-59.

Romanova, T.G. (2002). Institucional'nye preobrazovanija kak faktor ekonomicheskogo rosta [Institutional reforms as factors of economic growth]. SPb. Izd-vo S.-Peterb. gos. un-ta ekonomiki i finansov.

Sacks, J., and Pivovars'kij, O. (1996). Ekonomika perehidnogo periodu [The transition economy]. Kyiv: Osnova.

Saktoev, V.E. (1999). Transformacii rossijskoj makroekonomicheskoj modeli i ekonomicheskij rost [Economic transition in Russia and economic growth]. Dis. ... d-ra ekon. nauk : 08.00.01 SPb.

Salijchuk, V.F. (2004). Ekonomicheskij rost: teoreticheskie aspekty [Economic growth: theoretical issues]. Kurgan: Kurgan. gos. un-t.

Samojlov, A.V. (2005). Metody analiza i ocenki ekonomicheskogo rosta [Methods of analysis and estimation of economic growth]. SPb.: Izd-vo S.-Peterb. gos. un-ta ekonomiki i finansov.

Savchenko, M.I. (2005). Ekzogennye faktory ustojchivogo ekonomicheskogo rosta Rossii [Exogenous determinants for sustainable economic growth in Russia]. Dis. ... kand. ekon. nauk : 08.00.14 Krasnodar.

Seleznev, A.Z. (2001). Nematerial'noe proizvodstvo i ekonomicheskij rost [Non-material production and economic growth]. M.: Nauka.

Shchedrina T.I. (2003). Transfer tehnologij ta jogo rol' u realizaciï innovacijnoï modeli rozvitku [Technology transfer and its role in the innovation-based model of development]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 424-438). Kyiv: IEP, Feniks.

Shchedrina, T.I. (2003). Perspektivna politika shchodo transferu tehnologij [Technology transfer: policy for the future]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 439-447). Kyiv: IEP, Feniks.

Shnipko, O.S. (2003). Institucijni faktori posilennja konkurentospromozhnosti nacional'noï ekonomiki [Institutional determinants for the increase in competitiveness of the national economy]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 941-953). Kyiv: IEP, Feniks.

Shubravskaja, E. (2005). Ustojchivoe ekonomicheskoe razvitie: ponjatie i napravlenie issledovanij [Sustainable economic development: tehc ategory and direction for research]. *Ekonomika Ukrainy*, 1, pp. 36-41.

Shums'ka, S.S. (2003). Monetarna politika ta ekonomichne zrostannja [Monetary policy and economic growth]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 594-614). Kyiv: IEP, Feniks.

Sidorovich, A.V. (Ed.). (1997). Kurs ekonomicheskoj teorii. Obshie osnovy ekonomicheskoj teorii, mikroekonomika, makroekonomika, perehodnaja ekonomika: Uchebnoe posobie [Economic theory: microeconomics, macroeconomics, transition economics]. -M.: Dis.

Simkina, L.G., et al. (2002). Innovacionnyj ekonomicheskij rost: rossijskie vozmozhnosti i ih realizacija [Innovations-based economic growth: opportunities in Russia]. Sb. nauch. tr. M-vo obrazovanija Ros. Federacii. S.-Peterb. gos. izhener.-ekon. un-t; SPb.: SPbGIEU.

Snigir, L.Ya., and Shums'ka, S.S. (2003). Finansovi resursi ekonomichnogo rostu [Financial resources of economic growth]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 545-565). Kyiv: IEP, Feniks.

Sokolik, M.P. (2003). Formuvannja rivnja zhittja naselennja [Living standards of populaiton]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika*

dovgostrokovogo rozvitku (pp. 314-333). Kyiv: IEP, Feniks.

Sokolovskij, O.A. (2001). Ekonomicheskij rost v uslovijah sistemnoj transformacii: Obshie zakonomernosti i osobennosti v perehodnyj period [Economic growth under the conditions of systemic transformation: general laws and specifics of transition]. Dis. ... d-ra ekon. nauk: 08.00.01 Saratov.

Solovejkina, M.P. (2002). Ekonomicheskij rost, vozmozhnosti i granicy v transformirujushchejsja ekonomike: Metodologija i teorija analiza [Economic growth: potential and limits in the transition economy. Methodology and theory of analysis]. Dis. ... kand. ekon. nauk : 08.00.01 Rostov n/D.

Spirjagin, V.I. (2005). Issledovanie problem ekonomicheskogo rosta [Problems of economic growth]. Syktyvkar izd-vo Komi nauch. centra UrO RAN.

Suhorukov, A. (2006). Innovacijna paradigma ekonomichnogo rozvitku Ukraïni [The innovation-based paradigm of economic development in Ukraine]. *Ekonomika Ukraïni*, 7, pp. 92-95.

Sidenko, V.R. (2003). Ukraïna v procesah mizhnarodnoï integraciï [Ukraine in the processes of international integration]. Kharkiv: Fort.

Sidenko, V.R. (2003). Prioriteti evrointegracijnoï strategiï Ukraïni u sferi ekonomiki [The strategic economic priorities of Euro-integration in Ukraine]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 843-850). Kyiv: IEP, Feniks.

Sidenko, V.R., and Timchenko, O.G. (2003). Rozvitok vzaєmodiï Ukraïni z institutami ЄS ta regional'nih ekonomichnih organizacij [Development of the links between Ukraine and the EU institutions and regional economic organizations]. In V.M. Heyets (Ed.).

Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku (pp. 850-859). Kyiv: IEP, Feniks.

Sidenko, V.R., Liu Kong Than' (2003). Perspektivi vkljuchennja Ukraïni v global'ni ekonomichni procesi ta rozvitok vidnosin iz SOT [Perspectives of integration in the global economic processes for Ukriane and development of cooperation with the WTO]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 859-866). Kyiv: IEP, Feniks.

Tarasevich, V.M., Yaremenko, O.L., and Art'omova, T.O. (2003). Institucijne reguljuvannja social'no-ekonomichnoï dinamiki [Institutional regulation of the socio-economic dynamics]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 181-189). Kyiv: IEP, Feniks.

Temchuk, P.P., and Palamarchuk, V.O. (1994). Narisi z ekonomichnoï teoriï [Issues in economic theory]. Kyiv: ISDO.

Tjurina, V.U. (2005). Rossijskaja ekonomika: problemy i protivorechija ekonomicheskogo rosta [Russian economy: problems and contradictions of economic growth]. Saratov: Nauch. kn.

Tochilin, V.O. (2001). Rozvitok sektoriv i tovarnih rinkiv Ukrainy [Development of the industries and commodity markets in Ukraine]. Uzhgorod: IVA.

Tochilin, V.O. (2004). Formuvannja galuzevih rinkiv Ukrainy: perehidnij period [Creation of the branch-based markets in Ukraine]. Kyiv: Feniks.

Tolmachev, P.I. (2005). Ekonomicheskij rost kak osnova ustojchivogo razvitija nacional'nyh ekonomik: Vneshneekonomicheskie faktory [Economic growth as a basis for sustainable development of the national

economies: external factors]. Dis. ... d-ra ekon. nauk : 08.00.14, 08.00.01 M.

Tomas, V., Dajlami, M., Dhareshvar A., et al. (2001). Kachestvo rosta [Quality of growth]. M.: Ves' Mir.

Ungaeva, M.A. (2005). Ekonomicheskij rost: rol' struktury i institutov [Economic growth: the role of the structure and the institutions]. Dis. ... kand. ekon. nauk : 08.00.01 SPb.

Vahnenko, T.P. (2000). Derzhavnij borg Ukraïni ta jogo ekonomichni naslidki [Domestic debt in Ukraine and its economic consequences]. Kyiv: Al'terpres.

Vahnenko, T.P. (2003). Borgova politika derzhavi [Government borrowing policy]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 526-535). Kyiv: IEP, Feniks.

Veretennikova, I.I. (2005). Faktory i uslovija ekonomicheskogo rosta [Factors and conditions of economic growth]. SPb.: Himizdat 2005.

Vilenskij, A. V., Buhval'd, E. M., Runov, A. V., et al. (2002). Predprinimatel'stvo, rynok i ekonomicheskij rost [Entrepreneurship, market, and economic growth]. M.: In-t ekonomiki RAN.

Vorobyev, E.M., Hrytsenko, A.A., Kim, M.N. (Eds.). (1997). Ekonomicheskaja teorija [Economic theory]. Har'kov: Fortuna-Press.

Vosproizvodstvo i ekonomicheskij rost: Sbornik [Reproduction and economic growth: Collection of works]. (2001). Mosk. gos. un-t im. M. V. Lomonosova. M.: TEIS.

Vovkanich, S. (2005). Sociogumanisticheskij kontekst naukoemkoj ekonomiki innovacionnogo obshestva [Socio-humanistic context of the knowledge-based economy in an innovative society]. *Ekonomika Ukrainy*, 3, pp. 42-48.

Vozhzhov, A. (2004). Ob ocenke ispol'zovanija kreditnogo mul'tiplikatora dlja obespechenija ekonomicheskogo

rosta [Estimating the effectiveness of credit multiplicator for economic growth]. *Ekonomika Ukrainy*, 7, pp. 18-24.

Yaremenko, O.L. (2003). Institucijni riziki social'no-єkonomichnogo rozvitku Ukraïni. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 172-180). Kyiv: IEP, Feniks.

Yatskevich, V. (2006). Problema “predelov rosta” i sistemnaja optimizacija [The issue of growth limits and systemic optimization]. *Ekonomika Ukrainy*, 3, pp. 4-11.

Zadorozhny, G.V. (1996). Sobstvennost' i ekonomicheskaja vlast' [Property and economic power]. Kharkiv: Osnova.

Zagors'ka, T.P., Gumenjuk, K.V. (2003). Strukturni zmini v metalurgiï ta rozvitok vnutrishn'ogo rinku metaloprodukciï [Structural changes in the metallurgic industry and development of the domestic market for the products of the industry]. In V.M. Heyets (Ed.). *Ekonomika Ukrainy: strategija i politika dovgostrokovogo rozvitku* (pp. 793-809). Kyiv: IEP, Feniks.

Zas'ko, V.N. (2004). Vzaimodejstvie vneshnih i vnutrennih faktorov ekonomicheskogo rosta v uslovijah usilenija integracionnyh processov [Interactions between external and internal factors of economic growth under the conditions of strengthening integration]. Dis. ... d-ra ekon. nauk : 08.00.05 M.

Zemskova, E.S. (2005). Konechnoe potreblenie kak predposylka ekonomicheskogo rosta v transformacionnoj ekonomike [Final consumption as a precondition for economic growth in a transition economy]: Dis. ... kand. ekon. nauk: 08.00.01 M.

Zhabin, A.P., and Hasaev, G.R. (2004). Problemy kachestva ekonomicheskogo rosta: materialy Mezhdunar. nauch.

kongr., 17-28 maja 2004 [Quality of economic growth: Collection of works]. Samara: Sam. gos. ekon. akad.

Zhits, G.I. (2000). Innovacionnyj potencial i ekonomicheskij rost [Innovations and economic growth]. Saratov: Sarat. gos. tehn. un.

Zverev, O.A. (2005). Modeli makroekonomicheskogo ravnovesija i rosta [Models of macroeconomic equilibrium and growth]. SPb.: Izd-vo S.-Peterb. un-ta.

Other sources

Abramovitz, M. (1956). Resource and Output Trends in the United States Since 1870. *American Economic Review*, 46, pp. 5-23.

Acemoglu, D. (1994). Search in the Labor Market, Incomplete Contracts, and Growth. *CEPR Discussion Paper* no. 1026.

Acemoglu, D. (1996). A Microfoundation for Social Increasing Returns in Human Capital Accumulation. *Quarterly Journal of Economics*, 3, pp. 779-804.

Acemoglu, D. (1997). Training and Innovation in an Imperfect Labor Market. *Review of Economic Studies*.

Aghion, P. and Blanchard, O. (1993). On the Speed of Transition in Central Europe. *NBER Macro Annual*, Cambridge, MA.

Aghion, P., and Howitt, P. (1998). Capital Accumulation and Innovation as Complimentary Factors in Long-Run Growth. *Journal of Economic Theory*, 2, pp. 34-60.

Aghion, P., and Howitt, P. (1998). Endogenous Growth Theory. Cambridge: The MIT Press.

Alesina, A., and Rodrik, D. (1994). Distributive Politics and Economic Growth. *Quarterly Journal of Economics*, 109, pp. 465-490.

Arrow, K. (1962). The Economic Implications of Learning by Doing. In Robert Becker and Edwin III Burmeister

(Eds.). *Growth Theory. Volume I. Descriptive Growth Theories*. Vermont: Edward Elgar Publishing, 1991.

Arrow, K., Chenery, H., Minhas, B., and Solow, R. (1961). Capital-Labor Substitution and Economic Efficiency. *Review of Economics and Statistics*, 43, pp. 225-250.

Aslund, A. (2000). Why Has Ukraine Failed to Achieve Growth? In A. Aslund and G. de Menil (Eds.). *Economic Reform in Ukraine: The Unfinished Agenda* (pp. 255-277). Armonk, NY: M. E. Sharpe.

Aslund, A. (2001). Ukraine's Return to Economic Growth. *Post-Soviet Geography and Economics*, 42(5), pp. 313-328.

Aslund, A. (2002). *Building Capitalism: the Transformation of the Former Soviet Bloc*. New York: Cambridge University Press.

Aslund, A. (2002). Why Has Ukraine Returned to Economic Growth? Retrieved May 2006, from http://pdc.ceu.hu/archive/00001669/

Banajan, K. (1999). The Ukrainian Economy Since Independence. London: Edward Elgar Publishing.

Barro, R. (1997). Determinants of Economic Growth: A Cross-Country Empirical Study. New York: Cambridge University Press.

Barro, R. (2000). Inequality and Growth in a Panel of Countries. *Journal of Economic Growth*, 1, pp. 5-32.

Barro, R., and Lee, J. (1996). International Measures of Schooling Years and Schooling Quality. *American Economic Review*, 86, pp. 218-223.

Barro, R., and Sala-i-Martin, X. (1999). Economic Growth. Boston: The MIT Press.

Benhabib, J., and Spiegel, M. (2000). The Role of Financial Development in Growth and Investment. *Journal of Economic Growth*, 4, pp. 341-360.

Berthelemy, J., Pissarides, C., and Varoudakis, A. (2000). Human Capital and Growth: The Cost of Rent Seeking Activities. In M. S. Oosterbaan, Thijs de Ruyter van

Steveninck, and N. van der Windt (Eds.). *The Determinants of Economic Growth*. New York: Kluwer Academic Publisher, 2000.

Black, J. (1962). The Technical Progress Function and the Production Function. *Economica*, 5, pp. 35-48.

Blanchard, O. (1997). The Economics of Transition in Eastern Europe. Cambridge: Clarendon Press.

Bleaney, M., and Nishiyama, A. (2002). Explaining Growth: A Contest between Models. *Journal of Economic Growth*, 1, pp. 43-56.

Boon, P. (1996). Politics and the Effectiveness of Foreign Aid. *European Economic Review,* 40(2), pp. 289-329.

Burnside, C., and Dollar, D. (2000). Aid, Policies and Growth. *American Economic Review,* 90, pp. 847-867.

Carlberg, M. (1997). International Economic Growth. Berlin: Phisica-Verlag.

Chakraborty, S., and Das, M. (2005). Mortality, Human Capital and Persistent Inequality. *Journal of Economic Growth*, 10(2), pp. 159-192.

Chmelarova, V., and Papageorgiou, C. (2005). Nonlinearities in Capital-Skill Complementarity. *Journal of Economic Growth*, 10(1), pp. 59-89.

Chowdhury, A., and C. Kirkpatrick. (1994). Development Policy and Planning: An Introduction to Models and Techniques. London: Routledge.

Dabrowski, M. (2002). Is the Economic Growth in Ukraine Sustainable? In S. Cramon-Taubaden and I. Akimova (Eds.). Fostering Sustainable Growth in Ukraine. Berlin: Physica-Verlag.

Dinopoulos, E., and Waldo, D. (2005). Gradual Product replacement, Intangible-Asset Prices and Schumpeterian Growth. *Journal of Economic Growth*, 10(2), pp. 135-158.

Dodonov, B., Hirschhausen, C., Opitz, P., and Sugolov, P. (2002). Efficient Infrastructure Supply as a Condition for

Economic Development – The Case of Ukraine. In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Domar, E. (1946). "Capital Expansion, Rate of Growth and Employment." *Econometrica*, 14, pp. 137-147.

Domar, E. (1970). "Capital Expansion and Growth". In Amartya Sen (Eds.). *Growth Economics*. Baltimore: Penguin Books, 1970.

Dorfman, R., Samuelson, P., and Solow, R. (1958). *Linear Programming and Economic Analysis*. New York: Penguin.

Dornbush, R. (1996). Stabilization, Debt, and Reform. Policy Analysis for Developing Countries. London: Prentice Hall.

Durham, B. (1999). Economic Growth and Political Regimes. *Journal of Economic Growth*, 1, pp. 81-111.

Durlauf, S., and Johnson, P. (1995). Multiple Regimes and Cross-Country Growth Behavior. *Journal of Applied Econometrics*, 10, pp. 365-384.

Easterly, W. (2001). The Middle Class Consensus and Economic Development. *Journal of Economic Growth*, 4, pp. 317-335.

Economic Growth with Equity: Ukrainian Perspectives. P. Hansen and V. Nanivska (Eds.). Washington, D.C.: IBRD/World Bank, 1999.

Economist Intelligence Unit Database. New York: Bureau van Dijk Electronic Publishing.

Eremenko, I. (2002). Reserve Requirements and Implicit Taxation of Commercial Banks in Ukraine. In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Fisher, S., Sahay, R., and Vegh, C. (1996). Stabilization and Growth in Transition Economies: The Early Experience. *Journal of Economic Perspectives*, 2, pp. 45-66.

Galor, O., and Tsiddon, D. (1997). The Distribution of Human Capital and Economic Growth. *Journal of Economic Education*, 1, pp. 28-43.

Gavrilenkov, E. (2002). Achievements of Missed Opportunities: Factors of Economic Growth in Russia. What Lessons are Relevant to Ukraine? In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Ghost, A. (1999). A Macroeconomic Framework for Sustained Economic Growth. London: Prentice Hall.

Gjourgyan, G., and Mirzoyan, J. (2000). Methodology to Develop More Accurate Measures of Value Added: Experience of Armenia. Report presented at the Joint Workshop on Measurement of the Non-observed Economy, OECD, EuroStat, and Goskomstat of the Russian Federation, Moscow.

Gould, E., Moav, O., and Weinberg, B. (2001). Precautionary Demand for Education, Inequality, and Technological Progress. *Journal of Economic Growth*, 4, pp. 285-315.

Grafts, N. (1995). Exogenous or Endogenous Growth? The Industrial Revolution Reconsidered. *The Journal of Economic History*, 4, pp. 745-773.

Greenwood, J., and Uysal, G. (2005). New Goods and the Transition to a New Economy. *Journal of Economic Growth*, 10(2), pp. 99-134.

Gylfason, T. (2002). Natural Resources and Economic Growth: What is the Connection? In S. Cramon-Taubaden and I. Akimova (Eds). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Hansen H., and Tarp, F. (2001). Aid and Growth Regression. *Journal of Development Economics,* 64(2), p. 547-570.

Harrod, R. (1937). Review of Joan Robinson's 'Essays on the Theory of Employment'. *Economic Journal*, 49, p. 326-330.

Harrod, R. (1939). An Essay in Dynamic Theory. *Economic Journal*, 49, pp. 14-33.

Harrod, R. (1948). Towards a Dynamic Economics: Some Recent Developments of Economic Theory and Their Applications to Policy. London: Macmillan.

Harrod, R. (1970). Dynamic Theory. In Amartya Sen (Ed). *Growth Economics*. Baltimore: Penguin Books.

Hausmann, R., Pritchett, L., and Rodrik, D. (2005). Growth Accelerations. *Journal of Economic Growth*, 10(4), pp. 303-330.

Havrylyshyn, O. (1999). Growth Experience in Transition Countries, 1990-98. Washington, D.C.: International Monetary Fund.

Havrylyshyn, O., Izvorski, I., and Rooden, R. (1999). Growth in Transition Economies 1990-1997: An Econometric Analysis with Application to Ukraine. In A. Siedenberg and L. Hoffman (Eds.). *Ukraine at the Crossroads: Economic Reforms in International Perspective*. Berlin: Physica-Verlag.

Havrylyshyn, O., Lissovolik, B., and Shadman-Valavi, M. (2002). Ecoonmic Growth in Ukraine: What if Reforms and Ecoonmic Recovery Had Started Earlier? In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Heyets, V. (2002). Is there Any Economic Growth in Ukraine? In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Hicks, J. (1932). The Theory of Wages. London: Macmillan.

Hilgard, E. (1956). Theories of Learning. New York: Appleton-Century-Crofts.

Howitt, P., and Aghion, P. (1996). R&D in the Growth Process. *Journal of Economic Growth*, 1, pp. 49-74.

IMF Concludes Article 4 Consultation with Ukraine. Public Information Notice (PIN) 3 01/5, 2001. Retrieved August 12, 2004, from www.imf.org

IMF, Ukraine: Recent Economic Development, 2001. Retrieved August 12, 2004, from www.imf.org

Jahnke, J. (2002). Finance and Growth in Ukraine. In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Johansen, L. (1959). Substitution vs. Fixed Production Coefficients in the Theory of Economic Growth: A Synthesis. *Econometrica*, 27, pp. 157-176.

Jones, C., and J. Williams. (2000). Too Much of a Good Thing? The Economics of Investment in R&D. *Journal of Economic Growth*, 1, pp. 65-86.

Kalaitzidakis, P., Mamuneas, T., Savvides, A., and Stengos, T. (2001). Measures of Human Capital and Nonlinearities in Economic Growth. *Journal of Economic Growth*, 3, pp. 229-254.

Kaldor, N. (1955-1956). Alternative Theories of Distribution. *Review of Economic Studies*, vol. XXIII, 2.

Kaldor, N. (1961). Capital Accumulation and Economic Growth. In F. A. Lutz and D. C. Hague (Eds.). *The Theory of Capital*. (pp. 177-222). New York: St. Martin's Press.

Kaldor, N., and Mirrless, J. (1969). A New Model of Economic Growth. In J. E. Stiglitz and H. Uzawa (Eds.). *Readings in the Modern Theory of Economic Growth*, pp. 384-402.

Kaufmann, D., and Kaliberda, A. (1996). Integrating the Unofficial Economy into the Dynamics of Post-Socialist Economies. In B. Kaminski (Ed.). *Economic Transition in the Newly Independent States*. Armonk, NY: M. E. Sharpe.

Kelly, M., and Hageman, A. (1999). Marshallian Externalities in Innovation. *Journal of Economic Growth*, 1, pp. 39-54.

Kendrick, J. (1976). The Formation and Stock of Total Capital. New York: Columbia University for NBER.

Keynes, J. (1935). The General Theory of Employment, Interest and Money. New York: Harcourt.

Klein, L., and Kushnirsky, F. (2005). Econometric Modeling at Mixed Frequencies. *Journal of Economic and Social Measurement*, 30(4), pp. 251-277.

Kravchuk, R. (2002). Ukrainian Political Economy: The First Ten Years. New York: Palgrave MacMillan.

Kregel, J. (1973). The Reconstruction of Political Economy: an Introduction to Post-Keynesian Economics. London: Macmillan.

Krueger A., and Lindahl, M. (2000). Education for Growth: Why and For Whom? NBER Working Paper 7591.

Lackó, M. (1998). The Hidden Economies of Visegrád Countries in International Comparison: A Household Electricity Approach. In L. Halpern and C. Wyplosz (Eds.). *Hungary: Towards a Market Economy*. Cambridge: Cambridge University Press.

Lacko, M. (1999). Do Power Consumption Data Tell the Story? Electricity Intensity and Hidden Economy in Post-Socialist Countries. Budapest Working Papers on the Labor Market. Budapest: Institute of Economics, Hungarian Academy of Sciences.

Lal, D. (2000). Institutional Development and Economic Growth. In M. S. Oosterbaan, Thijs de Ruyter van Steveninck, and N. van der Windt (Eds.). *The Determinants of Economic Growth*. New York: Kluwer Academic Publisher, 2000.

Lensink, R., and Kuper, G. (2000). "Recent Advances in Economic Growth: a Policy Perspective." In M. S. Oosterbaan, Thijs de Ruyter van Steveninck, and N. van der Windt (Eds.). *The Determinants of Economic Growth*. New York: Kluwer Academic Publisher, 2000.

Lensink, R., and Morrissey, O. (1999). Aid Instability as a Measure of Uncertainty and the Positive Impact of Aid

on Growth. *CREDIT Research Paper* 99/6, University of Nottingham.

Leontief, W. (1938). The Significance of Marxian Economics for Present-day Economic Theory. *American Economic Review*.

Leontief, W. (1958). Theoretical Note of Time-Preference, Productivity of Capital, Stagnation, and Economic Growth. *American Economic Review*, 1.

Leontief, W. (1966). *Essays in Economics: Theories and Theorizing*. Oxford: Oxford University Press.

Lewis, A. (1984). The Rate of Growth of the World Economy. Nankang: Institute of Economics, Academia Sinca.

Lucas, R. (1987). On the Mechanics of Economic Development. In Donald P. Jacobs, Ehud Kalai, and Morton I. Kamien (Eds.). *Frontiers of Research in Economic Theory*. (pp. 82-102). New York: Cambridge University Press, 1998.

Mankiw, G., Romer, D., and Weil, D. (1992). A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics*, 2, pp. 407-437.

Mankovska, N., and Dean, J. (2002). The Relationship between Foreign Direct Investment and Trade Flows in Transition Economy: The Case of Ukraine. In S. Cramon-Taubaden and I. Akimova (Eds). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

McCandless, G., and Wallance, N. (1991). Introduction to Dynamic Macroeconomic Theory: an Overlapping Generations Approach. Cambridge: Harvard University Press.

McDermott, J. (1999). Mercantilism and Modern Growth. *Journal of Economic Growth*, 1, pp. 55-80.

Mincer, J. (1996). Economic Development, Growth of Human Capital, and the Dynamics of the Wage Structure. *Journal of Economic Growth*, 1, pp. 29-48.

Mulligan, C., and Xavier Sala-i-Martin. (2000). Measuring Aggregate Human Capital. *Journal of Economic Growth*, 3, pp. 215-252.

Nelson, R. (1996). The Sources of Economic Growth. Cambridge: Harvard University Press.

Nerlove, M. (1965). Estimation and Identification of Cobb-Douglas Production Function. Chicago: Rand McNally&Co.

O'Rourke, K., and Williamson, J. (2005). From Malthus to Ohlin: Trade, Industrialization and Distribution since 1500. *Journal of Economic Growth*, 10(1), pp. 5-34.

Olsson, O. (2005). Technological Opportunity and Growth. *Journal of Economic Growth*, 10(1), pp. 35-58.

Pomfret, R. (2000). Development Economics. New York: Prentice Hall.

Pritchett, L. (1996). Where Has All the Education Gone? Washington, D.C.: World Bank, Working Paper 1581.

Ramsey, F. (1928). A Mathematical Theory of Saving. In R. Becker and E. Burmeister (Eds.). *Growth Theory. Volume II. Optimal Growth Theories*. Vermont: Edward Elgar Publishing, 1991.

Redding, S. (1996). Low-Skill, Low-Quality Trap: Strategic Complementarities between Human Capital and R&D. *Economic Journal*, 106, pp. 458-470.

Reid, G. (1989). Classical Economic Growth: An Analysis in the Tradition of Adam Smith. New York: Basic Blackwell Ltd.

Robinson, J. (1937). Essays in the Theory of Employment. London: Macmillan.

Robinson, J. (1955-1956). The Classification of Inventions. *Review of Economic Studies*, 5, 139-142.

Robinson, J. (1956). The Accumulation of Capital. Homewood: Richard D. Irwin.

Romer, P. (1986). Increasing Returns and Long Run Growth. *Journal of Political Economy*, 5, pp. 1002-1037.

Romer, P. (1989). Capital Accumulation in the Theory of Long Run Growth. In R. Barro (Ed.). *Modern Business Cycle Theory*. (pp. 51-127). Cambridge: Harvard University Press.

Romer, P. (1989). Human Capital and Growth: Theory and Evidence. NBER Working Paper 3173.

Romer, P. (1990). Capital, Labor and Productivity. *Brookings Papers on Economic Activity*, Microeconomics Special Issue, pp. 337-367.

Romer, P. (1990). Endogenous Technological Change. *Journal of Political Economy*, 5, pp. 71-102.

Romer, P. (1994). The Origins of Endogenous Growth. *Journal of Economic Perspectives*, 1, pp. 3-22.

Rostow, W. (1990). Theorists of Economic Growth from David Hume to the Present; with a Perspective on the Next Century including a mathematical appendix by Michael Kennedy and Walt W. Rostow. New York: Oxford University Press.

Ruth, J. (1998). Economic Growth and Investment in Education; How Allocation Matters. *Journal of Economic Growth*, 4, pp. 337-360.

Samuelson, P. (1991). "A Theory of Induced Innovation Along Kennedy-Weisacker Lines". In Robert Becker and Edwin III Burmeister (Eds.). *Growth Theory. Volume I. Descriptive Growth Theories*. Vermont: Edward Elgar Publishing.

Scherbakov, A. (2002). A Restructuring Trap in Transition Economies: Where Does it Lead? In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Schuler, P. (2004). Implementation of WTO Regulatory Rules in Ukraine: Challenges and Opportunities. In I. Burakovsky, L. Handrich, and L. Hoffmann (Eds.). *Ukraine's WTO Accession: Challenge for Domestic Economic Reforms*. Berlin: Physica-Verlag.

Schultz, T. (1963). The Economic Value of Education. New York: Columbia University Press.
Schultz, T. (1970). Investment in Human Capital: The Role of Education and of Research. New York: Free Press.
Schultz, T. (1981). Investing in People: The Economics of Population Quality. Berkeley: University of California Press.
Schultz, T. (1990). Restoring Economic Equilibrium: Human Capital in the Modernizing Economy. Oxford, Cambridge: Blackwell.
Schultz, T. (1993). Origins of Increasing Returns. Oxford, Cambridge: Blackwell.
Schumpeter, J. (1911). Theory of Economic Development. New York: Harper & Brothers.
Schumpeter, J. (1934). The Theory of Economic Development: an Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Cambridge: Harvard University Press.
Schumpeter, J. (1939). Business Cycles: a Theoretical, Historical, and Statistical Analysis of the Capitalist Process. New York: McGraw Hill.
Schumpeter, J. (1947). Capitalism, Socialism, and Democracy. New York: Harper & Brothers.
Scott, M. (1989). A New View of Economic Growth. Oxford: Oxford University Press.
Segerstorm, P. (2000). The Long-Run Growth Effects of R&D Subsidies. *Journal of Economic Growth*. 3, pp. 277-305.
Sen, A. (1970). Growth Economics. Baltimore: Penguin Books.
Sengupta, J. (1998). New Growth Theory: An Applied Perspective. Northampton: Edward Elgar Publishing.
Shen, R. (1996). Ukraine's Economic Reform: Obstacles, Errors, Lessons. New York: Praeger Publishers.
Shioji, E. (2001). Public Capital and Economic Growth: a Convergence Approach. *Journal of Economic Growth*, 3, pp. 205-228.

Shkolnikov, V., Cornia, G., Leon, D., and Mesle, F. (1998). Causes of the Russian Mortality Crisis: Evidence and Interpretations. *World Development Report*, 26, pp. 1995-2011.

Shleifer, A. (2005). A Normal Country: Russia after Communism. Cambridge, MA: Harvard University Press.

Sokoloff, K., and Engerman, S. (2000). Institutions, Factor Endowments, and Path of Development in the New World. *Journal of Economic Perspectives*, 14, pp. 217-232.

Solow, R. (1957). Technical Change and the Aggregate Production Function. *Review of Economics and Statistics*, 39, pp. 312-320.

Solow, R. (1960). Investment and Technical Progress. In K. J. Arrow, S. Karlin, and P. Suppes (Eds.). *Mathematical Methods in Social Sciences*. (pp. 89-104). Stanford: Stanford University Press.

Solow, R. (1970). Growth Theory: An Exposition. Oxford: Clarendon Press.

Solow, R. (1988). Growth Theory: An Exposition. Oxford: Oxford University Press.

Sorensen, A. (1999). R&D, Learning, and Phases of Economic Growth. *Journal of Economic Growth*, 4, pp. 429-445.

Swan, T. (1969). Economic Growth and Capital Accumulation. In J. Stiglitz and H. Uzawa (Eds.). *Readings in the Modern Theory of Economic Growth*. 1969, pp. 88-116.

The Determinants of Economic Growth. M. S. Oosterbaan, Thijs de Ruyter van Steveninck, and N. van der Windt (Eds.). New York: Kluwer Academic Publisher, 2000.

Thieben, U. (2001). Fiscal Federalism in Western European and Other Countries: Centralization or Decentralization? What is Better for Economic Growth? Are There Implications for Ukraine? In L. Hoffman and F. Mollers (Eds.). *Ukraine on the Road to Europe*. Berlin: Physica-Verlag.

Thiel, E. (2002). The Investment Environment in Russia and Ukraine: Common Weaknesses in the Institutional and Policy Framework. In S. Cramon-Taubaden and I. Akimova (Eds.). *Fostering Sustainable Growth in Ukraine*. Berlin: Physica-Verlag.

Ukraine at the Crossroads: Economic Reforms in International Perspectives. A. Siedenberg and L. Hoffmann (Eds.). Berlin: Phisica-Verlag, 1999.

Ukraine: Recent Economic Developments. IMF Staff Country Report 96/21. Washington, D.C.: IMF, 1996. Retrieved May 1, 2001 from www.imf.org

Uzava, H, and Watanabe, T. (1960). A Note on the Classification of Technical Inventions. Technical Report 85. Stanford: Stanford University Press.

Uzava, H. (1967). Neutral Inventions and the Stability of Growth Equilibrium. In J. Stiglitz and H. Uzawa (Eds.). *Readings in Modern Theory of Economic Growth*, 1969.

Valdes, B. (1999). Economic Growth: Theory, Empirics, and Policy. Northampton: Edward Elgar Publishing.

Vanek, J. (1968). Maximal Economic Growth. A Geometric Approach to Von Neumann's Growth Theory and the Turnpike Theorem. Ithaca: Cornell University Press.

Verdoorn, P. (1956). Complementary and Long-Range Projections. *Econometrica*, 24, pp. 429-450.

Vitrenko, Y. (1999). Policy in Education. In J. Hansen and V. Nanivska (Eds.). *Economic Growth with Equity: Ukrainian Perspectives*. Washington, D.C.: IBRD.

Von Neumann, J. (1945-1946). A Model of General Economic Equilibrium. *Review of Economic Studies,* XIII, pp.1-9.

World Development Indicators Database. (2005). Retrieved August 12, 2006 from www.worldbank.org.

Zagler, M. (1999). Endogenous Growth, Market Failures and Economic Policy. New York: St.Martin's Press.

Zon, H. (2000). The Political Economy of Independent Ukraine. New York: St. Martin's Press.