Knowledge and Finance in Restructuring: a Look at the Russian Context

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KNOWLEDGE AND FINANCE IN RESTRUCTURING: A LOOK AT THE RUSSIAN CONTEXT

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INTRODUCTION

How can one evaluate the capacities of any country to integrate with the global economy with a positive effect for its population? Discussions around such problems as economic growth and social development regularly require the reconsideration of economic categories connecting the rent positions of natural resources with the effectiveness of human activity which also has a rent capacity. Governments have to decide the objectives of long run development and consider adequate methods to control processes.

In the 1960s and 1970s the strategy of national development was based on the idea of prioritized investment in physical capital and in infrastructure. Economists emphasized the necessity of replacing a simple labour force by perfect machines and robots. They raised also questions about such problems as how to use monocultural economic specialization for the accumulation of capital (Konovalova, 1972; Tulpanov, 1969), and how to develop strategies to assure complementarities between the manufacturing and labour complexes in processes of scientific and technological improvement.

In our time the analogous questioning develops according to the following guiding principles: One studies the significance of knowledge accumulation for modern economics; one concludes that economic growth requires the redistribution of resources and human activity in favour of non-material spheres, the substitution of manufacturing for the production of knowledge

1. I am grateful to Mary Jim Josephs who had the tough job of reading earlier version of this article, providing me with invaluable comments.

and its valorisation. In this respect the new stage of globalisation becomes a complementary factor of growth because it enhances connections between national economies and contributes to the strategy of extending information and diffusion of knowledge. Finance, as a sphere of services taking part in strategic management of firms and territories, plays a crucial role in these processes.

Researchers note the following peculiarities of this type of "knowledge-based" economy: first, a reduction of "competition" occurs (Aghion, Angeletos, Banerjee, Manova, 2005), in the light of which secondary financing of innovation already carried out is of no earthly use (Peaucelle and Peaucelle, 1978); second, one turns attention to the creative destruction of manufacturing systems caused by innovation, described by Shumpeter; and, third, one observes the increase in the risks of business activity (Aghion, Harris, Howitt, Vickers, 2001). Not all industries become knowledge-intensive. The intensity of research conducted by the firms and the intensity of competitive capacity depend to a high degree on the sphere of activity.

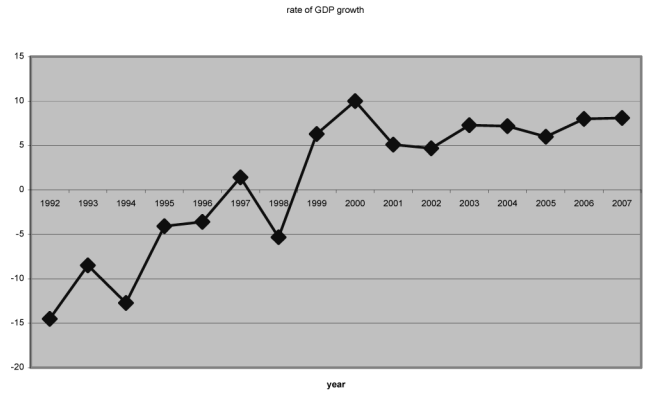
Two conflicting factors connect competition and innovation: innovation is necessary, in order to avoid competition and to attain monopoly status but, at the same time, it strengthens competition, because the development of new goods, as a result of the innovative activity, reduces the intensity of new research. L. Soete (2001), drawing on numerous empirical studies has shown that the accumulation of relative superiority (in terms of: the skills to produce and to act, the degree of the qualification of the workforce, and the capability for innovation) explains the stability of the dissimilarity between the efficiencies of various economic systems. The relative weakness of the industrial and scientific potential of any country, writes J.-L. Beffa (2005), in comparison with its competitors, is not necessarily connected with the weakness of the scientific sector of its firms, but is connected to a larger degree with the country's specialization in production with low technological intensity.

Beffa's diagnosis can be applied to the economy of Russia. The oil and gas industry, considered as one of low technological intensity, is an extremely important line in the diagram of the creation of its GDP. Oil and gas account for between 10 and 16% of its industrial production (depending on the method of calculation), for about 65% of exports, and for 30% of federal government revenue. Russia possesses 33% of world gas resources, 11% of coal resources and 26% of raw metals. It is the largest producer of palladium and nickel (20% of world output) and there are wide deposits of many rare minerals. However, this extremely resource-rich country cannot sustain as high a level of GDP *per capita* as oil-rich and oil-exporter Norway can do

(with 38.6 PPP-$ per capita), because of the large population and the important internal consumption of resources.

The average rate of growth of GDP *per capita* in Russia until 1952 was 1.5% with catastrophic negative rates in several years between 1992 and 1998 (graph 1.). In comparison, the world average increase of GDP per capita for this period was 2.1%.

Graph. 1 – The GDP growth rate between 1992 and 2007: Russian Federation



Furthermore the GDP *per capita* in absolute numbers suffered a disastrous decrease in the 1990s.

Table 1 – Russian Federation: GDP per capita (PPP-$)

1990	1995	2000	2002	2005	2006
8,340	5,930	7,240	8,230	11,560	12,740

Sources: UNO, World Bank.

The indicator of human development is a known indicator for international comparisons of well-being. In 2004 the member states of the European Union, accordingly to this indicator, took the positions from the first (Norway) to 48th (Latvia); Russia took 62nd position. The rating in terms of life expectancy at birth, mistakenly taken for a health indicator, gives another picture: Norway 79.4 years, Latvia 71.6 years and Russia, only 65.3 years (Peaucelle, 2004). Russia needs economic restructuring in order to achieve the following aims: to increase the standard of living, to enforce the population's health, and to prevent dependence upon the volatility of mineral resources priced at world market levels.

In this work I describe the mechanism for achieving the assigned goals of Russian development with 1) the aid, in the long run diversification, of new technology through highly risky technological projects and 2) the goals of flexible reconstruction, using financial means. The paper proposes the schema which describes the way to use credit policy in governing the dynamics of firms' shifts between classes of default risk. Such credit policy can control creative economic restructuring.

MAJOR FACTORS OF DEVELOPMENT IN RUSSIA

Place of oil and gas sectors in exports, their contribution to the creation of Russian funds of development

According to the theory of K. Marx, rent is the special case of super-profit derived from the investment of capital in activities such as extraction of minerals from the ground, and subtracted from the capitalist's income by the owner of the natural resources. For different reasons according to the origin of the resource one distinguishes two types of rent: absolute rent, actually a super-profit exceeding the average rate of profit in other industries; and differential rent, which is a difference in the amount of rent depending on the qualities of the natural resources and on labour productivity in the resource-sector. A share of this rent belongs to the entrepreneur whose investment adds to labour productivity.

At the present time the position of the Russian economy is determined, as specified above, by the concentration of gross profits in raw materials and in industries of low technological intensity: oil, gas, petrochemical, ferrous and non ferrous metallurgy. The structure of Russia's exports in 2003 (UN, Commodity Trade Statistics Database) was: oil 40%, gas 14%, manufactured goods without metallurgy 16%, iron and steel 7%, nonferrous metals 6%, foods and raw materials without gas and oil 9%, other commodities 8%. The direct effect of oil price rises contributed 45 per cent and oil exports added 24 per cent more to the GDP increase in 2000. In 2004 the oil rent was also important: the rise in prices contributed 20 per cent and the increasing volume of oil export 55% of the GDP growth rate (Milov, 2006).

Consequently, basic profit is created by the natural potential of the country; it is the absolute rent. The differential rent is relatively low; for example, the cost of extraction of one barrel of oil in Russia is equal to 15 $, while it is only 5$ in Saudi Arabia, and in recent years the proving cost has been a little over 1$ per barrel in Norway.

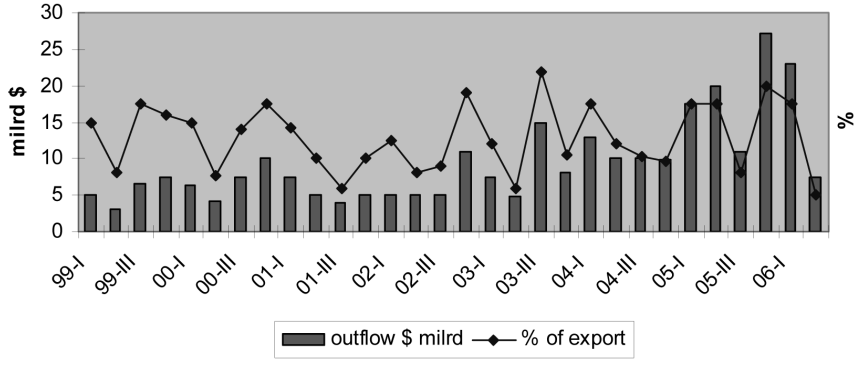
Table 2 – Some indicators of Russian foreign trade

	2002	2003	2004	2005
World price for oil in $ for a barrel	23,7	27,2	34,5	50,6
Exports Billion $	107	136	183	245
- in % GNP	31	32	32	32
- in volume	8,9	10,5	11,2	3,8
Import Billion $	61	76	97	125
- in % GNP	18	18	17	16
- in volume	9,9	19,3	23,3	29,8
Balance of foreign trade.	46	60	86	120

Sources: ЦМАКП -2005

Natural absolute rent must be used on behalf on all the population of Russia, as the owner of natural resources. However, the super-profits from the natural resources of the country have been appropriated by companies exploiting these indigenous resources. The greater part of these super-profits was taken out by the owners of companies and invested in foreign countries for expansion of their wealth. In 2005 Russian companies realized 15 billion dollars of direct and portfolio investments in national, innovative industrial sectors, but gross outflow of capital was equal to 72 billion dollars (Pukhov, 2006).

Graph 2 – Gross outflow of private capital

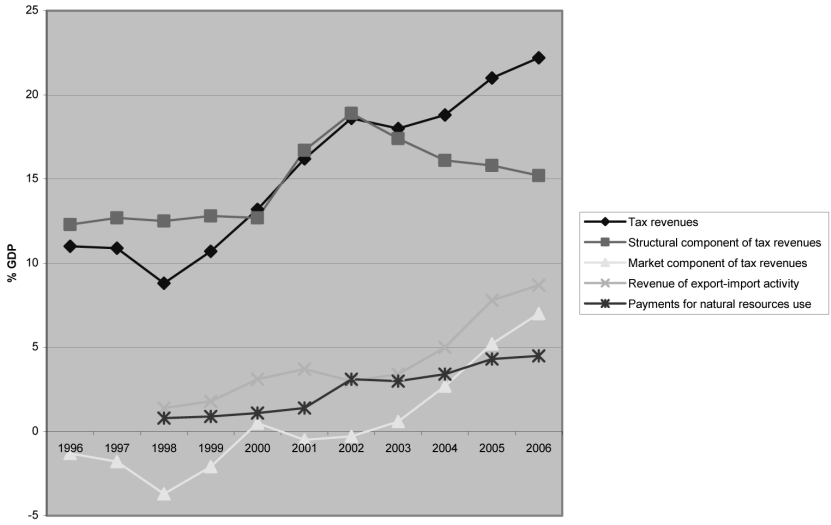


Such usage of natural rent was made possible because of shortcomings in the tax system. Creation of a new tax system in Russia in the early 1990 years took place during a forced transition to new economic conditions, resulting in a sharp decline in GDP, redistributed through the state budget. Double compression of budget expenditures during the economic crisis has had its influence on tax policy. Trying to offset the reduction in budgetary support for economic agents, the authorities included in the tax laws a large number of tax concessions and exemptions. The first Russian tax system had, among others, disadvantages such as: lack of properly developed issues of natural resources taxation, a hypertrophied big role for income tax, and low taxes on individuals and property.

After the implementation of major changes in tax legislation in the early 2000s, the tax revenue increased in real terms. The maximum rate of growth of 11.1% was observed in 2005. A similar dynamic occurred with regard to the proportion of tax revenue to GDP, which by 2005 had reached the maximum value for the period under review, equal to 36.9% of GDP. Looking on the trend of the market (conjuncture) component of tax revenues in the Russian federal budget (graph. 3) one can observe its increasing impact on budget revenue since 2003. It is the rising prices of oil and gas that provide an explanation of the favourable trend of tax revenues from foreign trade as well as of payment for the use of environmental resources. The Russian State has accumulated significant financial reserves during this time of strong increase in the prices of natural resources. According to the Russian Ministry of Finance, an increase of one dollar in the price of a barrel of oil gives 0.5% of GDP growth, one billion dollars of federal budget growth (0.3% of GDP) and two billion dollars of profit from exports.

Russian authorities began by constituting the State Stabilization Fund financed from the extra profits of the budget, based on the cost of one barrel of oil in excess of $27. The Stabilization Fund includes also the profits gained from the savings on interest-bearing payments in the case of early pay off of external debt. The Stabilization Fund is constituted so as to oblige the recurring expenses of the budget to remain below the minimal receipts, i.e. receipts which would be always collected, independently of the economic situation on the energy resources' markets. The state makes a decision to save, so as to ensure the normal development of the country in the event of abrupt deterioration of exporting conditions. In 2006 the Russian Stabilization Fund was estimated as one of the ten biggest sovereign funds in the world (see table 3.).

Graph.3 – Russian Federal budget: Impact of structural and market components on revenues, budget revenues of import-export activity and payments for natural resources use (measured as the ratio of Gross Domestic Product (GDP)



Sources: Government Council of Russian Federation (2007)

Table 3 – Biggest sovereign funds in 2006

Country	Name	$bns	%GDP2006
United Arabic Emirates	Investment authority of Abu-Dhabi	625	520.7
Norway	Pension government funds	322	102.6
Singapore	GIC	215	169.0
Kuwait	Investment authority of Kuwait	213	268.7
China	China Investment Corporation	200	8.0
Russia	Stabilisation Fund	127.5	14.2

Source: Lyons G., "State capitalism: The rise of sovereign wealth funds", cited by Coeuré (2008)

At the beginning, the savings of the Fund were converted into foreign currencies and paid on the accounts of the Russian federal Treasury. In 2006 the stabilization Fund comprised approximately US$ 60 billion and the reserves of exchanges consisted of more than US$ 200 billion. The operations of placement of the surplus receipts of the Funds are entrusted to the Ministry of Finance and to the Central Bank, which manages the accounts

in foreign currencies. The Ministry of Finance invests the funds in foreign assets on three accounts, one in dollars (45%), another in euros (45%) and a third in pounds sterling (10%). The Russian Central Bank proceeds by the acquisition of the claims of 14 developed foreign States. It prefers to compose its portfolio of low risk public obligations. For the moment, the Russian authorities do not have enough boldness to place these large sums of public money held by the Stabilization Funds inside Russia, and to convert them into Russian financial instruments.

At the end of March, 2007, the Russian Parliament approved the reform of the budget. The budget is now formed without the components of revenues generated from oil and gas, which will be used to form two new funds: the Reserve Fund and the National Wealth Fund. Thus, the Stabilization Fund ended its existence on January 1, 2008, and it is evaluated at US$ 144 billion. The Reserve Fund will not exceed 10% of GDP (that represents about US$ 120 billion at the end of 2007), and if the revenue from fuel sales surpasses this amount, it will complete the National Wealth Fund. At the beginning (February 1, 2008), this Fund held about US$ 40 billion. It is used to co-finance optional pension savings and to discharge the pension fund deficit. Both funds will target investments abroad in firms with a rating more than AAA- (evaluated by Fitch or S&P). At this point in time, no firm in Russia has such a high rating. Thus the Russian financial industry is developing on the basis of the new Reserve Fund with the aim of integrating all the international investment regulations, and as the basis of a Fund for future generations to innovate and build sustainable development projects.

Scientific and innovative potential of the Russian economy

In the analysis of potential acceleration of economic development one can also evaluate rents constituted because of utilisation of scientific and technological inventions created by people. In the modern global world two types of rent in economic relations can be selected (Frolov, 2004). Technological rent (1) is an activity of economic agents involved in high-level technological processing industries, as compared to activity in other industries with low technological intensity. Technological rent (2) is derived from the use of an innovative business cycle providing local monopolistic profit as compared to competitors.

It is possible to conclude, in accord with these definitions that in, the 1980s rent (1) was the engine of economic growth in Russia, as evidenced in the aviation industry, robot construction, rocket-space engineering, and radio electronics, all of which are highly technological, knowledge-intensive productions. This type of rent was promoted and used by the state

(USSR). From the middle of the 90s comparative advantages went to firms, possessors of rent (2), that accumulated front-rank technologies, such as computer engineering, software, telecommunications, biotechnology; nanotechnologies, phototechnology, and highly skilled personnel for their use. Russia is late in constituting the social relations of rent type (2), and in initiating the new manner of regulation. The knowledge based financial services in the restructuring of the economy at national level are suitable for generating the rent (2) super-profits.

The labour potential of Russia is greatly reduced for many reasons: by a demographic crisis (high death rate and weak birth-rate), by low health status among the active population, by a lowered level of education among young people and by a decline of the indices of scientific effectiveness since the USSR collapse. The last assertion is illustrated below (some other indicators are considered in Peaucelle, 1999).

Table 4 – Position in the world of Russian science by scientific domains and by change (the index of scientific citations)

Scientific domains	USSR 1983	1990	1995	2001	2002	2003
Fundamental biology		4.3	1.7	1.4	1.4	1.3
Medicine		2.7	0.7	0.5	0.5	0.5
Applied biology/ecology		2.6	1.9	1.7	1.7	1.6
Chemistry		15.3	6.9	5.6	5.4	5.1
Physics		13.5	7.3	7.3	6.9	6.4
Space sciences		7.5	4.0	4.2	4.3	4.1
Engineering		6.0	3.2	3.1	2.9	2.7
Mathematics		4.9	3.9	4.4	4.4	4.2
Total	8.4	7.2	3.3	2.9	2.8	2.6

Sources: OST, Indicators 1998, 2004

Concerning the source "indicators": the index of quoted Russian authors' scientific works (table 4.) traces a decline in the position of Russian science for the period from 1990 to 2003 in all fields of knowledge. Mathematics suffered less than all the others, a 15 percent decline; but medical sciences had the worst loss, with an 81 percent decline. The comparison of the numbers of Russian and U.S. doctoral degree earnings (table 5) gives an idea of the relative powerlessness of Russian post-graduate education in all science and engineering (S&E) fields and especially in physical and biological sciences.

Table 5 – Average earnings with doctoral degree in Russian Federation and United States: 2004 (in US dollars)

	Russian Federation	United States
All fields	29,850	42,155
All S&E fields	16,003	26,275
Physical/biological sciences	4,442	9,962
Agricultural sciences	893	1,046
Social/behavioural sciences	5,910	7,467
Engineering	4,758	5,776
Non-S&E fields	13,847	15,880

Sources: Science and Engineering indicators 2008, Appendix table 2-40

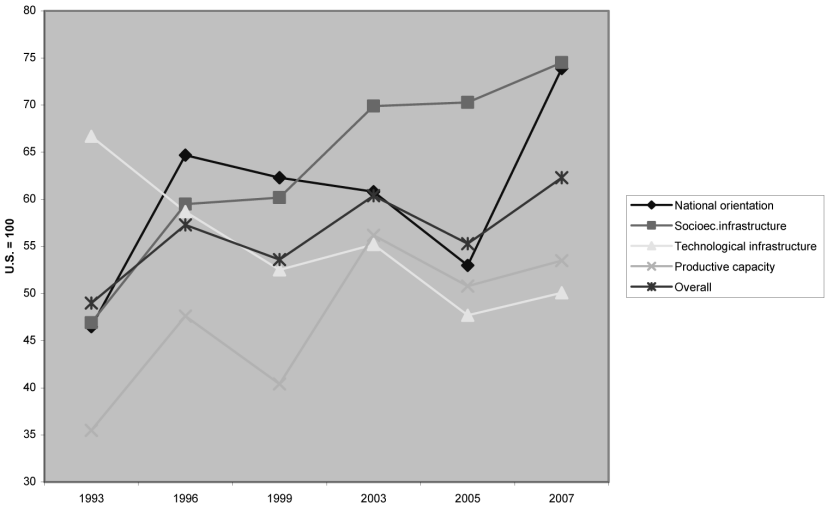
The National Science Board of the United States published in 2008 precious quantitative information on scientific and engineering enterprises. Graph.4 presents the evolution of some Russian indicators of S&E [2], measured in proportion to the U.S. level.

Overall, the technological competitiveness of Russia in comparison with that of the U.S. is slowly increasing from its bottom situation in 1999. Despite the great losses in absolute value the social component of competency, as it is defined in S&E indicators 2008, grew steadily between 1993 and 2007 relatively to the US one. But, the Russian indicator of technological infrastructure has fallen dramatically. Therefore it would be completely erroneous to judge the Russian trends only using these five lines in graph.4, because they are traced in connection with US feats at this period of time. And just at that stage of evolution the U.S. lost its status as the world's most competitive economy, since in 2007 the U.S. ranks only sixth in the table of global competitiveness.

The co-evolution of indices of knowledge for development between 1995 and the most recent year, estimated by the World Bank (2007), gives us some more details on the comparative knowledge competitiveness of Russian and U.S. economies.

2. National science board U.S. definitions of leading indicators: The overall indicator is a simple average of raw scores of four component indicators scaled to U.S. overall score. National orientation is composed of an investment risk index, and questions addressing national strategy, implementation, entrepreneurship, and attitudes toward technology. Socioeconomic infrastructure is composed of educational attainment and questions on national policies toward multinational investment and capital mobility. Technological infrastructure is composed of numbers of scientists employed in R&D, electronic data processing purchases, and questions on technical training and education, industrial R&D, and technological mastery. Productive capacity composed of electronics production, and questions on supply of skilled labour and indigenous component supply and management capability.

Graph. 4 – Leading indicators of technological competitiveness of Russia (U.S. = 100)



Sources: Science and Engineering indicators 2008

Table 6 – Knowledge economy index (KEI) [3]: Russian Federation and United States

	Russian Federation		United States	
	1995	recent	1995	recent
KEI	5.36	5.94	9.19	8.80
Economic/Institutional situation	6.53	6.92	9.36	8.91
Knowledge index	1.85	2.99	8.47	8.45
Innovation	5.73	6.92	9.46	9.44
Education	7.91	7.66	8.88	8.35
ICT index	5.96	6.19	9.76	8.95

Sources: Knowledge for Development program, World Bank (2007)

3. KEI is constructed as the average of the normalised values (between 1 and 10) of the 12 basic scored indicators. Economic/Institutional situation scores Economic performance (average annual GDP growth and human development index) and Economic incentive (tariff and non-tariff barriers, regulatory quality, and rule of law). Knowledge index is the average of normalised values of Education index (Adult literacy rate, secondary enrolment, and tertiary enrolment), Innovation index (Researchers in R&D, per million population; patent applications granted by the USPTO, per million population; scientific and technical journal articles, per million population), and Information infrastructure index (telephones per 1.000 persons, computers per 1.000 persons, internet users per 10.000 persons).

The components of the knowledge economy index have improved for Russia, except for the education and information infrastructure index, and all indexes have declined for U.S. The knowledge-intensive industry sector is represented in Russia mainly by the industries of the defence complex, including aviation, rocket-space and electronics; by the communications and radio industries; by the chemistry industry; by atomic shipbuilding; by the pharmaceutical industry; by production of chemical fibres; and by production of complex medical equipment.

In 2003, these industries were dominant in the knowledge-intensive sector, with 77% of this sector's turnover, irrespective of having suffered considerably after economic liberalisation in 1992. For instance, in the USSR, the aviation industry formerly produced more than 25% of world aviation technical equipment and employed 1.5 million persons. In 1998 only 516,000 persons were employed by this industry, and in its entire scientific sphere no more than 40,000 persons were employed. Today this industry is represented by 315 enterprises and by 250 companies that exploit civil aero-techniques. There are 70 enterprises specialising in R&D: 20 in aircraft and helicopters, 20 in engines, and 30 in various devices, aggregates, and systems. Frolov (2004) writes that the deterioration of general funds in the aviation industry is 51%. The rocket-space industry has strongly suffered as well. Between 1992 and 1998, there was an almost 9-fold decline in production volume and a 19-fold decline in investment. Russia is looking currently for closer ties with the western aeronautics sector in order to have access to technologies that Russian industry lacks.

The atomic industry is an aggregate of enterprises, research institutes and project-designer organizations based on radioactive ores, on production of radioactive materials, on development, production, repair, modernization and utilization of nuclear radiation reactor options, on equipment for atomic electrical power stations, and on utilization of nuclear weapons. In 2002 this industry employed 338,200 persons, but not all of them can be considered as scientifically qualified workers.

The structure of employment has changed with the rapid expansion of services in Russia. This expansion is responsible for the reorientation of young people with qualifications from technical secondary and higher educational institutions to business and management training of lower knowledge intensity.

V. Nikitin (2006) reports the current matching (level of coverage) between the graduates in Information and Communication Technologies (ICT) and industries' demand in these specialities in Russia. Amongst the 47 ICT areas of knowledge that comprise the base for statistical classification of professionals required in the specific ICT segment of the labour force,

17 have a coverage level fewer than 50% signifying a reluctant adaptation of the instruction system to industrial needs. Some of the most priority segments of demand, as specialists in "means of communication" and in "means of automation" are poorly covered. In contrast the coverage of demand in masters in "business computer sciences" is satisfactory. This indicates that Russia should develop the specialised instruction for sectors of knowledge-based services such as: "system administration", "information resources management and training", and "knowledge management".

The question is: how can the financial reserves and human and technological potential best be used in support of human development? One can use the reserves in shaping the fund for public scientific and innovative development, or as the fund for national technological agencies, for programmes of regional development, for petroleum investment trusts. The resources can also be used to support exports, to reduce the tax load on firms, or for the expansion of credit for development through the Russian bank.

LONG RUN DEVELOPMENT USING HIGH-TECH PROJECTS

The dynamics of scientific and technological development of the USSR were characterized by prominent gaps in the various fields and by the periods of relative inactivity. The capacity to concentrate efforts at critical times of national history, the will to achieve the victory that could be military or scientific, is at the origin of the significant progressions made in the 20th century. To rejoin this type of development, contemporary Russia, with its liberal economy, made up largely of private firms and banks, is testing new methods of provisioning the great investments required for risky knowledge-intensive projects, and supporting competition so as to improve quality in the introduction of scientific inventions into every sphere of activity.

Priority directions for science, technologies, and technical development were defined in 2002. Since that year many target programs were granted to be financed by the federal budget. In 2008 five main domains of concern have been carried out. Among these are in declining order in term of state's investment:

1. Infrastructural development, with reference to: new transportation technologies, culture, housing, the oceans, road safety, development of State statistics, socio-economic and ethno-cultural development of Russian Germans, social support for persons with disabilities, socio-economic development of Indigenous Peoples of the North, the social development of villages ;

2. Regional parities ;

3. Science, Innovation and Advanced technologies: the development of atomic-energy industrial complexes, the creation of an inventory of real estate, the national technological base, space program, global navigation system, the creation of highly effective systems to master geodesic sciences, development of civil aviation technology, the elaboration of priority areas for scientific and technical complexes, electronics, infrastructure for nano-industry ;

4. Security of livelihoods consists of such programmes as: environmental protection, prevention and combating socially significant diseases, comprehensive measures to counter drug abuse and illicit trafficking, ensuring nuclear and radioactive security, overcoming the effects of radiation accidents, risk reduction and mitigation of emergencies natural and technological, destruction of chemical weapon stockpiles, industrial utilization of arms and military equipment, development of penal system and judicial system ;

5. Integrating programmes for benefit of future generations: Russian children, education, Russian language, reformation of military education, and sport.

These target projects are instrumental in helping the country escape a demographic crisis and in the creation of a social security system true to the "historical and psychological traditions of Russia". Significant high-tech projects have an immediate positive effect because they employ a highly qualified workforce and they have a long run effect by increasing the demand for education, for new competences and qualifications, and for healthcare.

Besides such target projects the state finances, with the help of other financial facilities, certain projects within the framework of so called "critical technologies". The volume of the federal budget contribution to each project cannot exceed 50% of its expenditures. The list of "critical" technologies includes diagnostics and gene therapy, monitoring of the environment, technologies for the protection of nature, processing and utilization of technogeny, the synthesis of medications and food additives, life-support systems, bio-engineering technology, technologies for immune system correction, and the forecasting of biological and mineral resources. The tonality of these projects is rather different than that of target projects financed directly by the public investment funds. They support especially innovations related to life sciences, corresponding to the objectives of human healthy development.

THE KNOWLEDGE-BASED FINANCIAL SECTOR IN THE RESTRUCTURING OF THE ECONOMY

In this section are proposed some theoretical schema of development with restructuring, which would compensate that resting on state management of public Investment and Stabilization Funds. The background of my proposal is formed by the relationship between firm defaults and general economic dynamics that has been advocated for a long time in economic literature. This relationship was observed during recessions: during these periods firms have more difficulty in selling their products, their balance sheets are often damaged; the probability of failure increases, as well as the rates of credit offered by prospective lenders. Conversely, if the probability of failure of a firm increases, it has more difficulty in finding credit at low rates, which can increase the amount of regular reimbursements and reacts negatively on the firm's situation. This creates an accelerated movement towards default, with the usual consequences on employment, growth, and R&D.

At macro level, when the balance sheets of the companies in their large majority are surplus and support growth of production excessive compared to demand, the Regulator can impose deceleration and accept targeted bankruptcies of companies with low innovation intensity. To conclude such a policy of development with reorganization, it is essential to detect innovating companies and companies with various degrees of default risk.

In studies of default risks in relation to venture capital in innovating companies, one can use empirical data which contain information on the frequency of innovation and on particular aspects of the innovation process. This information comes, for example, from surveys on the subject of innovation in the companies, regularly carried out in Russia, and which gives information about the R&D expenditure (concerning products and processes), the sources of information and forms of collaboration used by the firm, the factors slowing down the innovation, and the degree of achievement of the objectives related to the innovation (share in firms' sales turnover). These data must be added to those used to calculate the scores of the companies reflecting their performance and quality of management, such as those published in "the Russian Economic Barometer" [4]: a ratio of the exploitation cycle, profitability, solvency, rate of debt, remaining stockholders' equity, structure of the assessment, treasury, liquidity, importance of doubtful debts etc. The sum of these data must be used to constitute the score of the companies, then to detect the homogeneous classes of them compared to the bankruptcy risk. Such empirical analysis would be important for detecting the average characteristics of the companies by class.

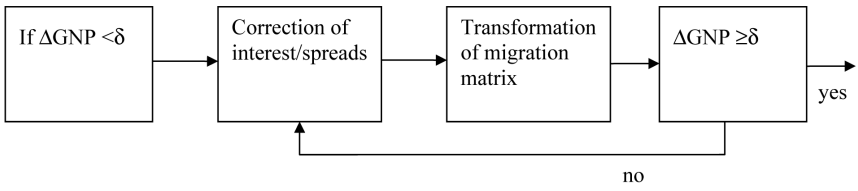
4. The Russian Economic Barometer; RAS, Institute of World Economy and International Relations.

The rating agencies can also report estimated summaries and histories of the risk evolution in the form of matrices of passage, ensuring information about the probability of the shift of one class of risk to another for different dates and for a certain collection of sectors. Such matrices of migration, having Markovian properties (Gagliardini, Gourieroux, 2005), can be used for a certain number of very important dynamic macroeconomic analyses: the assessment of bankruptcy risks as precursory indicators of reversal in the business cycles; the estimation of the systemic defaulting risk, i.e. simultaneous migrations of the companies with various degrees of risk in the same direction.

In our papers (Boussyguine, Peaucelle, 2004; Peaucelle, 2005) we explained the statistical methods of constituting the homogeneous classes of default risk, and procedures to analyse risk migration. Indeed, the revelation of causality bonds between the time series of bankruptcy risks for each class of risks and the time series of credit spreads for the same classes makes it possible to indicate the elements of the matrix of credit migration the most sensitive to the variations of the conditions of credit granting.

These empirical studies guide me in my consideration of the stabilisation of the complex innovation-production-financial system through the feedback management. Migration matrices characterise the "health" of the financial and the real economy (as a system). The pressures on them can be used to provide feedback on the components of whole output of the system [5]. I propose the regulation consisting of credit policy addressed to firms regarding the correlated trend of default risk, or regarding the general rate of economic growth. For example, in the case of growth-promoting industrial policy, the pressures, through credit, can be applied using the model presented in the following schema.

The output gap ΔGNP is the difference between the output levels considered necessary for the economy and the level of production that can be achieved with existing financial facilities. The gap is positive when actual output exceeds the economy's potential and negative when actual output is below potential output. A positive output gap is also referred to as excess demand and a negative output gap is referred to as excess supply.



5. Often analysed by backward-looking Markov switching model (Peaucelle, 1982).

The Regulator is concerned about both too much and too little output in the economy when either puts sustained up-grade or down-grade pressure on the risk default flight of firms. The transmission of Regulators' policy occurs in the form of changes in monetary conditions that affect the demand for credit. Lower interest rates tend to increase industrial activity. Conversely, higher interest rates tend to curb firms' spending. Strong demand for goods and services puts down-grade pressure on interest rates if it exceeds the economy's output. Thus, when the output gap is thought to be small and demand is seen to be increasing faster than potential output, the Regulator will act to tighten monetary conditions to promote production by modifying interest rates for firms belonging to certain classes of risk, revealed as sensitive by statistical analysis. Conversely, if the economy must be kept from over-heating, then the Regulator will be less likely to intervene, and monetary conditions will be modified later to control default trends.

Typically it is the Central Bank that carries out monetary policy. It does so by influencing short-term interest rates, i.e., by raising and lowering the target for the one-day rate. The one-day rate is the interest rate at which major financial institutions borrow and lend funds among themselves. The Central Bank sets a target level for that rate, called the key policy rate. Change in the target for the one-day rate influences other interest rates, including prime rates charged by commercial banks. When interest rates go down, firms are encouraged to borrow and produce more. But if the economy grows too fast, the Central Bank can then raise interest rates to slow down borrowing. This increases the probability of bankruptcy in low quality firms, and promotes restructuring.

I consider that banks are autonomous economic agents, satisfying the rules of Basle 2, which means they credit companies according to the degree of their bankruptcy risks, taking account of the discount rates of the Central Bank and pursuing the macro-economic objectives employment, growth, and inflation. Following these rules banks can help resolve the problem of risky investment and/or to fight against financial crises.

The Russian financial sector is weak in comparison, for example, with the financial sector of United States. Indeed, its parameters were in 2004 (International Financial Statistics. IMF.2004):

– Assets of banks represented 38% of GNP, (USA 94% of GNP)

– Credits of banks were 23% of GNP (USA 76% of GNP)

– Capitalization of stock market was 45 % of GNP (USA 137% of GNP)

– Liquidity of stock market (ratio of annual turnover toward market capitalization) was 18% of GNP (USA 128% of GNP).

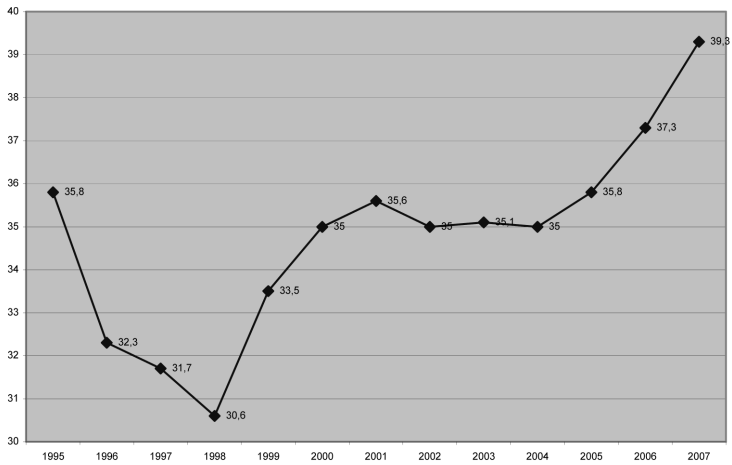
So far there are highly limited long-term financing proposals. Long-term loans in the credit of Russian banks do not exceed 15% of total loans despite a growing need of non-financial companies in attracting long-term resources for the implementation of investment plans. Russian banks have long-term liabilities on a scale of up to -3 per cent of GDP, which does not allow them to increase long-term lending without loss of stability.

Nevertheless, in recent years, a financial system of sustainable development has been inaugurated A law on the Development Bank was adopted in 2007; its equity capital was equal to US$ 10 billion. New funds were created: Russian Venture Company ($1.2 billion), Russian Nanotechnology Corporation (more than $ 5 billion), and Funds for reform of housing and communal services, with $10 billion.

Presently the large Russian banks are controlled by the state. New rules controlling the risks of banks and firms have been introduced, in particular, the rule of the determination of the volume of capital required for the reduction of the credit risk. Because of this requirement it becomes possible to calculate the risks of default of firms empirically, and to analyze their assumed dynamic, necessary for the model proposed in this section.

All these recurring financial innovations allowed the opening of an era of diversification in the Russian economy. The Moscow Centre for Macroeconomic Analysis and Short-Term Forecasting (Solntsev, 2008)) estimated the ratio [6] of commodities diversification, using data of 700 groups of products. Its evolution reveals significant production diversification for the last two years.

Graph. 5 – Evolution of diversification ratio of Russian economy: 1995 – 2007



Source: http://www.forecast.ru

6. The ratio of diversification is a inverse index of Herfindal-Hirschman

CONCLUDING REMARKS

Recent years have seen important economic growth in Russia, and a number of adjustments among industrial sectors, technological priorities, and in health and education areas. However, international competitiveness has remained concentrated in natural resource based sectors. I suggest that the natural resource rent has to be used for projects of long run sustainable human development improvement, and for the construction of knowledge-based financial systems able to control the restructuring now under way.

BIBLIOGRAPHY

AGHION PH., ANGELETOS G.-M., BANERJEE A., MANOVA K. (2005), *Volatility and Growth: Credit Constraints and Productivity-Enhancing Investment*, *MIT, Department of Economics*, Working Paper, 05-15.

AGHION PH., HARRIS C., HOWITT P., VICKERS J. (2001), "Competition, Imitation and Growth with Step-by-step Innovation", *Review of Economic Studies*, vol. 68, n° 3, pp. 467-492.

BEFFA J.-L. (2005), *Pour une nouvelle politique industrielle*, Compagnie de Saint-Gobain, Paris.

BOUSSYGUINE V., PEAUCELLE I. (2004), *Contrôler la croissance et la Restructuration*, W.P. CEPREMAP.

CŒURÉ B. (2008), « Faut-il avoir peur des fonds souverains ? », in *Hedge Funds, Private Equity, marchés financiers: les frères ennemis?*, (dir. B. Jacquillat), PUF, Paris.

FROLOV I. (2004), Фролов, И.Э. « Потенциал развития наукоемкого, высокотехнологичного сектора российской промышленности », *Вопросы прогиозирования*, n° 1.

GAGLIARDINI P., GOURIEROUX C. (2005), « Stochastic Migration Models », *Journal of Financial Econometrics*, 129 (1/2), pp. 139-182.

Government council of Russian federation (2007), *Основыне направления налоговой политики в Росийской Федерацни на 2008-2009*, Эаседание правительства Р.Ф. 2 марта.

KONOVALOVA I. (1972), Коновалова, И.П., *Проблема выбора отраслевой концепции зкономИкИ в развивающихся странах*, Диссертация на соискание стени кандидата зкономических наук, ЛҐУ. Leningrad.

MILOV V. (2006), Милов В., *Энергетика РоссиЮ источник роста и могущества или « самолет с одним крылом »*, http://www.forecast.ru.

NIKITIN V. (2006), Никитин, В.В., *Информационно-методическое обеспечение перечня формирования направлений и специалъностей в области информационно-коммуникационных технологий*, Москва МАКС Пресс.

OST (2004), *Indicators*, Observatoire des Sciences et des Techniques, Paris.

PEAUCELLE I., PEAUCELLE J.-L. (1978), *Les prix de revient dans la production de l'information*, Convention de recherche INRIA, n° 78054.

PEAUCELLE I. (1982), *Utilisation de la méthode d'adaptation dans l'estimation des taux de transition : exemple du système éducatif*, Couverture orange *CEPREMAP*, n° 8209.

PEAUCELLE I. (1999), "Intellectual Property Law and Technological Innovations : How does Russia stand to gain?", *Comparative Economic Research*, vol. 2., n° 2, Lodz Univ.Press, pp. 13-34.

PEAUCELLE I. (2004), "Quality of life and of health: Measures and subjective feelings at a national level", International conference *Modèles de Longévité, de Vieillissement et de Dégradation en Fiabilité*, Santé Publique, Médecine et Biologie, St. Petersburg, 7-9 June, Acts, t.1.

PEAUCELLE I. (2005), "Dynamic analysis of bankruptcy and economic waves", *PSE*, Document n° 2005-09

PUKHOV S. (2006), Пухов, С. *Платежный баланс: банки повернулись лицом к России*, Центр развития, Москва.

Science and Engineering indicators (2008), http://www.nsf.gov/statistics/seind08/

SOETE L. (2001), « L'impact de l'innovation, de la concurrence et de la réglementation sur la croissance : les enseignements récents de l'expérience européenne », dans *Institutions et croissance*, Albin Michel.

TULPANOV S. (1969), Тюльпанов, С.И. *Очерки политической экономии. Раэвивающиеся страны*, Москва.

ЦМАКП (2006), « Экономические итоги 2005 года », *Обзор макрозкономических тенденций*, n° 63, Центр макрозкономического анализа и краткосрочного прогнозирования, Москва.

World Bank (2007), Knowledge for Development program.