

FINANCIAL PRECONDITIONS OF THE TECHNOLOGICAL DEVELOPMENT OF AN ECONOMY

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Abstract. On the basis of a financial analysis of the technological sectors in Ukraine's economy, the author reveals financial preconditions for the change of technological orders. The article shows the limited character of the theoretical concept for the technological evolution of economic systems, which fails to hold true under the conditions of transition economy. Under the unstable conditions of transition economies, the technological advancement regenerates into its antipode, i.e. technological degradation of the production with a greatly financial basis. Due to the limited character of the existing market mechanisms, the author justifies the need to create a financial mechanism for technological development of the national economy with the use of state regulation.

JEL classification: G31.

Keywords: technological development, financial mechanism, statistical analysis, profit, profitability.

Reikšminiai žodžiai: technologinė plėtra, finansinis mechanizmas, statistinė analizė, pelnas, pelningumas.

1. Introduction

Directions and dynamics of industrial-technological development also are defined by a level of profitability of new technologies. Innovation changes of processing techniques became determining factors of modern economic development just because at a micro level their use results in growth of productivity and by that powerful increase of profitability of business is provided, that at a macro level transforms in strengthening national riches.

The establishment of market economic relation in the post socialist countries has aggravated a problem of technological development. Especially difficult this problem turned out for Ukraine, which economy is dominated with out-of-date technological

ways [Гець, В.М. 2009; Бажал, Ю.М. 2008; Шнипко, О.С. 2009]. Moreover, during the system crisis, which continued almost all last decade of the XX century, there was degradation, first of all, of those elements of productive forces which represent the high technology manufacture ownership to what specific gravity of a modern technological way of processing was catastrophically reduced. Present global financial and economic crisis has led to the further technological decline of industrial potential, an event on a background of proceeding washing away of financial assets from real sector of economy. Therefore the solution of a problem of reproduction of a technological way of manufacture at a modern level demands formation of the effective financial mechanism, capable to accumulate resources and to direct them to development of high-technology manufactures on a basis of commercialization of the saved up scientific potential.

Unfortunately, the financial mechanisms of the innovative-technological development which are realized in advanced economy, do not work in transformational economy, and, in particular, in the economy of Ukraine. So, despite of sharp necessity of maintenance of economic development on the basis of technological modernization of manufacture, the economic growth previous to expansion of global crisis, was based mainly on the basis of a favorable external conjuncture of the markets of the raw goods and production of a low degree of the processing made in the traditional and out-of-date technological ways with use physically and morally worn out equipment. Thus structural problems of economy went deep, disproportionality of distribution of resources for the benefit of not high-tech industries, an exhaustion of resources of high-technology manufactures. Stimulus to technological development of economy have been undermined, that in a result and has served as the reason of deep falling of a national economy with the beginning of global financial and economic crisis.

2. Statement of a problem.

In this respect a scientific problem of the analysis of financial preconditions of development of technological sectors of the domestic industry with the accumulation of financial resources and their transformations into a source of modernization appears. So, the purpose of our research is the exposure of the characteristics of the financial mechanism of technological changes in the structure of industrial production of Ukraine, in particular, finding-out of the following aspects: what is the structure of income and profit distribution between the enterprises of various technological sectors of industry and its connection with to the technological development of economy;

- how are the levels of profitability are differentiated;
- how are the own financial resources are distributed between technological sectors and whether these resources are enough for realization of modernization of manufacture.

3. Methods of research.

To answer the questions above the system statistical analysis of the basic financial parameters of the enterprises of the industry of Ukraine, grouped by technological sectors has been carried out. The grouping was carried out according to the criteria established by the Organization of Economic Co-operation and Development [OECD]. It is important to note, that such grouping actually coincides with classification on technological ways [Бажал, Ю.М. 2008].

4. Results of research.

The analysis of financial results of activity of the enterprises assumes an estimation of parameters of pure proceeds, profits, losses, etc. In particular, statistical supervision over dynamics of the net income of the industry of Ukraine over 2001-2008 testify, that it was growing in the actual prices as in manufacturing industry as a whole and by technological sectors is particular. So the net income of a manufacturing industry have grown 5,1 times, including high-technology manufactures—2,2 times, medium-high-technology—8 times, medium-low-technology—6,2 times, low-technology—4 times (fig. 1). As follows from the submitted data, during the period of supervision of the manufacturing industry of Ukraine, the net incomes was growing mainly in medium- and low-technology manufactures, whereas dynamics of change of the net income high-technology lagged behind by 2-3 times from other technological sectors. Taking into account that the net income of the enterprises of a manufacturing industry is formed basically due to industrial activity and is a source for capital financing in technological upgrade of the manufactures, it is possible to ascertain the following:

- volumes of net incomes medium- and low-technology manufactures dynamicaly grow, that allows to provide development of these technological sectors, to increases their industrial capital (including the basic and working capital);

- volumes of net incomes of the high-technology enterprises cover only current expenses necessary for maintenance of existing manufacture. Insignificant growth of incomes of the high-technology enterprises does not correspond to requirements of resource maintenance of their expanded reproduction and technical perfection.

The structure of the net income of the industry consists mainly of incomes of a manufacturing industry which share during 2001-2008 changed within the limits of 63-76%. In turn, net incomes of a processing industry include incomes of manufactures of different technological sectors. So, in 2001 the greatest densities made medium-low-technology manufactures (41%), then - low-technology from shares of 36%, medium-high-technology from 18%, high-technology manufactures - only 5%. The next years there were essential shifts in technological structure of the industry in a direction of increase in a share of net incomes medium-low-technology manufactures up to 49% in 2008 and medium-high-technology—up to 21% whereas the share low-technology and high-technology manufactures was reduced up to 28% and 2%, accordingly. Thus, in

distribution of net incomes of a manufacturing industry deterioration of proportions owing to reduction of densities of high-technology branches and expansions of a share of a medium-technology segment is observed. Thus reduction of densities low-technology a segment of a manufacturing industry became consequence of replacement with internal and the world market of production of final consumption of a domestic production (furniture, textiles, clothes, footwear) under pressure of an aggressive competition of foreign manufacturers, a stream of smuggling and understating of customs cost of the imported goods [Міністерство економіки України].

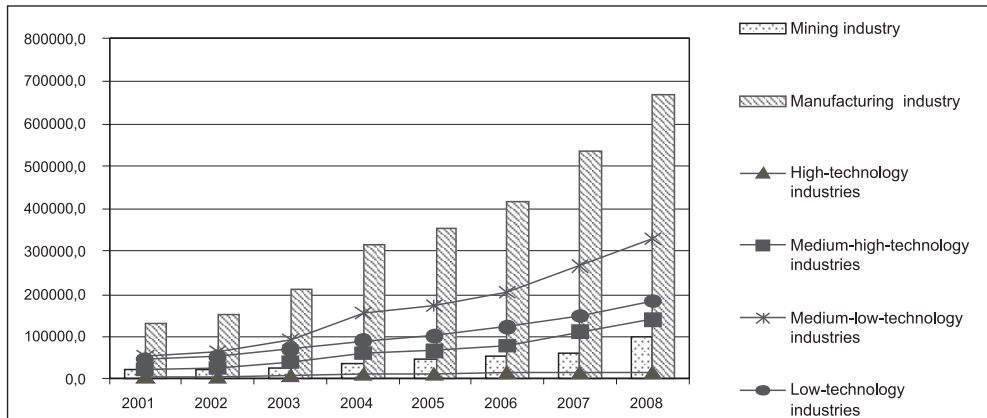


Fig. 1. The net income in the current prices of the industry of Ukraine and a manufacturing industry on technological sectors for 2001-2008 (UA Hryvnia mln) (Source: It is made on the data of the State committee of statistics of Ukraine)

Structural degradation of economy of Ukraine is predetermined not only reduction of densities of high-technology manufactures, but also decrease research and development (R&D) intensity the industries as a whole. In particular, R&D expenses counting upon one hryvnia of the net income in a manufacturing industry were reduced about 2,6% in 2001 up to 2,0% in 2008 (table. 1). The given reduction has been caused by sharp decrease R&D intensity medium-high-technology sector about 3,5% up to 2,1%, including R&D intensity such kinds of activity, as manufacture of machines and the equipment—about 4,8% up to 3,3%, manufacture of railway and tram locomotives and a rolling stock—about 5,8% up to 1,8%, chemical manufacture (without pharmaceutical) —about 1,4% up to 0,6%, manufactures of automobiles—about 0,5% up to 0,1%.

The common level R&D intensity initiating structure technological sectors of the domestic industry is much lower than in the advanced countries of the world and the Russian Federation (tab. 1) that testifies to prevalence of out-of-date processing technique in branches traditional for a national economy. For example, in such kind of activity as metallurgical manufacture which gives over 32% of the net income of a processing industry, till now prevails out-of-date technology of melt became a martin method with high capital -and energy intensity, low productivity.

At the same time, high-technology branches of manufacture of the Ukrainian industry increased intensity of expenses for R&D. So, if the average level of expenses during 2001-2008 made 18,9% in 2008 it has exceeded 22,2%. Among high-technology manufactures the some enterprises intensified expenses for R&D. It enterprises of such kinds of activity, as construction of aerospace devices where the level R&D intensity in 2008 has achieved 34% at average for the period of supervision of 23%; manufacture of medical devices, exact measuring devices where rates of growth of specific expenses for R&D have exceeded 530% for the period of 2001-2008 and is kept a maximum level R&D intensity among all kinds of industrial activity - on the average 40%; manufacture of the equipment for radio, TV and communications where specific expenses for research and development have increased in 1,5 times and have achieved a level of 13%. Average intensity of expenses for a R&D of domestic high-technology manufactures appreciably exceeds similar parameters of EU and other countries (tab. 1). It is possible to explain this phenomenon a low degree commercialization a scientific product in Ukraine—many developments of the Ukrainian scientists are in demand the foreign companies and take root abroad earlier, than in the country as in national economy innovative activity is constantly reduced.

However, separate kinds of high-technology manufactures of Ukraine have reduced specific expenses for a R&D that is predetermined by strengthening of technological dependence of national manufacturers from import technologies, means of production, materials and accessories. So, the level of corresponding expenses in manufacture writing and computers has decreased from 41% in 2001 up to 14% in 2008, in manufacture of pharmaceutical preparations—from 1,5% up to 0,9%, accordingly. It is necessary to note, that on an actual level R&D intensity the pharmaceutical branch of Ukraine corresponds to criteria of low-technology manufactures. In Ukraine the most part of medical products is issued under licenses of the foreign companies or are generics, i.e. the analogues of original preparations which are not having patent protection, moreover and are made from import substance.

Table 1. R&D intensity a manufacturing industry on technological sectors in Ukraine and other countries of the world (percent)*

	2001	2005	2006	2007	2008	An average level for 2001-2008	Russian Federation	EU	USA, Japan, South Korea, etc.
Manufacturing industry	2,6	2,1	1,6	1,7	2,0	2,0			
High-technology industries	14,6	19,7	16,7	18,0	22,2	18,9	23,9	12,4	9,6
Medium-high-technology industries	3,5	2,9	2,1	2,1	2,1	2,5	9,1	3,9	3,2

	2001	2005	2006	2007	2008	An average level for 2001-2008	Russian Federation	EU	USA, Japan, South Korea, etc.
Medium-low-technology industries	0,5	0,7	0,6	0,7	1,1	0,7	2,3	1,4	1,6
Low-technology industries	0,1	0,1	0,1	0,1	0,1	0,1	1,0	0,5	0,6

**It is calculated on the data of the State committee of statistics of Ukraine; [European Commission]*

Supervision over profit of the industry of Ukraine testifies that in dynamics the tendency of its growth prevailed, having discrete character - the period of fast increase in its volumes during 2002-2007 in 2008 was replaced by its reduction (fig. 2). Processing branch earns main share of profit of industries, however in 2008 densities of last was reduced, at the same time share of the profit of a mining industry was doubled. Hardly probable not a major factor of shifts in branch distribution of profit of the industries there was a rise in prices on raw production of the mining branch, exceeded a price index on production of a manufacturing industry, that in turn, has provoked recession of profits in branches of primary processing mineral raw material. So, profit medium-low-technology manufactures which traditionally form over half of total amount of the profit of a processing industry, in 2008 was reduced to 13% in comparison with the previous period exactly of a case to reduction of the profit of the enterprises of metallurgy, on manufacture of metal products and other mineral products. The profit of medium-high-technology and low-technology sectors approximately equally form from 12% up to 17% of the cumulative profit of a manufacturing industry. In 2008 the tendency of the last years to growth of profits of these technological sectors has proceeded only in medium-high-technology manufactures, and the low-technology enterprises have received the profit on 15% less, than in 2007. In particular, at the enterprises of the textile industry and tailoring there was a landslide reduction of volumes of the profit (on 47%) under influence of the unequal conditions of a competition created by the state in a home market for activity of national manufacturers in comparison with foreign competitors, and also realizations of the unreasoned tax policy resulted in an inefficiency large goods of the enterprises of branch in comparison with small business [Рапопорт, Г.; Герц, А. 2009].

In a manufacturing industry of Ukraine the high-technology enterprises receive the least volume of the profit which share in a total volume tends to reduction. So, its densities was reduced from 4,7% in 2002 up to 1,1% in 2008, or to 3,6%.

The demonstrated analysis of dynamics and structure of distribution of the profit, as a financial basis of self-financing, gives the basis to assert, that the enterprise of an mining industry and primary processing of mineral raw material possess the big financial potential for development whereas the enterprises on production of deep processing and final consumption, and especially technologically difficult production with a high share of the added cost, suffer from lack of own means and consequently

independently are not capable to carry out the expanded reproduction on a progressive technological basis.

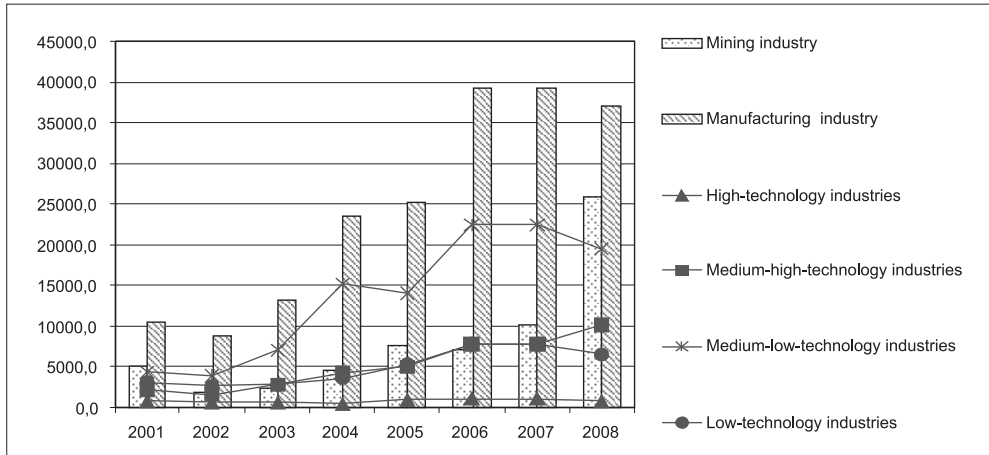


Fig. 2. Profit on usual activity up to the taxation of the industry of Ukraine on branches and technological sectors (UA Hryvnia mln) (Source: It is made on the data of the State committee of statistics of Ukraine)

The industry of Ukraine has the profitability providing break-even of activity though its level considerably varies in branches (fig. 3). So, the mining industry has high level of profitability of production, where during 2001-2008 it kept on the average on a mark of 17,0% whereas level of profitability of production in a manufacturing industry was lower more than twice and made only 7,9%.

In a processing industry the significant differentiation of levels of profitability of production, as on technological sectors, and by kinds of economic activities is observed. For example, concerning high profitability is inherent medium-low-technology to kinds of activity (on the average 8,8%), especially that make production with a low degree of processing (metallurgical manufacture—10,1%, manufacture of nonmetallic mineral products—11,9%). The mid-annual level of profitability of production of a high-technology segment of the industry in 2001-2008 made 8,4% that is high enough value for a manufacturing industry. Nevertheless, in aggregate high-technology manufactures wide scope of a variation is observed. So, individual values of profitability of production of some kinds of economic activities it is less average group than values, namely: the level of profitability of manufacture writing and computers makes 4,0%, manufactures of medical devices, exact measuring devices, optical devices and hours—5,8%, manufactures of the equipment for radio, TV and communications—7,4%. Individual levels of profitability of the aerospace industry and pharmaceutical manufacture exceed middle-group parameters and make 8,6% and 12,8%, accordingly.

In group of kinds of the activity belonging to a category medium-high-technology, profitability of production varied at a level of 8,2% in 2001-2008. In the smaller side from average group a level profitability of manufacture of automobiles deviated

for 5,9%, manufactures of railway and tram locomotives and a rolling stock for 7,5%, manufactures of machines and the equipment for 7,9% . As against these kinds of activity, chemical manufacture (9,6%) and manufacture of electric machines and devices (8,6%) have high profitability of production.

Among technological sectors the low level of profitability of production is inherent in low-technology manufactures—on the average 6,2%. In this group significant scope of a variation—from 4,2% in manufacture of furniture up to 8,8% in pulp and paper manufacture and publishing is observed. In the center of the designated interval there is a profitability such kinds economic activities, as manufacture of a leather and products from a leather and other materials with a level of profitability of production in 4,4%, textile manufacture and manufacture of clothes—5,1 %, manufacture of foodstuff and tobacco products—6,2%, wood industry—6,6%.

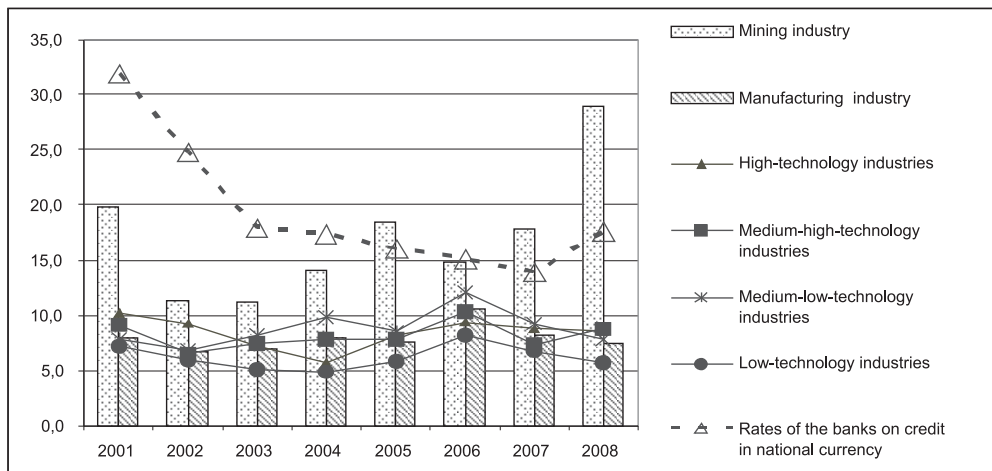


Fig. 3. Profitability of realization of production of the industry of Ukraine on branches and technological sectors and credit rates of banks of 2001-2008 (percent) (Source: It is made on the data of the State committee of statistics of Ukraine)

On all versions of factor of profitability of the capital, its level in industries of Ukraine varies over a wide range (fig. 4, 5, 6). So, during the period of supervision profitability of the cumulative capital of a processing industry changed from a minimum level—4,8% in 2002 up to maximal—10,7% in 2006. Changes of a level of profitability had non-uniform, wavy character. At the same time, profitability of a mining industry gradual increased from 3,1% in 2001 up to 18,9% in 2008. Break between values of this parameter in manufacturing and a mining industry in 2008 has reached triple size. Taking into account that among branches of a manufacturing industry on a level of profitability the manufactures engaged in primary processing of minerals are in the lead, and also adjacent manufactures with mining industries (first of all metallurgy and manufacture of nonmetallic mineral products), it is possible to draw a conclusion on financial conditionality of a natural-raw bias of structural shifts in a national economy.

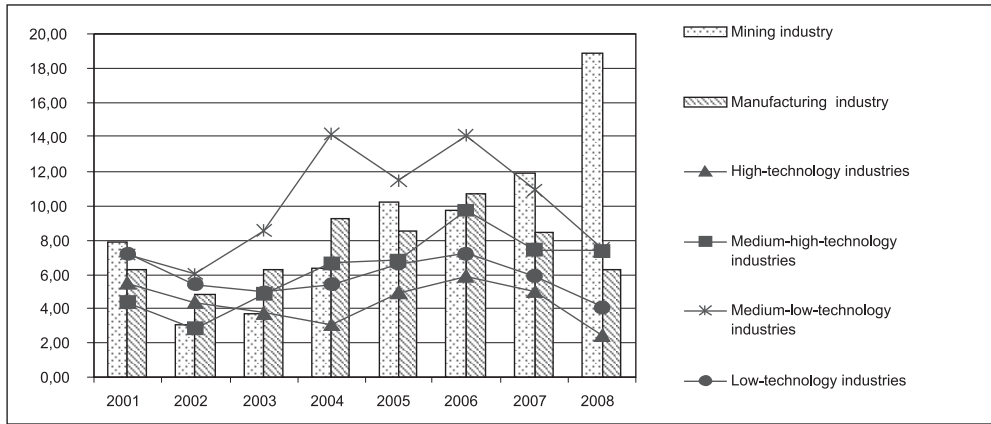


Fig. 4. Profitability of the cumulative capital of the industry on branches and technological sectors for 2001-2008 (percent) (Source: It is made on the data of the State committee of statistics of Ukraine)

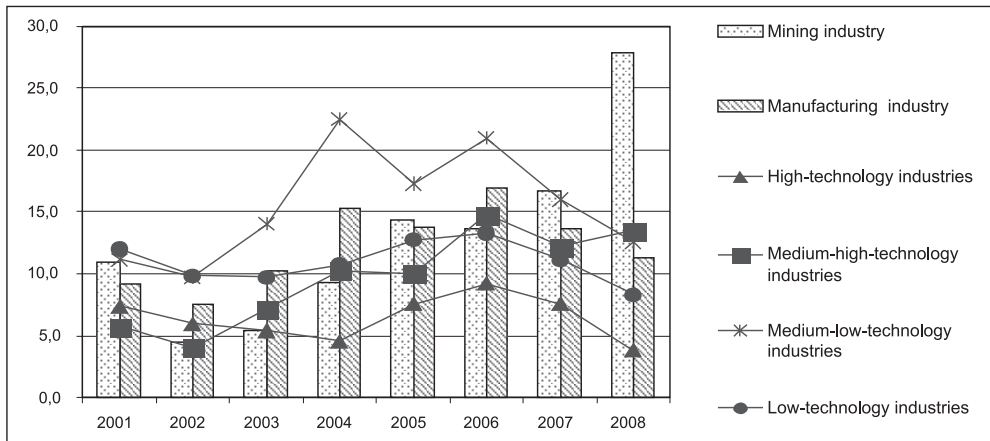


Fig. 5. Profitability of a fixed capital of the industry on branches and technological sectors for 2001-2008 (percent) (Source: It is made on the data of the State committee of statistics of Ukraine)

The variation of levels of profitability of medium-high-technology manufactures is close to average indices on a processing industry. In this group of manufactures stratification of levels of profitability amplifies. So, in 2008 profitability of the cumulative capital of manufacture of automobiles has made 1,7%, manufactures of machines and the equipment—5,8%, manufactures of electric machines—7,1%, chemical manufacture—10,8%, manufactures of railway locomotives and a rolling stock—11,3%. The differentiation of profitability is predetermined, in particular, by specific requirements of WTO to an openness of a home market of Ukraine, whence automobiles, machines and the equipment of a domestic production almost are completely superseded.

The investment demand for machines and the equipment for the industry is supported by necessity of technical maintenance of expansion of manufactures mining, power, metallurgical, the food industry and other branches of economy of Ukraine. Nevertheless, modernization of a significant part of the enterprises occurs by replacement of the out-of-date and worn out equipment by import machines and the equipment for the reason that national manufacturers are involved in a nonequivalent exchange and lose profitability.

Level of profitability low-technology manufactures in Ukraine rather low in spite of the fact that at them a low organic structure of the capital. So, in 2008 profitability of the cumulative capital in this technological group was equaled 4,1% whereas in a manufacturing industry as a whole in one and a half time was higher and made 6,3%. Growth of profitability of such branches as the food industry (which level of profitability made 4,2% in 2008), wood industry (2,2%), textile manufacture (2,4%) and leather manufacture (2,1%) restrains insufficiency of a raw-material base.

Profitability of the capitals enclosed in high-technology manufacture, essentially below the average level, existing developed in a manufacturing industry. So, if profitability of the cumulative capital in a processing industry made 6,3% in 2008, in high-technology manufactures—only 2,4% or in 2,6 times are less. A principal cause of it is rather high level of an organic structure of the capital, a long cycle of manufacture and the turnover of advanced means. Besides for national economy low congestion of capacities of the high-technology industries is characteristic, arisen by reason of replacement from commodity markets of domestic high-technology production and grows out «new cold war» in sphere of economy [8]. For example, the park of machines of the Ukrainian air carriers consists mainly of planes of foreign manufacture, used and got on reduced prices under leasing contracts. So, inter-branch distribution of profitability of capitals in the industry of Ukraine has developed not for the benefit of high-technology manufactures that radically contradicts global tendencies.

Comparison of values of profitability of own capital of the industry of Ukraine with the rate of refinancing established by national bank during 2001-2008, shows, that some kinds of manufactures have reached a level of profitability of own capital surpassing the rate refinancing (fig. 6). The number of such branches recently included a mining industry (where profitability has reached 28% in 2008 whereas the rate of refinancing made 15%). Manufactures of a processing industry periodically reached rather high profitability (especially medium-low-technology during 2003-2007, and low-technology and medium-high-technology in 2006-2007), but in 2008 the former level of profitability of branch has fallen below the rate of refinancing. The analytical data testify to instability of a financial condition of the enterprises of the industry, the limited availability of credit resources to this sector of economy and discrepancy of a state policy of monetary and credit regulation to problems of development of a national economy.

Comparison of parameters of profitability of own capital with depositary rates of banks as reference points of a minimum level of profitability, testifies, that during many years is kept the negative tendency of low efficiency of use of the capital of high-tech-

nology manufactures. For example, in 2001-2008 the average level of profitability of own capital of high-technology manufactures made 5,3%, fluctuating in limits from 3,5% per 2008 up to 8,0% in 2006 whereas rates of banks under deposits in national currency on the average made 8,5% and did not fall below 7,1% (2003) . Backlog of profitability of own capital of high-technology manufactures from a level of the depositary rate made 1,6 times. Thus, in Ukraine high-technology industries till now provided smaller profitability, than storage of means on the depositary bank account. Besides, market financing as, by the settled tendencies, its future efficiency and opportunities of returning of the involved means are unpromising is inaccessible to the enterprises of high-technology sector of the industry. At such level of profitability to invest in development of manufacture and an innovation it is not favorable, that is why the capital is deduced from manufacture and economic growth does not occur.

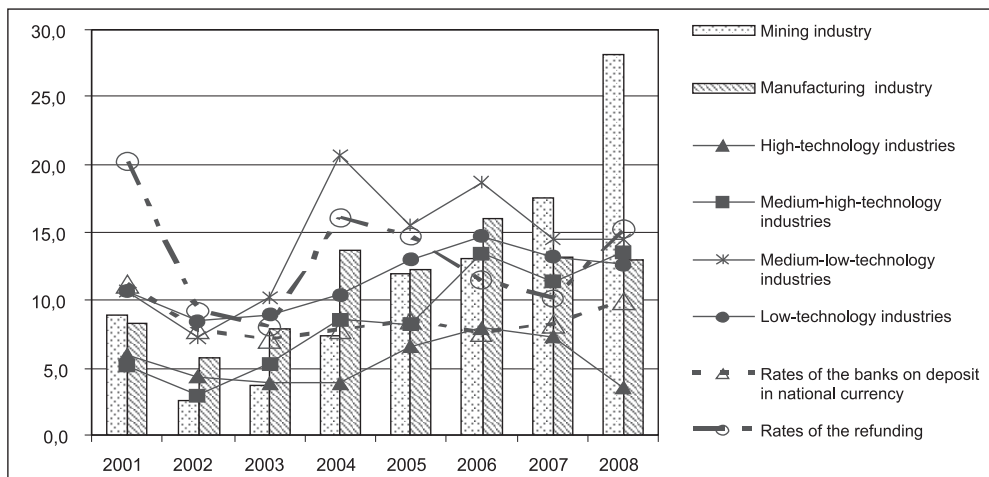


Fig. 6. Profitability of own capital of the industry on branches and the technological sectors, separate parameters of activity of bank system of Ukraine for 2001-2008 (percent) (Source: It is made on the data of the State committee of statistics of Ukraine)

Besides, at a present level of profitability of production of the enterprise of processing industries are practically deprived accesses to credits. The enterprises cannot use bank loans under rates of 14-22% whereas their own profitability in the best years hardly exceeded 12% (fig. 3). In conditions of crisis the problem of availability of credits was extremely complicated. Taking into account, that the basic source of investments into the industries there are own means of the enterprises the credit policy sold in Ukraine, excludes an opportunity of modernization of national manufacture and its translation into an innovative way of development.

Distribution of average indices of profitability of own capital of a manufacturing industry of Ukraine between the technological sectors, developed in 2001-2008, is characterized by their rather high values in medium-low-technology and low-technology manufactures (14,0% and 11,5%, accordingly) and low—in medium-high-technol-

ogy and high-technology manufactures (8,6% and 5,4%, accordingly). Long supervision over a productive attribute allows speaking about the steady statistical tendency in proportions of its distribution.

5. Conclusions

This financial analysis of technological sectors of the industry of Ukraine does not confirm general character of the theoretical concept of technological evolution of economic systems. The concrete analysis has shown that the positions of the concept concerning expansion of financial preconditions of change of technological ways are not realized in conditions transformational economy of Ukraine. Forward process of technological progress in actable conditions transformational economy regenerates in the contrast—the technological degradation of manufacture having substantially a financial basis. Financial preconditions of technological degradation are mirror opposite to what determine technological progress, namely: new technological ways, by definition being technologically difficult and capital-intensive, not having reached the exuberance, lose capitals during transformation of economic system;

- the price conjuncture changes—cost raw and material energy resources grows much faster, than cost of end production that does their inaccessible to national manufacturers;
- cost of manufacture of high-technology production grows, and profitability is reduced;
- technologically difficult manufactures lose own means that causes absence of the internal investment resources necessary for technical perfection of manufacture;
- Negative dynamics of profitability pushes away investors, strengthening deficiency of investment resources and dooming the enterprises on disappearance.

Thus, low rates of innovative-technological development of economy of Ukraine are predetermined by disproportions in distribution of profitability between the technological sectors of the industry interfering duly redistribution of financial resources in development of high technologies and brakes progressive structural shifts in economy. Proceeding from an inter-branch variation of a level of profitability as the indicator of ability of the enterprise to create new cost and also to finance the expanded reproduction and to involve investments, prospects of development of technological sectors of the industry of Ukraine are built in such sequence: a mining industry and processing of mineral raw material; medium-low-technology manufactures, medium-high-technology manufactures, low-technology manufactures, high-technology manufactures. Proportions of levels of profitability of branches and technological sectors of the industry in Ukraine do not give positive signals to the market which could stimulate having poured economic resources in high-technology manufactures and to lead to a progressive structural structure of economy. Therefore for achievement of progressive technological shifts in economy it is not necessary to hope for realization of market

mechanisms, and it is necessary to create the financial mechanism of technological development of a national economy with the help of levers of state regulation.

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FINANSINĖS EKONOMIKOS TECHNOLOGINĖS PLĖTROS PRIELAIIDOS

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Santrauka. Ukrainos ekonomikos technologinių sektorių finansinės analizės pavyzdžiu autorė atskleidžia finansines technologinių pokyčių prielaidas. Parodomas vyraujančios tų pokyčių sampratos ribotumas taikant pereinamojo laikotarpio ekonomikoms. Dažnai kintant pereinamųjų ekonomikų sąlygoms technologinė pažanga dėl finansinių išteklių stygiaus neretai sukelia technologinį gamybos nuosmūkį. Autorė patikslina naujos finansinės sistemos kūrimo poreikį. Tai padėtų nagrinėjama atvejais įveikti esamus rinkos trūkumus.

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