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Theoretical Comprehension of the Role of Transport in Ensuring Long-Term Economic Development

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ABSTRACT

The objective of the study described in the article is to develop a theoretical basis for assessing the long-term impact of transport on economic development in the context of a consistent decrease in transport costs. At the same time, transport costs are proposed to be considered considering the risks of loss of goods during transportation and violations of delivery times, as well as damage to the goods owner from blocking of the capital embodied in the product during its transportation.

Using deductive method in economics, a theoretical model of influence of transport costs on production and sale of goods is proposed, based on which it is concluded that reducing transport costs is a catalyst for economic growth, launching long-term interrelated processes of expanding the geographical area of sales of goods and ensuring growth in volumes, scale, and production efficiency. In contrast, lack of significant progress in development of transport and persistence of high transport costs contribute to conservation of the technical and technological situation and low production efficiency. Based on examples from economic history and modern practices, using methods of statistical analysis and technical and economic calculations, it is shown that the proposed model is consistent with empirical data.

Based on the developed model, recommendations were formulated regarding the directions of transport developments desirable for ensuring economic growth. In particular, the need for development of heavy traffic on railways is revealed that will serve to reduce the cost of transportation of relatively inexpensive goods and expand the possibilities for their delivery over long distances, as well as for high-speed transportation for expensive goods that are sensitive to delivery time. Attention is focused on importance of creating an appropriate transport infrastructure and the need to unite the efforts of the state and business for this purpose, contributing to development of transport infrastructure through both institutional instruments and budget investments within the framework of private-public partnership projects.

It is concluded that commodity exchange (trade and transport) is a significant factor in economic development, stimulating an increase in production volumes and efficiency. Therefore, economics should not be built «around production» or «around exchange» but proceed from their interaction and the active role of both of these spheres in the process of economic development.

Keywords: transport, economic growth, interregional trade, transport costs, transportation distance, scale of production, innovation.

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For the original Russian text of the article please see p. 6.

Background. The importance of economic exchange, based on the use of advantages in production of certain goods, for specialization and economic efficiency growth was shown by Adam Smith [1, pp. 69–82; 443–445]. It is not by chance that J. Mokyr calls the component (type) of economic growth based on expansion of exchange, beneficial for all parties involved, the Smithian growth [2]. C. Menger [3] and F. A. von Hayek [4] emphasized the productive nature of exchange: an increase in the value of goods because of exchange is tantamount to creating a new material good, and therefore exchange is no less important for economic growth than production.

The most significant increase in the value of goods is often achieved during international (interregional) exchange, when its participants are separated by considerable distances, and the economic features of production, sale and consumption of goods differ significantly. According to E. Helpman, confirmed by the analysis of economic history from ancient times to the present day, historical data show that trade between distant trading partners and the economic development were complexly interrelated and that this trade played a major role in historical development of the world economy [5, p. 12].

Theory of international trade, whose foundations were laid at the beginning of 19th century by D. Ricardo [6], and development was ensured at the beginning of 20th century by E. Heckscher [7] and B. Ohlin [8], emphasizes the determinant role of the production features in the regions between which commodity exchange is carried out: the comparative labour costs for production of certain goods (for Ricardo), relative endowments of the factors of production (for Heckscher and Ohlin). But the economic characteristics of the transport and logistics arteries of goods movement are also particularly important within the chain of commodity exchange. First, these characteristics determine costs if transportation, where the following components can be distinguished:

• Direct costs of transportation of goods (freight and other rates).

• Risks associated with a possibility of goods loss or damage during transportation, as well as risks of later delivery of goods to the recipient.

• Implicit costs of the owner of goods associated with blocking of the capital embodied in the transported goods during the delivery period, depending on speed and distance of transportation.

Secondly, transit capacity and quality characteristics of the transportation routes determine both the potential of total volumes of goods available for transportation, and their possible range.

In the theory of international trade, transport costs are considered when calculating the coefficients of the so-called «gravity equation» proposed by J. Tinbergen [9] and allowing to estimate the volume of trade between two countries depending on several factors. In this model, transport costs act as obstacles to international trade. With an increase in transport costs, the range of non-tradable goods produced exclusively for local consumption is expanding [5, p. 49], which means that opportunities for regional specialization and the use of comparative advantages are restrained.

It seems that considering the role of transport in commodity exchange processes only as of a cost source that forms barriers to trade and restrain opportunities for economic specialization does not allow us to adequately comprehend its real significance for economic development. Although transport costs can certainly be regarded as a kind of «friction» in the exchange system, transport is not a barrier, but a material basis for its implementation. The aforementioned productive nature of exchange at any significant distances can be realized only with the help of mainline transport. The active role of transport in stimulating economic development, shaping the era of modern economic growth has been noted, based on empirical analysis, in a number of works, in particular, in [10–15].

A theoretical comprehension of the role of transport in improving the welfare of society, creating consumer surplus is presented in the classic work of Jules Dupuit [16]. Dupuit's approaches were developed in work [17], where it is shown how creation of interregional transportation, which makes it possible to specialize production in each region, forms not only consumer surplus, but also the manufacturers' surplus.

Trade effects comprise particularly the effect of diversity, associated with the possibility for a consumer to choose from a wider range of goods [18]. In work [19], based on a

theoretical model, it is shown how expansion of the assortment of goods, achieved through opening of transportation links, increases production volume and consumer surplus.

Despite the presence of a significant body of works, revealing certain aspects of the impact of transport on economic growth and social welfare, the role of transport in ensuring long-term economic development requires in-depth theoretical comprehension. The *objective* of this study is to identify, using deductive method in economics, the essence of influence of progressive development of transport and reduction of transport costs on the change in production volume and prices of goods, as well as on increasing the scale and technical and technological level of production, and, thereby, on reducing production costs. This approach allows us to show the active role of transport in long-term stimulation and maintenance of economic growth, and the dynamic nature of consideration of transport costs makes it possible to look at them from a new perspective: if statically transport costs are just a barrier to trade and economic growth, then in dynamics, *decreasing* transport costs are an incentive to increase production volume and expand the geography of sales of goods, reduce market prices and increase consumer welfare. It is important to note that, while reducing *unit* costs of transportation of goods, their *total value* in the long run grows [20]. As shown in [21], this indicates not an increase in the «transport load» on the economy, but that transport costs, replacing, due to recombination of production resources in the process of regional specialization and interregional exchange, a more significant value of other types of costs, contribute to the growth of economic efficiency.

The *methods* of historical and statistical analysis as well as technical and economic calculations were used to demonstrate consistency of the formed theoretical model with economic practices.

Theoretical model of influence of transport costs on production and sale of goods

The influence of reliability of transportation and of the value of transport costs on production features and sales of goods can be revealed using the following model.

Let a product be produced in a certain region (Region 0) and technically can be delivered to other regions (1, 2, 3, etc.).

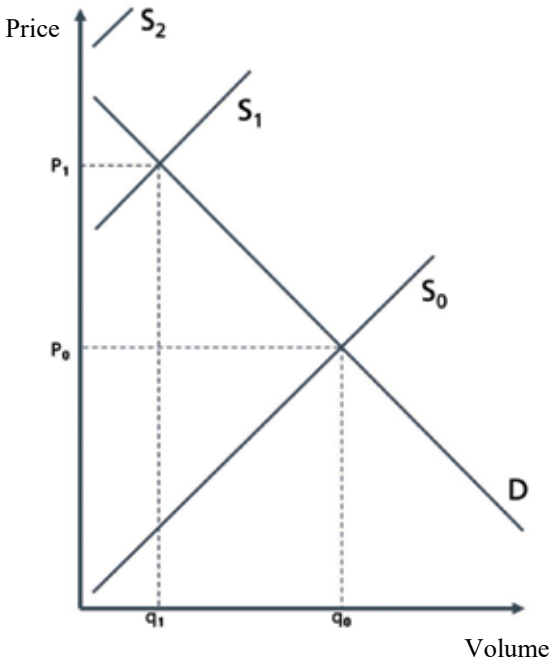
The demand curve for the product (D) is the same in all regions (this condition is not essential and is taken for a better visualization; with differences in demand curves in the regions, the conclusions will not fundamentally change).

Production in Region 0 is used primarily to meet demand in the region. In the absence of transportation links, the production volume will be q_0. When transportation links are created, additional volumes of goods are produced for delivery to other regions. This condition, as well as the amount of transport costs, determines the nature of supply curves in regions 1, 2, etc. (Transport costs, as mentioned above, consider not only the cost of transporting goods, but also possible losses associated with non-safety of goods and non-respect of delivery times, or corresponding insurance payments, as well as damage to the goods owner from blocking of working capital, embodied in a product, during transportation, and whose evaluation methodology is described in [22]. Thus, reduction of transport costs is influenced not only by direct reduction in the cost of transportation, but also by an increase in transportation reliability and speed).

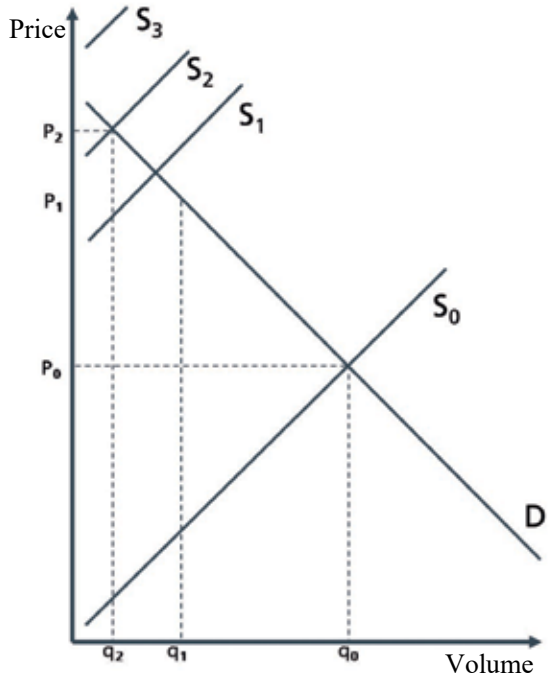
Supply curves in different regions shift upward with increase in distance from the region of production, sales volumes are, accordingly, lower than in the region of production, and prices are higher.

With a high level of transport costs (Pic. 1), supply prices in remote regions are significantly higher than in the production region. The geographical area of sales with the considered combination of supply and demand characteristics will be limited to Region 1. In Region 2 and more remote regions, the product will no longer be in demand: although there is demand for it and delivery is technically possible, supply curves lie above the demand curve. Thus, the high level of transport costs limits both the geographic area of sale of goods and the volume of sales. Accordingly, the volume of production is also limited (in this case, it will be $q_0 + q_1$). In conditions of limited sales, organization of mass production is impossible, which is a constraint for introduction of innovations, and production costs are high, which is reflected in «steepness» of the supply curve in the production region.

A significant reduction in transport costs shifts the supply curves downward in remote

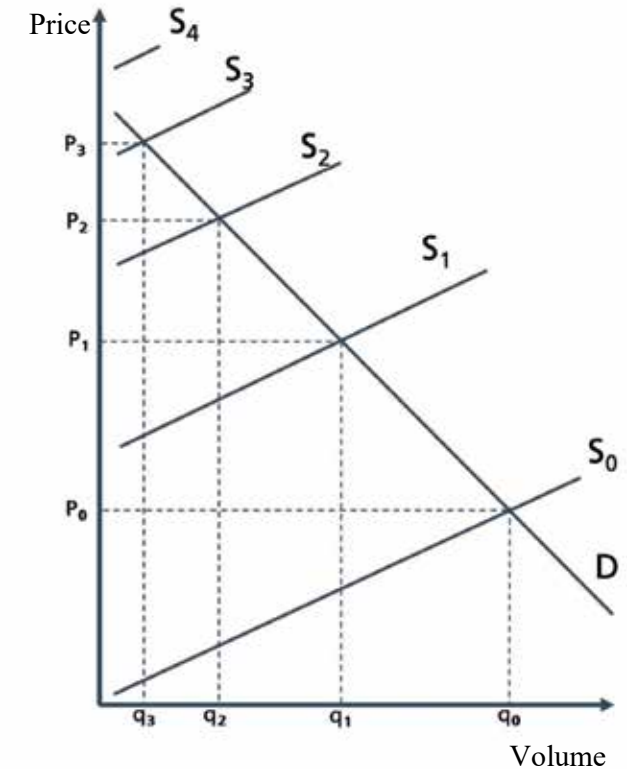


Pic. 1. The influence of transport costs on the sale of goods to remote regions.



Pic. 2. Changes in market characteristics under the influence of reduced transport costs in a short term.

regions (Pic. 2). As a result, the geographic sales area of the product is expanding, and the sales volume increases as well in those regions where it was sold earlier. Accordingly, the total volume of production increases, as do total producers' profits and effects received by consumers («consumer surplus»). In other words, lower transport costs contribute to economic growth and increased consumer welfare.

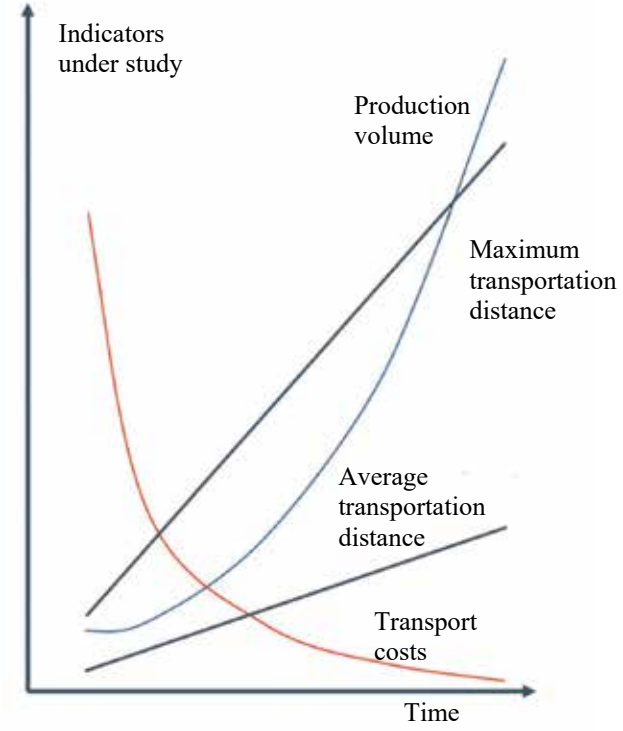


Pic. 3. Changes in market characteristics under the influence of lower transport costs in the long run.

The *long-term* consequences of lower transport costs are even more impressive. The resulting extension of the sales area and growth of production volume stimulate an increase in the scale of production, accompanied by improvement of equipment and technologies, which leads to a decrease in production costs. Graphically, this is expressed in a decrease in the slope of the supply curves (Pic. 3). As a result, the geographic area of product sales is expanding even more, prices are falling and sales are growing in those regions where the product was sold earlier, including the region of production.

Special attention should be paid to the last moment. In the short term, expansion of export of goods to other regions can lead to higher prices and even to reduction in consumption in the region of production. We have abstracted from such a possibility in this model, but it should be noted. Accordingly, reduction in export of goods due to transport or trade barriers in the short term will lead to a decrease in prices and an increase in consumption in the region of its production. In this regard, sometimes an illusion arises, primarily in the mass consciousness, that export of goods is unprofitable to consumers in the region of its production, and export restrictions will benefit them. However, let us emphasize again, such consequences can occur only in the short term. In the long term, expansion of export of goods, subject to an increase in the technical and technological level of production and economies of scale, will lead to a decrease in prices and an increase in consumption in the production region also. Therefore, encouraging export of goods in the long term can be beneficial not only to producers, but also to consumers in the region of production.

It should be noted that an increase in volume and distance of distribution of goods allows for economies of scale and innovation in the transport sector. As a result, transport costs will decrease even more, which will entail a further convergence of supply curves in different regions, an expansion of the geographical scale of sales, and an overall increase in production volumes. This will make a new increase in the scale and technical and technological level of production profitable, which will lead in turn to continuation of



Pic. 4. Long-term relationship of multi-stage changes in costs, production volumes and transportation distance.

«flattening» of supply curves and will give a new impetus to increased production volumes, sales range, and to a decrease in prices. In other words, the processes shown in pictures 2 and 3 will be iteratively repeated, and each stage will be a new step towards economic development and improving the well-being of people.

In practice, the described processes will be intertwined and chronologically paralleled, since at each period of time some manufacturers will respond to new opportunities associated with decrease in transport costs and expansion of sales geography, and will engage in an increase in scale and technical and technological improvement of production, while some carriers will respond to the already accomplished increase in production and transportation, expand the scale of their activities and introduce innovations, seeking to reduce transport costs. Therefore, the resulting graphs of long-term multi-stage changes in transport costs and production volumes can be presented not in the form of broken lines, but in the form of smooth curves (Pic. 4). Since the growth of the geographical scale of sales and the average distance of transportation occurs under the influence of both a decrease in transport costs and a decrease in production costs, the corresponding graphs can be represented as straight lines. (This is consistent with empirical data on the growth of the average distance of transportation in the largest railway systems of the world for more than a century [23, pp. 148–149]).

Thus, reducing transport costs, considering an increase in reliability and speed of transportation, is a catalyst for economic growth, launching long-term interconnected processes of reducing production and transport costs, increasing the volume, scale, and efficiency of production, and expanding the geography of sales of goods.

But what will happen in the conditions of long-term preservation of high transport costs, i.e. the situation shown in Pic. 1? In this case, in regions remote from the place of production, it will be possible to organize a profitable production of this product or its substitute of lower quality («ersatz product») even at a significantly higher level of production costs than in the region of initial production, but at a lower, compared to imported goods, price. As

a result, consumers in remote regions will receive an incentive to switch to consumption of locally produced substitutes, competitiveness of which is ensured by the only factor which is the high cost of imported goods. At the same time, economic resources that are ineffectively spent on production of substitute goods will be diverted from production of those goods in which these regions have a comparative advantage, and which would be advisable to be produced not only for domestic consumption, but also for export to other regions. Consequently, regional specialization, which is an incredibly significant factor in economic growth, will be constrained. Under such conditions, there will not be sufficient incentives for the growth of the scale and technical and technological level of production in «Region 0», and in remote regions, production may be into mothballs at an even lower level of technology and efficiency.

So, if reduction in transport costs is a powerful incentive for technical and technological development and growth of economic efficiency, then high transport costs create conditions for conservation of equipment, technologies, and low efficiency. (It should be noted that other barriers, like customs and other barriers) that impede development of commodity exchange operate in a similar way).

The higher are transport costs on the one hand, and the lower are production costs of a product or its substitutes in remote regions, on the other hand (in other words, the higher is the transport component which is the ratio of transport costs to production costs or the price of a product), the smaller are the geographical area of sale of the product and economically justified range of its transportation. Therefore, with high transport costs, «cheap» goods are non-tradable, and for more «expensive» goods, the range and volumes of transportation and sale are limited.

The closer are supply curves of a product in the region of production to the supply curves in remote regions of sale, the higher requirements must be met by local production of this product or substitute products in remote regions to be competitive.

Empirical evidence

Long-distance trade and, accordingly, transportation of goods over considerable distances existed already in ancient times [4; 24]. However, due to high transport costs associated, among other things, with unreliability and even danger of travel, long-distance trade was carried out mainly in expensive (silk, spices, jewellery) and so-called non-competing goods, that is, in goods that were in short supply or were not produced at all in the importing regions, or whose production (or of their substitutes) in sufficient quantity to meet demand was difficult or impossible due to lack of necessary resources.

In those cases, when it was possible to master local production of substitute goods, first of all, handicrafts, this often happened indeed, even if such production was small and primitive, and therefore expensive, and quality of products was lower than that of imported goods [25, pp. 164–168]. The gaps between supply curves across regions due to high transport costs (as shown in Pic. 1) created the conditions for this approach. In the absence of impressive progress in transport, there was no significant reduction in transport costs. This is evidenced by persistence in the Roman Empire for several centuries of significant interregional price differences without noticeable changes [26]. High transport costs there became a significant obstacle to enlargement of production and introduction of innovations, which ultimately blocked the possibility of industrial revolution during that period [15, pp. 160–162].

In the Middle Ages, a high level of transport costs persisted, which also predetermined preservation of the character of long-distance trade, where expensive and non-competitive goods still dominated: furs, spices, silk, porcelain, tea, silver, copper, etc. [27].

In the late Middle Ages (in 14th–15th centuries), due to improvement of maritime transport, the cost of transportation began to decrease, including due to increase in its reliability, which was reflected in a significant decrease in insurance rates [28]. This contributed to implementation in Europe of the so-called «commercial revolution» [29], which began around 13th century and continued until the beginning of 18th century. The commercial revolution provided not only an increase in the volume and expansion of the geography of trade, but also stimulated development of new forms and instruments of commercial activity (accounting, banking, and

Table 1

Acceleration of economic growth because of commercial revolution and the Great Geographical Discoveries

	1000–1500		1500–1820	
	Average annual GDP growth rate, %	Average annual GDP growth rate per capital, %	Average annual GDP growth rate, %	Average annual GDP growth rate per capital, %
Worldwide	0,15	0,05	0,32	0,05
Western Europe	0,28	0,12	0,40	0,14
The Netherlands	0,35	0,12	0,56	0,28
Great Britain	0,25	0,12	0,80	0,27

Source: Maddison, 2007 [20].

credit systems, etc.), an increase in money circulation. It is rightly regarded as the beginning of the economic revival of Europe, a qualitatively new stage in development of the Western European economy, which became the basis for changing the structure of the European market and society [30]. The structure of trade also began to change. Thus, by 16th century, grain, timber, fish, wine, salt, metals, fabrics, and raw materials for textile industry had constituted a significant part of the international trade [11].

The growth in volume and distance of transportation of goods during the commercial revolution and the subsequent era of the Great Geographical Discoveries contributed to acceleration of economic growth in 16th–18th centuries and, first of all, in the countries which were most successful in international trade: in the Netherlands and England (Table 1).

Nevertheless, before creation of a network of improved roads and canals and appearance of steam transport in the early 19th century, the progress of transportation was insufficient to drastically reduce transport costs worldwide. Therefore, up to 18th century, trade between distant regions still «*consisted mostly of non-competing products*» [5, p. 19]. The advent of railways and steamships opened qualitatively new opportunities for development of trade: transportation became massive, regular, reliable, and relatively cheap. Therefore, «*throughout* 19th *century trade developed rapidly, partly due to the significant decline in transport costs, partly due to the rise in industrial production*» [5, p. 19]. The developed model shows that these were not just complementary, but mutually supportive factors, and decrease in transport costs and expansion of exchange as a result of improved means of transport can be considered not just a catalyst, but a trigger of the industrial revolution and formation of the era of modern economic growth. This logically follows from the developed model and corresponds to the sequence of events in economic history: commercial revolution and the Great Geographical Discoveries preceded the industrial revolution. (In more detail, the impact of transport development on implementation of industrialization and the entry of mankind into the era of modern economic growth is described in [15]).

In this regard, agreeing with Helpman's thesis that trade between distant partners influenced economic development, and economic development had the impact on trade [5, p. 21], I would like to clarify another his statement that changes in the spheres of production and consumption have significantly influenced the volume of trade, initially low, and its subsequent growth [5, p. 21]. Of course, trade and transport activities depend on production, because, after all, only what is produced can be sold and transported. But it is precisely an opportunity for profitable sale of goods to remote regions, which opens thanks to improved transport and lower transport costs, that stimulates the growth of volumes and scale of production and interregional specialization, which in turn allows producing a larger volume of goods while using the same resources. This follows from the theoretical model and is confirmed by the course of economic history. As noted by K. Ya. Zagorsky, «*first, new ways and means of transport are created, which open up opportunities for obtaining and selling [goods] in all directions, and only then production, in turn, can begin to be built based on these new conditions...*» [10, p. 43].

The convergence of product supply curves in different regions, described in the developed model, is manifested in a decrease in price

Table 2

Influence of development of transportation links on grain prices in the regions of Prussia in the lean years of 19th century (the price of rye in agricultural regions in 1817 = 100)

Lean years	Rye price			Wheat price			Railway features
	Agricultural regions	Industrial regions	Difference	Agricultural regions	Industrial regions	Difference	
1817	100	236	136	171	296	125	No railways
1847	131	178	47	175	227	52	Initial stage of railway construction
1855	141	183	42	201	232	31	Significant railway network
1867	128	148	20	180	209	29	Main economic centres are connected by railways

Source: author's calculations according to data (Chuprov, 1875 [54]).

Table 3

Impact of lower transportation costs on wheat prices in Minnesota (USA) and England at the end of 19th century (wheat price in Minnesota in 1891–1894 =100)

Time period	Minnesota	England	Difference
1871–1874	118	271	153
1875–1878	117	231	114
1879–1882	149	212	63
1883–1886	104	168	64
1887–1890	118	150	32
1891–1894	100	138	38

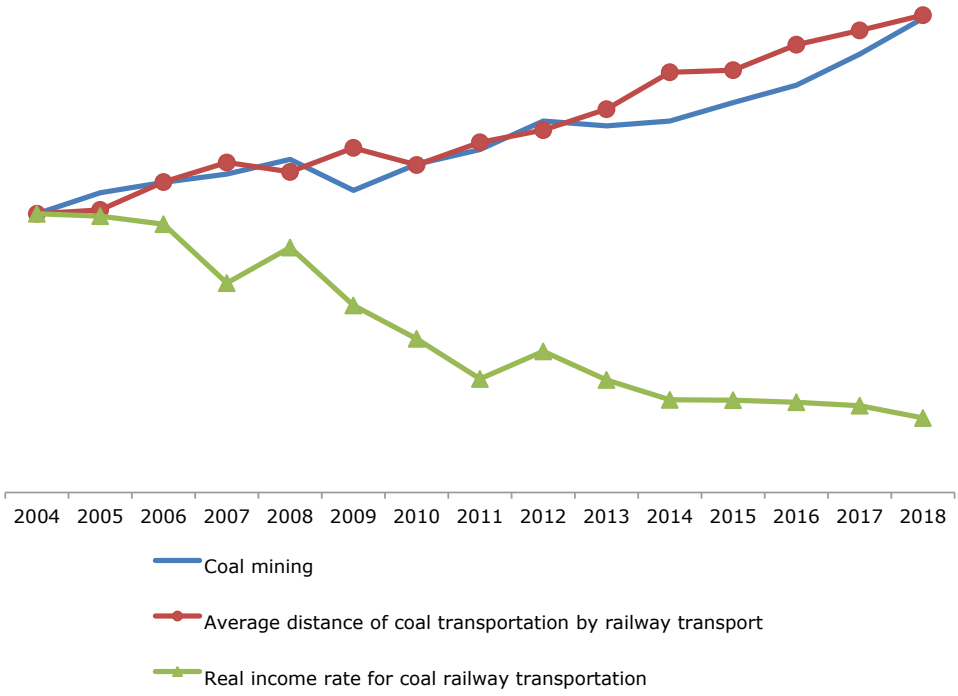
Source: author's calculations according to data (Zagorsky, 1930 [10]).

differences between regional markets. For example, the emergence of railways in 19th century and further development of the railway network in Prussia significantly reduced the differences in grain prices in country's agricultural and industrial regions (Table 2). This was especially evident in lean years: in the absence of railways, the corresponding differences were exceptionally large, while price differences consistently decreased with development of railway transportation, which, in comparison with horse-drawn transport, made delivery of goods both several times cheaper and accelerated, and, besides, significantly increased its reliability. A decrease in the cost of delivering grain from the United States to England (by 80 % from 1868 to 1895 [10, p. 59]), due to simultaneous reduction in the cost of railway and sea transportation, led to an almost twofold reduction in the price of wheat in England (Table 3). At the same time, in the agricultural states of the United States, there was no upward trend in wheat prices.

It follows from the presented model, that in the long run, there should be a general decline in the price level of traded goods. This conclusion is also confirmed by practices. For example, in the United States, over the past fifty years, the price index for manufactured goods has consistently lagged behind the services price index. And since the beginning of 21st century, there has been a significant decline in prices of durable consumer goods (delivered largely from China) in contrast with rising prices for services [31].

Another clear illustration of consistency of the theoretical model with empirical data is the long-term dynamics of production volumes, average transportation distances, and real profitable rates for railway coal transportation[1] in the Russian Federation (Pic. 5). It is noteworthy that during the global crisis, a decrease in the distance of coal transportation (in 2008) preceded a drop in coal production (in 2009). This is an illustrative example of the impact of commodity exchange processes, e.g., of the range of sales of goods, on the volume of production.

[1] The choice of an example of railway transportation of coal is since almost all coal mined in Russia is transported by railway transport, and one can judge the sale of coal in general following the indicators of its transportation by rail.



Pic. 5. Indices of indicators of coal production and coal railway transportation in the Russian Federation, 2004–2018 (%), 2004 = 100 %. Source: author's calculations according to Rosstat [Federal State Statistics Service], JSC Russian Railways data.

Thus, the developed theoretical model is consistent with empirical data and allows a better understanding of the role of transport in economic history and in ensuring long-term economic growth.

Conclusions and recommendations

Being convinced of the «explanatory power» of the developed theoretical model, it is necessary to focus on the conclusions that can be drawn on the basis of that model regarding directions of transport development that are desirable for economic growth.

In the modern global economy, the distance of transportation of goods has reached a significantly high level. Nevertheless, there are reserves for further growth in efficiency of the economy by increasing both the maximum and average transportation distance. At the same time, relatively cheap goods are more sensitive to the explicit component of transport costs, i.e., freight charges (level of transport tariffs). If sea and pipeline transport, due to technological features, provide a lower level of transportation costs and tariffs, which allows effective intercontinental and transcontinental transportation of even raw materials, then the level of transportation costs and tariffs for railway and road transportation is much higher. Its reduction would make it possible to expand the sales areas for the cheapest and highest quality raw materials in case of inland transportation. As follows from the presented model, this would have positive long-term consequences.

The key direction to reduce the cost of transportation is to increase weight of transporting vehicles, since the cost of transportation and load weight of a vehicle are inversely related [32, pp. 253–269]. In railway transport, the average train load weight and the share of heavy trains are very significant factors for the total operating costs [33]. The heavy trains traffic to increase the volume and reduce the cost of transportation of bulk cargo (coal, ore, etc.) is actively developing on railways in several countries (Australia, Brazil, Canada, China, USA, Sweden, South Africa), as well as in Russia [34]. Modernization of the infrastructure of the so-called Eastern range of the Russian railways network to develop transit of heavy trains is an important component of the long-term development program of JSC Russian Railways until 2025. Its implementation will

improve transport opportunities for domestic exporters.

The more expensive are the transported goods, the higher is their sensitivity to the implicit component of transport costs which is damage from blocking of the capital embodied in the transported goods. It is possible to reduce it by markedly increasing delivery speed. One of the options for solving that problem is the use of high-speed railway traffic (at a speed of over 200 km/h) for delivery of expensive goods, which has usually been used for passenger traffic only. Currently, options for organizing transcontinental high-speed railway transportation of goods, incl. e-commerce goods are developed [35].

Thus, implementation of heavy-haul transportation for relatively cheap goods and of high-speed transportation for expensive ones will help reducing delivery costs of both, and, thereby, increasing the volume of world production. The implementation of such transportation, being, of course, a business decision, requires availability of appropriate infrastructure. Meanwhile, development of the Russian transport infrastructure lags behind business requirements. «*At present, the need of the Russian economy for development and improvement of infrastructure is obvious*», which can have a «*long-term positive impact on economic growth*», «*become the basis for emergence of new areas of economic activity ... as well as create prerequisites for active involvement of the Russian economy in international trade*» [36, p. 23].

The construction of transport infrastructure is characterized by high capital intensity and slow payback, which makes it unattractive and difficult to implement for private business. Considering that such an infrastructure, on the one hand, stimulates economic growth, and on the other hand, it can be used to transport many different goods produced by various industries, that is, it does not have a distorting effect on the structure of production, government investments in its construction are more justified than in any other sectors of the economy. It is pertinent to recall that Adam Smith also attributed construction and maintenance of transport infrastructure to the responsibilities of the state [1, pp. 675–676]. We must agree with the opinion that in modern Russian conditions «*for transport ... measures of state support for investment activities are tactically and strategically justified*» [37, p. 12]. «*The constant growth of funding of development of transport infrastructure ... will improve production efficiency in the long term*» [38, p. 52]. Such expenses «*should be considered as investments in long-term economic growth*» [39, p. 14].

In this regard, it seems expedient for the state to participate in development of not only the road, but also the railway infrastructure for both heavy-hail traffic and high-speed transportation. At the same time, the world and Russian practices show that transport construction becomes most dynamic if private initiative is engaged [14; 15; 40–42]. Therefore, an even more important task is to create attractive conditions for private investment in transport infrastructure.

Thus, the tasks of developing transport infrastructure should be solved by the state and business together. The state, through direct budgetary and concessional debt financing, improving the tariff system, creating conditions for attracting private capital, removing unnecessary restrictions on the use of property of transport organizations in economic circulation, should form a frame of the transport system, harmonize development of different modes of transport and transport facilities of regions, create favourable opportunities for both domestic and international economic relations. Business must participate in investments in development and modernization of infrastructure, to ensure renewal of rolling stock at the expense of its own and attracted financing [43, p. 20]. An option for development of transport infrastructure that integrates private and public participation is the model of private-public partnership, which has shown itself through global practices to advantage [44, pp. 304–356].

Discussing the problems of further growth in the distance of transportation of goods in the interests of increasing efficiency of the economy, it should be noted that some already implemented options for embedding transport in production chains with a length of several thousand kilometres cause a critical reaction due to an increase in the load on environment [45, pp. 204–205]. It is not excluded that it can generate a public request for prohibitive measures on the part of the state in the spirit of fighting the so-called «excessively long-

distance» transportation, which Soviet economists regarded as irrational [46, pp. 227–233]. Taking such measures is highly undesirable. The problem of the impact of transport on the environment should be solved systematically, with development of appropriate economic, preferably market, mechanisms by the state to internalize negative externalities [45; 47].

As noted above, development of transport systems and reduction of transportation costs made it possible to turn almost all goods into tradable ones and to globalize commodity markets, which resulted in a steady trend of real cheapening of goods. It is logical that a completely different trend is observed regarding prices of services, since services are linked to the place of their provision and either can move with service providers (usually over relatively short distances), or the clients themselves can move to the places of service provision (the range of such movements is also limited). Therefore, markets for services are much less competitive than markets for goods, and, therefore, more conservative. However, qualitative changes are taking place in the markets of the most important, most valuable services, following development of transport, primarily an increase in speed of passenger traffic. There is «*globalization of service provision and international competition for clients, when educational and medical institutions compete not with neighbouring schools and hospitals and not even with corresponding institutions in their own country, but all over the world*» [48, p. 10]. The market for recreational services had been globalized even earlier.

Further expansion of spatial areas of service provision is associated with qualitatively new steps in increasing speed of passenger traffic [49]. The increase in speed of passenger traffic will also contribute to an increase in mobility of labour resources, making it possible to travel «both ways» every day, not for tens, but hundreds of kilometres. Increasing mobility of human capital, and this is the most valuable resource of the modern economy [50, p. 44], will improve efficiency of its use, contributing to economic growth and smoothing inter-regional imbalances in labour supply and demand, as well as, possibly, mitigating the problem of structural unemployment.

Thus, acceleration of travel, contributing to both increasing competitiveness of the services market (which means lower prices, increased quality and diversity) and expanding supply of labour resources, is an important factor in economic growth and improving the well-being of people. Correct accounting of these effects will make it possible to make a more objective economic assessment of efficiency of transport projects in the field of passenger transportation, and, therefore, will improve quality of investment activities in this area. At the same time, harmonization of investment and innovation activity in transport is of great importance [51]. Innovative transport technology, opening new opportunities for reducing the cost and increasing the distance of delivery of goods and passenger travel, is a significant factor in economic development. Therefore, the economic policy supporting its implementation, through both institutional instruments and budgetary investments in construction of innovative transport infrastructure, will help to increase the dynamics and sustainability of economic growth.

Conclusion. The theoretical model of influence of transport costs on production and sale of goods developed in the article reveals the economic relationship between development of commodity exchange and production activities, including its innovative aspect. It allows to deepen the understanding of the role of transport in ensuring long-term economic growth, shows the priority of transport development for a progressive increase in volume and efficiency of production based on mutually stimulating processes of expanding commodity exchange and scale of production, increasing the technological level of production and transport activities.

This seems important to show the groundlessness of opposing production to exchange, which has deep historical roots [4], and of fetishizing production (primarily heavy industry), characteristic of the Marxist direction of economic thought, especially in its Soviet version, and now being revived in within the contrasted «standard» economic theory of the so-called «Other Canon» of economics [heterodox economics]. Erik S. Reinert who is among the brightest representatives of the «Other Canon» notes, for example, that economists of the «mainstream» turn to theories based on exchange and trade, which leave no place for technology and new

knowledge, and confuse the bearer of progress (trade) with the cause of progress (technology), while it is necessary that economics was built around production, not exchange [52, pp. 81, 88].

The implementation of economic policy based on such ideas can make commodity exchange activity and its physical basis, comprising transport and logistics infrastructure, become a «bottleneck» of the economy, hindering development of production, and restraining economic growth. This is exactly what happened in the Soviet economy [53].

Commodity exchange activity (trade and transport) is not a passive «carrier of progress», not an auxiliary sphere, secondary to production, but an equally significant factor of economic development, stimulating an increase in production volume and efficiency. Therefore, economics should not be built «around production» either «around exchange», but proceed from the understanding of the interaction of production and exchange, from the active role of both of these spheres in the process of economic growth, and develop relevant recommendations in the field of economic policy.

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